Appendix G. Preliminary Drainage Study

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PRELIMINARY DRAINAGE REPORT

For

MARJA ACRES
4901 EL CAMINO REAL
CARLSBAD, CA 92010

CDP 16-33
SDP 2018-0001
CT 16-07
PUD 16-09
HDP 16-02
SUP 16-02

September 19, 2018
Revised: December 3, 2018
Revised: March 4, 2019

Mel Landy, PE

PREPARED BY:
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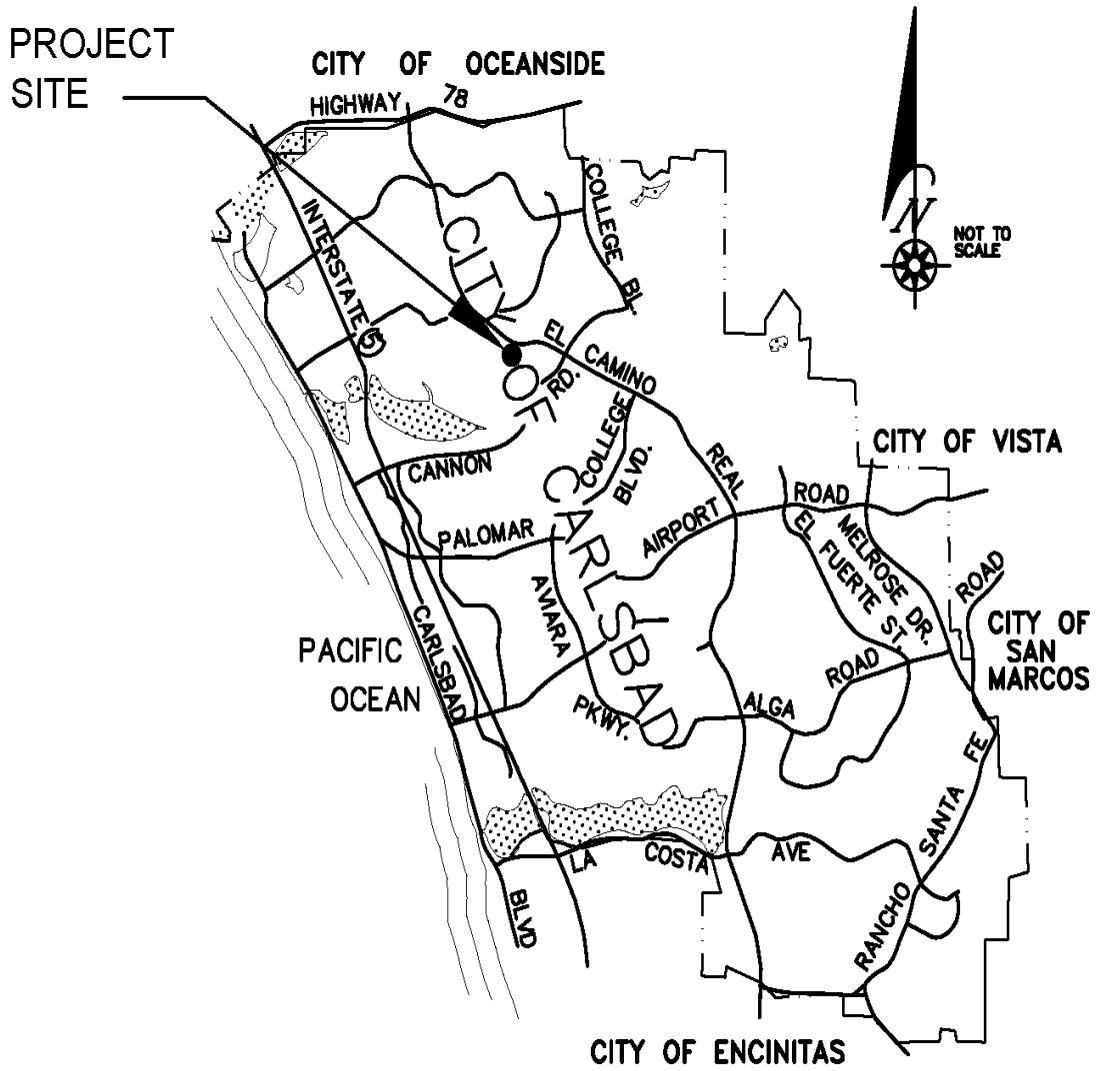
Introduction

This Drainage Study for the new development which includes senior living facility, Restaurant, Retail, residential community and recreational area for Marja Acres has been prepared to analyze the hydrologic and hydraulic characteristics of the existing and proposed project site. This report intends to present both the methodology and the calculations used for determining the runoff from the project site in both the pre-developed (existing) conditions and the post-developed (proposed) conditions produced by the 100-year, 6-hour storm. In addition, this report will propose the sizing of all necessary storm drain facilities and storm drain piping to safely convey the runoff, based on the 100-year rainfall event, per City of Carlsbad and County of San Diego Hydrology and Storm Drain Design Standards. Additionally Caltrans Highway Design Manual was used to generate the runoff coefficient for this project.

Elevations range from approximately 110 feet above mean sea level (msl) in the southaest area to approximately 41 feet msl in the northwest area.

Marja Acres is a proposed mix use project. The project is a proposed with a senior living building, along with retail building, restaurant building, Recreational areas and residential community on a 20.83 acre lot, currently the site includes 2 residential units, two commercial units and undeveloped land that has lain fallow since 2008. The site is located on the south side of El Camino Real, between Kelly Drive to the west and Lisa Street to the east. The subject site consists of three parcels totaling 20.85 acres (APN 207-101-35, 207-101-37, and 207-290-10). This property is owned by The Hoffman Legacy Trust and Michael W. Selna An Marja D. Selna Family Trust, and is being developed by Jason Han, Num Carlsbad LLC. The projects location is shown on the Site Map in Appendix B.

The site is bounded to the north by El Camino Real street, to the east an existing mobile home tract that prevents storm water from draining towards subject property, to the south there are existing homes that drain southerly to Park Drive away from the Marja Acres site, to the west there is an existing storm water drainage channel that drains to the southwest away from the property. Flow from the property known as Robertson Ranch, which fronts El Camino Real to the north of this site has been diverted, away from the site. Drainage improvement drawing 477-6 sheet 20 shows an existing 48-inch diameter storm drain pipe that flowed from north to south, discharging onto the Marja Acres site to be abandoned and capped. Stormwater flow from the southerly side of El Camino Real is directed northerly in a 24-inch diameter storm drain to a 48-inch storm drain that flows westerly discharging into Agua Hedionda Creek. The storm drain improvements have been constructed. Therefore there is no off-site tributary drainage area to the site. The site has an open dirt channel approximately 3’ wide along the toe of the 2:1 slope at the middle of the site that collects the storm water from the site and conveys it towards the west to the existing creek.



VICINITY MAP

Existing Drainage Conditions

On-site storm water drains towards the west of the site with two discharge locations on the westerly property line, the first discharge point is located approximately 200 feet of the southwesterly property corner which conveys roughly 25% of the site flow via surface flow through a natural low point, the second point is approximately 350 feet south of the northwesterly property corner with flows going through an existing on-site storm drain conveyance system that conveys on-site storm water to an off-site storm drain channel that collects storm water from several upstream and downstream properties. Flows from both discharge points ultimately enter the adjacent Agua Hedionda Creek.

Table 1 below summarizes the exiting condition 100-year peak flow for the project site.

Table 1 – Summary of Existing Condition Flows

Discharge Location	Drainage Area (AC)	Runoff Coefficient (C)	100-Year Peak Flow (cfs)
Node 15	15.21	0.49	28.38
Node 30	4.96	0.44	9.38
Node 45	0.21	0.55	0.49
Node 60	0.45	0.58	1.84
Total	20.83	-	40.09

Proposed Drainage Conditions

The project proposes to create new impervious surfaces: Rooftop, driveways and new parking areas. There will be grading activities to level out areas for new improvements, but the drainage patterns will mostly remain the same except for approximately 520 feet of the easterly perimeter slopes along frontage of El Camino Real. It is considered infeasible to capture flows from said slope and route them to the Point of discharge, instead flows will sheet flow onto El Camino Real where they will be capture by existing structures which will convey them onto Agua Hedionda creek.
The project proposes installation of storm drain structures that will convey flows to the westerly property line where they will discharge to the pre-development discharge point and ultimately enter the adjacent Agua Hedionda Creek. All generated flows will be taken via gutters and underground pipes to proposed bio-filtration facilities for water quality pollution control, hydromodification management and Q_{100} attenuation. Treated flows will then discharge at the same predevelopment point of discharge.

The two-site access driveway are unable to be routed to basins therefor modular wetlands for water quality purpose and collection of flows have been proposed along the west side of each access driveways. To maximize the treatment area of the westerly driveway a curb inlet is being proposed on the easterly half, which will capture flows and at the same time act as a conveying system to the flows from the perimeter slope basin J.1 and J.2. After

treatment said flows will then be conveyed in a southwesterly direction to confluences with site flows before being discharged. In addition to the modular wetland for the easterly driveway, a tree well has been included for water quality purposes and flow conveyance on the east side of the curb inlet located along El Camino Real, Said tree well is meant to treat flows downstream of the modular wetland taking advantage of the underground conveyance system that exists. Flows will be routed to an exising 18" RCP storm drain lateral which currently carries 2.6 cfs per DWG 477-6, during the post development condition the flows will increase to 4.35 cfs, with a delta of 1.75 cfs, said lateral is able to convey the flows and was design with watertight joints, therefore no need to replace of modify is necessary. This lateral conveys flows to a 48" RCP storm drain main which currently carries 118.6 cfs per DWG 477-6, meaning that a 1.5% increase in flows will not be detrimental to the downstream system. The existing 48" RCP main system was analysis to confirm that the increase in Q will not compromise the system downstream an HGL exhibit has been prepared and can be found within appendix 5.

Table 2 below summarizes the developed condition Design 100 year peak flow from the project.

Table 2 – Summary of unmitigated- developed conditions flows

BASIN / Node	**Effective C**	**Tc (min.)**	**I in/hr**	**Area (ac) Total**	**Q_{peak} (cfs) Total**
A (BMP 1) / 20	0.53	8.70	4.98	1.10	2.96
B (BMP2) / 40	0.72	5.40	6.77	0.93	4.52
C (BMP 3) / 60	0.72	8.10	5.21	0.83	3.13
D (BMP 6) / 105	0.69	10.28	4.47	4.63	14.47
E (BMP 7)/ 145	0.70	8.95	4.89	3.29	12.43
F (BMP 5)/ 175	0.60	4.01	7.11	1.71	7.25
G,H,I (BMP 4) /255	0.69	14.22	5.44	6.26	15.50
J / 232		12.89	3.86	0.61	1.10
K / 205		7.02	5.17	0.28	0.40
TOTAL ONSITE				**19.64**	**50.26**
Perimeter Slopes					
L	0.77	7.99	5.26	1.06	4.35
M	0.75	5.02	7.09	0.19	1.00
N	0.21	6.57	5.97	0.34	0.41
TOTAL PERIMETER				**1.59**	*** 3.16**
ONSITE & PERMITER TOTAL SUMMATION				**21.23**	**53.42**

* During Pre-development condition Basin L contributes 2.6 cfs per DWG 447-6 there for the post development condition has a delta of +1.75 cfs.

TABLE 3 – SUMMARY OF DEVELOPED DUAL AND TRIPLE PURPOSE BMPs

BMP	Tributary Area (Ac)[7]	DIMENSIONS					
		BMP Area[1] (ft^2)	Gravel Depth[2] (in)	Lower Orif. D (in)[3]	Depth Riser Invert (in)[4]	Weir Perimeter Length[5] (ft)	Total Surface Depth[6] (in)
BMP 1	1.105	1949	33	0.8	12	12	18
BMP 2	0.926	1098	33	0.9	6	12	12
BMP 3	0.827	2360	36	0.9	27	12	33
BMP 4	6.098	7724	48	2.3	45	12	63
BMP 5	1.660	1692	36	2.2	21	12	30
BMP 6	4.444	4347	36	2.4	21	12	31.5
BMP 7	3.206	3567	48	2.0	21	12	37.5

Notes:
(1): Area of amended soil equal to area of gravel. 18" thick and in conformance with specifications listed on Fact Sheet BF-2: Nutrient Sensitive Media Design.
(2): Gravel depth needed to comply with hydromodification purposes
(3): Diameter of orifice in gravel layer with invert at bottom of layer; tied with hydromod min threshold ($0.5 \cdot Q_2$).
(4): Depth of ponding beneath riser structure's surface spillway.
(5): Overflow length, the internal perimeter of the riser internal dimensions
(6): Total surface depth of BMP from top crest elevation to surface invert.
(7): Tributary area to basin not including area of BMP.

TABLE 4 – SUMMARY OF RISER DETAILS

BMP	Lower Slot			Middle Slot			Top Riser		Emergency Weir
	Width (ft)	Height (ft)	Elevation[1] (ft)	Width (ft)	Height (ft)	Elevation[1] (ft)	Length[2] (ft)	Elev.[1] (ft)	Length[3] (ft)
BMP 3	1.0	0.167	1.00	--	----	-----	12	2.25	
BMP 4	1.0	0.167	1.50	4.0	0.167	3.25	12	3.75	8
BMP 5	1.5	0.167	1.00	8.0	0.250	1.33	12	1.75	8
BMP 6	1.5	0.167	1.00	8.0	0.250	1.33	12	1.75	10
BMP 7	1.5	0.167	1.00	8.0	0.250	1.33	12	1.75	8

Notes:
(1): Basin ground surface elevation assumed to be 0.00 ft elevation.
(2): Overflow length is the internal perimeter of the riser structure.
(3): Additional Overflow length for peak flow discharge.

Peak flow attenuation

Basins BMP 3 and BMP 4 will store and manage the Q_{100} peak flows for flow attenuation to pre-development levels. The basins have a 36”x36” riser box with varying heights which will act as a spillway such that peak flows can be safely discharged to the receiving storm drain system, see data table on proposed condition exhibit for riser heights and underground gravel storage thickness. The development condition Peak flows were calculated using modified rational. The corresponding 6-hr hydrographs were generated using the CivilDesign extension. These hydrographs were then routed through the proposed-on site detention facilities in the CivilDesign Flood Hydrograph Routing Program, input values were based on Depth vs Storage and Depth vs Discharge data. In order to have a more accurate model the elevation inputs were every 0.125 feet to allow for an increase in the precision of the results, see Appendix 5 for input values. The initial orifice is located 1-foot above the finish grade of the bioretention basin, therefor any storage volume below the first orifice was not considered in the model. The results are summarized on table 5 below.

Table 5 – Summary of Detention Basin Routing

Detention Basin	100-Year Peak Inflow (cfs)	100-Year Peak Outflow (cfs)	Peak Water Surface Elevation (ft)
BMP 3	3.13	0.73	2.47
BMP 4	15.50	3.61	2.16

It should be noted that as a conservative design approach, it has been assumed that the design capture volume as stored in the detention facility prior to the routing of the 100-year storm event. The volumes are a conservative hydraulic design methodology only – for water quality discussion and BMP sizing analysis, refer to site specific SWQMP prepared by Howes Weiler & Associates.

Emergency Weir

This study has performed Spillway calculations for the seven basins being proposed as part of this project, assuming a complete clogging of the water quality facilities, and with peak flows being conveyed through the overflow system only. After the analysis it has been determined that basins 5,6 and 7 will require a secondary emergency box to allow peak flows to be conveyed without having detrimental effect on the basins. The results being presented on Appendix 6 of this report, represent the maximum flow capacity of each box, and as stated before with basin 5,6 and 7 having a secondary box. In each case the maximum discharge capacity of the emergency spillway is grater than the maximum peak flow entering the basin. See table 2 of this report for peak flows.

Study Methodology

The method of analysis was based on the Rational Method according to the San Diego. Runoff calculations for this study were accomplished by using the Rational Method. The Rational Method is a physically-based numerical method where runoff is assumed to be directly proportional to rainfall and area, less losses for infiltration and depression storage.

Flows were computed based on the Rational formula:

$$Q = CIA$$

Where Q = Peak discharge (cfs);
C = runoff coefficient, is based on Caltrans Highway design manual Values
I = rainfall intensity (in/hr)
A = watershed area (acre)

(1) Runoff Coefficient, C

The runoff coefficient C for this site is calculated as follows pursuant to section 819 of the Caltrans Highway Design Manual.

Due to the inability of the user to modify the Runoff Coefficient for the Initial Area Evaluation within the CivilDesign which determines it based on Table 4-1 of the County Hydrology Manual, which is based on land use coverage and soil type. The User adjusted the land use and soil type within the CivilDesign program to better approximate the Runoff Coefficient which were determined using the Caltrans Highway Design Manual Section 819.

Figure 819.2A

Runoff Coefficients for Undeveloped Areas
Watershed Types

	Extreme	High	Normal	Low
Relief	.28 -.35 Steep, rugged terrain with average slopes above 30%	.20 -.28 Hilly, with average slopes of 10 to 30%	.14 -.20 Rolling, with average slopes of 5 to 10%	.08 -.14 Relatively flat land, with average slopes of 0 to 5%
Soil Infiltration	.12 -.16 No effective soil cover, either rock or thin soil mantle of negligible infiltration capacity	.08 -.12 Slow to take up water, clay or shallow loam soils of low infiltration capacity, imperfectly or poorly drained	.06 -.08 Normal; well drained light or medium textured soils, sandy loams, silt and silt loams	.04 -.06 High; deep sand or other soil that takes up water readily, very light well drained soils
Vegetal Cover	.12 -.16 No effective plant cover, bare or very sparse cover	.08 -.12 Poor to fair; clean cultivation crops, or poor natural cover, less than 20% of drainage area over good cover	.06 -.08 Fair to good; about 50% of area in good grassland or woodland, not more than 50% of area in cultivated crops	.04 -.06 Good to excellent; about 90% of drainage area in good grassland, woodland or equivalent cover
Surface Storage	.10 -.12 Negligible surface depression few and shallow; drainageways steep and small, no marshes	.08 -.10 Low; well defined system of small drainageways; no ponds or marshes	.06 -.08 Normal; considerable surface depression storage; lakes and pond marshes	.04 -.06 High; surface storage, high; drainage system not sharply defined; large floodplain storage or large number of ponds or marshes
Given	An undeveloped watershed consisting of; 1) rolling terrain with average slopes of 5%, 2) clay type soils, 3) good grassland area, and 4) normal surface depressions.		Solution: Relief 0.14 Soil Infiltration 0.08 Vegetal Cover 0.04 Surface Storage 0.06 C = 0.32	
Find	The runoff coefficient, C, for the above watershed.			

Table 819.2B

Runoff Coefficients for Developed Areas (1)

Type of Drainage Area	Runoff Coefficient
Business:	
Downtown areas	0.70 - 0.95
Neighborhood areas	0.50 - 0.70
Residential:	
Single-family areas	0.30 - 0.50
Multi-units, detached	0.40 - 0.60
Multi-units, attached	0.60 - 0.75
Suburban	0.25 - 0.40
Apartment dwelling areas	0.50 - 0.70
Industrial:	
Light areas	0.50 - 0.80
Heavy areas	0.60 - 0.90
Parks, cemeteries:	0.10 - 0.25
Playgrounds:	0.20 - 0.40
Railroad yard areas:	0.20 - 0.40
Unimproved areas:	0.10 - 0.30
Lawns:	
Sandy soil, flat, 2%	0.05 - 0.10
Sandy soil, average, 2-7%	0.10 - 0.15
Sandy soil, steep, 7%	0.15 - 0.20
Heavy soil, flat, 2%	0.13 - 0.17
Heavy soil, average, 2-7%	0.18 - 0.22
Heavy soil, steep, 7%	0.25 - 0.35
Streets:	
Asphaltic	0.70 - 0.95
Concrete	0.80 - 0.95
Brick	0.70 - 0.85
Drives and walks	0.75 - 0.85
Roofs:	0.75 - 0.95

NOTES:
(1) From HDS No. 2.

(2) Rainfall Intensity, I

Average rainfall intensity for a duration equal to the Tc for the area, in inches per hour.

The storm frequency for this study has a 100-year recurrence interval. The six-hour anticipated precipitation for the project site subject to the design storm frequency.

P_6 = 2.7 in
P_{24} = 4.8 in
P_6 is in the range of 45% to 65% of P_{24} and therefore doesn't need to be adjusted.

The RM equation assumes that the storm event being analyzed delivers precipitation to the entire basin uniformly, and therefore the peak discharge rate will occur when a raindrop falls at the most remote portion of the basin arrives at the point of analysis. The RM also assumes that the fraction of rainfall that becomes runoff or the runoff coefficient C is not affected by the storm intensity, I, or the precipitation zone number.

(1) Time of Concentration, Tc

The time of concentration is the time required for runoff to flow from the most remote part of the watershed to the outlet point under consideration.
The time of concentration for each sub-area on site, *Tc* is determined from the following formula (San Diego County Hydrology Manual, dated June 2003) with the initial lengths and times adjusted per Table 3-2 of the Manual for slope and land use.

$$T_c = \frac{1.8(1.1-C)\sqrt{D}}{\sqrt[3]{S}}$$ (For overland time of flow)

Where,

T_c = Time of Concentration (hours)

D = Watercourse Distance (ft)

S = Slope (%)

C = Runoff Coefficient

$$T_c = \left(\frac{11.9L^3}{\Delta E}\right)^{0.385}$$ (For natural watersheds)

Where,

T_c = Time of Concentration in hours (hours)

L = Watercourse Distance (miles)

ΔE = Change in elevation along effective slope line (ft)

The average rainfall intensity is calculated from the following equation (San Diego County Hydrology Manual, June 2003).

$$I = 7.44 \times P_6 \times D^{-0.645}$$

Where,

I = Rainfall Intensity (in/hr)

P_6 = Six hour precipitation (inches)

D = Duration (min.)

There is an illustration of this formula in Figure 2, which is per County 2003 Hydrology Manual. Time of concentration (T_C) is composed of two components: The initial time of concentration (T_i), and the travel time (T_t).

The maximum overland flow length (L_M) is used from Table 4 in calculating the initial time of concentration. The source for this chart is the San Diego County Hydrology Manual (Table 3.2), June 2003.

Table 4 - Maximum Overland Flow Length (L_M) & Initial Time of Concentration (T_i)

Element	DU/ Acre	0.50%		1%		2%		3%		5%		10%	
		L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i
Natural		50	13.2	70	12.5	85	10.9	100	10.3	100	8.7	100	6.9
LDR	1	50	12.2	70	11.5	85	10.0	100	9.5	100	8.0	100	6.4
LDR	2	50	11.3	70	10.5	85	9.2	100	8.8	100	7.4	100	5.8
LDR	2.9	50	103.0	70	10.0	85	8.8	95	8.1	100	7.0	100	5.6
MDR	4.3	50	10.2	70	9.6	80	8.1	95	7.8	100	6.7	100	5.3
MDR	7.3	50	9.2	65	8.4	80	7.4	95	7.0	100	6.0	100	4.8
MDR	10.9	50	8.7	65	7.9	80	6.9	90	6.4	100	5.7	100	4.5
MDR	14.5	50	8.2	65	7.4	80	6.5	90	6.0	100	5.4	100	4.3
HDR	24	50	6.7	65	6.1	75	5.1	90	4.9	95	4.3	100	3.5
HDR	43	50	5.3	65	4.7	75	4.0	85	3.8	95	3.4	100	2.7
N. Com.		50	5.3	60	4.5	75	4.0	85	3.8	95	3.4	100	2.7
G. Com.		50	4.7	60	4.1	75	3.6	85	3.4	90	2.9	100	2.4
O.P./Com.		50	41.0	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
Limited I.		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
General I.		50	3.7	60	3.2	70	2.7	80	2.6	90	2.3	100	1.9

The County of San Diego Rational Method program within CivilDesign was utilized in calculating runoff for all basins smaller than 0.5 square miles in size.

Summary

Upon performing hydrologic analysis of the project site in both the proposed developed and existing condition, the following results were produced:

Table 6 – Summary of peak flows

Discharge location	Area (ac)			100-Yr peak Flows (cfs)			
	Existing	Developed	Difference	Existing	Developed Unmitigated	Developed Mitigated	Difference
Node 55/76	20.84	21.23	+ 0.4(1)	40.09	53.42	39.13(2)	-0.96 ok

(1) Increase in area is due to the offsite analysis as part of Basin L, to determine the effect of increasing the Q being discharge onto the existing 18" RCP Lateral per DWQ 447-6.

(2) Values are based on the Subtraction of the Delta from the mitigated Results of BMP 3 & 4 from the Unmitigated Q, Delta from BMP 3 & 4 = 14.29 cfs

As shown in the above table, the proposed Marja Acres project will result in a net decrease of peak flow discharged from the project site approximately 2.17 cfs.

Finaly design details will be provided at the final engineering phase of the development.

Hydromodification

The project is considered a Priority Project according to the City's Storm Water Standards and will need to manage hydromodification.
The hydromodification results are provided in the SWQMP as part of the SWMM Technical memorandum.

Conclusions

The proposed storm drain system was designed in accordance with the guidelines set by the City of Carlsbad and County of San Diego. During the design of the proposed drainage systems precautions were taken to limit adverse downstream affects and to maintain existing drainage characteristics wherever possible.

Please refer to the project SWQMP for the water quality impacts and mitigation measures for the proposed improvements. A summary of the facts and findings associated with this project and the measures addressed by this report is as follows:

- The project will not significantly alter drainage patterns on the site.
- The ultimate discharge points will not be changed.
- Graded areas and slopes will be landscaped to reduce or eliminate sediment discharge.
- Construction and post-construction BMPs will address mitigation measures to protect water quality and protection of water quality objectives and beneficial uses to the maximum extent practicable.

- The storm drain system for the project is designed to route and convey all resulting runoff from developed conditions to the existing points of discharge.
- The project proposes to route runoff on bio-filtration facilities that will improve water quality and will help avoid flooding off-site by attenuating velocities and reducing peak flows.

References

"San Diego County Hydrology Manual", revised June 2003, County of San Diego, Department of Public Works, Flood Control Section.

"California Regional Water Quality Control Board Order No. 2001-07," California Regional Water Control Board, San Diego Region (SDRWQCB).

APPENDIX 1
Existing Conditions Calculations & Drainage Map

EL CAMINO REAL (PUBLIC)

18" RCP SD PER DWG 477-6

18" RCP SD PER DWG 477-6, SHT 20.

Q_{100}=2.6 CFS PER DWG 447-6

EXIST. DRIVEWAY

PARCEL NO. 1
APN 207-101-35
6.26 ACRES

EXISTING SHOPS TO BE REMOVED

150' EASEMENT TO S.V.G.M.A. PER DEED REC. JUNE 1, 1933 IN BOOK 4874, PAGE 143 AND 148 O.R.

SOUTHERN PACIFIC RAILROAD (PUBLIC)

Dense Trees

41.4 EG
Q_{100}=28.38 CFS

54.8 EG
Q_{100}=1.84 CFS

84.9 EG

92.6 EG

47.6 EG
Q_{100}=9.38 CFS

95.8 EG
Q_{100}=0.49 CFS

104.1 EG

102.6 EG

109.5 EG

110.5 EG

108.7 EG

L = 130'

L = 75'

L = 1125'

L = 283'

L = 75'

BASIN A.2
15.01 ACRES | Q_{100}=27.88 CFS

BASIN A.1
0.20 ACRES | Q_{100}=0.50 CFS

BASIN B.1
0.03 ACRES | Q_{100}=0.08 CFS

BASIN B.2
4.93 ACRES | Q_{100}=9.30 CFS

BASIN C.1
0.01 ACRES | Q_{100}=0.026 CFS

BASIN C.2
0.20 ACRES | Q_{100}=0.46 CFS

BASIN D.1
0.05 ACRES | Q_{100}=0.30 CFS

BASIN D.2
0.40 ACRES | Q_{100}=1.54 CFS

EXISTING HOUSE TO BE REMOVED

EXISTING WAREHOUSE TO BE REMOVED

PARCEL NO. 2
APN 207-101-37
14.39 ACRES

PARK DR. (PUBLIC)

LEGEND

ITEM	SYMBOL
BASIN BOUNDARY	
SUBBASIN BOUNDARY	
SOIL TYPE BOUNDARY	
DRAINAGE DIRECTION	
DRAINAGE DESCRIPTION	BASIN / ACRES / Q_{100} CFS
NODE	40
EX. IMPERVIOUS	

SCALE: 1" = 50'

50 25 0 50 100 150

PREPARED BY:

HowesWeiler & Associates

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MARJA ACRES
PRE-DEVELOPMENT CONDITION
DRAINAGE EXHIBIT

DATE: 11/30/18

DRAWING: SHEET 1 OF 1

SAVE DATE: 11/30/2018 – PLOT DATE: 12/1/2018 – FILE NAME: S:\PROJECTS\12704 Marja Acres\CIVIL\REPORTS\HYDROLOGY\12-01 Existing Codition.dwg

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c)1991-2009 Version 7.8

Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
Rational Hydrology Study Date: 11/27/18

Marja Acres – Pre-Development Condition
100 Year Storm Event

********* Hydrology Study Control Information **********

Program License Serial Number 6290

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour, precipitation(inches) = 2.700
24 hour precipitation(inches) = 4.800
P6/P24 = 56.3%
San Diego hydrology manual 'C' values used **

**** Note - (Caltrans " Highway Design Manual - Figure 819.2A, Runoff Coefficients for Undeveloped Areas" and Table 819.2B Runoff Coefficients for Developed Areas, were used to determine the weighted runoff coefficient. 'C' Values within this Software were selected to closely resemble actual values.**

++
Process from Point/Station 5.000 to Point/Station 10.000
**** INITIAL AREA EVALUATION ****
BASIN A

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[LOW DENSITY RESIDENTIAL]
(2.9 DU/A or Less)
Impervious value, Ai = 0.250
Sub-Area C Value = 0
Initial subarea total flow distance = 75.000(Ft.)
Highest elevation = 110.500(Ft.)
Lowest elevation = 109.500(Ft.)
Elevation difference = 1.000(Ft.) Slope = 1.333 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of 1.33 %, in a development type of

```
 2.9 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.35 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4900)*(  70.000^.5)/(   1.333^(1/3)]=   8.35
Rainfall intensity (I) =      5.111(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.490
Subarea runoff =      0.501(CFS)
Total initial stream area =        0.200(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       15.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =   109.500(Ft.)
Downstream point elevation =    41.400(Ft.)
Channel length thru subarea  =  1710.000(Ft.)
Channel base width      =   10.000(Ft.)
Slope or 'Z' of left channel bank =   8.000
Slope or 'Z' of right channel bank =   8.000
Estimated mean flow rate at midpoint of channel =     14.468(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    0.500(Ft.)
Flow(q) thru subarea =     14.468(CFS)
Depth of flow =   0.201(Ft.), Average velocity =   6.209(Ft/s)
Channel flow top width =   13.212(Ft.)
Flow Velocity =    6.21(Ft/s)
Travel time  =    4.59 min.
Time of concentration =   12.94 min.
Critical depth =      0.363(Ft.)
 Adding area flow to channel
Rainfall intensity (I) =      3.853(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.490 given for subarea
Rainfall intensity =      3.853(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.490  CA =      7.365
Subarea runoff =     27.876(CFS) for     15.010(Ac.)
Total runoff =     28.376(CFS)      Total area =      15.210(Ac.)
Depth of flow =   0.295(Ft.), Average velocity =   7.784(Ft/s)
Critical depth =      0.539(Ft.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station       15.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     15.210(Ac.)
Runoff from this stream =     28.376(CFS)
Time of concentration =   12.94 min.
Rainfall intensity =     3.853(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)
```

```
1       28.376     12.94               3.853
Qmax(1) =
         1.000 *    1.000 *    28.376) + =      28.376
Total of 1 streams to confluence:
Flow rates before confluence point:
      28.376
Maximum flow rates at confluence using above data:
       28.376
Area of streams before confluence:
       15.210
Results of confluence:
Total flow rate =     28.376(CFS)
Time of concentration =    12.937 min.
Effective stream area after confluence =     15.210(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       50.000 to Point/Station       55.000
**** INITIAL AREA EVALUATION ****
BASIN D
________________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                         ]
(Office Professional    )
Impervious value, Ai = 0.900
Sub-Area C Value = 0.850
Initial subarea total flow distance  =   75.000(Ft.)
Highest elevation =   92.600(Ft.)
Lowest elevation =   84.900(Ft.)
Elevation difference =    7.700(Ft.) Slope = 10.267 %
Top of Initial Area Slope adjusted by User to 10.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of  10.00 %, in a development type of
 Office Professional
In Accordance With Figure 3-3
Initial Area Time of Concentration =   2.09 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8500)*( 100.000^.5)/(  10.000^(1/3)]=   2.09
Calculated TC of    2.089 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      7.114(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.850
Subarea runoff =      0.302(CFS)
Total initial stream area =        0.050(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       55.000 to Point/Station       60.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =    84.900(Ft.)
Downstream point elevation =    54.800(Ft.)
Channel length thru subarea  =   130.000(Ft.)
```

```
Channel base width      =    1.000(Ft.)
Slope or 'Z' of left channel bank =   8.000
Slope or 'Z' of right channel bank =   8.000
Estimated mean flow rate at midpoint of channel =      1.098(CFS)
Manning's 'N'    = 0.030
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      1.098(CFS)
Depth of flow =   0.123(Ft.), Average velocity =   4.494(Ft/s)
Channel flow top width =    2.970(Ft.)
Flow Velocity =    4.49(Ft/s)
Travel time  =    0.48 min.
Time of concentration =    2.57 min.
Critical depth =      0.205(Ft.)
 Adding area flow to channel
Calculated TC of    2.571 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      7.114(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.540 given for subarea
Rainfall intensity =      7.114(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.574  CA =      0.259
Subarea runoff =      1.537(CFS) for      0.400(Ac.)
Total runoff =      1.839(CFS)      Total area =       0.450(Ac.)
Depth of flow =   0.158(Ft.), Average velocity =   5.157(Ft/s)
Critical depth =      0.264(Ft.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       60.000 to Point/Station       60.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.450(Ac.)
Runoff from this stream =      1.839(CFS)
Time of concentration =    2.57 min.
Rainfall intensity =     7.114(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)

1        1.839      2.57               7.114
Qmax(1) =
         1.000 *    1.000 *     1.839) + =       1.839

Total of 1 streams to confluence:
Flow rates before confluence point:
       1.839
Maximum flow rates at confluence using above data:
        1.839
Area of streams before confluence:
        0.450
Results of confluence:
Total flow rate =      1.839(CFS)
Time of concentration =     2.571 min.
Effective stream area after confluence =      0.450(Ac.)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station       25.000
**** INITIAL AREA EVALUATION ****
```
BASIN B

```
_____________________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[LOW DENSITY RESIDENTIAL                     ]
(2.9 DU/A or Less       )
Impervious value, Ai = 0.250
Sub-Area C Value = 0.490
Initial subarea total flow distance  =   75.000(Ft.)
Highest elevation =  110.500(Ft.)
Lowest elevation =  108.700(Ft.)
Elevation difference =    1.800(Ft.) Slope =  2.400 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 85.00 (Ft)
for the top area slope value of   2.40 %, in a development type of
 2.9 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   7.56 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4900)*(  85.000^.5)/(   2.400^(1/3)]=   7.56
Rainfall intensity (I) =      5.448(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.490
Subarea runoff =      0.080(CFS)
Total initial stream area =        0.030(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       25.000 to Point/Station       30.000
**** IMPROVED CHANNEL TRAVEL TIME ****
_____________________________________________________________________________
Upstream point elevation =   108.700(Ft.)
Downstream point elevation =    47.600(Ft.)
Channel length thru subarea  =  1125.000(Ft.)
Channel base width      =    5.000(Ft.)
Slope or 'Z' of left channel bank =   8.000
Slope or 'Z' of right channel bank =   8.000
Estimated mean flow rate at midpoint of channel =      4.770(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    0.250(Ft.)
Flow(q) thru subarea =      4.770(CFS)
Depth of flow =   0.140(Ft.), Average velocity =   5.560(Ft/s)
Channel flow top width =    7.243(Ft.)
Flow Velocity =    5.56(Ft/s)
Travel time  =    3.37 min.
Time of concentration =   10.93 min.
Critical depth =      0.262(Ft.)
 Adding area flow to channel
Rainfall intensity (I) =      4.295(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.440 given for subarea
Rainfall intensity =      4.295(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
```

```
(Q=KCIA) is C = 0.440  CA =      2.184
Subarea runoff =      9.299(CFS) for      4.930(Ac.)
Total runoff =      9.379(CFS)      Total area =       4.960(Ac.)
Depth of flow =   0.205(Ft.), Average velocity =   6.907(Ft/s)
Critical depth =      0.379(Ft.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       30.000 to Point/Station       30.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      4.960(Ac.)
Runoff from this stream =      9.379(CFS)
Time of concentration =   10.93 min.
Rainfall intensity =     4.295(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)
1        9.379     10.93               4.295
Qmax(1) =
         1.000 *    1.000 *     9.379) + =       9.379
Total of 1 main streams to confluence:
Flow rates before confluence point:
       9.379
Maximum flow rates at confluence using above data:
        9.379
Area of streams before confluence:
        4.960
Results of confluence:
Total flow rate =      9.379(CFS)
Time of concentration =    10.933 min.
Effective stream area after confluence  =      4.960(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       35.000 to Point/Station       40.000
**** INITIAL AREA EVALUATION ****
BASIN C
________________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[LOW DENSITY RESIDENTIAL                    ]
(2.9 DU/A or Less       )
Impervious value, Ai = 0.250
Sub-Area C Value = 0.490
Initial subarea total flow distance  =   75.000(Ft.)
Highest elevation =  104.100(Ft.)
Lowest elevation =  102.600(Ft.)
Elevation difference =    1.500(Ft.) Slope =  2.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 85.00 (Ft)
for the top area slope value of   2.00 %, in a development type of
```

```
 2.9 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.03 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4900)*(  85.000^.5)/(   2.000^(1/3)]=   8.03
Rainfall intensity (I) =      5.239(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.490
Subarea runoff =      0.026(CFS)
Total initial stream area =        0.010(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       40.000 to Point/Station       45.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =   102.600(Ft.)
Downstream point elevation =    95.800(Ft.)
Channel length thru subarea  =   283.000(Ft.)
Channel base width      =    5.000(Ft.)
Slope or 'Z' of left channel bank =   8.000
Slope or 'Z' of right channel bank =   8.000
Estimated mean flow rate at midpoint of channel =      0.282(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    0.250(Ft.)
Flow(q) thru subarea =      0.282(CFS)
Depth of flow =   0.034(Ft.), Average velocity =   1.564(Ft/s)
Channel flow top width =    5.548(Ft.)
Flow Velocity =    1.56(Ft/s)
Travel time  =    3.02 min.
Time of concentration =   11.05 min.
Critical depth =      0.045(Ft.)
 Adding area flow to channel
Rainfall intensity (I) =      4.266(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.550 given for subarea
Rainfall intensity =      4.266(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.547  CA =      0.115
Subarea runoff =      0.464(CFS) for      0.200(Ac.)
Total runoff =      0.490(CFS)      Total area =       0.210(Ac.)
Depth of flow =   0.047(Ft.), Average velocity =   1.921(Ft/s)
Critical depth =      0.064(Ft.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       40.000 to Point/Station       45.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.210(Ac.)
Runoff from this stream =      0.490(CFS)
Time of concentration =   11.05 min.
Rainfall intensity =     4.266(In/Hr)
Summary of stream data:

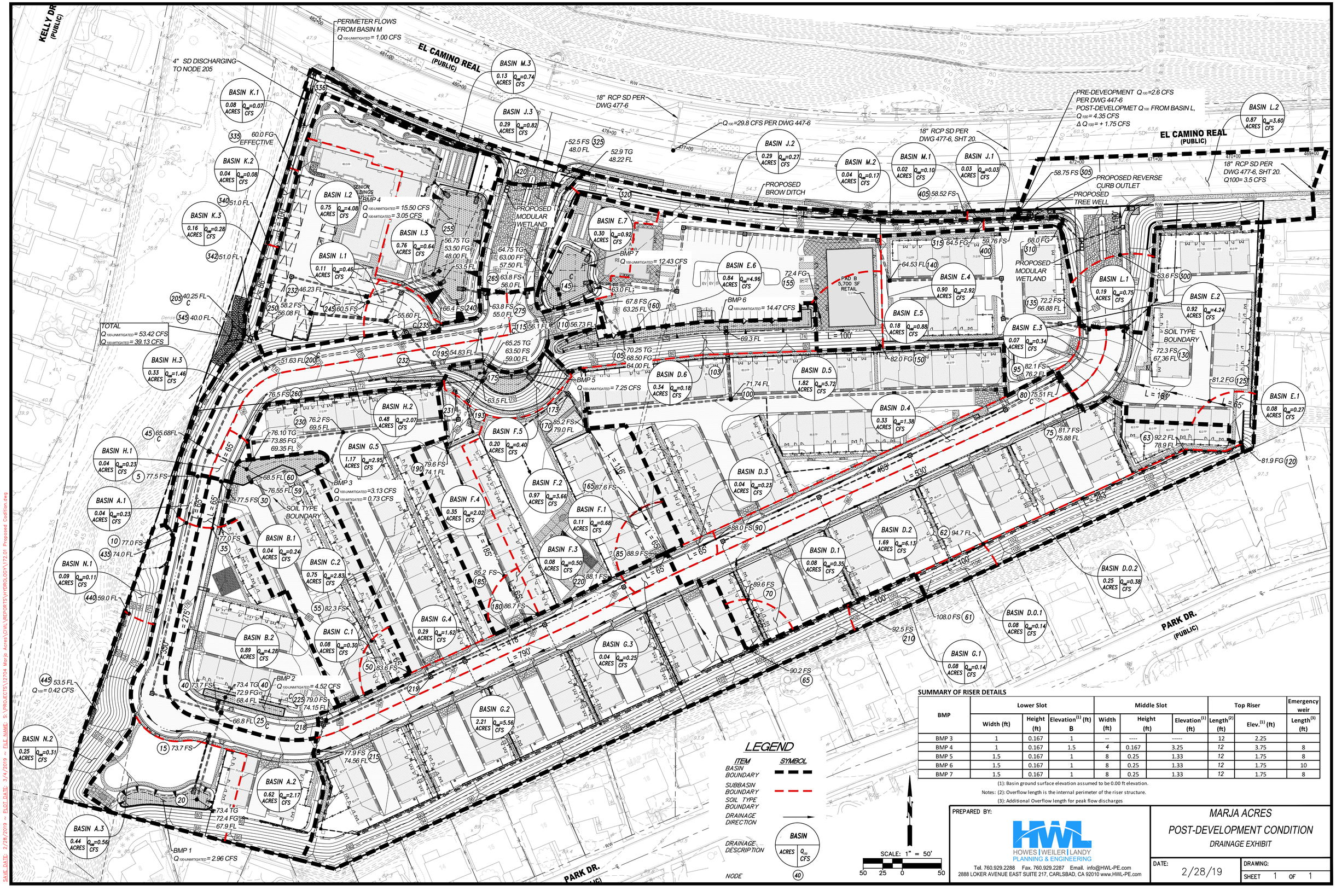
Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)

1        0.490     11.05              4.266
```

```
Qmax(1) =
         1.000 *    1.000 *     0.490) + =       0.490

Total of 1 streams to confluence:
Flow rates before confluence point:
       0.490
Maximum flow rates at confluence using above data:
        0.490
Area of streams before confluence:
        0.210
Results of confluence:
Total flow rate =      0.490(CFS)
Time of concentration =    11.050 min.
Effective stream area after confluence =      0.210(Ac.)
End of computations, total study area =          20.830 (Ac.)
```

APPENDIX 2
Developed Conditions Calculations & Drainage Map



SUMMARY OF RISER DETAILS

BMP	Lower Slot			Middle Slot			Top Riser		Emergency weir
	Width (ft)	Height (ft)	Elevation[1] (ft) B	Width (ft)	Height (ft)	Elevation[1] (ft)	Length[2] (ft)	Elev.[1] (ft)	Length[3] (ft)
BMP 3	1	0.167	1	--	----	-----	12	2.25	
BMP 4	1	0.167	1.5	4	0.167	3.25	12	3.75	8
BMP 5	1.5	0.167	1	8	0.25	1.33	12	1.75	8
BMP 6	1.5	0.167	1	8	0.25	1.33	12	1.75	10
BMP 7	1.5	0.167	1	8	0.25	1.33	12	1.75	8

(1): Basin ground surface elevation assumed to be 0.00 ft elevation.
Notes: (2): Overflow length is the internal perimeter of the riser structure.
(3): Additional Overflow length for peak flow discharges

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MARJA ACRES
POST-DEVELOPMENT CONDITION
DRAINAGE EXHIBIT

DATE: 2/28/19

DRAWING: SHEET 1 OF 1

SAVE DATE: 2/28/2019 • PLOT DATE: 3/4/2019 • FILE NAME: S:\PROJECTS\12704 Marja Acres\DWG\REPORTS\HYDROLOGY\12701 Proposed Condition.dwg

```
      San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2009 Version 7.8

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
      Rational Hydrology Study        Date: 11/30/18
--------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
Marja Acres – Post-Development Condition
100 Year Storm Event

--------------------------------------------------------------------------

Program License Serial Number 6290

--------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour,  precipitation(inches) =  2.700
24 hour precipitation(inches) =  4.800
P6/P24 =    56.3%
San Diego hydrology manual 'C' values used **

** Note - ( Caltrans " Highway Design Manual - Figure 819.2A, Runoff
Coefficients for Undeveloped Areas" and Table 819.2B Runoff Coefficients
for Developed Areas, were used to determine the weighted runoff
coefficient. 'C' Values within this Software were selected to closely
resemble actual values.

BASIN D
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       61.000 to Point/Station       62.000
**** INITIAL AREA EVALUATION ****
D.0.1
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.300
Initial subarea total flow distance  =  100.000(Ft.)
Highest elevation =  108.000(Ft.)
Lowest elevation =   94.700(Ft.)
Elevation difference =   13.300(Ft.) Slope = 13.300 %
Top of Initial Area Slope adjusted by User to 10.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of  10.00 %, in a development type of
 Permanent Open Space
```

```
In Accordance With Figure 3-3
Initial Area Time of Concentration =   6.68 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.3000)*( 100.000^.5)/(  10.000^(1/3)]=   6.68
Rainfall intensity (I) =      5.899(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.300
Subarea runoff =      0.142(CFS)
Total initial stream area =        0.080(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       62.000 to Point/Station       63.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
D.0.2
Estimated mean flow rate at midpoint of channel =      0.363(CFS)
Depth of flow =   0.384(Ft.), Average velocity =   2.460(Ft/s)
      ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              1.00
      2              0.50              0.50
      3              1.00              0.00
      4              1.50              0.50
      5              2.00              1.00
Manning's 'N' friction factor =   0.015
------------------------------------------------------------------
Sub-Channel flow  =      0.363(CFS)
  '     '    flow top width =      0.768(Ft.)
  '     '    velocity=    2.460(Ft/s)
  '     '    area =      0.147(Sq.Ft)
  '     '    Froude number =     0.989

Upstream point elevation =    94.700(Ft.)
Downstream point elevation =    92.200(Ft.)
Flow length =   283.000(Ft.)
Travel time  =    1.92 min.
Time of concentration =    8.60 min.
Depth of flow =   0.384(Ft.)
Average velocity =   2.460(Ft/s)
Total irregular channel flow =     0.363(CFS)
Irregular channel normal depth above invert elev. =   0.384(Ft.)
Average velocity of channel(s) =   2.460(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      5.013(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.320 given for subarea
Rainfall intensity =      5.013(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.315  CA =      0.104
Subarea runoff =      0.380(CFS) for      0.250(Ac.)
Total runoff =      0.521(CFS)      Total area =       0.330(Ac.)
Depth of flow =   0.440(Ft.), Average velocity =   2.693(Ft/s)



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

```
Process from Point/Station       63.000 to Point/Station       75.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =    78.900(Ft.)
Downstream point/station elevation =    75.880(Ft.)
Pipe length  =   170.00(Ft.) Slope =   0.0178  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.521(CFS)
Given pipe size =      8.00(In.)
Calculated individual pipe flow  =     0.521(CFS)
Normal flow depth in pipe =    3.13(In.)
Flow top width inside pipe =    7.81(In.)
Critical Depth =    4.06(In.)
Pipe flow velocity =      4.12(Ft/s)
Travel time through pipe =    0.69 min.
Time of concentration (TC) =     9.29 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       75.000 to Point/Station       75.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.330(Ac.)
Runoff from this stream =      0.521(CFS)
Time of concentration =    9.29 min.
Rainfall intensity =     4.771(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)

1        0.521      9.29               4.771
Qmax(1) =
         1.000 *    1.000 *     0.521) + =       0.521
Total of 1 streams to confluence:
Flow rates before confluence point:
       0.521
Maximum flow rates at confluence using above data:
        0.521
Area of streams before confluence:
        0.330
Results of confluence:
Total flow rate =      0.521(CFS)
Time of concentration =     9.290 min.
Effective stream area after confluence =      0.330(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       65.000 to Point/Station       70.000
**** INITIAL AREA EVALUATION ****
D.1
------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[MEDIUM DENSITY RESIDENTIAL                 ]
(14.5 DU/A or Less      )
Impervious value, Ai = 0.500
```

```
Sub-Area C Value = 0.630
Initial subarea total flow distance  =   65.000(Ft.)
Highest elevation =   90.200(Ft.)
Lowest elevation =   89.600(Ft.)
Elevation difference =    0.600(Ft.) Slope =  0.923 %
Top of Initial Area Slope adjusted by User to  3.800 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 90.00 (Ft)
for the top area slope value of   3.80 %, in a development type of
 14.5 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   5.14 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.6300)*(  90.000^.5)/(   3.800^(1/3)]=   5.14
Rainfall intensity (I) =      6.985(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.630
Subarea runoff =      0.352(CFS)
Total initial stream area =        0.080(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       70.000 to Point/Station       75.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
D.2
Top of street segment elevation =    89.600(Ft.)
End of street segment elevation =    81.700(Ft.)
Length of street segment  =   530.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  19.000(Ft.)
Distance from crown to crossfall grade break  =  17.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      3.359(CFS)
Depth of flow =   0.292(Ft.), Average velocity =   2.382(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   7.762(Ft.)
Flow velocity =   2.38(Ft/s)
Travel time =    3.71 min.     TC =    8.85  min.
 Adding area flow to street
Rainfall intensity (I) =      4.922(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.750 given for subarea
Rainfall intensity =      4.922(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.745  CA =      1.318
Subarea runoff =      6.134(CFS) for      1.690(Ac.)
Total runoff =      6.487(CFS)      Total area =       1.770(Ac.)
Street flow at end of street =      6.487(CFS)
Half street flow at end of street =      3.243(CFS)
Depth of flow =   0.343(Ft.), Average velocity =   2.769(Ft/s)
```

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Flow width (from curb towards crown)=  10.338(Ft.)

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Process from Point/Station       75.000 to Point/Station       75.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.770(Ac.)
Runoff from this stream =      6.487(CFS)
Time of concentration =    8.85 min.
Rainfall intensity =     4.922(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)

1        0.521      9.29               4.771
2        6.487      8.85               4.922
Qmax(1) =
         1.000 *    1.000 *     0.521) +
         0.969 *    1.000 *     6.487) + =       6.809
Qmax(2) =
         1.000 *    0.953 *     0.521) +
         1.000 *    1.000 *     6.487) + =       6.983
Total of 2 streams to confluence:
Flow rates before confluence point:
       0.521       6.487
Maximum flow rates at confluence using above data:
        6.809        6.983
Area of streams before confluence:
        0.330        1.770
Results of confluence:
Total flow rate =      6.983(CFS)
Time of concentration =     8.851 min.
Effective stream area after confluence =      2.100(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       75.000 to Point/Station       80.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    75.880(Ft.)
Downstream point/station elevation =    75.510(Ft.)
Pipe length  =    45.00(Ft.) Slope =   0.0082  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.983(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     6.983(CFS)
Normal flow depth in pipe =   11.45(In.)
Flow top width inside pipe =   17.32(In.)
Critical Depth =   12.28(In.)
Pipe flow velocity =      5.89(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =     8.98 min.


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Process from Point/Station       85.000 to Point/Station       90.000
**** INITIAL AREA EVALUATION ****
```
D.3
```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                        ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Initial subarea total flow distance  =   65.000(Ft.)
Highest elevation =   88.900(Ft.)
Lowest elevation =   88.000(Ft.)
Elevation difference =    0.900(Ft.) Slope =  1.385 %
Top of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 60.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 General Commercial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   3.90 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8200)*(  60.000^.5)/(   1.000^(1/3)]=   3.90
Calculated TC of    3.904 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      7.114(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.820
Subarea runoff =      0.233(CFS)
Total initial stream area =        0.040(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       90.000 to Point/Station       95.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
```
D.4
```
Top of street segment elevation =    88.000(Ft.)
End of street segment elevation =    82.100(Ft.)
Length of street segment  =   483.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  19.000(Ft.)
Distance from crown to crossfall grade break  =  17.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      0.841(CFS)
Depth of flow =   0.213(Ft.), Average velocity =   1.704(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   3.799(Ft.)
Flow velocity =   1.70(Ft/s)
```

```
Travel time =    4.73 min.     TC =    8.63  min.
 Adding area flow to street
Rainfall intensity (I) =      5.003(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.880 given for subarea
Rainfall intensity =      5.003(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.874  CA =      0.323
Subarea runoff =      1.384(CFS) for      0.330(Ac.)
Total runoff =      1.617(CFS)      Total area =       0.370(Ac.)
Street flow at end of street =      1.617(CFS)
Half street flow at end of street =      0.808(CFS)
Depth of flow =   0.251(Ft.), Average velocity =   1.890(Ft/s)
Flow width (from curb towards crown)=   5.703(Ft.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       95.000 to Point/Station       80.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    76.200(Ft.)
Downstream point/station elevation =    75.510(Ft.)
Pipe length  =     3.00(Ft.) Slope =   0.2300  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.617(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     1.617(CFS)
Normal flow depth in pipe =    2.49(In.)
Flow top width inside pipe =    9.74(In.)
Critical Depth =    6.48(In.)
Pipe flow velocity =     13.69(Ft/s)
Travel time through pipe =    0.00 min.
Time of concentration (TC) =     8.63 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       95.000 to Point/Station       80.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 3
Stream flow area =      0.370(Ac.)
Runoff from this stream =      1.617(CFS)
Time of concentration =    8.63 min.
Rainfall intensity =     5.002(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)

1        0.521      9.29               4.771
2        6.487      8.85               4.922
3        1.617      8.63               5.002
Qmax(1) =
         1.000 *    1.000 *     0.521) +
         0.969 *    1.000 *     6.487) +
         0.954 *    1.000 *     1.617) + =       8.351
Qmax(2) =
         1.000 *    0.953 *     0.521) +
         1.000 *    1.000 *     6.487) +
         0.984 *    1.000 *     1.617) + =       8.574
```

```
Qmax(3) =
         1.000 *    0.929 *     0.521) +
         1.000 *    0.975 *     6.487) +
         1.000 *    1.000 *     1.617) + =       8.428

Total of 3 streams to confluence:
Flow rates before confluence point:
       0.521       6.487       1.617
Maximum flow rates at confluence using above data:
        8.351        8.574        8.428
Area of streams before confluence:
        0.330        1.770        0.370
Results of confluence:
Total flow rate =      8.574(CFS)
Time of concentration =     8.851 min.
Effective stream area after confluence =      2.470(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       80.000 to Point/Station      100.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    75.510(Ft.)
Downstream point/station elevation =    71.740(Ft.)
Pipe length  =   445.00(Ft.) Slope =   0.0085  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.574(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     8.574(CFS)
Normal flow depth in pipe =   10.73(In.)
Flow top width inside pipe =   23.87(In.)
Critical Depth =   12.52(In.)
Pipe flow velocity =      6.31(Ft/s)
Travel time through pipe =    1.18 min.
Time of concentration (TC) =    10.03 min.

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Process from Point/Station      100.000 to Point/Station      100.000
**** SUBAREA FLOW ADDITION ****
D.5
________________________________________________________________________
Rainfall intensity (I) =      4.541(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.770 given for subarea
Time of concentration =    10.03 min.
Rainfall intensity =      4.541(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.733  CA =      3.147
Subarea runoff =      5.715(CFS) for      1.820(Ac.)
Total runoff =     14.289(CFS)      Total area =       4.290(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      100.000 to Point/Station      103.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    71.740(Ft.)
Downstream point/station elevation =    70.830(Ft.)
Pipe length  =    51.75(Ft.) Slope =   0.0176  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    14.289(CFS)
Given pipe size =     24.00(In.)
```

```
Calculated individual pipe flow  =    14.289(CFS)
Normal flow depth in pipe =   11.66(In.)
Flow top width inside pipe =   23.99(In.)
Critical Depth =   16.33(In.)
Pipe flow velocity =      9.43(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    10.12 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      105.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    70.830(Ft.)
Downstream point/station elevation =    67.700(Ft.)
Pipe length  =    30.30(Ft.) Slope =   0.1033  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    14.289(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    14.289(CFS)
Normal flow depth in pipe =    7.21(In.)
Flow top width inside pipe =   22.01(In.)
Critical Depth =   16.33(In.)
Pipe flow velocity =     17.98(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =    10.15 min.

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Process from Point/Station      105.000 to Point/Station      105.000
**** SUBAREA FLOW ADDITION ****
D.6
________________________________________________________________________
Rainfall intensity (I) =      4.507(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.190 given for subarea
Time of concentration =    10.15 min.
Rainfall intensity =      4.507(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.694  CA =      3.211
Subarea runoff =      0.182(CFS) for      0.340(Ac.)
Total runoff =     14.472(CFS)      Total area =       4.630(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      110.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    64.000(Ft.)
Downstream point/station elevation =    56.730(Ft.)
Pipe length  =    52.50(Ft.) Slope =   0.1385  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    14.472(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =    14.472(CFS)
Normal flow depth in pipe =    7.58(In.)
Flow top width inside pipe =   17.78(In.)
Critical Depth =   16.72(In.)
Pipe flow velocity =     20.46(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    10.19 min.
```

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Process from Point/Station      110.000 to Point/Station      115.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    56.730(Ft.)
Downstream point/station elevation =    56.100(Ft.)
Pipe length  =    42.60(Ft.) Slope =   0.0148  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    14.472(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    14.472(CFS)
Normal flow depth in pipe =   12.36(In.)
Flow top width inside pipe =   23.99(In.)
Critical Depth =   16.44(In.)
Pipe flow velocity =      8.87(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    10.27 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      115.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      4.630(Ac.)
Runoff from this stream =     14.472(CFS)
Time of concentration =   10.27 min.
Rainfall intensity =     4.472(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       14.472     10.27               4.468
Qmax(1) =
         1.000 *    1.000 *    14.472) + =      14.472

Total of 1 main streams to confluence:
Flow rates before confluence point:
      14.472

Maximum flow rates at confluence using above data:
       14.472

Area of streams before confluence:
        4.630

Results of confluence:
Total flow rate =     14.472(CFS)
Time of concentration =    10.269 min.
Effective stream area after confluence  =      4.630(Ac.)
```

BASIN E

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      120.000 to Point/Station      125.000
**** INITIAL AREA EVALUATION ****
```

E.1

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[LOW DENSITY RESIDENTIAL                    ]
(2.9 DU/A or Less       )
Impervious value, Ai = 0.250
Sub-Area C Value = 0.490
Initial subarea total flow distance  =   65.000(Ft.)
Highest elevation =   81.900(Ft.)
Lowest elevation =   81.200(Ft.)
Elevation difference =    0.700(Ft.) Slope =  1.077 %
Top of Initial Area Slope adjusted by User to  8.800 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   8.80 %, in a development type of
 2.9 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   5.32 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4900)*( 100.000^.5)/(   8.800^(1/3)]=   5.32
Rainfall intensity (I) =      6.836(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.490
Subarea runoff =      0.268(CFS)
Total initial stream area =        0.080(Ac.)


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Process from Point/Station      125.000 to Point/Station      130.000
**** IMPROVED CHANNEL TRAVEL TIME ****
```

E.2

```
Upstream point elevation =    81.200(Ft.)
Downstream point elevation =    72.300(Ft.)
Channel length thru subarea  =   181.000(Ft.)
Channel base width      =    5.000(Ft.)
Slope or 'Z' of left channel bank =   8.000
Slope or 'Z' of right channel bank =   8.000
Estimated mean flow rate at midpoint of channel =      2.351(CFS)
Manning's 'N'    = 0.013
Maximum depth of channel  =    0.250(Ft.)
Flow(q) thru subarea =      2.351(CFS)
Depth of flow =   0.089(Ft.), Average velocity =   4.652(Ft/s)
Channel flow top width =    6.416(Ft.)
Flow Velocity =    4.65(Ft/s)
Travel time  =    0.65 min.
Time of concentration =    5.97 min.
Critical depth =      0.172(Ft.)
 Adding area flow to channel
Rainfall intensity (I) =      6.347(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.730 given for subarea
```

```
Rainfall intensity =      6.347(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.711  CA =      0.711
Subarea runoff =      4.244(CFS) for      0.920(Ac.)
Total runoff =      4.512(CFS)      Total area =       1.000(Ac.)
Depth of flow =   0.129(Ft.), Average velocity =   5.810(Ft/s)
Critical depth =      0.254(Ft.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      130.000 to Point/Station      135.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    67.360(Ft.)
Downstream point/station elevation =    66.880(Ft.)
Pipe length  =    45.00(Ft.) Slope =   0.0107  Manning's N = 0.013
No. of pipes = 2  Required pipe flow  =     4.512(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     2.256(CFS)
Normal flow depth in pipe =    6.79(In.)
Flow top width inside pipe =   11.90(In.)
Critical Depth =    7.71(In.)
Pipe flow velocity =      4.92(Ft/s)
Travel time through pipe =    0.15 min.
Time of concentration (TC) =     6.12 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      135.000 to Point/Station      135.000
**** SUBAREA FLOW ADDITION ****
E.3
________________________________________________________________________
Rainfall intensity (I) =      6.245(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.940 given for subarea
Time of concentration =     6.12 min.
Rainfall intensity =      6.245(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.726  CA =      0.777
Subarea runoff =      0.338(CFS) for      0.070(Ac.)
Total runoff =      4.850(CFS)      Total area =       1.070(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      135.000 to Point/Station      140.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    66.880(Ft.)
Downstream point/station elevation =    64.530(Ft.)
Pipe length  =   295.00(Ft.) Slope =   0.0080  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.850(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     4.850(CFS)
Normal flow depth in pipe =    9.19(In.)
Flow top width inside pipe =   18.00(In.)
Critical Depth =   10.17(In.)
Pipe flow velocity =      5.35(Ft/s)
Travel time through pipe =    0.92 min.
Time of concentration (TC) =     7.04 min.
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      140.000 to Point/Station      140.000
**** SUBAREA FLOW ADDITION ****
```
E.4
```
------------------------------------------------------------------------
Rainfall intensity (I) =      5.706(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.650 given for subarea
Time of concentration =     7.04 min.
Rainfall intensity =      5.706(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.691  CA =      1.362
Subarea runoff =      2.920(CFS) for      0.900(Ac.)
Total runoff =      7.769(CFS)      Total area =       1.970(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      140.000 to Point/Station      145.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =    64.530(Ft.)
Downstream point/station elevation =    63.000(Ft.)
Pipe length  =   486.00(Ft.) Slope =   0.0031  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.769(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     7.769(CFS)
Normal flow depth in pipe =   13.57(In.)
Flow top width inside pipe =   23.79(In.)
Critical Depth =   11.91(In.)
Pipe flow velocity =      4.24(Ft/s)
Travel time through pipe =    1.91 min.
Time of concentration (TC) =     8.95 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      140.000 to Point/Station      145.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.970(Ac.)
Runoff from this stream =      7.769(CFS)
Time of concentration =    8.95 min.
Rainfall intensity =     4.888(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                  (In/Hr)

1        7.769      8.95               4.888
Qmax(1) =
         1.000 *    1.000 *     7.769) + =       7.769
Total of 1 streams to confluence:
Flow rates before confluence point:
       7.769
Maximum flow rates at confluence using above data:
        7.769
Area of streams before confluence:
        1.970
Results of confluence:
Total flow rate =      7.769(CFS)
```

```
Time of concentration =     8.947 min.
Effective stream area after confluence =      1.970(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      150.000 to Point/Station      155.000
**** INITIAL AREA EVALUATION ****
```
E.5
```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[HIGH DENSITY RESIDENTIAL                    ]
(24.0 DU/A or Less      )
Impervious value, Ai = 0.650
Sub-Area C Value = 0.690
Initial subarea total flow distance  =  100.000(Ft.)
Highest elevation =   82.000(Ft.)
Lowest elevation =   72.400(Ft.)
Elevation difference =    9.600(Ft.) Slope =  9.600 %
Top of Initial Area Slope adjusted by User to  9.900 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   9.90 %, in a development type of
 24.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   3.44 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.6900)*( 100.000^.5)/(   9.900^(1/3)]=   3.44
Calculated TC of    3.437 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      7.114(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.690
Subarea runoff =      0.884(CFS)
Total initial stream area =        0.180(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      155.000 to Point/Station      160.000
**** IMPROVED CHANNEL TRAVEL TIME ****
```
E.6
```
Upstream point elevation =    72.400(Ft.)
Downstream point elevation =    67.800(Ft.)
Channel length thru subarea  =   285.000(Ft.)
Channel base width      =    5.000(Ft.)
Slope or 'Z' of left channel bank =   8.000
Slope or 'Z' of right channel bank =   8.000
Estimated mean flow rate at midpoint of channel =      3.337(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    0.250(Ft.)
Flow(q) thru subarea =      3.337(CFS)
Depth of flow =   0.161(Ft.), Average velocity =   3.288(Ft/s)
Channel flow top width =    7.582(Ft.)
Flow Velocity =    3.29(Ft/s)
Travel time  =    1.44 min.
Time of concentration =    4.88 min.
Critical depth =      0.213(Ft.)
 Adding area flow to channel
```

```
Calculated TC of    4.882 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      7.114(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.830 given for subarea
Rainfall intensity =      7.114(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.805  CA =      0.821
Subarea runoff =      4.960(CFS) for      0.840(Ac.)
Total runoff =      5.843(CFS)      Total area =       1.020(Ac.)
Depth of flow =   0.220(Ft.), Average velocity =   3.925(Ft/s)
Critical depth =      0.291(Ft.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      160.000 to Point/Station      145.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    63.250(Ft.)
Downstream point/station elevation =    63.000(Ft.)
Pipe length  =    42.60(Ft.) Slope =   0.0059  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.843(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     5.843(CFS)
Normal flow depth in pipe =   11.37(In.)
Flow top width inside pipe =   17.37(In.)
Critical Depth =   11.21(In.)
Pipe flow velocity =      4.96(Ft/s)
Travel time through pipe =    0.14 min.
Time of concentration (TC) =     5.02 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      145.000 to Point/Station      145.000
**** SUBAREA FLOW ADDITION ****
E.7
________________________________________________________________________
Rainfall intensity (I) =      7.091(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.440 given for subarea
Time of concentration =     5.02 min.
Rainfall intensity =      7.091(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.722  CA =      0.953
Subarea runoff =      0.917(CFS) for      0.300(Ac.)
Total runoff =      6.761(CFS)      Total area =       1.320(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      145.000 to Point/Station      145.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.320(Ac.)
Runoff from this stream =      6.761(CFS)
Time of concentration =    5.02 min.
Rainfall intensity =     7.091(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                  (In/Hr)
```

```
1        7.769      8.95               4.888
2        6.761      5.02               7.091
Qmax(1) =
         1.000 *    1.000 *     7.769) +
         0.689 *    1.000 *     6.761) + =      12.429
Qmax(2) =
         1.000 *    0.562 *     7.769) +
         1.000 *    1.000 *     6.761) + =      11.124
Total of 2 streams to confluence:
Flow rates before confluence point:
       7.769       6.761
Maximum flow rates at confluence using above data:
       12.429       11.124
Area of streams before confluence:
        1.970        1.320
Results of confluence:
Total flow rate =     12.429(CFS)
Time of concentration =     8.947 min.
Effective stream area after confluence =      3.290(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      145.000 to Point/Station      115.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    57.500(Ft.)
Downstream point/station elevation =    56.100(Ft.)
Pipe length  =    24.30(Ft.) Slope =   0.0576  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.429(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =    12.429(CFS)
Normal flow depth in pipe =    8.93(In.)
Flow top width inside pipe =   18.00(In.)
Critical Depth =   15.96(In.)
Pipe flow velocity =     14.22(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =     8.98 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      115.000 to Point/Station      115.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      3.290(Ac.)
Runoff from this stream =     12.429(CFS)
Time of concentration =    8.98 min.
Rainfall intensity =     4.878(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)

1       14.472     10.28               4.472
2       12.429      8.97               4.880
Qmax(1) =
```

```
         1.000 *    1.000 *    14.472) +
         0.916 *    1.000 *    12.429) + =      25.852
Qmax(2) =
         1.000 *    0.872 *    14.472) +
         1.000 *    1.000 *    12.429) + =      25.052

Total of 2 main streams to confluence:
Flow rates before confluence point:
      14.472      12.429
Maximum flow rates at confluence using above data:
       25.852       25.052
Area of streams before confluence:
        4.630        3.290

Results of confluence:
Total flow rate =     25.852(CFS)
Time of concentration =    10.269 min.
Effective stream area after confluence  =      7.920(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      115.000 to Point/Station      195.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    56.100(Ft.)
Downstream point/station elevation =    54.830(Ft.)
Pipe length  =   111.00(Ft.) Slope =   0.0114  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    25.852(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    25.852(CFS)
Normal flow depth in pipe =   16.57(In.)
Flow top width inside pipe =   29.84(In.)
Critical Depth =   20.79(In.)
Pipe flow velocity =      9.30(Ft/s)
Travel time through pipe =    0.20 min.
Time of concentration (TC) =    10.47 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      195.000 to Point/Station      195.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      7.920(Ac.)
Runoff from this stream =     25.852(CFS)
Time of concentration =   10.47 min.
Rainfall intensity =     4.417(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)

1       25.852     10.47               4.417
Qmax(1) =
         1.000 *    1.000 *    25.852) + =      25.852

Total of 1 main streams to confluence:
```

```
Flow rates before confluence point:
      25.852
Maximum flow rates at confluence using above data:
       25.852
Area of streams before confluence:
        7.920

Results of confluence:
Total flow rate =     25.852(CFS)
Time of concentration =    10.468 min.
Effective stream area after confluence  =      7.920(Ac.)
```

BASIN F

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       85.000 to Point/Station      165.000
**** INITIAL AREA EVALUATION ****
```

F.1

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.290
Decimal fraction soil group D = 0.710
[INDUSTRIAL area type                        ]
(General Industrial       )
Impervious value, Ai = 0.950
Sub-Area C Value = 0.870
Initial subarea total flow distance  =   65.000(Ft.)
Highest elevation =   88.900(Ft.)
Lowest elevation =   87.600(Ft.)
Elevation difference =    1.300(Ft.) Slope =  2.000 %
Top of Initial Area Slope adjusted by User to  2.100 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   2.10 %, in a development type of
 General Industrial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   2.70 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8700)*(  70.000^.5)/(   2.100^(1/3)]=   2.70
Calculated TC of    2.705 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      7.114(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.870
Subarea runoff =      0.681(CFS)
Total initial stream area =        0.110(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      165.000 to Point/Station      170.000
**** IMPROVED CHANNEL TRAVEL TIME ****
```

F.2

```
Upstream point elevation =    87.600(Ft.)
Downstream point elevation =    85.200(Ft.)
Channel length thru subarea  =   116.000(Ft.)
Channel base width      =    5.000(Ft.)
Slope or 'Z' of left channel bank =   8.000
Slope or 'Z' of right channel bank =   8.000
```

```
Estimated mean flow rate at midpoint of channel =      2.546(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    0.250(Ft.)
Flow(q) thru subarea =      2.546(CFS)
Depth of flow =   0.129(Ft.), Average velocity =   3.270(Ft/s)
Channel flow top width =    7.065(Ft.)
Flow Velocity =    3.27(Ft/s)
Travel time  =    0.59 min.
Time of concentration =    3.30 min.
Critical depth =      0.182(Ft.)
 Adding area flow to channel
Calculated TC of    3.296 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      7.114(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.530 given for subarea
Rainfall intensity =      7.114(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.565  CA =      0.610
Subarea runoff =      3.657(CFS) for      0.970(Ac.)
Total runoff =      4.338(CFS)      Total area =       1.080(Ac.)
Depth of flow =   0.174(Ft.), Average velocity =   3.891(Ft/s)
Critical depth =      0.250(Ft.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      170.000 to Point/Station      173.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    79.000(Ft.)
Downstream point/station elevation =    77.120(Ft.)
Pipe length  =    53.70(Ft.) Slope =   0.0350  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.338(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     4.338(CFS)
Normal flow depth in pipe =    7.05(In.)
Flow top width inside pipe =   11.81(In.)
Critical Depth =   10.49(In.)
Pipe flow velocity =      9.04(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =     3.40 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      173.000 to Point/Station      175.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    77.120(Ft.)
Downstream point/station elevation =    64.000(Ft.)
Pipe length  =    42.40(Ft.) Slope =   0.3094  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.338(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     4.338(CFS)
Normal flow depth in pipe =    3.81(In.)
Flow top width inside pipe =   11.18(In.)
Critical Depth =   10.49(In.)
Pipe flow velocity =     20.21(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =     3.43 min.
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      175.000 to Point/Station      175.000
**** CONFLUENCE OF MINOR STREAMS ****
_____________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.080(Ac.)
Runoff from this stream =      4.338(CFS)
Time of concentration =    3.43 min.
Rainfall intensity =     7.114(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)
1        4.338      3.43               7.114
Qmax(1) =
         1.000 *    1.000 *     4.338) + =       4.338
Total of 1 streams to confluence:
Flow rates before confluence point:
       4.338
Maximum flow rates at confluence using above data:
        4.338
Area of streams before confluence:
        1.080
Results of confluence:
Total flow rate =      4.338(CFS)
Time of concentration =     3.430 min.
Effective stream area after confluence =      1.080(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      180.000 to Point/Station      185.000
**** INITIAL AREA EVALUATION ****
F.3
_____________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.030
Decimal fraction soil group D = 0.970
[INDUSTRIAL area type                        ]
(General Industrial       )
Impervious value, Ai = 0.950
Sub-Area C Value = 0.870
Initial subarea total flow distance  =   65.000(Ft.)
Highest elevation =   86.700(Ft.)
Lowest elevation =   85.200(Ft.)
Elevation difference =    1.500(Ft.) Slope =  2.308 %
Top of Initial Area Slope adjusted by User to  1.800 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   1.80 %, in a development type of
 General Industrial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   2.85 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8700)*(  70.000^.5)/(   1.800^(1/3)]=   2.85
Calculated TC of    2.847 minutes is less than 5 minutes,
```

```
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      7.114(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.870
Subarea runoff =      0.495(CFS)
Total initial stream area =        0.080(Ac.)

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Process from Point/Station      185.000 to Point/Station      190.000
**** IMPROVED CHANNEL TRAVEL TIME ****
```
F.4
```
Upstream point elevation =    85.200(Ft.)
Downstream point elevation =    79.600(Ft.)
Channel length thru subarea  =   185.000(Ft.)
Channel base width      =    5.000(Ft.)
Slope or 'Z' of left channel bank =   8.000
Slope or 'Z' of right channel bank =   8.000
Estimated mean flow rate at midpoint of channel =      1.541(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    0.250(Ft.)
Flow(q) thru subarea =      1.541(CFS)
Depth of flow =   0.087(Ft.), Average velocity =   3.123(Ft/s)
Channel flow top width =    6.387(Ft.)
Flow Velocity =    3.12(Ft/s)
Travel time  =    0.99 min.
Time of concentration =    3.83 min.
Critical depth =      0.133(Ft.)
 Adding area flow to channel
Calculated TC of    3.835 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      7.114(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.810 given for subarea
Rainfall intensity =      7.114(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.821  CA =      0.353
Subarea runoff =      2.017(CFS) for      0.350(Ac.)
Total runoff =      2.512(CFS)      Total area =       0.430(Ac.)
Depth of flow =   0.115(Ft.), Average velocity =   3.694(Ft/s)
Critical depth =      0.180(Ft.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      190.000 to Point/Station      193.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation =    74.100(Ft.)
Downstream point/station elevation =    70.910(Ft.)
Pipe length  =    75.20(Ft.) Slope =   0.0424  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.512(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     2.512(CFS)
Normal flow depth in pipe =    4.84(In.)
Flow top width inside pipe =   11.77(In.)
Critical Depth =    8.15(In.)
Pipe flow velocity =      8.46(Ft/s)
Travel time through pipe =    0.15 min.
Time of concentration (TC) =     3.98 min.
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      193.000 to Point/Station      175.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =    70.910(Ft.)
Downstream point/station elevation =    63.500(Ft.)
Pipe length  =    29.30(Ft.) Slope =   0.2529  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.512(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     2.512(CFS)
Normal flow depth in pipe =    3.04(In.)
Flow top width inside pipe =   10.43(In.)
Critical Depth =    8.15(In.)
Pipe flow velocity =     16.09(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =     4.01 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      176.000 to Point/Station      177.000
**** SUBAREA FLOW ADDITION ****
F.5
------------------------------------------------------------------------
Calculated TC of    4.014 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      7.114(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.280 given for subarea
Time of concentration =     4.01 min.
Rainfall intensity =      7.114(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.649  CA =      0.409
Subarea runoff =      0.398(CFS) for      0.200(Ac.)
Total runoff =      2.910(CFS)      Total area =       0.630(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      175.000 to Point/Station      175.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.630(Ac.)
Runoff from this stream =      2.910(CFS)
Time of concentration =    4.01 min.
Rainfall intensity =     7.114(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)

1        4.338      3.43               7.114
2        2.910      4.01               7.114
Qmax(1) =
         1.000 *    1.000 *     4.338) +
         1.000 *    0.855 *     2.910) + =       6.825
Qmax(2) =
         1.000 *    1.000 *     4.338) +
         1.000 *    1.000 *     2.910) + =       7.248

Total of 2 streams to confluence:
```

```
Flow rates before confluence point:
       4.338       2.910
Maximum flow rates at confluence using above data:
        6.825        7.248
Area of streams before confluence:
        1.080        0.630
Results of confluence:
Total flow rate =      7.248(CFS)
Time of concentration =     4.013 min.
Effective stream area after confluence =      1.710(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      175.000 to Point/Station      195.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    59.000(Ft.)
Downstream point/station elevation =    54.830(Ft.)
Pipe length  =    54.00(Ft.) Slope =   0.0772  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.248(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     7.248(CFS)
Normal flow depth in pipe =    7.63(In.)
Flow top width inside pipe =   11.55(In.)
Critical depth could not be calculated.
Pipe flow velocity =     13.77(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =     4.08 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      195.000 to Point/Station      195.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.710(Ac.)
Runoff from this stream =      7.248(CFS)
Time of concentration =    4.08 min.
Rainfall intensity =     7.114(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)

1       25.852     10.47               4.413
2        7.248      4.08               7.114
Qmax(1) =
         1.000 *    1.000 *    25.852) +
         0.620 *    1.000 *     7.248) + =      30.368
Qmax(2) =
         1.000 *    0.387 *    25.852) +
         1.000 *    1.000 *     7.248) + =      17.327

Total of 2 main streams to confluence:
Flow rates before confluence point:
      25.867       7.248
Maximum flow rates at confluence using above data:
```

```
       30.368       17.327
Area of streams before confluence:
        7.920        1.710
Results of confluence:
Total flow rate =     30.349(CFS)
Time of concentration =    10.468 min.
Effective stream area after confluence  =      9.630(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      195.000 to Point/Station      200.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    54.830(Ft.)
Downstream point/station elevation =    51.630(Ft.)
Pipe length  =   259.00(Ft.) Slope =   0.0124  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    30.368(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    30.368(CFS)
Normal flow depth in pipe =   17.91(In.)
Flow top width inside pipe =   29.43(In.)
Critical Depth =   22.52(In.)
Pipe flow velocity =      9.94(Ft/s)
Travel time through pipe =    0.43 min.
Time of concentration (TC) =    10.90 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      200.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      9.630(Ac.)
Runoff from this stream =     30.349(CFS)
Time of concentration =   10.92 min.
Rainfall intensity =     4.299(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)

1       30.368     10.90               4.303
Qmax(1) =
         1.000 *    1.000 *    30.349) + =      30.368

Total of 1 main streams to confluence:
Flow rates before confluence point:
      30.368
Maximum flow rates at confluence using above data:
       30.368
Area of streams before confluence:
        9.630

Results of confluence:
Total flow rate =     30.368(CFS)
Time of concentration =    10.902 min.
Effective stream area after confluence  =      9.630(Ac.)
```

BASIN A

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.000 to Point/Station       10.000
**** INITIAL AREA EVALUATION ****
```

A.1

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[HIGH DENSITY RESIDENTIAL                    ]
(43.0 DU/A or Less      )
Impervious value, Ai = 0.800
Sub-Area C Value = 0.790
Initial subarea total flow distance  =   65.000(Ft.)
Highest elevation =   77.500(Ft.)
Lowest elevation =   77.000(Ft.)
Elevation difference =    0.500(Ft.) Slope =  0.769 %
Top of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 65.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 43.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   4.50 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7900)*(  65.000^.5)/(   1.000^(1/3)]=   4.50
Calculated TC of    4.499 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      7.114(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.790
Subarea runoff =      0.225(CFS)
Total initial stream area =        0.040(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       15.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
```

A.2

```
Top of street segment elevation =    77.000(Ft.)
End of street segment elevation =    73.650(Ft.)
Length of street segment  =   350.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  19.000(Ft.)
Distance from crown to crossfall grade break  =  17.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      1.240(CFS)
Depth of flow =   0.242(Ft.), Average velocity =   1.629(Ft/s)
```

```
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   5.273(Ft.)
Flow velocity =   1.63(Ft/s)
Travel time =    3.58 min.     TC =    8.08  min.
 Adding area flow to street
Rainfall intensity (I) =      5.220(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.690 given for subarea
Rainfall intensity =      5.220(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.696  CA =      0.459
Subarea runoff =      2.173(CFS) for      0.620(Ac.)
Total runoff =      2.398(CFS)      Total area =       0.660(Ac.)
Street flow at end of street =      2.398(CFS)
Half street flow at end of street =      1.199(CFS)
Depth of flow =   0.284(Ft.), Average velocity =   1.861(Ft/s)
Flow width (from curb towards crown)=   7.360(Ft.)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station       20.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
A.3
Estimated mean flow rate at midpoint of channel =      2.711(CFS)
Depth of flow =   0.527(Ft.), Average velocity =   4.880(Ft/s)
      ******* Irregular Channel Data ***********
----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              1.00
      2              2.00              0.00
      3              4.00              1.00
Manning's 'N' friction factor =   0.015
----------------------------------------------------------------
Sub-Channel flow  =      2.711(CFS)
  '     '    flow top width =      2.108(Ft.)
  '     '    velocity=    4.880(Ft/s)
  '     '    area =      0.555(Sq.Ft)
  '     '    Froude number =     1.675

Upstream point elevation =    73.650(Ft.)
Downstream point elevation =    72.400(Ft.)
Flow length =    75.000(Ft.)
Travel time  =    0.26 min.
Time of concentration =    8.34 min.
Depth of flow =   0.527(Ft.)
Average velocity =   4.880(Ft/s)
Total irregular channel flow =     2.711(CFS)
Irregular channel normal depth above invert elev. =   0.527(Ft.)
Average velocity of channel(s) =   4.880(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      5.116(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.270 given for subarea
Rainfall intensity =      5.116(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.526  CA =      0.578
Subarea runoff =      0.560(CFS) for      0.440(Ac.)
Total runoff =      2.958(CFS)      Total area =       1.100(Ac.)
Depth of flow =   0.545(Ft.), Average velocity =   4.987(Ft/s)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station       25.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____________________________________________________________________
Upstream point/station elevation =    67.900(Ft.)
Downstream point/station elevation =    66.800(Ft.)
Pipe length  =   112.00(Ft.) Slope =   0.0098  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.958(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     2.958(CFS)
Normal flow depth in pipe =    6.56(In.)
Flow top width inside pipe =   17.33(In.)
Critical Depth =    7.83(In.)
Pipe flow velocity =      5.07(Ft/s)
Travel time through pipe =    0.37 min.
Time of concentration (TC) =     8.70 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       25.000 to Point/Station       25.000
**** CONFLUENCE OF MINOR STREAMS ****
_____________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.100(Ac.)
Runoff from this stream =      2.958(CFS)
Time of concentration =    8.70 min.
Rainfall intensity =     4.975(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                  (In/Hr)

1        2.958      8.70               4.975
Qmax(1) =
         1.000 *    1.000 *     2.958) + =       2.958

Total of 1 streams to confluence:
Flow rates before confluence point:
       2.958
Maximum flow rates at confluence using above data:
        2.958
Area of streams before confluence:
        1.100
Results of confluence:
Total flow rate =      2.958(CFS)
Time of concentration =     8.705 min.
Effective stream area after confluence =      1.100(Ac.)
```

BASIN B

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       30.000 to Point/Station       35.000
**** INITIAL AREA EVALUATION ****
```

B.1

```
_____________________________________________________________________
Decimal fraction soil group A = 0.000
```

```
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
(Limited Industrial       )
Impervious value, Ai = 0.900
Sub-Area C Value = 0.850
Initial subarea total flow distance  =   65.000(Ft.)
Highest elevation =   77.500(Ft.)
Lowest elevation =   77.000(Ft.)
Elevation difference =    0.500(Ft.) Slope =  0.769 %
Top of Initial Area Slope adjusted by User to  1.400 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 60.00 (Ft)
for the top area slope value of   1.40 %, in a development type of
 Limited Industrial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   3.12 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8500)*(  60.000^.5)/(   1.400^(1/3)]=   3.12
Calculated TC of    3.116 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      7.114(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.850
Subarea runoff =      0.242(CFS)
Total initial stream area =        0.040(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       35.000 to Point/Station       40.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
```

B.2

```
Top of street segment elevation =    77.000(Ft.)
End of street segment elevation =    73.650(Ft.)
Length of street segment  =   275.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  19.000(Ft.)
Distance from crown to crossfall grade break  =  17.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      2.302(CFS)
Depth of flow =   0.273(Ft.), Average velocity =   2.028(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   6.819(Ft.)
Flow velocity =   2.03(Ft/s)
Travel time =    2.26 min.     TC =    5.38  min.
 Adding area flow to street
Rainfall intensity (I) =      6.789(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.710 given for subarea
```

```
Rainfall intensity =      6.789(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.716  CA =      0.666
Subarea runoff =      4.279(CFS) for      0.890(Ac.)
Total runoff =      4.521(CFS)      Total area =       0.930(Ac.)
Street flow at end of street =      4.521(CFS)
Half street flow at end of street =      2.260(CFS)
Depth of flow =   0.322(Ft.), Average velocity =   2.356(Ft/s)
Flow width (from curb towards crown)=   9.256(Ft.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       40.000 to Point/Station       25.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    68.400(Ft.)
Downstream point/station elevation =    66.800(Ft.)
Pipe length  =    17.00(Ft.) Slope =   0.0941  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.521(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     4.521(CFS)
Normal flow depth in pipe =    4.55(In.)
Flow top width inside pipe =   15.65(In.)
Critical Depth =    9.80(In.)
Pipe flow velocity =     12.86(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =     5.40 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       25.000 to Point/Station       25.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.930(Ac.)
Runoff from this stream =      4.521(CFS)
Time of concentration =    5.40 min.
Rainfall intensity =     6.771(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)

1        2.958      8.70               4.975
2        4.521      5.40               6.771
Qmax(1) =
         1.000 *    1.000 *     2.958) +
         0.735 *    1.000 *     4.521) + =       6.279
Qmax(2) =
         1.000 *    0.620 *     2.958) +
         1.000 *    1.000 *     4.521) + =       6.355

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.958       4.521
Maximum flow rates at confluence using above data:
        6.279        6.355
Area of streams before confluence:
```

```
        1.100        0.930
Results of confluence:
Total flow rate =      6.355(CFS)
Time of concentration =     5.398 min.
Effective stream area after confluence =      2.030(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       25.000 to Point/Station       45.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    66.800(Ft.)
Downstream point/station elevation =    65.680(Ft.)
Pipe length  =   408.00(Ft.) Slope =   0.0027  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.355(CFS)
Given pipe size =     18.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
0.574(Ft.)  at the headworks or inlet of the pipe(s)
Pipe friction loss =      1.493(Ft.)
Minor friction loss =      0.201(Ft.)     K-factor =   1.00
Pipe flow velocity =      3.60(Ft/s)
Travel time through pipe =    1.89 min.
Time of concentration (TC) =     7.29 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       45.000 to Point/Station       45.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.030(Ac.)
Runoff from this stream =      6.355(CFS)
Time of concentration =    7.29 min.
Rainfall intensity =     5.579(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                  (In/Hr)


1        6.355      7.29               5.579
Qmax(1) =
         1.000 *    1.000 *     6.355) + =       6.355

Total of 1 streams to confluence:
Flow rates before confluence point:
       6.355
Maximum flow rates at confluence using above data:
        6.355
Area of streams before confluence:
        2.030
Results of confluence:
Total flow rate =      6.355(CFS)
Time of concentration =     7.288 min.
Effective stream area after confluence =      2.030(Ac.)
```

BASIN C

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       50.000 to Point/Station       55.000
**** INITIAL AREA EVALUATION ****
```

C.1

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[MEDIUM DENSITY RESIDENTIAL                  ]
(14.5 DU/A or Less      )
Impervious value, Ai = 0.500
Sub-Area C Value = 0.630
Initial subarea total flow distance  =   65.000(Ft.)
Highest elevation =   83.600(Ft.)
Lowest elevation =   82.300(Ft.)
Elevation difference =    1.300(Ft.) Slope =  2.000 %
Top of Initial Area Slope adjusted by User to  1.500 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   1.50 %, in a development type of
 14.5 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   6.61 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.6300)*(  80.000^.5)/(   1.500^(1/3)]=   6.61
Rainfall intensity (I) =      5.941(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.630
Subarea runoff =      0.299(CFS)
Total initial stream area =        0.080(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       55.000 to Point/Station       60.000
**** IMPROVED CHANNEL TRAVEL TIME ****
```

C.2

```
Upstream point elevation =    82.300(Ft.)
Downstream point elevation =    73.850(Ft.)
Channel length thru subarea  =   275.000(Ft.)
Channel base width      =    5.000(Ft.)
Slope or 'Z' of left channel bank =   8.000
Slope or 'Z' of right channel bank =   8.000
Estimated mean flow rate at midpoint of channel =      1.703(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    0.250(Ft.)
Flow(q) thru subarea =      1.703(CFS)
Depth of flow =   0.091(Ft.), Average velocity =   3.250(Ft/s)
Channel flow top width =    6.463(Ft.)
Flow Velocity =    3.25(Ft/s)
Travel time  =    1.41 min.
Time of concentration =    8.02 min.
Critical depth =      0.142(Ft.)
 Adding area flow to channel
Rainfall intensity (I) =      5.245(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.730 given for subarea
```

```
Rainfall intensity =      5.245(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.720  CA =      0.598
Subarea runoff =      2.836(CFS) for      0.750(Ac.)
Total runoff =      3.136(CFS)      Total area =       0.830(Ac.)
Depth of flow =   0.130(Ft.), Average velocity =   4.000(Ft/s)
Critical depth =      0.205(Ft.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       64.000 to Point/Station       64.000
**** 6 HOUR HYDROGRAPH ****
________________________________________________________________________
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Hydrograph Data - Section 6, San Diego County Hydrology manual,June 2003

Time of Concentration =   8.03
Basin Area =    12.49 Acres
6 Hour Rainfall =  2.700 Inches
Runoff Coefficient =  0.048
Peak Discharge =     3.13 CFS
     Time (Min)     Discharge (CFS)
       0               0.000
       8               0.096
       16               0.098
       24               0.101
       32               0.102
       40               0.106
       48               0.108
       56               0.112
       64               0.114
       72               0.118
       80               0.120
       88               0.126
       96               0.129
       104               0.135
       112               0.138
       120               0.146
       128               0.150
       136               0.159
       144               0.164
       152               0.176
       160               0.183
       168               0.199
       176               0.208
       184               0.231
       192               0.245
       200               0.281
       208               0.304
       216               0.372
       224               0.424
       232               0.622
       240               0.876
       248               3.134
       256               0.499
       264               0.334
       272               0.261
```

280	0.219
288	0.190
296	0.170
304	0.154
312	0.142
320	0.132
328	0.123
336	0.116
344	0.110
352	0.104
360	0.099
368	0.095

++

6 - H O U R S T O R M

R u n o f f H y d r o g r a p h

Hydrograph in 1 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	0.8	1.6	2.4	3.1
0+ 0	0.0000	0.00	Q	|	|	|	|
0+ 1	0.0000	0.01	Q	|	|	|	|
0+ 2	0.0000	0.02	Q	|	|	|	|
0+ 3	0.0001	0.04	Q	|	|	|	|
0+ 4	0.0002	0.05	Q	|	|	|	|
0+ 5	0.0002	0.06	Q	|	|	|	|
0+ 6	0.0003	0.07	Q	|	|	|	|
0+ 7	0.0005	0.08	VQ	|	|	|	|
0+ 8	0.0006	0.10	VQ	|	|	|	|
0+ 9	0.0007	0.10	VQ	|	|	|	|
0+10	0.0009	0.10	VQ	|	|	|	|
0+11	0.0010	0.10	VQ	|	|	|	|
0+12	0.0011	0.10	VQ	|	|	|	|
0+13	0.0013	0.10	VQ	|	|	|	|
0+14	0.0014	0.10	VQ	|	|	|	|
0+15	0.0015	0.10	VQ	|	|	|	|
0+16	0.0017	0.10	VQ	|	|	|	|
0+17	0.0018	0.10	VQ	|	|	|	|
0+18	0.0019	0.10	VQ	|	|	|	|
0+19	0.0021	0.10	VQ	|	|	|	|
0+20	0.0022	0.10	VQ	|	|	|	|
0+21	0.0024	0.10	VQ	|	|	|	|
0+22	0.0025	0.10	VQ	|	|	|	|
0+23	0.0026	0.10	VQ	|	|	|	|
0+24	0.0028	0.10	VQ	|	|	|	|
0+25	0.0029	0.10	VQ	|	|	|	|
0+26	0.0030	0.10	VQ	|	|	|	|
0+27	0.0032	0.10	VQ	|	|	|	|
0+28	0.0033	0.10	VQ	|	|	|	|
0+29	0.0035	0.10	|Q	|	|	|	|
0+30	0.0036	0.10	|Q	|	|	|	|
0+31	0.0037	0.10	|Q	|	|	|	|
0+32	0.0039	0.10	|Q	|	|	|	|
0+33	0.0040	0.10	|Q	|	|	|	|
0+34	0.0042	0.10	|Q	|	|	|	|

0+35	0.0043	0.10	|Q	|	|	|	|
0+36	0.0045	0.10	|Q	|	|	|	|
0+37	0.0046	0.10	|Q	|	|	|	|
0+38	0.0047	0.10	|Q	|	|	|	|
0+39	0.0049	0.11	|Q	|	|	|	|
0+40	0.0050	0.11	|Q	|	|	|	|
0+41	0.0052	0.11	|Q	|	|	|	|
0+42	0.0053	0.11	|Q	|	|	|	|
0+43	0.0055	0.11	|Q	|	|	|	|
0+44	0.0056	0.11	|Q	|	|	|	|
0+45	0.0058	0.11	|Q	|	|	|	|
0+46	0.0059	0.11	|Q	|	|	|	|
0+47	0.0061	0.11	|Q	|	|	|	|
0+48	0.0062	0.11	|Q	|	|	|	|
0+49	0.0064	0.11	|Q	|	|	|	|
0+50	0.0065	0.11	|Q	|	|	|	|
0+51	0.0067	0.11	|Q	|	|	|	|
0+52	0.0068	0.11	|QV	|	|	|	|
0+53	0.0070	0.11	|QV	|	|	|	|
0+54	0.0071	0.11	|QV	|	|	|	|
0+55	0.0073	0.11	|QV	|	|	|	|
0+56	0.0074	0.11	|QV	|	|	|	|
0+57	0.0076	0.11	|QV	|	|	|	|
0+58	0.0077	0.11	|QV	|	|	|	|
0+59	0.0079	0.11	|QV	|	|	|	|
1+ 0	0.0080	0.11	|QV	|	|	|	|
1+ 1	0.0082	0.11	|QV	|	|	|	|
1+ 2	0.0084	0.11	|QV	|	|	|	|
1+ 3	0.0085	0.11	|QV	|	|	|	|
1+ 4	0.0087	0.11	|QV	|	|	|	|
1+ 5	0.0088	0.11	|QV	|	|	|	|
1+ 6	0.0090	0.11	|QV	|	|	|	|
1+ 7	0.0091	0.12	|QV	|	|	|	|
1+ 8	0.0093	0.12	|QV	|	|	|	|
1+ 9	0.0095	0.12	|QV	|	|	|	|
1+10	0.0096	0.12	|QV	|	|	|	|
1+11	0.0098	0.12	|QV	|	|	|	|
1+12	0.0099	0.12	|QV	|	|	|	|
1+13	0.0101	0.12	|Q V	|	|	|	|
1+14	0.0103	0.12	|Q V	|	|	|	|
1+15	0.0104	0.12	|Q V	|	|	|	|
1+16	0.0106	0.12	|Q V	|	|	|	|
1+17	0.0108	0.12	|Q V	|	|	|	|
1+18	0.0109	0.12	|Q V	|	|	|	|
1+19	0.0111	0.12	|Q V	|	|	|	|
1+20	0.0113	0.12	|Q V	|	|	|	|
1+21	0.0114	0.12	|Q V	|	|	|	|
1+22	0.0116	0.12	|Q V	|	|	|	|
1+23	0.0118	0.12	|Q V	|	|	|	|
1+24	0.0119	0.12	|Q V	|	|	|	|
1+25	0.0121	0.12	|Q V	|	|	|	|
1+26	0.0123	0.12	|Q V	|	|	|	|
1+27	0.0124	0.13	|Q V	|	|	|	|
1+28	0.0126	0.13	|Q V	|	|	|	|
1+29	0.0128	0.13	|Q V	|	|	|	|
1+30	0.0130	0.13	|Q V	|	|	|	|

1+31	0.0131	0.13	|Q V	|	|	|	|
1+32	0.0133	0.13	|Q V	|	|	|	|
1+33	0.0135	0.13	|Q V	|	|	|	|
1+34	0.0137	0.13	|Q V	|	|	|	|
1+35	0.0138	0.13	|Q V	|	|	|	|
1+36	0.0140	0.13	|Q V	|	|	|	|
1+37	0.0142	0.13	|Q V	|	|	|	|
1+38	0.0144	0.13	|Q V	|	|	|	|
1+39	0.0146	0.13	|Q V	|	|	|	|
1+40	0.0147	0.13	|Q V	|	|	|	|
1+41	0.0149	0.13	|Q V	|	|	|	|
1+42	0.0151	0.13	|Q V	|	|	|	|
1+43	0.0153	0.13	|Q V	|	|	|	|
1+44	0.0155	0.13	|Q V	|	|	|	|
1+45	0.0157	0.14	|Q V	|	|	|	|
1+46	0.0159	0.14	|Q V	|	|	|	|
1+47	0.0160	0.14	|Q V	|	|	|	|
1+48	0.0162	0.14	|Q V	|	|	|	|
1+49	0.0164	0.14	|Q V	|	|	|	|
1+50	0.0166	0.14	|Q V	|	|	|	|
1+51	0.0168	0.14	|Q V	|	|	|	|
1+52	0.0170	0.14	|Q V	|	|	|	|
1+53	0.0172	0.14	|Q V	|	|	|	|
1+54	0.0174	0.14	|Q V	|	|	|	|
1+55	0.0176	0.14	|Q V	|	|	|	|
1+56	0.0178	0.14	|Q V	|	|	|	|
1+57	0.0180	0.14	|Q V	|	|	|	|
1+58	0.0182	0.14	|Q V	|	|	|	|
1+59	0.0184	0.14	|Q V	|	|	|	|
2+ 0	0.0186	0.15	|Q V	|	|	|	|
2+ 1	0.0188	0.15	|Q V	|	|	|	|
2+ 2	0.0190	0.15	|Q V	|	|	|	|
2+ 3	0.0192	0.15	|Q V	|	|	|	|
2+ 4	0.0194	0.15	|Q V	|	|	|	|
2+ 5	0.0196	0.15	|Q V	|	|	|	|
2+ 6	0.0198	0.15	|Q V	|	|	|	|
2+ 7	0.0200	0.15	|Q V	|	|	|	|
2+ 8	0.0202	0.15	|Q V	|	|	|	|
2+ 9	0.0204	0.15	|Q V	|	|	|	|
2+10	0.0206	0.15	|Q V	|	|	|	|
2+11	0.0208	0.15	|Q V	|	|	|	|
2+12	0.0210	0.15	|Q V	|	|	|	|
2+13	0.0212	0.16	|Q V	|	|	|	|
2+14	0.0215	0.16	|Q V	|	|	|	|
2+15	0.0217	0.16	| Q V	|	|	|	|
2+16	0.0219	0.16	| Q V	|	|	|	|
2+17	0.0221	0.16	| Q V	|	|	|	|
2+18	0.0223	0.16	| Q V	|	|	|	|
2+19	0.0226	0.16	| Q V	|	|	|	|
2+20	0.0228	0.16	| Q V	|	|	|	|
2+21	0.0230	0.16	| Q V	|	|	|	|
2+22	0.0232	0.16	| Q V	|	|	|	|
2+23	0.0234	0.16	| Q V	|	|	|	|
2+24	0.0237	0.16	| Q V	|	|	|	|
2+25	0.0239	0.17	| Q V	|	|	|	|
2+26	0.0241	0.17	| Q V	|	|	|	|

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2+27       0.0244      0.17  | Q    V  |          |          |          |
2+28       0.0246      0.17  | Q    V  |          |          |          |
2+29       0.0248      0.17  | Q    V  |          |          |          |
2+30       0.0251      0.17  | Q    V  |          |          |          |
2+31       0.0253      0.17  | Q    V  |          |          |          |
2+32       0.0256      0.18  | Q    V  |          |          |          |
2+33       0.0258      0.18  | Q    V  |          |          |          |
2+34       0.0260      0.18  | Q    V  |          |          |          |
2+35       0.0263      0.18  | Q    V  |          |          |          |
2+36       0.0265      0.18  | Q    V  |          |          |          |
2+37       0.0268      0.18  | Q    V  |          |          |          |
2+38       0.0270      0.18  | Q     V |          |          |          |
2+39       0.0273      0.18  | Q     V |          |          |          |
2+40       0.0275      0.18  | Q     V |          |          |          |
2+41       0.0278      0.18  | Q     V |          |          |          |
2+42       0.0280      0.19  | Q     V |          |          |          |
2+43       0.0283      0.19  | Q     V |          |          |          |
2+44       0.0286      0.19  | Q     V |          |          |          |
2+45       0.0288      0.19  | Q     V |          |          |          |
2+46       0.0291      0.19  | Q     V |          |          |          |
2+47       0.0294      0.20  | Q     V |          |          |          |
2+48       0.0297      0.20  | Q     V |          |          |          |
2+49       0.0299      0.20  | Q     V |          |          |          |
2+50       0.0302      0.20  | Q      V|          |          |          |
2+51       0.0305      0.20  | Q      V|          |          |          |
2+52       0.0308      0.20  | Q      V|          |          |          |
2+53       0.0310      0.20  | Q      V|          |          |          |
2+54       0.0313      0.21  | Q      V|          |          |          |
2+55       0.0316      0.21  | Q      V|          |          |          |
2+56       0.0319      0.21  | Q      V|          |          |          |
2+57       0.0322      0.21  | Q      V|          |          |          |
2+58       0.0325      0.21  | Q      V|          |          |          |
2+59       0.0328      0.22  | Q      V|          |          |          |
3+ 0       0.0331      0.22  | Q      V|          |          |          |
3+ 1       0.0334      0.22  | Q      V|          |          |          |
3+ 2       0.0337      0.23  | Q       V          |          |          |
3+ 3       0.0340      0.23  | Q       V          |          |          |
3+ 4       0.0343      0.23  | Q       V          |          |          |
3+ 5       0.0347      0.23  | Q       V          |          |          |
3+ 6       0.0350      0.23  | Q       V          |          |          |
3+ 7       0.0353      0.24  |  Q      V          |          |          |
3+ 8       0.0356      0.24  |  Q      V          |          |          |
3+ 9       0.0360      0.24  |  Q      V          |          |          |
3+10       0.0363      0.24  |  Q      V          |          |          |
3+11       0.0366      0.24  |  Q      V          |          |          |
3+12       0.0370      0.24  |  Q      |V         |          |          |
3+13       0.0373      0.25  |  Q      |V         |          |          |
3+14       0.0377      0.25  |  Q      |V         |          |          |
3+15       0.0380      0.26  |  Q      |V         |          |          |
3+16       0.0384      0.26  |  Q      |V         |          |          |
3+17       0.0387      0.27  |  Q      |V         |          |          |
3+18       0.0391      0.27  |  Q      |V         |          |          |
3+19       0.0395      0.28  |  Q      |V         |          |          |
3+20       0.0399      0.28  |  Q      |V         |          |          |
3+21       0.0403      0.28  |  Q      | V        |          |          |
3+22       0.0407      0.29  |  Q      | V        |          |          |
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3+23       0.0411      0.29  |  Q       | V        |          |          |
3+24       0.0415      0.29  |  Q       | V        |          |          |
3+25       0.0419      0.30  |  Q       | V        |          |          |
3+26       0.0423      0.30  |  Q       | V        |          |          |
3+27       0.0427      0.30  |  Q       | V        |          |          |
3+28       0.0431      0.30  |  Q       | V        |          |          |
3+29       0.0436      0.31  |  Q       | V        |          |          |
3+30       0.0440      0.32  |   Q      |  V       |          |          |
3+31       0.0444      0.33  |   Q      |  V       |          |          |
3+32       0.0449      0.34  |   Q      |  V       |          |          |
3+33       0.0454      0.35  |   Q      |  V       |          |          |
3+34       0.0459      0.35  |   Q      |  V       |          |          |
3+35       0.0464      0.36  |   Q      |  V       |          |          |
3+36       0.0469      0.37  |   Q      |  V       |          |          |
3+37       0.0474      0.38  |   Q      |   V      |          |          |
3+38       0.0479      0.38  |   Q      |   V      |          |          |
3+39       0.0485      0.39  |   Q      |   V      |          |          |
3+40       0.0490      0.40  |    Q     |   V      |          |          |
3+41       0.0496      0.40  |    Q     |   V      |          |          |
3+42       0.0502      0.41  |    Q     |   V      |          |          |
3+43       0.0507      0.42  |    Q     |    V     |          |          |
3+44       0.0513      0.42  |    Q     |    V     |          |          |
3+45       0.0519      0.45  |    Q     |    V     |          |          |
3+46       0.0526      0.47  |     Q    |    V     |          |          |
3+47       0.0533      0.50  |     Q    |    V     |          |          |
3+48       0.0540      0.52  |     Q    |     V    |          |          |
3+49       0.0547      0.55  |     Q    |     V    |          |          |
3+50       0.0555      0.57  |      Q   |     V    |          |          |
3+51       0.0564      0.60  |      Q   |     V    |          |          |
3+52       0.0572      0.62  |      Q   |      V   |          |          |
3+53       0.0581      0.65  |       Q  |      V   |          |          |
3+54       0.0591      0.69  |       Q  |      V   |          |          |
3+55       0.0600      0.72  |        Q |      V   |          |          |
3+56       0.0611      0.75  |        Q |       V  |          |          |
3+57       0.0621      0.78  |        Q |       V  |          |          |
3+58       0.0633      0.81  |         Q|       V  |          |          |
3+59       0.0644      0.84  |         Q|        V |          |          |
4+ 0       0.0656      0.88  |          |Q       V |          |          |
4+ 1       0.0672      1.16  |          |   Q     V|          |          |
4+ 2       0.0692      1.44  |          |       Q V|          |          |
4+ 3       0.0716      1.72  |          |         |Q         |          |
4+ 4       0.0744      2.01  |          |         | V  Q     |          |
4+ 5       0.0775      2.29  |          |         |  V     Q |          |
4+ 6       0.0810      2.57  |          |         |   V      | Q        |
4+ 7       0.0850      2.85  |          |         |    V     |     Q    |
4+ 8       0.0893      3.13  |          |         |     V    |        Q |
4+ 9       0.0931      2.80  |          |         |      V   |    Q     |
4+10       0.0966      2.47  |          |         |       V  |Q         |
4+11       0.0995      2.15  |          |         |      Q V |          |
4+12       0.1020      1.82  |          |         |  Q       V          |
4+13       0.1041      1.49  |          |       Q |          |V         |
4+14       0.1057      1.16  |          |   Q     |          |V         |
4+15       0.1068      0.83  |          |Q        |          |V         |
4+16       0.1075      0.50  |     Q    |         |          | V        |
4+17       0.1081      0.48  |     Q    |         |          | V        |
4+18       0.1088      0.46  |    Q     |         |          | V        |
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4+19       0.1094      0.44  |    Q     |          |          | V        |
4+20       0.1099      0.42  |    Q     |          |          | V        |
4+21       0.1105      0.40  |    Q     |          |          | V        |
4+22       0.1110      0.38  |   Q      |          |          |  V       |
4+23       0.1115      0.35  |   Q      |          |          |  V       |
4+24       0.1120      0.33  |   Q      |          |          |  V       |
4+25       0.1124      0.32  |   Q      |          |          |  V       |
4+26       0.1128      0.32  |   Q      |          |          |  V       |
4+27       0.1133      0.31  |  Q       |          |          |  V       |
4+28       0.1137      0.30  |  Q       |          |          |  V       |
4+29       0.1141      0.29  |  Q       |          |          |  V       |
4+30       0.1145      0.28  |  Q       |          |          |   V      |
4+31       0.1148      0.27  |  Q       |          |          |   V      |
4+32       0.1152      0.26  |  Q       |          |          |   V      |
4+33       0.1155      0.26  |  Q       |          |          |   V      |
4+34       0.1159      0.25  |  Q       |          |          |   V      |
4+35       0.1162      0.25  |  Q       |          |          |   V      |
4+36       0.1166      0.24  |  Q       |          |          |   V      |
4+37       0.1169      0.23  | Q        |          |          |   V      |
4+38       0.1172      0.23  | Q        |          |          |   V      |
4+39       0.1175      0.22  | Q        |          |          |    V     |
4+40       0.1178      0.22  | Q        |          |          |    V     |
4+41       0.1181      0.22  | Q        |          |          |    V     |
4+42       0.1184      0.21  | Q        |          |          |    V     |
4+43       0.1187      0.21  | Q        |          |          |    V     |
4+44       0.1190      0.20  | Q        |          |          |    V     |
4+45       0.1192      0.20  | Q        |          |          |    V     |
4+46       0.1195      0.20  | Q        |          |          |    V     |
4+47       0.1198      0.19  | Q        |          |          |    V     |
4+48       0.1200      0.19  | Q        |          |          |    V     |
4+49       0.1203      0.19  | Q        |          |          |    V     |
4+50       0.1206      0.19  | Q        |          |          |    V     |
4+51       0.1208      0.18  | Q        |          |          |     V    |
4+52       0.1210      0.18  | Q        |          |          |     V    |
4+53       0.1213      0.18  | Q        |          |          |     V    |
4+54       0.1215      0.17  | Q        |          |          |     V    |
4+55       0.1218      0.17  | Q        |          |          |     V    |
4+56       0.1220      0.17  | Q        |          |          |     V    |
4+57       0.1222      0.17  | Q        |          |          |     V    |
4+58       0.1225      0.17  | Q        |          |          |     V    |
4+59       0.1227      0.16  | Q        |          |          |     V    |
5+ 0       0.1229      0.16  | Q        |          |          |     V    |
5+ 1       0.1231      0.16  | Q        |          |          |     V    |
5+ 2       0.1234      0.16  | Q        |          |          |     V    |
5+ 3       0.1236      0.16  |Q         |          |          |     V    |
5+ 4       0.1238      0.15  |Q         |          |          |     V    |
5+ 5       0.1240      0.15  |Q         |          |          |     V    |
5+ 6       0.1242      0.15  |Q         |          |          |      V   |
5+ 7       0.1244      0.15  |Q         |          |          |      V   |
5+ 8       0.1246      0.15  |Q         |          |          |      V   |
5+ 9       0.1248      0.15  |Q         |          |          |      V   |
5+10       0.1250      0.14  |Q         |          |          |      V   |
5+11       0.1252      0.14  |Q         |          |          |      V   |
5+12       0.1254      0.14  |Q         |          |          |      V   |
5+13       0.1256      0.14  |Q         |          |          |      V   |
5+14       0.1258      0.14  |Q         |          |          |      V   |
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    5+15       0.1260      0.14  |Q        |          |          |       V  |
    5+16       0.1262      0.14  |Q        |          |          |       V  |
    5+17       0.1264      0.14  |Q        |          |          |       V  |
    5+18       0.1265      0.13  |Q        |          |          |       V  |
    5+19       0.1267      0.13  |Q        |          |          |       V  |
    5+20       0.1269      0.13  |Q        |          |          |       V  |
    5+21       0.1271      0.13  |Q        |          |          |       V  |
    5+22       0.1273      0.13  |Q        |          |          |       V  |
    5+23       0.1274      0.13  |Q        |          |          |       V  |
    5+24       0.1276      0.13  |Q        |          |          |        V |
    5+25       0.1278      0.13  |Q        |          |          |        V |
    5+26       0.1280      0.13  |Q        |          |          |        V |
    5+27       0.1281      0.12  |Q        |          |          |        V |
    5+28       0.1283      0.12  |Q        |          |          |        V |
    5+29       0.1285      0.12  |Q        |          |          |        V |
    5+30       0.1286      0.12  |Q        |          |          |        V |
    5+31       0.1288      0.12  |Q        |          |          |        V |
    5+32       0.1290      0.12  |Q        |          |          |        V |
    5+33       0.1291      0.12  |Q        |          |          |        V |
    5+34       0.1293      0.12  |Q        |          |          |        V |
    5+35       0.1294      0.12  |Q        |          |          |        V |
    5+36       0.1296      0.12  |Q        |          |          |        V |
    5+37       0.1298      0.12  |Q        |          |          |        V |
    5+38       0.1299      0.11  |Q        |          |          |        V |
    5+39       0.1301      0.11  |Q        |          |          |        V |
    5+40       0.1302      0.11  |Q        |          |          |        V |
    5+41       0.1304      0.11  |Q        |          |          |        V |
    5+42       0.1305      0.11  |Q        |          |          |        V |
    5+43       0.1307      0.11  |Q        |          |          |        V |
    5+44       0.1308      0.11  |Q        |          |          |        V |
    5+45       0.1310      0.11  |Q        |          |          |         V|
    5+46       0.1311      0.11  |Q        |          |          |         V|
    5+47       0.1313      0.11  |Q        |          |          |         V|
    5+48       0.1314      0.11  |Q        |          |          |         V|
    5+49       0.1316      0.11  |Q        |          |          |         V|
    5+50       0.1317      0.11  |Q        |          |          |         V|
    5+51       0.1319      0.10  |Q        |          |          |         V|
    5+52       0.1320      0.10  |Q        |          |          |         V|
    5+53       0.1322      0.10  |Q        |          |          |         V|
    5+54       0.1323      0.10  |Q        |          |          |         V|
    5+55       0.1324      0.10  |Q        |          |          |         V|
    5+56       0.1326      0.10  |Q        |          |          |         V|
    5+57       0.1327      0.10  |Q        |          |          |         V|
    5+58       0.1329      0.10  |Q        |          |          |         V|
    5+59       0.1330      0.10  |Q        |          |          |         V|
    6+ 0       0.1331      0.10  |Q        |          |          |         V|
    6+ 1       0.1333      0.10  |Q        |          |          |         V|
    6+ 2       0.1334      0.10  |Q        |          |          |         V|
    6+ 3       0.1335      0.10  |Q        |          |          |         V|
    6+ 4       0.1337      0.10  |Q        |          |          |         V|
    6+ 5       0.1338      0.10  |Q        |          |          |         V|
    6+ 6       0.1339      0.10  |Q        |          |          |         V|
    6+ 7       0.1341      0.10  |Q        |          |          |         V|
    6+ 8       0.1342      0.10  |Q        |          |          |          V
---------------------------------------------------------------------------
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       60.000 to Point/Station       45.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    69.350(Ft.)
Downstream point/station elevation =    65.680(Ft.)
Pipe length  =    50.00(Ft.) Slope =   0.0734  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.136(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     3.136(CFS)
Normal flow depth in pipe =    4.71(In.)
Flow top width inside pipe =   11.72(In.)
Critical Depth =    9.10(In.)
Pipe flow velocity =     10.98(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =     8.10 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       45.000 to Point/Station       45.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.830(Ac.)
Runoff from this stream =      3.136(CFS)
Time of concentration =    8.10 min.
Rainfall intensity =     5.213(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        6.355      7.29               5.579
2        3.136      8.10               5.213
Qmax(1) =
         1.000 *    1.000 *     6.355) +
         1.000 *    0.900 *     3.136) + =       9.178
Qmax(2) =
         0.934 *    1.000 *     6.355) +
         1.000 *    1.000 *     3.136) + =       9.074

Total of 2 streams to confluence:
Flow rates before confluence point:
       6.355       3.136
Maximum flow rates at confluence using above data:
        9.178        9.074
Area of streams before confluence:
        2.030        0.830
Results of confluence:
Total flow rate =      9.178(CFS)
Time of concentration =     7.288 min.
Effective stream area after confluence =      2.860(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       45.000 to Point/Station      200.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    65.680(Ft.)
Downstream point/station elevation =    51.630(Ft.)
Pipe length  =   144.00(Ft.) Slope =   0.0976  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.178(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     9.178(CFS)
Normal flow depth in pipe =    6.51(In.)
Flow top width inside pipe =   17.30(In.)
Critical Depth =   14.05(In.)
Pipe flow velocity =     15.92(Ft/s)
Travel time through pipe =    0.15 min.
Time of concentration (TC) =     7.44 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      200.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.860(Ac.)
Runoff from this stream =      9.178(CFS)
Time of concentration =    7.44 min.
Rainfall intensity =     5.506(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       30.368     10.90               4.303
2        9.178      7.44               5.506
Qmax(1) =
         1.000 *    1.000 *    30.368) +
         0.782 *    1.000 *     9.178) + =      37.540
Qmax(2) =
         1.000 *    0.682 *    30.368) +
         1.000 *    1.000 *     9.178) + =      29.900

Total of 2 main streams to confluence:
Flow rates before confluence point:
      30.368       9.178
Maximum flow rates at confluence using above data:
       37.540       29.900
Area of streams before confluence:
        9.630        2.860


Results of confluence:
Total flow rate =     37.540(CFS)
Time of concentration =    10.902 min.
Effective stream area after confluence  =     12.490(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      205.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    51.630(Ft.)
Downstream point/station elevation =    51.100(Ft.)
Pipe length  =    55.00(Ft.) Slope =   0.0096  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    37.540(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    37.540(CFS)
Normal flow depth in pipe =   22.95(In.)
Flow top width inside pipe =   25.45(In.)
Critical Depth =   24.87(In.)
Pipe flow velocity =      9.32(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =    11.00 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      205.000 to Point/Station      205.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     12.490(Ac.)
Runoff from this stream =     37.540(CFS)
Time of concentration =   11.00 min.
Rainfall intensity =     4.278(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       37.540     11.00               4.278
Qmax(1) =
         1.000 *    1.000 *    37.540) + =      37.540

Total of 1 main streams to confluence:
Flow rates before confluence point:
      37.540
Maximum flow rates at confluence using above data:
       37.540
Area of streams before confluence:
       12.490


Results of confluence:
Total flow rate =     37.540(CFS)
Time of concentration =    11.000 min.
Effective stream area after confluence  =     12.490(Ac.)
```

BASIN G

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       61.000 to Point/Station      210.000
**** INITIAL AREA EVALUATION ****
```

G.1

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.300
Initial subarea total flow distance  =  100.000(Ft.)
Highest elevation =  108.000(Ft.)
Lowest elevation =   92.500(Ft.)
Elevation difference =   15.500(Ft.) Slope = 15.500 %
Top of Initial Area Slope adjusted by User to 10.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of  10.00 %, in a development type of
 Permanent Open Space
In Accordance With Figure 3-3
Initial Area Time of Concentration =   6.68 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.3000)*( 100.000^.5)/(  10.000^(1/3)]=   6.68
Rainfall intensity (I) =      5.899(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.300
Subarea runoff =      0.142(CFS)
Total initial stream area =        0.080(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      210.000 to Point/Station      215.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
```

G.2

```
Top of street segment elevation =    92.500(Ft.)
End of street segment elevation =    78.900(Ft.)
Length of street segment  =   790.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  19.000(Ft.)
Distance from crown to crossfall grade break  =  17.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      2.864(CFS)
Depth of flow =   0.276(Ft.), Average velocity =   2.435(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   6.969(Ft.)
```

```
Flow velocity =   2.43(Ft/s)
Travel time =    5.41 min.     TC =   12.09  min.
 Adding area flow to street
Rainfall intensity (I) =      4.025(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.630 given for subarea
Rainfall intensity =      4.025(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.618  CA =      1.416
Subarea runoff =      5.558(CFS) for      2.210(Ac.)
Total runoff =      5.700(CFS)      Total area =       2.290(Ac.)
Street flow at end of street =      5.700(CFS)
Half street flow at end of street =      2.850(CFS)
Depth of flow =   0.327(Ft.), Average velocity =   2.839(Ft/s)
Flow width (from curb towards crown)=   9.493(Ft.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      215.000 to Point/Station      218.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    74.560(Ft.)
Downstream point/station elevation =    74.090(Ft.)
Pipe length  =    52.00(Ft.) Slope =   0.0090  Manning's N = 0.013
No. of pipes = 2  Required pipe flow  =     5.700(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     2.850(CFS)
Normal flow depth in pipe =    6.58(In.)
Flow top width inside pipe =   17.34(In.)
Critical Depth =    7.69(In.)
Pipe flow velocity =      4.87(Ft/s)
Travel time through pipe =    0.18 min.
Time of concentration (TC) =    12.27 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      215.000 to Point/Station      225.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.290(Ac.)
Runoff from this stream =      5.700(CFS)
Time of concentration =   12.27 min.
Rainfall intensity =     3.987(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                  (In/Hr)

1        5.700     12.27               3.987
Qmax(1) =
         1.000 *    1.000 *     5.700) + =       5.700

Total of 1 streams to confluence:
Flow rates before confluence point:
       5.700
Maximum flow rates at confluence using above data:
        5.700
Area of streams before confluence:
```

```
        2.290
Results of confluence:
Total flow rate =      5.700(CFS)
Time of concentration =    12.270 min.
Effective stream area after confluence =      2.290(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       85.000 to Point/Station      220.000
**** INITIAL AREA EVALUATION ****
```

G.3

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
(General Industrial       )
Impervious value, Ai = 0.950
Sub-Area C Value = 0.870
Initial subarea total flow distance  =   65.000(Ft.)
Highest elevation =   88.900(Ft.)
Lowest elevation =   88.100(Ft.)
Elevation difference =    0.800(Ft.) Slope =  1.231 %
Top of Initial Area Slope adjusted by User to  1.300 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 60.00 (Ft)
for the top area slope value of   1.30 %, in a development type of
 General Industrial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   2.94 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8700)*(  60.000^.5)/(   1.300^(1/3)]=   2.94
Calculated TC of    2.938 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      7.114(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.870
Subarea runoff =      0.248(CFS)
Total initial stream area =        0.040(Ac.)

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Process from Point/Station      220.000 to Point/Station      225.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
```

G.4

```
Top of street segment elevation =    88.100(Ft.)
End of street segment elevation =    79.000(Ft.)
Length of street segment  =   418.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  19.000(Ft.)
Distance from crown to crossfall grade break  =  17.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
```

```
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      0.962(CFS)
Depth of flow =   0.203(Ft.), Average velocity =   2.246(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   3.340(Ft.)
Flow velocity =   2.25(Ft/s)
Travel time =    3.10 min.     TC =    6.04  min.
 Adding area flow to street
Rainfall intensity (I) =      6.298(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.900 given for subarea
Rainfall intensity =      6.298(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.896  CA =      0.296
Subarea runoff =      1.615(CFS) for      0.290(Ac.)
Total runoff =      1.863(CFS)      Total area =       0.330(Ac.)
Street flow at end of street =      1.863(CFS)
Half street flow at end of street =      0.931(CFS)
Depth of flow =   0.242(Ft.), Average velocity =   2.454(Ft/s)
Flow width (from curb towards crown)=   5.263(Ft.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      225.000 to Point/Station      218.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    74.150(Ft.)
Downstream point/station elevation =    74.090(Ft.)
Pipe length  =     3.00(Ft.) Slope =   0.0200  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.863(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     1.863(CFS)
Normal flow depth in pipe =    4.30(In.)
Flow top width inside pipe =   15.36(In.)
Critical Depth =    6.16(In.)
Pipe flow velocity =      5.74(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =     6.05 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      220.000 to Point/Station      225.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.330(Ac.)
Runoff from this stream =      1.863(CFS)
Time of concentration =    6.05 min.
Rainfall intensity =     6.292(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)

1        5.700     12.27               3.987
2        1.863      6.05               6.292
Qmax(1) =
         1.000 *    1.000 *     5.700) +
```

```
         0.634 *    1.000 *     1.863) + =       6.881
Qmax(2) =
         1.000 *    0.493 *     5.700) +
         1.000 *    1.000 *     1.863) + =       4.673

Total of 2 streams to confluence:
Flow rates before confluence point:
       5.700       1.863
Maximum flow rates at confluence using above data:
        6.881        4.673
Area of streams before confluence:
        2.290        0.330
Results of confluence:
Total flow rate =      6.881(CFS)
Time of concentration =    12.270 min.
Effective stream area after confluence =      2.620(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      218.000 to Point/Station      230.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    74.090(Ft.)
Downstream point/station elevation =    69.500(Ft.)
Pipe length  =   470.00(Ft.) Slope =   0.0098  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.881(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     6.881(CFS)
Normal flow depth in pipe =   10.71(In.)
Flow top width inside pipe =   17.67(In.)
Critical Depth =   12.19(In.)
Pipe flow velocity =      6.28(Ft/s)
Travel time through pipe =    1.25 min.
Time of concentration (TC) =    13.52 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      230.000 to Point/Station      230.000
**** SUBAREA FLOW ADDITION ****
G.5
________________________________________________________________________
Rainfall intensity (I) =      3.746(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.780 given for subarea
Time of concentration =    13.52 min.
Rainfall intensity =      3.746(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.693  CA =      2.625
Subarea runoff =      2.951(CFS) for      1.170(Ac.)
Total runoff =      9.831(CFS)      Total area =       3.790(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      230.000 to Point/Station      231.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    67.030(Ft.)
Downstream point/station elevation =    63.660(Ft.)
Pipe length  =   205.30(Ft.) Slope =   0.0164  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.831(CFS)
Given pipe size =     18.00(In.)
```

```
Calculated individual pipe flow  =     9.831(CFS)
Normal flow depth in pipe =   11.41(In.)
Flow top width inside pipe =   17.34(In.)
Critical Depth =   14.51(In.)
Pipe flow velocity =      8.31(Ft/s)
Travel time through pipe =    0.41 min.
Time of concentration (TC) =    13.93 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      231.000 to Point/Station      232.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    63.660(Ft.)
Downstream point/station elevation =    58.800(Ft.)
Pipe length  =    41.80(Ft.) Slope =   0.1163  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.831(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     9.831(CFS)
Normal flow depth in pipe =    6.45(In.)
Flow top width inside pipe =   17.26(In.)
Critical Depth =   14.51(In.)
Pipe flow velocity =     17.29(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    13.97 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      232.000 to Point/Station      235.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    58.800(Ft.)
Downstream point/station elevation =    55.600(Ft.)
Pipe length  =    79.40(Ft.) Slope =   0.0403  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.831(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     9.831(CFS)
Normal flow depth in pipe =    8.64(In.)
Flow top width inside pipe =   17.99(In.)
Critical Depth =   14.51(In.)
Pipe flow velocity =     11.72(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    14.08 min.


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Process from Point/Station      230.000 to Point/Station      235.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      3.790(Ac.)
Runoff from this stream =      9.831(CFS)
Time of concentration =   14.08 min.
Rainfall intensity =     3.648(In/Hr)
Summary of stream data:
Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)
```

```
1        9.831     14.08               3.648
Qmax(1) =
         1.000 *    1.000 *     9.831) + =       9.831

Total of 1 streams to confluence:
Flow rates before confluence point:
       9.831
Maximum flow rates at confluence using above data:
        9.831
Area of streams before confluence:
        3.790
Results of confluence:
Total flow rate =      9.831(CFS)
Time of concentration =    14.082 min.
Effective stream area after confluence =      3.790(Ac.)
```

BASIN I

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      240.000 to Point/Station      245.000
**** INITIAL AREA EVALUATION ****
```

I.1

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                 ]
(14.5 DU/A or Less      )
Impervious value, Ai = 0.500
Sub-Area C Value = 0.600
Initial subarea total flow distance  =  100.000(Ft.)
Highest elevation =   66.400(Ft.)
Lowest elevation =   60.500(Ft.)
Elevation difference =    5.900(Ft.) Slope =  5.900 %
Top of Initial Area Slope adjusted by User to  5.500 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   5.50 %, in a development type of
 14.5 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   5.10 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.6000)*( 100.000^.5)/(   5.500^(1/3)]=   5.10
Rainfall intensity (I) =      7.025(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.600
Subarea runoff =      0.464(CFS)
Total initial stream area =        0.110(Ac.)

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Process from Point/Station      245.000 to Point/Station      250.000
**** IMPROVED CHANNEL TRAVEL TIME ****
```

I.2

```
Upstream point elevation =    60.500(Ft.)
Downstream point elevation =    58.200(Ft.)
Channel length thru subarea  =   120.000(Ft.)
```

```
Channel base width      =    0.750(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   1.000
Estimated mean flow rate at midpoint of channel =      2.473(CFS)
Manning's 'N'    = 0.005
Maximum depth of channel  =    0.100(Ft.)
Flow(q) thru subarea =      2.473(CFS)
Depth of flow =   0.223(Ft.), Average velocity =  13.408(Ft/s)
Channel flow top width =    0.850(Ft.)
Flow Velocity =   13.41(Ft/s)
Travel time  =    0.15 min.
Time of concentration =    5.25 min.
Critical depth =      0.648(Ft.)
Adding area flow to channel
Rainfall intensity (I) =      6.895(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.790 given for subarea
Rainfall intensity =      6.895(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.766  CA =      0.659
Subarea runoff =      4.077(CFS) for      0.750(Ac.)
Total runoff =      4.541(CFS)      Total area =       0.860(Ac.)
Depth of flow =   0.318(Ft.), Average velocity =  17.097(Ft/s)
!!Warning: Water is above left or right bank elevations
ERROR - Channel depth exceeds maximum allowable depth
Critical depth =      0.969(Ft.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      250.000 to Point/Station      235.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    56.080(Ft.)
Downstream point/station elevation =    55.600(Ft.)
Pipe length  =    98.00(Ft.) Slope =   0.0049  Manning's N = 0.013
No. of pipes = 2  Required pipe flow  =     4.541(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     2.270(CFS)
Normal flow depth in pipe =    8.99(In.)
Flow top width inside pipe =   10.41(In.)
Critical Depth =    7.73(In.)
Pipe flow velocity =      3.60(Ft/s)
Travel time through pipe =    0.45 min.
Time of concentration (TC) =     5.70 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      250.000 to Point/Station      235.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.860(Ac.)
Runoff from this stream =      4.541(CFS)
Time of concentration =    5.70 min.
Rainfall intensity =     6.536(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)
```

```
1        9.831     14.08               3.648
2        4.541      5.70               6.536
Qmax(1) =
         1.000 *    1.000 *     9.831) +
         0.558 *    1.000 *     4.541) + =      12.365
Qmax(2) =
         1.000 *    0.405 *     9.831) +
         1.000 *    1.000 *     4.541) + =       8.521

Total of 2 streams to confluence:
Flow rates before confluence point:
       9.831       4.541
Maximum flow rates at confluence using above data:
       12.365        8.521
Area of streams before confluence:
        3.790        0.860
Results of confluence:
Total flow rate =     12.365(CFS)
Time of concentration =    14.082 min.
Effective stream area after confluence =      4.650(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      235.000 to Point/Station      255.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    55.600(Ft.)
Downstream point/station elevation =    53.500(Ft.)
Pipe length  =    85.00(Ft.) Slope =   0.0247  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.365(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =    12.365(CFS)
Normal flow depth in pipe =   11.63(In.)
Flow top width inside pipe =   17.22(In.)
Critical Depth =   15.93(In.)
Pipe flow velocity =     10.25(Ft/s)
Travel time through pipe =    0.14 min.
Time of concentration (TC) =    14.22 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      255.000 to Point/Station      255.000
**** SUBAREA FLOW ADDITION ****
I.3
________________________________________________________________________
Rainfall intensity (I) =      3.625(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.400 given for subarea
Time of concentration =    14.22 min.
Rainfall intensity =      3.625(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.663  CA =      3.587
Subarea runoff =      0.639(CFS) for      0.760(Ac.)
Total runoff =     13.004(CFS)      Total area =       5.410(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      255.000 to Point/Station      255.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
```

```
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      5.410(Ac.)
Runoff from this stream =     13.004(CFS)
Time of concentration =   14.22 min.
Rainfall intensity =     3.625(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)

1       13.004     14.22               3.625
Qmax(1) =
         1.000 *    1.000 *    13.004) + =      13.004

Total of 1 streams to confluence:
Flow rates before confluence point:
      13.004
Maximum flow rates at confluence using above data:
       13.004
Area of streams before confluence:
        5.410
Results of confluence:
Total flow rate =     13.004(CFS)
Time of concentration =    14.220 min.
Effective stream area after confluence =      5.410(Ac.)
```

BASIN H

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       30.000 to Point/Station      260.000
**** INITIAL AREA EVALUATION ****
H.1
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[HIGH DENSITY RESIDENTIAL                    ]
(43.0 DU/A or Less      )
Impervious value, Ai = 0.800
Sub-Area C Value = 0.790
Initial subarea total flow distance  =   65.000(Ft.)
Highest elevation =   77.500(Ft.)
Lowest elevation =   76.500(Ft.)
Elevation difference =    1.000(Ft.) Slope =  1.538 %
Top of Initial Area Slope adjusted by User to  2.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 75.00 (Ft)
for the top area slope value of   2.00 %, in a development type of
 43.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   3.84 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7900)*(  75.000^.5)/(   2.000^(1/3)]=   3.84
Calculated TC of    3.835 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      7.114(In/Hr) for a   100.0 year storm
```

```
Effective runoff coefficient used for area (Q=KCIA) is C = 0.790
Subarea runoff =      0.225(CFS)
Total initial stream area =        0.040(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      260.000 to Point/Station      265.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
```

H.2

```
Top of street segment elevation =    76.500(Ft.)
End of street segment elevation =    63.800(Ft.)
Length of street segment  =   517.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  19.000(Ft.)
Distance from crown to crossfall grade break  =  17.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      1.195(CFS)
Depth of flow =   0.213(Ft.), Average velocity =   2.417(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   3.805(Ft.)
Flow velocity =   2.42(Ft/s)
Travel time =    3.57 min.     TC =    7.40  min.
 Adding area flow to street
Rainfall intensity (I) =      5.524(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.800 given for subarea
Rainfall intensity =      5.524(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.799  CA =      0.416
Subarea runoff =      2.071(CFS) for      0.480(Ac.)
Total runoff =      2.296(CFS)      Total area =       0.520(Ac.)
Street flow at end of street =      2.296(CFS)
Half street flow at end of street =      1.148(CFS)
Depth of flow =   0.251(Ft.), Average velocity =   2.681(Ft/s)
Flow width (from curb towards crown)=   5.707(Ft.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      265.000 to Point/Station      275.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation =    56.000(Ft.)
Downstream point/station elevation =    55.000(Ft.)
Pipe length  =    46.00(Ft.) Slope =   0.0217  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.296(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     2.296(CFS)
Normal flow depth in pipe =    5.55(In.)
Flow top width inside pipe =   11.97(In.)
Critical Depth =    7.77(In.)
```

```
Pipe flow velocity =      6.46(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =     7.52 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.000 to Point/Station      275.000
**** SUBAREA FLOW ADDITION ****
```
H.3
```
Rainfall intensity (I) =      5.467(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.820 given for subarea
Time of concentration =     7.52 min.
Rainfall intensity =      5.467(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.807  CA =      0.686
Subarea runoff =      1.456(CFS) for      0.330(Ac.)
Total runoff =      3.752(CFS)      Total area =       0.850(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      275.000 to Point/Station      255.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =    55.000(Ft.)
Downstream point/station elevation =    53.500(Ft.)
Pipe length  =    30.00(Ft.) Slope =   0.0500  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.752(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     3.752(CFS)
Normal flow depth in pipe =    4.86(In.)
Flow top width inside pipe =   15.99(In.)
Critical Depth =    8.87(In.)
Pipe flow velocity =      9.73(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =     7.57 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      255.000 to Point/Station      255.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.850(Ac.)
Runoff from this stream =      3.752(CFS)
Time of concentration =    7.57 min.
Rainfall intensity =     5.443(In/Hr)
Summary of stream data:
Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)

1       13.004     14.22               3.625
2        3.752      7.57               5.443
Qmax(1) =
         1.000 *    1.000 *    13.004) +
         0.666 *    1.000 *     3.752) + =      15.502
Qmax(2) =
         1.000 *    0.532 *    13.004) +
         1.000 *    1.000 *     3.752) + =      10.676
Total of 2 streams to confluence:
```

```
Flow rates before confluence point:
      13.004       3.752
Maximum flow rates at confluence using above data:
       15.502       10.676
Area of streams before confluence:
        5.410        0.850
Results of confluence:
Total flow rate =     15.502(CFS)
Time of concentration =    14.220 min.
Effective stream area after confluence =      6.260(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      256.000 to Point/Station      256.000
**** 6 HOUR HYDROGRAPH ****
______________________________________________________________________
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Hydrograph Data - Section 6, San Diego County Hydrology manual,June 2003

Time of Concentration =  14.22
Basin Area =    18.75 Acres
6 Hour Rainfall =  2.700 Inches
Runoff Coefficient =  0.228
Peak Discharge =    15.50 CFS
     Time (Min)     Discharge (CFS)
       0               0.000
       14               0.688
       28               0.725
       42               0.746
       56               0.792
       70               0.818
       84               0.877
       98               0.911
       112               0.990
       126               1.037
       140               1.150
       154               1.220
       168               1.398
       182               1.516
       196               1.853
       210               2.110
       224               3.098
       238               4.366
       252              15.502
       266               2.485
       280               1.663
       294               1.301
       308               1.090
       322               0.948
       336               0.846
       350               0.768
       364               0.706
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                   6 - H O U R    S T O R M
              R u n o f f      H y d r o g r a p h
----------------------------------------------------------------------
            Hydrograph in   1   Minute intervals ((CFS))
```

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	3.9	7.8	11.6	15.5
0+ 0	0.0000	0.00	Q				
0+ 1	0.0001	0.05	Q				
0+ 2	0.0002	0.10	Q				
0+ 3	0.0004	0.15	Q				
0+ 4	0.0007	0.20	Q				
0+ 5	0.0010	0.25	Q				
0+ 6	0.0014	0.29	Q				
0+ 7	0.0019	0.34	Q				
0+ 8	0.0024	0.39	VQ				
0+ 9	0.0030	0.44	VQ				
0+10	0.0037	0.49	VQ				
0+11	0.0045	0.54	VQ				
0+12	0.0053	0.59	VQ				
0+13	0.0062	0.64	VQ				
0+14	0.0071	0.69	VQ				
0+15	0.0081	0.69	VQ				
0+16	0.0090	0.69	VQ				
0+17	0.0100	0.70	VQ				
0+18	0.0109	0.70	VQ				
0+19	0.0119	0.70	VQ				
0+20	0.0129	0.70	VQ				
0+21	0.0138	0.71	VQ				
0+22	0.0148	0.71	VQ				
0+23	0.0158	0.71	VQ				
0+24	0.0168	0.71	VQ				
0+25	0.0178	0.72	VQ				
0+26	0.0188	0.72	VQ				
0+27	0.0198	0.72	VQ				
0+28	0.0208	0.73	VQ				
0+29	0.0218	0.73	VQ				
0+30	0.0228	0.73	VQ				
0+31	0.0238	0.73	|Q				
0+32	0.0248	0.73	|Q				
0+33	0.0258	0.73	|Q				
0+34	0.0268	0.73	|Q				
0+35	0.0278	0.74	|Q				
0+36	0.0288	0.74	|Q				
0+37	0.0298	0.74	|Q				
0+38	0.0309	0.74	|Q				
0+39	0.0319	0.74	|Q				
0+40	0.0329	0.74	|Q				
0+41	0.0339	0.74	|Q				
0+42	0.0350	0.75	|Q				
0+43	0.0360	0.75	|Q				
0+44	0.0370	0.75	|Q				
0+45	0.0381	0.76	|Q				
0+46	0.0391	0.76	|Q				
0+47	0.0402	0.76	|Q				
0+48	0.0412	0.77	|Q				
0+49	0.0423	0.77	|Q				
0+50	0.0433	0.77	|Q				
0+51	0.0444	0.78	|VQ				

```
0+52       0.0455      0.78  |VQ       |          |          |          |
0+53       0.0465      0.78  |VQ       |          |          |          |
0+54       0.0476      0.79  | Q       |          |          |          |
0+55       0.0487      0.79  | Q       |          |          |          |
0+56       0.0498      0.79  | Q       |          |          |          |
0+57       0.0509      0.79  | Q       |          |          |          |
0+58       0.0520      0.80  | Q       |          |          |          |
0+59       0.0531      0.80  | Q       |          |          |          |
1+ 0       0.0542      0.80  | Q       |          |          |          |
1+ 1       0.0553      0.80  | Q       |          |          |          |
1+ 2       0.0564      0.80  | Q       |          |          |          |
1+ 3       0.0575      0.80  | Q       |          |          |          |
1+ 4       0.0586      0.81  | Q       |          |          |          |
1+ 5       0.0597      0.81  | Q       |          |          |          |
1+ 6       0.0609      0.81  | Q       |          |          |          |
1+ 7       0.0620      0.81  | Q       |          |          |          |
1+ 8       0.0631      0.81  | Q       |          |          |          |
1+ 9       0.0642      0.82  | Q       |          |          |          |
1+10       0.0653      0.82  | Q       |          |          |          |
1+11       0.0665      0.82  | Q       |          |          |          |
1+12       0.0676      0.83  | Q       |          |          |          |
1+13       0.0688      0.83  | Q       |          |          |          |
1+14       0.0699      0.83  | Q       |          |          |          |
1+15       0.0711      0.84  | Q       |          |          |          |
1+16       0.0722      0.84  | QV      |          |          |          |
1+17       0.0734      0.85  | QV      |          |          |          |
1+18       0.0746      0.85  | QV      |          |          |          |
1+19       0.0757      0.86  | QV      |          |          |          |
1+20       0.0769      0.86  | QV      |          |          |          |
1+21       0.0781      0.86  | QV      |          |          |          |
1+22       0.0793      0.87  | QV      |          |          |          |
1+23       0.0805      0.87  | QV      |          |          |          |
1+24       0.0817      0.88  | QV      |          |          |          |
1+25       0.0829      0.88  | QV      |          |          |          |
1+26       0.0842      0.88  | QV      |          |          |          |
1+27       0.0854      0.88  | QV      |          |          |          |
1+28       0.0866      0.89  | QV      |          |          |          |
1+29       0.0878      0.89  | QV      |          |          |          |
1+30       0.0890      0.89  | QV      |          |          |          |
1+31       0.0903      0.89  | QV      |          |          |          |
1+32       0.0915      0.90  | QV      |          |          |          |
1+33       0.0927      0.90  | QV      |          |          |          |
1+34       0.0940      0.90  | QV      |          |          |          |
1+35       0.0952      0.90  | Q V     |          |          |          |
1+36       0.0965      0.91  | Q V     |          |          |          |
1+37       0.0977      0.91  | Q V     |          |          |          |
1+38       0.0990      0.91  | Q V     |          |          |          |
1+39       0.1003      0.92  | Q V     |          |          |          |
1+40       0.1015      0.92  | Q V     |          |          |          |
1+41       0.1028      0.93  | Q V     |          |          |          |
1+42       0.1041      0.93  | Q V     |          |          |          |
1+43       0.1054      0.94  | Q V     |          |          |          |
1+44       0.1067      0.94  | Q V     |          |          |          |
1+45       0.1080      0.95  | Q V     |          |          |          |
1+46       0.1093      0.96  | Q V     |          |          |          |
1+47       0.1106      0.96  | Q V     |          |          |          |
```

1+48	0.1120	0.97	Q V			
1+49	0.1133	0.97	Q V			
1+50	0.1147	0.98	Q V			
1+51	0.1160	0.98	Q V			
1+52	0.1174	0.99	Q V			
1+53	0.1187	0.99	Q V			
1+54	0.1201	1.00	Q V			
1+55	0.1215	1.00	Q V			
1+56	0.1229	1.00	Q V			
1+57	0.1243	1.01	Q V			
1+58	0.1257	1.01	Q V			
1+59	0.1270	1.01	Q V			
2+ 0	0.1284	1.02	Q V			
2+ 1	0.1299	1.02	Q V			
2+ 2	0.1313	1.02	Q V			
2+ 3	0.1327	1.03	Q V			
2+ 4	0.1341	1.03	Q V			
2+ 5	0.1355	1.03	Q V			
2+ 6	0.1369	1.04	Q V			
2+ 7	0.1384	1.04	Q V			
2+ 8	0.1398	1.05	Q V			
2+ 9	0.1413	1.06	Q V			
2+10	0.1428	1.07	Q V			
2+11	0.1443	1.08	Q V			
2+12	0.1458	1.09	Q V			
2+13	0.1473	1.09	Q V			
2+14	0.1488	1.10	Q V			
2+15	0.1503	1.11	Q V			
2+16	0.1518	1.12	Q V			
2+17	0.1534	1.13	Q V			
2+18	0.1550	1.13	Q V			
2+19	0.1565	1.14	Q V			
2+20	0.1581	1.15	Q V			
2+21	0.1597	1.15	Q V			
2+22	0.1613	1.16	Q V			
2+23	0.1629	1.16	Q V			
2+24	0.1645	1.17	Q V			
2+25	0.1661	1.17	Q V			
2+26	0.1678	1.18	Q V			
2+27	0.1694	1.18	Q V			
2+28	0.1710	1.19	Q V			
2+29	0.1727	1.19	Q V			
2+30	0.1743	1.20	Q V			
2+31	0.1760	1.20	Q V			
2+32	0.1777	1.21	Q V			
2+33	0.1793	1.21	Q V			
2+34	0.1810	1.22	Q V			
2+35	0.1827	1.23	Q V			
2+36	0.1844	1.25	Q V			
2+37	0.1862	1.26	Q V			
2+38	0.1879	1.27	Q V			
2+39	0.1897	1.28	Q V			
2+40	0.1915	1.30	Q V			
2+41	0.1933	1.31	Q V			
2+42	0.1951	1.32	Q V			
2+43	0.1969	1.33	Q V			

```
2+44       0.1988      1.35  |  Q    V |          |          |          |
2+45       0.2006      1.36  |  Q    V |          |          |          |
2+46       0.2025      1.37  |  Q    V |          |          |          |
2+47       0.2044      1.39  |  Q    V |          |          |          |
2+48       0.2064      1.40  |  Q    V |          |          |          |
2+49       0.2083      1.41  |  Q    V |          |          |          |
2+50       0.2103      1.41  |  Q    V |          |          |          |
2+51       0.2122      1.42  |  Q    V |          |          |          |
2+52       0.2142      1.43  |  Q     V|          |          |          |
2+53       0.2162      1.44  |  Q     V|          |          |          |
2+54       0.2182      1.45  |  Q     V|          |          |          |
2+55       0.2202      1.46  |  Q     V|          |          |          |
2+56       0.2222      1.47  |  Q     V|          |          |          |
2+57       0.2242      1.47  |  Q     V|          |          |          |
2+58       0.2263      1.48  |  Q     V|          |          |          |
2+59       0.2283      1.49  |  Q     V|          |          |          |
3+ 0       0.2304      1.50  |  Q     V|          |          |          |
3+ 1       0.2325      1.51  |  Q     V|          |          |          |
3+ 2       0.2345      1.52  |  Q     V|          |          |          |
3+ 3       0.2367      1.54  |  Q     V|          |          |          |
3+ 4       0.2388      1.56  |   Q     V          |          |          |
3+ 5       0.2410      1.59  |   Q     V          |          |          |
3+ 6       0.2432      1.61  |   Q     V          |          |          |
3+ 7       0.2455      1.64  |   Q     V          |          |          |
3+ 8       0.2478      1.66  |   Q     V          |          |          |
3+ 9       0.2501      1.68  |   Q     V          |          |          |
3+10       0.2524      1.71  |   Q     V          |          |          |
3+11       0.2548      1.73  |   Q     V          |          |          |
3+12       0.2572      1.76  |   Q     V          |          |          |
3+13       0.2597      1.78  |   Q     V          |          |          |
3+14       0.2622      1.80  |   Q     |V         |          |          |
3+15       0.2647      1.83  |   Q     |V         |          |          |
3+16       0.2672      1.85  |   Q     |V         |          |          |
3+17       0.2698      1.87  |   Q     |V         |          |          |
3+18       0.2724      1.89  |   Q     |V         |          |          |
3+19       0.2751      1.91  |   Q     |V         |          |          |
3+20       0.2777      1.93  |   Q     |V         |          |          |
3+21       0.2804      1.94  |    Q    |V         |          |          |
3+22       0.2831      1.96  |    Q    |V         |          |          |
3+23       0.2858      1.98  |    Q    | V        |          |          |
3+24       0.2886      2.00  |    Q    | V        |          |          |
3+25       0.2914      2.02  |    Q    | V        |          |          |
3+26       0.2942      2.04  |    Q    | V        |          |          |
3+27       0.2970      2.05  |    Q    | V        |          |          |
3+28       0.2998      2.07  |    Q    | V        |          |          |
3+29       0.3027      2.09  |    Q    | V        |          |          |
3+30       0.3056      2.11  |    Q    | V        |          |          |
3+31       0.3086      2.18  |    Q    | V        |          |          |
3+32       0.3117      2.25  |    Q    |  V       |          |          |
3+33       0.3149      2.32  |    Q    |  V       |          |          |
3+34       0.3182      2.39  |     Q   |  V       |          |          |
3+35       0.3216      2.46  |     Q   |  V       |          |          |
3+36       0.3251      2.53  |     Q   |  V       |          |          |
3+37       0.3287      2.60  |     Q   |  V       |          |          |
3+38       0.3324      2.67  |     Q   |  V       |          |          |
3+39       0.3362      2.75  |      Q  |   V      |          |          |
```

```
3+40       0.3400      2.82  |       Q   |    V      |           |           |
3+41       0.3440      2.89  |       Q   |    V      |           |           |
3+42       0.3481      2.96  |       Q   |    V      |           |           |
3+43       0.3523      3.03  |       Q   |    V      |           |           |
3+44       0.3565      3.10  |       Q   |     V     |           |           |
3+45       0.3609      3.19  |        Q  |     V     |           |           |
3+46       0.3654      3.28  |        Q  |     V     |           |           |
3+47       0.3701      3.37  |        Q  |     V     |           |           |
3+48       0.3749      3.46  |        Q  |     V     |           |           |
3+49       0.3797      3.55  |         Q |     V     |           |           |
3+50       0.3848      3.64  |         Q |      V    |           |           |
3+51       0.3899      3.73  |         Q |      V    |           |           |
3+52       0.3952      3.82  |         Q |      V    |           |           |
3+53       0.4006      3.91  |          Q|      V    |           |           |
3+54       0.4061      4.00  |          Q|       V   |           |           |
3+55       0.4117      4.09  |          Q|       V   |           |           |
3+56       0.4175      4.18  |          Q|       V   |           |           |
3+57       0.4234      4.28  |          |Q       V   |           |           |
3+58       0.4294      4.37  |          |Q        V  |           |           |
3+59       0.4365      5.16  |          |  Q      V  |           |           |
4+ 0       0.4447      5.96  |          |    Q    V  |           |           |
4+ 1       0.4540      6.75  |          |       Q V  |           |           |
4+ 2       0.4644      7.55  |          |         Q  |           |           |
4+ 3       0.4759      8.34  |          |          VQ           |           |
4+ 4       0.4885      9.14  |          |          V  Q         |           |
4+ 5       0.5021      9.93  |          |          |V   Q       |           |
4+ 6       0.5169     10.73  |          |          |V     Q     |           |
4+ 7       0.5328     11.52  |          |          | V       Q |           |
4+ 8       0.5498     12.32  |          |          |  V       |Q           |
4+ 9       0.5678     13.12  |          |          |  V       |  Q         |
4+10       0.5870     13.91  |          |          |   V      |    Q       |
4+11       0.6073     14.71  |          |          |    V     |      Q     |
4+12       0.6286     15.50  |          |          |     V    |        Q   |
4+13       0.6487     14.57  |          |          |      V   |      Q     |
4+14       0.6675     13.64  |          |          |       V  |    Q       |
4+15       0.6850     12.71  |          |          |       V  | Q          |
4+16       0.7012     11.78  |          |          |        VQ            |
4+17       0.7162     10.85  |          |          |       Q V            |
4+18       0.7298      9.92  |          |          |    Q    V            |
4+19       0.7422      8.99  |          |          |  Q       |V          |
4+20       0.7533      8.06  |          |          Q          |V          |
4+21       0.7632      7.13  |          |        Q  |         | V         |
4+22       0.7717      6.20  |          |     Q     |         | V         |
4+23       0.7790      5.27  |          |  Q        |         | V         |
4+24       0.7850      4.34  |          |Q          |         |  V        |
4+25       0.7897      3.41  |        Q  |          |         |  V        |
4+26       0.7931      2.49  |     Q     |          |         |  V        |
4+27       0.7964      2.43  |     Q     |          |         |  V        |
4+28       0.7997      2.37  |     Q     |          |         |  V        |
4+29       0.8029      2.31  |    Q      |          |         |  V        |
4+30       0.8060      2.25  |    Q      |          |         |  V        |
4+31       0.8090      2.19  |    Q      |          |         |   V       |
4+32       0.8119      2.13  |    Q      |          |         |   V       |
4+33       0.8148      2.07  |    Q      |          |         |   V       |
4+34       0.8176      2.02  |    Q      |          |         |   V       |
4+35       0.8202      1.96  |    Q      |          |         |   V       |
```

```
4+36       0.8229      1.90  |   Q     |         |         |   V     |
4+37       0.8254      1.84  |   Q     |         |         |   V     |
4+38       0.8278      1.78  |   Q     |         |         |   V     |
4+39       0.8302      1.72  |   Q     |         |         |   V     |
4+40       0.8325      1.66  |   Q     |         |         |    V    |
4+41       0.8348      1.64  |   Q     |         |         |    V    |
4+42       0.8370      1.61  |   Q     |         |         |    V    |
4+43       0.8392      1.59  |   Q     |         |         |    V    |
4+44       0.8413      1.56  |   Q     |         |         |    V    |
4+45       0.8434      1.53  |  Q      |         |         |    V    |
4+46       0.8455      1.51  |  Q      |         |         |    V    |
4+47       0.8475      1.48  |  Q      |         |         |    V    |
4+48       0.8495      1.46  |  Q      |         |         |    V    |
4+49       0.8515      1.43  |  Q      |         |         |    V    |
4+50       0.8535      1.40  |  Q      |         |         |    V    |
4+51       0.8553      1.38  |  Q      |         |         |     V   |
4+52       0.8572      1.35  |  Q      |         |         |     V   |
4+53       0.8590      1.33  |  Q      |         |         |     V   |
4+54       0.8608      1.30  |  Q      |         |         |     V   |
4+55       0.8626      1.29  |  Q      |         |         |     V   |
4+56       0.8644      1.27  |  Q      |         |         |     V   |
4+57       0.8661      1.26  |  Q      |         |         |     V   |
4+58       0.8678      1.24  |  Q      |         |         |     V   |
4+59       0.8695      1.23  |  Q      |         |         |     V   |
5+ 0       0.8711      1.21  |  Q      |         |         |     V   |
5+ 1       0.8728      1.20  |  Q      |         |         |     V   |
5+ 2       0.8744      1.18  |  Q      |         |         |     V   |
5+ 3       0.8760      1.17  |  Q      |         |         |     V   |
5+ 4       0.8776      1.15  | Q       |         |         |     V   |
5+ 5       0.8792      1.13  | Q       |         |         |      V  |
5+ 6       0.8807      1.12  | Q       |         |         |      V  |
5+ 7       0.8822      1.10  | Q       |         |         |      V  |
5+ 8       0.8837      1.09  | Q       |         |         |      V  |
5+ 9       0.8852      1.08  | Q       |         |         |      V  |
5+10       0.8867      1.07  | Q       |         |         |      V  |
5+11       0.8882      1.06  | Q       |         |         |      V  |
5+12       0.8896      1.05  | Q       |         |         |      V  |
5+13       0.8910      1.04  | Q       |         |         |      V  |
5+14       0.8925      1.03  | Q       |         |         |      V  |
5+15       0.8939      1.02  | Q       |         |         |      V  |
5+16       0.8952      1.01  | Q       |         |         |      V  |
5+17       0.8966      1.00  | Q       |         |         |      V  |
5+18       0.8980      0.99  | Q       |         |         |      V  |
5+19       0.8993      0.98  | Q       |         |         |      V  |
5+20       0.9007      0.97  | Q       |         |         |      V  |
5+21       0.9020      0.96  | Q       |         |         |      V  |
5+22       0.9033      0.95  | Q       |         |         |       V |
5+23       0.9046      0.94  | Q       |         |         |       V |
5+24       0.9059      0.93  | Q       |         |         |       V |
5+25       0.9071      0.93  | Q       |         |         |       V |
5+26       0.9084      0.92  | Q       |         |         |       V |
5+27       0.9097      0.91  | Q       |         |         |       V |
5+28       0.9109      0.90  | Q       |         |         |       V |
5+29       0.9122      0.90  | Q       |         |         |       V |
5+30       0.9134      0.89  | Q       |         |         |       V |
5+31       0.9146      0.88  | Q       |         |         |       V |
```

```
    5+32       0.9158      0.88  | Q       |         |         |        V |
    5+33       0.9170      0.87  | Q       |         |         |        V |
    5+34       0.9182      0.86  | Q       |         |         |        V |
    5+35       0.9194      0.85  | Q       |         |         |        V |
    5+36       0.9205      0.85  | Q       |         |         |        V |
    5+37       0.9217      0.84  | Q       |         |         |        V |
    5+38       0.9228      0.83  | Q       |         |         |        V |
    5+39       0.9240      0.83  | Q       |         |         |        V |
    5+40       0.9251      0.82  | Q       |         |         |        V |
    5+41       0.9262      0.82  | Q       |         |         |        V |
    5+42       0.9274      0.81  | Q       |         |         |         V|
    5+43       0.9285      0.81  | Q       |         |         |         V|
    5+44       0.9296      0.80  | Q       |         |         |         V|
    5+45       0.9307      0.80  | Q       |         |         |         V|
    5+46       0.9318      0.79  | Q       |         |         |         V|
    5+47       0.9328      0.78  | Q       |         |         |         V|
    5+48       0.9339      0.78  | Q       |         |         |         V|
    5+49       0.9350      0.77  |Q        |         |         |         V|
    5+50       0.9360      0.77  |Q        |         |         |         V|
    5+51       0.9371      0.76  |Q        |         |         |         V|
    5+52       0.9381      0.76  |Q        |         |         |         V|
    5+53       0.9392      0.75  |Q        |         |         |         V|
    5+54       0.9402      0.75  |Q        |         |         |         V|
    5+55       0.9412      0.75  |Q        |         |         |         V|
    5+56       0.9422      0.74  |Q        |         |         |         V|
    5+57       0.9433      0.74  |Q        |         |         |         V|
    5+58       0.9443      0.73  |Q        |         |         |         V|
    5+59       0.9453      0.73  |Q        |         |         |         V|
    6+ 0       0.9463      0.72  |Q        |         |         |         V|
    6+ 1       0.9473      0.72  |Q        |         |         |         V|
    6+ 2       0.9482      0.71  |Q        |         |         |         V|
    6+ 3       0.9492      0.71  |Q        |         |         |         V|
    6+ 4       0.9502      0.71  |Q        |         |         |          V
--------------------------------------------------------------------------

      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      Process from Point/Station      255.000 to Point/Station      332.000
      **** PIPEFLOW TRAVEL TIME (User specified size) ****
      ______________________________________________________________________
      Upstream point/station elevation =    48.000(Ft.)
      Downstream point/station elevation =    46.230(Ft.)
      Pipe length  =    87.30(Ft.) Slope =   0.0203  Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =    15.502(CFS)
      Given pipe size =     24.00(In.)
      Calculated individual pipe flow  =    15.502(CFS)
      Normal flow depth in pipe =   11.73(In.)
      Flow top width inside pipe =   23.99(In.)
      Critical Depth =   17.04(In.)
      Pipe flow velocity =     10.15(Ft/s)
      Travel time through pipe =    0.14 min.
      Time of concentration (TC) =    14.36 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      Process from Point/Station      332.000 to Point/Station      332.000
      **** CONFLUENCE OF MINOR STREAMS ****
```

```
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      6.260(Ac.)
Runoff from this stream =     15.502(CFS)
Time of concentration =   14.36 min.
Rainfall intensity =     3.602(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)
1       15.502     14.36               3.602
Qmax(1) =
         1.000 *    1.000 *    15.502) + =      15.502
Total of 1 streams to confluence:
Flow rates before confluence point:
      15.502
Maximum flow rates at confluence using above data:
       15.502
Area of streams before confluence:
        6.260
Results of confluence:
Total flow rate =     15.502(CFS)
Time of concentration =    14.363 min.
Effective stream area after confluence =      6.260(Ac.)
```

BASIN J

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      310.000 to Point/Station      315.000
**** INITIAL AREA EVALUATION ****
```

J.1

```
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.200
Initial subarea total flow distance  =  100.000(Ft.)
Highest elevation =   68.000(Ft.)
Lowest elevation =   64.500(Ft.)
Elevation difference =    3.500(Ft.) Slope =  3.500 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   3.50 %, in a development type of
 Permanent Open Space
In Accordance With Figure 3-3
Initial Area Time of Concentration =  10.67 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.2000)*( 100.000^.5)/(   3.500^(1/3)]=  10.67
Rainfall intensity (I) =      4.363(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.200
Subarea runoff =      0.026(CFS)
Total initial stream area =        0.030(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      315.000 to Point/Station      320.000
**** SUBAREA FLOW ADDITION ****
J.2
------------------------------------------------------------------------
Rainfall intensity (I) =      4.363(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.210 given for subarea
Time of concentration =    10.67 min.
Rainfall intensity =      4.363(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.209  CA =      0.067
Subarea runoff =      0.266(CFS) for      0.290(Ac.)
Total runoff =      0.292(CFS)      Total area =       0.320(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      320.000 to Point/Station      325.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =    48.220(Ft.)
Downstream point/station elevation =    48.000(Ft.)
Pipe length  =    40.30(Ft.) Slope =   0.0055  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.292(CFS)
Given pipe size =      6.00(In.)
Calculated individual pipe flow  =     0.292(CFS)
Normal flow depth in pipe =    3.71(In.)
Flow top width inside pipe =    5.83(In.)
Critical Depth =    3.28(In.)
Pipe flow velocity =      2.29(Ft/s)
Travel time through pipe =    0.29 min.
Time of concentration (TC) =    10.96 min.

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Process from Point/Station      265.000 to Point/Station      325.000
**** SUBAREA FLOW ADDITION ****
J.3
------------------------------------------------------------------------
Rainfall intensity (I) =      4.287(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.660 given for subarea
Time of concentration =    10.96 min.
Rainfall intensity =      4.287(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.423  CA =      0.258
Subarea runoff =      0.815(CFS) for      0.290(Ac.)
Total runoff =      1.107(CFS)      Total area =       0.610(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      325.000 to Point/Station      332.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =    48.000(Ft.)
Downstream point/station elevation =    46.230(Ft.)
Pipe length  =   357.00(Ft.) Slope =   0.0050  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.107(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     1.107(CFS)
Normal flow depth in pipe =    5.58(In.)
Flow top width inside pipe =   11.97(In.)
Critical Depth =    5.32(In.)
```

```
Pipe flow velocity =      3.10(Ft/s)
Travel time through pipe =    1.92 min.
Time of concentration (TC) =    12.89 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      325.000 to Point/Station      332.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.610(Ac.)
Runoff from this stream =      1.107(CFS)
Time of concentration =   12.89 min.
Rainfall intensity =     3.863(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)
1       15.502     14.36               3.602
2        1.107     12.89               3.863
Qmax(1) =
         1.000 *    1.000 *    15.502) +
         0.932 *    1.000 *     1.107) + =      16.535
Qmax(2) =
         1.000 *    0.897 *    15.502) +
         1.000 *    1.000 *     1.107) + =      15.015
Total of 2 streams to confluence:
Flow rates before confluence point:
      15.502       1.107
Maximum flow rates at confluence using above data:
       16.535       15.015
Area of streams before confluence:
        6.260        0.610
Results of confluence:
Total flow rate =     16.535(CFS)
Time of concentration =    14.363 min.
Effective stream area after confluence =      6.870(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      332.000 to Point/Station      205.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    46.230(Ft.)
Downstream point/station elevation =    40.580(Ft.)
Pipe length  =   198.30(Ft.) Slope =   0.0285  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    16.535(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    16.535(CFS)
Normal flow depth in pipe =   11.04(In.)
Flow top width inside pipe =   23.92(In.)
Critical Depth =   17.59(In.)
Pipe flow velocity =     11.72(Ft/s)
Travel time through pipe =    0.28 min.
Time of concentration (TC) =    14.65 min.


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Process from Point/Station      205.000 to Point/Station      205.000
**** CONFLUENCE OF MAIN STREAMS ****
____________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      6.870(Ac.)
Runoff from this stream =     16.535(CFS)
Time of concentration =   14.65 min.
Rainfall intensity =     3.557(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)

1       37.540     11.00               4.278
2       16.535     14.65               3.557
Qmax(1) =
         1.000 *    1.000 *    37.540) +
         1.000 *    0.751 *    16.535) + =      49.960
Qmax(2) =
         0.831 *    1.000 *    37.540) +
         1.000 *    1.000 *    16.535) + =      47.748

Total of 2 main streams to confluence:
Flow rates before confluence point:
      37.540      16.535
Maximum flow rates at confluence using above data:
       49.960       47.748
Area of streams before confluence:
       12.490        6.870


Results of confluence:
Total flow rate =     49.960(CFS)
Time of concentration =    11.000 min.
Effective stream area after confluence  =     19.360(Ac.)
```

BASIN K

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      335.000 to Point/Station      336.000
**** INITIAL AREA EVALUATION ****
K.1
____________________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.200
Initial subarea total flow distance  =  345.000(Ft.)
Highest elevation =   60.000(Ft.)
Lowest elevation =   47.500(Ft.)
Elevation difference =   12.500(Ft.) Slope =  3.623 %
```

```
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   3.62 %, in a development type of
 Permanent Open Space
In Accordance With Figure 3-3
Initial Area Time of Concentration =  10.55 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.2000)*( 100.000^.5)/(   3.623^(1/3)]=  10.55
Rainfall intensity (I) =      4.395(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.200
Subarea runoff =      0.070(CFS)
Total initial stream area =        0.080(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      336.000 to Point/Station      205.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    44.500(Ft.)
Downstream point/station elevation =    42.780(Ft.)
Pipe length  =   345.00(Ft.) Slope =   0.0050  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.070(CFS)
Given pipe size =      4.00(In.)
Calculated individual pipe flow  =     0.070(CFS)
Normal flow depth in pipe =    2.04(In.)
Flow top width inside pipe =    4.00(In.)
Critical Depth =    1.76(In.)
Pipe flow velocity =      1.55(Ft/s)
Travel time through pipe =    3.70 min.
Time of concentration (TC) =    14.25 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      336.000 to Point/Station      205.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.080(Ac.)
Runoff from this stream =      0.070(CFS)
Time of concentration =   14.25 min.
Rainfall intensity =     3.620(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)
1        0.070     14.25               3.620
Qmax(1) =
         1.000 *    1.000 *     0.070) + =       0.070

Total of 1 streams to confluence:
Flow rates before confluence point:
       0.070
Maximum flow rates at confluence using above data:
        0.070
Area of streams before confluence:
        0.080
Results of confluence:
Total flow rate =      0.070(CFS)
```

```
Time of concentration =    14.248 min.
Effective stream area after confluence =      0.080(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      335.000 to Point/Station      340.000
**** INITIAL AREA EVALUATION ****
```
K.2
```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[UNDISTURBED NATURAL TERRAIN                ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.350
Initial subarea total flow distance  =  100.000(Ft.)
Highest elevation =   60.000(Ft.)
Lowest elevation =   51.000(Ft.)
Elevation difference =    9.000(Ft.) Slope =  9.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   9.00 %, in a development type of
 Permanent Open Space
In Accordance With Figure 3-3
Initial Area Time of Concentration =   6.49 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.3500)*( 100.000^.5)/(   9.000^(1/3)]=   6.49
Rainfall intensity (I) =      6.012(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.350
Subarea runoff =      0.084(CFS)
Total initial stream area =        0.040(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      340.000 to Point/Station      342.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
```
K.3
```
Estimated mean flow rate at midpoint of channel =      0.253(CFS)
Depth of flow =   0.264(Ft.), Average velocity =   2.720(Ft/s)
      ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              0.75
      2              1.00              0.00
      3              2.00              0.75
Manning's 'N' friction factor =   0.015
------------------------------------------------------------------
Sub-Channel flow  =      0.253(CFS)
  '     '    flow top width =      0.704(Ft.)
  '     '    velocity=    2.720(Ft/s)
  '     '    area =      0.093(Sq.Ft)
  '     '    Froude number =     1.320

Upstream point elevation =    51.000(Ft.)
Downstream point elevation =    49.700(Ft.)
Flow length =    86.000(Ft.)
```

```
Travel time  =    0.53 min.
Time of concentration =    7.02 min.
Depth of flow =   0.264(Ft.)
Average velocity =   2.720(Ft/s)
Total irregular channel flow =     0.253(CFS)
Irregular channel normal depth above invert elev. =   0.264(Ft.)
Average velocity of channel(s) =   2.720(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      5.717(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.310 given for subarea
Rainfall intensity =      5.717(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.318  CA =      0.064
Subarea runoff =      0.279(CFS) for      0.160(Ac.)
Total runoff =      0.364(CFS)      Total area =       0.200(Ac.)
Depth of flow =   0.303(Ft.), Average velocity =   2.980(Ft/s)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      342.000 to Point/Station      205.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.200(Ac.)
Runoff from this stream =      0.364(CFS)
Time of concentration =    7.02 min.
Rainfall intensity =     5.717(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                  (In/Hr)

1        0.070     14.25               3.620
2        0.364      7.02               5.717
Qmax(1) =
         1.000 *    1.000 *     0.070) +
         0.633 *    1.000 *     0.364) + =       0.301
Qmax(2) =
         1.000 *    0.492 *     0.070) +
         1.000 *    1.000 *     0.364) + =       0.398

Total of 2 streams to confluence:
Flow rates before confluence point:
       0.070       0.364
Maximum flow rates at confluence using above data:
        0.301        0.398
Area of streams before confluence:
        0.080        0.200
Results of confluence:
Total flow rate =      0.398(CFS)
Time of concentration =     7.017 min.
Effective stream area after confluence =      0.280(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      205.000 to Point/Station      205.000
**** CONFLUENCE OF MAIN STREAMS ****
```

```
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      0.280(Ac.)
Runoff from this stream =      0.398(CFS)
Time of concentration =    7.02 min.
Rainfall intensity =     5.717(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       37.540     11.00               4.278
2       16.535     14.65               3.557
3        0.398      7.02               5.717
Qmax(1) =
         1.000 *    1.000 *    37.540) +
         1.000 *    0.751 *    16.535) +
         0.748 *    1.000 *     0.398) + =      50.258
Qmax(2) =
         0.831 *    1.000 *    37.540) +
         1.000 *    1.000 *    16.535) +
         0.622 *    1.000 *     0.398) + =      47.996
Qmax(3) =
         1.000 *    0.638 *    37.540) +
         1.000 *    0.479 *    16.535) +
         1.000 *    1.000 *     0.398) + =      32.267

Total of 3 main streams to confluence:
Flow rates before confluence point:
      37.540      16.535       0.398
Maximum flow rates at confluence using above data:
       50.258       47.996       32.267
Area of streams before confluence:
       12.490        6.870        0.280


Results of confluence:
Total flow rate =     50.258(CFS)
Time of concentration =    11.000 min.
Effective stream area after confluence  =     19.640(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      205.000 to Point/Station      345.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =    40.250(Ft.)
Downstream point/station elevation =    40.000(Ft.)
Pipe length  =     2.00(Ft.) Slope =   0.1250  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    50.258(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    50.258(CFS)
Normal flow depth in pipe =   12.19(In.)
Flow top width inside pipe =   29.47(In.)
```

```
Critical Depth =   27.63(In.)
Pipe flow velocity =     26.86(Ft/s)
Travel time through pipe =    0.00 min.
Time of concentration (TC) =    11.00 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      345.000 to Point/Station      345.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     19.640(Ac.)
Runoff from this stream =     50.258(CFS)
Time of concentration =   11.00 min.
Rainfall intensity =     4.278(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                  (In/Hr)

1       50.258     11.00               4.278
Qmax(1) =
         1.000 *    1.000 *    50.258) + =      50.258

Total of 1 streams to confluence:
Flow rates before confluence point:
      50.258
Maximum flow rates at confluence using above data:
       50.258
Area of streams before confluence:
       19.640
Results of confluence:
Total flow rate =     50.258(CFS)
Time of concentration =    11.002 min.
Effective stream area after confluence =     19.640(Ac.)
End of computations, total study area =          19.640 (Ac.)


------------------------------------------------------------------------
MARJA ACRES (PERIMETER SLOPES)
POST-DEVELOPMENT
100-YEAR STORM EVENT
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
------------------------------------------------------------------------
Program License Serial Number 6290
------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour,  precipitation(inches) =  2.700
24 hour precipitation(inches) =  4.800
P6/P24 =    56.3%
San Diego hydrology manual 'C' values used**
```

**** Note - (Caltrans " Highway Design Manual - Figure 819.2A, Runoff Coefficients for Undeveloped Areas" and Table 819.2B Runoff Coefficients for Developed Areas, were used to determine the weighted runoff coefficient. 'C' Values within this Software were selected to closely resemble actual values.**

BASIN L

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      130.000 to Point/Station      300.000
**** INITIAL AREA EVALUATION ****
```

L.1

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[HIGH DENSITY RESIDENTIAL                    ]
(24.0 DU/A or Less      )
Impervious value, Ai = 0.650
Sub-Area C Value = 0.690
Initial subarea total flow distance  =  100.000(Ft.)
Highest elevation =   72.300(Ft.)
Lowest elevation =   63.600(Ft.)
Elevation difference =    8.700(Ft.) Slope =  8.700 %
Top of Initial Area Slope adjusted by User to 10.300 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of  10.30 %, in a development type of
 24.0 DU/A or Less
In Accordance With Table 3-2
Initial Area Time of Concentration =   7.00 minutes
 (for slope value of  10.00 %)
Rainfall intensity (I) =      5.726(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.690
Subarea runoff =      0.751(CFS)
Total initial stream area =        0.190(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      300.000 to Point/Station      305.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
```

L.2

```
Estimated mean flow rate at midpoint of channel =      2.509(CFS)
Depth of flow =   0.269(Ft.), Average velocity =   3.187(Ft/s)
      ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              0.50
      2              0.49              0.49
      3              0.50              0.00
      4              2.00              0.13
      5             12.00              0.33
Manning's 'N' friction factor =   0.015
------------------------------------------------------------------
Sub-Channel flow  =      2.509(CFS)
  '     '    flow top width =      8.440(Ft.)
```

```
  '     '    velocity=    3.187(Ft/s)
  '     '    area =      0.787(Sq.Ft)
  '     '    Froude number =     1.839

Upstream point elevation =    63.600(Ft.)
Downstream point elevation =    58.750(Ft.)
Flow length =   190.000(Ft.)
Travel time  =    0.99 min.
Time of concentration =    7.99 min.
Depth of flow =   0.269(Ft.)
Average velocity =   3.187(Ft/s)
Total irregular channel flow =     2.509(CFS)
Irregular channel normal depth above invert elev. =   0.269(Ft.)
Average velocity of channel(s) =   3.187(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      5.256(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.800 given for subarea
Rainfall intensity =      5.256(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.780  CA =      0.827
Subarea runoff =      3.597(CFS) for      0.870(Ac.)
Total runoff =      4.347(CFS)      Total area =       1.060(Ac.)
Depth of flow =   0.312(Ft.), Average velocity =   3.629(Ft/s)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      305.000 to Point/Station      305.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.060(Ac.)
Runoff from this stream =      4.347(CFS)
Time of concentration =    7.99 min.
Rainfall intensity =     5.256(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                  (In/Hr)

1        4.347      7.99               5.256
Qmax(1) =
         1.000 *    1.000 *     4.347) + =       4.347

Total of 1 streams to confluence:
Flow rates before confluence point:
       4.347

Maximum flow rates at confluence using above data:
        4.347

Area of streams before confluence:
        1.060

Results of confluence:
Total flow rate =      4.347(CFS)
Time of concentration =     7.994 min.
Effective stream area after confluence =      1.060(Ac.)
```

BASIN M

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      400.000 to Point/Station      405.000
**** INITIAL AREA EVALUATION ****
```

M.1

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
[HIGH DENSITY RESIDENTIAL                    ]
(24.0 DU/A or Less      )
Impervious value, Ai = 0.650
Sub-Area C Value = 0.690
Initial subarea total flow distance  =   60.000(Ft.)
Highest elevation =   59.760(Ft.)
Lowest elevation =   58.520(Ft.)
Elevation difference =    1.240(Ft.) Slope =  2.067 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 75.00 (Ft)
for the top area slope value of   2.06 %, in a development type of
 24.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   5.02 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.6900)*(  75.000^.5)/(   2.060^(1/3)]=   5.02
Rainfall intensity (I) =      7.093(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.690
Subarea runoff =      0.098(CFS)
Total initial stream area =        0.020(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      405.000 to Point/Station      410.000
**** SUBAREA FLOW ADDITION ****
```

M.2

```
Rainfall intensity (I) =      7.093(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.610 given for subarea
Time of concentration =     5.02 min.
Rainfall intensity =      7.093(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.637  CA =      0.038
Subarea runoff =      0.173(CFS) for      0.040(Ac.)
Total runoff =      0.271(CFS)      Total area =       0.060(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      420.000 to Point/Station      420.000
**** SUBAREA FLOW ADDITION ****
```

M.3

```
Rainfall intensity (I) =      7.093(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.800 given for subarea
Time of concentration =     5.02 min.
Rainfall intensity =      7.093(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.748  CA =      0.142
```

```
Subarea runoff =      0.738(CFS) for      0.130(Ac.)
Total runoff =      1.009(CFS)      Total area =       0.190(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      425.000 to Point/Station      425.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.190(Ac.)
Runoff from this stream =      1.009(CFS)
Time of concentration =    5.02 min.
Rainfall intensity =     7.093(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        1.009      5.02               7.093
Qmax(1) =
         1.000 *    1.000 *     1.009) + =       1.009

Total of 1 streams to confluence:
Flow rates before confluence point:
       1.009
Maximum flow rates at confluence using above data:
        1.009
Area of streams before confluence:
        0.190
Results of confluence:
Total flow rate =      1.009(CFS)
Time of concentration =     5.023 min.
Effective stream area after confluence =      0.190(Ac.)
```

BASIN N

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      435.000 to Point/Station      440.000
**** INITIAL AREA EVALUATION ****
```

N.1

```
________________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.200
Initial subarea total flow distance  =  100.000(Ft.)
Highest elevation =   74.000(Ft.)
Lowest elevation =   59.000(Ft.)
Elevation difference =   15.000(Ft.) Slope = 15.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of  15.00 %, in a development type of
```

```
 Permanent Open Space
In Accordance With Figure 3-3
Initial Area Time of Concentration =   6.57 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.2000)*( 100.000^.5)/(  15.000^(1/3)]=   6.57
Rainfall intensity (I) =      5.966(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.200
Subarea runoff =      0.107(CFS)
Total initial stream area =        0.090(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      440.000 to Point/Station      445.000
**** SUBAREA FLOW ADDITION ****
N.2
Rainfall intensity (I) =      5.966(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.210 given for subarea
Time of concentration =     6.57 min.
Rainfall intensity =      5.966(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.207  CA =      0.070
Subarea runoff =      0.313(CFS) for      0.250(Ac.)
Total runoff =      0.421(CFS)      Total area =       0.340(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      440.000 to Point/Station      445.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.340(Ac.)
Runoff from this stream =      0.421(CFS)
Time of concentration =    6.57 min.
Rainfall intensity =     5.966(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        0.421      6.57               5.966
Qmax(1) =
         1.000 *    1.000 *     0.421) + =       0.421

Total of 1 streams to confluence:
Flow rates before confluence point:
       0.421
Maximum flow rates at confluence using above data:
        0.421
Area of streams before confluence:
        0.340
Results of confluence:
Total flow rate =      0.421(CFS)
Time of concentration =     6.569 min.
Effective stream area after confluence =      0.340(Ac.)
End of computations, total study area =           1.590 (Ac.)
```

APPENDIX 3
Modified-Puls Detention Routing

```
                FLOOD HYDROGRAPH ROUTING PROGRAM
          Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
                      Study date: 11/30/18

------------------------------------------------------------------------

Program License Serial Number 6290

------------------------------------------------------------------------
********************* HYDROGRAPH INFORMATION **********************

          From study/file name: pmcalbmp3.rte
*****************************HYDROGRAPH DATA*****************************
           Number of intervals =   368
           Time interval =    1.0 (Min.)
           Maximum/Peak flow rate =        3.134 (CFS)
           Total volume =       0.134 (Ac.Ft)
     Status of hydrographs being held in storage
                 Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
     Peak (CFS)      0.000     0.000     0.000     0.000     0.000
     Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
************************************************************************

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       64.000 to Point/Station       64.000
**** RETARDING BASIN ROUTING ****
________________________________________________________________________

User entry of depth-outflow-storage data
------------------------------------------------------------------------
Total number of inflow hydrograph intervals = 368
Hydrograph time unit =  1.000 (Min.)
Initial depth in storage basin =   0.00(Ft.)
------------------------------------------------------------------------
------------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =      0.00 (Ac.Ft)
Initial basin outflow =   0.00 (CFS)
------------------------------------------------------------------------
------------------------------------------------------------------------
Depth vs. Storage and Depth vs. Discharge data:
 Basin Depth  Storage    Outflow   (S-O*dt/2)   (S+O*dt/2)
     (Ft.)    (Ac.Ft)    (CFS)     (Ac.Ft)    (Ac.Ft)
------------------------------------------------------------------------
         0.000      0.000      0.000      0.000        0.000
         0.125      0.007      0.137      0.007        0.007
         0.250      0.014      0.333      0.014        0.014
         0.375      0.020      0.441      0.020        0.020
         0.500      0.027      0.527      0.027        0.027
         0.625      0.034      0.600      0.034        0.034
         0.750      0.041      0.666      0.041        0.041
```

0.875	0.047	0.726	0.047	0.048
1.000	0.054	0.781	0.053	0.055

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	0.8	1.57	2.35	3.13	Depth (Ft.)
0.017	0.01	0.00	0.000	O	|	|	|	|	0.00
0.033	0.02	0.00	0.000	O	|	|	|	|	0.00
0.050	0.04	0.00	0.000	O	|	|	|	|	0.00
0.067	0.05	0.00	0.000	O	|	|	|	|	0.00
0.083	0.06	0.00	0.000	O	|	|	|	|	0.00
0.100	0.07	0.01	0.000	O	|	|	|	|	0.01
0.117	0.08	0.01	0.000	O	|	|	|	|	0.01
0.133	0.10	0.01	0.000	O	|	|	|	|	0.01
0.150	0.10	0.01	0.001	O	|	|	|	|	0.01
0.167	0.10	0.01	0.001	O	|	|	|	|	0.01
0.183	0.10	0.02	0.001	O	|	|	|	|	0.02
0.200	0.10	0.02	0.001	O	|	|	|	|	0.02
0.217	0.10	0.02	0.001	O	|	|	|	|	0.02
0.233	0.10	0.02	0.001	O	|	|	|	|	0.02
0.250	0.10	0.02	0.001	O	|	|	|	|	0.02
0.267	0.10	0.03	0.001	O	|	|	|	|	0.02
0.283	0.10	0.03	0.001	OI	|	|	|	|	0.03
0.300	0.10	0.03	0.002	OI	|	|	|	|	0.03
0.317	0.10	0.03	0.002	OI	|	|	|	|	0.03
0.333	0.10	0.03	0.002	OI	|	|	|	|	0.03
0.350	0.10	0.04	0.002	OI	|	|	|	|	0.03
0.367	0.10	0.04	0.002	OI	|	|	|	|	0.03
0.383	0.10	0.04	0.002	OI	|	|	|	|	0.04
0.400	0.10	0.04	0.002	OI	|	|	|	|	0.04
0.417	0.10	0.04	0.002	OI	|	|	|	|	0.04
0.433	0.10	0.04	0.002	OI	|	|	|	|	0.04
0.450	0.10	0.05	0.002	OI	|	|	|	|	0.04
0.467	0.10	0.05	0.002	OI	|	|	|	|	0.04
0.483	0.10	0.05	0.002	OI	|	|	|	|	0.04
0.500	0.10	0.05	0.003	OI	|	|	|	|	0.05
0.517	0.10	0.05	0.003	OI	|	|	|	|	0.05
0.533	0.10	0.05	0.003	OI	|	|	|	|	0.05
0.550	0.10	0.05	0.003	OI	|	|	|	|	0.05
0.567	0.10	0.06	0.003	OI	|	|	|	|	0.05
0.583	0.10	0.06	0.003	OI	|	|	|	|	0.05
0.600	0.10	0.06	0.003	OI	|	|	|	|	0.05
0.617	0.10	0.06	0.003	OI	|	|	|	|	0.05
0.633	0.10	0.06	0.003	OI	|	|	|	|	0.05
0.650	0.11	0.06	0.003	OI	|	|	|	|	0.06
0.667	0.11	0.06	0.003	OI	|	|	|	|	0.06
0.683	0.11	0.06	0.003	OI	|	|	|	|	0.06
0.700	0.11	0.06	0.003	OI	|	|	|	|	0.06
0.717	0.11	0.07	0.003	OI	|	|	|	|	0.06
0.733	0.11	0.07	0.003	OI	|	|	|	|	0.06
0.750	0.11	0.07	0.003	OI	|	|	|	|	0.06

0.767	0.11	0.07	0.004	OI				0.06
0.783	0.11	0.07	0.004	OI				0.06
0.800	0.11	0.07	0.004	OI				0.06
0.817	0.11	0.07	0.004	OI				0.07
0.833	0.11	0.07	0.004	OI				0.07
0.850	0.11	0.07	0.004	OI				0.07
0.867	0.11	0.08	0.004	OI				0.07
0.883	0.11	0.08	0.004	OI				0.07
0.900	0.11	0.08	0.004	OI				0.07
0.917	0.11	0.08	0.004	OI				0.07
0.933	0.11	0.08	0.004	OI				0.07
0.950	0.11	0.08	0.004	OI				0.07
0.967	0.11	0.08	0.004	OI				0.07
0.983	0.11	0.08	0.004	OI				0.07
1.000	0.11	0.08	0.004	OI				0.07
1.017	0.11	0.08	0.004	OI				0.08
1.033	0.11	0.08	0.004	OI				0.08
1.050	0.11	0.08	0.004	OI				0.08
1.067	0.11	0.09	0.004	OI				0.08
1.083	0.11	0.09	0.004	OI				0.08
1.100	0.11	0.09	0.004	OI				0.08
1.117	0.12	0.09	0.004	OI				0.08
1.133	0.12	0.09	0.005	OI				0.08
1.150	0.12	0.09	0.005	OI				0.08
1.167	0.12	0.09	0.005	OI				0.08
1.183	0.12	0.09	0.005	OI				0.08
1.200	0.12	0.09	0.005	OI				0.08
1.217	0.12	0.09	0.005	OI				0.08
1.233	0.12	0.09	0.005	OI				0.08
1.250	0.12	0.09	0.005	OI				0.09
1.267	0.12	0.09	0.005	OI				0.09
1.283	0.12	0.09	0.005	OI				0.09
1.300	0.12	0.10	0.005	OI				0.09
1.317	0.12	0.10	0.005	OI				0.09
1.333	0.12	0.10	0.005	OI				0.09
1.350	0.12	0.10	0.005	OI				0.09
1.367	0.12	0.10	0.005	OI				0.09
1.383	0.12	0.10	0.005	|O				0.09
1.400	0.12	0.10	0.005	|O				0.09
1.417	0.12	0.10	0.005	|O				0.09
1.433	0.12	0.10	0.005	|O				0.09
1.450	0.13	0.10	0.005	|O				0.09
1.467	0.13	0.10	0.005	|O				0.09
1.483	0.13	0.10	0.005	|O				0.09
1.500	0.13	0.10	0.005	|O				0.09
1.517	0.13	0.10	0.005	|O				0.09
1.533	0.13	0.10	0.005	|O				0.10
1.550	0.13	0.10	0.005	|O				0.10
1.567	0.13	0.11	0.005	|O				0.10
1.583	0.13	0.11	0.005	|O				0.10
1.600	0.13	0.11	0.005	|O				0.10
1.617	0.13	0.11	0.005	|O				0.10
1.633	0.13	0.11	0.006	|O				0.10
1.650	0.13	0.11	0.006	|O				0.10
1.667	0.13	0.11	0.006	|O				0.10
1.683	0.13	0.11	0.006	|O				0.10

1.700	0.13	0.11	0.006	O				0.10
1.717	0.13	0.11	0.006	O				0.10
1.733	0.13	0.11	0.006	O				0.10
1.750	0.14	0.11	0.006	O				0.10
1.767	0.14	0.11	0.006	O				0.10
1.783	0.14	0.11	0.006	O				0.10
1.800	0.14	0.11	0.006	O				0.10
1.817	0.14	0.11	0.006	O				0.10
1.833	0.14	0.12	0.006	O				0.11
1.850	0.14	0.12	0.006	O				0.11
1.867	0.14	0.12	0.006	O				0.11
1.883	0.14	0.12	0.006	O				0.11
1.900	0.14	0.12	0.006	O				0.11
1.917	0.14	0.12	0.006	O				0.11
1.933	0.14	0.12	0.006	O				0.11
1.950	0.14	0.12	0.006	O				0.11
1.967	0.14	0.12	0.006	O				0.11
1.983	0.14	0.12	0.006	O				0.11
2.000	0.15	0.12	0.006	O				0.11
2.017	0.15	0.12	0.006	O				0.11
2.033	0.15	0.12	0.006	O				0.11
2.050	0.15	0.12	0.006	O				0.11
2.067	0.15	0.12	0.006	O				0.11
2.083	0.15	0.12	0.006	O				0.11
2.100	0.15	0.13	0.006	O				0.11
2.117	0.15	0.13	0.006	O				0.11
2.133	0.15	0.13	0.006	O				0.12
2.150	0.15	0.13	0.006	O				0.12
2.167	0.15	0.13	0.007	O				0.12
2.183	0.15	0.13	0.007	O				0.12
2.200	0.15	0.13	0.007	O				0.12
2.217	0.16	0.13	0.007	O				0.12
2.233	0.16	0.13	0.007	O				0.12
2.250	0.16	0.13	0.007	O				0.12
2.267	0.16	0.13	0.007	O				0.12
2.283	0.16	0.13	0.007	O				0.12
2.300	0.16	0.13	0.007	O				0.12
2.317	0.16	0.13	0.007	O				0.12
2.333	0.16	0.13	0.007	O				0.12
2.350	0.16	0.14	0.007	O				0.12
2.367	0.16	0.14	0.007	O				0.12
2.383	0.16	0.14	0.007	O				0.12
2.400	0.16	0.14	0.007	O				0.13
2.417	0.17	0.14	0.007	O				0.13
2.433	0.17	0.14	0.007	O				0.13
2.450	0.17	0.14	0.007	O				0.13
2.467	0.17	0.14	0.007	O				0.13
2.483	0.17	0.14	0.007	O				0.13
2.500	0.17	0.14	0.007	O				0.13
2.517	0.17	0.15	0.007	O				0.13
2.533	0.18	0.15	0.007	O				0.13
2.550	0.18	0.15	0.007	O				0.13
2.567	0.18	0.15	0.007	O				0.13
2.583	0.18	0.15	0.007	O				0.13
2.600	0.18	0.15	0.008	O				0.13
2.617	0.18	0.15	0.008	O				0.13

2.633	0.18	0.15	0.008	O				0.14
2.650	0.18	0.15	0.008	O				0.14
2.667	0.18	0.16	0.008	O				0.14
2.683	0.18	0.16	0.008	O				0.14
2.700	0.19	0.16	0.008	O				0.14
2.717	0.19	0.16	0.008	O				0.14
2.733	0.19	0.16	0.008	O				0.14
2.750	0.19	0.16	0.008	O				0.14
2.767	0.19	0.16	0.008	O				0.14
2.783	0.20	0.16	0.008	OI				0.14
2.800	0.20	0.16	0.008	OI				0.14
2.817	0.20	0.17	0.008	OI				0.14
2.833	0.20	0.17	0.008	OI				0.14
2.850	0.20	0.17	0.008	OI				0.15
2.867	0.20	0.17	0.008	OI				0.15
2.883	0.20	0.17	0.008	OI				0.15
2.900	0.21	0.17	0.008	OI				0.15
2.917	0.21	0.17	0.008	OI				0.15
2.933	0.21	0.18	0.008	OI				0.15
2.950	0.21	0.18	0.008	OI				0.15
2.967	0.21	0.18	0.008	OI				0.15
2.983	0.22	0.18	0.009	OI				0.15
3.000	0.22	0.18	0.009	OI				0.15
3.017	0.22	0.18	0.009	OI				0.15
3.033	0.23	0.18	0.009	OI				0.15
3.050	0.23	0.19	0.009	OI				0.16
3.067	0.23	0.19	0.009	OI				0.16
3.083	0.23	0.19	0.009	OI				0.16
3.100	0.23	0.19	0.009	OI				0.16
3.117	0.24	0.19	0.009	OI				0.16
3.133	0.24	0.19	0.009	OI				0.16
3.150	0.24	0.20	0.009	OI				0.16
3.167	0.24	0.20	0.009	O				0.16
3.183	0.24	0.20	0.009	O				0.16
3.200	0.24	0.20	0.009	O				0.17
3.217	0.25	0.20	0.009	O				0.17
3.233	0.25	0.20	0.009	O				0.17
3.250	0.26	0.21	0.009	O				0.17
3.267	0.26	0.21	0.010	O				0.17
3.283	0.27	0.21	0.010	O				0.17
3.300	0.27	0.21	0.010	O				0.17
3.317	0.28	0.21	0.010	O				0.17
3.333	0.28	0.22	0.010	O				0.18
3.350	0.28	0.22	0.010	O				0.18
3.367	0.29	0.22	0.010	O				0.18
3.383	0.29	0.22	0.010	O				0.18
3.400	0.29	0.23	0.010	O				0.18
3.417	0.30	0.23	0.010	OI				0.18
3.433	0.30	0.23	0.010	OI				0.19
3.450	0.30	0.23	0.010	OI				0.19
3.467	0.30	0.24	0.011	OI				0.19
3.483	0.31	0.24	0.011	OI				0.19
3.500	0.32	0.24	0.011	OI				0.19
3.517	0.33	0.25	0.011	OI				0.19
3.533	0.34	0.25	0.011	OI				0.20
3.550	0.35	0.25	0.011	OI				0.20

3.567	0.35	0.26	0.011	OI					0.20
3.583	0.36	0.26	0.011	OI					0.20
3.600	0.37	0.26	0.012	OI					0.21
3.617	0.38	0.27	0.012	OI					0.21
3.633	0.38	0.27	0.012	OI					0.21
3.650	0.39	0.28	0.012	OI					0.21
3.667	0.40	0.28	0.012	O I					0.22
3.683	0.40	0.29	0.012	O I					0.22
3.700	0.41	0.29	0.012	O I					0.22
3.717	0.42	0.30	0.013	OI					0.23
3.733	0.42	0.30	0.013	OI					0.23
3.750	0.45	0.31	0.013	OI					0.23
3.767	0.47	0.31	0.013	OI					0.24
3.783	0.50	0.32	0.013	O I					0.24
3.800	0.52	0.33	0.014	O I					0.25
3.817	0.55	0.33	0.014	O I					0.25
3.833	0.57	0.34	0.014	O I					0.26
3.850	0.60	0.34	0.015	O I					0.26
3.867	0.62	0.35	0.015	O I					0.27
3.883	0.65	0.36	0.015	O I					0.28
3.900	0.69	0.37	0.016	O I					0.29
3.917	0.72	0.37	0.016	O I					0.30
3.933	0.75	0.38	0.017	O I					0.31
3.950	0.78	0.39	0.017	O I					0.32
3.967	0.81	0.40	0.018	O I					0.33
3.983	0.84	0.41	0.018	O I					0.34
4.000	0.88	0.42	0.019	O I					0.35
4.017	1.16	0.44	0.020	O	I				0.37
4.033	1.44	0.45	0.021	O	I				0.39
4.050	1.72	0.47	0.023	O	I				0.42
4.067	2.01	0.50	0.024	O	I				0.45
4.083	2.29	0.52	0.027	O	I				0.49
4.100	2.57	0.55	0.029	O	I				0.54
4.117	2.85	0.58	0.032	O	I				0.59
4.133	3.13	0.61	0.036	O	I				0.65
4.150	2.80	0.65	0.039	O	I				0.71
4.167	2.47	0.67	0.042	O	I				0.76
4.183	2.15	0.69	0.044	O	I				0.81
4.200	1.82	0.71	0.046	O	I				0.84
4.217	1.49	0.72	0.047	O	I				0.87
4.233	1.16	0.73	0.048	O	I				0.89
4.250	0.83	0.73	0.048	OI					0.89
4.267	0.50	0.73	0.048	I O					0.89
4.283	0.48	0.73	0.048	I O					0.88
4.300	0.46	0.73	0.047	I O					0.88
4.317	0.44	0.72	0.047	I O					0.87
4.333	0.42	0.72	0.046	I O					0.86
4.350	0.40	0.72	0.046	I O					0.85
4.367	0.38	0.71	0.046	I O					0.84
4.383	0.35	0.71	0.045	I O					0.83
4.400	0.33	0.70	0.045	I O					0.82
4.417	0.32	0.70	0.044	I O					0.81
4.433	0.32	0.69	0.044	I O					0.80
4.450	0.31	0.69	0.043	I O					0.79
4.467	0.30	0.68	0.042	I O					0.78
4.483	0.29	0.68	0.042	I O					0.77

4.500	0.28	0.67	0.041	| I O |	|	|	|	0.76
4.517	0.27	0.66	0.041	| I O |	|	|	|	0.75
4.533	0.26	0.66	0.040	| I O |	|	|	|	0.74
4.550	0.26	0.65	0.040	| I O |	|	|	|	0.73
4.567	0.25	0.65	0.039	| I O |	|	|	|	0.72
4.583	0.25	0.64	0.039	| I O |	|	|	|	0.71
4.600	0.24	0.64	0.038	| I O |	|	|	|	0.70
4.617	0.23	0.63	0.038	| I O |	|	|	|	0.69
4.633	0.23	0.63	0.037	| I O |	|	|	|	0.68
4.650	0.22	0.62	0.036	| I O |	|	|	|	0.67
4.667	0.22	0.62	0.036	| I O |	|	|	|	0.66
4.683	0.22	0.61	0.035	| I O |	|	|	|	0.65
4.700	0.21	0.61	0.035	| I O |	|	|	|	0.64
4.717	0.21	0.60	0.034	| I O |	|	|	|	0.63
4.733	0.20	0.60	0.034	| I O |	|	|	|	0.62
4.750	0.20	0.59	0.033	| I O |	|	|	|	0.61
4.767	0.20	0.59	0.033	| I O |	|	|	|	0.60
4.783	0.19	0.58	0.032	|I O |	|	|	|	0.59
4.800	0.19	0.58	0.032	|I O |	|	|	|	0.58
4.817	0.19	0.57	0.031	|I O |	|	|	|	0.57
4.833	0.19	0.56	0.031	|I O |	|	|	|	0.56
4.850	0.18	0.56	0.030	|I O |	|	|	|	0.55
4.867	0.18	0.55	0.030	|I O |	|	|	|	0.54
4.883	0.18	0.55	0.029	|I O |	|	|	|	0.54
4.900	0.17	0.54	0.028	|I O |	|	|	|	0.53
4.917	0.17	0.54	0.028	|I O |	|	|	|	0.52
4.933	0.17	0.53	0.027	|I O |	|	|	|	0.51
4.950	0.17	0.53	0.027	|I O |	|	|	|	0.50
4.967	0.17	0.52	0.027	|I O |	|	|	|	0.49
4.983	0.16	0.51	0.026	|I O |	|	|	|	0.48
5.000	0.16	0.51	0.026	|I O |	|	|	|	0.47
5.017	0.16	0.50	0.025	|I O |	|	|	|	0.47
5.033	0.16	0.50	0.025	|I O |	|	|	|	0.46
5.050	0.16	0.49	0.024	|I O |	|	|	|	0.45
5.067	0.15	0.49	0.024	|I O |	|	|	|	0.44
5.083	0.15	0.48	0.023	|I O |	|	|	|	0.43
5.100	0.15	0.47	0.023	|I O |	|	|	|	0.42
5.117	0.15	0.47	0.022	|I O |	|	|	|	0.42
5.133	0.15	0.46	0.022	|I O |	|	|	|	0.41
5.150	0.15	0.46	0.021	|I O |	|	|	|	0.40
5.167	0.14	0.45	0.021	|I O |	|	|	|	0.39
5.183	0.14	0.45	0.021	|I O |	|	|	|	0.39
5.200	0.14	0.44	0.020	|I O |	|	|	|	0.38
5.217	0.14	0.44	0.020	|I O |	|	|	|	0.37
5.233	0.14	0.43	0.019	|I O |	|	|	|	0.36
5.250	0.14	0.42	0.019	|I O |	|	|	|	0.35
5.267	0.14	0.42	0.019	|I O |	|	|	|	0.35
5.283	0.14	0.41	0.018	|I O |	|	|	|	0.34
5.300	0.13	0.40	0.018	|I O |	|	|	|	0.33
5.317	0.13	0.40	0.017	|I O |	|	|	|	0.32
5.333	0.13	0.39	0.017	|I O |	|	|	|	0.31
5.350	0.13	0.38	0.017	|I O |	|	|	|	0.31
5.367	0.13	0.38	0.016	|I O |	|	|	|	0.30
5.383	0.13	0.37	0.016	|I O |	|	|	|	0.29
5.400	0.13	0.36	0.016	|I O |	|	|	|	0.29
5.417	0.13	0.36	0.015	|I O |	|	|	|	0.28

5.433	0.13	0.35	0.015	I O				0.27
5.450	0.12	0.35	0.015	I O				0.27
5.467	0.12	0.34	0.014	I O				0.26
5.483	0.12	0.34	0.014	I O				0.25
5.500	0.12	0.33	0.014	I O				0.25
5.517	0.12	0.32	0.014	I O				0.24
5.533	0.12	0.31	0.013	I O				0.24
5.550	0.12	0.31	0.013	I O				0.23
5.567	0.12	0.30	0.013	I O				0.23
5.583	0.12	0.29	0.013	IO				0.22
5.600	0.12	0.29	0.012	IO				0.22
5.617	0.12	0.28	0.012	IO				0.22
5.633	0.11	0.27	0.012	IO				0.21
5.650	0.11	0.27	0.012	IO				0.21
5.667	0.11	0.26	0.011	IO				0.20
5.683	0.11	0.26	0.011	IO				0.20
5.700	0.11	0.25	0.011	IO				0.20
5.717	0.11	0.25	0.011	IO				0.19
5.733	0.11	0.24	0.011	IO				0.19
5.750	0.11	0.24	0.011	IO				0.19
5.767	0.11	0.23	0.010	IO				0.18
5.783	0.11	0.23	0.010	IO				0.18
5.800	0.11	0.22	0.010	IO				0.18
5.817	0.11	0.22	0.010	IO				0.18
5.833	0.11	0.21	0.010	IO				0.17
5.850	0.10	0.21	0.010	IO				0.17
5.867	0.10	0.20	0.009	IO				0.17
5.883	0.10	0.20	0.009	IO				0.17
5.900	0.10	0.20	0.009	IO				0.16
5.917	0.10	0.19	0.009	O				0.16
5.933	0.10	0.19	0.009	O				0.16
5.950	0.10	0.19	0.009	O				0.16
5.967	0.10	0.18	0.009	O				0.15
5.983	0.10	0.18	0.009	O				0.15
6.000	0.10	0.18	0.008	O				0.15
6.017	0.10	0.17	0.008	O				0.15
6.033	0.10	0.17	0.008	O				0.15
6.050	0.10	0.17	0.008	IO				0.15
6.067	0.10	0.17	0.008	IO				0.14
6.083	0.10	0.16	0.008	IO				0.14
6.100	0.10	0.16	0.008	IO				0.14
6.117	0.10	0.16	0.008	IO				0.14
6.133	0.10	0.16	0.008	IO				0.14
6.150	0.00	0.15	0.008	IO				0.13
6.167	0.00	0.15	0.007	IO				0.13
6.183	0.00	0.14	0.007	IO				0.13
6.200	0.00	0.14	0.007	IO				0.12
6.217	0.00	0.13	0.007	IO				0.12
6.233	0.00	0.13	0.007	IO				0.12
6.250	0.00	0.13	0.006	IO				0.11
6.267	0.00	0.12	0.006	IO				0.11
6.283	0.00	0.12	0.006	IO				0.11
6.300	0.00	0.12	0.006	IO				0.11
6.317	0.00	0.11	0.006	IO				0.10
6.333	0.00	0.11	0.006	IO				0.10
6.350	0.00	0.11	0.005	IO				0.10

6.367	0.00	0.10	0.005	IO				0.09
6.383	0.00	0.10	0.005	IO				0.09
6.400	0.00	0.10	0.005	IO				0.09
6.417	0.00	0.10	0.005	O				0.09
6.433	0.00	0.09	0.005	O				0.08
6.450	0.00	0.09	0.005	O				0.08
6.467	0.00	0.09	0.005	O				0.08
6.483	0.00	0.09	0.004	O				0.08
6.500	0.00	0.08	0.004	O				0.08
6.517	0.00	0.08	0.004	O				0.07
6.533	0.00	0.08	0.004	O				0.07
6.550	0.00	0.08	0.004	O				0.07
6.567	0.00	0.08	0.004	O				0.07
6.583	0.00	0.07	0.004	O				0.07
6.600	0.00	0.07	0.004	O				0.06
6.617	0.00	0.07	0.004	O				0.06
6.633	0.00	0.07	0.003	O				0.06
6.650	0.00	0.07	0.003	O				0.06
6.667	0.00	0.06	0.003	O				0.06
6.683	0.00	0.06	0.003	O				0.06
6.700	0.00	0.06	0.003	O				0.06
6.717	0.00	0.06	0.003	O				0.05
6.733	0.00	0.06	0.003	O				0.05
6.750	0.00	0.06	0.003	O				0.05
6.767	0.00	0.05	0.003	O				0.05
6.783	0.00	0.05	0.003	O				0.05
6.800	0.00	0.05	0.003	O				0.05
6.817	0.00	0.05	0.003	O				0.05
6.833	0.00	0.05	0.002	O				0.04
6.850	0.00	0.05	0.002	O				0.04
6.867	0.00	0.05	0.002	O				0.04
6.883	0.00	0.04	0.002	O				0.04
6.900	0.00	0.04	0.002	O				0.04
6.917	0.00	0.04	0.002	O				0.04
6.933	0.00	0.04	0.002	O				0.04
6.950	0.00	0.04	0.002	O				0.04
6.967	0.00	0.04	0.002	O				0.04
6.983	0.00	0.04	0.002	O				0.03
7.000	0.00	0.04	0.002	O				0.03
7.017	0.00	0.04	0.002	O				0.03
7.033	0.00	0.04	0.002	O				0.03
7.050	0.00	0.03	0.002	O				0.03
7.067	0.00	0.03	0.002	O				0.03
7.083	0.00	0.03	0.002	O				0.03
7.100	0.00	0.03	0.002	O				0.03
7.117	0.00	0.03	0.002	O				0.03
7.133	0.00	0.03	0.002	O				0.03
7.150	0.00	0.03	0.001	O				0.03
7.167	0.00	0.03	0.001	O				0.03
7.183	0.00	0.03	0.001	O				0.03
7.200	0.00	0.03	0.001	O				0.02
7.217	0.00	0.03	0.001	O				0.02
7.233	0.00	0.03	0.001	O				0.02
7.250	0.00	0.02	0.001	O				0.02
7.267	0.00	0.02	0.001	O				0.02
7.283	0.00	0.02	0.001	O				0.02

7.300	0.00	0.02	0.001	O	|	|	|	|	0.02
7.317	0.00	0.02	0.001	O	|	|	|	|	0.02
7.333	0.00	0.02	0.001	O	|	|	|	|	0.02
7.350	0.00	0.02	0.001	O	|	|	|	|	0.02
7.367	0.00	0.02	0.001	O	|	|	|	|	0.02
7.383	0.00	0.02	0.001	O	|	|	|	|	0.02
7.400	0.00	0.02	0.001	O	|	|	|	|	0.02
7.417	0.00	0.02	0.001	O	|	|	|	|	0.02
7.433	0.00	0.02	0.001	O	|	|	|	|	0.02
7.450	0.00	0.02	0.001	O	|	|	|	|	0.02
7.467	0.00	0.02	0.001	O	|	|	|	|	0.02
7.483	0.00	0.02	0.001	O	|	|	|	|	0.02
7.500	0.00	0.02	0.001	O	|	|	|	|	0.02
7.517	0.00	0.02	0.001	O	|	|	|	|	0.01
7.533	0.00	0.02	0.001	O	|	|	|	|	0.01
7.550	0.00	0.02	0.001	O	|	|	|	|	0.01
7.567	0.00	0.01	0.001	O	|	|	|	|	0.01
7.583	0.00	0.01	0.001	O	|	|	|	|	0.01
7.600	0.00	0.01	0.001	O	|	|	|	|	0.01
7.617	0.00	0.01	0.001	O	|	|	|	|	0.01
7.633	0.00	0.01	0.001	O	|	|	|	|	0.01
7.650	0.00	0.01	0.001	O	|	|	|	|	0.01
7.667	0.00	0.01	0.001	O	|	|	|	|	0.01
7.683	0.00	0.01	0.001	O	|	|	|	|	0.01
7.700	0.00	0.01	0.001	O	|	|	|	|	0.01
7.717	0.00	0.01	0.001	O	|	|	|	|	0.01
7.733	0.00	0.01	0.001	O	|	|	|	|	0.01
7.750	0.00	0.01	0.001	O	|	|	|	|	0.01
7.767	0.00	0.01	0.001	O	|	|	|	|	0.01
7.783	0.00	0.01	0.001	O	|	|	|	|	0.01
7.800	0.00	0.01	0.001	O	|	|	|	|	0.01
7.817	0.00	0.01	0.001	O	|	|	|	|	0.01
7.833	0.00	0.01	0.000	O	|	|	|	|	0.01
7.850	0.00	0.01	0.000	O	|	|	|	|	0.01
7.867	0.00	0.01	0.000	O	|	|	|	|	0.01
7.883	0.00	0.01	0.000	O	|	|	|	|	0.01
7.900	0.00	0.01	0.000	O	|	|	|	|	0.01
7.917	0.00	0.01	0.000	O	|	|	|	|	0.01
7.933	0.00	0.01	0.000	O	|	|	|	|	0.01
7.950	0.00	0.01	0.000	O	|	|	|	|	0.01
7.967	0.00	0.01	0.000	O	|	|	|	|	0.01
7.983	0.00	0.01	0.000	O	|	|	|	|	0.01
8.000	0.00	0.01	0.000	O	|	|	|	|	0.01
8.017	0.00	0.01	0.000	O	|	|	|	|	0.01
8.033	0.00	0.01	0.000	O	|	|	|	|	0.01
8.050	0.00	0.01	0.000	O	|	|	|	|	0.01
8.067	0.00	0.01	0.000	O	|	|	|	|	0.01
8.083	0.00	0.01	0.000	O	|	|	|	|	0.01
8.100	0.00	0.01	0.000	O	|	|	|	|	0.01
8.117	0.00	0.01	0.000	O	|	|	|	|	0.01
8.133	0.00	0.01	0.000	O	|	|	|	|	0.01
8.150	0.00	0.01	0.000	O	|	|	|	|	0.01
8.167	0.00	0.01	0.000	O	|	|	|	|	0.01
8.183	0.00	0.01	0.000	O	|	|	|	|	0.01
8.200	0.00	0.01	0.000	O	|	|	|	|	0.00
8.217	0.00	0.01	0.000	O	|	|	|	|	0.00

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  8.233    0.00    0.01      0.000  O       |       |       |       |      0.00
  8.250    0.00    0.00      0.000  O       |       |       |       |      0.00
  8.267    0.00    0.00      0.000  O       |       |       |       |      0.00
  8.283    0.00    0.00      0.000  O       |       |       |       |      0.00
  8.300    0.00    0.00      0.000  O       |       |       |       |      0.00
  8.317    0.00    0.00      0.000  O       |       |       |       |      0.00
  8.333    0.00    0.00      0.000  O       |       |       |       |      0.00
  8.350    0.00    0.00      0.000  O       |       |       |       |      0.00
  8.367    0.00    0.00      0.000  O       |       |       |       |      0.00
  8.383    0.00    0.00      0.000  O       |       |       |       |      0.00
  8.400    0.00    0.00      0.000  O       |       |       |       |      0.00
  8.417    0.00    0.00      0.000  O       |       |       |       |      0.00
  8.433    0.00    0.00      0.000  O       |       |       |       |      0.00
  8.450    0.00    0.00      0.000  O       |       |       |       |      0.00
  8.467    0.00    0.00      0.000  O       |       |       |       |      0.00
  8.483    0.00    0.00      0.000  O       |       |       |       |      0.00
  8.500    0.00    0.00      0.000  O       |       |       |       |      0.00

 ****************************HYDROGRAPH DATA****************************
           Number of intervals =   551
           Time interval =    1.0 (Min.)
           Maximum/Peak flow rate =        0.734 (CFS)
           Total volume =       0.134 (Ac.Ft)
     Status of hydrographs being held in storage
                 Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
     Peak (CFS)      0.000     0.000     0.000     0.000     0.000
     Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
 ************************************************************************

------------------------------------------------------------------
 ********************* HYDROGRAPH INFORMATION **********************
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From study/file name: pmcalbmp4.rte

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****************************HYDROGRAPH DATA****************************
           Number of intervals =   364
           Time interval =    1.0 (Min.)
           Maximum/Peak flow rate =       15.502 (CFS)
           Total volume =       0.950 (Ac.Ft)
     Status of hydrographs being held in storage
                 Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
     Peak (CFS)      0.000     0.000     0.000     0.000     0.000
     Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
     ************************************************************************



     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
     Process from Point/Station      256.000 to Point/Station      256.000
     **** RETARDING BASIN ROUTING ****
     ________________________________________________________________________

     User entry of depth-outflow-storage data
     ----------------------------------------------------------------
     Total number of inflow hydrograph intervals = 364
     Hydrograph time unit =  1.000 (Min.)
```

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Initial depth in storage basin =   0.00(Ft.)
--------------------------------------------------------------------
--------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =      0.00 (Ac.Ft)
Initial basin outflow =   0.00 (CFS)
--------------------------------------------------------------------
--------------------------------------------------------------------
Depth vs. Storage and Depth vs. Discharge data:
 Basin Depth  Storage    Outflow   (S-O*dt/2)   (S+O*dt/2)
     (Ft.)    (Ac.Ft)    (CFS)     (Ac.Ft)    (Ac.Ft)
--------------------------------------------------------------------
    0.000      0.000      0.000      0.000        0.000
    0.125      0.260      0.206      0.260        0.260
    0.250      0.283      0.500      0.283        0.283
    0.375      0.305      0.661      0.305        0.305
    0.500      0.329      0.790      0.328        0.330
    0.625      0.352      0.901      0.351        0.353
    0.750      0.376      0.999      0.375        0.377
    0.875      0.399      1.089      0.398        0.400
    1.000      0.424      1.172      0.423        0.425
    1.125      0.473      1.249      0.472        0.474
    1.500      0.522      1.457      0.521        0.523
    1.625      0.548      1.520      0.547        0.549
    1.750      0.573      1.580      0.572        0.574
    1.875      0.599      2.186      0.597        0.601
    2.000      0.625      3.029      0.623        0.627
    2.250      0.677      3.912      0.674        0.680
    2.375      0.704      4.259      0.701        0.707
    2.500      0.730      4.572      0.727        0.733
    2.625      0.757      6.500      0.753        0.761
    2.750      0.785      9.779      0.778        0.792
--------------------------------------------------------------------
            Hydrograph Detention Basin Routing
--------------------------------------------------------------------

Graph values: 'I'= unit inflow; 'O'=outflow at time shown
--------------------------------------------------------------------
 Time   Inflow  Outflow    Storage                                    Depth
(Hours)  (CFS)   (CFS)     (Ac.Ft) .0       3.9    7.75   11.63   15.50 (Ft.)
 0.017    0.05    0.00      0.000  O       |       |       |       |     0.00
 0.033    0.10    0.00      0.000  O       |       |       |       |     0.00
 0.050    0.15    0.00      0.000  O       |       |       |       |     0.00
 0.067    0.20    0.00      0.001  O       |       |       |       |     0.00
 0.083    0.25    0.00      0.001  O       |       |       |       |     0.00
 0.100    0.29    0.00      0.001  O       |       |       |       |     0.00
 0.117    0.34    0.00      0.002  O       |       |       |       |     0.00
 0.133    0.39    0.00      0.002  O       |       |       |       |     0.00
 0.150    0.44    0.00      0.003  O       |       |       |       |     0.00
 0.167    0.49    0.00      0.003  OI      |       |       |       |     0.00
 0.183    0.54    0.00      0.004  OI      |       |       |       |     0.00
 0.200    0.59    0.00      0.005  OI      |       |       |       |     0.00
 0.217    0.64    0.00      0.006  OI      |       |       |       |     0.00
 0.233    0.69    0.01      0.007  OI      |       |       |       |     0.00
 0.250    0.69    0.01      0.008  OI      |       |       |       |     0.00
 0.267    0.69    0.01      0.008  OI      |       |       |       |     0.00
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0.283	0.70	0.01	0.009	OI				0.00
0.300	0.70	0.01	0.010	OI				0.00
0.317	0.70	0.01	0.011	OI				0.01
0.333	0.70	0.01	0.012	OI				0.01
0.350	0.71	0.01	0.013	OI				0.01
0.367	0.71	0.01	0.014	OI				0.01
0.383	0.71	0.01	0.015	OI				0.01
0.400	0.71	0.01	0.016	OI				0.01
0.417	0.72	0.01	0.017	OI				0.01
0.433	0.72	0.01	0.018	OI				0.01
0.450	0.72	0.02	0.019	OI				0.01
0.467	0.73	0.02	0.020	OI				0.01
0.483	0.73	0.02	0.021	OI				0.01
0.500	0.73	0.02	0.022	OI				0.01
0.517	0.73	0.02	0.023	OI				0.01
0.533	0.73	0.02	0.024	OI				0.01
0.550	0.73	0.02	0.025	OI				0.01
0.567	0.73	0.02	0.026	OI				0.01
0.583	0.74	0.02	0.027	OI				0.01
0.600	0.74	0.02	0.028	OI				0.01
0.617	0.74	0.02	0.029	OI				0.01
0.633	0.74	0.02	0.030	OI				0.01
0.650	0.74	0.02	0.031	OI				0.01
0.667	0.74	0.03	0.032	OI				0.02
0.683	0.74	0.03	0.033	OI				0.02
0.700	0.75	0.03	0.034	OI				0.02
0.717	0.75	0.03	0.035	OI				0.02
0.733	0.75	0.03	0.036	OI				0.02
0.750	0.76	0.03	0.037	OI				0.02
0.767	0.76	0.03	0.038	OI				0.02
0.783	0.76	0.03	0.039	OI				0.02
0.800	0.77	0.03	0.040	OI				0.02
0.817	0.77	0.03	0.041	OI				0.02
0.833	0.77	0.03	0.042	OI				0.02
0.850	0.78	0.03	0.043	OI				0.02
0.867	0.78	0.03	0.044	OI				0.02
0.883	0.78	0.04	0.045	OI				0.02
0.900	0.79	0.04	0.046	OI				0.02
0.917	0.79	0.04	0.047	OI				0.02
0.933	0.79	0.04	0.048	OI				0.02
0.950	0.79	0.04	0.049	OI				0.02
0.967	0.80	0.04	0.050	OI				0.02
0.983	0.80	0.04	0.051	OI				0.02
1.000	0.80	0.04	0.052	OI				0.03
1.017	0.80	0.04	0.053	OI				0.03
1.033	0.80	0.04	0.054	OI				0.03
1.050	0.80	0.04	0.055	OI				0.03
1.067	0.81	0.04	0.056	OI				0.03
1.083	0.81	0.05	0.057	OI				0.03
1.100	0.81	0.05	0.058	OI				0.03
1.117	0.81	0.05	0.059	OI				0.03
1.133	0.81	0.05	0.061	OI				0.03
1.150	0.82	0.05	0.062	OI				0.03
1.167	0.82	0.05	0.063	OI				0.03
1.183	0.82	0.05	0.064	OI				0.03
1.200	0.83	0.05	0.065	OI				0.03

1.217	0.83	0.05	0.066	OI	|	|	|	0.03
1.233	0.83	0.05	0.067	OI	|	|	|	0.03
1.250	0.84	0.05	0.068	OI	|	|	|	0.03
1.267	0.84	0.05	0.069	OI	|	|	|	0.03
1.283	0.85	0.06	0.070	OI	|	|	|	0.03
1.300	0.85	0.06	0.071	OI	|	|	|	0.03
1.317	0.86	0.06	0.072	OI	|	|	|	0.03
1.333	0.86	0.06	0.073	OI	|	|	|	0.04
1.350	0.86	0.06	0.075	OI	|	|	|	0.04
1.367	0.87	0.06	0.076	OI	|	|	|	0.04
1.383	0.87	0.06	0.077	OI	|	|	|	0.04
1.400	0.88	0.06	0.078	OI	|	|	|	0.04
1.417	0.88	0.06	0.079	OI	|	|	|	0.04
1.433	0.88	0.06	0.080	OI	|	|	|	0.04
1.450	0.88	0.06	0.081	OI	|	|	|	0.04
1.467	0.89	0.07	0.082	OI	|	|	|	0.04
1.483	0.89	0.07	0.084	OI	|	|	|	0.04
1.500	0.89	0.07	0.085	OI	|	|	|	0.04
1.517	0.89	0.07	0.086	OI	|	|	|	0.04
1.533	0.90	0.07	0.087	OI	|	|	|	0.04
1.550	0.90	0.07	0.088	OI	|	|	|	0.04
1.567	0.90	0.07	0.089	OI	|	|	|	0.04
1.583	0.90	0.07	0.090	OI	|	|	|	0.04
1.600	0.91	0.07	0.092	OI	|	|	|	0.04
1.617	0.91	0.07	0.093	OI	|	|	|	0.04
1.633	0.91	0.07	0.094	OI	|	|	|	0.05
1.650	0.92	0.08	0.095	OI	|	|	|	0.05
1.667	0.92	0.08	0.096	OI	|	|	|	0.05
1.683	0.93	0.08	0.097	OI	|	|	|	0.05
1.700	0.93	0.08	0.099	OI	|	|	|	0.05
1.717	0.94	0.08	0.100	OI	|	|	|	0.05
1.733	0.94	0.08	0.101	OI	|	|	|	0.05
1.750	0.95	0.08	0.102	OI	|	|	|	0.05
1.767	0.96	0.08	0.103	OI	|	|	|	0.05
1.783	0.96	0.08	0.104	OI	|	|	|	0.05
1.800	0.97	0.08	0.106	OI	|	|	|	0.05
1.817	0.97	0.08	0.107	O I	|	|	|	0.05
1.833	0.98	0.09	0.108	O I	|	|	|	0.05
1.850	0.98	0.09	0.109	O I	|	|	|	0.05
1.867	0.99	0.09	0.111	O I	|	|	|	0.05
1.883	0.99	0.09	0.112	O I	|	|	|	0.05
1.900	1.00	0.09	0.113	O I	|	|	|	0.05
1.917	1.00	0.09	0.114	O I	|	|	|	0.05
1.933	1.00	0.09	0.116	O I	|	|	|	0.06
1.950	1.01	0.09	0.117	O I	|	|	|	0.06
1.967	1.01	0.09	0.118	O I	|	|	|	0.06
1.983	1.01	0.09	0.119	O I	|	|	|	0.06
2.000	1.02	0.10	0.121	O I	|	|	|	0.06
2.017	1.02	0.10	0.122	O I	|	|	|	0.06
2.033	1.02	0.10	0.123	O I	|	|	|	0.06
2.050	1.03	0.10	0.124	O I	|	|	|	0.06
2.067	1.03	0.10	0.126	O I	|	|	|	0.06
2.083	1.03	0.10	0.127	O I	|	|	|	0.06
2.100	1.04	0.10	0.128	O I	|	|	|	0.06
2.117	1.04	0.10	0.130	O I	|	|	|	0.06
2.133	1.05	0.10	0.131	O I	|	|	|	0.06

2.150	1.06	0.10	0.132	O I	|	|	|	0.06
2.167	1.07	0.11	0.134	O I	|	|	|	0.06
2.183	1.08	0.11	0.135	O I	|	|	|	0.06
2.200	1.09	0.11	0.136	O I	|	|	|	0.07
2.217	1.09	0.11	0.138	O I	|	|	|	0.07
2.233	1.10	0.11	0.139	O I	|	|	|	0.07
2.250	1.11	0.11	0.140	O I	|	|	|	0.07
2.267	1.12	0.11	0.142	O I	|	|	|	0.07
2.283	1.13	0.11	0.143	O I	|	|	|	0.07
2.300	1.13	0.11	0.145	O I	|	|	|	0.07
2.317	1.14	0.12	0.146	O I	|	|	|	0.07
2.333	1.15	0.12	0.147	O I	|	|	|	0.07
2.350	1.15	0.12	0.149	O I	|	|	|	0.07
2.367	1.16	0.12	0.150	O I	|	|	|	0.07
2.383	1.16	0.12	0.152	O I	|	|	|	0.07
2.400	1.17	0.12	0.153	O I	|	|	|	0.07
2.417	1.17	0.12	0.155	O I	|	|	|	0.07
2.433	1.18	0.12	0.156	O I	|	|	|	0.07
2.450	1.18	0.12	0.157	O I	|	|	|	0.08
2.467	1.19	0.13	0.159	O I	|	|	|	0.08
2.483	1.19	0.13	0.160	O I	|	|	|	0.08
2.500	1.20	0.13	0.162	O I	|	|	|	0.08
2.517	1.20	0.13	0.163	O I	|	|	|	0.08
2.533	1.21	0.13	0.165	O I	|	|	|	0.08
2.550	1.21	0.13	0.166	O I	|	|	|	0.08
2.567	1.22	0.13	0.168	O I	|	|	|	0.08
2.583	1.23	0.13	0.169	O I	|	|	|	0.08
2.600	1.25	0.14	0.171	O I	|	|	|	0.08
2.617	1.26	0.14	0.172	O I	|	|	|	0.08
2.633	1.27	0.14	0.174	O I	|	|	|	0.08
2.650	1.28	0.14	0.175	O I	|	|	|	0.08
2.667	1.30	0.14	0.177	O I	|	|	|	0.09
2.683	1.31	0.14	0.179	O I	|	|	|	0.09
2.700	1.32	0.14	0.180	O I	|	|	|	0.09
2.717	1.33	0.14	0.182	O I	|	|	|	0.09
2.733	1.35	0.15	0.184	O I	|	|	|	0.09
2.750	1.36	0.15	0.185	O I	|	|	|	0.09
2.767	1.37	0.15	0.187	O I	|	|	|	0.09
2.783	1.39	0.15	0.189	O I	|	|	|	0.09
2.800	1.40	0.15	0.190	O I	|	|	|	0.09
2.817	1.41	0.15	0.192	O I	|	|	|	0.09
2.833	1.41	0.15	0.194	O I	|	|	|	0.09
2.850	1.42	0.15	0.195	O I	|	|	|	0.09
2.867	1.43	0.16	0.197	O I	|	|	|	0.09
2.883	1.44	0.16	0.199	O I	|	|	|	0.10
2.900	1.45	0.16	0.201	O I	|	|	|	0.10
2.917	1.46	0.16	0.203	O I	|	|	|	0.10
2.933	1.47	0.16	0.204	O I	|	|	|	0.10
2.950	1.47	0.16	0.206	O I	|	|	|	0.10
2.967	1.48	0.16	0.208	O I	|	|	|	0.10
2.983	1.49	0.17	0.210	O I	|	|	|	0.10
3.000	1.50	0.17	0.212	O I	|	|	|	0.10
3.017	1.51	0.17	0.213	O I	|	|	|	0.10
3.033	1.52	0.17	0.215	O I	|	|	|	0.10
3.050	1.54	0.17	0.217	O I	|	|	|	0.10
3.067	1.56	0.17	0.219	O I	|	|	|	0.11

3.083	1.59	0.18	0.221	O	I	|	|	|	0.11
3.100	1.61	0.18	0.223	O	I	|	|	|	0.11
3.117	1.64	0.18	0.225	O	I	|	|	|	0.11
3.133	1.66	0.18	0.227	O	I	|	|	|	0.11
3.150	1.68	0.18	0.229	O	I	|	|	|	0.11
3.167	1.71	0.18	0.231	O	I	|	|	|	0.11
3.183	1.73	0.18	0.233	O	I	|	|	|	0.11
3.200	1.76	0.19	0.235	O	I	|	|	|	0.11
3.217	1.78	0.19	0.238	O	I	|	|	|	0.11
3.233	1.80	0.19	0.240	O	I	|	|	|	0.12
3.250	1.83	0.19	0.242	O	I	|	|	|	0.12
3.267	1.85	0.19	0.244	O	I	|	|	|	0.12
3.283	1.87	0.20	0.247	O	I	|	|	|	0.12
3.300	1.89	0.20	0.249	O	I	|	|	|	0.12
3.317	1.91	0.20	0.251	O	I	|	|	|	0.12
3.333	1.93	0.20	0.254	O	I	|	|	|	0.12
3.350	1.94	0.20	0.256	O	I	|	|	|	0.12
3.367	1.96	0.20	0.258	O	I	|	|	|	0.12
3.383	1.98	0.22	0.261	O	I	|	|	|	0.13
3.400	2.00	0.25	0.263	O	I	|	|	|	0.14
3.417	2.02	0.28	0.266	O	I	|	|	|	0.16
3.433	2.04	0.31	0.268	O	I	|	|	|	0.17
3.450	2.05	0.34	0.270	O	I	|	|	|	0.18
3.467	2.07	0.37	0.273	O	I	|	|	|	0.19
3.483	2.09	0.40	0.275	O	I	|	|	|	0.21
3.500	2.11	0.43	0.277	O	I	|	|	|	0.22
3.517	2.18	0.46	0.280	O	I	|	|	|	0.23
3.533	2.25	0.49	0.282	|O	I	|	|	|	0.25
3.550	2.32	0.51	0.285	|O	I	|	|	|	0.26
3.567	2.39	0.53	0.287	|O	I	|	|	|	0.27
3.583	2.46	0.55	0.290	|O	I	|	|	|	0.29
3.600	2.53	0.57	0.292	|O	I	|	|	|	0.30
3.617	2.60	0.59	0.295	|O	I	|	|	|	0.32
3.633	2.67	0.61	0.298	|O	I	|	|	|	0.34
3.650	2.75	0.63	0.301	|O	I	|	|	|	0.35
3.667	2.82	0.65	0.304	|O	I	|	|	|	0.37
3.683	2.89	0.67	0.307	|O	I	|	|	|	0.38
3.700	2.96	0.69	0.310	|O	I	|	|	|	0.40
3.717	3.03	0.70	0.313	|O	I	|	|	|	0.42
3.733	3.10	0.72	0.316	|O	I	|	|	|	0.43
3.750	3.19	0.74	0.320	|O	I	|	|	|	0.45
3.767	3.28	0.76	0.323	|O	I	|	|	|	0.47
3.783	3.37	0.78	0.327	|O	I	|	|	|	0.49
3.800	3.46	0.80	0.330	|O	I	|	|	|	0.51
3.817	3.55	0.81	0.334	|O	I	|	|	|	0.53
3.833	3.64	0.83	0.338	|O	I	|	|	|	0.55
3.850	3.73	0.85	0.342	|O	I	|	|	|	0.57
3.867	3.82	0.87	0.346	|O	I	|	|	|	0.59
3.883	3.91	0.89	0.350	|O	I	|	|	|	0.61
3.900	4.00	0.91	0.354	|O	I	|	|	|	0.64
3.917	4.09	0.93	0.358	|O	I	|	|	|	0.66
3.933	4.18	0.94	0.363	|O	I	|	|	|	0.68
3.950	4.28	0.96	0.367	|O	I	|	|	|	0.70
3.967	4.37	0.98	0.372	| O	|I	|	|	|	0.73
3.983	5.16	1.00	0.377	| O	| I	|	|	|	0.76
4.000	5.96	1.03	0.383	| O	| I	|	|	|	0.79

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4.017    6.75    1.06      0.391  | O      |    I   |        |        |      0.83
4.033    7.55    1.09      0.399  | O      |      I |        |        |      0.87
4.050    8.34    1.12      0.408  | O      |        |I       |        |      0.92
4.067    9.14    1.15      0.419  | O      |        | I      |        |      0.97
4.083    9.93    1.18      0.430  | O      |        |   I    |        |      1.02
4.100   10.73    1.20      0.443  | O      |        |     I  |        |      1.05
4.117   11.52    1.22      0.457  | O      |        |      I |        |      1.08
4.133   12.32    1.25      0.471  | O      |        |        |I       |      1.12
4.150   13.12    1.31      0.487  | O      |        |        |  I     |      1.23
4.167   13.91    1.38      0.504  | O      |        |        |    I   |      1.36
4.183   14.71    1.46      0.522  |  O     |        |        |      I |      1.50
4.200   15.50    1.50      0.540  |  O     |        |        |       I|      1.59
4.217   14.57    1.55      0.559  |  O     |        |        |      I |      1.68
4.233   13.64    1.66      0.576  |  O     |        |        |    I   |      1.77
4.250   12.71    2.02      0.592  |   O    |        |        | I      |      1.84
4.267   11.78    2.40      0.606  |   O    |        |       I|        |      1.91
4.283   10.85    2.79      0.618  |    O   |        |     I  |        |      1.96
4.300    9.92    3.08      0.628  |     O  |        |   I    |        |      2.01
4.317    8.99    3.23      0.637  |     O  |        | I      |        |      2.06
4.333    8.06    3.35      0.644  |     O  |        I        |        |      2.09
4.350    7.13    3.45      0.650  |      O |     I  |        |        |      2.12
4.367    6.20    3.52      0.654  |      O |   I    |        |        |      2.14
4.383    5.27    3.57      0.657  |      O | I      |        |        |      2.15
4.400    4.34    3.60      0.659  |      OI        |        |        |      2.16
4.417    3.41    3.61      0.659  |      O |       |        |        |      2.16
4.433    2.49    3.59      0.658  |    I O |       |        |        |      2.16
4.450    2.43    3.57      0.657  |    I O |       |        |        |      2.15
4.467    2.37    3.54      0.655  |   I  O |       |        |        |      2.14
4.483    2.31    3.51      0.653  |   I  O |       |        |        |      2.14
4.500    2.25    3.48      0.652  |   I  O |       |        |        |      2.13
4.517    2.19    3.45      0.650  |   I  O |       |        |        |      2.12
4.533    2.13    3.42      0.648  |   I  O |       |        |        |      2.11
4.550    2.07    3.39      0.646  |   I  O |       |        |        |      2.10
4.567    2.02    3.36      0.645  |   I O  |       |        |        |      2.09
4.583    1.96    3.33      0.643  |   I O  |       |        |        |      2.09
4.600    1.90    3.30      0.641  |  I  O  |       |        |        |      2.08
4.617    1.84    3.27      0.639  |  I  O  |       |        |        |      2.07
4.633    1.78    3.23      0.637  |  I  O  |       |        |        |      2.06
4.650    1.72    3.20      0.635  |  I  O  |       |        |        |      2.05
4.667    1.66    3.16      0.633  |  I  O  |       |        |        |      2.04
4.683    1.64    3.13      0.631  |  I  O  |       |        |        |      2.03
4.700    1.61    3.09      0.629  |  I  O  |       |        |        |      2.02
4.717    1.59    3.06      0.627  |  I  O  |       |        |        |      2.01
4.733    1.56    3.02      0.625  |  I  O  |       |        |        |      2.00
4.750    1.53    2.96      0.623  |  I  O  |       |        |        |      1.99
4.767    1.51    2.89      0.621  |  I O   |       |        |        |      1.98
4.783    1.48    2.83      0.619  |  I O   |       |        |        |      1.97
4.800    1.46    2.77      0.617  |  I O   |       |        |        |      1.96
4.817    1.43    2.71      0.615  | I  O   |       |        |        |      1.95
4.833    1.40    2.66      0.614  | I  O   |       |        |        |      1.94
4.850    1.38    2.60      0.612  | I  O   |       |        |        |      1.94
4.867    1.35    2.55      0.610  | I  O   |       |        |        |      1.93
4.883    1.33    2.50      0.609  | I  O   |       |        |        |      1.92
4.900    1.30    2.44      0.607  | I  O   |       |        |        |      1.91
4.917    1.29    2.39      0.605  | I O    |       |        |        |      1.91
4.933    1.27    2.34      0.604  | I O    |       |        |        |      1.90
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4.950	1.26	2.30	0.602	I O				1.89
4.967	1.24	2.25	0.601	I O				1.88
4.983	1.23	2.21	0.600	I O				1.88
5.000	1.21	2.17	0.598	I O				1.87
5.017	1.20	2.14	0.597	I O				1.87
5.033	1.18	2.11	0.596	I O				1.86
5.050	1.17	2.08	0.594	I O				1.85
5.067	1.15	2.05	0.593	I O				1.85
5.083	1.13	2.02	0.592	I O				1.84
5.100	1.12	1.99	0.591	I O				1.84
5.117	1.10	1.97	0.590	I O				1.83
5.133	1.09	1.94	0.588	I O				1.82
5.150	1.08	1.91	0.587	IO				1.82
5.167	1.07	1.89	0.586	IO				1.81
5.183	1.06	1.86	0.585	IO				1.81
5.200	1.05	1.83	0.584	IO				1.80
5.217	1.04	1.81	0.583	IO				1.80
5.233	1.03	1.78	0.582	IO				1.79
5.250	1.02	1.76	0.581	IO				1.79
5.267	1.01	1.74	0.580	IO				1.78
5.283	1.00	1.71	0.579	IO				1.78
5.300	0.99	1.69	0.578	IO				1.77
5.317	0.98	1.67	0.577	IO				1.77
5.333	0.97	1.65	0.576	I O				1.76
5.350	0.96	1.62	0.575	I O				1.76
5.367	0.95	1.60	0.574	I O				1.75
5.383	0.94	1.58	0.573	I O				1.75
5.400	0.93	1.58	0.572	I O				1.75
5.417	0.93	1.58	0.571	I O				1.74
5.433	0.92	1.57	0.570	I O				1.74
5.450	0.91	1.57	0.570	I O				1.73
5.467	0.90	1.57	0.569	I O				1.73
5.483	0.90	1.57	0.568	I O				1.72
5.500	0.89	1.57	0.567	I O				1.72
5.517	0.88	1.56	0.566	I O				1.71
5.533	0.88	1.56	0.565	I O				1.71
5.550	0.87	1.56	0.564	I O				1.70
5.567	0.86	1.56	0.563	I O				1.70
5.583	0.85	1.55	0.562	I O				1.70
5.600	0.85	1.55	0.561	I O				1.69
5.617	0.84	1.55	0.560	I O				1.69
5.633	0.83	1.55	0.559	I O				1.68
5.650	0.83	1.54	0.558	I O				1.68
5.667	0.82	1.54	0.557	I O				1.67
5.683	0.82	1.54	0.556	I O				1.67
5.700	0.81	1.54	0.555	I O				1.66
5.717	0.81	1.53	0.554	I O				1.66
5.733	0.80	1.53	0.553	I O				1.65
5.750	0.80	1.53	0.552	I O				1.65
5.767	0.79	1.53	0.551	I O				1.64
5.783	0.78	1.53	0.550	I O				1.64
5.800	0.78	1.52	0.549	I O				1.63
5.817	0.77	1.52	0.548	I O				1.63
5.833	0.77	1.52	0.547	I O				1.62
5.850	0.76	1.52	0.546	I O				1.62
5.867	0.76	1.51	0.545	I O				1.61

5.883	0.75	1.51	0.544	I O				1.61
5.900	0.75	1.51	0.543	I O				1.60
5.917	0.75	1.51	0.542	I O				1.60
5.933	0.74	1.50	0.541	I O				1.59
5.950	0.74	1.50	0.540	I O				1.59
5.967	0.73	1.50	0.539	I O				1.58
5.983	0.73	1.49	0.538	I O				1.58
6.000	0.72	1.49	0.537	I O				1.57
6.017	0.72	1.49	0.536	I O				1.57
6.033	0.71	1.49	0.534	I O				1.56
6.050	0.71	1.48	0.533	I O				1.55
6.067	0.71	1.48	0.532	I O				1.55
6.083	0.00	1.48	0.531	I O				1.54
6.100	0.00	1.47	0.529	I O				1.53
6.117	0.00	1.47	0.527	I O				1.52
6.133	0.00	1.46	0.525	I O				1.51
6.150	0.00	1.46	0.523	I O				1.50
6.167	0.00	1.45	0.521	I O				1.49
6.183	0.00	1.44	0.519	I O				1.47
6.200	0.00	1.43	0.517	I O				1.46
6.217	0.00	1.43	0.515	I O				1.44
6.233	0.00	1.42	0.513	I O				1.43
6.250	0.00	1.41	0.511	I O				1.41
6.267	0.00	1.40	0.509	I O				1.40
6.283	0.00	1.39	0.507	I O				1.38
6.300	0.00	1.39	0.505	I O				1.37
6.317	0.00	1.38	0.503	I O				1.36
6.333	0.00	1.37	0.501	I O				1.34
6.350	0.00	1.36	0.499	I O				1.33
6.367	0.00	1.35	0.498	I O				1.31
6.383	0.00	1.35	0.496	I O				1.30
6.400	0.00	1.34	0.494	I O				1.28
6.417	0.00	1.33	0.492	I O				1.27
6.433	0.00	1.32	0.490	I O				1.26
6.450	0.00	1.31	0.488	I O				1.24
6.467	0.00	1.31	0.487	I O				1.23
6.483	0.00	1.30	0.485	I O				1.21
6.500	0.00	1.29	0.483	I O				1.20
6.517	0.00	1.28	0.481	I O				1.19
6.533	0.00	1.28	0.479	I O				1.17
6.550	0.00	1.27	0.478	I O				1.16
6.567	0.00	1.26	0.476	I O				1.15
6.583	0.00	1.25	0.474	I O				1.13
6.600	0.00	1.25	0.472	I O				1.12
6.617	0.00	1.25	0.471	I O				1.12
6.633	0.00	1.24	0.469	I O				1.11
6.650	0.00	1.24	0.467	I O				1.11
6.667	0.00	1.24	0.466	I O				1.11
6.683	0.00	1.23	0.464	I O				1.10
6.700	0.00	1.23	0.462	I O				1.10
6.717	0.00	1.23	0.461	I O				1.09
6.733	0.00	1.23	0.459	I O				1.09
6.750	0.00	1.22	0.457	I O				1.08
6.767	0.00	1.22	0.455	I O				1.08
6.783	0.00	1.22	0.454	I O				1.08
6.800	0.00	1.22	0.452	I O				1.07

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  6.817    0.00    1.21      0.450  I O     |       |       |       |      1.07
  6.833    0.00    1.21      0.449  I O     |       |       |       |      1.06
  6.850    0.00    1.21      0.447  I O     |       |       |       |      1.06
  6.867    0.00    1.21      0.445  I O     |       |       |       |      1.05
  6.883    0.00    1.20      0.444  I O     |       |       |       |      1.05
  6.900    0.00    1.20      0.442  I O     |       |       |       |      1.05
  6.917    0.00    1.20      0.440  I O     |       |       |       |      1.04
  6.933    0.00    1.20      0.439  I O     |       |       |       |      1.04
  6.950    0.00    1.19      0.437  I O     |       |       |       |      1.03
  6.967    0.00    1.19      0.436  I O     |       |       |       |      1.03
  6.983    0.00    1.19      0.434  I O     |       |       |       |      1.03
  7.000    0.00    1.18      0.432  I O     |       |       |       |      1.02
-------------------------------------------^V---------------------------------
 14.000    0.00    0.16      0.200  O       |       |       |       |      0.10
 14.017    0.00    0.16      0.199  O       |       |       |       |      0.10
 14.033    0.00    0.16      0.199  O       |       |       |       |      0.10
 14.050    0.00    0.16      0.199  O       |       |       |       |      0.10
 14.067    0.00    0.16      0.199  O       |       |       |       |      0.10
 14.083    0.00    0.16      0.198  O       |       |       |       |      0.10
 14.100    0.00    0.16      0.198  O       |       |       |       |      0.10
 14.117    0.00    0.16      0.198  O       |       |       |       |      0.10
 14.133    0.00    0.16      0.198  O       |       |       |       |      0.10
 14.150    0.00    0.16      0.198  O       |       |       |       |      0.09
 14.167    0.00    0.16      0.197  O       |       |       |       |      0.09
 14.183    0.00    0.16      0.197  O       |       |       |       |      0.09
 14.200    0.00    0.16      0.197  O       |       |       |       |      0.09
 14.217    0.00    0.16      0.197  O       |       |       |       |      0.09
 14.233    0.00    0.16      0.197  O       |       |       |       |      0.09
 14.250    0.00    0.16      0.196  O       |       |       |       |      0.09
 14.267    0.00    0.16      0.196  O       |       |       |       |      0.09
 14.283    0.00    0.16      0.196  O       |       |       |       |      0.09
 14.300    0.00    0.16      0.196  O       |       |       |       |      0.09
 14.317    0.00    0.15      0.195  O       |       |       |       |      0.09
 14.333    0.00    0.15      0.195  O       |       |       |       |      0.09
 14.350    0.00    0.15      0.195  O       |       |       |       |      0.09
 14.367    0.00    0.15      0.195  O       |       |       |       |      0.09
 14.383    0.00    0.15      0.195  O       |       |       |       |      0.09
 14.400    0.00    0.15      0.194  O       |       |       |       |      0.09
 14.417    0.00    0.15      0.194  O       |       |       |       |      0.09
 14.433    0.00    0.15      0.194  O       |       |       |       |      0.09
 14.450    0.00    0.15      0.194  O       |       |       |       |      0.09
 14.467    0.00    0.15      0.194  O       |       |       |       |      0.09
 14.483    0.00    0.15      0.193  O       |       |       |       |      0.09
 14.500    0.00    0.15      0.193  O       |       |       |       |      0.09
 14.517    0.00    0.15      0.193  O       |       |       |       |      0.09
 14.533    0.00    0.15      0.193  O       |       |       |       |      0.09
 14.550    0.00    0.15      0.192  O       |       |       |       |      0.09
 14.567    0.00    0.15      0.192  O       |       |       |       |      0.09
 14.583    0.00    0.15      0.192  O       |       |       |       |      0.09
 14.600    0.00    0.15      0.192  O       |       |       |       |      0.09
 14.617    0.00    0.15      0.192  O       |       |       |       |      0.09
 14.633    0.00    0.15      0.191  O       |       |       |       |      0.09
 14.650    0.00    0.15      0.191  O       |       |       |       |      0.09
 14.667    0.00    0.15      0.191  O       |       |       |       |      0.09
 14.683    0.00    0.15      0.191  O       |       |       |       |      0.09
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14.700    0.00    0.15      0.191  O       |       |       |       |      0.09
14.717    0.00    0.15      0.190  O       |       |       |       |      0.09
14.733    0.00    0.15      0.190  O       |       |       |       |      0.09
14.750    0.00    0.15      0.190  O       |       |       |       |      0.09
14.767    0.00    0.15      0.190  O       |       |       |       |      0.09
14.783    0.00    0.15      0.190  O       |       |       |       |      0.09
14.800    0.00    0.15      0.189  O       |       |       |       |      0.09
14.817    0.00    0.15      0.189  O       |       |       |       |      0.09
14.833    0.00    0.15      0.189  O       |       |       |       |      0.09
14.850    0.00    0.15      0.189  O       |       |       |       |      0.09
14.867    0.00    0.15      0.189  O       |       |       |       |      0.09
14.883    0.00    0.15      0.188  O       |       |       |       |      0.09
14.900    0.00    0.15      0.188  O       |       |       |       |      0.09
14.917    0.00    0.15      0.188  O       |       |       |       |      0.09
14.933    0.00    0.15      0.188  O       |       |       |       |      0.09
14.950    0.00    0.15      0.187  O       |       |       |       |      0.09
14.967    0.00    0.15      0.187  O       |       |       |       |      0.09
14.983    0.00    0.15      0.187  O       |       |       |       |      0.09
15.000    0.00    0.15      0.187  O       |       |

     Remaining water in basin =    0.00 (Ac.Ft)


     ****************************HYDROGRAPH DATA****************************
               Number of intervals =  5001
               Time interval =    1.0 (Min.)
               Maximum/Peak flow rate =        3.609 (CFS)
               Total volume =       0.948 (Ac.Ft)
          Status of hydrographs being held in storage
                     Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
          Peak (CFS)      0.000     0.000     0.000     0.000     0.000
          Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
     ***********************************************************************

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APPENDIX 4
Runoff Coefficient Calculations, Maps, Charts,
Reference Drawings

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Pre-Project Drainage

Basin ID	Total Area (ac)	Relief	Soil Infiltration	Vegetal Cover	Surface Storage	Weighted Runoff Coef C: (5, 10yr Frequency)	Weighted Runoff Coef C: (100 0yr Frequency)	Weighted Runoff Coef C: (100 0yr Frequency)
A.1	0.20	0.14	0.08	0.08	0.10	0.40	0.50	
A.2	15.01	0.13	0.07	0.12	0.08	0.40	0.49	0.49
B.1	0.03	0.14	0.08	0.08	0.10	0.40	0.50	
B.2	4.93	0.11	0.08	0.08	0.08	0.36	0.44	0.44
C.1	0.01	0.14	0.08	0.08	0.10	0.40	0.50	
C.2	0.20	0.14	0.08	0.12	0.10	0.44	0.55	0.55
D.1*	0.05	-	-	0.70	-	0.70	0.88	
D.2	0.40	0.19	0.08	0.08	0.08	0.44	0.54	0.58
Total	20.83							

* Basin area is assumed to be in developed condition

Runoff Coefficient Table Per Highway Desing Manual Figure 819.2A				
	Extreme	High	Normal	Low
Relief	0.28-0.35	0.20-0.28	0.14-0.20	0.08-0.14
Soil Infiltration	0.12-0.16	0.08-0.12	0.06-0.08	0.04-0.06
Vegetation Cover	0.12-0.16	0.08-0.12	0.06-0.08	0.04-0.06
Surface Storage	0.10-0.12	0.08-0.10	0.06-0.08	0.04-0.06

Basin A.2

	Extreme		High		Normal		Low	
	Area (sf)	Value	Area (sf)	Value	Area (sf)	Value	Area (sf)	Value
Relief	70241	0.28	77080	0.2	125876	0.14	380850	0.08
Soil Infiltration	-	-	191152	0.08	462894	0.06	-	-
Vegetal Cover	-	-	240633	0.08	-	-	342787	0.04
Surface Storage	-	-	654046	0.08	-	-	-	-
	Asphalt		Sinlge Family Areas					
Developed Areas	62907	0.7	12507	0.3				

Developed Areas Runoff Coefficient values per Highway Design Manual Table 819.2B

Basin B.2

	Extreme		High		Normal		Low	
	Area (sf)	Value	Area (sf)	Value	Area (sf)	Value	Area (sf)	Value
Relief	10336	0.28	21640	0.2	43158	0.14	135669	0.08
Soil Infiltration	-	-	214787	0.08	-	-	-	-
Vegetal Cover	-	-	126800	0.08	69943	0.06	12800	0.04
Surface Storage	-	-	214787	0.08	-	-	-	-
	Asphalt		Sinlge Family Areas					
Developed Areas	-	-	5245	0.3				

Basin D.2

	Extreme		High		Normal		Low	
	Area (sf)	Value	Area (sf)	Value	Area (sf)	Value	Area (sf)	Value
Relief	2765	0.28	11717	0.2	949	0.14	2263	0.08
Soil Infiltration	-	-	17636	0.08	-	-	-	-
Vegetal Cover	-	-	-	-	16268	0.06	-	-
Surface Storage	-	-	15778	0.08	-	-	-	-
	Asphalt		Sinlge Family Areas					
Developed Areas	-	-	1568	0.3				

Post-Project Drainage

Basin ID	Total Area (ac)	Multi Family Residential (SF)	Lawns 2% (SF)	Lawns 7% (SF)	Asphaltic (SF)	Drives & Walks (SF)	Weighted Runoff Coef C: (5, 10yr Frequency)	Weighted Runoff Coef C: (100 yr Frequency)	Total Weighted Runoff Coef C: (100 yr Frequency)
A.1	0.04	0	481	0	1182	89	0.61	0.77	
A.2	0.62	3462	5283	4629	11602	2208	0.55	0.69	
A.3	0.44	1076	9797	6466	0	1860	0.22	0.27	0.53
B.1	0.04	0	225	0	1059	514	0.72	0.90	
B.2	0.89	10203	11758	0	11434	5158	0.57	0.71	0.72
C.1	0.08	1859	1157	0	0	302	0.52	0.65	
C.2	0.75	14396	9098	0	7807	1405	0.58	0.73	0.72
D.0.1	0.08	0	0	2873	0	400	0.25	0.31	
D.0.2	0.25	0	0	9386	0	1440	0.25	0.32	
D.1	0.08	1830	1160	0	0	338	0.52	0.65	
D.2	1.69	29647	18808	0	18760	6330	0.60	0.75	
D.3	0.04	0	362	0	1075	384	0.67	0.83	
D.4	0.33	0	2177	0	8975	3273	0.70	0.88	
D.5	1.82	41050	17848	0	16201	4110	0.61	0.77	
D.6	0.34	0	3344	11282	0	0	0.15	0.19	0.69
E.1	0.08	931	1872	0	483	269	0.41	0.51	
E.2	0.92	14096	10540	653	11221	3358	0.59	0.73	
E.3	0.07	0	257	0	2006	596	0.75	0.94	
E.4	0.90	12090	11767	3407	8538	3590	0.52	0.65	
E.5	0.18	3670	754	1947	0	1337	0.55	0.68	
E.6	0.84	3595	7076	0	22433	3531	0.67	0.83	
E.7	0.30	2104	6656	1445	0	2849	0.35	0.44	0.70
F.1	0.11	3153	107	0	1524	0	0.76	0.95	
F.2	0.97	11247	21396	0	2931	6698	0.42	0.53	
F.3	0.08	1825	99	0	1355	0	0.76	0.95	
F.4	0.35	6641	2886	0	4919	1011	0.65	0.81	
F.5	0.20	0	1647	5875	0	982	0.22	0.28	0.60
G.1	0.08	0	0	2880	0	400	0.25	0.31	
G.2	2.21	29277	17569	23010	20085	6535	0.51	0.63	
G.3	0.04	0	124	0	1121	617	0.76	0.95	
G.4	0.29	0	1677	0	8079	2977	0.72	0.90	
G.5	1.17	25453	10744	0	13276	1397	0.63	0.78	
H.1	0.04	0	495	0	993	354	0.62	0.77	
H.2	0.48	0	3039	2296	11341	4448	0.64	0.80	
H.3	0.33	0	3027	0	9737	1496	0.66	0.82	
I.1	0.11	0	1676	581	2607	129	0.49	0.62	
I.2	0.75	6784	5101	2769	15345	2800	0.63	0.79	
I.3	0.76	7183	16524	5710	0	3585	0.32	0.40	0.69
J.1	0.03	0	0	1281	0	0	0.17	0.21	
J.2	0.29	0	0	12816	0	0	0.17	0.21	0.43
J.3	0.29	0	3472	1930	5790	1697	0.53	0.66	
K.1	0.04	0	0	1260	0	300	0.29	0.36	
K.2	0.16	0	0	6238	0	900	0.25	0.31	0.32
L.1	0.19	0	973	2521	3869	975	0.53	0.67	
L.2	0.87	0	1352	9045	23082	4447	0.64	0.80	0.77

M.1	0.02	0	259	0	0	456	0.54	0.67	
M.2	0.04	0	689	0	0	904	0.49	0.61	
M.3	0.13	0	1142	161	965	3312	0.64	0.80	0.75
N.1	0.09	0	0	4107	0	0	0.17	0.21	0.21
N.2	0.25	0	0	10897	0	0	0.17	0.21	

Total 20.89

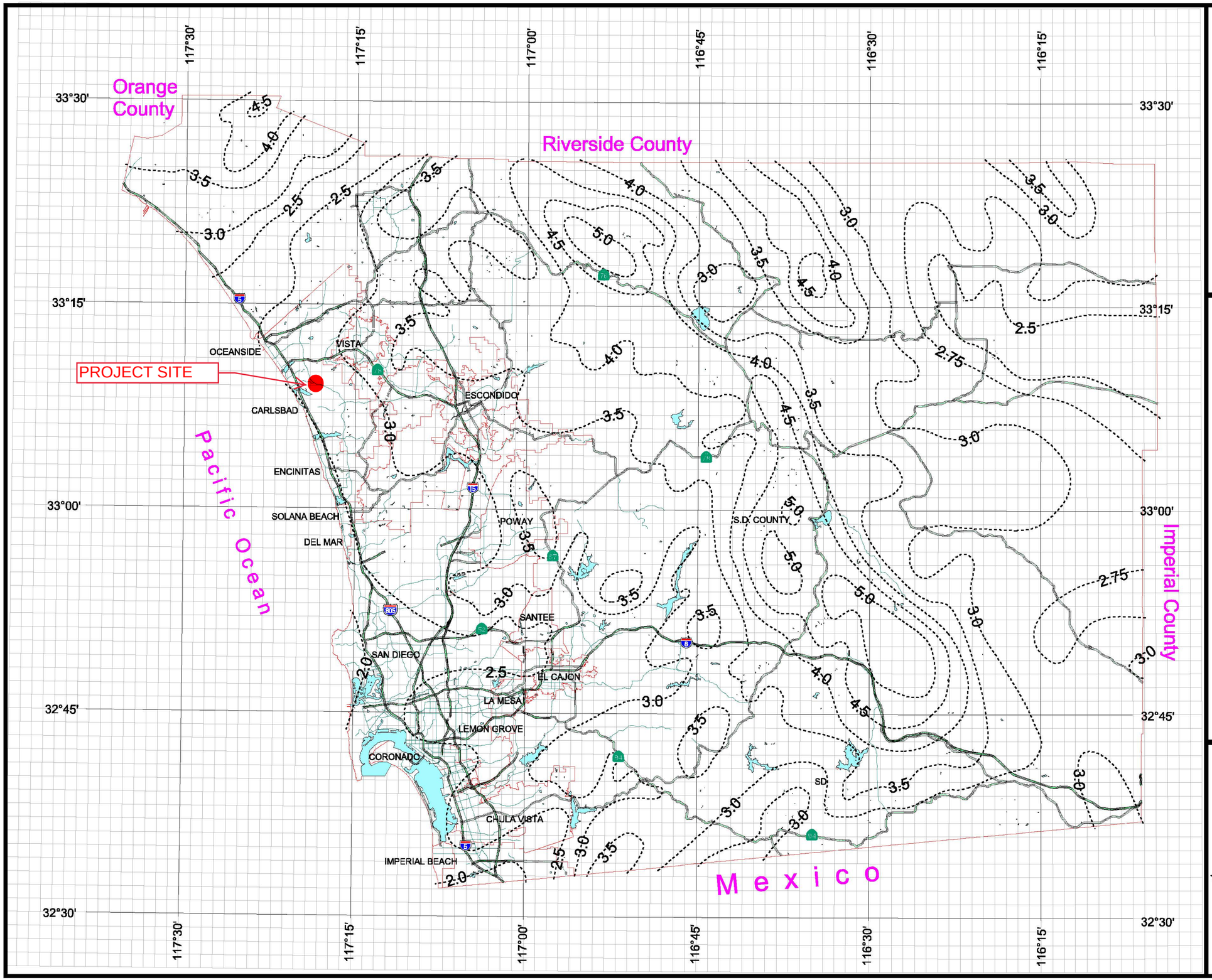
Runoff Coefficient Table Per Highway Desing Manual Figure 819.2B	
Type of Drainage Area	Runoff Coefficient
Multi Family Residential	0.75
Lawns:	
Sandy soil, flat, 2%	0.08
Sandy soil, steep, 7%	0.17
Streets:	
Asphaltic	0.82
Drives and Walks	0.80

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)



N W E S

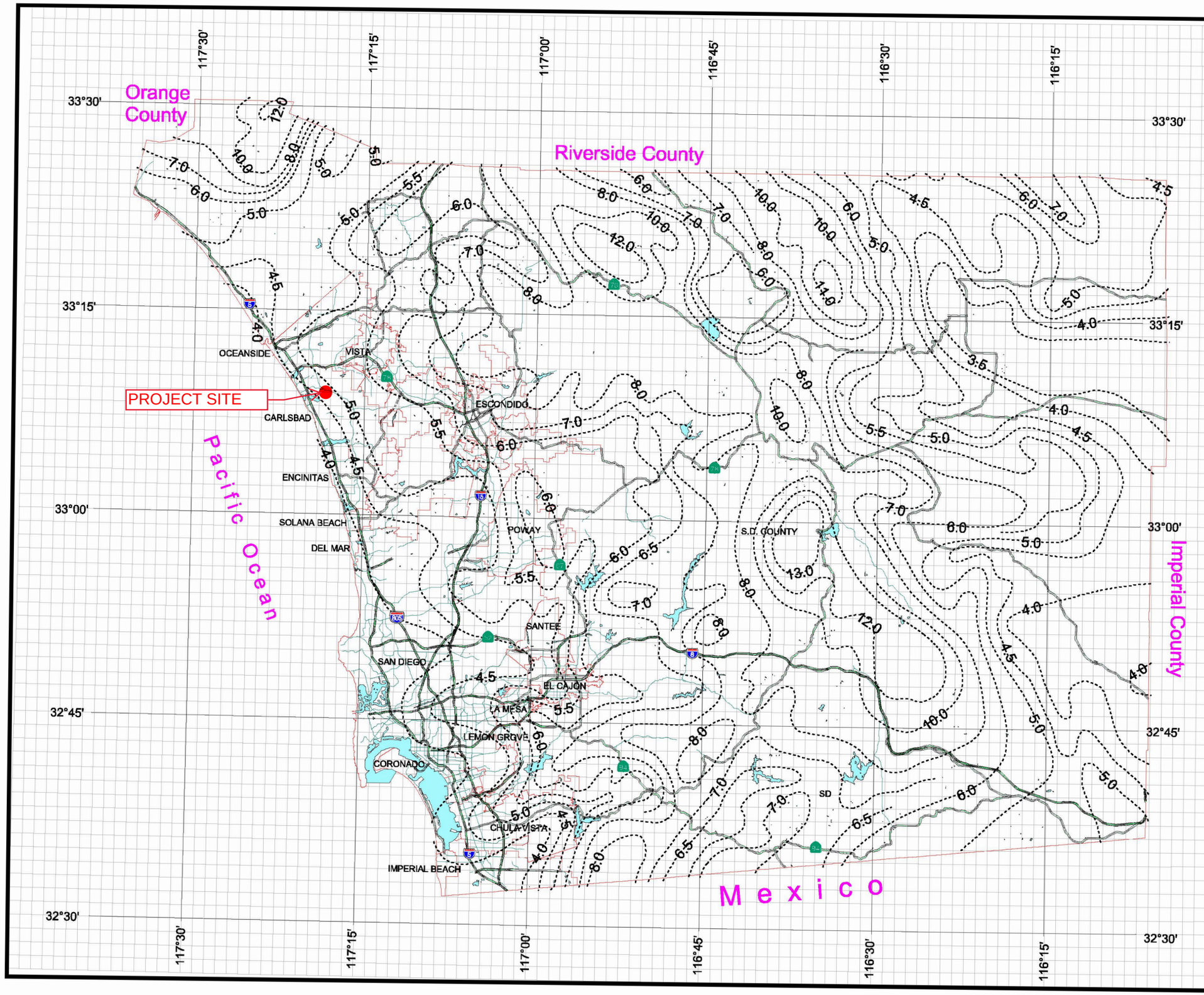
3 0 3 Miles

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)



DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

N
W E
S

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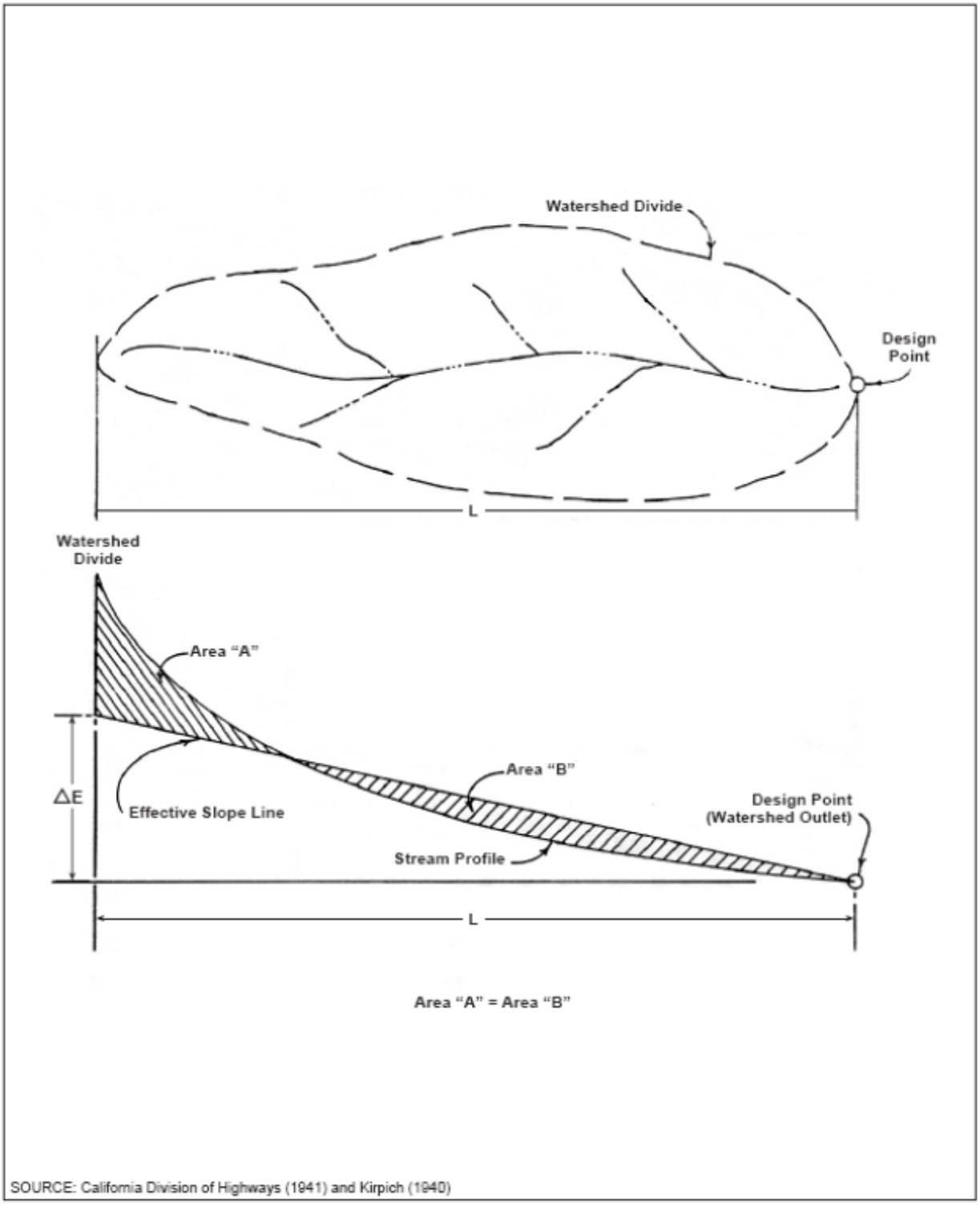


FIGURE

Computation of Effective Slope for Natural Watersheds

39

3-5

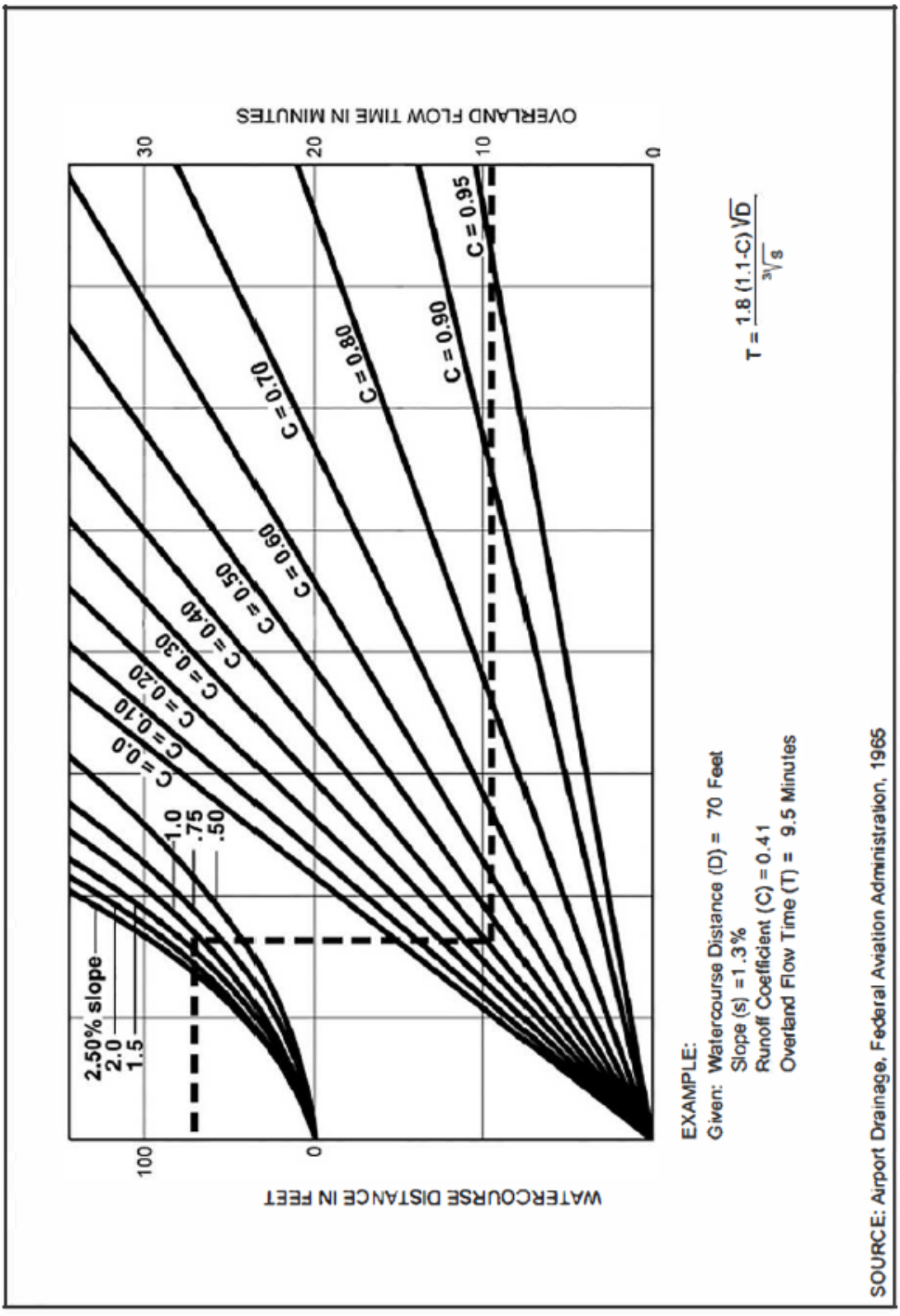


FIGURE 3-3

Rational Formula - Overland Time of Flow Nomograph

43

Manning's *n* Values for Overland Flow[1]

The BMP Design Manuals within the County of San Diego allow for a land surface description other than short prairie grass to be used for hydromodification BMP design only if documentation provided is consistent with Table A.6 of the SWMM 5 User's Manual.

In January 2016, the EPA released the SWMM Reference Manual Volume I – Hydrology (SWMM Hydrology Reference Manual). The SWMM Hydrology Reference Manual complements the SWMM 5 User's Manual by providing an in-depth description of the program's hydrologic components. Table 3-5 of the SWMM Hydrology Reference Manual expounds upon Table A.6 of the SWMM 5 User's Manual by providing Manning's *n* values for additional overland flow surfaces. Therefore, in order to provide SWMM users with a wider range of land surfaces suitable for local application and to provide Copermittees with confidence in the design parameters, we recommend using the values published by Yen and Chow in Table 3-5 of the EPA SWMM Reference Manual Volume I – Hydrology. The values are provided in the table below:

Overland Surface	Manning value (*n*)
Smooth asphalt pavement	0.010
Smooth impervious surface	0.011
Tar and sand pavement	0.012
Concrete pavement	0.014
Rough impervious surface	0.015
Smooth bare packed soil	0.017
Moderate bare packed soil	0.025
Rough bare packed soil	0.032
Gravel soil	0.025
Mowed poor grass	0.030
Average grass, closely clipped sod	0.040
Pasture	0.040
Timberland	0.060
Dense grass	0.060
Shrubs and bushes	0.080
Land Use	
Business	0.014
Semibusiness	0.022
Industrial	0.020
Dense residential	0.025
Suburban residential	0.030
Parks and lawns	0.040

[1]Content summarized from *Improving Accuracy in Continuous Simulation Modeling: Guidance for Selecting Pervious Overland Flow Manning's n Values in the San Diego Region* (TRWE, 2016).

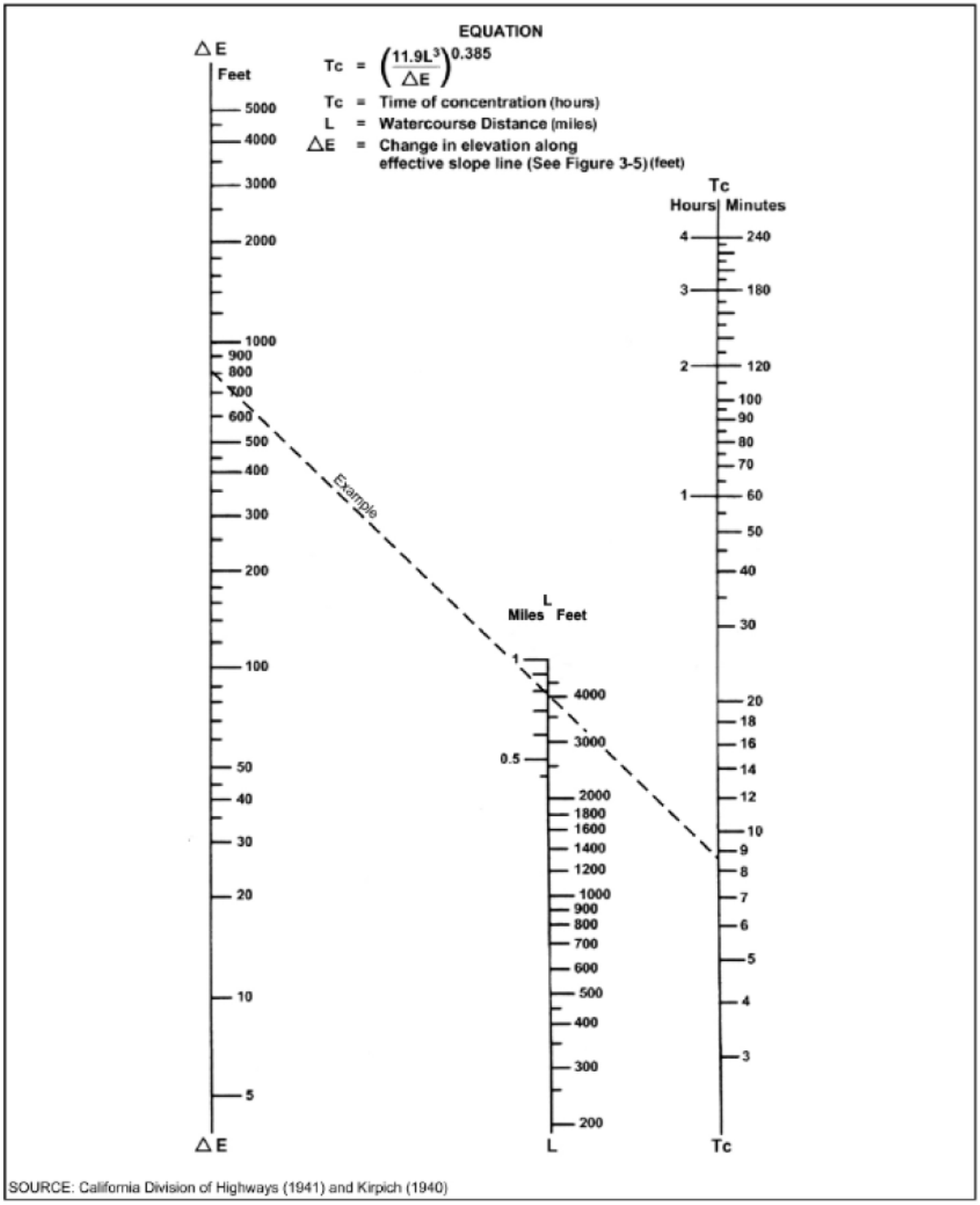
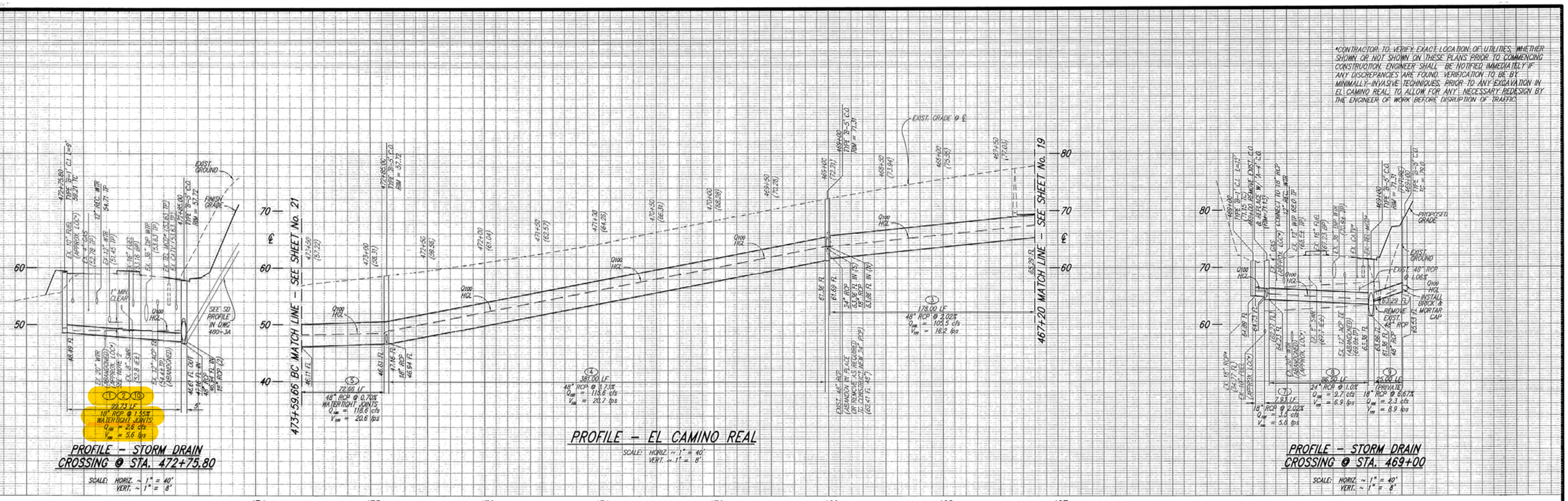


FIGURE 3-4

Nomograph for Determination of
Time of Concentration (Tc) or Travel Time (Tt) for Natural Watersheds

27

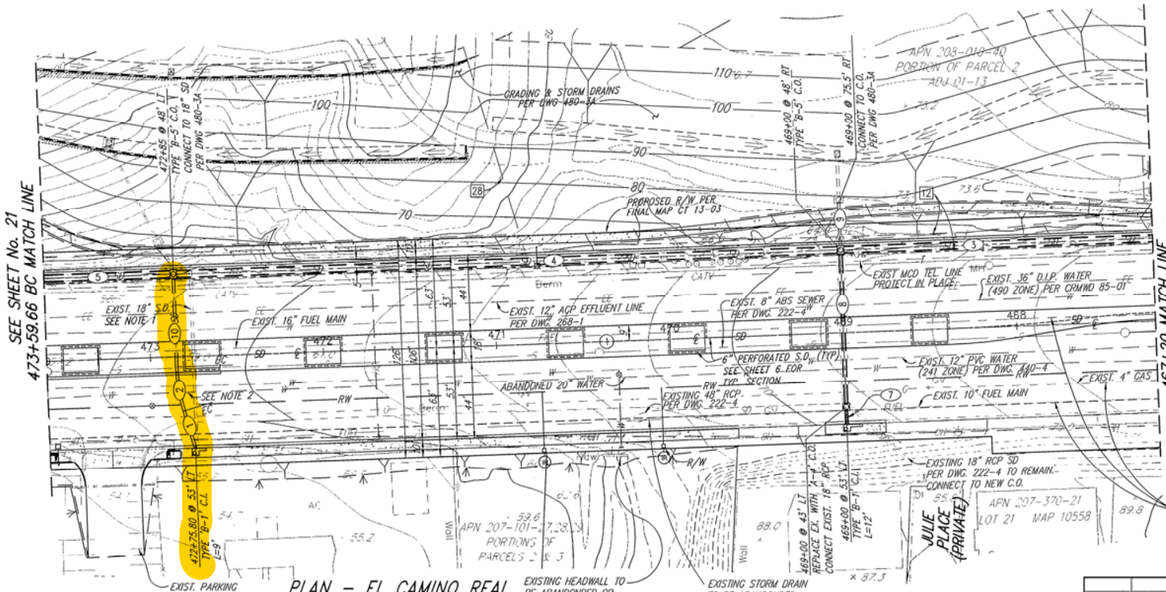


CENTERLINE DATA			
NO	DELTA/BEARING	RADIUS	LENGTH
1	N 87°53'57" E	——	639.66'

STORM DRAIN DATA				
NO	DELTA/BEARING	RADIUS	LENGTH	REMARKS
1	N 17°05'46" W	——	22.40'	18" RCP ~ 1350-D*
2	Δ = 14°59'33"	100.00'	26.17'	" "
3	N 87°53'47" E	——	178.00'	48" RCP ~ 1350-D
4	N 87°53'47" E	——	381.00'	" "
5	N 87°53'47" E	——	72.66'	48" RCP ~ 1350-D*
6	NOT USED			
7	N 02°06'13" W	——	7.93'	18" RCP ~ 1350-D
8	N 02°06'13" W	——	86.50'	24" RCP ~ 1350-D
9	N 02°06'13" W	——	25.00'	18" RCP ~ 1350-D (PRIVATE)
10	N 02°06'13" W	——	51.16'	18" RCP ~ 1350-D*

*WATER-TIGHT JOINTS

0' 10' 40'
20 80'
SCALE: 1" = 40'



NOTES:

1. A SEARCH OF EXIST. 18" STORM DRAIN HAS BEEN CONDUCTED AND NOTHING FOUND. IF CONTRACTOR LOCATES EXIST. STORM DRAIN DURING CONSTRUCTION, HE SHALL CONTACT ENGINEER TO EVALUATE USE OF EXIST. LINE IN LIEU OF (10).
2. REMOVE PORTION OF EXIST. ABANDONED 20" WATER AS REQUIRED.

EXISTING EASEMENTS

(12) DRAINAGE CHANNEL TO COUNTY OF SAN DIEGO REC. MAR. 12, 1970, DOC. 44687, O.R.
(28) MEMORANDUM OF MANAGEMENT AND FUNDING AGREEMENT REC. DEC. 21, 2007, DOC. 2007-0786169, O.R.

CAUTION!
EXCAVATING IN THE VICINITY OF HIGH PRESSURE GAS & FUEL LINES. CONTRACTOR TO COORDINATE WITH JORDAN NEUNER FROM KINDER MORGAN AT (310) 628-7350 AT LEAST TWO WEEKS PRIOR TO COMMENCEMENT OF WORK NEAR FUEL LINES

GRADING AND DEMOLITION PLAN – SEE SHEET No. 11
SURFACE IMPROVEMENT PLAN, REC. WATER PLAN – SEE SHEET No. 29
MEDIAN PLAN – SEE SHEET No. 38

CAUTION !!
CONTRACTOR TO VERIFY THE EXACT LOCATION OF EXISTING UTILITIES IN THE FIELD PRIOR TO CONSTRUCTION!

NOTE !!
ELECTRONIC DATA FILES ARE FOR REFERENCE ONLY AND ARE NOT TO BE USED FOR HORIZONTAL OR VERTICAL SURVEY CONTROL.

REGISTERED PROFESSIONAL ENGINEER GEORGE O'DAY NO. 32014 EXP. 12/31/16 CIVIL STATE OF CALIFORNIA

O'Day CONSULTANTS
2710 Loker Avenue West Suite 100
Carlsbad, California 92010
760-931-7700
Fax: 760-931-8680
ODayConsultants.com
Civil Engineering
Planning
Processing
Surveying

DESIGNED BY: N.F./K.H. DATE: FEB. 2013
DRAWN BY: T.G./G.M. SCALE: AS SHOWN
PROJECT MGR.: G.O. JOB NO.: 10-1307
ENGINEER OF WORK: GEORGE O'DAY DATE: 4/22/15 RCE: 32014

"AS-BUILT"
GEORGE O'DAY P.E. 32014 EXP. _____ DATE
REVIEWED BY:
INSPECTOR DATE

BENCHMARK
DESCRIPTION: 2.5" DISC STAMPED "CLSB-105, L.S. 6215"
LOCATION: IN NORTHEAST CORNER OF CANNON RD. BRIDGE OVER AGUA HEDIONDA CREEK, 120 FEET SOUTHWEST OF EL CAMINO REAL
RECORD FROM: R.O.S. NO. 17271 (PT. NO. 105)
ELEVATION: 45.410 M.S.L. DATUM: NGVD 1929

DATE	INITIAL		DATE	INITIAL	DATE	INITIAL
ENGINEER OF WORK		REVISION DESCRIPTION	OTHER APPROVAL		CITY APPROVAL	

SHEET 20 | CITY OF CARLSBAD ENGINEERING DEPARTMENT | SHEETS 96

STORM DRAIN PLAN FOR:
ROBERTSON RANCH WEST VILLAGE
(RANCHO COSTERA)
EL CAMINO REAL C.D.P. 11-10

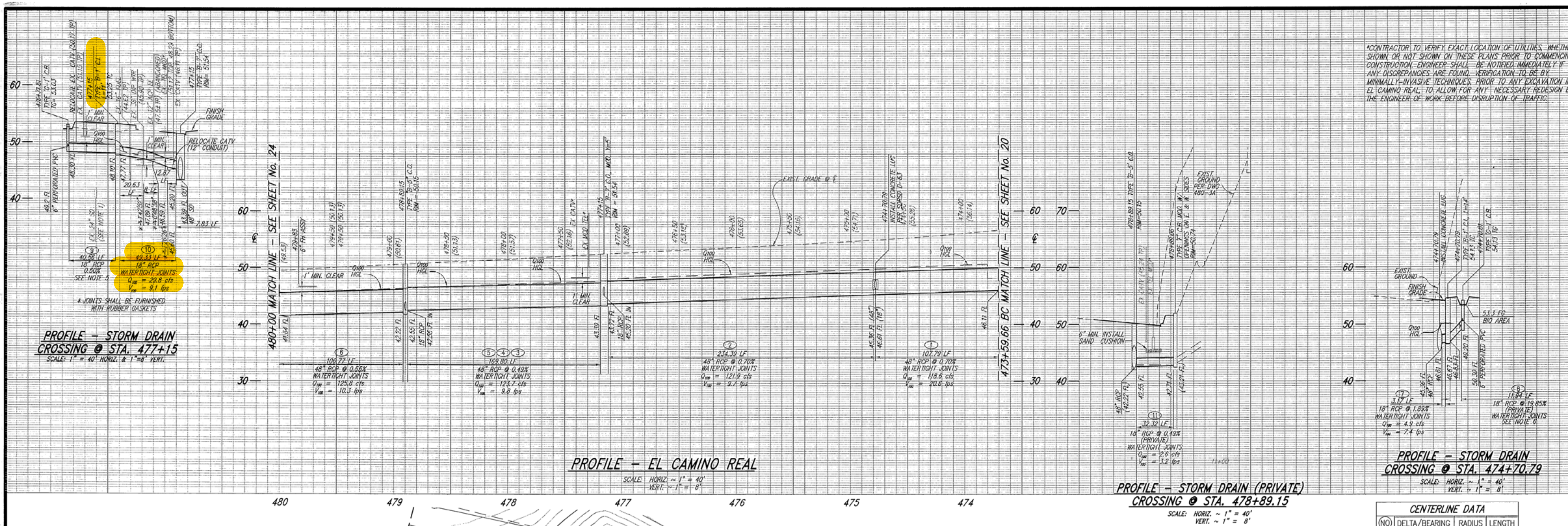
APPROVED BY: JASON S. GELDERT
ENGINEERING MANAGER RCE 63912 EXP. 09/30/16 DATE 6.16.2015

DWN BY: CHKD BY: RVWD BY: | PROJECT NO. C.T. 13-03 | DRAWING NO. 477-6

G:\10\1307\1007MP20.dwg Apr 21, 2015 9:13am
Xrefs: 1007IR; 1007WLY; 1007BPRO; 1007ATP01; 1007AUTL7; 1007AMAP; 1007AMAP; 1007AN; 1007WSTR; 1007WUTL; 1007BGRD; 1007BGRD; 1007BUTL

DRAWING NUMBER
SAN DIEGO PRODUCTS • NEW HOPE, MINNESOTA
DRAWING NUMBER
SAN DIEGO PRODUCTS • NEW HOPE, MINNESOTA
DRAWING NUMBER
SAN DIEGO PRODUCTS • NEW HOPE, MINNESOTA
DRAWING NUMBER
20 of 96

*CONTRACTOR TO VERIFY EXACT LOCATION OF UTILITIES, WHETHER SHOWN OR NOT SHOWN ON THESE PLANS PRIOR TO COMMENCING CONSTRUCTION. ENGINEER SHALL BE NOTIFIED IMMEDIATELY IF ANY DISCREPANCIES ARE FOUND. VERIFICATION TO BE BY MINIMALLY-INVASIVE TECHNIQUES, PRIOR TO ANY EXCAVATION IN EL CAMINO REAL, TO ALLOW FOR ANY NECESSARY REDESIGN BY THE ENGINEER OF WORK BEFORE DISRUPTION OF TRAFFIC.



PROFILE – STORM DRAIN CROSSING @ STA. 477+15

SCALE: 1" = 40' HORIZ. & 1" = 8' VERT.

PROFILE – EL CAMINO REAL

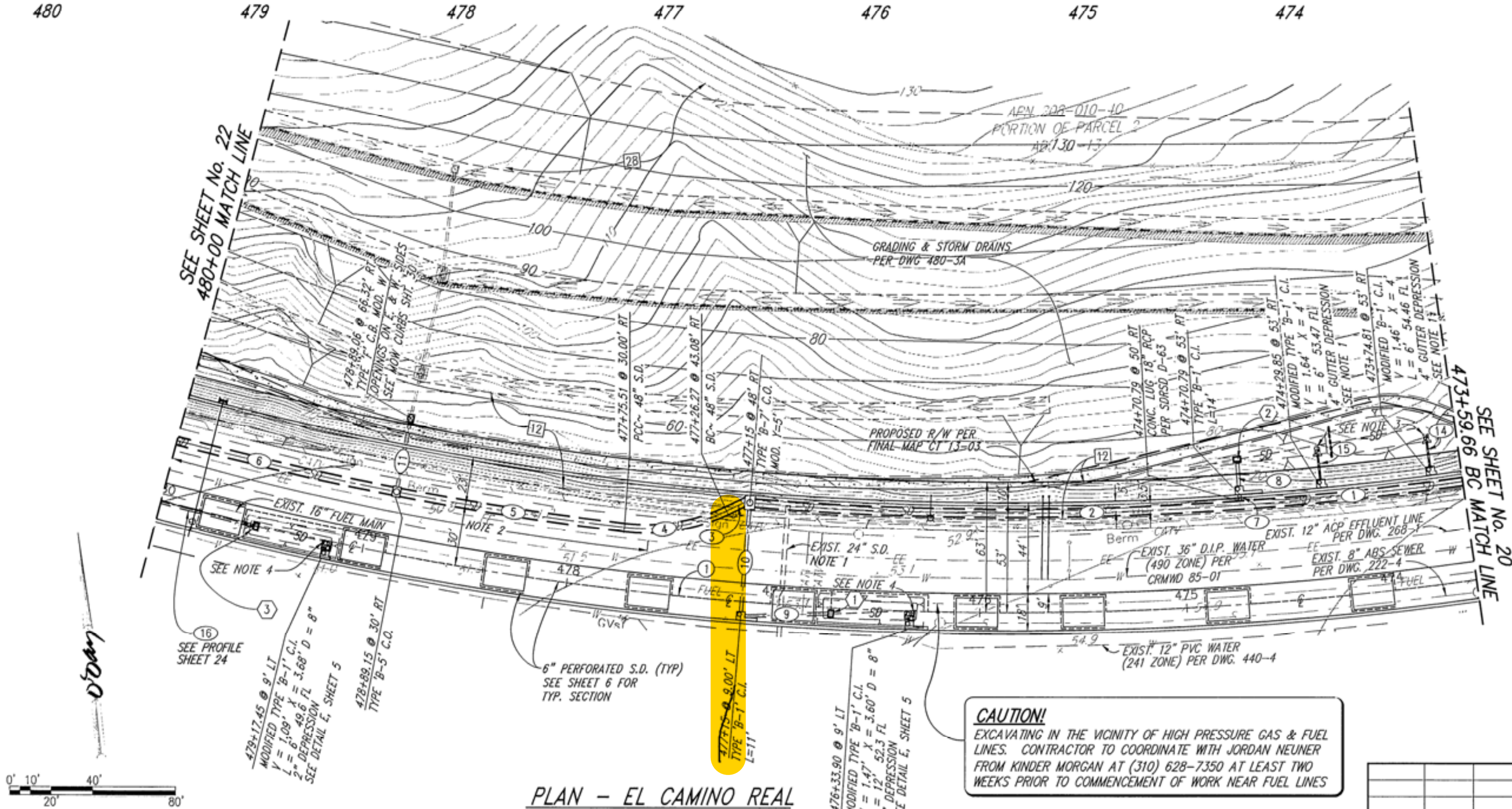
SCALE: HORIZ. ~ 1" = 40' VERT. ~ 1" = 8'

PROFILE – STORM DRAIN (PRIVATE) CROSSING @ STA. 478+89.15

SCALE: HORIZ. ~ 1" = 40' VERT. ~ 1" = 8'

PROFILE – STORM DRAIN CROSSING @ STA. 474+70.79

SCALE: HORIZ. ~ 1" = 40' VERT. ~ 1" = 8'



PLAN – EL CAMINO REAL

SCALE: 1" = 40'

CENTERLINE DATA			
NO	DELTA/BEARING	RADIUS	LENGTH
1	Δ = 21°08'20"	1600.07'	590.34'

MOD TYPE 'B' C.I. PIPE DATA

NO	REMARKS
14	STA. 473+74.81 @ 53' RT. ~ MOD. TYPE 'B' C.I. FL 10" IN = 54.52 FL 10" OUT = 54.27
15	STA. 474+29.85 @ 53' RT. ~ MOD. TYPE 'B' C.I. FL 10" IN = 53.52 FL 10" OUT = 53.28

EXISTING EASEMENTS

[12] DRAINAGE CHANNEL TO COUNTY OF SAN DIEGO REC. MAR. 12, 1970, DOC. 44687, O.R.

[28] MEMORANDUM OF MANAGEMENT AND FUNDING AGREEMENT REC. DEC. 21, 2007, DOC. 2007-0786169, O.R.

STORM DRAIN DATA

NO	DELTA/BEARING	RADIUS	LENGTH	REMARKS
1	Δ = 03°58'45"	1552.07'	107.79'	48" RCP ~ 1350-D*
2	Δ = 08°39'09"	1552.07'	234.39'	" "
3	N 70°37'14" E	———	9.77'	" "
4	Δ = 32°10'01"	90.00'	50.53'	48" RCP ~ 1350-D**
5	Δ = 03°59'46"	1570.07'	109.50'	48" RCP ~ 1350-D*
6	Δ = 03°53'47"	1570.07'	106.77'	" "
7	N 01°52'32" E	———	3.17'	18" RCP ~ 1350-D*
8	N 01°52'32" E	———	11.94'	18" RCP ~ 1350-D (PRIVATE)*
9	N 85°50'52" W	———	40.56'	18" RCP ~ 1350-D
10	N 10°37'14" E	———	49.33'	18" RCP ~ 1350-D*
11	N 16°59'50" E	———	32.32'	18" RCP ~ 1350-D (PRIVATE)*
14	N 01°16'51" W	———	12.43'	10" PVC~ DR18 @ 2%** (PRIVATE)
15	N 00°53'17" W	———	12.13'	10" PVC~ DR18 @ 2%** (PRIVATE)
16	N 69°33'58" W	———	46.27'	18" RCP ~ 1350-D

* WATER-TIGHT JOINTS
** WATER-TIGHT JOINTS & 8' LENGTHS BEVELED AT ONE END.
*** SEE 'MOD TYPE 'B' C.I. PIPE DATA' TABLE AT LEFT FOR FLOWLINE INFO. FOR INLET DETAILS SEE MEDIAN & SURFACE IMPROVEMENT PLAN.

NOTES:

1. A SEARCH OF EXIST. 24" STORM DRAIN HAS BEEN CONDUCTED AND NOTHING FOUND. IF CONTRACTOR LOCATES EXIST. STORM DRAIN DURING CONSTRUCTION, HE SHALL CONTACT ENGINEER TO EVALUATE USE OF EXIST. LINE IN LIEU OF (10).
2. REMOVE 250 LF± EXIST. 24" ACP EFFLUENT LINE FOR STORM DRAIN CONSTRUCTION. NO CUTTING OF ACP PERMITTED. CONTRACTOR TO REMOVE PER CMWD STANDARDS AND DISPOSE OF PROPERLY.
3. INSTALL 2.5' x 3.3' (W x L) RIP-RAP PER MOD. D-40, TYPE 2, ROCK CLASS=No. 2 BACKING 1.1' THICK: FILTER BLANKET = ¼" AGGREGATE. 12" THICK.
4. INSTALL 5' X 5' (W x L) RIP-RAP PER MOD. D-40, TYPE 2, ROCK CLASS=No. 2 BACKING 1.1' THICK: FILTER BLANKET = ¼" AGGREGATE. 12" THICK.
5. THESE STORM DRAINS ARE SUBJECT TO HYDROMODIFICATION FLOWS AND NOT Q100: (9) (14) (15) (16) REFER TO SWMP 13-03.

STORM DRAIN BOX DATA*

NO	REMARKS
1	STA. 476+71.81 @ 2.84' LT. ~ TYPE 'G-1' C.B. TG = 53.13 TC = 53.22 ORIFICE = 0.9"ø FL 6" IN = 49.30 FL 18" OUT = 48.30
2	STA. 474+70.81 @ 70.07' RT. ~ TYPE 'G-1' C.B. TG = 54.13 TC = 54.40 ORIFICE = 2"ø FL 6" IN = 50.30 FL 18" OUT = 49.20
3	STA. 479+52.79 @ 0.79' LT. ~ TYPE 'G-1' C.B. TG = 50.23 TC = 50.65 ORIFICE = 1"ø FL 6" IN = 46.40 FL 18" OUT = 44.85

* INSTALL SCREW-ON END CAP OVER 6" PERFORATED FL WITH DIA. AS NOTED. SEE DETAIL SHEET 6.

GRADING AND DEMOLITION PLAN – SEE SHEET No. 12
SURFACE IMPROVEMENT PLAN, REC. WATER PLAN – SEE SHEET No. 30
MEDIAN PLAN – SEE SHEET No. 39

CAUTION!
EXCAVATING IN THE VICINITY OF HIGH PRESSURE GAS & FUEL LINES. CONTRACTOR TO COORDINATE WITH JORDAN NEUNER FROM KINDER MORGAN AT (310) 628-7350 AT LEAST TWO WEEKS PRIOR TO COMMENCEMENT OF WORK NEAR FUEL LINES

CAUTION !!
CONTRACTOR TO VERIFY THE EXACT LOCATION OF EXISTING UTILITIES IN THE FIELD PRIOR TO CONSTRUCTION!

NOTE !!
ELECTRONIC DATA FILES ARE FOR REFERENCE ONLY AND ARE NOT TO BE USED FOR HORIZONTAL OR VERTICAL SURVEY CONTROL.

BENCHMARK

DESCRIPTION: 2.5" DISC STAMPED "CLSB-105, L.S. 6215"
LOCATION: IN NORTHEAST CORNER OF CANNON RD. BRIDGE OVER AGUA HEDIONDA CREEK, 120 FEET SOUTHWEST OF EL CAMINO REAL
RECORD FROM: R.O.S. NO. 17271 (PT. NO. 105)
ELEVATION: 45.410 M.S.L. DATUM: NGVD 1929

REGISTERED PROFESSIONAL ENGINEER GEORGE O'DAY NO. 32014 EXP. 12/31/16 CIVIL STATE OF CALIFORNIA

O'Day CONSULTANTS
2710 Loker Avenue West Suite 100 Carlsbad, California 92010 760-931-7700 Fax: 760-931-8680 ODayConsultants.com
Civil Engineering Planning Processing Surveying

DESIGNED BY: N.F./K.H. DATE: FEB. 2013
DRAWN BY: T.G./G.M. SCALE: AS SHOWN
PROJECT MGR.: G.O. JOB NO.: 10-1307

ENGINEER OF WORK: George O'Day GEORGE O'DAY DATE: 4/22/15 RCE: 32014

"AS-BUILT"
GEORGE O'DAY P.E. 32014 EXP.______ DATE
REVIEWED BY: ______ INSPECTOR DATE

DATE	INITIAL	REVISION DESCRIPTION	DATE	INITIAL	DATE	INITIAL
ENGINEER OF WORK			OTHER APPROVAL		CITY APPROVAL	

SHEET 21 | CITY OF CARLSBAD ENGINEERING DEPARTMENT | SHEETS 96

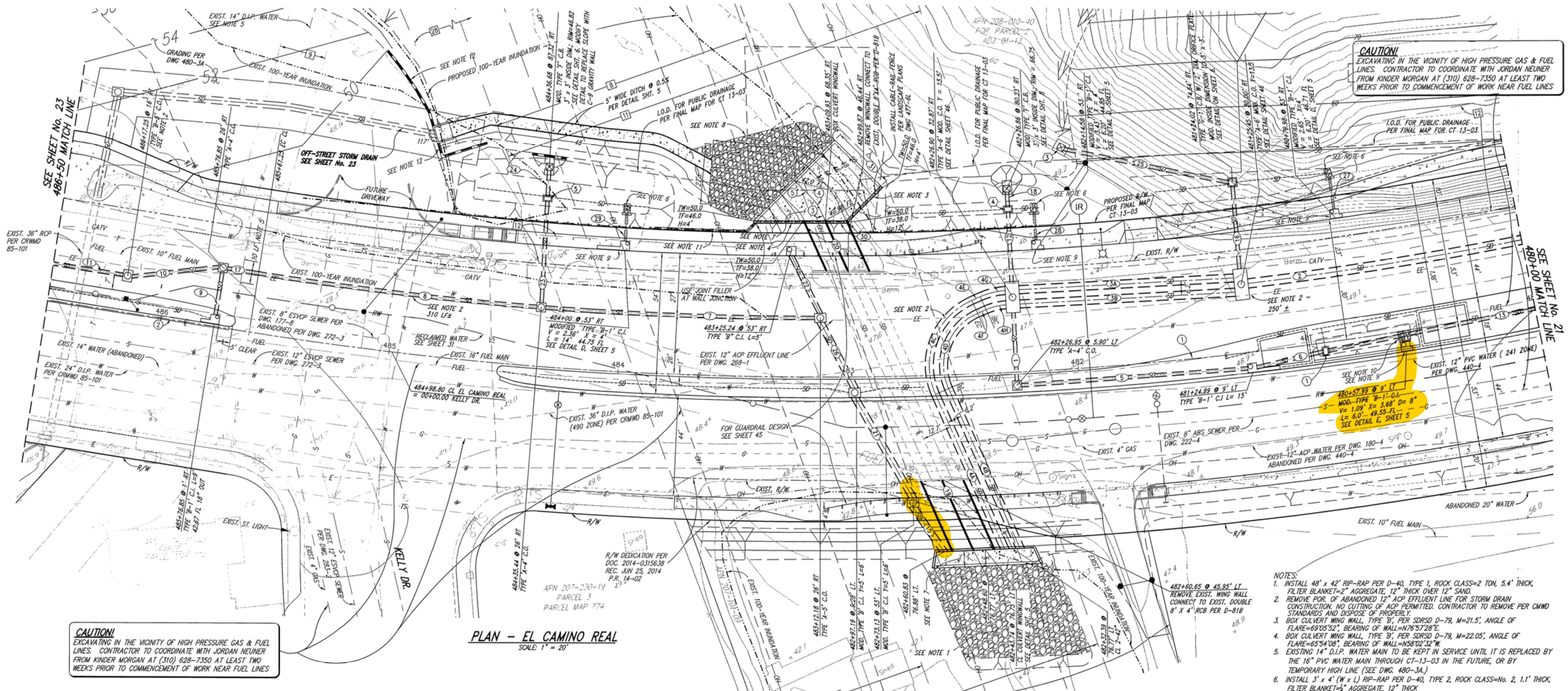
STORM DRAIN PLAN FOR: ROBERTSON RANCH WEST VILLAGE (RANCHO COSTERA) EL CAMINO REAL C.D.P. 11-10

APPROVED BY: Jason S. Geldert JASON S. GELDERT 6-16-2015
ENGINEERING MANAGER RCE 63912 EXP. 09/30/16 DATE

DWN BY: ______ CHKD BY: JLR RVWD BY: JLR

PROJECT NO. C.T. 13-03

DRAWING NO. 477-6



CAUTION!
EXCAVATING IN THE VICINITY OF HIGH PRESSURE GAS & FUEL LINES. CONTRACTOR TO COORDINATE WITH JORDAN NEUNER FROM KINDER MORGAN AT (310) 628-7350 AT LEAST TWO WEEKS PRIOR TO COMMENCEMENT OF WORK NEAR FUEL LINES

CAUTION!
EXCAVATING IN THE VICINITY OF HIGH PRESSURE GAS & FUEL LINES. CONTRACTOR TO COORDINATE WITH JORDAN NEUNER FROM KINDER MORGAN AT (310) 628-7350 AT LEAST TWO WEEKS PRIOR TO COMMENCEMENT OF WORK NEAR FUEL LINES

PLAN – EL CAMINO REAL

SCALE: 1" = 20'

STORM DRAIN DATA

NO	DELTA/BEARING	RADIUS	LENGTH	REMARKS
1	N 29°08'40" E	——	30.02'	18" RCP ~ 1350-D*
2	Δ = 04°22'58"	1570.07'	120.10'	48" RCP ~ 1350-D*
3A	N 61°05'29" W	——	93.31'	42" RCP ~ 1350-D*
3B	N 61°05'29" W	——	93.67'	" "
4A	N 07°51'36" E	——	73.75'	" "
4B	N 07°51'36" E	——	76.20'	" "
4C	Δ = 90°00'00"	31.20'	49.01'	42" RCP ~ 1350-D**
4D	Δ = 90°00'00"	25.00'	39.27'	" "
4E	N 82°08'24" W	——	4.00'	42" RCP ~ 1350-D*
4F	N 82°08'24" W	——	4.00'	" "
4G	Δ = 20°39'05"	31.20'	11.25'	42" RCP ~ 1350-D**
4H	Δ = 20°39'05"	25.00'	9.01'	" "
5	N 62°19'58" W	——	98.46'	18" RCP ~ 1350-D*
6	N 71°28'15"W	——	29.77'	18" RCP ~ 1350-D
7	Δ = 04°15'00"	1574.07'	116.76'	18" RCP ~ 1350-D*
8	Δ = 04°25'56"	1574.07'	121.77'	" "
9	N 40°55'24" E	——	18.83'	" "
10	N 64°26'16" W	——	37.74'	" "
11	N 49°04'36" W	——	30.76'	" "
12	N 29°06'29" E	——	30.67'	" "
13	N 69°33'58" W	——	91.65'	18" RCP ~ 1350-D

STORM DRAIN DATA, CONTINUED

NO	DELTA/BEARING	RADIUS	LENGTH	REMARKS
15	N 02°37'18" W	——	23.52'	36" RCP ~ 1350-D*
16	N 27°19'59" E	——	36.42'	18" RCP ~ 1350-D* (PRIVATE)
17	N 49°04'36" W	——	13.60'	18" RCP ~ 1350-D*
18	N 29°00'55" E	——	6.52'	" "
19	N 07°51'36" E	——	33.26'	DOUBLE 8' x 4' RCB PER D-77
20	N 07°51'36" E	——	23.96'	" "
21	N 02°00'17" E	——	50.70'	36" RCP ~ 1350-D*
22	N 05°33'44" E	——	28.15'	24" RCP ~ 1350-D*
23	N 35°15'19" E	——	44.58'	18" RCP ~ 1350-D*
24	N 35°21'36" E	——	11.34'	" "
25	N 46°31'13" W	——	73.09'	18" RCP ~ 1350-D* (PVT.) @ 4.76%
26	N 04°42'39" E	——	32.39'	36" RCP ~ 1350-D*
27	N 24°05'04" E	——	14.09'	12"PVC ~ DR18 @ 2%***
28	N 28°09'58" E	——	12.10'	" "
29	N 35°08'57" E	——	12.33'	12"PVC ~ DR18 @ 1%***
30	N 58°02'32" W	——	19.17'	DOUBLE 8'x4' RCB PER D-77 @ INLET
31	N 13°02'32" W	——	28.37'	CONCRETE APRON
32	N 76°57'28" E	——	49.87'	CONCRETE APRON

* WATER-TIGHT JOINTS
** WATER-TIGHT JOINTS AND 4' LENGTHS OF PIPE BEVELED AT BOTH ENDS.
*** SEE 'MOD TYPE 'B' C.I. PIPE DATA' TABLE LEFT FOR FLOWLINE INFO. FOR INLET DETAILS SEE MEDIAN & SURFACE IMPROVEMENT PLANS.

MOD TYPE 'B' C.I. PIPE DATA

NO	REMARKS
27	STA. 480+80 @ 53' RT. ~ MOD. TYPE 'B-1' C.I. FL 12" IN = 46.72 FL 12" OUT = 46.44
28	STA. 482+15 @ 53' RT. ~ MOD. TYPE 'B-1' C.I. FL 12" IN = 44.87 FL 12" OUT = 44.63
29	STA. 484+00.75 @ 53' RT. ~ MOD. TYPE 'B-1' C.I. FL 12" IN = 44.88 FL 12" OUT = 44.63

STORM DRAIN BOX DATA*

NO	REMARKS
1	STA 480+92.44 @ 3.67' LT. TYPE 'G-1' C.B. TG = 48.93 TC = 49.39 ORIFICE = 1"ø FL 6" IN = 45.10 FL 18" OUT = 43.83
3	STA 482+00.84 @ 96.72' RT. TYPE 'F' C.B. MOD. INSIDE DIMENSION TO 3' X 3'. RIM = 51.13 FL 18" OUT = 45.88
4	STA 482+26.87 @ 71.25' RT. TYPE 'G-1' C.B. TG = 45.43 TC = 46.81 ORIFICE = 1"ø FL 6" IN = 41.60 FL 18" OUT = 40.66
5	STA 484+36.40 @ 73.53' RT. TYPE 'G-1' C.B. TG = 45.43 TC = 46.91 ORIFICE = 2"ø FL 6" IN = 41.60 FL 18" OUT = 41.58

* INSTALL SCREW-ON END CAP OVER 6" PERFORATED FL WITH DIA. AS NOTED SEE DETAIL SHEET 6

EXISTING EASEMENTS

- [8] PUBLIC UTILITIES & INCIDENTALS TO S.D.G.&E. REC. JUNE 1, 1953, BK. 4874, PG 148, O.R.
- [9] PIPELINE & INCIDENTALS TO C.M.W.D. REC. JUNE 16, 1961, DOC. 96185, O.R.
- [11] PUBLIC UTILITIES & INCIDENTALS TO S.D.G.&E. REC. JUNE 16, 1966, DOC. 98887, O.R.
- [12] DRAINAGE CHANNEL TO COUNTY OF SAN DIEGO REC. MAR. 12, 1970, DOC. 44687, O.R.
- [28] MEMORANDUM OF MANAGEMENT AND FUNDING AGREEMENT REC. DEC. 21, 2007, DOC. 2007-0786169, O.R.
- [35] PUBLIC UTILITIES & INCIDENTALS TO S.D.G.&E. REC. JUNE 1, 1953, DOC. 74512, O.R.
- [36] PUBLIC UTILITIES & INCIDENTALS TO S.D.G.&E. REC. OCT. 7, 1967, F/N 152395, O.R.

CENTERLINE DATA

NO	DELTA/BEARING	RADIUS	LENGTH
1	Δ = 21°53'16"	1600.07'	611.25'
2	N 49°04'36" W	——	88.75'
3	N 07°51'36" E	——	4.59'
4	Δ= 20°54'08"	20.00'	7.30'
5	N 13°02'32" W	——	10.55'

*CONTRACTOR TO VERIFY EXACT LOCATION OF UTILITIES, WHETHER SHOWN OR NOT SHOWN ON THESE PLANS PRIOR TO COMMENCING CONSTRUCTION. ENGINEER SHALL BE NOTIFIED IMMEDIATELY IF ANY DISCREPANCIES ARE FOUND. VERIFICATION TO BE BY MINIMALLY-INVASIVE TECHNIQUES, PRIOR TO ANY EXCAVATION IN EL CAMINO REAL, TO ALLOW FOR ANY NECESSARY REDESIGN BY THE ENGINEER OF WORK BEFORE DISRUPTION OF TRAFFIC.

GRADING PLAN – SEE SHEET No. 13
STORM DRAIN PROFILES – SEE SHEET No. 24
SURFACE IMPROVEMENT PLAN, REC. WATER PLAN – SEE SHEET No. 31
MEDIAN PLAN – SEE SHEET No. 40

NOTES:
1. INSTALL 48' x 42' RIP-RAP PER D-40, TYPE 1, ROCK CLASS=2 TON, 5.4' THICK, FILTER BLANKET=2" AGGREGATE, 12" THICK OVER 12" SAND.
2. REMOVE POR. OF ABANDONED 12" ACP EFFLUENT LINE FOR STORM DRAIN CONSTRUCTION. NO CUTTING OF ACP PERMITTED. CONTRACTOR TO REMOVE PER CMWD STANDARDS AND DISPOSE OF PROPERLY.
3. BOX CULVERT WING WALL, TYPE 'B', PER SDRSD D-79, M=21.5', ANGLE OF FLARE=69°05'52", BEARING OF WALL=N76°57'28"E.
4. BOX CULVERT WING WALL, TYPE 'B', PER SDRSD D-79, M=22.05', ANGLE OF FLARE=65°54'08", BEARING OF WALL=N58°02'32"W.
5. EXISTING 14" D.I.P. WATER MAIN TO BE KEPT IN SERVICE UNTIL IT IS REPLACED BY THE 16" PVC WATER MAIN THROUGH CT-13-03 IN THE FUTURE, OR BY TEMPORARY HIGH LINE (SEE DWG. 480-3A.)
6. INSTALL 3' x 4' (W x L) RIP-RAP PER D-40, TYPE 2, ROCK CLASS=No. 2, 1.1' THICK, FILTER BLANKET=½" AGGREGATE, 12" THICK
7. INSTALL CONCRETE APRON AND CUTOFF WALL PER DETAIL SHEET 5.
8. INSTALL RIP-RAP PER D-40 TYPE 2, ROCK CLASS=No. 2 BACKING, 1.1' THICK, FILTER BLANKET = ½" AGGREGATE, 12" THICK. SEE PLAN FOR RIP-RAP DIMENSIONS.
9. THESE STORM DRAINS ARE SUBJECT TO HYDROMODIFICATION FLOWS AND NOT Q100. SEE SWMP 13-03.
10. INSTALL 5' x 5' (W x L) RIP-RAP PER D-40, TYPE 2, ROCK CLASS=No. 2, 1.1' THICK, FILTER BLANKET=½" AGGREGATE, 12" THICK.
11. INSTALL GRAVITY RETAINING WALL PER C-9. MATCH WINGWALL ON EAST END. WALL FACING WILL BE "ORCO SPLIT-FACE BLOCK, WHEAT COLOR"
12. INSTALL GRAVITY RETAINING WALL PER C-9.
13. INSTALL U-TYPE HEADWALL PER D-35A & B. USE SPECIFICATIONS FOR 72" PIPE BUT MODIFY HEIGHT OF HEADWALL TO MATCH ADJACENT C-9 WALL, I.E. TW=50.0. SKEW ANGLE RELATIVE TO 36" PIPE= 117° (SEE PLAN)

San Diego Gas & Electric Company
Reviewed By: [signature] Date 5-1-15
Colleen Fino
Land Management Representative
Valid for 18 months from date of signature

SCALE: 1" = 20'

CAUTION !!
CONTRACTOR TO VERIFY THE EXACT LOCATION OF EXISTING UTILITIES IN THE FIELD PRIOR TO CONSTRUCTION!

NOTE !!
ELECTRONIC DATA FILES ARE FOR REFERENCE ONLY AND ARE NOT TO BE USED FOR HORIZONTAL OR VERTICAL SURVEY CONTROL.

REGISTERED PROFESSIONAL ENGINEER GEORGE O'DAY NO. 32014 EXP. 12/31/16 CIVIL STATE OF CALIFORNIA

O'Day CONSULTANTS
2710 Loker Avenue West Suite 100
Carlsbad, California 92010
760-931-7700
Fax: 760-931-8680
ODayConsultants.com
Civil Engineering Planning Processing Surveying

DESIGNED BY: N.F./K.H. DATE: FEB. 2013
DRAWN BY: T.G./G.M. SCALE: AS SHOWN
PROJECT MGR.: G.O. JOB NO.: 10-1307

ENGINEER OF WORK: [signature] DATE: 4/27/15
GEORGE O'DAY RCE: 32014

"AS-BUILT"
GEORGE O'DAY P.E. 32014 EXP. ______ DATE
REVIEWED BY:
INSPECTOR DATE

BENCHMARK
DESCRIPTION: 2.5" DISC STAMPED "CLSB-105, L.S. 6215"
LOCATION: IN NORTHEAST CORNER OF CANNON RD. BRIDGE OVER AGUA HEDIONDA CREEK, 120 FEET SOUTHWEST OF EL CAMINO REAL
RECORD FROM: R.O.S. NO. 17271 (PT. NO. 105)
ELEVATION: 45.410 M.S.L. DATUM: NGVD 1929

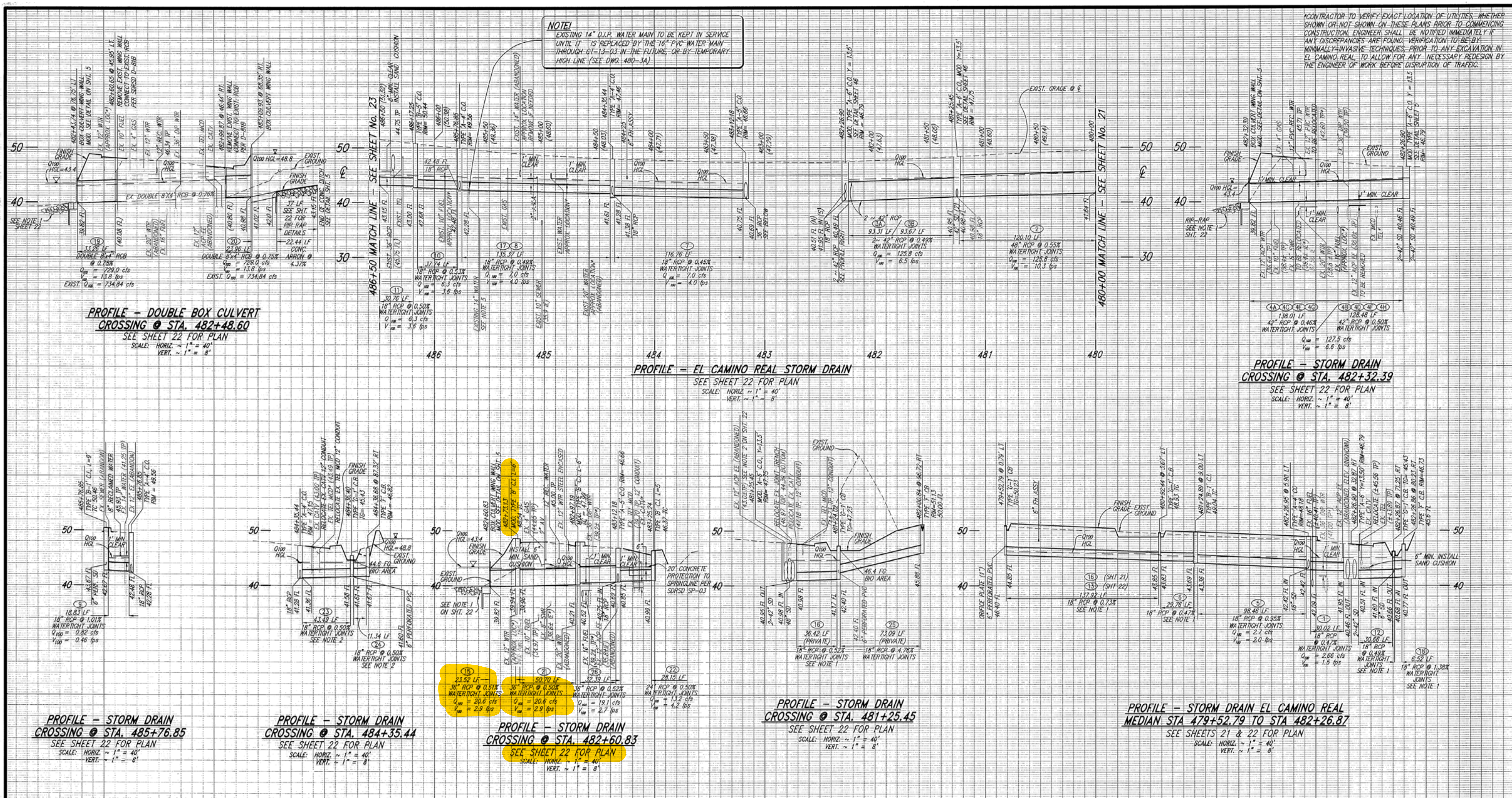
DATE	INITIAL	REVISION DESCRIPTION	DATE	INITIAL	DATE	INITIAL
ENGINEER OF WORK			OTHER APPROVAL		CITY APPROVAL	

SHEET 22 — CITY OF CARLSBAD ENGINEERING DEPARTMENT — SHEETS 96

STORM DRAIN PLAN FOR:
ROBERTSON RANCH WEST VILLAGE
(RANCHO COSTERA)
EL CAMINO REAL C.D.P. 11-10

APPROVED BY: [signature] JASON S. GELDERT 6.16.2015
ENGINEERING MANAGER RCE 63912 EXP. 09/30/16 DATE

DWN BY: ____
CHKD BY: JLR
RVWD BY: JLR
PROJECT NO. C.T. 13-03
DRAWING NO. 477-6



NOTES:
1. THESE STORM DRAINS ARE SUBJECT TO HYDROMODIFICATION FLOWS AND NOT Q100. SEE SWMP 13-03.

CAUTION !!
CONTRACTOR TO VERIFY THE EXACT LOCATION OF EXISTING UTILITIES IN THE FIELD PRIOR TO CONSTRUCTION!

NOTE !!
ELECTRONIC DATA FILES ARE FOR REFERENCE ONLY AND ARE NOT TO BE USED FOR HORIZONTAL OR VERTICAL SURVEY CONTROL.

REGISTERED PROFESSIONAL ENGINEER GEORGE O'DAY NO. 32014 EXP. 12/31/16 CIVIL STATE OF CALIFORNIA

O'Day CONSULTANTS
2710 Loker Avenue West Suite 100 Carlsbad, California 92010
760-931-7700 Fax: 760-931-8680 ODayConsultants.com
Civil Engineering Planning Processing Surveying

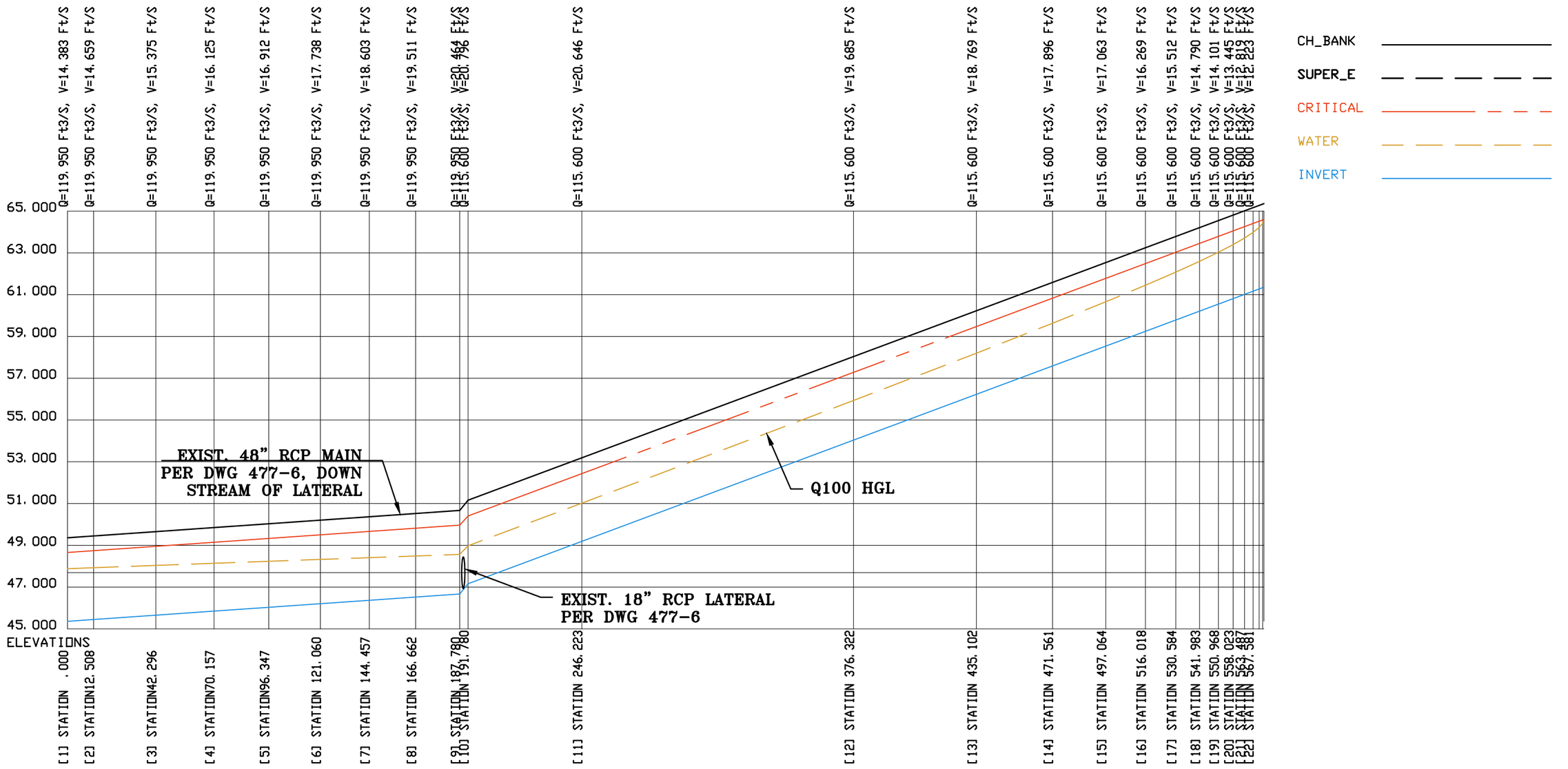
DESIGNED BY: N.F./K.H. DATE: FEB. 2013
DRAWN BY: T.G./G.M. SCALE: AS SHOWN
PROJECT MGR.: G.O. JOB NO.: 10-1307
ENGINEER OF WORK: GEORGE O'DAY DATE: 4/22/15 RCE: 32014

"AS-BUILT"
1" = 40'
GEORGE O'DAY P.E. 32014 EXP. ____ DATE
REVIEWED BY:
INSPECTOR DATE

BENCHMARK
DESCRIPTION: 2.5" DISC STAMPED "CLSB-105, L.S. 6215"
LOCATION: IN NORTHEAST CORNER OF CANNON RD. BRIDGE OVER AGUA HEDIONDA CREEK, 120 FEET SOUTHWEST OF EL CAMINO REAL
RECORD FROM: R.O.S. NO. 17271 (PT. NO. 105)
ELEVATION: 45.410 M.S.L. DATUM: NGVD 1929

DATE	INITIAL	REVISION DESCRIPTION	DATE	INITIAL	DATE	INITIAL
ENGINEER OF WORK			OTHER APPROVAL		CITY APPROVAL	

SHEET 24 — CITY OF CARLSBAD ENGINEERING DEPARTMENT — SHEETS 96
STORM DRAIN PLAN FOR:
ROBERTSON RANCH WEST VILLAGE (RANCHO COSTERA) EL CAMINO REAL C.D.P. 11-10
APPROVED BY: JASON S. GELDERT 6-16-2015
ENGINEERING MANAGER RCE 63912 EXP. 09/30/16 DATE
DWN BY: CHKD BY: JLR RVWD BY: JLR
PROJECT NO. C.T. 13-03 DRAWING NO. 477-6



Marja Lateral
Q100 Increase

[No.]	TYPE OPERATION	STATION (FT)	INV ELEV (FT)	WATER LEVEL (FT)	CHAN HT (FT)	TYPE CHANNEL	'N'	#PIER/PIP	FLOW RATE (CFS)	VELOCITY (FT/S)	TOP WIDTH (FT)	CHAN WDTH (FT)	CRIT DPTH (FT)	RADIUS/<PT (FT OR <)	RMKS
[1]	SYSTEM OUTLET	.000	45.360	2.520	4.000	PIPE	.013	1	119.950	14.383	3.862	4.000	3.297	.000	
[2]	REACH	12.508	45.447	2.479	4.000	PIPE	.013	1	119.950	14.659	3.883	4.000	3.297	.000	
[3]	REACH	42.296	45.655	2.382	4.000	PIPE	.013	1	119.950	15.375	3.926	4.000	3.297	.000	
[4]	REACH	70.157	45.849	2.290	4.000	PIPE	.013	1	119.950	16.125	3.958	4.000	3.297	.000	
[5]	REACH	96.347	46.032	2.203	4.000	PIPE	.013	1	119.950	16.912	3.979	4.000	3.297	.000	
[6]	REACH	121.060	46.205	2.120	4.000	PIPE	.013	1	119.950	17.738	3.993	4.000	3.297	.000	
[7]	REACH	144.457	46.368	2.041	4.000	PIPE	.013	1	119.950	18.603	3.999	4.000	3.297	.000	
[8]	REACH	166.662	46.523	1.966	4.000	PIPE	.013	1	119.950	19.511	3.999	4.000	3.297	.000	
[9]	REACH	187.780	46.670	1.895	4.000	PIPE	.013	1	119.950	20.464	3.994	4.000	3.297	.000	EFFECTS TO STORM DRAIN MAIN DUE TO FLOW INCREASE ON EXISTING LATERAL
[10]	JUNCTION	191.780	47.160	1.819	4.000	PIPE	.013	1	115.600	20.796	3.984	4.000	3.243	.000	
[11]	REACH	246.223	49.189	1.829	4.000	PIPE	.013	1	115.600	20.646	3.985	4.000	3.243	.000	
[12]	REACH	376.322	54.038	1.897	4.000	PIPE	.013	1	115.600	19.685	3.995	4.000	3.243	.000	

APPENDIX 5
Flood Hydrograph Routing Input Values

BF-3 STAGE STORAGE

	ELEV	AREA	VOLUME
* 0	74.85	2,360.00	2360
0.125	74.98	2,360.00	2655
0.250	75.10	2,360.00	2950
0.375	75.23	2,360.00	3245
0.500	75.35	2,360.00	3540
0.625	75.48	2,360.00	3835
0.750	75.60	2,360.00	4130
0.875	75.73	2,360.00	4425
1.000	75.85	2,360.00	4680

BF-4 STAGE STORAGE

	ELEV	AREA	VOLUME
* 0.000	55.000	10,353.34	10353.34
0.125	55.125	11,324.81	11324.81
0.250	55.250	12,308.04	12308.04
0.375	55.375	13,303.08	13303.08
0.500	55.500	14,309.97	14309.97
0.625	55.625	15,328.77	15328.77
0.750	55.750	8,285.82	16359.02
0.875	55.875	8,370.50	17400.04
1.000	56.000	8,454.06	18451.58
1.125	56.125	8,609.46	20587.55
1.500	56.500	8,763.17	22756.15
1.625	56.625	8,839.38	23856.31
** 1.750	56.750	8,915.17	24965.97
1.875	56.875	8,990.54	26085.08
2.000	57.000	9,065.48	27213.58
2.250	57.250	9,214.09	29498.55
2.375	57.375	9,287.76	30654.92
2.500	57.500	9,361.00	31820.47
2.625	57.625	9,433.82	32995.14
2.750	57.750	9,506.22	34178.90

Note: Volume was converted into Ac. Ft to use as input withing the CivilDesign Flood Hydrograph Routing software.

* First Outlet

** Second Outlet

Outlet structure for Discharge of Detention Basin BF-3

Discharge vs Elevation Table

Low orifice:			Lower slot			Emergency Weir	
Number:			Invert:	0.00	ft	Invert:	1.250 ft
Cg-low:			B	1.00	ft	B:	12 ft
Middle orifice:			h	0.167	ft		
number of orif:			Upper slot				
Cg-middle:			Invert:	0.000	ft		
invert elev:			B:	0.00	ft		
			h	0.000	ft		

h (ft)	H/D-low -	H/D-mid -	Qslot-low (cfs)	Qemer (cfs)	Qtot (cfs)
0.000	0.000	0.000	0.000	0.000	0.000
0.042	0.500	0.000	0.026	0.000	0.026
0.083	1.000	0.000	0.075	0.000	0.075
0.125	1.500	0.000	0.137	0.000	0.137
0.167	2.000	0.000	0.211	0.000	0.211
0.208	2.500	0.000	0.288	0.000	0.288
0.250	3.000	0.000	0.333	0.000	0.333
0.292	3.500	0.500	0.372	0.000	0.372
0.333	4.000	1.000	0.408	0.000	0.408
0.375	4.500	1.500	0.441	0.000	0.441
0.417	5.000	2.000	0.471	0.000	0.471
0.458	5.500	2.500	0.500	0.000	0.500
0.500	6.000	3.000	0.527	0.000	0.527
0.542	6.500	3.500	0.552	0.000	0.552
0.583	7.000	4.000	0.577	0.000	0.577
0.625	7.500	4.500	0.600	0.000	0.600
0.667	8.000	5.000	0.623	0.000	0.623
0.708	8.500	5.500	0.645	0.000	0.645
0.750	9.000	6.000	0.666	0.000	0.666
0.792	9.500	6.500	0.687	0.000	0.687
0.833	10.000	7.000	0.707	0.000	0.707
0.875	10.500	7.500	0.726	0.000	0.726
0.917	11.000	8.000	0.745	0.000	0.745
0.958	11.500	8.500	0.763	0.000	0.763
1.000	12.000	9.000	0.781	0.000	0.781
1.042	12.500	9.500	0.799	0.000	0.799
1.083	13.000	10.000	0.816	0.000	0.816
1.125	13.500	10.500	0.833	0.000	0.833
1.167	14.000	11.000	0.849	0.000	0.849
1.208	14.500	11.500	0.865	0.000	0.865
1.250	15.000	12.000	0.881	0.000	0.881
1.292	15.500	12.500	0.897	0.316	1.213
1.333	16.000	13.000	0.912	0.895	1.807
1.375	16.500	13.500	0.927	1.644	2.571
1.417	17.000	14.000	0.942	2.531	3.473
1.458	17.500	14.500	0.957	3.537	4.494
1.500	18.000	15.000	0.971	4.650	5.621

Outlet structure for Discharge of Detention Basin BF-4

Discharge vs Elevation Table

Low orifice:		Lower slot			Emergency Weir		
Number:		Invert:	0.00	ft	Invert:	2.500	ft
Cg-low:		B	1.50	ft	B:	12	ft
Middle orifice:		h	0.167	ft			
number of orif:		Upper slot					
Cg-middle:		Invert:	1.750	ft			
invert elev:		B:	4.00	ft			
		h	0.167	ft			

h (ft)	H/D-low -	H/D-mid -	Qslot-low (cfs)	Qslot-upp (cfs)	Qemer (cfs)	Qtot (cfs)
0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.042	0.500	0.000	0.040	0.000	0.000	0.040
0.083	1.000	0.000	0.112	0.000	0.000	0.112
0.125	1.500	0.000	0.206	0.000	0.000	0.206
0.167	2.000	0.000	0.316	0.000	0.000	0.316
0.208	2.500	0.000	0.433	0.000	0.000	0.433
0.250	3.000	0.000	0.500	0.000	0.000	0.500
0.292	3.500	0.500	0.559	0.000	0.000	0.559
0.333	4.000	1.000	0.612	0.000	0.000	0.612
0.375	4.500	1.500	0.661	0.000	0.000	0.661
0.417	5.000	2.000	0.707	0.000	0.000	0.707
0.458	5.500	2.500	0.749	0.000	0.000	0.749
0.500	6.000	3.000	0.790	0.000	0.000	0.790
0.542	6.500	3.500	0.829	0.000	0.000	0.829
0.583	7.000	4.000	0.865	0.000	0.000	0.865
0.625	7.500	4.500	0.901	0.000	0.000	0.901
0.667	8.000	5.000	0.935	0.000	0.000	0.935
0.708	8.500	5.500	0.968	0.000	0.000	0.968
0.750	9.000	6.000	0.999	0.000	0.000	0.999
0.792	9.500	6.500	1.030	0.000	0.000	1.030
0.833	10.000	7.000	1.060	0.000	0.000	1.060
0.875	10.500	7.500	1.089	0.000	0.000	1.089
0.917	11.000	8.000	1.117	0.000	0.000	1.117
0.958	11.500	8.500	1.145	0.000	0.000	1.145
1.000	12.000	9.000	1.172	0.000	0.000	1.172
1.042	12.500	9.500	1.198	0.000	0.000	1.198
1.083	13.000	10.000	1.224	0.000	0.000	1.224
1.125	13.500	10.500	1.249	0.000	0.000	1.249
1.167	14.000	11.000	1.274	0.000	0.000	1.274
1.208	14.500	11.500	1.298	0.000	0.000	1.298
1.250	15.000	12.000	1.322	0.000	0.000	1.322
1.292	15.500	12.500	1.345	0.000	0.000	1.345
1.333	16.000	13.000	1.368	0.000	0.000	1.368
1.375	16.500	13.500	1.391	0.000	0.000	1.391

1.417	17.000	14.000	1.413	0.000	0.000	1.413
1.458	17.500	14.500	1.435	0.000	0.000	1.435
1.500	18.000	15.000	1.457	0.000	0.000	1.457
1.542	18.500	15.500	1.478	0.000	0.000	1.478
1.583	19.000	16.000	1.499	0.000	0.000	1.499
1.625	19.500	16.500	1.520	0.000	0.000	1.520
1.667	20.000	17.000	1.540	0.000	0.000	1.540
1.708	20.500	17.500	1.560	0.000	0.000	1.560
1.750	21.000	18.000	1.580	0.000	0.000	1.580
1.792	21.500	18.500	1.600	0.105	0.000	1.705
1.833	22.000	19.000	1.619	0.298	0.000	1.917
1.875	22.500	19.500	1.638	0.548	0.000	2.186
1.917	23.000	20.000	1.657	0.844	0.000	2.501
1.958	23.500	20.500	1.676	1.155	0.000	2.831
2.000	24.000	21.000	1.694	1.334	0.000	3.029
2.042	24.500	21.500	1.713	1.492	0.000	3.205
2.083	25.000	22.000	1.731	1.634	0.000	3.365
2.125	25.500	22.500	1.749	1.766	0.000	3.514
2.167	26.000	23.000	1.766	1.887	0.000	3.654
2.208	26.500	23.500	1.784	2.002	0.000	3.786
2.250	27.000	24.000	1.801	2.110	0.000	3.912
2.292	27.500	24.500	1.819	2.213	0.000	4.032
2.333	28.000	25.000	1.836	2.312	0.000	4.148
2.375	28.500	25.500	1.853	2.406	0.000	4.259
2.417	29.000	26.000	1.869	2.497	0.000	4.367
2.458	29.500	26.500	1.886	2.585	0.000	4.471
2.500	30.000	27.000	1.902	2.670	0.000	4.572
2.542	30.500	27.500	1.919	2.752	0.316	4.987
2.583	31.000	28.000	1.935	2.832	0.895	5.661
2.625	31.500	28.500	1.951	2.909	1.644	6.504
2.667	32.000	29.000	1.967	2.985	2.531	7.483
2.708	32.500	29.500	1.983	3.059	3.537	8.579
2.750	33.000	30.000	1.998	3.131	4.650	9.779
2.792	33.500	30.500	2.014	3.201	5.860	11.075
2.833	34.000	31.000	2.029	3.270	7.159	12.458
2.875	34.500	31.500	2.045	3.337	8.543	13.925
2.917	35.000	32.000	2.060	3.403	10.005	15.468
2.958	35.500	32.500	2.075	3.468	11.543	17.086
3.000	36.000	33.000	2.090	3.532	13.152	18.774
3.042	36.500	33.500	2.105	3.594	14.830	20.529
3.083	37.000	34.000	2.120	3.656	16.574	22.349
3.125	37.500	34.500	2.134	3.716	18.381	24.231
3.167	38.000	35.000	2.149	3.776	20.249	26.174
3.208	38.500	35.500	2.163	3.834	22.177	28.174
3.250	39.000	36.000	2.178	3.892	24.162	30.232

APPENDIX 6
Emergency Weir Flow Capacity

Outlet structure for Discharge of Detention Basin BF-1

Discharge vs Elevation Table

Emergency Weir		
Invert:	1.000	ft
B:	12	ft

Wier Perimeter Length

h (ft)	H/D-low -	H/D-mid -	Qemer (cfs)	
0.000	0.000	0.000	0.000	Bottom of Basin
0.042	0.500	0.000	0.000	
0.083	1.000	0.000	0.000	
0.125	1.500	0.000	0.000	
0.167	2.000	0.000	0.000	
0.208	2.500	0.000	0.000	
0.250	3.000	0.000	0.000	
0.292	3.500	0.500	0.000	
0.333	4.000	1.000	0.000	
0.375	4.500	1.500	0.000	
0.417	5.000	2.000	0.000	
0.458	5.500	2.500	0.000	
0.500	6.000	3.000	0.000	
0.542	6.500	3.500	0.000	
0.583	7.000	4.000	0.000	
0.625	7.500	4.500	0.000	
0.667	8.000	5.000	0.000	
0.708	8.500	5.500	0.000	
0.750	9.000	6.000	0.000	
0.792	9.500	6.500	0.000	
0.833	10.000	7.000	0.000	
0.875	10.500	7.500	0.000	
0.917	11.000	8.000	0.000	
0.958	11.500	8.500	0.000	
1.000	12.000	9.000	0.000	Emergency Wier
1.042	12.500	9.500	0.316	
1.083	13.000	10.000	0.895	
1.125	13.500	10.500	1.644	
1.167	14.000	11.000	2.531	
1.208	14.500	11.500	3.537	
1.250	15.000	12.000	4.650	Free Board

Outlet structure for Discharge of Detention Basin BF-2

Discharge vs Elevation Table

Emergency Weir		
Invert:	0.500	ft
B:	12	ft

Wier Perimeter Length

h (ft)	H/D-low -	H/D-mid -	Qemer (cfs)	
0.000	0.000	0.000	0.000	Bottom of Basin
0.042	0.500	0.000	0.000	
0.083	1.000	0.000	0.000	
0.125	1.500	0.000	0.000	
0.167	2.000	0.000	0.000	
0.208	2.500	0.000	0.000	
0.250	3.000	0.000	0.000	
0.292	3.500	0.500	0.000	
0.333	4.000	1.000	0.000	
0.375	4.500	1.500	0.000	
0.417	5.000	2.000	0.000	
0.458	5.500	2.500	0.000	
0.500	6.000	3.000	0.000	Emergency Wier
0.542	6.500	3.500	0.316	
0.583	7.000	4.000	0.895	
0.625	7.500	4.500	1.644	
0.667	8.000	5.000	2.531	
0.708	8.500	5.500	3.537	
0.750	9.000	6.000	4.650	Free Board

Outlet structure for Discharge of Detention Basin BF-3

Discharge vs Elevation Table

Emergency Weir		
Invert:	2.250 ft	
B:	12 ft	Wier Perimeter Length

h (ft)	H/D-low -	H/D-mid -	Qemer (cfs)	
0.000	0.000	0.000	0.000	Bottom of Basin
0.042	0.500	0.000	0.000	
0.083	1.000	0.000	0.000	
0.125	1.500	0.000	0.000	
0.167	2.000	0.000	0.000	
0.208	2.500	0.000	0.000	
0.250	3.000	0.000	0.000	
0.292	3.500	0.500	0.000	
0.333	4.000	1.000	0.000	
0.375	4.500	1.500	0.000	
0.417	5.000	2.000	0.000	
0.458	5.500	2.500	0.000	
0.500	6.000	3.000	0.000	
0.542	6.500	3.500	0.000	
0.583	7.000	4.000	0.000	
0.625	7.500	4.500	0.000	
0.667	8.000	5.000	0.000	
0.708	8.500	5.500	0.000	
0.750	9.000	6.000	0.000	
0.792	9.500	6.500	0.000	
0.833	10.000	7.000	0.000	
0.875	10.500	7.500	0.000	
0.917	11.000	8.000	0.000	
0.958	11.500	8.500	0.000	
1.000	12.000	9.000	0.000	First Outlet
1.042	12.500	9.500	0.000	
1.083	13.000	10.000	0.000	
1.125	13.500	10.500	0.000	
1.167	14.000	11.000	0.000	
1.208	14.500	11.500	0.000	
1.250	15.000	12.000	0.000	
1.292	15.500	12.500	0.000	
1.333	16.000	13.000	0.000	
1.375	16.500	13.500	0.000	
1.417	17.000	14.000	0.000	
1.458	17.500	14.500	0.000	
1.500	18.000	15.000	0.000	
1.542	18.500	15.500	0.000	
1.583	19.000	16.000	0.000	
1.625	19.500	16.500	0.000	
1.667	20.000	17.000	0.000	
1.708	20.500	17.500	0.000	
1.750	21.000	18.000	0.000	
1.792	21.500	18.500	0.000	
1.833	22.000	19.000	0.000	
1.875	22.500	19.500	0.000	
1.917	23.000	20.000	0.000	
1.958	23.500	20.500	0.000	
2.000	24.000	21.000	0.000	
2.042	24.500	21.500	0.000	
2.083	25.000	22.000	0.000	
2.125	25.500	22.500	0.000	
2.167	26.000	23.000	0.000	
2.208	26.500	23.500	0.000	
2.250	27.000	24.000	0.000	Emergency Wier
2.292	27.500	24.500	0.316	
2.333	28.000	25.000	0.895	
2.375	28.500	25.500	1.644	
2.417	29.000	26.000	2.531	
2.458	29.500	26.500	3.537	
2.500	30.000	27.000	4.650	Free Board

Outlet structure for Discharge of Detention Basin BF-4

Discharge vs Elevation Table

Emergency Weir			
Invert:	3.750 ft		ft
B:	20 ft		ft

Wier Perimeter Length

h (ft)	H/D-low -	H/D-mid -	Qlow-orif (cfs)	Qlow-weir (cfs)	Qtot-low (cfs)	Qmid-orif (cfs)	Qmid-weir (cfs)	Qtot-med (cfs)	Qslot-low (cfs)	Qslot-upp (cfs)	Qemer (cfs)	Qtot (cfs)	
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Bottom of Basin
0.042	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
0.083	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
0.125	1.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
0.167	2.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
0.208	2.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
0.250	3.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
0.292	3.500	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
0.333	4.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
0.375	4.500	1.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
0.417	5.000	2.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
0.458	5.500	2.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
0.500	6.000	3.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
0.542	6.500	3.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
0.583	7.000	4.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
0.625	7.500	4.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
0.667	8.000	5.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
0.708	8.500	5.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
0.750	9.000	6.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
0.792	9.500	6.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
0.833	10.000	7.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
0.875	10.500	7.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
0.917	11.000	8.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
0.958	11.500	8.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
1.000	12.000	9.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
1.042	12.500	9.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
1.083	13.000	10.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
1.125	13.500	10.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
1.167	14.000	11.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
1.208	14.500	11.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
1.250	15.000	12.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
1.292	15.500	12.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
1.333	16.000	13.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
1.375	16.500	13.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
1.417	17.000	14.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
1.458	17.500	14.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
1.500	18.000	15.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	First Outlet
1.542	18.500	15.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
1.583	19.000	16.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
1.625	19.500	16.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
1.667	20.000	17.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
1.708	20.500	17.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
1.750	21.000	18.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
1.792	21.500	18.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
1.833	22.000	19.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
1.875	22.500	19.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
1.917	23.000	20.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
1.958	23.500	20.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
2.000	24.000	21.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
2.042	24.500	21.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
2.083	25.000	22.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
2.125	25.500	22.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
2.167	26.000	23.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
2.208	26.500	23.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
2.250	27.000	24.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
2.292	27.500	24.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
2.333	28.000	25.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
2.375	28.500	25.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
2.417	29.000	26.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
2.458	29.500	26.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
2.500	30.000	27.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

2.542	30.500	27.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
2.583	31.000	28.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
2.625	31.500	28.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
2.667	32.000	29.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
2.708	32.500	29.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
2.750	33.000	30.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
2.792	33.500	30.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
2.833	34.000	31.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
2.875	34.500	31.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
2.917	35.000	32.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
2.958	35.500	32.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
3.000	36.000	33.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
3.042	36.500	33.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
3.083	37.000	34.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
3.125	37.500	34.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
3.167	38.000	35.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
3.208	38.500	35.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
3.250	39.000	36.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Second Outlet
3.292	39.500	36.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
3.333	40.000	37.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
3.375	40.500	37.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
3.417	41.000	38.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
3.458	41.500	38.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
3.500	42.000	39.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
3.542	42.500	39.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
3.583	43.000	40.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
3.625	43.500	40.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
3.667	44.000	41.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
3.708	44.500	41.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
3.750	45.000	42.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Emergency Wier
3.792	45.500	42.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.527	0.527	
3.833	46.000	43.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.491	1.491	
3.875	46.500	43.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.740	2.740	
3.917	47.000	44.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.219	4.219	
3.958	47.500	44.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.896	5.896	
4.000	48.000	45.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	7.750	7.750	
4.042	48.500	45.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	9.766	9.766	
4.083	49.000	46.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	11.932	11.932	
4.125	49.500	46.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	14.238	14.238	
4.167	50.000	47.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	16.675	16.675	
4.208	50.500	47.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	19.238	19.238	
4.250	51.000	48.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	21.920	21.920	Free Board

Outlet structure for Discharge of Detention Basin BF-5

Discharge vs Elevation Table

Emergency Weir		
Invert:	1.750 ft	
B:	20 ft	Wier Perimeter Length (Double Box)

h (ft)	H/D-low -	H/D-mid -	Qemer (cfs)	
0.000	0.000	0.000	0.000	Bottom of Basin
0.042	0.500	0.000	0.000	
0.083	1.000	0.000	0.000	
0.125	1.500	0.000	0.000	
0.167	2.000	0.000	0.000	
0.208	2.500	0.000	0.000	
0.250	3.000	0.000	0.000	
0.292	3.500	0.500	0.000	
0.333	4.000	1.000	0.000	
0.375	4.500	1.500	0.000	
0.417	5.000	2.000	0.000	
0.458	5.500	2.500	0.000	
0.500	6.000	3.000	0.000	
0.542	6.500	3.500	0.000	
0.583	7.000	4.000	0.000	
0.625	7.500	4.500	0.000	
0.667	8.000	5.000	0.000	
0.708	8.500	5.500	0.000	
0.750	9.000	6.000	0.000	
0.792	9.500	6.500	0.000	
0.833	10.000	7.000	0.000	
0.875	10.500	7.500	0.000	
0.917	11.000	8.000	0.000	
0.958	11.500	8.500	0.000	
1.000	12.000	9.000	0.000	First Outlet
1.042	12.500	9.500	0.000	
1.083	13.000	10.000	0.000	
1.125	13.500	10.500	0.000	
1.167	14.000	11.000	0.000	
1.208	14.500	11.500	0.000	
1.250	15.000	12.000	0.000	
1.292	15.500	12.500	0.000	
1.333	16.000	13.000	0.000	Second Outlet
1.375	16.500	13.500	0.000	
1.417	17.000	14.000	0.000	
1.458	17.500	14.500	0.000	
1.500	18.000	15.000	0.000	
1.542	18.500	15.500	0.000	
1.583	19.000	16.000	0.000	
1.625	19.500	16.500	0.000	
1.667	20.000	17.000	0.000	
1.708	20.500	17.500	0.000	
1.750	21.000	18.000	0.000	Emergency Wier
1.792	21.500	18.500	0.527	
1.833	22.000	19.000	1.491	
1.875	22.500	19.500	2.740	
1.917	23.000	20.000	4.219	
1.958	23.500	20.500	5.896	
2.000	24.000	21.000	7.750	Free Board

Outlet structure for Discharge of Detention Basin BF-6

Discharge vs Elevation Table

Emergency Weir		
Invert:	1.750	ft
B:	22	ft

Wier Perimeter Length
(Double Box)

h (ft)	H/D-low -	H/D-mid -	Qemer (cfs)	
0.000	0.000	0.000	0.000	Bottom of Basin
0.042	0.500	0.000	0.000	
0.083	1.000	0.000	0.000	
0.125	1.500	0.000	0.000	
0.167	2.000	0.000	0.000	
0.208	2.500	0.000	0.000	
0.250	3.000	0.000	0.000	
0.292	3.500	0.500	0.000	
0.333	4.000	1.000	0.000	
0.375	4.500	1.500	0.000	
0.417	5.000	2.000	0.000	
0.458	5.500	2.500	0.000	
0.500	6.000	3.000	0.000	
0.542	6.500	3.500	0.000	
0.583	7.000	4.000	0.000	
0.625	7.500	4.500	0.000	
0.667	8.000	5.000	0.000	
0.708	8.500	5.500	0.000	
0.750	9.000	6.000	0.000	
0.792	9.500	6.500	0.000	
0.833	10.000	7.000	0.000	
0.875	10.500	7.500	0.000	
0.917	11.000	8.000	0.000	
0.958	11.500	8.500	0.000	
1.000	12.000	9.000	0.000	First Outlet
1.042	12.500	9.500	0.000	
1.083	13.000	10.000	0.000	
1.125	13.500	10.500	0.000	
1.167	14.000	11.000	0.000	
1.208	14.500	11.500	0.000	
1.250	15.000	12.000	0.000	
1.292	15.500	12.500	0.000	
1.333	16.000	13.000	0.000	Second Outlet
1.375	16.500	13.500	0.000	
1.417	17.000	14.000	0.000	
1.458	17.500	14.500	0.000	
1.500	18.000	15.000	0.000	
1.542	18.500	15.500	0.000	
1.583	19.000	16.000	0.000	
1.625	19.500	16.500	0.000	
1.667	20.000	17.000	0.000	
1.708	20.500	17.500	0.000	
1.750	21.000	18.000	0.000	Emergency Wier
1.792	21.500	18.500	0.580	
1.833	22.000	19.000	1.641	
1.875	22.500	19.500	3.014	
1.917	23.000	20.000	4.640	
1.958	23.500	20.500	6.485	
2.000	24.000	21.000	8.525	
2.042	24.500	21.500	10.743	
2.083	25.000	22.000	13.125	
2.125	25.500	22.500	15.661	Free Board

Outlet structure for Discharge of Detention Basin BF-7

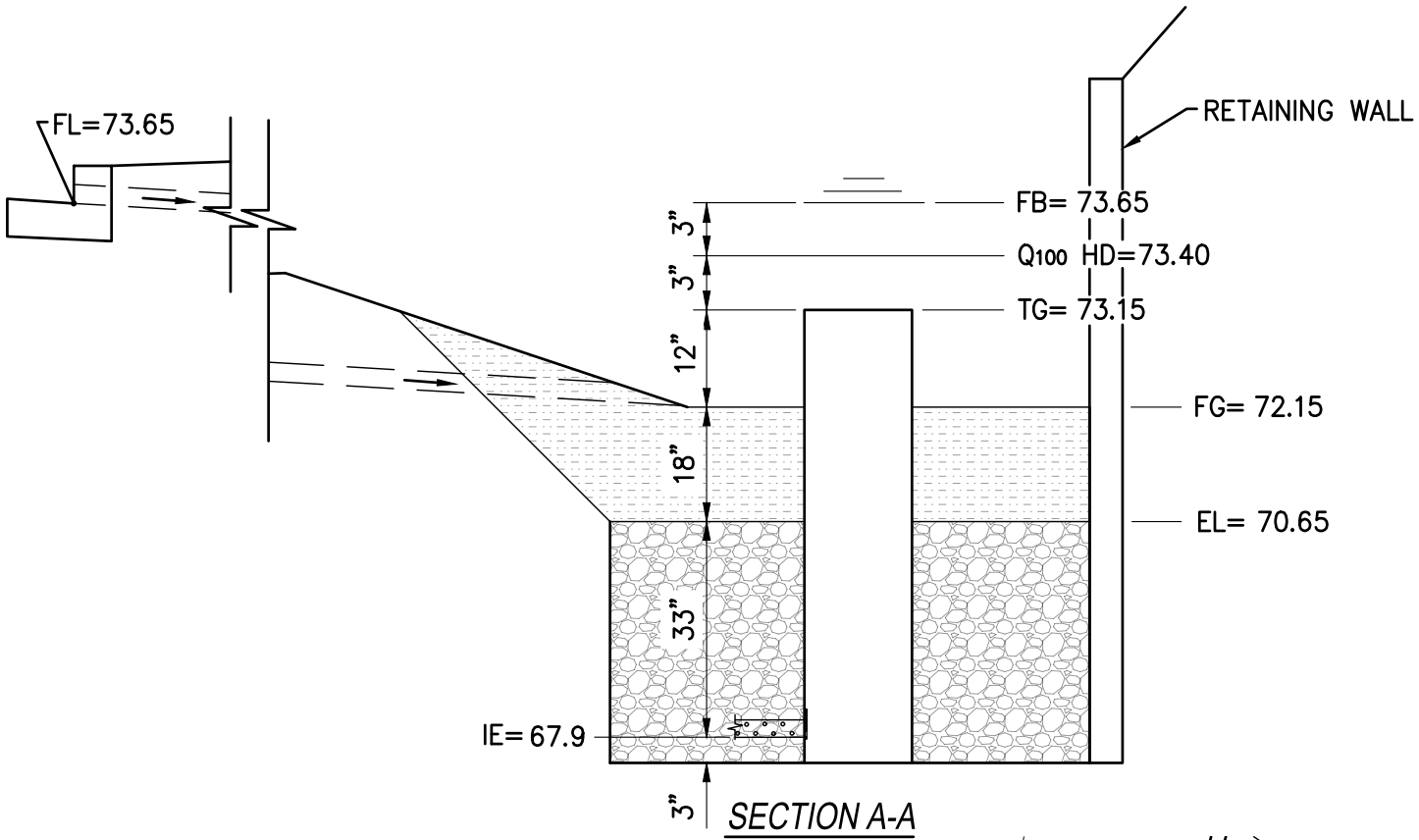
Discharge vs Elevation Table

Emergency Weir		
Invert:	1.750	ft
B:	20	ft

Wier Perimeter Length
(Double Box)

h (ft)	H/D-low -	H/D-mid -	Qemer (cfs)	
0.000	0.000	0.000	0.000	Bottom of Basin
0.042	0.500	0.000	0.000	
0.083	1.000	0.000	0.000	
0.125	1.500	0.000	0.000	
0.167	2.000	0.000	0.000	
0.208	2.500	0.000	0.000	
0.250	3.000	0.000	0.000	
0.292	3.500	0.500	0.000	
0.333	4.000	1.000	0.000	
0.375	4.500	1.500	0.000	
0.417	5.000	2.000	0.000	
0.458	5.500	2.500	0.000	
0.500	6.000	3.000	0.000	
0.542	6.500	3.500	0.000	
0.583	7.000	4.000	0.000	
0.625	7.500	4.500	0.000	
0.667	8.000	5.000	0.000	
0.708	8.500	5.500	0.000	
0.750	9.000	6.000	0.000	
0.792	9.500	6.500	0.000	
0.833	10.000	7.000	0.000	
0.875	10.500	7.500	0.000	
0.917	11.000	8.000	0.000	
0.958	11.500	8.500	0.000	
1.000	12.000	9.000	0.000	First Outlet
1.042	12.500	9.500	0.000	
1.083	13.000	10.000	0.000	
1.125	13.500	10.500	0.000	
1.167	14.000	11.000	0.000	
1.208	14.500	11.500	0.000	
1.250	15.000	12.000	0.000	
1.292	15.500	12.500	0.000	
1.333	16.000	13.000	0.000	Second Outlet
1.375	16.500	13.500	0.000	
1.417	17.000	14.000	0.000	
1.458	17.500	14.500	0.000	
1.500	18.000	15.000	0.000	
1.542	18.500	15.500	0.000	
1.583	19.000	16.000	0.000	
1.625	19.500	16.500	0.000	
1.667	20.000	17.000	0.000	
1.708	20.500	17.500	0.000	
1.750	21.000	18.000	0.000	Emergency Wier
1.792	21.500	18.500	0.527	
1.833	22.000	19.000	1.491	
1.875	22.500	19.500	2.740	
1.917	23.000	20.000	4.219	
1.958	23.500	20.500	5.896	
2.000	24.000	21.000	7.750	
2.042	24.500	21.500	9.766	
2.083	25.000	22.000	11.932	
2.125	25.500	22.500	14.238	Free Board

APPENDIX 7
BASIN DETAILS



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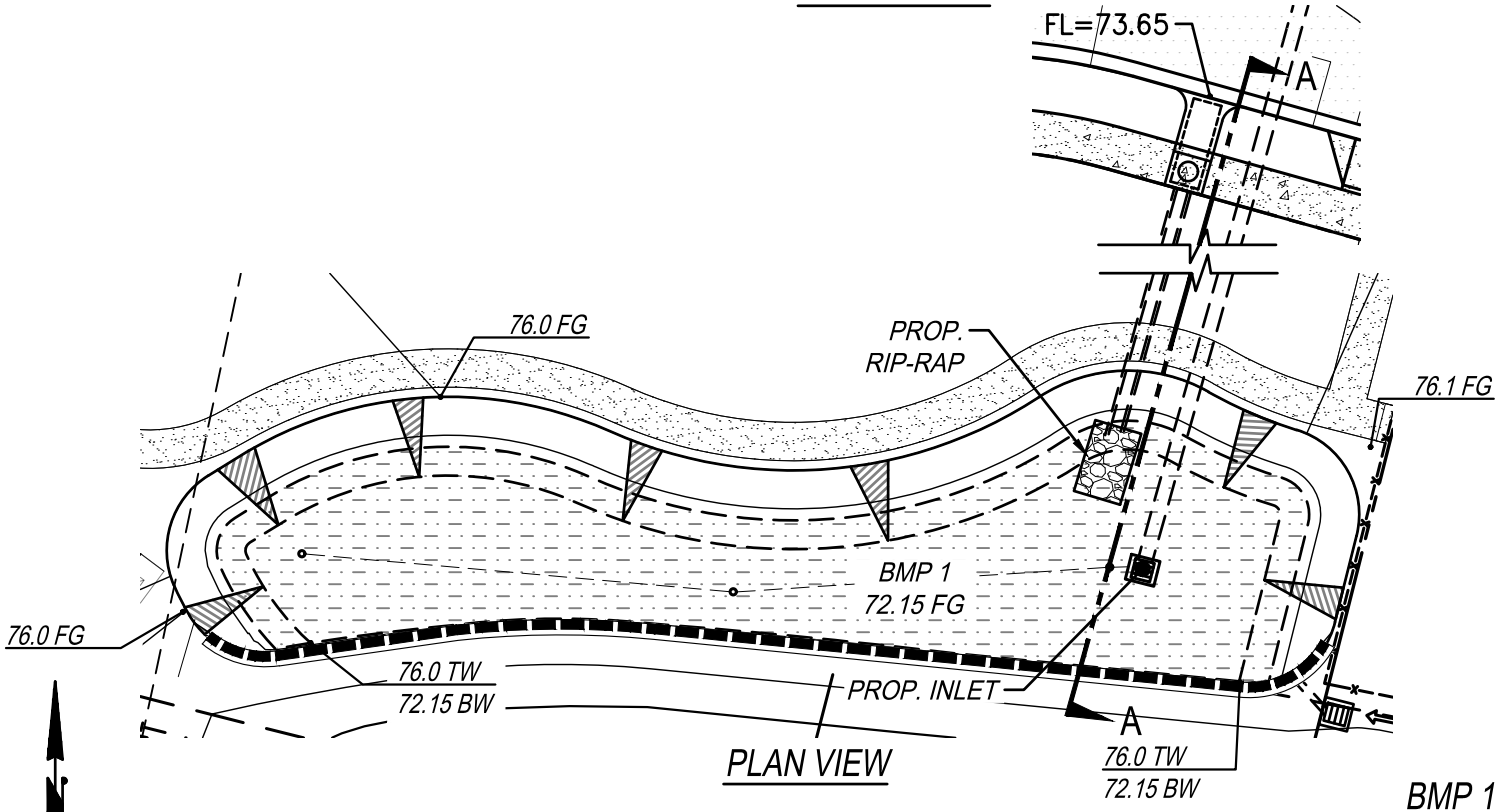

PLAN VIEW

BMP 1

SCALE: 1" = 20'

20 10 0 20

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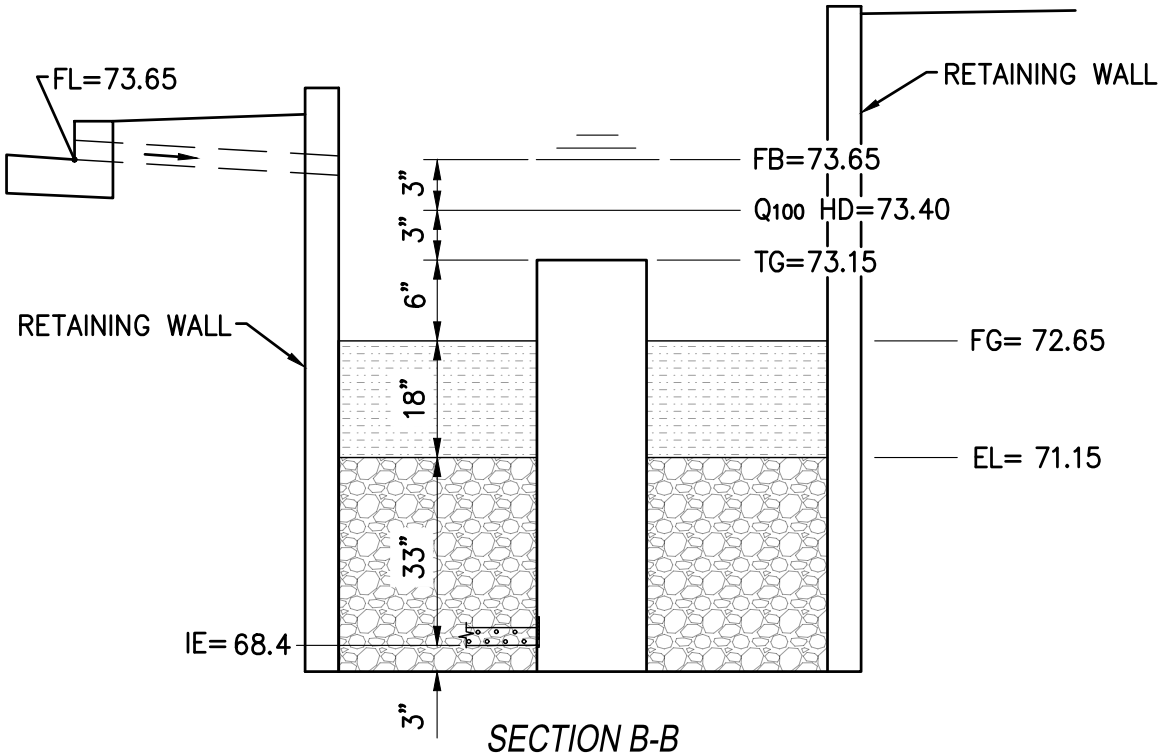
MARJA ACRES

BMP DETAILS

DATE: 2/28/19

DRAWING:



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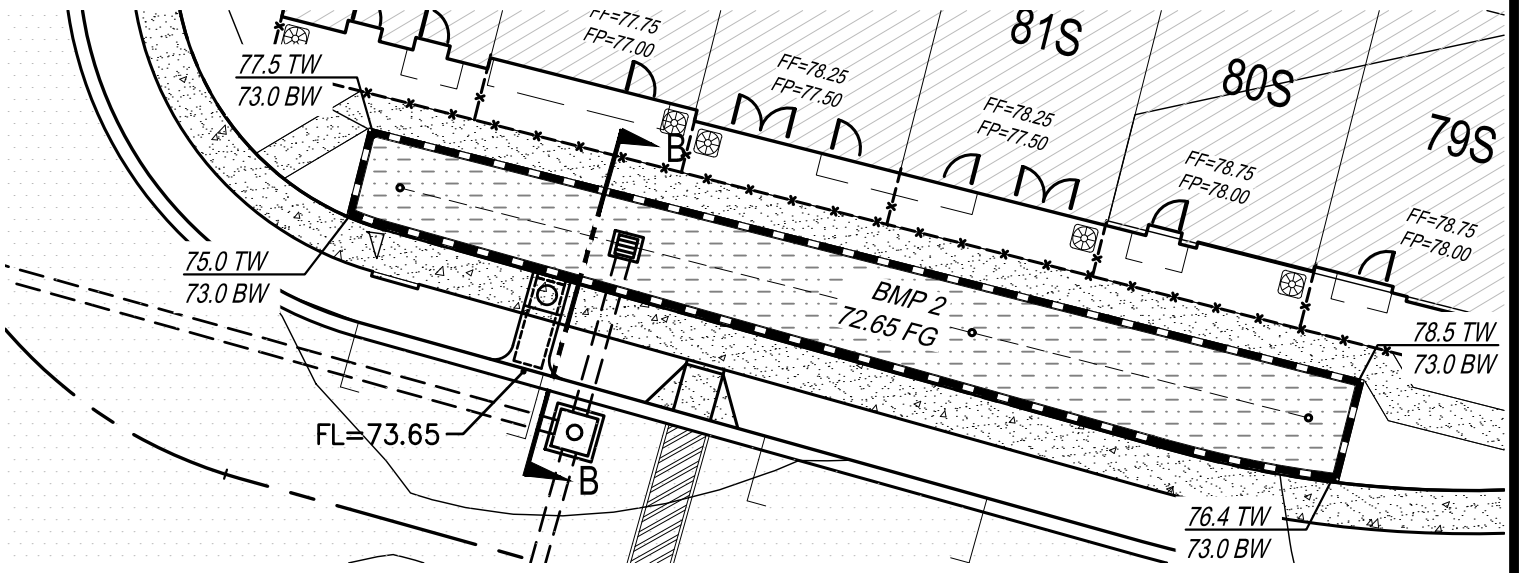

PLAN VIEW

BMP 2

SCALE: 1" = 20'

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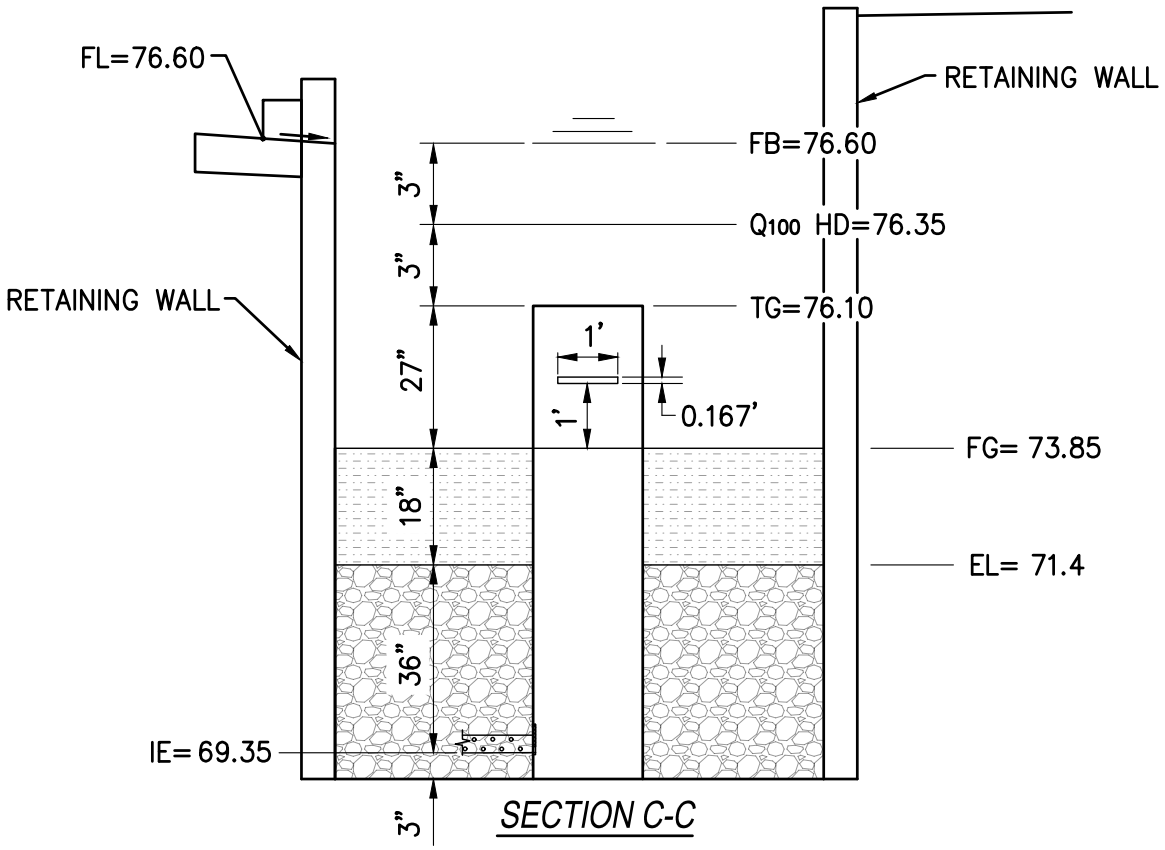
BMP DETAILS

DATE: 2/26/19

DRAWING:

SHEET 2 OF 7



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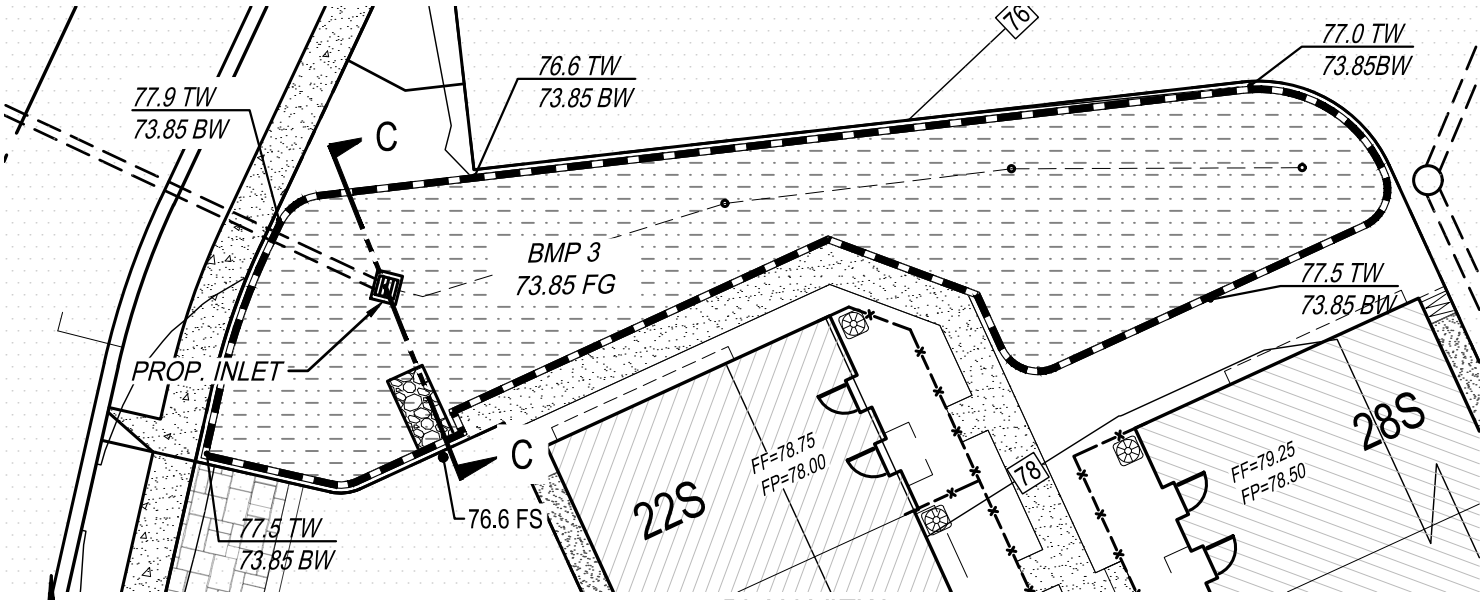

PLAN VIEW

BMP 3

SCALE: 1" = 20'

20 10 0 20

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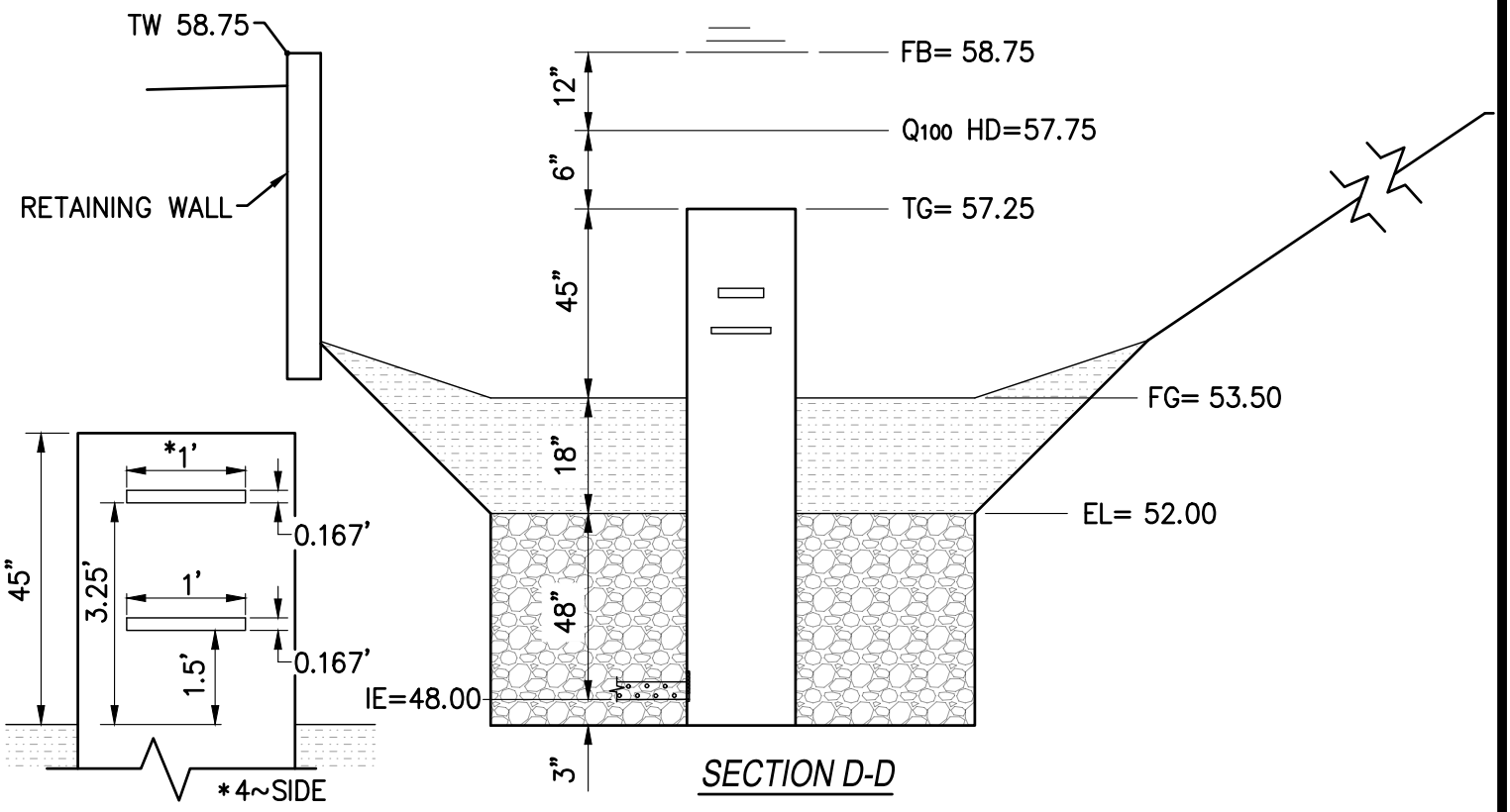

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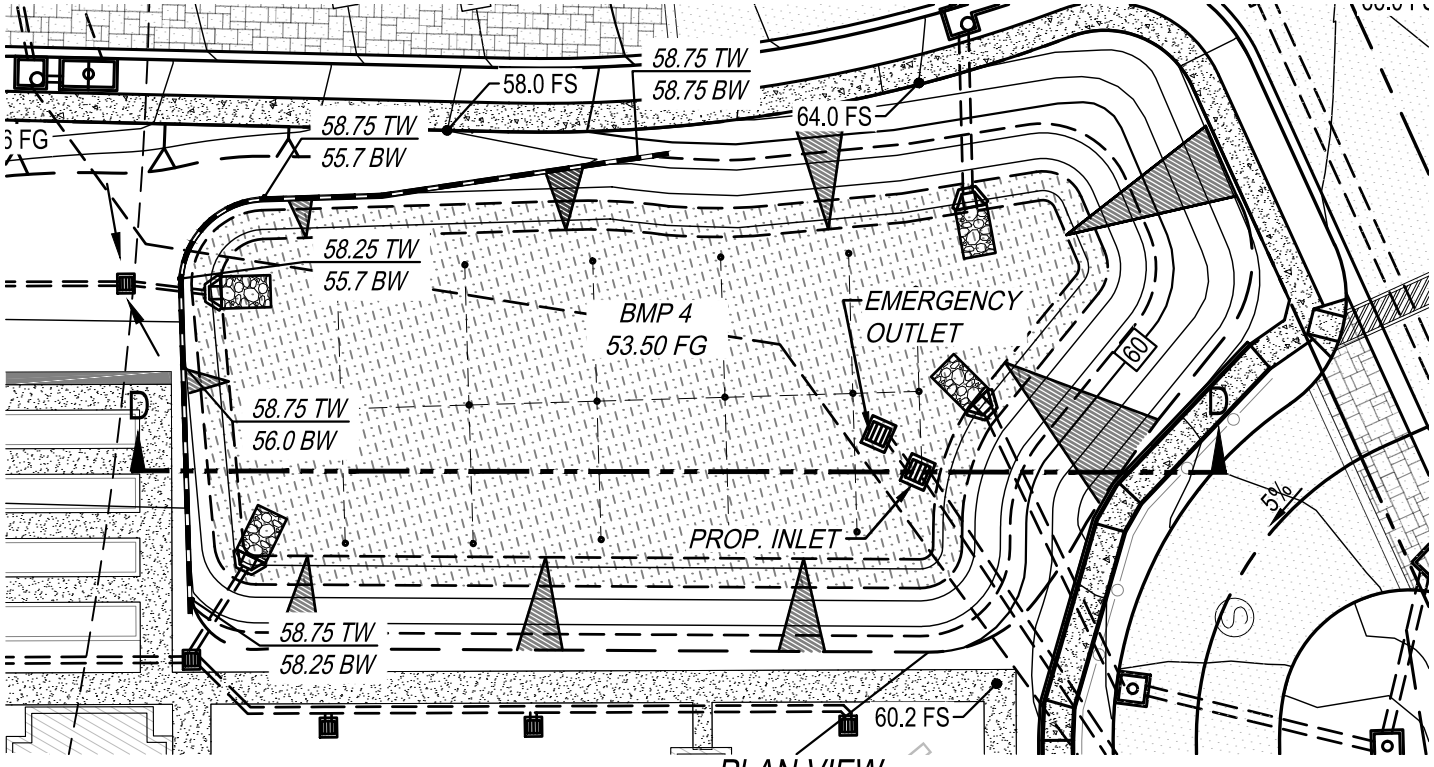

PLAN VIEW

BMP 4

SCALE: 1" = 30'

30 15 0 30

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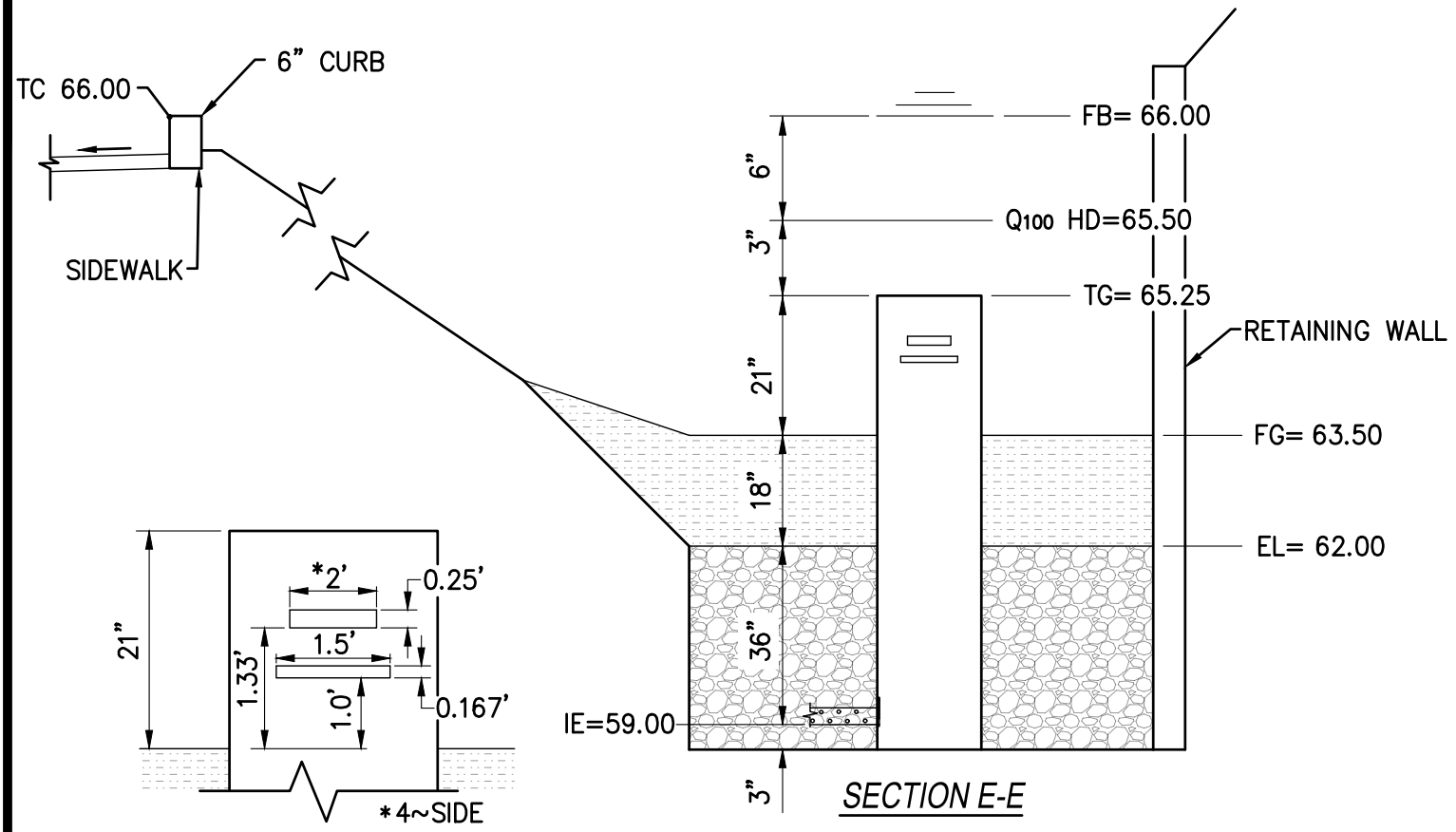
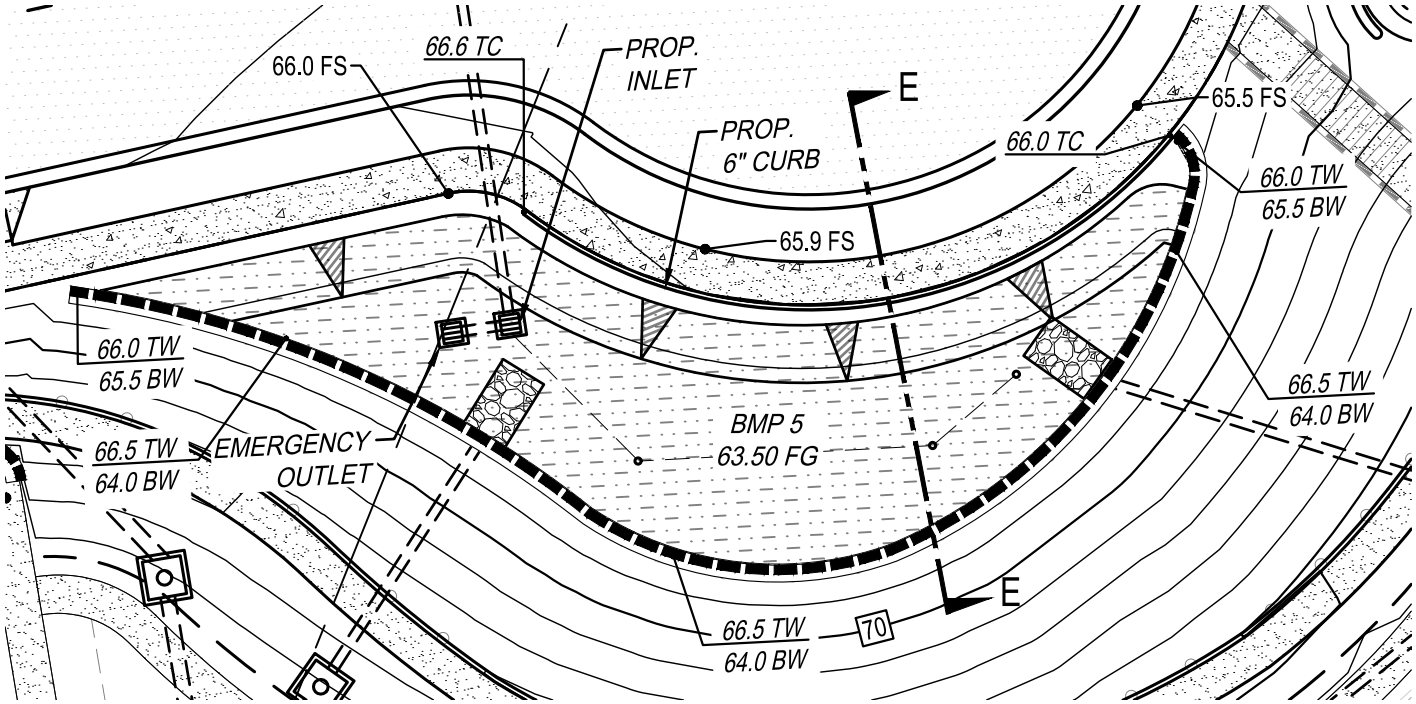
DRAWING:



SECTION E-E



PLAN VIEW

BMP 5

SCALE: 1" = 20'

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DATE: 2/28/19

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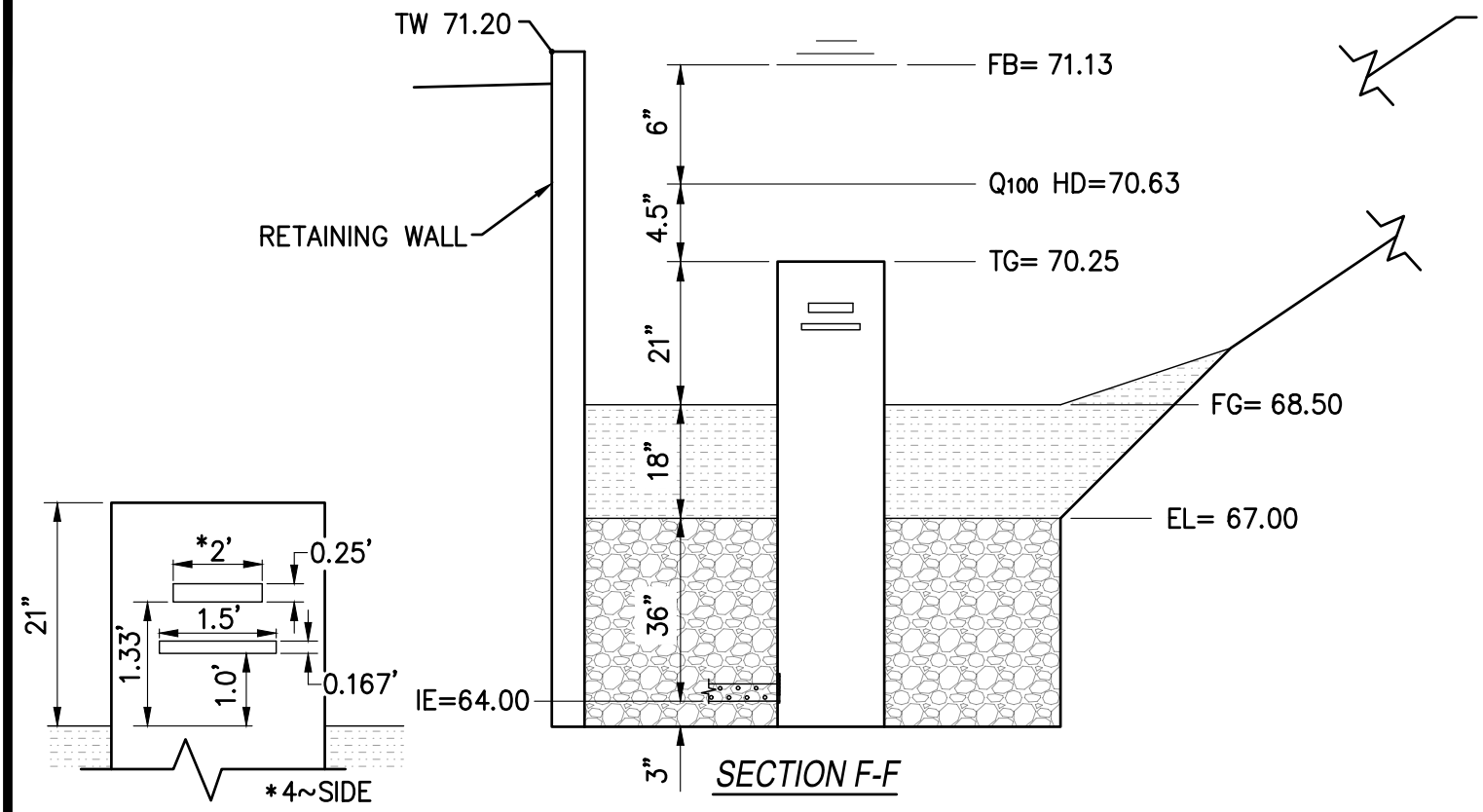

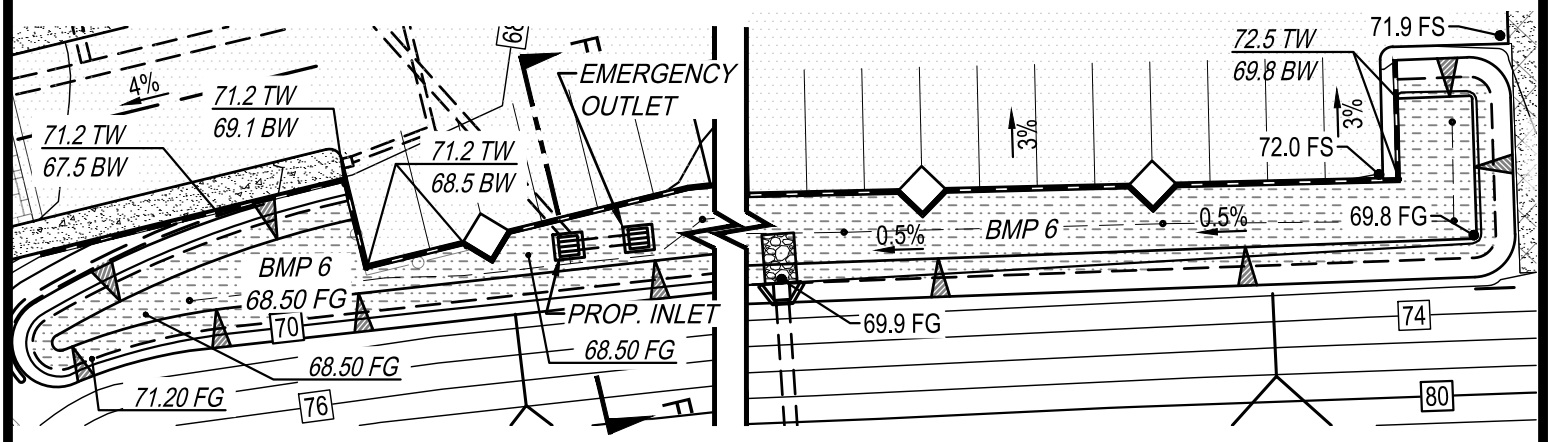

PLAN VIEW

BMP 6

SCALE: 1" = 30'

30 15 0 30

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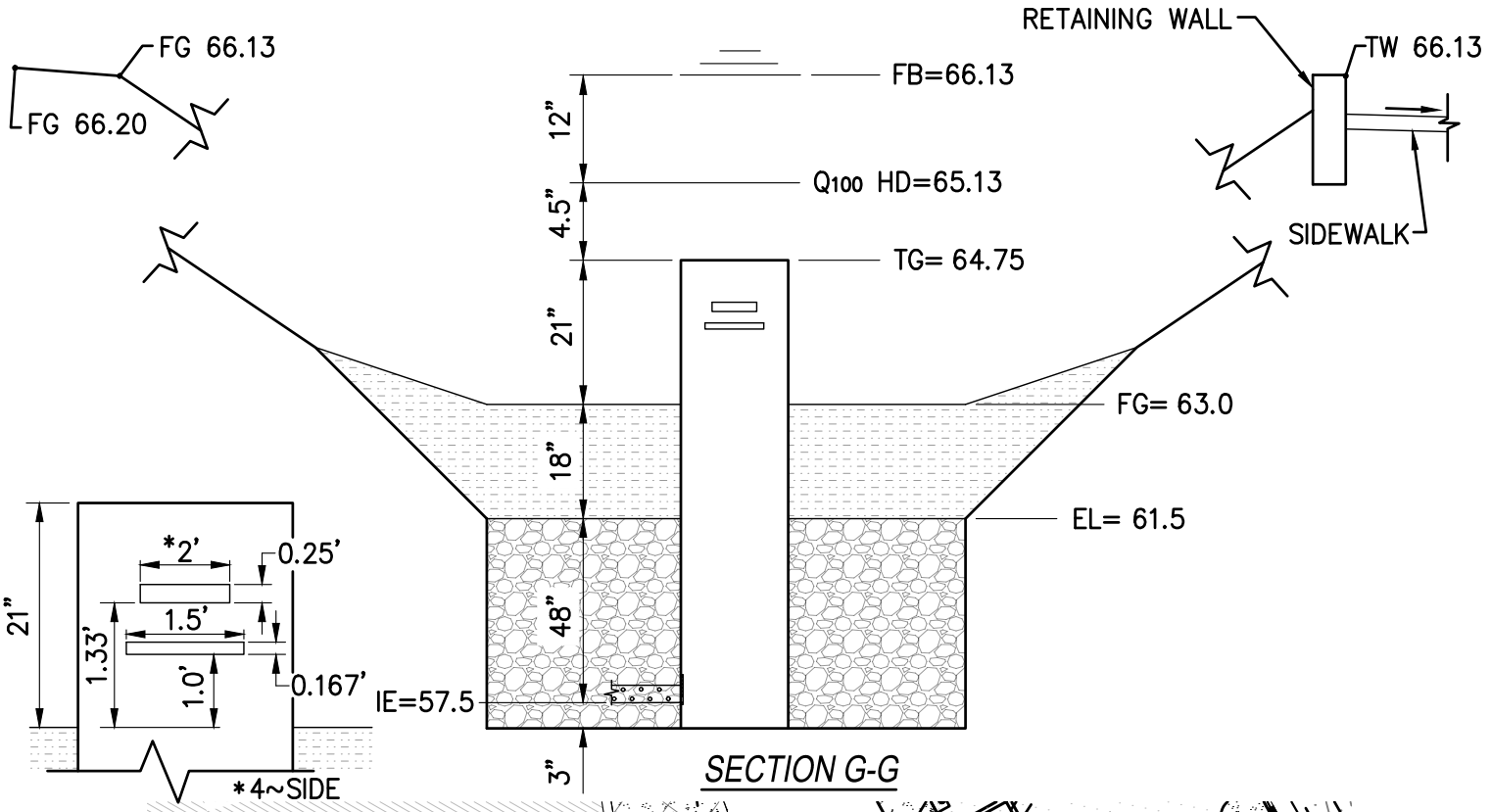
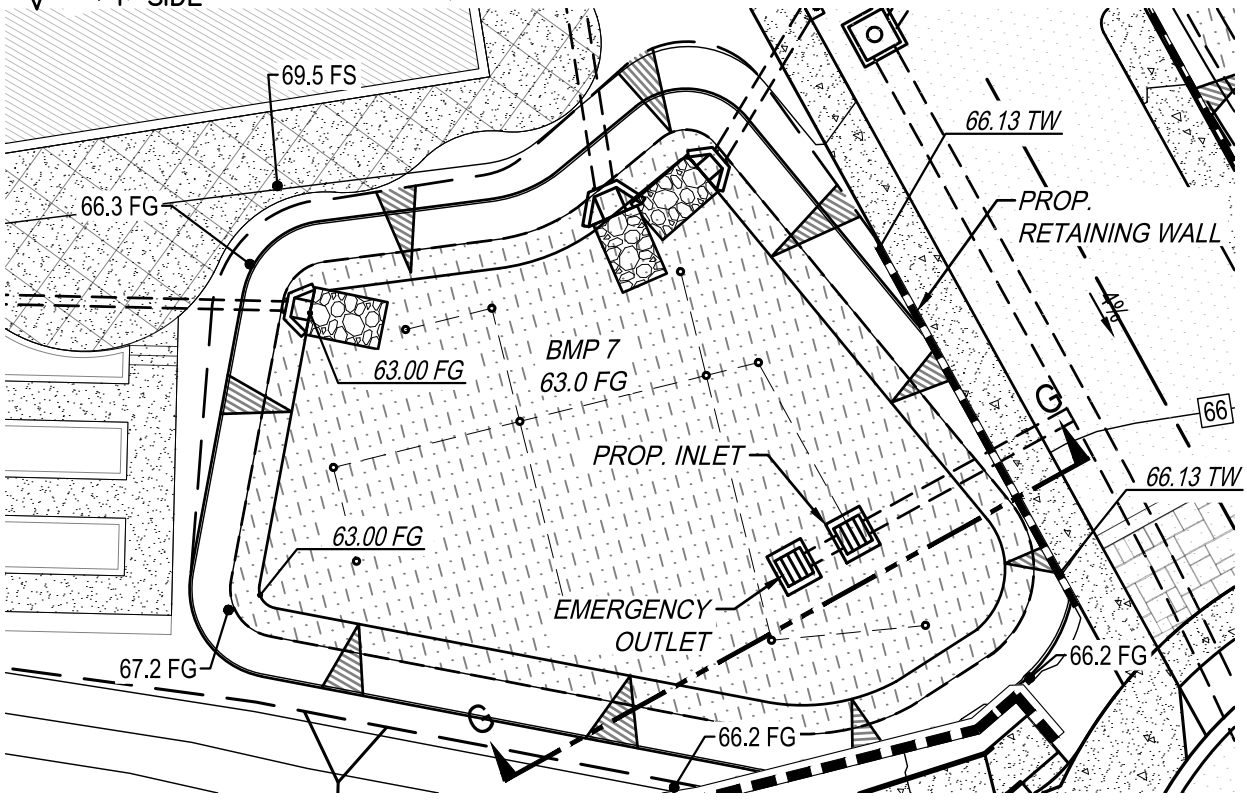
DATE: 2/28/19

DRAWING:



SECTION G-G



PLAN VIEW

BMP 7

SCALE: 1" = 20'

20 10 0 20

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DRAWING:

SHEET 7 OF 7

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