JOHN MASSON PARK BIKE PARK

Drainage Report for John Masson Bike Park

2401 N BROADWAY
ESCONDIDO, CA 92026
APN: 187-310-09-00

OCTOBER 2024

Applicant:

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This Drainage Report has been prepared by Kimley-Horn and Associates, Inc. under the direct supervision of the following Registered Civil engineer. The undersigned attests to the technical data contained in this study, and to the qualifications of technical specialists providing engineering computations upon which the recommendations and conclusions are based.

Paul Senker	10/23/2024
Registered Civil Engineer	Date

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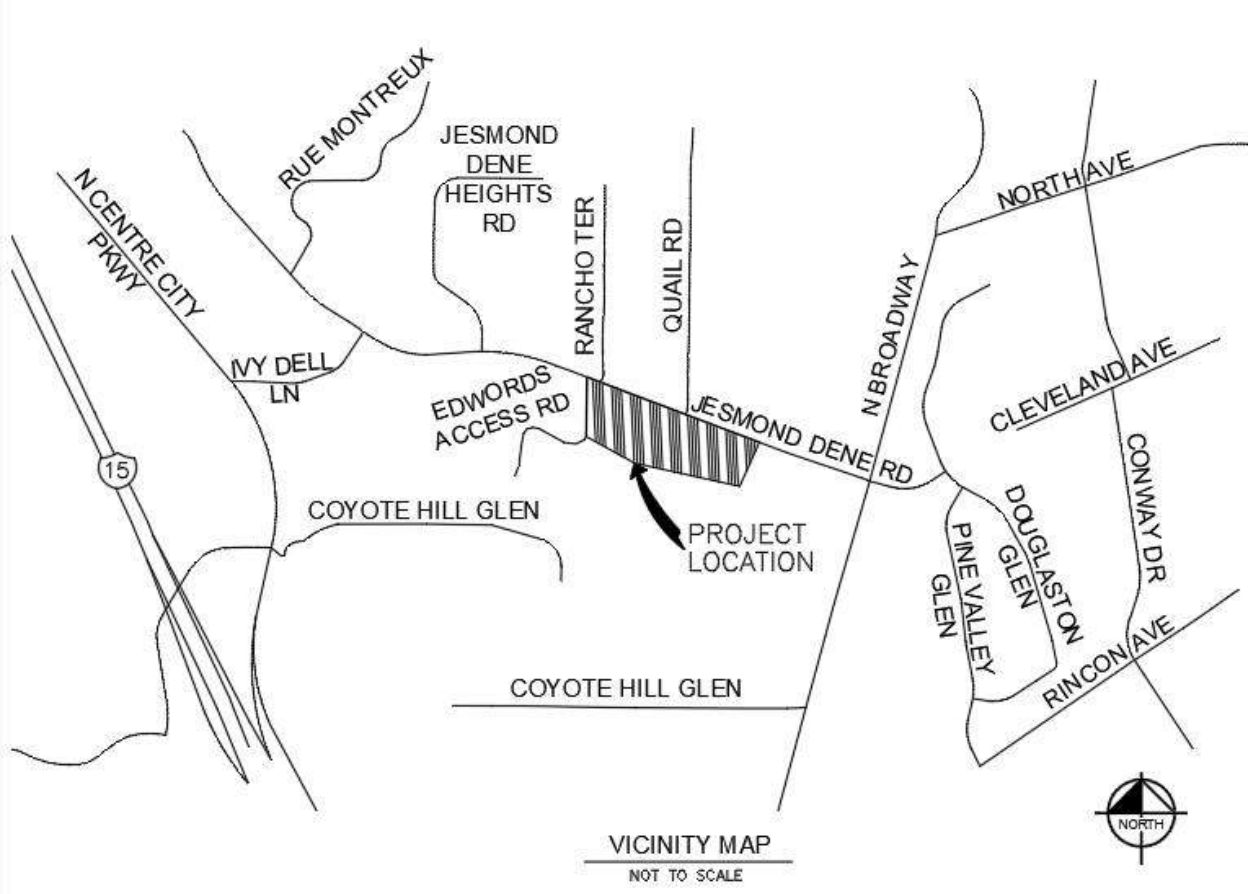
1 INTRODUCTION

1.1 PROJECT DESCRIPTION

The John Masson Park Bike Park project will consist of a paved bike pump track, an unpaved skill track, and an unpaved kids track on an approximately 4.6-acre undeveloped portion of the existing Jesmond Dene Park within the City of Escondido, California. The park property is bounded by Jesmond Dene Road to the north, N Broadway to the east, the Vista Canal Flume access road to the south, and Edwords Access Rd to the west. See **Figure 1-1** for the Vicinity Map. The property is comprised of Assessor Parcel Number (APN) 187-310-09-00. The project includes the grading of the existing parcel for the three proposed bike tracks. The purpose of this report is to present the hydrology analysis and drainage calculations for the design of the Bike Park project.

Figure 1–1 Vicinity Map



2 PROJECT SETTING

2.1 TOPOGRAPHY

Topographic information for the project was obtained from a land survey by Sampo Engineering in March 2023 and March 2024. The project is located on the USGS Valley Center quadrangle map, see **Appendix A**. The bike park project is located within the Escondido Creek watershed with onsite slopes starting in the northwest and southwest corners (approximate elevations respectively 769 and 768 ft amsl) leading east towards the existing sedimentation basin within Jesmond Dene Park (approximate elevation 759 ft amsl).

2.2 PRECIPITATION

Storm intensity values were taken from the County of San Diego Hydrology Manual, 2003. The design storm was the 50-year, and 100-year rainfall event calculated from the County of San Diego Hydrology Manual Rainfall Isopluvials and Figure 3-1 (see **Appendix C**) and determined to be 3.1 inches for the 50-year 6-hour event and 3.6 inches for the 100-year 6-hour event.

2.3 SOIL TYPES

The condition and type of soil are major factors affecting infiltration and runoff. The Natural Resources Conservation Service (NRCS) has classified soils into four general categories for comparing infiltration and runoff rates. The categories are based on properties that influence runoff, such as water infiltration rate, texture, natural discharge and moisture condition. The runoff potential is based on the amount storm water runoff at the end of a long duration storm that occurs after the soil is saturated.

Soil types were determined using the United States Department of Agriculture (USDA) Web Soil Survey. The project site consists mainly type A soils and type C along the northern boundary of the project. Hydrologic soil group A soils have a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission. Hydrologic soil group C soils have a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

A geotechnical investigation has not yet been performed at the project site. See **Appendix B** for soils information.

2.4 LAND USE

The project site location is within the City of Escondido, California. The entirety of the existing park is located within the City's OS-P: Open Space/Park zoning. The land use designation is P: Public Land per Open Space.

2.5 GROUNDWATER

Geotechnical investigation was not performed on this project site. Per SGMA Data Viewer, groundwater depth of nearby monitoring well (11S02W34M002S) is approximately 30 feet.

2.6 FEMA MAPPING

The project site is located within Zone X of the FEMA Flood Insurance Rate Map (FIRM), which is defined as an area of minimal flood hazard, outside the 500-year flood level. See **Appendix H** for FEMA map.

2.7 CLEAN WATER ACT SECTION 404 PERMIT AND 401 CERTIFICATION

The physical alteration of water bodies, including wetlands and streams, are regulated by federal and state statues under Section 401 (Certification) and Section 404 (Permits) of the Federal Clean Water Act. This project does not propose any discharge of dredged and/or fill material within any Waters of the U.S., therefore, is not subject to the Clean Water Act Sections 404 Permit and 401 Certification.

3 HYDROLOGIC ANALYSIS

3.1 METHODOLOGY

The Modified Rational Method was used to analyze the hydrology for the project. This methodology is typically used for small basins less than 500 acres in size because a uniform rainfall distribution is assumed for the entire duration. Drainage calculations comply with the requirements outlined in the County of San Diego Hydrology Manual, 2003. The San Diego County Advanced Engineering Software (AES) computer program was used for the Modified Rational Method analysis to calculate peak flow for the 2, 5, 10, 25, 50, and 100-year storm events under existing and proposed conditions. This program uses parameters from the County of San Diego Hydrology Manual to estimate times of concentration and peak flow rates.

3.1.1 GEOMETRY

Sub-basin boundaries, initial subareas, and flow paths were delineated for each sub-basin with AutoCAD Civil 3D software. These hydrologic parameters are shown for existing conditions and proposed conditions in **Exhibit A** and **Exhibit B**. Point elevations and surfaces within Civil 3D were also used to determine flow path slopes and estimate the shape of routing reaches. A summary of the existing condition and proposed condition inputs into the AES models are included in **Appendix A.** Topography for the project area was obtained from a land survey by Samp Engineering in 2023 and 2024 and is based on the City of Escondido BM. One-meter resolution DEM topography for offsite drainage areas was obtained from the USGS National Map.

3.1.2 INTENSITY AND TIME OF CONCENTRATION

Rainfall data for frequency events were taken from the County of San Diego Hydrology Manual Rainfall Isopluvials to determine the appropriate precipitation for the project site. This duration precipitation value was then inputted directly into AES for each frequency event. AES software was used to calculate the appropriate time of concentration for each sub-basin The AES software then calculates an intensity based on the calculated time of concentration.

3.1.3 RUNOFF COEFFICIENT AND LOSS RATES

AES software was used to calculate loss rates and subsequent runoff coefficients for each sub-basin based on land use type and hydrologic soil group. The existing conditions utilized for the model was chaparral broadleaf for offsite conditions and lawn/park for onsite condition. The proposed conditions land use is

broadleaf (chaparral) for offsite condition and dirt and paved for onsite. Hydrologic soil group A was used for the entire site.

3.2 EXISTING CONDITIONS

The project site overland flows from the northwest corner and the southwest corner towards the east, into the existing desilting basin within Jesmond Dene Park.

Runoff coefficients for the existing site was based on the County of San Diego Hydrology Manual and is identified below in **Table 3-1** for undeveloped sites. See **Exhibit A** for **Existing Drainage Exhibit.** The hydrology model results are presented in **Appendix D.**

Table 3–1 Existing Conditions Hydrology

Drainage Area	Runoff Coefficient	Area (acres)	% Impervious	Flow Rate (cfs)					
				2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
1 (Offsite)	0.2	9.16	0	4.74	5.91	7.27	8.48	9.21	11.19
2 (Onsite)	0.2	2.28	0	0.65	0.89	1.08	1.31	1.36	1.70
3 (Offsite)	0.2	2.82	0	1.35	1.70	2.15	2.41	2.61	3.18
4 (Onsite)	0.2	2.28	0	0.55	0.74	0.88	1.03	1.14	1.44
Total		16.54	0		9.24	11.38	13.23	14.32	17.51

3.3 PROPOSED CONDITIONS

Proposed hydrologic calculations have been prepared for both onsite and offsite improvements of the project. Tributary areas were delineated based on proposed grading for the project. The final development will be approximately 8% impervious area and 92% landscape/dirt. The San Diego County Advanced Engineering Software (AES) computer program was used for the Modified Rational Method analysis to calculate peak flow for the 2, 5, 10, 25, 50, and 100-year storm events under proposed conditions. Runoff generated from the site will be collected by onsite inlets, conveyed through a swale system, and discharge into an onsite infiltration basin for treatment and detention. This basin will be designed for conjunctive use to 1) filter and treat the water quality storm event volume by means of infiltration as documented in the project specific SWQMP, 2) Reduce peak runoff to hydromodification requirements and 3) Reduce 100-year discharge to pre-development flow rate.

The project will discharge all flows through the point of compliance in the eastern portion of the project by making a connection to the existing City-operated desilting basin within Jesmond Dene Park.

With the overall project site being 8% impervious and drainage area DA 4 being 13% impervious, the Runoff Coefficient used in the AES calculations was 0.34, which is used for approximately 20% impervious condition for soil group A in the San Diego County Hydrology Manual Table 3-1. The model was run using residential land use because AES model does not provide a value for C that was similar to site conditions with less than 20% impervious area. See **Exhibit B** for **Proposed Drainage Exhibit.** The hydrology model results are presented in **Appendix E.**

All runoff that is collected from offsite will be conveyed through a drainage ditch along the parameter of the site to the offsite desilting basin. This portion of runoff peak flow was calculated using the rational method and runoff coefficient value of 0.2 as it is all existing landscaping. See **Appendix E** for calculations.

See **Table 3-2** for the Proposed Conditions Hydrology. This table describes the flow rate before the site is routed through the detention basin for mitigation. See **Section 4.1.3** and **Table 4-1** for mitigated flows. All flows from the onsite detention basin and offsite ultimately reach the existing desilting basin. There are two points of compliance for the project. One is at the proposed infiltration basin and the other is at the existing desilting basin.

Table 3–2 Proposed Conditions Hydrology

Discharge Location	Runoff Coefficient	Area (acres)	% Impervious Area	Flow Rate (cfs)				
				5 Year	10 Year	25 Year	50 Year	100 Year
1 (Offsite)	0.20	9.16	0	5.91	7.27	8.48	9.21	11.19
2 (Onsite)	0.20	1.94	0	0.71	0.86	1.05	1.16	1.37
3 (Offsite)	0.20	2.82	0	1.70	2.15	2.41	2.61	3.18
4 (Onsite)	0.34	2.62	13	1.86	2.29	2.71	2.99	3.66
Total		16.54	8%	10.18	12.57	14.65	15.97	19.40

4 HYDRAULIC ANALYSIS

4.1 METHODOLOGY

Drainage structures were designed for the John Masson Bike Park project according to the procedures and methodologies outlined in the County of San Diego Hydraulic Design Manual, 2015. The proposed drainage network is included on the **Proposed Drainage Exhibit**, **Exhibit B**.

4.1.1 INFILTRATION BASIN CALCULATIONS

The development of this site results in an increase of onsite peak discharge runoff. One infiltration basin is proposed to mitigate peak flows by storing stormwater runoff and controlling the release of flow. The proposed basin will be located along the eastern edge of the bike park site. The project is required to mitigate for downstream hydromodification and detain for the 100-year peak flow rate. The project specific Stormwater Quality Management Plan (SWQMP) determined the storage volume and outlet orifice required to mitigate for hydromodification. Orifice calculations were prepared to determine the size of the outlets to meet hydromodification requirements and are used in the flood routing for the peak storm events. See **Appendix F** for the outlet rating curves for each basin. See project specific SWQMP for hydromodification compliance documentation.

To size the peak attenuation volume required, the Rational Method hydrology results were input into Rick Rat Hydrographs to develop a hydrograph. The proposed hydrograph was routed using the PCSWMM software with the calculated basin size and a riser structure to determine peak flow rates and maximum elevation of the basin. See **Appendix F** for infiltration basin calculations and **Table 4-1** summarizing the basin routing results. The project peak flow rates are less than the pre-project flow rate for all storm events per the criteria above.

Table 4–1 **Proposed Onsite Infiltration Basin Summary**

Storm Event	Existing Runoff (DA 2, 4)	Proposed Runoff Before Mitigation (DA 2, 4)	Proposed Runoff After Mitigation	Runoff Detained	Maximum Water Surface Elevation
(yr)	Q (cfs)	Q (cfs)	Q (cfs)	Q (cfs)	ft
5	1.63	2.57	0.35	2.22	755.6
10	1.96	3.15	1.07	2.08	755.7
25	2.34	3.76	1.46	2.3	756
50	2.50	4.15	1.62	2.53	756.1
100	3.14	5.03	1.9	3.13	756.4
Top of Basin					758.9
100 Year Freeboard (feet)					2.5
Top of Riser					755.4
Basin Volume Provided (cubic feet)					23,037
Finished Grade (feet)					752.4

Below is a summary of the discharge leaving the site in the existing, proposed before mitigation, and proposed after mitigation condition for the 50- and 100-year storm event at the Point of Compliance. This table demonstrates that the project detains flows to less than the existing site runoff.

Table 4–2 Summary of Discharge at POC 1

Total % Impervious	Existing Drainage Area to POC	Proposed Drainage Area to POC	Storm Event	Existing Runoff	Proposed Runoff Before Mitigation	Proposed Runoff After Mitigation
	(ac)	(ac)	(yr)	Q (cfs)	Q (cfs)	Q (cfs)
8%	4.56	4.56	5	1.63	2.57	0.35
			10	1.96	3.15	1.07
			25	2.34	3.76	1.46
			50	2.50	4.15	1.62
			100	3.14	5.03	1.9

Drawdown times for the detention basins are required to drawdown the surface ponding within 96 hours per section 6.3.7 Drawdown Time of the 2016 Storm Water Standards Part 1: BMP Design Manual for Permanent Site Design, Storm Water Treatment and Hydromodification Management. See **Table 4-3** below, for a summary of storm event drawdown times for the 5, 10, 25, 50, and 100-year storm, assuming 0.5 inches/hour infiltration rate. These drawdown times represent the duration it takes to drain the surface storage area after the end of the storm event (6 hrs) for each basin and are supported by the hydrographs and PCSWMM results in **Appendix F**.

Table 4–3 Proposed Infiltration Basin Drawdown Summary

Storm Event	Depth in Basin After 6 Hour Storm	Drawdown Time
(yr)	ft	hrs
5	3.05	73.2
10	3.07	73.68
25	3.08	73.92
50	3.08	73.92
100	3.06	73.44

4.1.2 EARTHEN TRIANGULAR CHANNEL

Proposed earthen ditch is located at the southern parameter of the project site capturing and routing offsite runoff to existing sedimentation basin. Earthen channel size was calculated using the FlowMaster computer program. This program's input consists of ditch shape, roughness coefficient, channel slope, left/right side-slope, depth for a specific discharge. A triangular channel was designed at a roughness co-efficient of 0.020 and a 10-year storm capacity. The FlowMaster inlet design output files can be referenced in **Appendix G**.

5 WATER QUALITY

5.1 POST CONSTRUCTION BMP

A project specific Storm Water Quality Management Plan (SWQMP) has been prepared. Self- mitigating areas are proposed throughout the project to provide stormwater treatment for the pollutants where practical. Infiltration basin is also proposed onsite to capture 100-year run-off and account for hydromodification. Infiltration calculations are provided in the project specific SWQMP.

5.2 EROSION AND SEDIMENTATION

The proposed park site will be approximately 8% impervious with landscaped slopes and parkway landscaped areas. Graded and disturbed areas will be re-vegetated and landscaped to minimize erosion. The post construction site will have minimal risks of erosion occurring given proper plant establishment and transport of sediments downstream will be significantly reduced by means of pretreatment and onsite infiltration basin. It will be critical to maintain construction site BMPs throughout the construction duration.

6 DRAINAGE IMPROVEMENTS

This drainage study was prepared to document the storm drain design for John Masson Bike Park. The project includes the construction of four bike tracks. The drainage improvements throughout the project consist of self-mitigating areas, swales, earthen channel and infiltration basin.

The proposed drainage improvements are designed to mitigate flood and water quality impacts such that no adjacent properties will be negatively impacted from runoff generated by the development of this project. This Drainage Study documents that this project does not create any negative drainage impacts to any adjacent properties.

APPENDICES

APPENDIX A

USGS MAP

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map
OnDemand Topo

7.5-MINUTE TOPO QUADRANGLE
Custom Extent
7.5-MINUTE TOPO

Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid:Universal Transverse Mercator, Zone 11S

Data is provided by The National Map (TNM), is the best available at the time of map generation, and includes data content from supporting themes of Elevation, Hydrography, Geographic Names, Boundaries, Transportation, Structures, Land Cover, and Orthoimagery. Refer to associated Federal Geographic Data Committee (FGDC) Metadata for additional source data information.

This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands. Temporal changes may have occurred since these data were collected and some data may no longer represent actual surface conditions.

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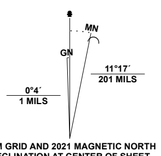


UTM GRID AND 2021 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

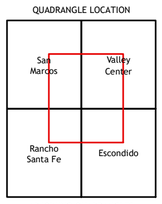
U.S. National Grid
100,000 - m Square ID
MS
Grid Zone Designation
11S

SCALE 1:24 000

1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

CONTOUR INTERVAL 40 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988
CONTOUR SMOOTHNESS = Medium

QUADRANGLE LOCATION



ADJOINING QUADRANGLES

ROAD CLASSIFICATION

Expressway	Local Connector
Secondary Hwy	Local Road
Ramp	4WD
Interstate Route	US Route
State Route	

7.5-MINUTE TOPO, CA
2024

APPENDIX B

SOIL INFORMATION

Map Scale: 1:2,110 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 30 60 120 180

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

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

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 20, Aug 30, 2024

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

Date(s) aerial images were photographed: Mar 14, 2022—Mar 17, 2022

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
ClG2	Cieneba coarse sandy loam, 30 to 65 percent slopes, eroded	3.3	16.4%
RaB	Ramona sandy loam, 2 to 5 percent slopes	8.5	42.7%
RaC	Ramona sandy loam, 5 to 9 percent slopes	0.1	0.5%
VaA	Visalia sandy loam, 0 to 2 percent slopes	8.1	40.4%
Totals for Area of Interest		**20.0**	**100.0%**

San Diego County Area, California

VaA—Visalia sandy loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: hbh2
Elevation: 600 to 1,200 feet
Mean annual precipitation: 15 inches
Mean annual air temperature: 57 degrees F
Frost-free period: 200 to 350 days
Farmland classification: Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Visalia and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Visalia

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Riser, flat
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 12 inches: sandy loam
H2 - 12 to 40 inches: fine sandy loam
H3 - 40 to 60 inches: very fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 2c
Hydrologic Soil Group: A

Ecological site: R019XG911CA - Loamy Fan
Hydric soil rating: No

Minor Components

Greenfield
Percent of map unit: 5 percent
Hydric soil rating: No

Grangeville
Percent of map unit: 5 percent
Hydric soil rating: No

Placentia
Percent of map unit: 2 percent
Hydric soil rating: No

Tujunga
Percent of map unit: 2 percent
Hydric soil rating: No

Unnamed
Percent of map unit: 1 percent
Landform: Flood plains
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 20, Aug 30, 2024

APPENDIX C

HYDROLOGY MANUAL EXCERPTS

Note that the Initial Time of Concentration should be reflective of the general land-use at the upstream end of a drainage basin. A single lot with an area of two or less acres does not have a significant effect where the drainage basin area is 20 to 600 acres.

Table 3-2 provides limits of the length (Maximum Length (L_M)) of sheet flow to be used in hydrology studies. Initial T_i values based on average C values for the Land Use Element are also included. These values can be used in planning and design applications as described below. Exceptions may be approved by the "Regulating Agency" when submitted with a detailed study.

Table 3-2

MAXIMUM OVERLAND FLOW LENGTH (L_M) & INITIAL TIME OF CONCENTRATION (T_i)

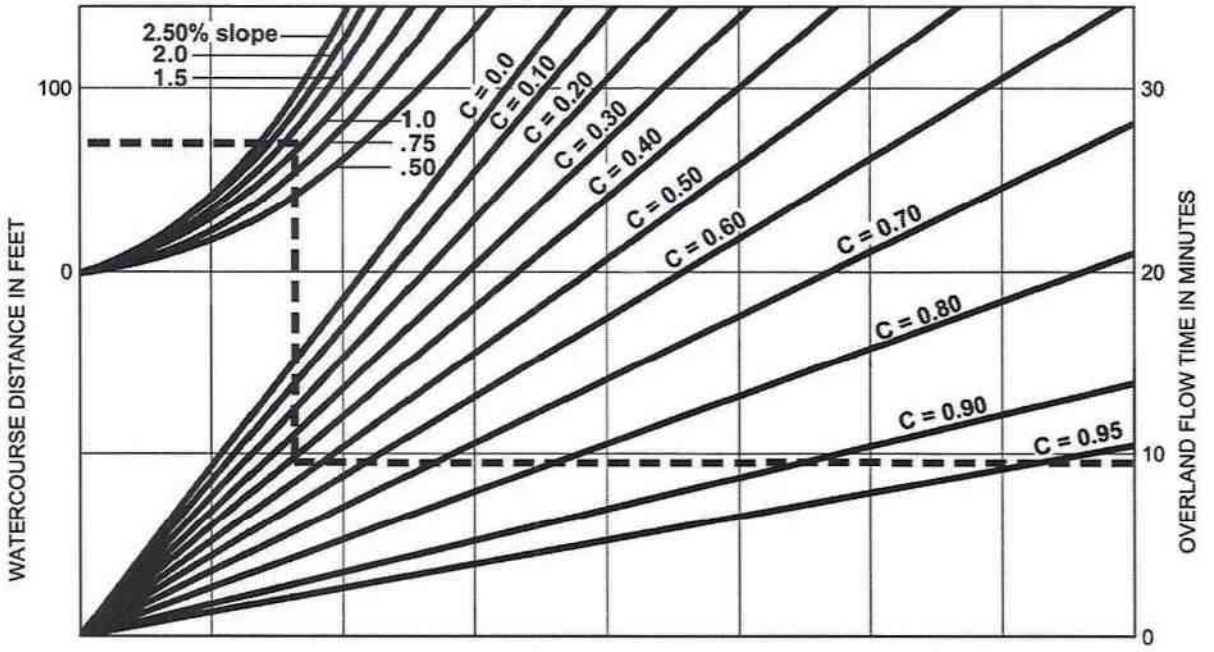
Element*	DU/ Acre	.5%		1%		2%		3%		5%		10%	
		L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i
Natural		50	13.2	70	12.5	85	10.9	100	10.3	100	8.7	100	6.9
LDR	1	50	12.2	70	11.5	85	10.0	100	9.5	100	8.0	100	6.4
LDR	2	50	11.3	70	10.5	85	9.2	100	8.8	100	7.4	100	5.8
LDR	2.9	50	10.7	70	10.0	85	8.8	95	8.1	100	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	4.2	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

*See Table 3-1 for more detailed description

Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

Land Use		Runoff Coefficient "C"				
			Soil Type			
NRCS Elements	County Elements	% IMPER.	A	B	C	D
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35
Low Density Residential (LDR)	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N. Com)	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I.)	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	General Industrial	95	0.87	0.87	0.87	0.87

*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, Cp, for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).
DU/A = dwelling units per acre
NRCS = National Resources Conservation Service



EXAMPLE:
Given: Watercourse Distance (D) = 70 Feet
Slope (s) = 1.3%
Runoff Coefficient (C) = 0.41
Overland Flow Time (T) = 9.5 Minutes

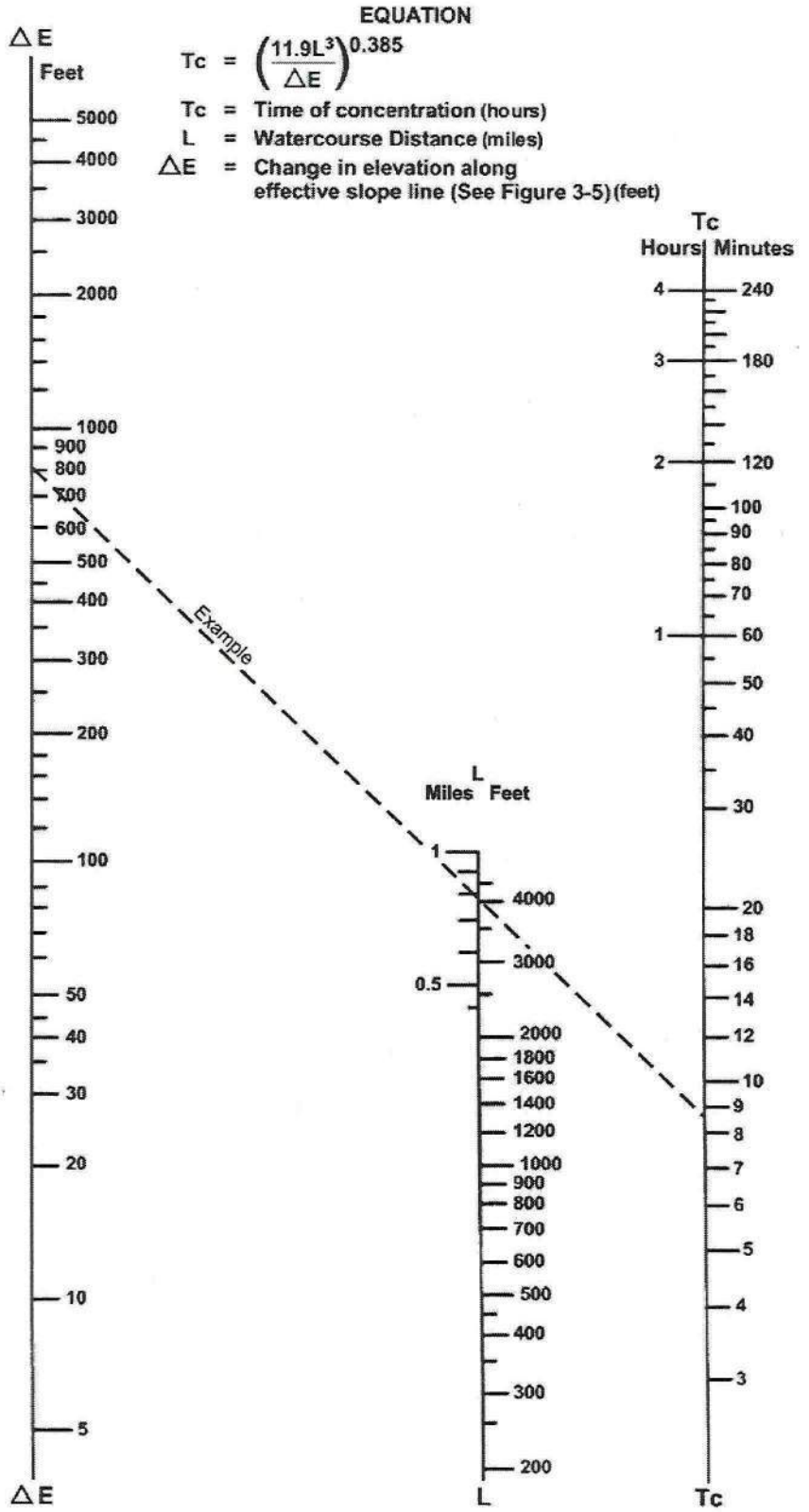
$$T = \frac{1.8\,(1.1-C)\sqrt{D}}{\sqrt[3]{s}}$$

OURCE: Airport Drainage, Federal Aviation Administration, 1965

FIGURE

Rational Formula - Overland Time of Flow Nomograph

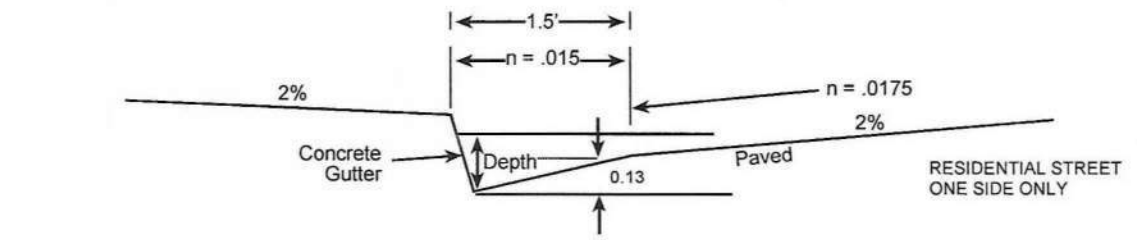
3-3

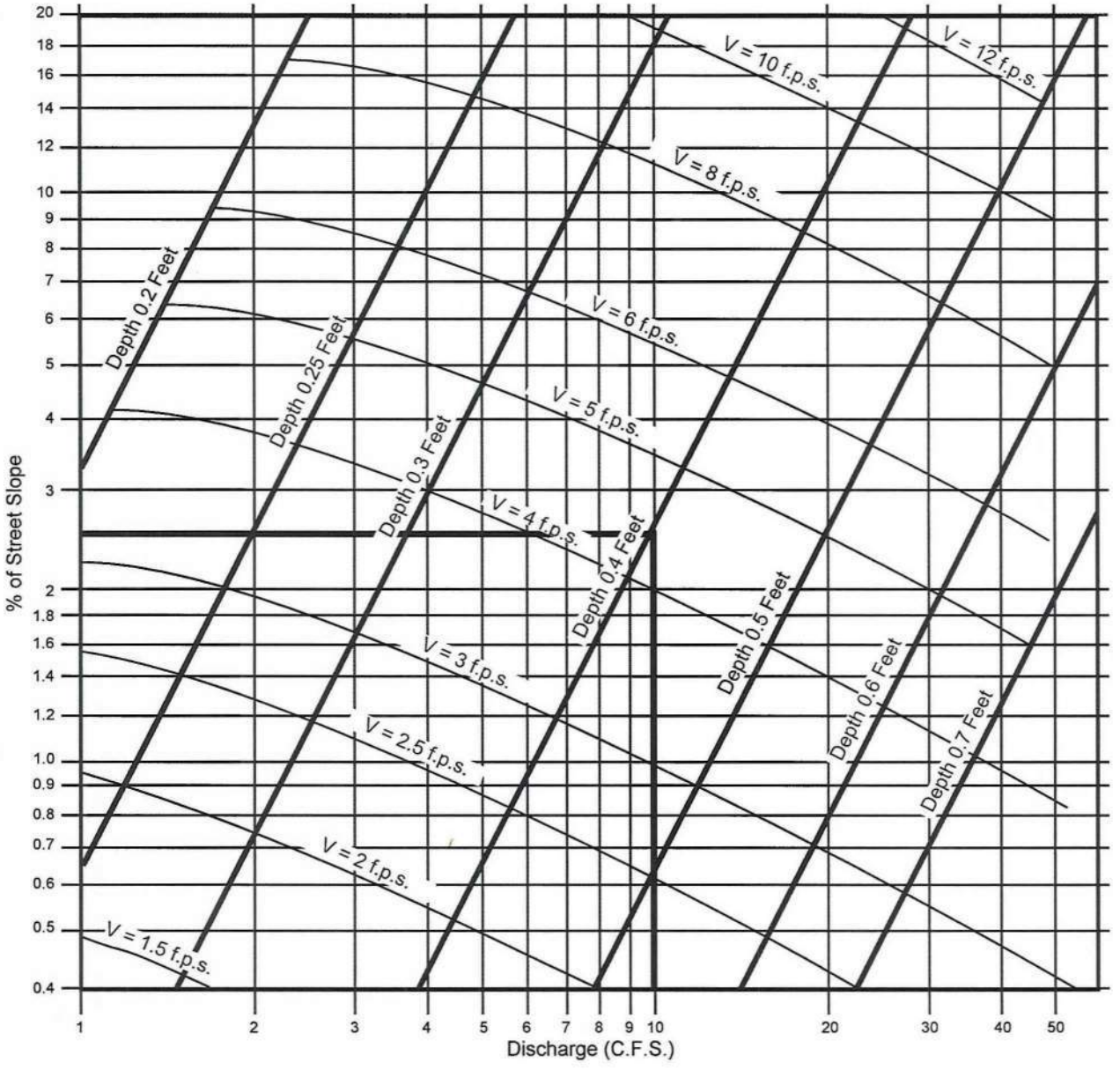


SOURCE: California Division of Highways (1941) and Kirpich (1940)

FIGURE 3-4

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





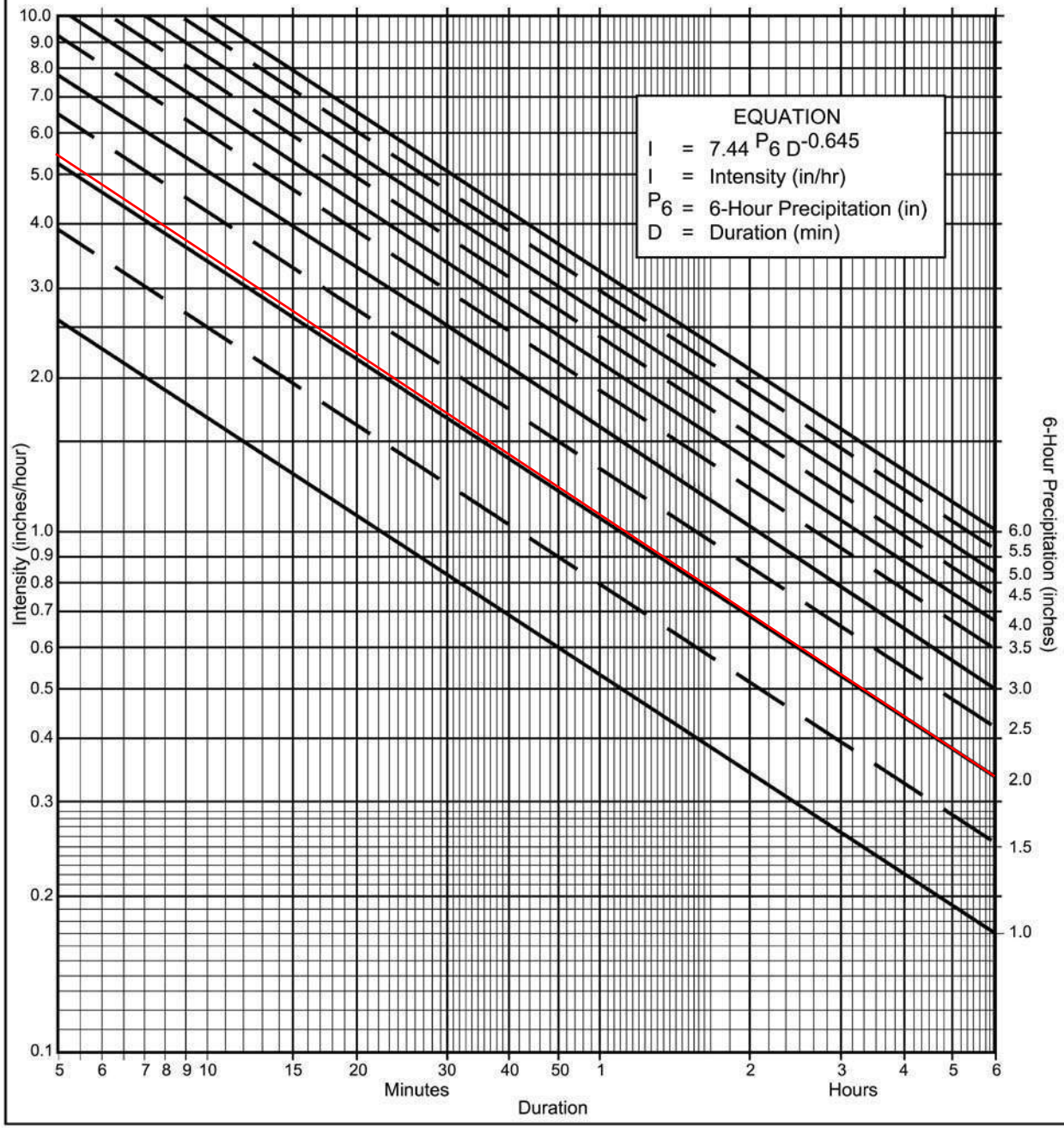
EXAMPLE:
Given: Q = 10 S = 2.5%
Chart gives: Depth = 0.4, Velocity = 4.4 f.p.s.

SOURCE: San Diego County Department of Special District Services Design Manual

FIGURE

Gutter and Roadway Discharge - Velocity Chart

3-6



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 5 year

(b) P_6 = 2.0 in., P_{24} = 3.8, $\frac{P_6}{P_{24}}$ = 53 %(2)

(c) Adjusted P_6(2) = 2.0 in.

(d) t_x = 5 min.

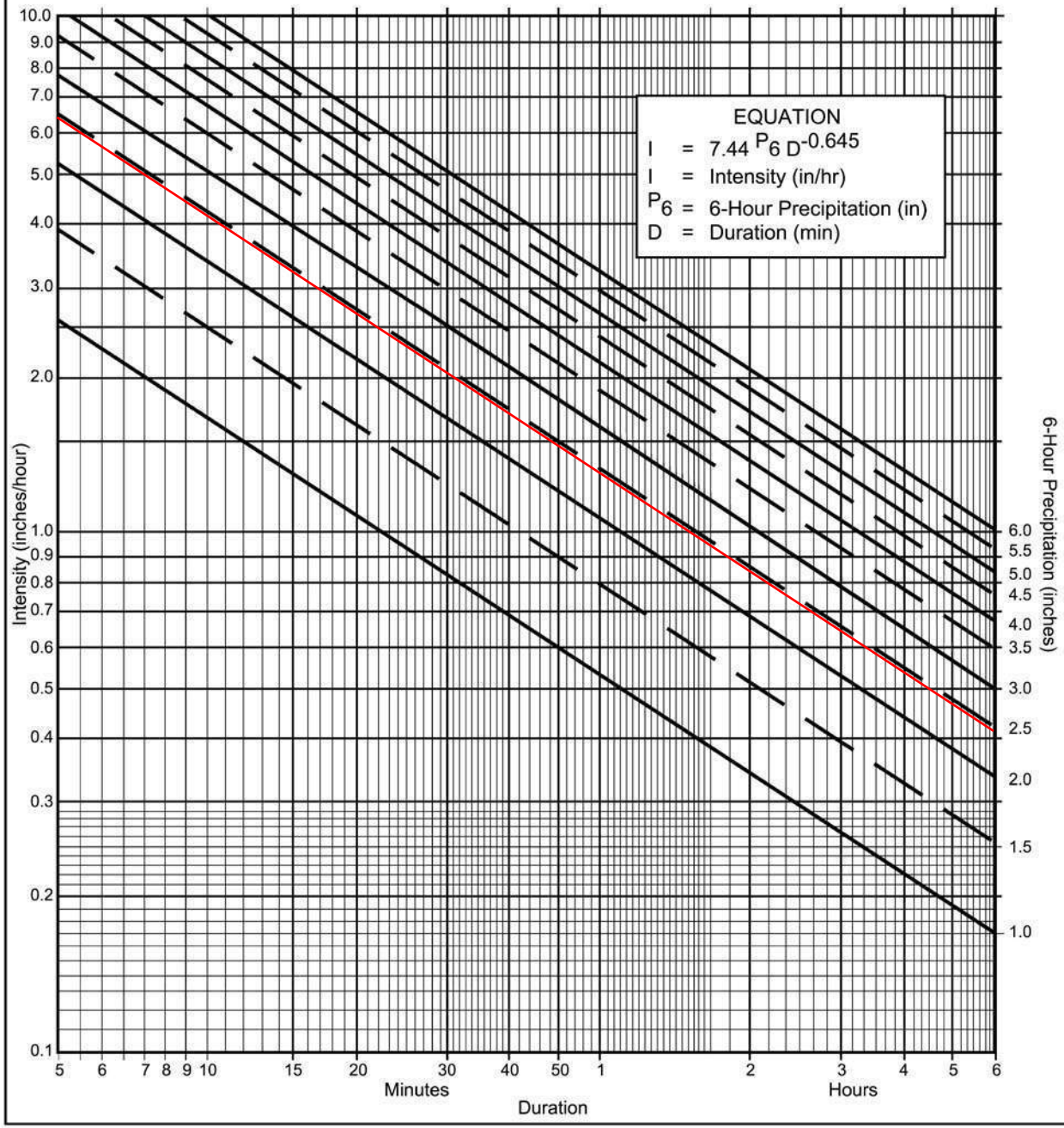
(e) I = 5.27 in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 10 year

(b) P_6 = 2.4 in., P_{24} = 4.3, $\frac{P_6}{P_{24}}$ = 56 %(2)

(c) Adjusted P_6(2) = 2.4 in.

(d) t_x = 5 min.

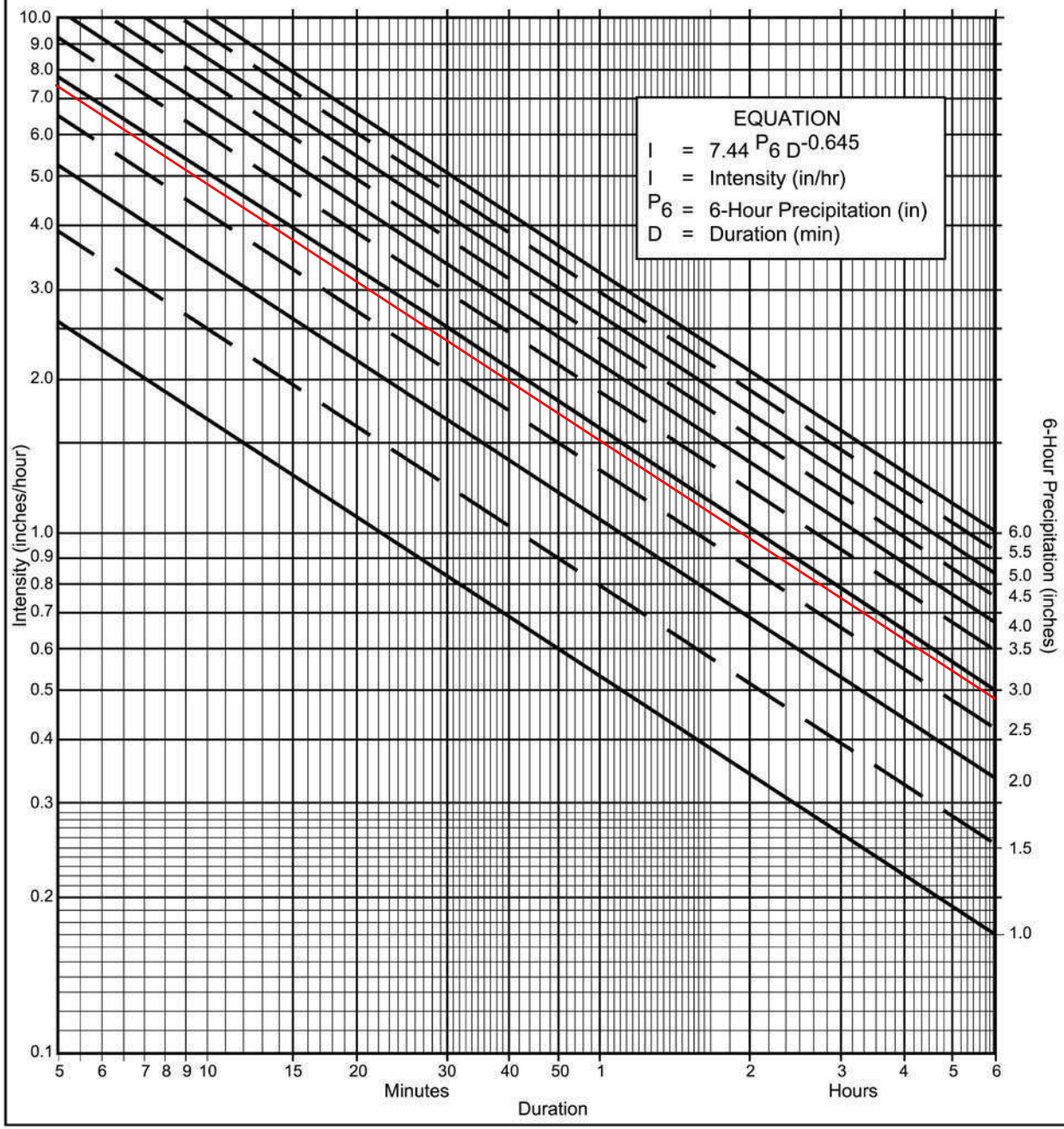
(e) I = 6.32 in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 25 year

(b) P_6 = 2.8 in., P_{24} = 5.8, $\frac{P_6}{P_{24}}$ = 48 %(2)

(c) Adjusted P_6(2) = 48 in.

(d) t_x = 5 min.

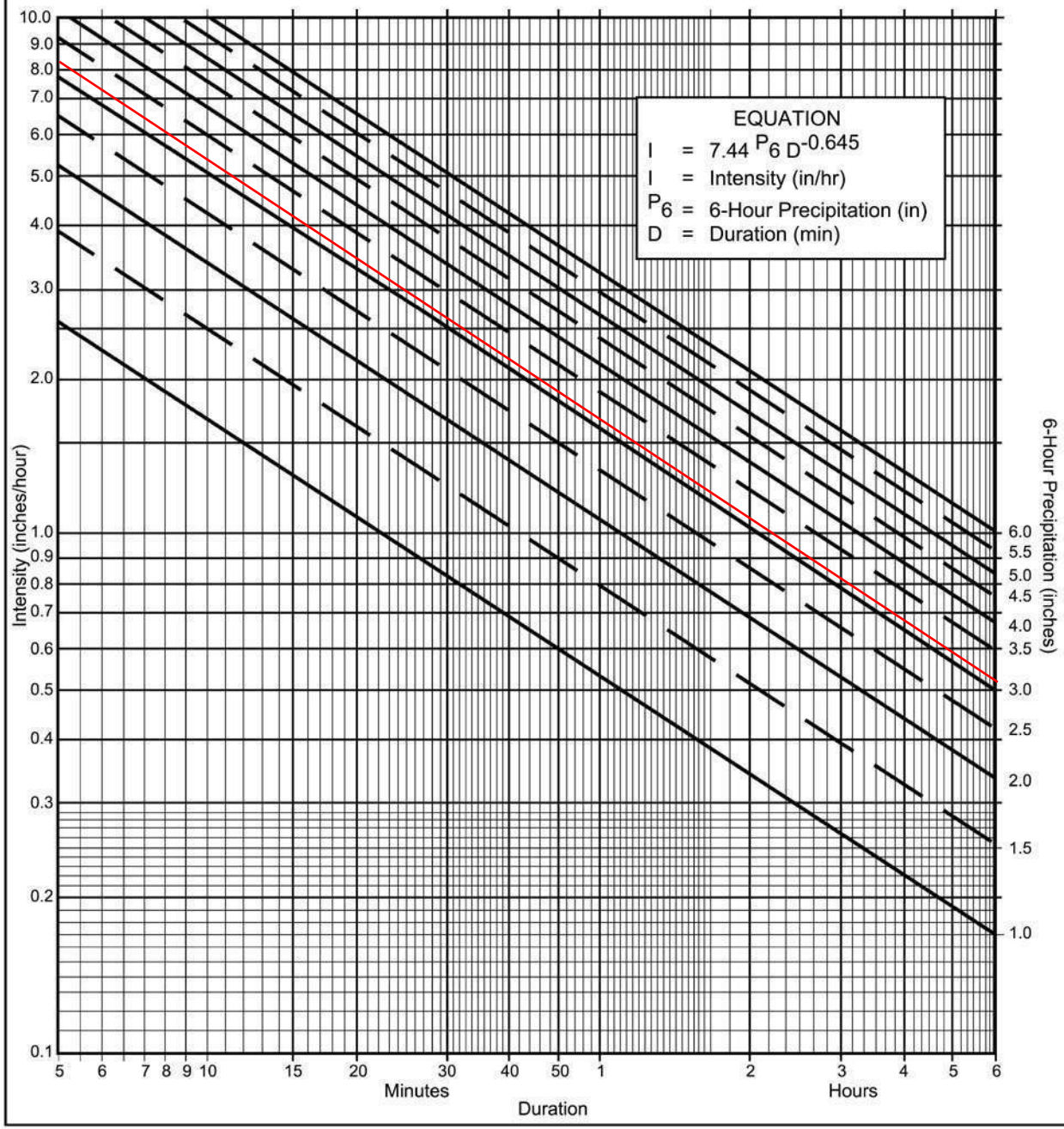
(e) I = 7.38 in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 50 year

(b) P_6 = 3.1 in., P_{24} = 6.3, $\frac{P_6}{P_{24}}$ = 49 %(2)

(c) Adjusted P_6(2) = 3.1 in.

(d) t_x = 5 min.

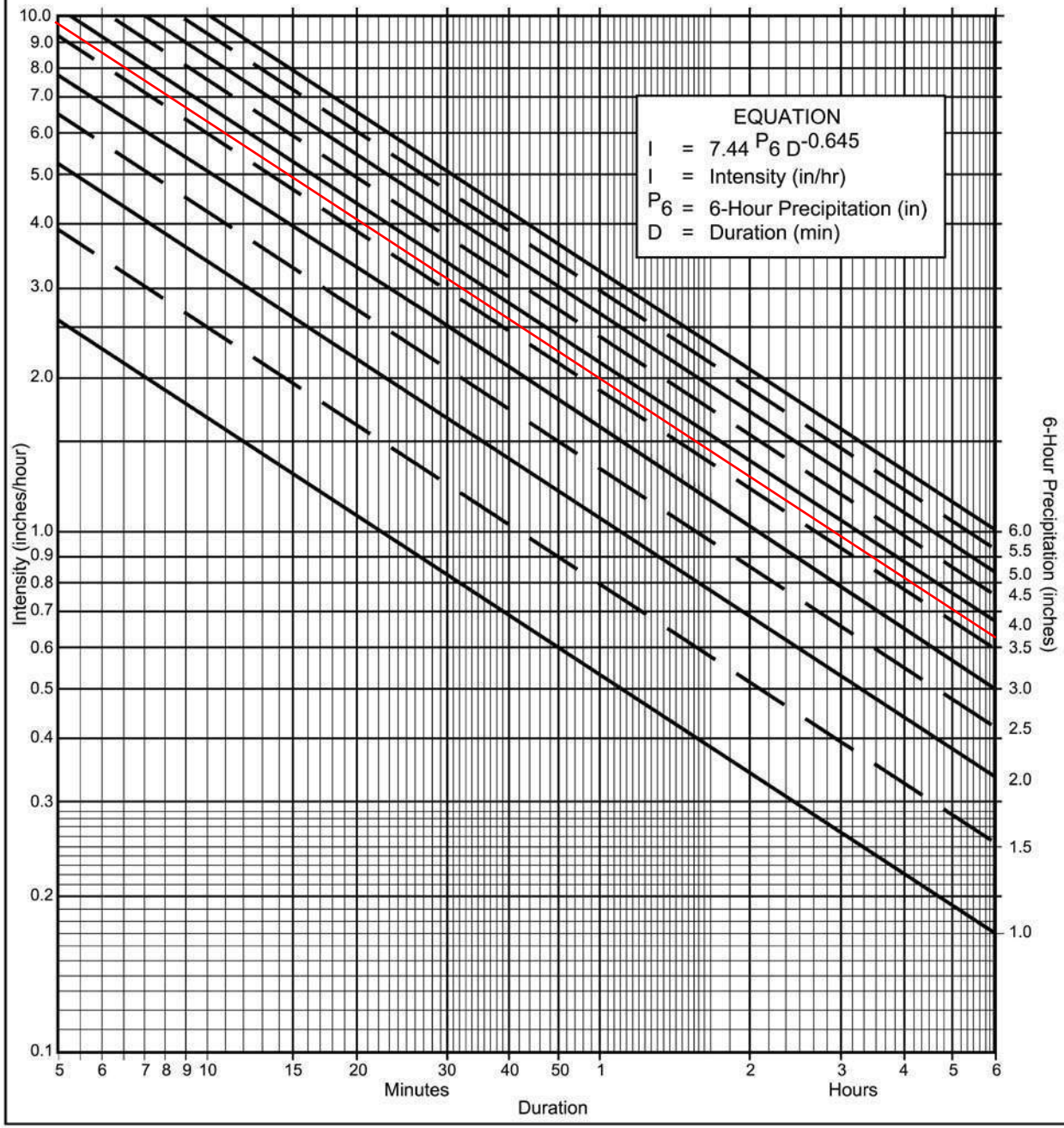
(e) I = 8.16 in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 100 year

(b) P_6 = 3.6 in., P_{24} = 8.0, $\frac{P_6}{P_{24}}$ = 45 %(2)

(c) Adjusted P_6(2) = 3.6 in.

(d) t_x = 5 min.

(e) I = 9.48 in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1

County of San Diego Hydrology Manual

Rainfall Isopluvials

2 Year Rainfall Event - 6 Hours

Isopluvial (inches)

P6 = 1.60 INCHES

Orange County

Riverside County

Imperial County

Pacific Ocean

Mexico

Project Location

OCEANSIDE
VISTA
CARLSBAD
ESCONDIDO
ENCINITAS
SOLANA BEACH
DEL MAR
POWAY
S.D. COUNTY
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
CHULA VISTA
IMPERIAL BEACH
SD

33°30'
33°15'
33°00'
32°45'
32°30'
117°30'
117°15'
117°00'
116°45'
116°30'
116°15'

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3 0 3 Miles

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Rainfall Isopluvials

2 Year Rainfall Event - 24 Hours

Isopluvial (inches)

P24 = 2.54 INCHES

Orange County

Riverside County

Imperial County

Pacific Ocean

Mexico

Project Location

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VISTA
CARLSBAD
ESCONDIDO
ENCINITAS
SOLANA BEACH
DEL MAR
POWAY
S.D. COUNTY
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
SD
CHULA VISTA
IMPERIAL BEACH

117°30' 117°15' 117°00' 116°45' 116°30' 116°15'

33°30' 33°15' 33°00' 32°45' 32°30'

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Rainfall Isopluvials

5 Year Rainfall Event - 6 Hours

Isopluvial (inches)

P6 = 2.0 INCHES

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Riverside County

Imperial County

Mexico

Pacific Ocean

Project Location

OCEANSIDE
VISTA
CARLSBAD
ESCONDIDO
ENCINITAS
SOLANA BEACH
DEL MAR
POWAY
S.D. COUNTY
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
SD
CHULA VISTA
IMPERIAL BEACH

117°30' 117°15' 117°00' 116°45' 116°30' 116°15'

33°30' 33°15' 33°00' 32°45' 32°30'

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Rainfall Isopluvials

5 Year Rainfall Event - 24 Hours

Isopluvial (inches)

P24 = 3.8 INCHES

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Riverside County

Imperial County

Pacific Ocean

Mexico

Project Location

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ESCONDIDO
CARLSBAD
ENCINITAS
SOLANA BEACH
DEL MAR
POWAY
S.D. COUNTY
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
SD
CHULA VISTA
IMPERIAL BEACH

117°30' 117°15' 117°00' 116°45' 116°30' 116°15'
33°30' 33°15' 33°00' 32°45' 32°30'

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Rainfall Isopluvials

10 Year Rainfall Event - 6 Hours

Isopluvial (inches)

P6 = 2.41 INCHES

Orange County

Riverside County

Imperial County

Mexico

Pacific Ocean

Project Location

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CARLSBAD
ENCINITAS
SOLANA BEACH
DEL MAR
POWAY
S.D. COUNTY
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
CHULA VISTA
IMPERIAL BEACH
SD

117°30' 117°15' 117°00' 116°45' 116°30' 116°15'
33°30' 33°15' 33°00' 32°45' 32°30'

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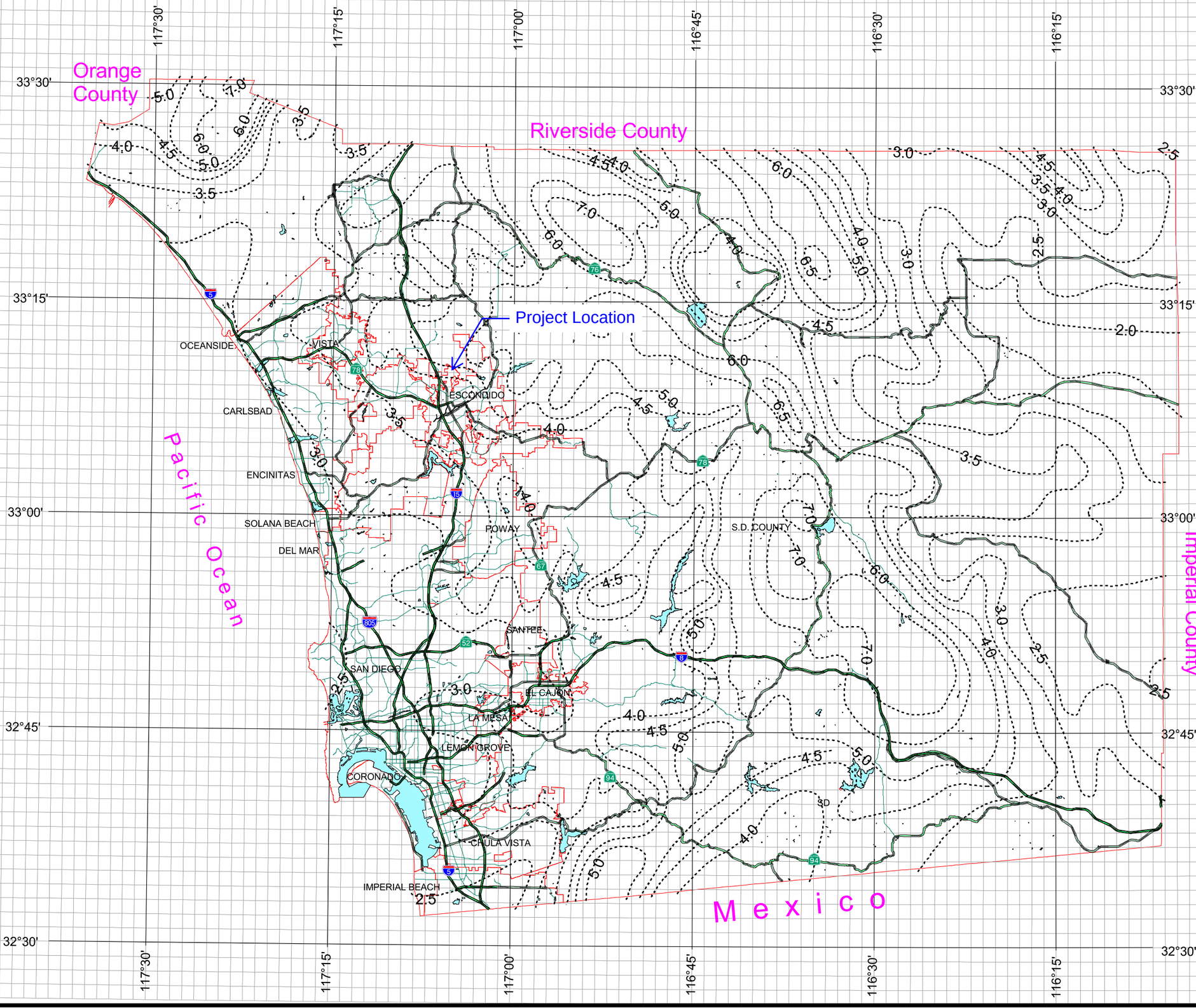
Rainfall Isopluvials

10 Year Rainfall Event - 24 Hours

Isopluvial (inches)

P24 = 4.30 INCHES



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Rainfall Isopluvials

25 Year Rainfall Event - 6 Hours

Isopluvial (inches)

P6 = 2.82 INCHES

Project Location

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Imperial County

Mexico

Pacific Ocean

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SOLANA BEACH
DEL MAR
POWAY
S.D. COUNTY
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
SD
CHULA VISTA
IMPERIAL BEACH

117°30' 117°15' 117°00' 116°45' 116°30' 116°15'
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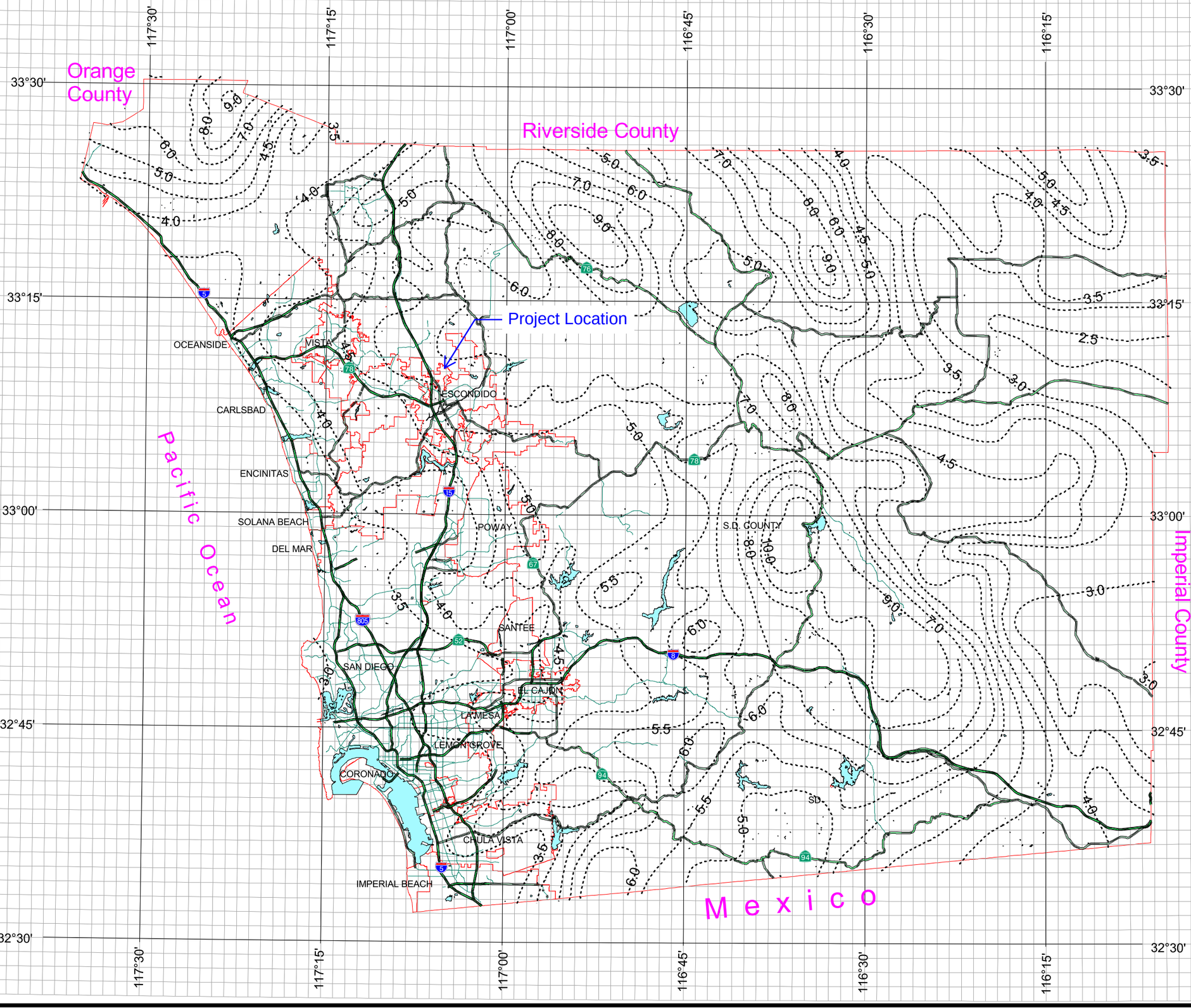
Rainfall Isopluvials

25 Year Rainfall Event - 24 Hours

Isopluvial (inches)

P24 = 5.80 INCHES



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County of San Diego Hydrology Manual

Rainfall Isopluvials

50 Year Rainfall Event - 6 Hours

Isopluvial (inches)

P6 = 3.1 INCHES

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Riverside County

Imperial County

Pacific Ocean

Mexico

Project Location

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ESCONDIDO
ENCINITAS
SOLANA BEACH
DEL MAR
POWAY
S.D. COUNTY
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
SD
CHULA VISTA
IMPERIAL BEACH

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32°45'
32°30'
117°30'
117°15'
117°00'
116°45'
116°30'
116°15'

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County of San Diego Hydrology Manual

Rainfall Isopluvials

50 Year Rainfall Event - 24 Hours

Isopluvial (inches)

P24 = 6.3 INCHES

Orange County

Riverside County

Imperial County

Mexico

Pacific Ocean

Project Location

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VISTA
CARLSBAD
ESCONDIDO
ENCINITAS
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DEL MAR
POWAY
S.D. COUNTY
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
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CHULA VISTA
IMPERIAL BEACH

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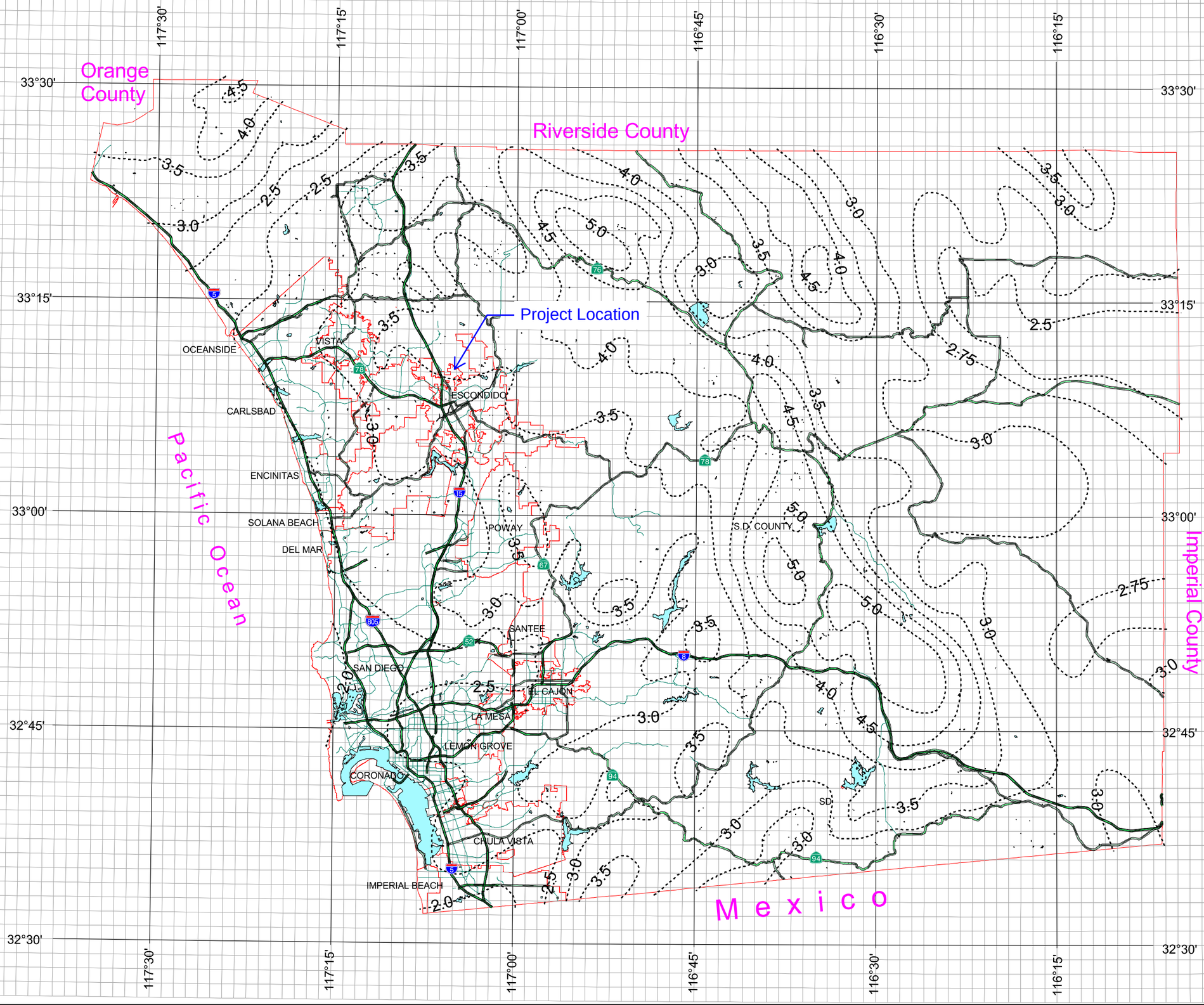
Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

P6 = 3.6 INCHES



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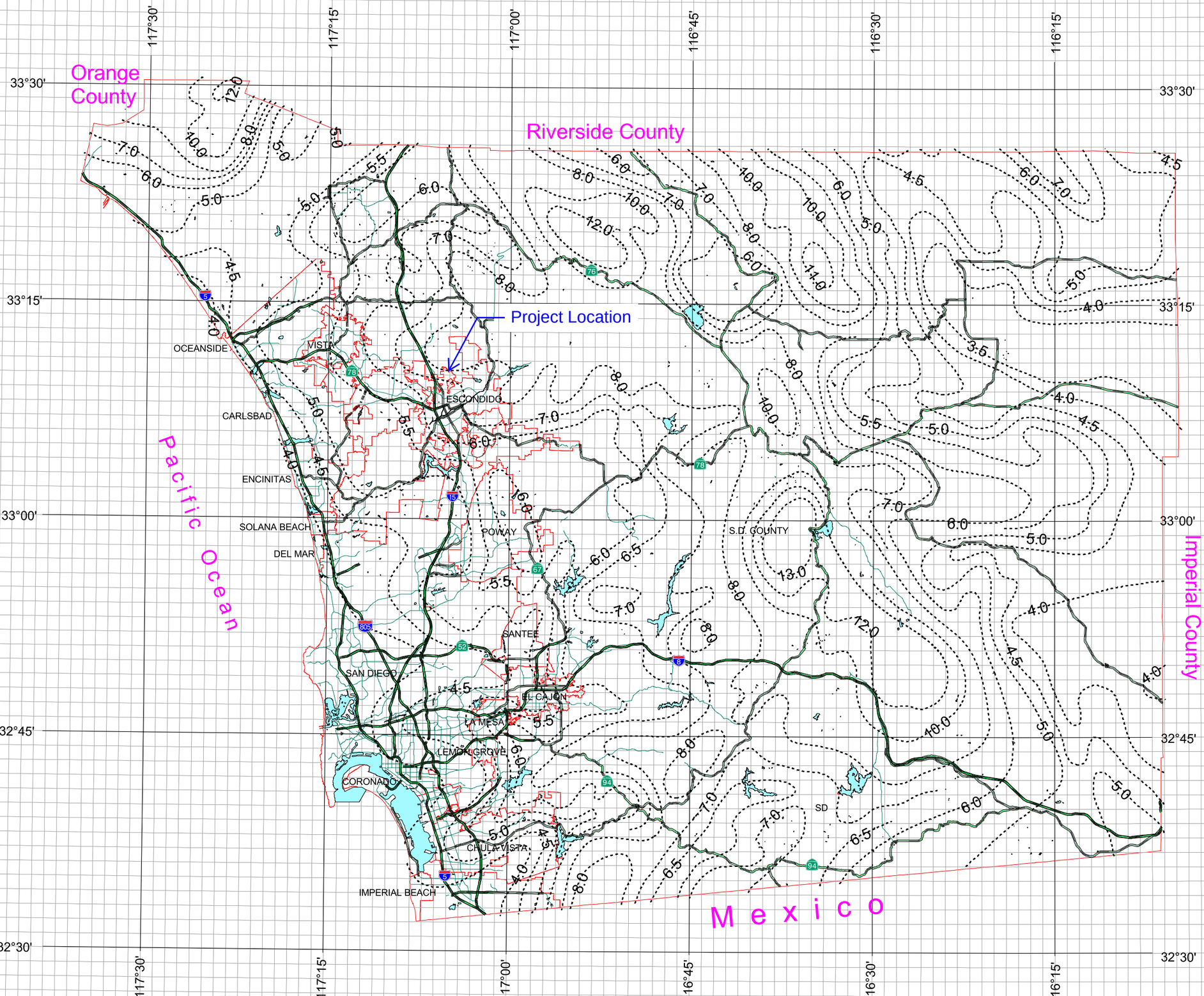
County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)

P100 = 8.0 INCHES



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APPENDIX D

EXISTING CONDITION HYDROLOGY CALCULATIONS

```
 ************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2011 Advanced Engineering Software (aes)
              Ver. 18.0 Release Date: 07/01/2011  License ID 1499

                              Analysis prepared by:

                          Kimley-Horn and Associates, Inc.
                                 765 The City Drive
                                     Suite 200
                                  Orange, CA 92868

 ************************** DESCRIPTION OF STUDY **************************
* JOHN MASSON PARK PROJECT - EXISTIN 5 YEAR ANALYSIS                      *
* BY SANAM WARSI                                                          *
* OCTOBER 9, 2024                                                         *
 ************************************************************************

  FILE NAME: EX5.DAT
  TIME/DATE OF STUDY: 17:55 10/10/2024
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =   5.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.000
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1196.00
  DOWNSTREAM ELEVATION(FEET) =   1076.00
  ELEVATION DIFFERENCE(FEET) =    120.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.520
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
     5 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.050
  SUBAREA RUNOFF(CFS) =      0.16
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1076.00  DOWNSTREAM(FEET) =    767.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   590.00   CHANNEL SLOPE =  0.5222
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
     5 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.228
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.64
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.10
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   3.17
  Tc(MIN.) =   10.69
  SUBAREA AREA(ACRES) =     4.48       SUBAREA RUNOFF(CFS) =    2.89
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        4.7         PEAK FLOW RATE(CFS) =       3.02

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   4.14
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     690.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     5 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.228
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
  SUBAREA AREA(ACRES) =    4.48   SUBAREA RUNOFF(CFS) =    2.89
  TOTAL AREA(ACRES) =        9.2   TOTAL RUNOFF(CFS) =       5.91
  TC(MIN.) =   10.69

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  39
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    767.90
  DOWNSTREAM ELEVATION(FEET) =    764.77
  ELEVATION DIFFERENCE(FEET) =      3.13
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =   11.075
     5 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.155
  SUBAREA RUNOFF(CFS) =      0.13
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.13

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  51
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    764.77  DOWNSTREAM(FEET) =    759.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   427.00   CHANNEL SLOPE =  0.0133
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
     5 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.959
  LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  39
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.33
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.59
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =  12.12
  Tc(MIN.) =   23.19
  SUBAREA AREA(ACRES) =     1.04       SUBAREA RUNOFF(CFS) =    0.41
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        1.2         PEAK FLOW RATE(CFS) =       0.49

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   0.66
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     527.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     5 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.959
  LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  39
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
  SUBAREA AREA(ACRES) =    1.04   SUBAREA RUNOFF(CFS) =    0.41
  TOTAL AREA(ACRES) =        2.3   TOTAL RUNOFF(CFS) =       0.89
  TC(MIN.) =   23.19

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1156.00
  DOWNSTREAM ELEVATION(FEET) =   1076.00
  ELEVATION DIFFERENCE(FEET) =     80.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.520
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
     5 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.050
  SUBAREA RUNOFF(CFS) =      0.16
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1076.00  DOWNSTREAM(FEET) =    769.62
```

```
 CHANNEL LENGTH THRU SUBAREA(FEET) =   567.00   CHANNEL SLOPE =  0.5404
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
    5 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.014
 CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  31
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.54
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.16
 AVERAGE FLOW DEPTH(FEET) =   0.01   TRAVEL TIME(MIN.) =   4.37
 Tc(MIN.) =   11.89
 SUBAREA AREA(ACRES) =     1.31       SUBAREA RUNOFF(CFS) =    0.79
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
 TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       0.91

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.02   FLOW VELOCITY(FEET/SEC.) =   2.47
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     667.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    302.00 TO NODE    302.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    5 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.014
 CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  31
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
 SUBAREA AREA(ACRES) =    1.31   SUBAREA RUNOFF(CFS) =    0.79
 TOTAL AREA(ACRES) =        2.8   TOTAL RUNOFF(CFS) =       1.70
 TC(MIN.) =   11.89

****************************************************************************
 FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  39
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    769.62
 DOWNSTREAM ELEVATION(FEET) =    765.80
 ELEVATION DIFFERENCE(FEET) =      3.82
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.364
    5 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.293
 SUBAREA RUNOFF(CFS) =      0.13
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.13

****************************************************************************
 FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    765.80  DOWNSTREAM(FEET) =    758.90
 CHANNEL LENGTH THRU SUBAREA(FEET) =   667.00   CHANNEL SLOPE =  0.0103
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
    5 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.617
 LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
```

```
 S.C.S. CURVE NUMBER (AMC II) =  39
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.30
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.53
 AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =  20.86
 Tc(MIN.) =   31.23
 SUBAREA AREA(ACRES) =     1.04       SUBAREA RUNOFF(CFS) =    0.34
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
 TOTAL AREA(ACRES) =        1.2         PEAK FLOW RATE(CFS) =       0.40

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   0.55
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =     767.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    5 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.617
 LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  39
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
 SUBAREA AREA(ACRES) =    1.04   SUBAREA RUNOFF(CFS) =    0.34
 TOTAL AREA(ACRES) =        2.3   TOTAL RUNOFF(CFS) =       0.74
 TC(MIN.) =   31.23
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        2.3  TC(MIN.) =     31.23
 PEAK FLOW RATE(CFS)   =       0.74
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2011 Advanced Engineering Software (aes)
             Ver. 18.0 Release Date: 07/01/2011  License ID 1499

                           Analysis prepared by:

                      Kimley-Horn and Associates, Inc.
                             765 The City Drive
                                 Suite 200
                              Orange, CA 92868

 ************************** DESCRIPTION OF STUDY **************************
* JOHN MASSON PARK PROJECT - EXISTING 10 YEAR ANALYSIS                     *
* BY SANAM WARSI                                                           *
* OCTOBER 9, 2024                                                          *
 **************************************************************************

  FILE NAME: EX10.DAT
  TIME/DATE OF STUDY: 18:21 10/10/2024
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =  10.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.410
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  DESERT SHRUB POOR COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  63
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1196.00
  DOWNSTREAM ELEVATION(FEET) =   1076.00
  ELEVATION DIFFERENCE(FEET) =    120.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.520
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.880
  SUBAREA RUNOFF(CFS) =      0.20
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.20

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1076.00  DOWNSTREAM(FEET) =    767.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   590.00   CHANNEL SLOPE =  0.5222
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.971
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.97
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.47
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   2.83
  Tc(MIN.) =   10.35
  SUBAREA AREA(ACRES) =     4.48       SUBAREA RUNOFF(CFS) =    3.56
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        4.7         PEAK FLOW RATE(CFS) =       3.72

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   4.15
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     690.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.971
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
  SUBAREA AREA(ACRES) =    4.48   SUBAREA RUNOFF(CFS) =    3.56
  TOTAL AREA(ACRES) =        9.2   TOTAL RUNOFF(CFS) =       7.27
  TC(MIN.) =   10.35

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  39
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    767.90
  DOWNSTREAM ELEVATION(FEET) =    764.77
  ELEVATION DIFFERENCE(FEET) =      3.13
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =   11.075
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.802
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.15

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  51
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    764.77  DOWNSTREAM(FEET) =    759.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   427.00   CHANNEL SLOPE =  0.0133
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.359
  LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  39
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.40
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.59
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =  12.13
  Tc(MIN.) =   23.21
  SUBAREA AREA(ACRES) =     1.04       SUBAREA RUNOFF(CFS) =    0.49
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        1.2         PEAK FLOW RATE(CFS) =       0.59

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   0.69
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     527.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.359
  LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  39
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
  SUBAREA AREA(ACRES) =    1.04   SUBAREA RUNOFF(CFS) =    0.49
  TOTAL AREA(ACRES) =        2.3   TOTAL RUNOFF(CFS) =       1.08
  TC(MIN.) =   23.21

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1156.00
  DOWNSTREAM ELEVATION(FEET) =   1076.00
  ELEVATION DIFFERENCE(FEET) =     80.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.520
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.880
  SUBAREA RUNOFF(CFS) =      0.20
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.20

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1076.00  DOWNSTREAM(FEET) =    769.62
```

```
 CHANNEL LENGTH THRU SUBAREA(FEET) =   567.00   CHANNEL SLOPE =  0.5404
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.812
 CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  31
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.68
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.69
 AVERAGE FLOW DEPTH(FEET) =   0.01   TRAVEL TIME(MIN.) =   3.51
 Tc(MIN.) =   11.03
 SUBAREA AREA(ACRES) =     1.31       SUBAREA RUNOFF(CFS) =    1.00
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
 TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       1.15

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.02   FLOW VELOCITY(FEET/SEC.) =   2.82
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     667.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    302.00 TO NODE    302.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.812
 DESERT SHRUB POOR COVER RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  63
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
 SUBAREA AREA(ACRES) =    1.31   SUBAREA RUNOFF(CFS) =    1.00
 TOTAL AREA(ACRES) =        2.8   TOTAL RUNOFF(CFS) =       2.15
 TC(MIN.) =   11.03

****************************************************************************
 FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  39
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    769.62
 DOWNSTREAM ELEVATION(FEET) =    765.80
 ELEVATION DIFFERENCE(FEET) =      3.82
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.364
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.968
 SUBAREA RUNOFF(CFS) =      0.16
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
 FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    765.80  DOWNSTREAM(FEET) =    758.90
 CHANNEL LENGTH THRU SUBAREA(FEET) =   667.00   CHANNEL SLOPE =  0.0103
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.922
 LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
```

```
 S.C.S. CURVE NUMBER (AMC II) =  39
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.38
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.52
 AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =  21.53
 Tc(MIN.) =   31.90
 SUBAREA AREA(ACRES) =     1.04       SUBAREA RUNOFF(CFS) =    0.40
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
 TOTAL AREA(ACRES) =        1.2         PEAK FLOW RATE(CFS) =       0.48

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   0.56
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =     767.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.922
 LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  39
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
 SUBAREA AREA(ACRES) =    1.04   SUBAREA RUNOFF(CFS) =    0.40
 TOTAL AREA(ACRES) =        2.3   TOTAL RUNOFF(CFS) =       0.88
 TC(MIN.) =   31.90
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        2.3  TC(MIN.) =     31.90
 PEAK FLOW RATE(CFS)   =       0.88
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2011 Advanced Engineering Software (aes)
              Ver. 18.0 Release Date: 07/01/2011  License ID 1499

                              Analysis prepared by:

                          Kimley-Horn and Associates, Inc.
                                 765 The City Drive
                                     Suite 200
                                  Orange, CA 92868

 ************************* DESCRIPTION OF STUDY *************************
* JOHN MASSON PARK PROJECT - EXISTING 25 YEAR ANALYSIS                  *
* BY SANAM WARSI                                                        *
* OCTOBER 9, 2024                                                       *
 ************************************************************************

  FILE NAME: EX25.DAT
  TIME/DATE OF STUDY: 18:30 10/10/2024
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =  25.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.820
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1196.00
  DOWNSTREAM ELEVATION(FEET) =   1076.00
  ELEVATION DIFFERENCE(FEET) =    120.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.520
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.710
  SUBAREA RUNOFF(CFS) =      0.23
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.23

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1076.00  DOWNSTREAM(FEET) =    767.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   590.00   CHANNEL SLOPE =  0.5222
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.629
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.34
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.40
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   2.89
  Tc(MIN.) =   10.41
  SUBAREA AREA(ACRES) =     4.48       SUBAREA RUNOFF(CFS) =    4.15
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        4.7         PEAK FLOW RATE(CFS) =       4.33

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.05   FLOW VELOCITY(FEET/SEC.) =   4.25
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     690.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.629
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
  SUBAREA AREA(ACRES) =    4.48   SUBAREA RUNOFF(CFS) =    4.15
  TOTAL AREA(ACRES) =        9.2   TOTAL RUNOFF(CFS) =       8.48
  TC(MIN.) =   10.41

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  39
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    767.90
  DOWNSTREAM ELEVATION(FEET) =    764.77
  ELEVATION DIFFERENCE(FEET) =      3.13
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =   11.075
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.449
  SUBAREA RUNOFF(CFS) =      0.18
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.18

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  51
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    764.77  DOWNSTREAM(FEET) =    759.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   427.00   CHANNEL SLOPE =  0.0133
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.873
  LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  39
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.48
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.66
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =  10.74
  Tc(MIN.) =   21.82
  SUBAREA AREA(ACRES) =     1.04       SUBAREA RUNOFF(CFS) =    0.60
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        1.2         PEAK FLOW RATE(CFS) =       0.71

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.05   FLOW VELOCITY(FEET/SEC.) =   0.70
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     527.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.873
  LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  39
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
  SUBAREA AREA(ACRES) =    1.04   SUBAREA RUNOFF(CFS) =    0.60
  TOTAL AREA(ACRES) =        2.3   TOTAL RUNOFF(CFS) =       1.31
  TC(MIN.) =   21.82

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1156.00
  DOWNSTREAM ELEVATION(FEET) =   1076.00
  ELEVATION DIFFERENCE(FEET) =     80.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.520
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.710
  SUBAREA RUNOFF(CFS) =      0.23
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.23

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1076.00  DOWNSTREAM(FEET) =    769.62
```

```
 CHANNEL LENGTH THRU SUBAREA(FEET) =   567.00   CHANNEL SLOPE =  0.5404
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.265
 CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  31
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.81
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.20
 AVERAGE FLOW DEPTH(FEET) =   0.02   TRAVEL TIME(MIN.) =   4.30
 Tc(MIN.) =   11.82
 SUBAREA AREA(ACRES) =     1.31       SUBAREA RUNOFF(CFS) =    1.12
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
 TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       1.29

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.02   FLOW VELOCITY(FEET/SEC.) =   3.15
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     667.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    302.00 TO NODE    302.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.265
 CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  31
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
 SUBAREA AREA(ACRES) =    1.31   SUBAREA RUNOFF(CFS) =    1.12
 TOTAL AREA(ACRES) =        2.8   TOTAL RUNOFF(CFS) =       2.41
 TC(MIN.) =   11.82

****************************************************************************
 FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  39
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    769.62
 DOWNSTREAM ELEVATION(FEET) =    765.80
 ELEVATION DIFFERENCE(FEET) =      3.82
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.364
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.643
 SUBAREA RUNOFF(CFS) =      0.19
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.19

****************************************************************************
 FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    765.80  DOWNSTREAM(FEET) =    758.90
 CHANNEL LENGTH THRU SUBAREA(FEET) =   667.00   CHANNEL SLOPE =  0.0103
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.256
 LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
```

```
 S.C.S. CURVE NUMBER (AMC II) =  39
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.44
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.52
 AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =  21.37
 Tc(MIN.) =   31.73
 SUBAREA AREA(ACRES) =     1.04       SUBAREA RUNOFF(CFS) =    0.47
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
 TOTAL AREA(ACRES) =        1.2         PEAK FLOW RATE(CFS) =       0.56

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   0.63
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =     767.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.256
 LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  39
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
 SUBAREA AREA(ACRES) =    1.04   SUBAREA RUNOFF(CFS) =    0.47
 TOTAL AREA(ACRES) =        2.3   TOTAL RUNOFF(CFS) =       1.03
 TC(MIN.) =   31.73
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        2.3  TC(MIN.) =     31.73
 PEAK FLOW RATE(CFS)   =       1.03
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2011 Advanced Engineering Software (aes)
              Ver. 18.0 Release Date: 07/01/2011  License ID 1499

                              Analysis prepared by:

                          Kimley-Horn and Associates, Inc.
                                765 The City Drive
                                     Suite 200
                                  Orange, CA 92868

 ************************* DESCRIPTION OF STUDY *************************
* JOHN MASSON PARK PROJECT - EXISTING 50 YEAR ANALYSIS                  *
* BY SANAM WARSI                                                        *
* OCTOBER 9, 2024                                                       *
 ************************************************************************

  FILE NAME: EX50.DAT
  TIME/DATE OF STUDY: 06:15 10/11/2024
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =  50.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.020
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1196.00
  DOWNSTREAM ELEVATION(FEET) =   1076.00
  ELEVATION DIFFERENCE(FEET) =    120.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.520
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.115
  SUBAREA RUNOFF(CFS) =      0.24
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.24

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1076.00  DOWNSTREAM(FEET) =    767.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   590.00   CHANNEL SLOPE =  0.5222
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.025
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.53
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.67
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   2.68
  Tc(MIN.) =   10.20
  SUBAREA AREA(ACRES) =     4.48       SUBAREA RUNOFF(CFS) =    4.50
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        4.7         PEAK FLOW RATE(CFS) =       4.70

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.05   FLOW VELOCITY(FEET/SEC.) =   4.61
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     690.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.025
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
  SUBAREA AREA(ACRES) =    4.48   SUBAREA RUNOFF(CFS) =    4.50
  TOTAL AREA(ACRES) =        9.2   TOTAL RUNOFF(CFS) =       9.21
  TC(MIN.) =   10.20

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  39
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    767.90
  DOWNSTREAM ELEVATION(FEET) =    764.77
  ELEVATION DIFFERENCE(FEET) =      3.13
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =   11.075
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.764
  SUBAREA RUNOFF(CFS) =      0.19
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.19

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  51
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    764.77  DOWNSTREAM(FEET) =    759.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   427.00   CHANNEL SLOPE =  0.0133
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.978
  LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  39
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.51
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.60
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =  11.87
  Tc(MIN.) =   22.94
  SUBAREA AREA(ACRES) =     1.04       SUBAREA RUNOFF(CFS) =    0.62
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        1.2         PEAK FLOW RATE(CFS) =       0.74

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.05   FLOW VELOCITY(FEET/SEC.) =   0.72
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     527.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.978
  LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  39
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
  SUBAREA AREA(ACRES) =    1.04   SUBAREA RUNOFF(CFS) =    0.62
  TOTAL AREA(ACRES) =        2.3   TOTAL RUNOFF(CFS) =       1.36
  TC(MIN.) =   22.94

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1156.00
  DOWNSTREAM ELEVATION(FEET) =   1076.00
  ELEVATION DIFFERENCE(FEET) =     80.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.520
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.115
  SUBAREA RUNOFF(CFS) =      0.24
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.24

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1076.00  DOWNSTREAM(FEET) =    769.62
```

```
 CHANNEL LENGTH THRU SUBAREA(FEET) =   567.00   CHANNEL SLOPE =  0.5404
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.635
 CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  31
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.86
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.34
 AVERAGE FLOW DEPTH(FEET) =   0.02   TRAVEL TIME(MIN.) =   4.04
 Tc(MIN.) =   11.56
 SUBAREA AREA(ACRES) =     1.31       SUBAREA RUNOFF(CFS) =    1.21
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
 TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       1.40

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.03   FLOW VELOCITY(FEET/SEC.) =   2.65
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     667.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    302.00 TO NODE    302.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.635
 CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  31
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
 SUBAREA AREA(ACRES) =    1.31   SUBAREA RUNOFF(CFS) =    1.21
 TOTAL AREA(ACRES) =        2.8   TOTAL RUNOFF(CFS) =       2.61
 TC(MIN.) =   11.56

****************************************************************************
 FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  39
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    769.62
 DOWNSTREAM ELEVATION(FEET) =    765.80
 ELEVATION DIFFERENCE(FEET) =      3.82
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.364
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.972
 SUBAREA RUNOFF(CFS) =      0.20
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.20

****************************************************************************
 FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    765.80  DOWNSTREAM(FEET) =    758.90
 CHANNEL LENGTH THRU SUBAREA(FEET) =   667.00   CHANNEL SLOPE =  0.0103
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.495
 LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
```

```
  S.C.S. CURVE NUMBER (AMC II) =  39
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.48
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.56
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =  19.83
  Tc(MIN.) =   30.19
  SUBAREA AREA(ACRES) =     1.04       SUBAREA RUNOFF(CFS) =    0.52
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        1.2         PEAK FLOW RATE(CFS) =       0.62

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.05   FLOW VELOCITY(FEET/SEC.) =   0.61
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =     767.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.495
  LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  39
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
  SUBAREA AREA(ACRES) =    1.04   SUBAREA RUNOFF(CFS) =    0.52
  TOTAL AREA(ACRES) =        2.3   TOTAL RUNOFF(CFS) =       1.14
  TC(MIN.) =   30.19
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.3  TC(MIN.) =     30.19
  PEAK FLOW RATE(CFS)   =       1.14
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
____________________________________________________________________________
****************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2011 Advanced Engineering Software (aes)
             Ver. 18.0 Release Date: 07/01/2011  License ID 1499

                           Analysis prepared by:

                      Kimley-Horn and Associates, Inc.
                             765 The City Drive
                                 Suite 200
                              Orange, CA 92868

 ************************** DESCRIPTION OF STUDY **************************
* JOHN MASSON PARK PROJECT - EXISTING 100 YEAR ANALYSIS                    *
* BY SANAM WARSI                                                           *
* OCTOBER 09,2024                                                          *
 ***************************************************************************

  FILE NAME: EX100.DAT
  TIME/DATE OF STUDY: 06:29 10/11/2024
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1196.00
  DOWNSTREAM ELEVATION(FEET) =   1076.00
  ELEVATION DIFFERENCE(FEET) =    120.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.520
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.290
 SUBAREA RUNOFF(CFS) =      0.29
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.29

****************************************************************************
 FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1076.00  DOWNSTREAM(FEET) =    767.90
 CHANNEL LENGTH THRU SUBAREA(FEET) =   590.00   CHANNEL SLOPE =  0.5222
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.109
 CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  31
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.03
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.15
 AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   2.37
 Tc(MIN.) =    9.89
 SUBAREA AREA(ACRES) =     4.48       SUBAREA RUNOFF(CFS) =    5.47
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
 TOTAL AREA(ACRES) =        4.7         PEAK FLOW RATE(CFS) =       5.72

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   4.81
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     690.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.109
 CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  31
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
 SUBAREA AREA(ACRES) =    4.48   SUBAREA RUNOFF(CFS) =    5.47
 TOTAL AREA(ACRES) =        9.2   TOTAL RUNOFF(CFS) =      11.19
 TC(MIN.) =    9.89

****************************************************************************
 FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  39
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    767.90
 DOWNSTREAM ELEVATION(FEET) =    764.77
 ELEVATION DIFFERENCE(FEET) =      3.13
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =   11.075
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.679
 SUBAREA RUNOFF(CFS) =      0.23
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.23

****************************************************************************
 FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  51
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    764.77  DOWNSTREAM(FEET) =    759.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   427.00   CHANNEL SLOPE =  0.0133
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.731
  LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  39
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.63
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.70
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =  10.17
  Tc(MIN.) =   21.24
  SUBAREA AREA(ACRES) =     1.04       SUBAREA RUNOFF(CFS) =    0.78
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        1.2         PEAK FLOW RATE(CFS) =       0.93

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   0.78
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     527.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.731
  LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  39
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
  SUBAREA AREA(ACRES) =    1.04   SUBAREA RUNOFF(CFS) =    0.78
  TOTAL AREA(ACRES) =        2.3   TOTAL RUNOFF(CFS) =       1.70
  TC(MIN.) =   21.24

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1156.00
  DOWNSTREAM ELEVATION(FEET) =   1076.00
  ELEVATION DIFFERENCE(FEET) =     80.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.520
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.290
  SUBAREA RUNOFF(CFS) =      0.29
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.29

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1076.00  DOWNSTREAM(FEET) =    769.62
```

```
 CHANNEL LENGTH THRU SUBAREA(FEET) =   567.00   CHANNEL SLOPE =  0.5404
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.646
 CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  31
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.06
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.58
 AVERAGE FLOW DEPTH(FEET) =   0.02   TRAVEL TIME(MIN.) =   3.66
 Tc(MIN.) =   11.18
 SUBAREA AREA(ACRES) =     1.31       SUBAREA RUNOFF(CFS) =    1.48
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
 TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       1.71

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.03   FLOW VELOCITY(FEET/SEC.) =   3.23
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     667.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    302.00 TO NODE    302.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.646
 CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  31
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
 SUBAREA AREA(ACRES) =    1.31   SUBAREA RUNOFF(CFS) =    1.48
 TOTAL AREA(ACRES) =        2.8   TOTAL RUNOFF(CFS) =       3.18
 TC(MIN.) =   11.18

****************************************************************************
 FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  39
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    769.62
 DOWNSTREAM ELEVATION(FEET) =    765.80
 ELEVATION DIFFERENCE(FEET) =      3.82
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.364
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.927
 SUBAREA RUNOFF(CFS) =      0.24
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.24

****************************************************************************
 FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    765.80  DOWNSTREAM(FEET) =    758.90
 CHANNEL LENGTH THRU SUBAREA(FEET) =   667.00   CHANNEL SLOPE =  0.0103
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.155
 LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
```

```
 S.C.S. CURVE NUMBER (AMC II) =  39
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.58
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.65
 AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =  17.19
 Tc(MIN.) =   27.55
 SUBAREA AREA(ACRES) =     1.04       SUBAREA RUNOFF(CFS) =    0.66
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
 TOTAL AREA(ACRES) =        1.2         PEAK FLOW RATE(CFS) =       0.78

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   0.66
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =     767.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.155
 LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  39
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
 SUBAREA AREA(ACRES) =    1.04   SUBAREA RUNOFF(CFS) =    0.66
 TOTAL AREA(ACRES) =        2.3   TOTAL RUNOFF(CFS) =       1.44
 TC(MIN.) =   27.55
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        2.3  TC(MIN.) =     27.55
 PEAK FLOW RATE(CFS)   =       1.44
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

APPENDIX E

PROPOSED CONDITION HYDROLOGY CALCULATIONS

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2016 Advanced Engineering Software (aes)
              Ver. 23.0 Release Date: 07/01/2016  License ID 1499

                              Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* JOHN MASSON PARK PROJECT - PROPOSED 5 YEAR ANALYSIS                    *
* BY SANAM WARSI                                                         *
* OCTOBER 9,2024                                                         *
 ************************************************************************

  FILE NAME: PROP5.DAT
  TIME/DATE OF STUDY: 17:44 10/17/2024
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =   5.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.000
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1196.00
  DOWNSTREAM ELEVATION(FEET) =   1076.00
  ELEVATION DIFFERENCE(FEET) =    120.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.520
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
    5 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.050
  SUBAREA RUNOFF(CFS) =      0.16
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1076.00  DOWNSTREAM(FEET) =    767.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   590.00   CHANNEL SLOPE =  0.5222
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
    5 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.228
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.64
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.10
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   3.17
  Tc(MIN.) =   10.69
  SUBAREA AREA(ACRES) =     4.48       SUBAREA RUNOFF(CFS) =    2.89
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        4.7         PEAK FLOW RATE(CFS) =       3.02

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   4.14
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     690.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    5 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.228
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
  SUBAREA AREA(ACRES) =    4.48   SUBAREA RUNOFF(CFS) =    2.89
  TOTAL AREA(ACRES) =        9.2   TOTAL RUNOFF(CFS) =       5.91
  TC(MIN.) =   10.69

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  63
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    767.90
  DOWNSTREAM ELEVATION(FEET) =    764.51
  ELEVATION DIFFERENCE(FEET) =      3.39
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.784
    5 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.210
  SUBAREA RUNOFF(CFS) =      0.13
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.13

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  51
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    764.51  DOWNSTREAM(FEET) =    759.34
  CHANNEL LENGTH THRU SUBAREA(FEET) =   456.00   CHANNEL SLOPE =  0.0113
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
     5 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.842
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  63
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.29
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.52
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =  14.73
  Tc(MIN.) =   25.52
  SUBAREA AREA(ACRES) =     0.87       SUBAREA RUNOFF(CFS) =    0.32
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       0.39

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   0.54
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     556.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     5 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.842
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  63
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
  SUBAREA AREA(ACRES) =    0.87   SUBAREA RUNOFF(CFS) =    0.32
  TOTAL AREA(ACRES) =        1.9   TOTAL RUNOFF(CFS) =       0.71
  TC(MIN.) =   25.52

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1156.00
  DOWNSTREAM ELEVATION(FEET) =   1076.00
  ELEVATION DIFFERENCE(FEET) =     80.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.520
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
     5 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.050
  SUBAREA RUNOFF(CFS) =      0.16
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1076.00  DOWNSTREAM(FEET) =    770.39
```

```
 CHANNEL LENGTH THRU SUBAREA(FEET) =   576.00   CHANNEL SLOPE =  0.5306
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
    5 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.001
 CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  31
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.54
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.16
 AVERAGE FLOW DEPTH(FEET) =   0.01   TRAVEL TIME(MIN.) =   4.45
 Tc(MIN.) =   11.97
 SUBAREA AREA(ACRES) =     1.31       SUBAREA RUNOFF(CFS) =    0.79
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
 TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       0.91

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.02   FLOW VELOCITY(FEET/SEC.) =   2.46
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     676.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    302.00 TO NODE    302.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    5 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.001
 CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  31
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
 SUBAREA AREA(ACRES) =    1.31   SUBAREA RUNOFF(CFS) =    0.79
 TOTAL AREA(ACRES) =        2.8   TOTAL RUNOFF(CFS) =       1.69
 TC(MIN.) =   11.97

****************************************************************************
 FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .3400
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  51
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    769.60
 DOWNSTREAM ELEVATION(FEET) =    765.11
 ELEVATION DIFFERENCE(FEET) =      4.49
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.293
    5 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.802
 SUBAREA RUNOFF(CFS) =      0.26
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.26

****************************************************************************
 FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    765.11  DOWNSTREAM(FEET) =    759.34
 CHANNEL LENGTH THRU SUBAREA(FEET) =   526.00   CHANNEL SLOPE =  0.0110
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
    5 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.090
 RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .3400
 SOIL CLASSIFICATION IS "A"
```

```
  S.C.S. CURVE NUMBER (AMC II) =  51
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.71
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.69
  AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =  12.68
  Tc(MIN.) =   20.97
  SUBAREA AREA(ACRES) =     1.21       SUBAREA RUNOFF(CFS) =    0.86
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.340
  TOTAL AREA(ACRES) =        1.4         PEAK FLOW RATE(CFS) =       1.00

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   0.81
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =     626.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     5 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.090
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .3400
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  51
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3400
  SUBAREA AREA(ACRES) =    1.21   SUBAREA RUNOFF(CFS) =    0.86
  TOTAL AREA(ACRES) =        2.6   TOTAL RUNOFF(CFS) =       1.86
  TC(MIN.) =   20.97
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.6  TC(MIN.) =     20.97
  PEAK FLOW RATE(CFS)   =       1.86
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
____________________________________________________________________________
****************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2016 Advanced Engineering Software (aes)
             Ver. 23.0 Release Date: 07/01/2016  License ID 1499

                           Analysis prepared by:




 ************************** DESCRIPTION OF STUDY **************************
* JOHN MASSON PARK PROJECT - PROPOSED 10 YEAR ANALYSIS                     *
* BY SANAM WARSI                                                           *
* OCTOBER 9, 2024                                                          *
 **************************************************************************

  FILE NAME: PROP10.DAT
  TIME/DATE OF STUDY: 18:03 10/17/2024
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =  10.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.410
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1196.00
  DOWNSTREAM ELEVATION(FEET) =   1076.00
  ELEVATION DIFFERENCE(FEET) =    120.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.520
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.880
  SUBAREA RUNOFF(CFS) =      0.20
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.20

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1076.00  DOWNSTREAM(FEET) =    767.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   590.00   CHANNEL SLOPE =  0.5222
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.971
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.97
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.47
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   2.83
  Tc(MIN.) =   10.35
  SUBAREA AREA(ACRES) =     4.48       SUBAREA RUNOFF(CFS) =    3.56
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        4.7         PEAK FLOW RATE(CFS) =       3.72

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   4.15
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     690.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.971
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
  SUBAREA AREA(ACRES) =    4.48   SUBAREA RUNOFF(CFS) =    3.56
  TOTAL AREA(ACRES) =        9.2   TOTAL RUNOFF(CFS) =       7.27
  TC(MIN.) =   10.35

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  63
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    767.90
  DOWNSTREAM ELEVATION(FEET) =    764.51
  ELEVATION DIFFERENCE(FEET) =      3.39
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.784
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.868
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.15

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  51
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    764.51  DOWNSTREAM(FEET) =    759.34
  CHANNEL LENGTH THRU SUBAREA(FEET) =   456.00   CHANNEL SLOPE =  0.0113
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.218
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  63
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.36
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.52
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =  14.74
  Tc(MIN.) =   25.53
  SUBAREA AREA(ACRES) =     0.87       SUBAREA RUNOFF(CFS) =    0.39
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       0.47

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   0.56
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     556.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.218
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  63
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
  SUBAREA AREA(ACRES) =    0.87   SUBAREA RUNOFF(CFS) =    0.39
  TOTAL AREA(ACRES) =        1.9   TOTAL RUNOFF(CFS) =       0.86
  TC(MIN.) =   25.53

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1156.00
  DOWNSTREAM ELEVATION(FEET) =   1076.00
  ELEVATION DIFFERENCE(FEET) =     80.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.520
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.880
  SUBAREA RUNOFF(CFS) =      0.20
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.20

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1076.00  DOWNSTREAM(FEET) =    770.39
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   576.00   CHANNEL SLOPE =  0.5306
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.798
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.67
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.69
  AVERAGE FLOW DEPTH(FEET) =   0.01   TRAVEL TIME(MIN.) =   3.57
  Tc(MIN.) =   11.09
  SUBAREA AREA(ACRES) =     1.31       SUBAREA RUNOFF(CFS) =    0.99
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       1.15

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.02   FLOW VELOCITY(FEET/SEC.) =   2.81
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     676.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    302.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.798
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
  SUBAREA AREA(ACRES) =    1.31   SUBAREA RUNOFF(CFS) =    0.99
  TOTAL AREA(ACRES) =        2.8   TOTAL RUNOFF(CFS) =       2.14
  TC(MIN.) =   11.09

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .3400
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  51
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    769.60
  DOWNSTREAM ELEVATION(FEET) =    765.11
  ELEVATION DIFFERENCE(FEET) =      4.49
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.293
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.582
  SUBAREA RUNOFF(CFS) =      0.31
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.31

****************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    765.11  DOWNSTREAM(FEET) =    759.34
  CHANNEL LENGTH THRU SUBAREA(FEET) =   526.00   CHANNEL SLOPE =  0.0110
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.567
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .3400
  SOIL CLASSIFICATION IS "A"
```

```
  S.C.S. CURVE NUMBER (AMC II) =  51
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.86
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.73
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =  12.07
  Tc(MIN.) =   20.36
  SUBAREA AREA(ACRES) =     1.21       SUBAREA RUNOFF(CFS) =    1.06
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.340
  TOTAL AREA(ACRES) =        1.4         PEAK FLOW RATE(CFS) =       1.23

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.07   FLOW VELOCITY(FEET/SEC.) =   0.80
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =     626.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.567
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .3400
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  51
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3400
  SUBAREA AREA(ACRES) =    1.21   SUBAREA RUNOFF(CFS) =    1.06
  TOTAL AREA(ACRES) =        2.6   TOTAL RUNOFF(CFS) =       2.29
  TC(MIN.) =   20.36
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.6  TC(MIN.) =     20.36
  PEAK FLOW RATE(CFS)   =       2.29
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
____________________________________________________________________________
****************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2016 Advanced Engineering Software (aes)
             Ver. 23.0 Release Date: 07/01/2016  License ID 1499

                           Analysis prepared by:




 ************************** DESCRIPTION OF STUDY **************************
* JOHN MASSON PARK PROJECT - PROPOSED 25 YEAR ANALYSIS                     *
* BY SANAM WARSI                                                           *
* OCTOBER 9, 2024                                                          *
 **************************************************************************

  FILE NAME: PROP25.DAT
  TIME/DATE OF STUDY: 18:14 10/17/2024
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =  25.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.820
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1196.00
  DOWNSTREAM ELEVATION(FEET) =   1076.00
  ELEVATION DIFFERENCE(FEET) =    120.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.520
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.710
  SUBAREA RUNOFF(CFS) =      0.23
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.23

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1076.00  DOWNSTREAM(FEET) =    767.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   590.00   CHANNEL SLOPE =  0.5222
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.629
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.34
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.40
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   2.89
  Tc(MIN.) =   10.41
  SUBAREA AREA(ACRES) =     4.48       SUBAREA RUNOFF(CFS) =    4.15
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        4.7         PEAK FLOW RATE(CFS) =       4.33

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.05   FLOW VELOCITY(FEET/SEC.) =   4.25
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     690.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.629
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
  SUBAREA AREA(ACRES) =    4.48   SUBAREA RUNOFF(CFS) =    4.15
  TOTAL AREA(ACRES) =        9.2   TOTAL RUNOFF(CFS) =       8.48
  TC(MIN.) =   10.41

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  63
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    767.90
  DOWNSTREAM ELEVATION(FEET) =    764.51
  ELEVATION DIFFERENCE(FEET) =      3.39
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.784
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.526
  SUBAREA RUNOFF(CFS) =      0.18
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.18

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  51
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    764.51  DOWNSTREAM(FEET) =    759.34
  CHANNEL LENGTH THRU SUBAREA(FEET) =   456.00   CHANNEL SLOPE =  0.0113
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.713
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  63
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.43
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.58
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =  13.06
  Tc(MIN.) =   23.84
  SUBAREA AREA(ACRES) =     0.87       SUBAREA RUNOFF(CFS) =    0.47
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       0.58

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   0.65
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     556.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.713
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  63
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
  SUBAREA AREA(ACRES) =    0.87   SUBAREA RUNOFF(CFS) =    0.47
  TOTAL AREA(ACRES) =        1.9   TOTAL RUNOFF(CFS) =       1.05
  TC(MIN.) =   23.84

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1156.00
  DOWNSTREAM ELEVATION(FEET) =   1076.00
  ELEVATION DIFFERENCE(FEET) =     80.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.520
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.710
  SUBAREA RUNOFF(CFS) =      0.23
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.23

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1076.00  DOWNSTREAM(FEET) =    770.39
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   576.00   CHANNEL SLOPE =  0.5306
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.247
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.81
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.19
  AVERAGE FLOW DEPTH(FEET) =   0.02   TRAVEL TIME(MIN.) =   4.38
  Tc(MIN.) =   11.90
  SUBAREA AREA(ACRES) =     1.31       SUBAREA RUNOFF(CFS) =    1.11
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       1.28

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.02   FLOW VELOCITY(FEET/SEC.) =   3.14
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     676.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    302.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.247
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
  SUBAREA AREA(ACRES) =    1.31   SUBAREA RUNOFF(CFS) =    1.11
  TOTAL AREA(ACRES) =        2.8   TOTAL RUNOFF(CFS) =       2.40
  TC(MIN.) =   11.90

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .3400
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  51
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    769.60
  DOWNSTREAM ELEVATION(FEET) =    765.11
  ELEVATION DIFFERENCE(FEET) =      4.49
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.293
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.361
  SUBAREA RUNOFF(CFS) =      0.36
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.36

****************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    765.11  DOWNSTREAM(FEET) =    759.34
  CHANNEL LENGTH THRU SUBAREA(FEET) =   526.00   CHANNEL SLOPE =  0.0110
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.043
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .3400
  SOIL CLASSIFICATION IS "A"
```

```
  S.C.S. CURVE NUMBER (AMC II) =  51
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.02
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.75
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =  11.66
  Tc(MIN.) =   19.96
  SUBAREA AREA(ACRES) =     1.21       SUBAREA RUNOFF(CFS) =    1.25
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.340
  TOTAL AREA(ACRES) =        1.4         PEAK FLOW RATE(CFS) =       1.46

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.07   FLOW VELOCITY(FEET/SEC.) =   0.93
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =     626.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.043
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .3400
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  51
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3400
  SUBAREA AREA(ACRES) =    1.21   SUBAREA RUNOFF(CFS) =    1.25
  TOTAL AREA(ACRES) =        2.6   TOTAL RUNOFF(CFS) =       2.71
  TC(MIN.) =   19.96
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.6  TC(MIN.) =     19.96
  PEAK FLOW RATE(CFS)   =       2.71
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
 ************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2016 Advanced Engineering Software (aes)
              Ver. 23.0 Release Date: 07/01/2016  License ID 1499

                              Analysis prepared by:
```

```
 ************************** DESCRIPTION OF STUDY ************************
* JOHN MASSON PARK PROJECT - PROPOSED 50 YEAR ANALYSIS                    *
* BY SANAM WARSI                                                          *
* OCTOBER 9, 2024                                                         *
 ************************************************************************

  FILE NAME: PROP550.DAT
  TIME/DATE OF STUDY: 18:20 10/17/2024
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =  50.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.020
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1196.00
  DOWNSTREAM ELEVATION(FEET) =   1076.00
  ELEVATION DIFFERENCE(FEET) =    120.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.520
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.115
  SUBAREA RUNOFF(CFS) =      0.24
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.24

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1076.00  DOWNSTREAM(FEET) =    767.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   590.00   CHANNEL SLOPE =  0.5222
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.025
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.53
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.67
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   2.68
  Tc(MIN.) =   10.20
  SUBAREA AREA(ACRES) =     4.48       SUBAREA RUNOFF(CFS) =    4.50
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        4.7         PEAK FLOW RATE(CFS) =       4.70

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.05   FLOW VELOCITY(FEET/SEC.) =   4.61
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     690.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.025
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
  SUBAREA AREA(ACRES) =    4.48   SUBAREA RUNOFF(CFS) =    4.50
  TOTAL AREA(ACRES) =        9.2   TOTAL RUNOFF(CFS) =       9.21
  TC(MIN.) =   10.20

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  63
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    767.90
  DOWNSTREAM ELEVATION(FEET) =    764.51
  ELEVATION DIFFERENCE(FEET) =      3.39
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.784
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.846
  SUBAREA RUNOFF(CFS) =      0.19
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.19

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  51
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    764.51  DOWNSTREAM(FEET) =    759.34
  CHANNEL LENGTH THRU SUBAREA(FEET) =   456.00   CHANNEL SLOPE =  0.0113
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.989
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  63
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.46
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.63
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =  12.04
  Tc(MIN.) =   22.82
  SUBAREA AREA(ACRES) =     0.87       SUBAREA RUNOFF(CFS) =    0.52
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       0.64

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.05   FLOW VELOCITY(FEET/SEC.) =   0.63
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     556.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.989
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  63
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
  SUBAREA AREA(ACRES) =    0.87   SUBAREA RUNOFF(CFS) =    0.52
  TOTAL AREA(ACRES) =        1.9   TOTAL RUNOFF(CFS) =       1.16
  TC(MIN.) =   22.82

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1156.00
  DOWNSTREAM ELEVATION(FEET) =   1076.00
  ELEVATION DIFFERENCE(FEET) =     80.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.520
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.115
  SUBAREA RUNOFF(CFS) =      0.24
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.24

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1076.00  DOWNSTREAM(FEET) =    770.39
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   576.00   CHANNEL SLOPE =  0.5306
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.616
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.86
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.34
  AVERAGE FLOW DEPTH(FEET) =   0.02   TRAVEL TIME(MIN.) =   4.11
  Tc(MIN.) =   11.63
  SUBAREA AREA(ACRES) =     1.31       SUBAREA RUNOFF(CFS) =    1.21
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       1.39

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.03   FLOW VELOCITY(FEET/SEC.) =   2.64
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     676.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    302.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.616
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
  SUBAREA AREA(ACRES) =    1.31   SUBAREA RUNOFF(CFS) =    1.21
  TOTAL AREA(ACRES) =        2.8   TOTAL RUNOFF(CFS) =       2.60
  TC(MIN.) =   11.63

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .3400
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  51
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    769.60
  DOWNSTREAM ELEVATION(FEET) =    765.11
  ELEVATION DIFFERENCE(FEET) =      4.49
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.293
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.741
  SUBAREA RUNOFF(CFS) =      0.39
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.39

****************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    765.11  DOWNSTREAM(FEET) =    759.34
  CHANNEL LENGTH THRU SUBAREA(FEET) =   526.00   CHANNEL SLOPE =  0.0110
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.362
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .3400
  SOIL CLASSIFICATION IS "A"
```

```
  S.C.S. CURVE NUMBER (AMC II) =  51
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.11
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.82
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =  10.72
  Tc(MIN.) =   19.02
  SUBAREA AREA(ACRES) =     1.21       SUBAREA RUNOFF(CFS) =    1.38
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.340
  TOTAL AREA(ACRES) =        1.4         PEAK FLOW RATE(CFS) =       1.61

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.08   FLOW VELOCITY(FEET/SEC.) =   0.92
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =     626.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.362
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .3400
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  51
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3400
  SUBAREA AREA(ACRES) =    1.21   SUBAREA RUNOFF(CFS) =    1.38
  TOTAL AREA(ACRES) =        2.6   TOTAL RUNOFF(CFS) =       2.99
  TC(MIN.) =   19.02
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.6  TC(MIN.) =     19.02
  PEAK FLOW RATE(CFS)   =       2.99
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
_____________________________________________________________________________
****************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2016 Advanced Engineering Software (aes)
             Ver. 23.0 Release Date: 07/01/2016  License ID 1499

                           Analysis prepared by:




 ************************** DESCRIPTION OF STUDY **************************
* JOHN MASSON PARK PROJECT - PROPOSED 100 YEAR ANALYSIS                    *
* BY SANAM WARSI                                                           *
* OCTOBER 9, 2024                                                          *
 **************************************************************************

  FILE NAME: PROP100.DAT
  TIME/DATE OF STUDY: 17:31 10/17/2024
-----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
-----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
-----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1196.00
  DOWNSTREAM ELEVATION(FEET) =   1076.00
  ELEVATION DIFFERENCE(FEET) =    120.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.520
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.290
 SUBAREA RUNOFF(CFS) =      0.29
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.29

****************************************************************************
 FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1076.00  DOWNSTREAM(FEET) =    767.90
 CHANNEL LENGTH THRU SUBAREA(FEET) =   590.00   CHANNEL SLOPE =  0.5222
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.109
 CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  31
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.03
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.15
 AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   2.37
 Tc(MIN.) =    9.89
 SUBAREA AREA(ACRES) =     4.48       SUBAREA RUNOFF(CFS) =    5.47
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
 TOTAL AREA(ACRES) =        4.7         PEAK FLOW RATE(CFS) =       5.72

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   4.81
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     690.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.109
 CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  31
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
 SUBAREA AREA(ACRES) =    4.48   SUBAREA RUNOFF(CFS) =    5.47
 TOTAL AREA(ACRES) =        9.2   TOTAL RUNOFF(CFS) =      11.19
 TC(MIN.) =    9.89

****************************************************************************
 FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  63
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    767.90
 DOWNSTREAM ELEVATION(FEET) =    764.51
 ELEVATION DIFFERENCE(FEET) =      3.39
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.784
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.777
 SUBAREA RUNOFF(CFS) =      0.23
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.23

****************************************************************************
 FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  51
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    764.51  DOWNSTREAM(FEET) =    759.34
  CHANNEL LENGTH THRU SUBAREA(FEET) =   456.00   CHANNEL SLOPE =  0.0113
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.530
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  63
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.55
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.61
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =  12.36
  Tc(MIN.) =   23.14
  SUBAREA AREA(ACRES) =     0.87       SUBAREA RUNOFF(CFS) =    0.61
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       0.76

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.05   FLOW VELOCITY(FEET/SEC.) =   0.71
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     556.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.530
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  63
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
  SUBAREA AREA(ACRES) =    0.87   SUBAREA RUNOFF(CFS) =    0.61
  TOTAL AREA(ACRES) =        1.9   TOTAL RUNOFF(CFS) =       1.37
  TC(MIN.) =   23.14

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1156.00
  DOWNSTREAM ELEVATION(FEET) =   1076.00
  ELEVATION DIFFERENCE(FEET) =     80.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.520
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.290
  SUBAREA RUNOFF(CFS) =      0.29
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.29

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1076.00  DOWNSTREAM(FEET) =    770.39
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   576.00   CHANNEL SLOPE =  0.5306
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.624
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.05
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.58
  AVERAGE FLOW DEPTH(FEET) =   0.02   TRAVEL TIME(MIN.) =   3.72
  Tc(MIN.) =   11.24
  SUBAREA AREA(ACRES) =     1.31       SUBAREA RUNOFF(CFS) =    1.47
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       1.70

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.03   FLOW VELOCITY(FEET/SEC.) =   3.22
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     676.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    302.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.624
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .2000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  31
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
  SUBAREA AREA(ACRES) =    1.31   SUBAREA RUNOFF(CFS) =    1.47
  TOTAL AREA(ACRES) =        2.8   TOTAL RUNOFF(CFS) =       3.17
  TC(MIN.) =   11.24

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .3400
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  51
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    769.60
  DOWNSTREAM ELEVATION(FEET) =    765.11
  ELEVATION DIFFERENCE(FEET) =      4.49
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.293
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.844
  SUBAREA RUNOFF(CFS) =      0.47
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.47

****************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    765.11  DOWNSTREAM(FEET) =    759.34
  CHANNEL LENGTH THRU SUBAREA(FEET) =   526.00   CHANNEL SLOPE =  0.0110
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.105
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .3400
  SOIL CLASSIFICATION IS "A"
```

```
  S.C.S. CURVE NUMBER (AMC II) =  51
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.34
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.87
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =  10.02
  Tc(MIN.) =   18.32
  SUBAREA AREA(ACRES) =     1.21       SUBAREA RUNOFF(CFS) =    1.69
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.340
  TOTAL AREA(ACRES) =        1.4         PEAK FLOW RATE(CFS) =       1.97

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   1.02
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =     626.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.105
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .3400
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  51
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3400
  SUBAREA AREA(ACRES) =    1.21   SUBAREA RUNOFF(CFS) =    1.69
  TOTAL AREA(ACRES) =        2.6   TOTAL RUNOFF(CFS) =       3.66
  TC(MIN.) =   18.32
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.6  TC(MIN.) =     18.32
  PEAK FLOW RATE(CFS)   =       3.66
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

APPENDIX F

DETENTION BASINS CALCULATIONS

PCSWMM Report

DRAFT

InfiltrationBasin

Model JohnMason_InfilBasin_100yr_PostDev.inp

Kimley-Horn and Associates Inc.

October 18, 2024

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DRAFT

Summary 1A: Inflows

Name	JohnMason_InfilBasin_100yr_PostDev	JohnMason_InfilBasin_50yr_PostDev
Time series inflows	1	1
Dry weather	0	0
Groundwater	0	0
RDII inflows	0	0

Summary 1B: Inflows

Name	JohnMason_InfilBasin_25yr_PostDev	JohnMason_InfilBasin_10yr_PostDev
Time series inflows	1	1
Dry weather	0	0
Groundwater	0	0
RDII inflows	0	0

Summary 1C: Inflows

Name	JohnMason_InfilBasin_5yr_PostDev
Time series inflows	1
Dry weather	0
Groundwater	0
RDII inflows	0

Summary 2A: Node statistics

Name	JohnMason_InfilBasin_100yr_PostDev	JohnMason_InfilBasin_50yr_PostDev
Max. ground elev. (ft)	758.934	758.934
Min. ground elev. (ft)	757	757
Max. invert elev. (ft)	752.434	752.434
Min. invert elev. (ft)	99	99
Max. depth (ft)	7	7
Min. depth (ft)	6.5	6.5

DRAFT

Summary 2B: Node statistics

Name	JohnMason_InfilBasin_25yr_PostDev	JohnMason_InfilBasin_10yr_PostDev
Max. ground elev. (ft)	758.934	758.934
Min. ground elev. (ft)	757	757
Max. invert elev. (ft)	752.434	752.434
Min. invert elev. (ft)	99	99
Max. depth (ft)	7	7
Min. depth (ft)	6.5	6.5

Summary 2C: Node statistics

Name	JohnMason_InfilBasin_5yr_PostDev
Max. ground elev. (ft)	758.934
Min. ground elev. (ft)	757
Max. invert elev. (ft)	752.434
Min. invert elev. (ft)	99
Max. depth (ft)	7
Min. depth (ft)	6.5

Summary 3A: Results statistics

Name	JohnMason_InfilBasin_100yr_PostDev
Max. subcatchment total runoff (MG)	n/a
Max. subcatchment peak runoff (cfs)	n/a
Max. subcatchment runoff coefficient	n/a
Max. subcatchment total precip (in)	n/a
Min. subcatchment total precip (in)	n/a
Max. node depth (ft)	3.93
Num. nodes surcharged	0
Max. node surcharge duration (hours)	0
Max. node height above crown (ft)	0
Min. node depth below rim (ft)	0
Num. nodes flooded	0
Max. node flooding duration (hours)	0
Max. node flood volume (MG)	0
Max. node ponded volume or depth (acre-in/1000 ft^3/ft)	0
Max. storage volume (1000 ft^3)	11.223
Max. storage percent full (%)	43
Max. outfall flow frequency (%)	99.88
Max. outfall peak flow (cfs)	1.91

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Summary 3A: Results statistics (continued...)

Name	JohnMason_InfilBasin_100yr_PostDev
Max. outfall total volume (MG)	0.082
Total outfall volume (MG)	0.082
Max. link peak flow (cfs)	1.91
Max. link peak velocity (ft/s)	0
Min. link peak velocity (ft/s)	100000000
Num. conduits surcharged	0
Max. conduit surcharge duration (hours)	0
Max. conduit capacity limited duration (hours)	0

Summary 3B: Results statistics

Name	JohnMason_InfilBasin_50yr_PostDev
Max. subcatchment total runoff (MG)	n/a
Max. subcatchment peak runoff (cfs)	n/a
Max. subcatchment runoff coefficient	n/a
Max. subcatchment total precip (in)	n/a
Min. subcatchment total precip (in)	n/a
Max. node depth (ft)	3.67
Num. nodes surcharged	0
Max. node surcharge duration (hours)	0
Max. node height above crown (ft)	0
Min. node depth below rim (ft)	0
Num. nodes flooded	0
Max. node flooding duration (hours)	0
Max. node flood volume (MG)	0
Max. node ponded volume or depth (acre-in/1000 ft³/ft)	0
Max. storage volume (1000 ft³)	10.113
Max. storage percent full (%)	39
Max. outfall flow frequency (%)	99.88
Max. outfall peak flow (cfs)	1.63
Max. outfall total volume (MG)	0.068
Total outfall volume (MG)	0.068
Max. link peak flow (cfs)	1.63
Max. link peak velocity (ft/s)	0
Min. link peak velocity (ft/s)	100000000
Num. conduits surcharged	0
Max. conduit surcharge duration (hours)	0
Max. conduit capacity limited duration (hours)	0

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Summary 3C: Results statistics

Name	JohnMason_InfilBasin_25yr_PostDev
Max. subcatchment total runoff (MG)	n/a
Max. subcatchment peak runoff (cfs)	n/a
Max. subcatchment runoff coefficient	n/a
Max. subcatchment total precip (in)	n/a
Min. subcatchment total precip (in)	n/a
Max. node depth (ft)	3.55
Num. nodes surcharged	0
Max. node surcharge duration (hours)	0
Max. node height above crown (ft)	0
Min. node depth below rim (ft)	0
Num. nodes flooded	0
Max. node flooding duration (hours)	0
Max. node flood volume (MG)	0
Max. node ponded volume or depth (acre-in/1000 ft³/ft)	0
Max. storage volume (1000 ft³)	9.597
Max. storage percent full (%)	37
Max. outfall flow frequency (%)	99.88
Max. outfall peak flow (cfs)	1.47
Max. outfall total volume (MG)	0.061
Total outfall volume (MG)	0.061
Max. link peak flow (cfs)	1.47
Max. link peak velocity (ft/s)	0
Min. link peak velocity (ft/s)	100000000
Num. conduits surcharged	0
Max. conduit surcharge duration (hours)	0
Max. conduit capacity limited duration (hours)	0

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Summary 3D: Results statistics

Name	JohnMason_InfilBasin_10yr_PostDev
Max. subcatchment total runoff (MG)	n/a
Max. subcatchment peak runoff (cfs)	n/a
Max. subcatchment runoff coefficient	n/a
Max. subcatchment total precip (in)	n/a
Min. subcatchment total precip (in)	n/a
Max. node depth (ft)	3.31
Num. nodes surcharged	0
Max. node surcharge duration (hours)	0
Max. node height above crown (ft)	0

Summary 3D: Results statistics (continued...)

Name	JohnMason_InfilBasin_10yr_PostDev
Min. node depth below rim (ft)	0
Num. nodes flooded	0
Max. node flooding duration (hours)	0
Max. node flood volume (MG)	0
Max. node ponded volume or depth (acre-in/1000 ft³/ft)	0
Max. storage volume (1000 ft³)	8.635
Max. storage percent full (%)	33
Max. outfall flow frequency (%)	99.85
Max. outfall peak flow (cfs)	1.08
Max. outfall total volume (MG)	0.046
Total outfall volume (MG)	0.046
Max. link peak flow (cfs)	1.08
Max. link peak velocity (ft/s)	0
Min. link peak velocity (ft/s)	100000000
Num. conduits surcharged	0
Max. conduit surcharge duration (hours)	0
Max. conduit capacity limited duration (hours)	0

Summary 3E: Results statistics

Name	JohnMason_InfilBasin_5yr_PostDev
Max. subcatchment total runoff (MG)	n/a
Max. subcatchment peak runoff (cfs)	n/a
Max. subcatchment runoff coefficient	n/a
Max. subcatchment total precip (in)	n/a
Min. subcatchment total precip (in)	n/a
Max. node depth (ft)	3.12
Num. nodes surcharged	0
Max. node surcharge duration (hours)	0
Max. node height above crown (ft)	0
Min. node depth below rim (ft)	0
Num. nodes flooded	0
Max. node flooding duration (hours)	0
Max. node flood volume (MG)	0
Max. node ponded volume or depth (acre-in/1000 ft³/ft)	0
Max. storage volume (1000 ft³)	7.903
Max. storage percent full (%)	30
Max. outfall flow frequency (%)	99.79
Max. outfall peak flow (cfs)	0.36

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Summary 3E: Results statistics (continued...)

Name	JohnMason_InfilBasin_5yr_PostDev
Max. outfall total volume (MG)	0.031
Total outfall volume (MG)	0.031
Max. link peak flow (cfs)	0.36
Max. link peak velocity (ft/s)	0
Min. link peak velocity (ft/s)	100000000
Num. conduits surcharged	0
Max. conduit surcharge duration (hours)	0
Max. conduit capacity limited duration (hours)	0

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APPENDIX G

EARTHEN TRIANGULAR CHANNEL CALCULATIONS

Offsite V Ditch - 10 Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.020
Channel Slope	0.020 ft/ft
Left Side Slope	1.500 H:V
Right Side Slope	1.500 H:V
Discharge	9.41 cfs

Results

Normal Depth	12.3 in
Flow Area	1.6 ft²
Wetted Perimeter	3.7 ft
Hydraulic Radius	5.1 in
Top Width	3.08 ft
Critical Depth	14.4 in
Critical Slope	0.009 ft/ft
Velocity	5.96 ft/s
Velocity Head	0.55 ft
Specific Energy	1.58 ft
Froude Number	1.466
Flow Type	Supercritical

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	12.3 in
Critical Depth	14.4 in
Channel Slope	0.020 ft/ft
Critical Slope	0.009 ft/ft

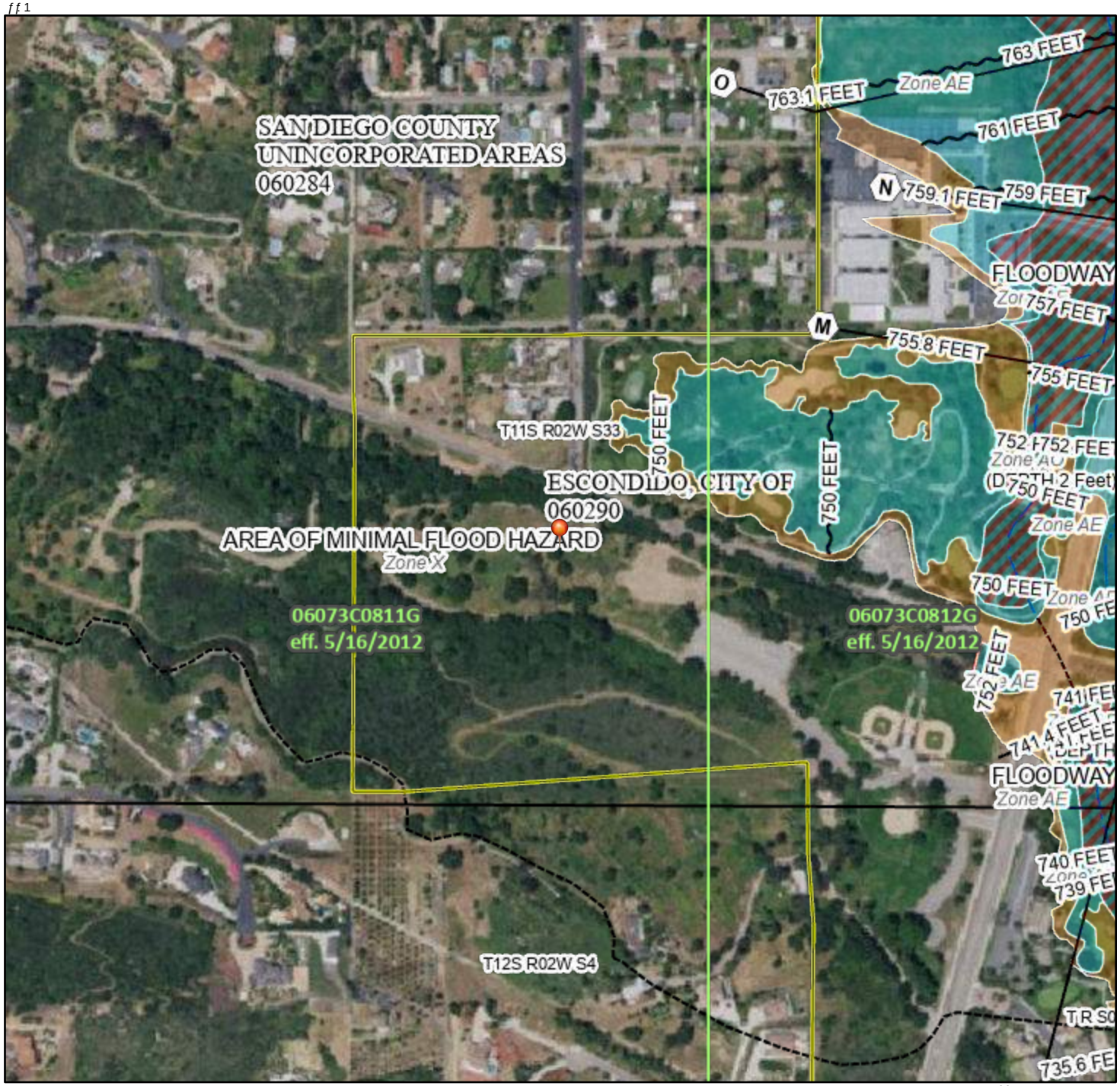
APPENDIX H

FEMA MAP

1DWLRQDO)ORRG'DWD'LUHFWRU\6WWH

FEMA

ff 1



)HHW

ff 1

%DVHPDS,PDJHU\6RXUFH 86'1DWLRQDO DS

/HJHQG

6)(5 7RS(1(5)5(6

L:WKRXW %DVH)ORRG(OHYDWLRQ %()
=RQH$ 9 $
L:WK%DVH)ORRG(OHYDWLRQV =RQH$($($+ $2 9(9 $
5HGXFHGZDWHU\)ORRGZD

$QQXDO &KDQFH)ORRG+D]DUG $UHDV
R DQQXDO FKDQFHORRGZDWHUDH
G+D]DUGHVWKDQRQHIRRW RU ZKGUDLQDJH
DUHDV RI OHVV WKDQRQHVTXDUHPLOH=RQH;
)WXUH&RQGLWLRQV $QQXDO
&KDQFH)ORRG+D]DUG =RQH;
$UHDZLWK5HGXFHG)ORRG5LVNGXHWR
/HYHH 6HH1RWHV =RQH;
$UHDZLWK)ORRG5LVNGXHWR/HYHH =RQH'

$UHDRI0LQLPDO)ORRG+D]DUG =RQH;
(IIHFWLYH/HWWHUV
$UHDRI8QGHWHUPLQHG)ORRG+D]DUG =RQH'

&KDQQHO &XOYHUW RU6WUXFWXUH
/HYHH RU:DOO

&URVV6HFWLRQVZLWK$QQXDO &KDQFH
DWHU 6XUIDFH(OHYDWLRQ
&RDVWDO 7UDQVHFW
%DVH)ORRG(OHYDWLRQ/LQH %(
/LPLW R6WUXFW
-XULVGLFWLRQ%RXQGDU\
&RDVWDO 7UDQVHFW %DVHOLQH
3URILOH%DVHOLQH
+GURJUDSKLF)HDWXUH

L'LWDO DWD$YDLODEOH
R'LWDO DWD$YDLODEOH
8QPDSSHG

7KHSLQGLFDWHGRQWKHPDSLV DQDSSURSULDWH
SRLQW VHOHFWHGE\WKHXVHU DQGGRHV QRW UHSUHV
DQDWWHVWDWLYHSURFHVVRU\ORFDWLRQ

7KLVPSRFHOLHVZLWKSVVWDQGDUGIRU WKHXVHR
GL.LWDO IORRGPS/LI LW LVQRW YRLGDV GHVFULEHGEHORZ
7KHEDVHPDSVKRZQRFHOLHVZLWKSVEDVHPDS
DFFXUDWHDQGGUG/

7KHIORRGKD]DUGLQRUPDWLQLV GHULYHGGLUHFWO\IURPWKH
DWHUDWLDWLYH)HEEVHUYLHVSURYLGHGE\ 7KLVPS
ZVHSRUWHGRQ DW 3 DQGGRHVQW
UHOHFW FKDQJHV RU DPGPQWV VXEVHXHQW WR WKLVGDWH DQG
WLFH 7KH)HDQGHIHFWLYHLQRUPDWLQRPEFKDQJHRU
EHFRPVXSUVHGGE\QHZGDWDRYHU WLFH

7KLVPSLPHLVYRLGLI WKHIQHRUFRUHWHIOORZLQJPS
HOHPQWVGRQW DSSHDU EDVHPSLPH\\ IORRGRQHODEHOV
OHJHQG VFDOHEDU PSFUHDWLRQGDWH FRRLW\LGHQWLILHUV
)5$DQG QXPEHU DQG)5$IHFWLYHGDWH DSLPH/IRU
XQPSSHGDQGXQRGHUQL}HGUHDV FDQQRW EHXVHGIRU
UHDOWRRU\SUSRVHV

APPENDIX I

SDHM RESULTS

SDHM 3.1

PROJECT REPORT

General Model Information

Project Name: JohnMason_pond
Site Name:
Site Address:
City:
Report Date: 10/23/2024
Gage: ESCONDID
Data Start: 10/01/1964
Data End: 09/30/2004
Timestep: Hourly
Precip Scale: 1.000
Version Date: 2021/06/28

POC Thresholds

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

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Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A,NatVeg,Flat	4.56
Pervious Total	4.56

Impervious Land Use	acre
Impervious Total	0
Basin Total	4.56

Element Flows To:

Surface	Interflow	Groundwater

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Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A,NatVeg,Flat	4.2
Pervious Total	4.2

Impervious Land Use	acre
IMPERVIOUS-FLAT	0.36
Impervious Total	0.36
Basin Total	4.56

Element Flows To:

Surface	Interflow	Groundwater
Trapezoidal Pond 1	Trapezoidal Pond 1	

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Routing Elements
Predeveloped Routing

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Mitigated Routing

Trapezoidal Pond 1

Bottom Length:	100.00 ft.	
Bottom Width:	28.00 ft.	
Depth:	6.5 ft.	
Volume at riser head:	0.2583 acre-feet.	
Infiltration On		
Infiltration rate:	0.3	
Infiltration safety factor:	1	
Total Volume Infiltrated (ac-ft.):		23.028
Total Volume Through Riser (ac-ft.):		7.701
Total Volume Through Facility (ac-ft.):		30.729
Percent Infiltrated:		74.94
Total Precip Applied to Facility:		2.64
Total Evap From Facility:		0.462
Side slope 1:	3 To 1	
Side slope 2:	0 To 1	
Side slope 3:	3 To 1	
Side slope 4:	0 To 1	
Discharge Structure		
Riser Height:	3 ft.	
Riser Diameter:	9.5 in.	
Element Flows To:		
Outlet 1	Outlet 2	

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Pond Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.064	0.000	0.000	0.000
0.0722	0.065	0.004	0.000	0.019
0.1444	0.066	0.009	0.000	0.019
0.2167	0.067	0.014	0.000	0.019
0.2889	0.068	0.019	0.000	0.019
0.3611	0.069	0.024	0.000	0.019
0.4333	0.070	0.029	0.000	0.019
0.5056	0.071	0.034	0.000	0.019
0.5778	0.072	0.039	0.000	0.019
0.6500	0.073	0.044	0.000	0.019
0.7222	0.074	0.050	0.000	0.019
0.7944	0.075	0.055	0.000	0.019
0.8667	0.076	0.060	0.000	0.019
0.9389	0.077	0.066	0.000	0.019
1.0111	0.078	0.072	0.000	0.019
1.0833	0.079	0.077	0.000	0.019
1.1556	0.080	0.083	0.000	0.019
1.2278	0.081	0.089	0.000	0.019
1.3000	0.082	0.095	0.000	0.019
1.3722	0.083	0.101	0.000	0.019
1.4444	0.084	0.107	0.000	0.019
1.5167	0.085	0.113	0.000	0.019
1.5889	0.086	0.119	0.000	0.019
1.6611	0.087	0.125	0.000	0.019
1.7333	0.088	0.132	0.000	0.019
1.8056	0.089	0.138	0.000	0.019
1.8778	0.090	0.145	0.000	0.019

1.9500	0.091	0.151	0.000	0.019
2.0222	0.092	0.158	0.000	0.019
2.0944	0.093	0.164	0.000	0.019
2.1667	0.094	0.171	0.000	0.019
2.2389	0.095	0.178	0.000	0.019
2.3111	0.096	0.185	0.000	0.019
2.3833	0.097	0.192	0.000	0.019
2.4556	0.098	0.199	0.000	0.019
2.5278	0.099	0.206	0.000	0.019
2.6000	0.100	0.213	0.000	0.019
2.6722	0.101	0.220	0.000	0.019
2.7444	0.102	0.228	0.000	0.019
2.8167	0.103	0.235	0.000	0.019
2.8889	0.104	0.243	0.000	0.019
2.9611	0.105	0.250	0.000	0.019
3.0333	0.106	0.258	0.051	0.019
3.1056	0.107	0.266	0.284	0.019
3.1778	0.108	0.273	0.591	0.019
3.2500	0.109	0.281	0.889	0.019
3.3222	0.110	0.289	1.105	0.019
3.3944	0.111	0.297	1.226	0.019
3.4667	0.112	0.305	1.348	0.019
3.5389	0.113	0.313	1.449	0.019
3.6111	0.114	0.321	1.543	0.019
3.6833	0.115	0.330	1.631	0.019
3.7556	0.116	0.338	1.715	0.019
3.8278	0.117	0.347	1.796	0.019
3.9000	0.118	0.355	1.872	0.019
3.9722	0.119	0.364	1.946	0.019
4.0444	0.120	0.372	2.017	0.019
4.1167	0.121	0.381	2.086	0.019
4.1889	0.122	0.390	2.152	0.019
4.2611	0.123	0.398	2.216	0.019
4.3333	0.124	0.407	2.279	0.019
4.4056	0.125	0.416	2.340	0.019
4.4778	0.126	0.425	2.399	0.019
4.5500	0.127	0.435	2.457	0.019
4.6222	0.127	0.444	2.514	0.019
4.6944	0.128	0.453	2.569	0.019
4.7667	0.129	0.462	2.623	0.019
4.8389	0.130	0.472	2.676	0.019
4.9111	0.131	0.481	2.728	0.019
4.9833	0.132	0.491	2.780	0.019
5.0556	0.133	0.501	2.830	0.019
5.1278	0.134	0.510	2.879	0.019
5.2000	0.135	0.520	2.927	0.019
5.2722	0.136	0.530	2.975	0.019
5.3444	0.137	0.540	3.022	0.019
5.4167	0.138	0.550	3.068	0.019
5.4889	0.139	0.560	3.114	0.019
5.5611	0.140	0.570	3.159	0.019
5.6333	0.141	0.580	3.203	0.019
5.7056	0.142	0.590	3.246	0.019
5.7778	0.143	0.601	3.290	0.019
5.8500	0.144	0.611	3.332	0.019
5.9222	0.145	0.622	3.374	0.019
5.9944	0.146	0.632	3.415	0.019
6.0667	0.147	0.643	3.456	0.019

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6.1389	0.148	0.654	3.497	0.019
6.2111	0.149	0.664	3.537	0.019
6.2833	0.150	0.675	3.576	0.019
6.3556	0.151	0.686	3.616	0.019
6.4278	0.152	0.697	3.654	0.019
6.5000	0.153	0.708	3.693	0.019
6.5722	0.154	0.719	3.730	0.019

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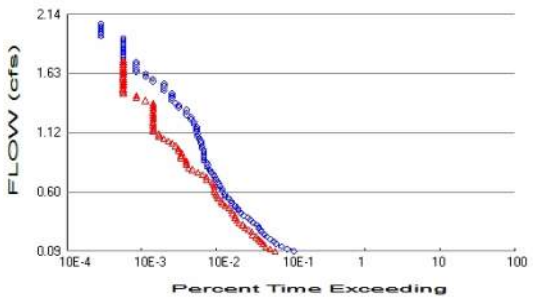
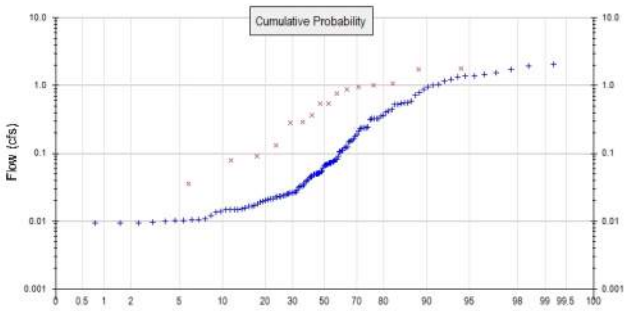
Analysis Results

POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 4.56
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 4.2
Total Impervious Area: 0.36

Flow Frequency Method: Cunnane

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.538124
5 year	1.306624
10 year	1.544397
25 year	1.978718

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0
5 year	0.541492
10 year	0.997671
25 year	1.753373

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Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0891	389	216	55	Pass
0.1099	312	187	59	Pass
0.1306	266	163	61	Pass
0.1513	225	149	66	Pass
0.1721	206	140	67	Pass
0.1928	188	131	69	Pass
0.2135	169	122	72	Pass
0.2342	155	109	70	Pass
0.2550	143	105	73	Pass
0.2757	138	96	69	Pass
0.2964	130	85	65	Pass
0.3172	125	79	63	Pass
0.3379	109	71	65	Pass
0.3586	101	67	66	Pass
0.3794	94	63	67	Pass
0.4001	82	62	75	Pass
0.4208	75	59	78	Pass
0.4415	70	56	80	Pass
0.4623	67	52	77	Pass
0.4830	63	47	74	Pass
0.5037	57	43	75	Pass
0.5245	56	41	73	Pass
0.5452	51	37	72	Pass
0.5659	46	36	78	Pass
0.5867	45	35	77	Pass
0.6074	42	34	80	Pass
0.6281	42	33	78	Pass
0.6488	40	33	82	Pass
0.6696	38	32	84	Pass
0.6903	37	31	83	Pass
0.7110	35	26	74	Pass
0.7318	33	26	78	Pass
0.7525	32	23	71	Pass
0.7732	30	20	66	Pass
0.7940	29	17	58	Pass
0.8147	27	15	55	Pass
0.8354	27	14	51	Pass
0.8561	26	14	53	Pass
0.8769	24	14	58	Pass
0.8976	24	12	50	Pass
0.9183	24	12	50	Pass
0.9391	24	12	50	Pass
0.9598	24	11	45	Pass
0.9805	23	11	47	Pass
1.0013	23	10	43	Pass
1.0220	22	9	40	Pass
1.0427	22	8	36	Pass
1.0634	21	7	33	Pass
1.0842	20	6	30	Pass
1.1049	20	6	30	Pass
1.1256	19	5	26	Pass
1.1464	19	5	26	Pass
1.1671	19	5	26	Pass

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1.1878	18	5	27	Pass
1.2086	18	5	27	Pass
1.2293	16	5	31	Pass
1.2500	16	5	31	Pass
1.2707	14	5	35	Pass
1.2915	14	5	35	Pass
1.3122	14	5	35	Pass
1.3329	11	5	45	Pass
1.3537	11	5	45	Pass
1.3744	10	5	50	Pass
1.3951	9	4	44	Pass
1.4159	9	3	33	Pass
1.4366	9	3	33	Pass
1.4573	9	2	22	Pass
1.4780	7	2	28	Pass
1.4988	7	2	28	Pass
1.5195	7	2	28	Pass
1.5402	7	2	28	Pass
1.5610	5	2	40	Pass
1.5817	5	2	40	Pass
1.6024	4	2	50	Pass
1.6232	4	2	50	Pass
1.6439	3	2	66	Pass
1.6646	3	2	66	Pass
1.6853	3	2	66	Pass
1.7061	3	2	66	Pass
1.7268	3	2	66	Pass
1.7475	2	2	100	Pass
1.7683	2	0	0	Pass
1.7890	2	0	0	Pass
1.8097	2	0	0	Pass
1.8305	2	0	0	Pass
1.8512	2	0	0	Pass
1.8719	2	0	0	Pass
1.8926	2	0	0	Pass
1.9134	2	0	0	Pass
1.9341	2	0	0	Pass
1.9548	1	0	0	Pass
1.9756	1	0	0	Pass
1.9963	1	0	0	Pass
2.0170	1	0	0	Pass
2.0378	1	0	0	Pass
2.0585	1	0	0	Pass
2.0792	0	0	0	Pass
2.0999	0	0	0	Pass
2.1207	0	0	0	Pass
2.1414	0	0	0	Pass

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Water Quality

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Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

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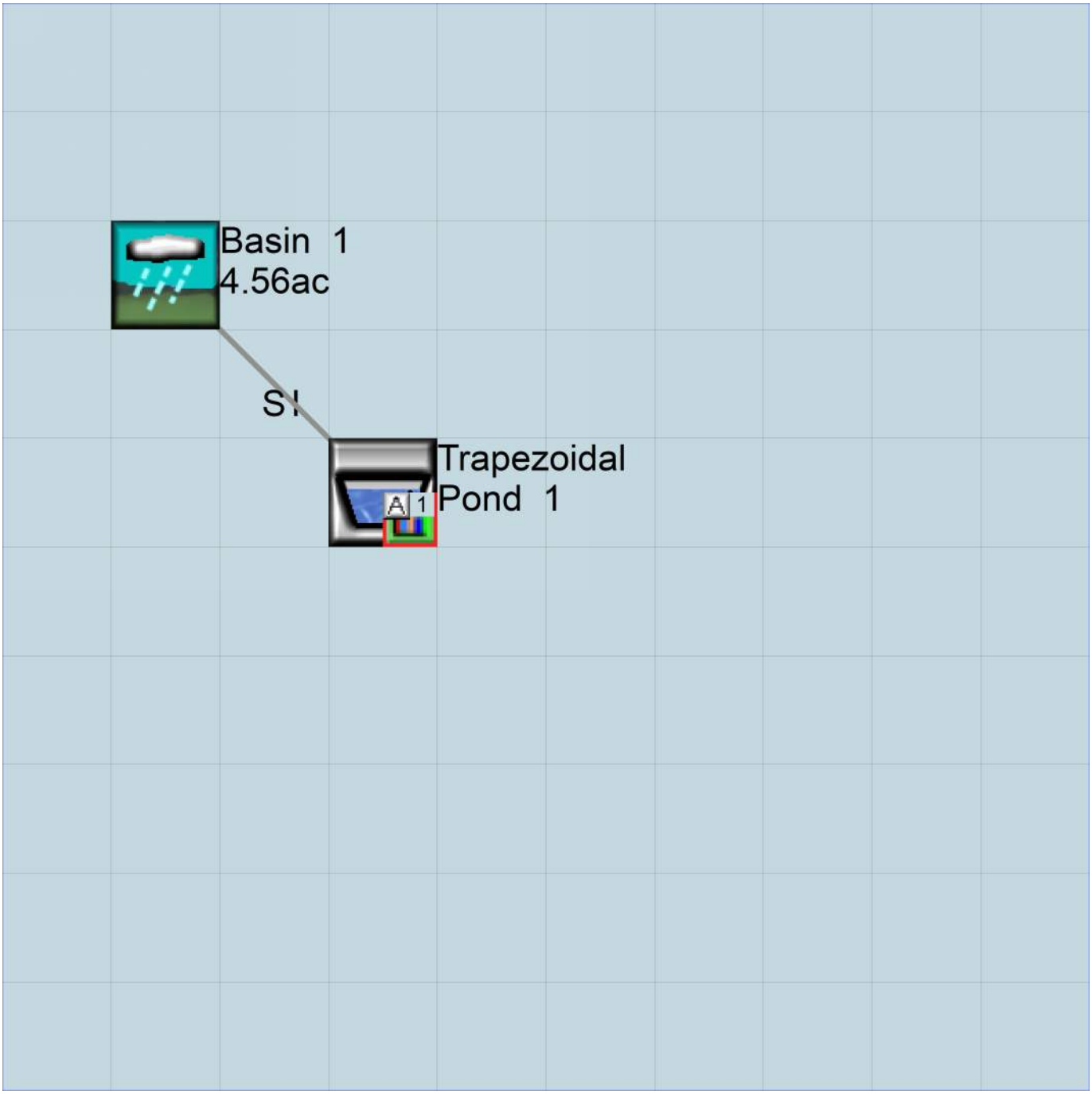
Appendix
Predeveloped Schematic

Mitigated Schematic



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Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1964 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   JohnMason_pond.wdm
MESSU       25   MitJohnMason_pond.MES
            27   MitJohnMason_pond.L61
            28   MitJohnMason_pond.L62
            30   POCJohnMason_pond1.dat
END FILES

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

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

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

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```
    1         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

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

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
    1             0       4.2      0.09       100      0.05       2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    1             0         0         2         2         0      0.05      0.05
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    1             0       0.6      0.04         1       0.3         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
    1       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
    1       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1  0.1
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
    1             0         0      0.01         0       0.4      0.01         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    1      IMPERVIOUS-FLAT        1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

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

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

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

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```
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >       IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    1            100      0.05     0.011       0.1
  END IWAT-PARM2

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

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

END IMPLND

SCHEMATIC
<-Source->                 <--Area-->     <-Target->   MBLK    ***
<Name>   #                 <-factor->     <Name>   #   Tbl#    ***
Basin  1***
PERLND   1                       4.2      RCHRES   1      2
PERLND   1                       4.2      RCHRES   1      3
IMPLND   1                      0.36      RCHRES   1      5

******Routing******
PERLND   1                       4.2      COPY     1     12
IMPLND   1                      0.36      COPY     1     15
PERLND   1                       4.2      COPY     1     13
RCHRES   1                         1      COPY   501     17
END SCHEMATIC

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



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

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<----------------><---> User T-series  Engl Metr LKFG             ***
                                        in  out                             ***
    1     Trapezoidal Pond-005    2    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

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

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

  HYDR-PARM1
```

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

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
    1              1      0.02       0.0       0.0       0.5       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                       ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
         *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
  FTABLE      1
   91    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)    (cfs)     (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.064279  0.000000  0.000000  0.000000
  0.072222  0.065274  0.004678  0.000000  0.019444
  0.144444  0.066269  0.009428  0.000000  0.019444
  0.216667  0.067264  0.014250  0.000000  0.019444
  0.288889  0.068258  0.019144  0.000000  0.019444
  0.361111  0.069253  0.024110  0.000000  0.019444
  0.433333  0.070248  0.029148  0.000000  0.019444
  0.505556  0.071243  0.034257  0.000000  0.019444
  0.577778  0.072238  0.039438  0.000000  0.019444
  0.650000  0.073232  0.044691  0.000000  0.019444
  0.722222  0.074227  0.050016  0.000000  0.019444
  0.794444  0.075222  0.055413  0.000000  0.019444
  0.866667  0.076217  0.060882  0.000000  0.019444
  0.938889  0.077212  0.066422  0.000000  0.019444
  1.011111  0.078206  0.072034  0.000000  0.019444
  1.083333  0.079201  0.077718  0.000000  0.019444
  1.155556  0.080196  0.083474  0.000000  0.019444
  1.227778  0.081191  0.089302  0.000000  0.019444
  1.300000  0.082185  0.095202  0.000000  0.019444
  1.372222  0.083180  0.101174  0.000000  0.019444
  1.444444  0.084175  0.107217  0.000000  0.019444
  1.516667  0.085170  0.113332  0.000000  0.019444
  1.588889  0.086165  0.119519  0.000000  0.019444
  1.661111  0.087159  0.125778  0.000000  0.019444
  1.733333  0.088154  0.132109  0.000000  0.019444
  1.805556  0.089149  0.138512  0.000000  0.019444
  1.877778  0.090144  0.144986  0.000000  0.019444
  1.950000  0.091139  0.151532  0.000000  0.019444
  2.022222  0.092133  0.158151  0.000000  0.019444
  2.094444  0.093128  0.164841  0.000000  0.019444
  2.166667  0.094123  0.171602  0.000000  0.019444
  2.238889  0.095118  0.178436  0.000000  0.019444
  2.311111  0.096113  0.185342  0.000000  0.019444
  2.383333  0.097107  0.192319  0.000000  0.019444
  2.455556  0.098102  0.199368  0.000000  0.019444
  2.527778  0.099097  0.206489  0.000000  0.019444
  2.600000  0.100092  0.213682  0.000000  0.019444
  2.672222  0.101087  0.220947  0.000000  0.019444
  2.744444  0.102081  0.228284  0.000000  0.019444
  2.816667  0.103076  0.235692  0.000000  0.019444
  2.888889  0.104071  0.243172  0.000000  0.019444
  2.961111  0.105066  0.250725  0.000000  0.019444
```

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```
  3.033333  0.106061  0.258349  0.051076  0.019444
  3.105556  0.107055  0.266044  0.284209  0.019444
  3.177778  0.108050  0.273812  0.591427  0.019444
  3.250000  0.109045  0.281652  0.889193  0.019444
  3.322222  0.110040  0.289563  1.105884  0.019444
  3.394444  0.111035  0.297546  1.226838  0.019444
  3.466667  0.112029  0.305601  1.348490  0.019444
  3.538889  0.113024  0.313728  1.449085  0.019444
  3.611111  0.114019  0.321927  1.543137  0.019444
  3.683333  0.115014  0.330198  1.631776  0.019444
  3.755556  0.116009  0.338540  1.715843  0.019444
  3.827778  0.117003  0.346955  1.795979  0.019444
  3.900000  0.117998  0.355441  1.872688  0.019444
  3.972222  0.118993  0.363999  1.946377  0.019444
  4.044444  0.119988  0.372629  2.017376  0.019444
  4.116667  0.120983  0.381330  2.085960  0.019444
  4.188889  0.121977  0.390104  2.152360  0.019444
  4.261111  0.122972  0.398949  2.216772  0.019444
  4.333333  0.123967  0.407867  2.279364  0.019444
  4.405556  0.124962  0.416856  2.340282  0.019444
  4.477778  0.125957  0.425917  2.399655  0.019444
  4.550000  0.126951  0.435049  2.457594  0.019444
  4.622222  0.127946  0.444254  2.514198  0.019444
  4.694444  0.128941  0.453530  2.569555  0.019444
  4.766667  0.129936  0.462879  2.623745  0.019444
  4.838889  0.130931  0.472299  2.676837  0.019444
  4.911111  0.131925  0.481791  2.728898  0.019444
  4.983333  0.132920  0.491355  2.779983  0.019444
  5.055556  0.133915  0.500991  2.830146  0.019444
  5.127778  0.134910  0.510698  2.879436  0.019444
  5.200000  0.135904  0.520478  2.927896  0.019444
  5.272222  0.136899  0.530329  2.975567  0.019444
  5.344444  0.137894  0.540252  3.022486  0.019444
  5.416667  0.138889  0.550247  3.068687  0.019444
  5.488889  0.139884  0.560314  3.114204  0.019444
  5.561111  0.140878  0.570452  3.159064  0.019444
  5.633333  0.141873  0.580663  3.203297  0.019444
  5.705556  0.142868  0.590945  3.246927  0.019444
  5.777778  0.143863  0.601299  3.289978  0.019444
  5.850000  0.144858  0.611725  3.332473  0.019444
  5.922222  0.145852  0.622223  3.374434  0.019444
  5.994444  0.146847  0.632793  3.415878  0.019444
  6.066667  0.147842  0.643434  3.456826  0.019444
  6.138889  0.148837  0.654148  3.497295  0.019444
  6.211111  0.149832  0.664933  3.537300  0.019444
  6.283333  0.150826  0.675790  3.576858  0.019444
  6.355556  0.151821  0.686719  3.615984  0.019444
  6.427778  0.152816  0.697720  3.654690  0.019444
  6.500000  0.153811  0.708792  3.692991  0.019444
  END FTABLE  1
END FTABLES

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

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   1 HYDR   RO     1 1        1      WDM   1006 FLOW     ENGL      REPL
RCHRES   1 HYDR   O      1 1        1      WDM   1007 FLOW     ENGL      REPL
RCHRES   1 HYDR   O      2 1        1      WDM   1008 FLOW     ENGL      REPL
```

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```
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1009 STAG     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     12.1      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     12.1      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

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

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

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

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

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

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

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


END MASS-LINK

END RUN
```

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Predeveloped HSPF Message File

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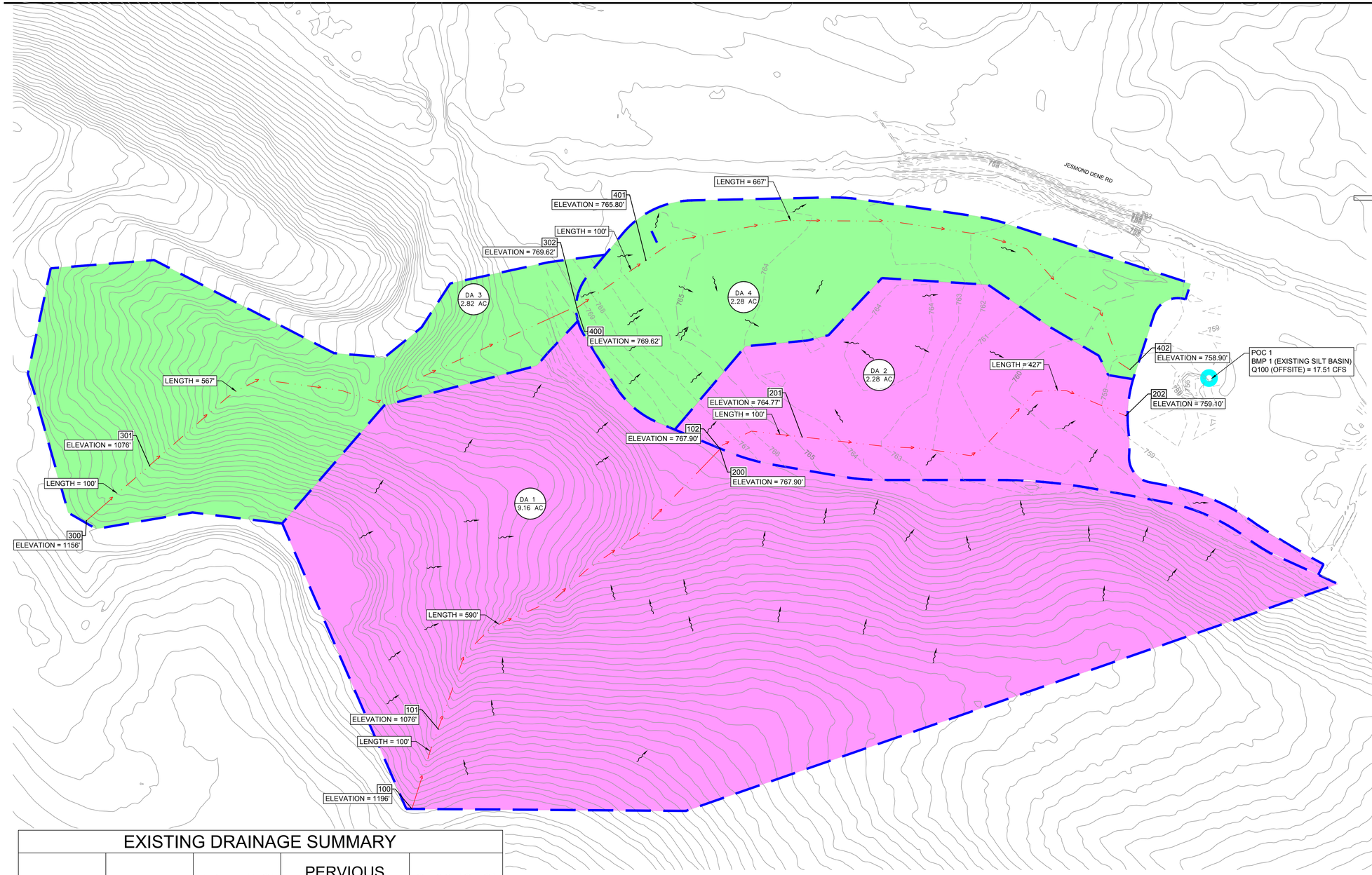
EXHIBIT A

EXISTING DRAINAGE EXHIBIT



LEGEND

- EXISTING CONTOUR
- DRAINAGE AREA (DA) BOUNDARY
- DIRECTION OF FLOW
- FLOW PATH
- DRAINAGE AREA NUMBER (X)
- DRAINAGE AREA (IN ACRES) (XX)
- RIGHT OF WAY
- POINT OF COMPLIANCE (POC)
- PROPOSED DETENTION BASIN
- PROPOSED STORM DRAIN
- HYDROMODIFICATION AREA (HMA) 1
- HYDROMODIFICATION AREA (HMA) 2
- DRAINAGE NODE NUMBER (102)

GENERAL NOTES:

1. DRAINAGE AREAS ARE BASED ON PROJECT LIMITS AND EXISTING TOPOGRAPHY

HYDROLOGIC SOIL GROUP:

HYDROLOGIC SOIL TYPE: A

DEPTH TO GROUNDWATER:

~ 30 FT

CCSYAS:

IN THE EXISTING CONDITION, POTENTIAL CRITICAL COARSE SEDIMENT YIELD AREAS FLOW THROUGH THE PROJECT SITE AND EVENTUALLY TO THE EXISTING DESILTING BASIN. HOWEVER, IN THE PROPOSED CONDITION, THE RUN OFF FROM OFFSITE AREAS (INCLUDING CCSYA) IS BYPASSED THROUGH A PROPOSED DITCH RUNNING ALONG THE PARAMETER OF THE PROJECT SITE, ROUTING THE FLOWS INTO THE EXISTING DESILTING BASIN MATCHING THE EXISTING DRAINAGE CONDITION.

EXISTING DRAINAGE SUMMARY

DA	BMP	AREA (AC)	PERVIOUS AREA (AC)	Q100 (CFS)
1	BMP 1	9.16	9.16	11.19
3	BMP 1	2.82	2.82	3.18
2	BMP 1	2.28	2.28	1.70
4	BMP 1	2.28	2.28	1.44
TOTAL		16.54		17.51

*NOTE: POC 1 ULTIMATELY DISCHARGES TO PACIFIC OCEAN IN BOTH PRE- AND POST-DEVELOPMENT CONDITION. POINT OF COMPLIANCE SHOWN AT EXISTING DESILTING BASIN IN PRE-DEVELOPMENT CONDITION FOR CLARITY.

NORTH

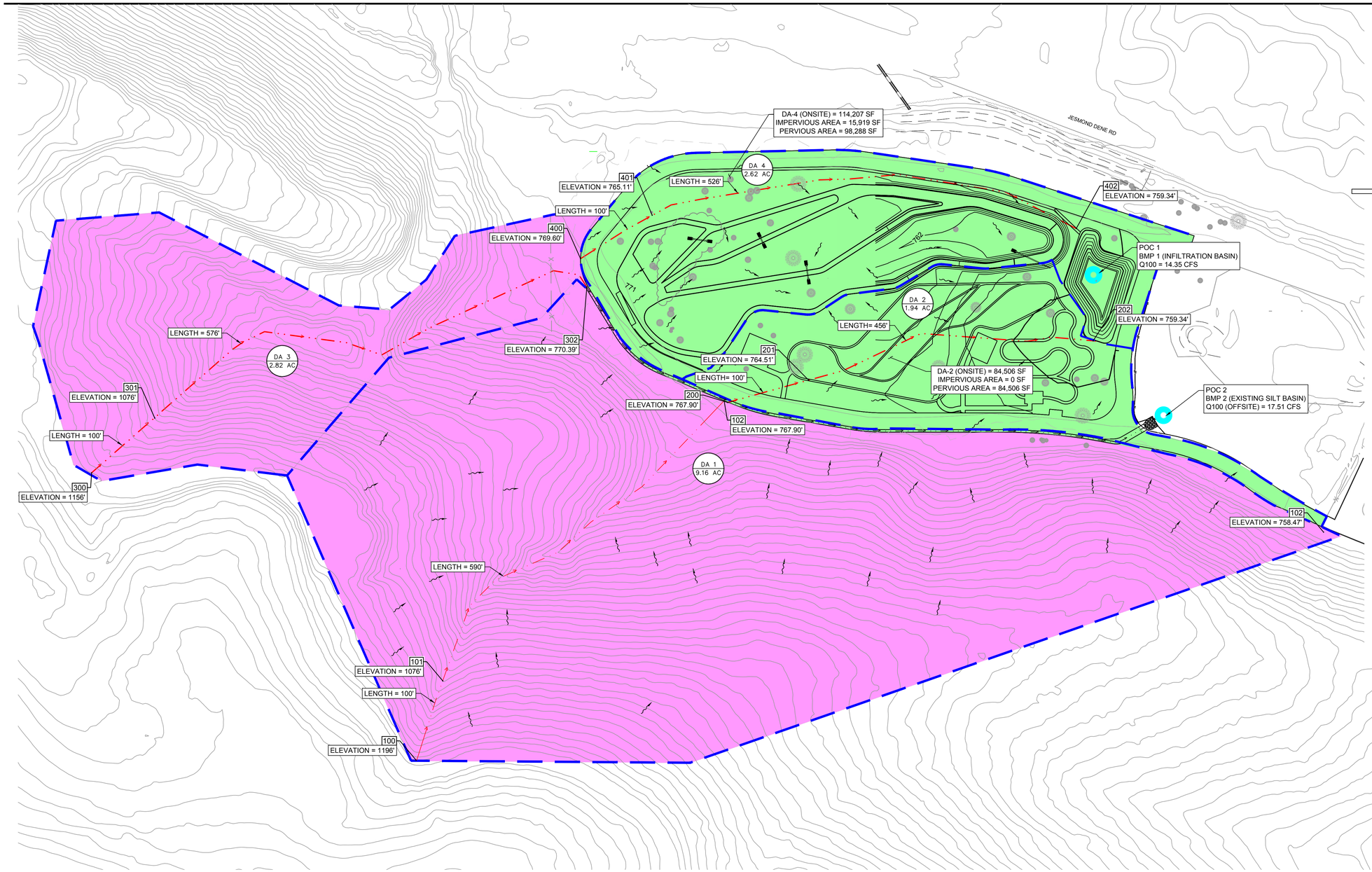
GRAPHIC SCALE IN FEET
0 30 60 120
1" = 60'
WHEN PRINTED AT FULL SIZE
(24" BY 36")

Kimley»Horn

EXISTING CONDITIONS DRAINAGE MAP
JOHN MASSON BIKE PARK, CITY OF ESCONDIDO
10/23/2024

EXHIBIT B

PROPOSED DRAINAGE EXHIBIT



LEGEND

- EXISTING CONTOUR
- DRAINAGE AREA (DA) BOUNDARY
- DIRECTION OF FLOW
- FLOW PATH
- DRAINAGE AREA NUMBER
- DRAINAGE AREA (IN ACRES)
- RIGHT OF WAY
- POINT OF COMPLIANCE (POC)
- PROPOSED DETENTION BASIN
- PROPOSED STORM DRAIN
- HYDROMODIFICATION AREA (HMA) 1
- HYDROMODIFICATION AREA (HMA) 2
- DRAINAGE NODE NUMBER
- EARTHEN SWALE FLOWPATH

GENERAL NOTES:

1. DRAINAGE AREAS ARE BASED ON PROJECT LIMITS AND EXISTING AND PROPOSED TOPOGRAPHY

HYDROLOGIC SOIL GROUP:

HYDROLOGIC SOIL TYPE: A

DEPTH TO GROUNDWATER:

~ 30 FT

CCSYAS:

IN THE EXISTING CONDITION, POTENTIAL CRITICAL COARSE SEDIMENT YIELD AREAS FLOW THROUGH THE PROJECT SITE AND EVENTUALLY TO THE EXISTING DESILTING BASIN. HOWEVER, IN THE PROPOSED CONDITION, THE RUN OFF FROM OFFSITE AREAS (INCLUDING CCSYA) IS BYPASSED THROUGH A PROPOSED DITCH RUNNING ALONG THE PARAMETER OF THE PROJECT SITE, ROUTING THE FLOWS INTO THE EXISTING DESILTING BASIN MATCHING THE EXISTING DRAINAGE CONDITION.

PROPOSED DRAINAGE SUMMARY

HMA	POC	DA	AREA (AC)	TOTAL AREA (AC)	EXISTING Q100 (CFS)	PROPOSED UNMITIGATED Q100 (CFS)	PROPOSED MITIGATED Q100 (CFS)
HMA 1	BMP 2	1	9.16	11.98	11.19	11.19	-
		3	2.82		3.18	3.18	-
HMA 2	BMP 1	2	1.94	4.56	1.70	1.37	1.90
		4	2.62		1.44	3.66	

*TREE WELLS DESIGNED TO SATISFY BOTH POLLUTANT CONTROL AND HYDROMODIFICATION MANAGEMENT PERFORMANCE STANDARDS. IN CASES WHERE HYDROMODIFICATION MITIGATION WITHIN THE DA IS INFEASIBLE, THE BASIN WITHIN THE SAME POC WAS DESIGNED TO MITIGATE IMPACTS FROM THE DA. SEE REPORT FOR MORE INFORMATION.
**INFILTRATION BASIN (BMP 1) IS PROPOSED TO MITIGATE PEAK FLOW EVENTS, WHILE THE TREE WELLS SATISFY BOTH POLLUTANT CONTROL AND HYDROMODIFICATION MANAGEMENT PERFORMANCE STANDARDS. SEE REPORT FOR MORE INFORMATION.

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PROPOSED CONDITIONS HYDROMODIFICATION EXHIBIT

JOHN MASSON BIKE PARK, CITY OF ESCONDIDO

10/23/2024