TM DRAINAGE STUDY

For

PICO PLACE

Prepared for**:**

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CHAPTER 1 - EXECUTIVE SUMMARY

1.1 – Introduction

The Pico Place residential project site is located adjacent to Pico Avenue in the City of San Marcos, California.

Runoff from the proposed site will drain to a single point of discharge from the project site, the existing storm drain system located with the adjacent Pico Avenue to the eastern boundary of the site.

This study analyzes existing and developed condition 100-year peak flowrates from the development to the existing point of discharge.

The project site lies outside any FEMA 100-year floodplain zones. Therefore, no Letters of Map Revision will be required.

Treatment of storm water runoff from the site has been addressed in a separate report - the “Storm Water Quality Management Plan for Pico Place”, dated April 2023 by REC.

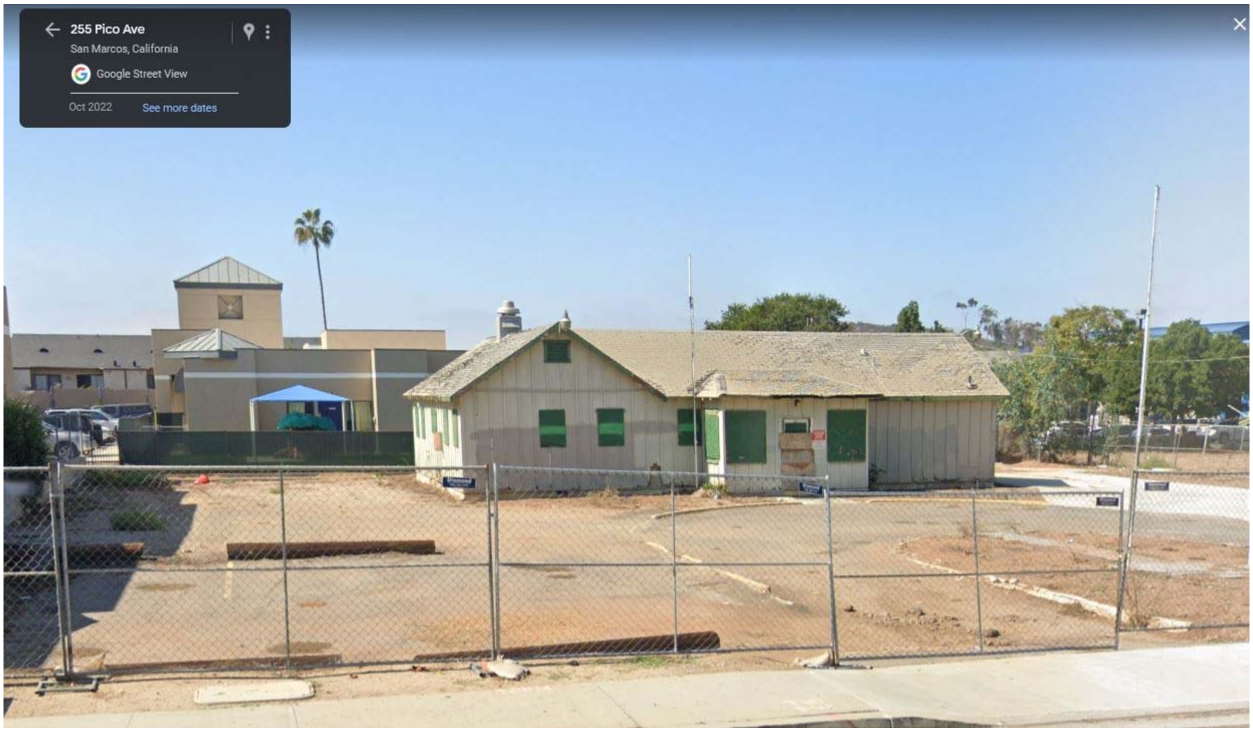
Per County of San Diego drainage criteria, the Modified Rational Method should be used to determine peak design flowrates when the contributing drainage area is less than 1.0 square mile. Since the total watershed area discharging from the site is less than 1.0 square mile, AES computer software was used to model the pre & post developed condition runoff response per the Modified Rational Method.

Methodology used for the computation of design rainfall events, hydrographs, runoff coefficients, and rainfall intensity values are consistent with criteria set forth in the “County of San Diego Drainage Design Manual”. A more detailed explanation of methodology used for this analysis is listed in Chapter 2 of this report.

Hydraulic Modified-Puls detention basin routing of the aforementioned modified rational method hydrology was performed using the Army Corps of Engineers HEC-HMS software. Hydrographs were generated using the RatHydro program developed by Rick Engineering Company.

1.2 – Summary of Existing Conditions

In existing conditions, the Pico Place project site is a developed residential lot featuring a single residential structure including several paved surface areas with an adjoining undeveloped lot to the north that is sparsely vegetated. An exhibit is provided on the following page to illustrate the existing impervious condition of the site accordingly.



Runoff from the existing site flows overland to two (2) points of discharge; POC-1, an existing RCP storm drain located at the eastern boundary of the project site within Pico Avenue and POC-2, the westerly boundary of the site.

Per County of San Diego rainfall isopluvial maps, the design 100-year rainfall depth for the project site is 3.4 inches. The project site comprises of hydrologic soil class C soils such that runoff coefficients of 0.75 and 0.34 were used for the tributaries to POC-1 and POC-2 respectively (see weighted runoff calculations in Chapter 4). Table 1 summarizes the existing condition design 100-year peak flow from the project site.

Table 1 – SUMMARY OF EXISTING CONDITIONS FLOWS

Drainage Area	Drainage Area (Ac)	Runoff Coefficient (C)	100-Year Peak Flow (cfs)
Pico Drive Tributary (POC-1)	0.234	0.75	1.57
Western Boundary Tributary (POC-2)	0.51*	0.34**	0.91
Total	0.744	--	2.48

* = inclusive of 0.068 Ac of offsite area to the west of the project site.
** = onsite area coefficient only.

1.3 – Summary of Developed Conditions

The Pico Place project proposes the construction of multi- family residences, inclusive of a servicing drive and associated landscaping. Runoff from the project is drained to one (1) receiving multiple purpose water quality/HMP/Q100 detention vault. Detained flows are drained from the BMP facility and discharged to the existing storm drain system within the adjacent Pico Avenue.

Per County of San Diego rainfall isopluvial maps, the design 100-year rainfall depth for the project site is 3.4 inches. The project site comprises of hydrologic soil class C soils such that a runoff coefficient of 0.75 was used for the proposed residential (see weighted runoff calculations in Chapter 4). Table 2 summarizes the developed condition design 100-year peak flow from the project site.

Table 2 – SUMMARY OF DEVELOPED CONDITIONS FLOWS UNMITTIGATED

Drainage Area	Drainage Area (Ac)	Runoff Coefficient (C)	100-Year Peak Flow (cfs)
Pico Place Project Site	0.674	0.75	3.9
POC-1 Total	0.674	0.75	3.9

Prior to discharging from the project site, first flush runoff will be treated via an onsite filtration BMP in accordance with standards set forth by the Regional Water Quality Control Board and the City of San Marcos' BMP Design Manual (see "Storm Water Quality Management Plan for Pico Place").

Peak developed flows from the project site are conveyed to one (1) onsite detention facility prior to discharging to the existing storm drain system. The vault system is approximately 9-feet deep with a width of 9-feet and length of 54-feet. Due to the limited grade on the project site and utility constraints, the vault is to be located several feet below the existing storm drain invert in Pico Avenue such that the vault can only be drained via the use of pumps. Due to HMP criteria, two (2) separate pumps will be employed on the project site, a low flow pump outlet will be located at 3.0 feet from the bottom of the basin invert while the peak Q100 flow pump will be located at 7.25 feet from the basin invert. In an extreme event, flows will outlet via the surface private drive to Pico Avenue without risk of flooding the residential structures and also providing single vehicular lane access.

The developed condition peak flows calculated using modified rational method was then routed through the detention facility on the project site in HEC-HMS. The HMS Modified-Puls results are summarized in Table 3.

TABLE 3 – SUMMARY OF DETENTION BASIN ROUTING

Detention Basin	100-Year Peak Inflow (cfs)	100-Year Peak Outflow (cfs)	Time of Concentration (tc)	Peak Water Surface Elevation (ft)
Vault	3.9	1.5	10.3	8.96

Input hydrographs for the HMS analysis were generated using the RatHydro program developed by Rick Engineering Company and are provided Chapter 3 of this report.

Rational method hydrographs, stage-storage, stage-discharge relationships and HEC-HMS model output is provided in Chapter 3 of this report.

There is an existing Day Care site located adjacent to the western boundary of the project site. This small 0.068 Ac tributary of 0.5 cfs offsite run-on will be intercepted by a proposed storm drain system that will convey these flows through the project site such that they do not comingle with onsite flows. As these flows are generated by a neighboring site, this run-on is not required to be treated or detained within the proposed project site.

A proposed 12-inch RCP will be constructed within the adjacent Pico Avenue conveying the project and offsite flows in a northerly direction, ultimately converging with an existing 15-inch RCP storm drain. A hydraulic analysis has been undertaken with Chapter 4 of this report demonstrating that the existing 15-inch storm drain has capacity to safely convey these flows. A conservative outlet tailwater condition assumed the top of pipe of the 15-inch downstream for this analysis.

1.4 – Summary of Results

Table 4 summarizes developed and existing condition drainage areas and resultant 100-year peak flow rates at the receiving discharge location from the Pico Place Development site. Per County of San Diego rainfall isopluvial maps, the design 100-year rainfall depth for the site area is 3.4 inches.

Table 4 – SUMMARY OF ONSITE PEAK FLOWS MITIGATED

Discharge Location	Area (ac)			100 Year Peak Flow (cfs)		
	Existing	Developed	Difference	Existing	Developed	Difference
Pico Ave (POC-1)	0.234	0.674	+0.44*	1.57	1.50	-0.07
Western Boundary (POC-2)	0.44	0.0	-0.44	0.67	0.00	-0.67

* = note, rounding discrepancy for 0.005 Ac difference.

As illustrated in Table 4, the proposed Pico Place project site will result in a net decrease of peak flows discharged from the project site by approximately 0.07 cfs at POC-1 while fully removing flows tributary to the western boundary location (POC-2), thus the project has no net impact to the receiving watershed. All developed runoff will receive water quality treatment in accordance with the site specific SWQMP.

Total runoff tributary to the Pico Avenue 15-inch storm drain increases from 1.57 cfs to 1.8 cfs due to the interception of runoff from the adjacent property site that previously discharged to the western point of discharge. The hydraulic analysis prepared in Chapter 4 of this report demonstrates that this 0.23 cfs increase does not negatively impact this existing storm drains capacity to convey peak flow.

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

1.5 – Conclusions

This report has been prepared in accordance with the County of San Diego Hydrology Manual. This report has evaluated and addressed the potential impacts and proposed mitigation measures. A summary of the facts and findings associated with this project and the measures addressed by this report is as follows:

- The project will not alter drainage patterns on the site or increase runoff after development.
- The ultimate discharge points will not be changed.
- Graded areas and slopes will be hydroseeded to reduce or eliminate sediment discharge.
- Identify and discuss, with appropriate backup/research information, the following question item by item for CEQA purposes. Would the project:

A. Substantially alter the existing drainage patterns of the site or area, including through the alteration if the course of a stream or river, in a manner which would result in substantial erosion or siltation on – or off-site?

The project does not substantially alter the existing drainage pattern of the area and does not alter the course of a stream or river.

The storm drain system for the entire project is designed to route and convey all resulting runoff from developed conditions to existing point of discharge.

B. Substantially alter the existing drainage patterns of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?

The project will not substantially alter the existing drainage pattern of the area as it will not alter the course of a stream or river, and also will not substantially increase the rate or amount of surface runoff in a manner which would result in on- or off-site flooding.

C. Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems?

No. The project drains directly to the existing storm drain system and does not increase flows to existing storm water drainage systems.

D. Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood insurance Rate Map or other flood hazard delineation map, including County Floodplain Maps? For example; research the foregoing and provide same (to indicate applicability or not) in the study?

The project does not place any structure within a 100-year flood hazard area.

E. Place within a 100-year flood hazard area structures which would impede or redirect flood flows?

There are no structures proposed within a 100-year flood hazard area.

F. Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam on-sit or off-site?

NA

1.6 – References

"*County of San Diego Hydrology Manual*", June 2003

"*San Diego County Hydraulic Design Manual*", September 2014

"*Stormwater Quality Management Plan for Pico Place Development*", April 2023, REC Consultants.

1.7 – Declaration of Responsible Charge

THIS PRELIMINARY DRAINAGE STUDY HAS BEEN PREPARED UNDER THE DIRECTION OF THE FOLLOWING REGISTERED CIVIL ENGINEER. THE REGISTERED ENGINEER ATTESTS TO THE TECHNICAL INFORMATION CONTAINED HEREIN AND THE ENGINEERING DATA UPON WHICH RECOMMENDATIONS, CONCLUSIONS, AND DECISIONS ARE BASED.

Luis A. Parra-Rosales R.C.E. 66377

CHAPTER 2 - METHODOLOGY

2.1 – County of San Diego Design Criteria

SECTION 3
RATIONAL METHOD AND MODIFIED RATIONAL METHOD

3.1 THE RATIONAL METHOD

The Rational Method (RM) is a mathematical formula used to determine the maximum runoff rate from a given rainfall. It has particular application in urban storm drainage, where it is used to estimate peak runoff rates from small urban and rural watersheds for the design of storm drains and small drainage structures. The RM is recommended for analyzing the runoff response from drainage areas up to approximately 1 square mile in size. It should not be used in instances where there is a junction of independent drainage systems or for drainage areas greater than approximately 1 square mile in size. In these instances, the Modified Rational Method (MRM) should be used for junctions of independent drainage systems in watersheds up to approximately 1 square mile in size (see Section 3.4); or the NRCS Hydrologic Method should be used for watersheds greater than approximately 1 square mile in size (see Section 4).

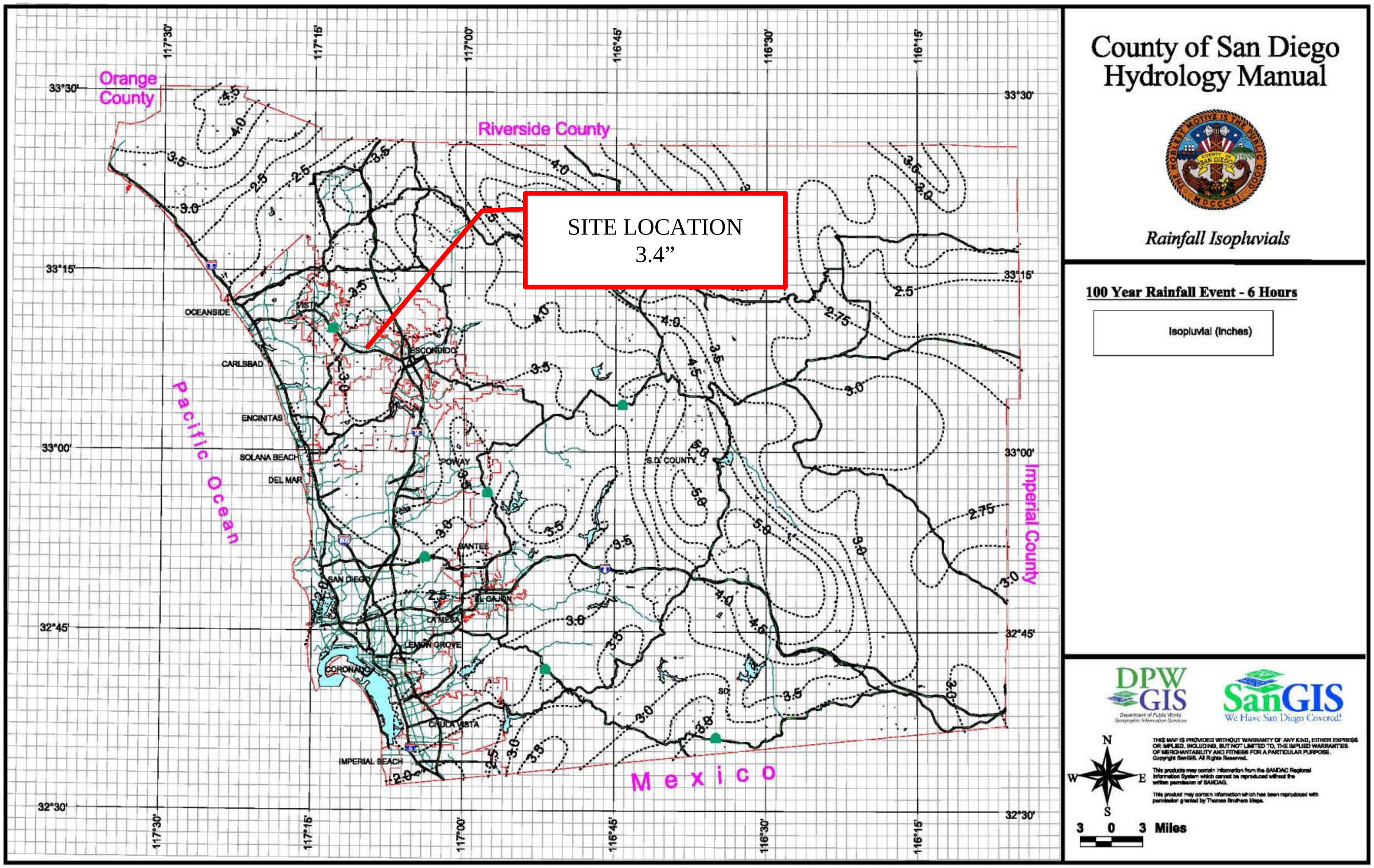
The RM can be applied using any design storm frequency (e.g., 100-year, 50-year, 10-year, etc.). The local agency determines the design storm frequency that must be used based on the type of project and specific local requirements. A discussion of design storm frequency is provided in Section 2.3 of this manual. A procedure has been developed that converts the 6-hour and 24-hour precipitation isopluvial map data to an Intensity-Duration curve that can be used for the rainfall intensity in the RM formula as shown in Figure 3-1. The RM is applicable to a 6-hour storm duration because the procedure uses Intensity-Duration Design Charts that are based on a 6-hour storm duration.

3.1.1 Rational Method Formula

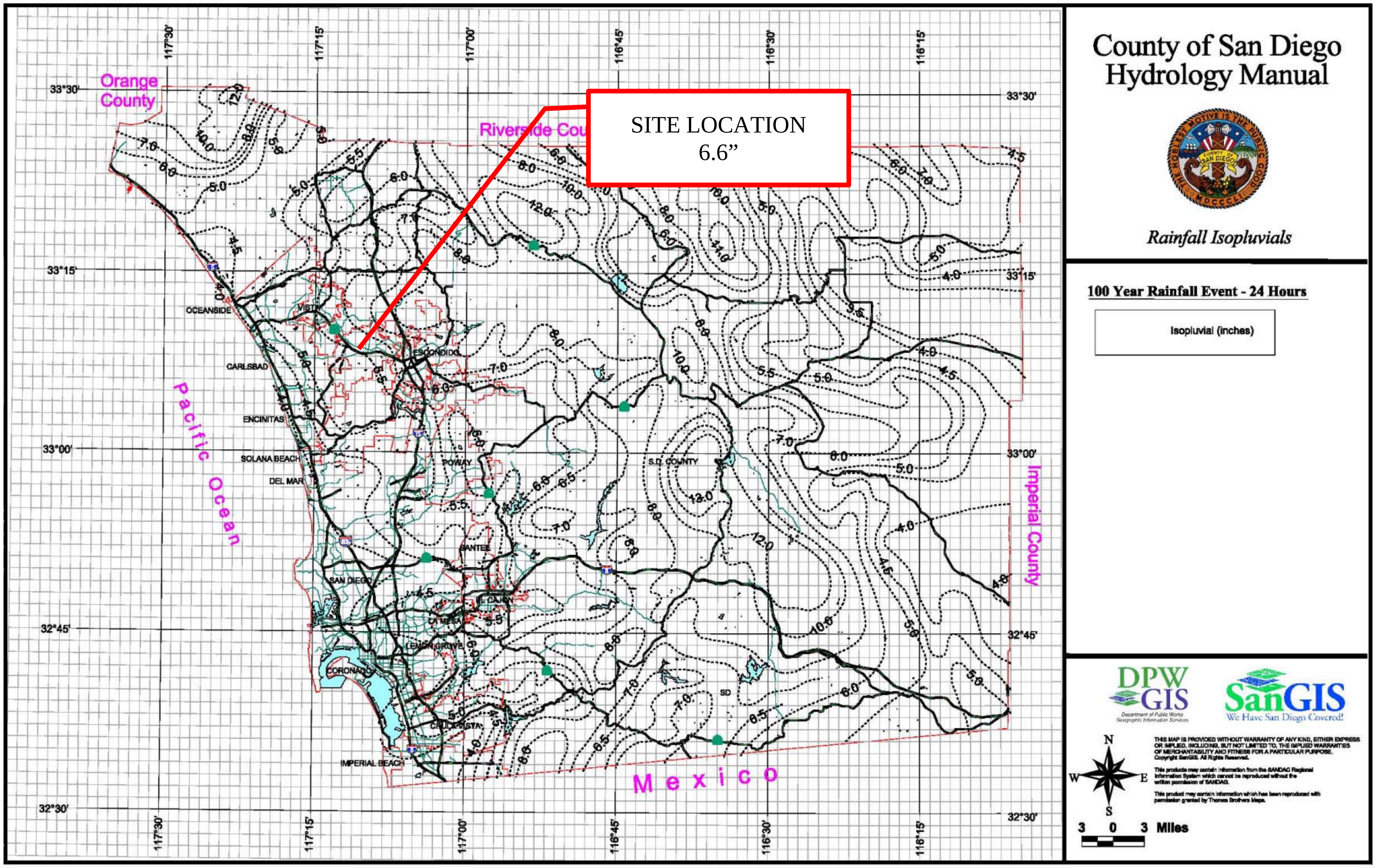
The RM formula estimates the peak rate of runoff at any location in a watershed as a function of the drainage area (A), runoff coefficient (C), and rainfall intensity (I) for a duration equal to the time of concentration (T_c), which is the time required for water to

2.2 – Design Rainfall Determination

2.2.1 – 100-Year, 6-Hour Rainfall Isopluvial Map



2.2.2 – 100-Year, 24-Hour Rainfall Isopluvial Map



2.3 – Runoff Coefficient Determination

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

- The storm frequency of peak discharges is the same as that of I for the given T_c.

- The fraction of rainfall that becomes runoff (or the runoff coefficient, C) is independent of I or precipitation zone number (PZN) condition (PZN Condition is discussed in Section 4.1.2.4).

- The peak rate of runoff is the only information produced by using the RM.

3.1.2 Runoff Coefficient

Table 3-1 lists the estimated runoff coefficients for urban areas. The concepts related to the runoff coefficient were evaluated in a report entitled *Evaluation, Rational Method "C" Values* (Hill, 2002) that was reviewed by the Hydrology Manual Committee. The Report is available at San Diego County Department of Public Works, Flood Control Section and on the San Diego County Department of Public Works web page.

The runoff coefficients are based on land use and soil type. Soil type can be determined from the soil type map provided in Appendix A. An appropriate runoff coefficient (C) for each type of land use in the subarea should be selected from this table and multiplied by the percentage of the total area (A) included in that class. The sum of the products for all land uses is the weighted runoff coefficient ($\Sigma[CA]$). Good engineering judgment should be used when applying the values presented in Table 3-1, as adjustments to these values may be appropriate based on site-specific characteristics. In any event, the impervious percentage (% Impervious) as given in the table, for any area, shall govern the selected value for C. The runoff coefficient can also be calculated for an area based on soil type and impervious percentage using the following formula:

$$C = 0.90 \times (\% \text{ Impervious}) + C_p \times (1 - \% \text{ Impervious})$$

Where: C_p = Pervious Coefficient Runoff Value for the soil type (shown in Table 3-1 as Undisturbed Natural Terrain/Permanent Open Space, 0% Impervious). Soil type can be determined from the soil type map provided in Appendix A.

The values in Table 3-1 are typical for most urban areas. However, if the basin contains rural or agricultural land use, parks, golf courses, or other types of nonurban land use that are expected to be permanent, the appropriate value should be selected based upon the soil and cover and approved by the local agency.

2.4 – Urban Watershed Overland Time of Flow Nomograph

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.

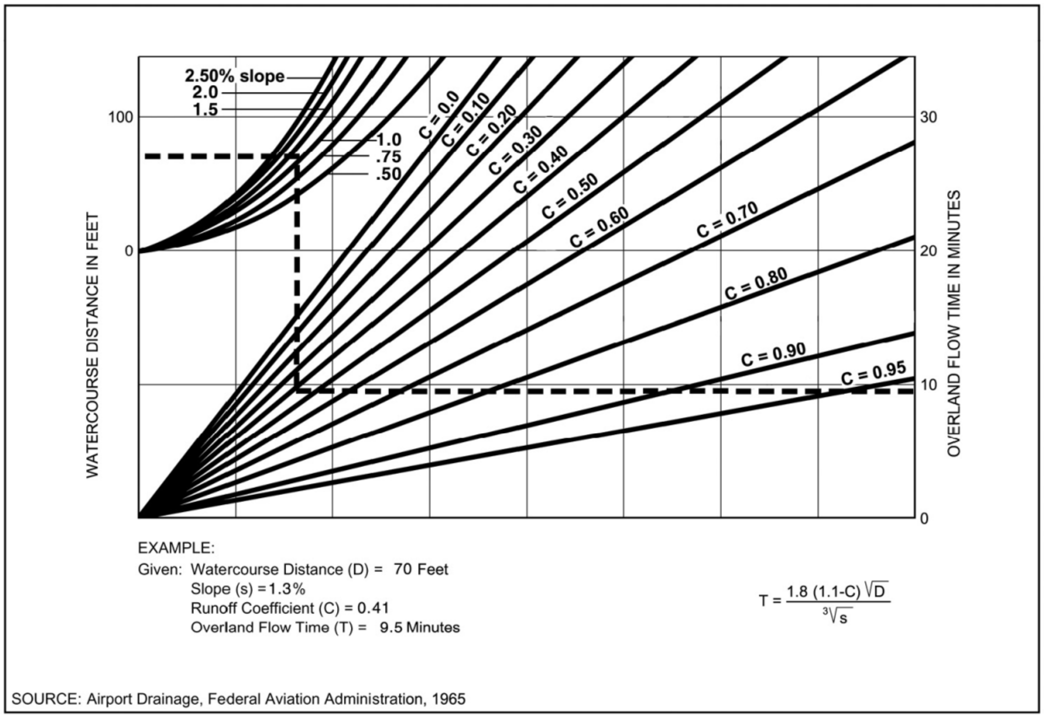
Table 3-2 provides limits of the length (Maximum Length (L_M)) of sheet flow to be used in hydrology studies. Initial T_i values based on average C values for the Land Use Element are also included. These values can be used in planning and design applications as described below. Exceptions may be approved 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/	.5%		1%		2%		3%		5%		10%	
	Acre	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

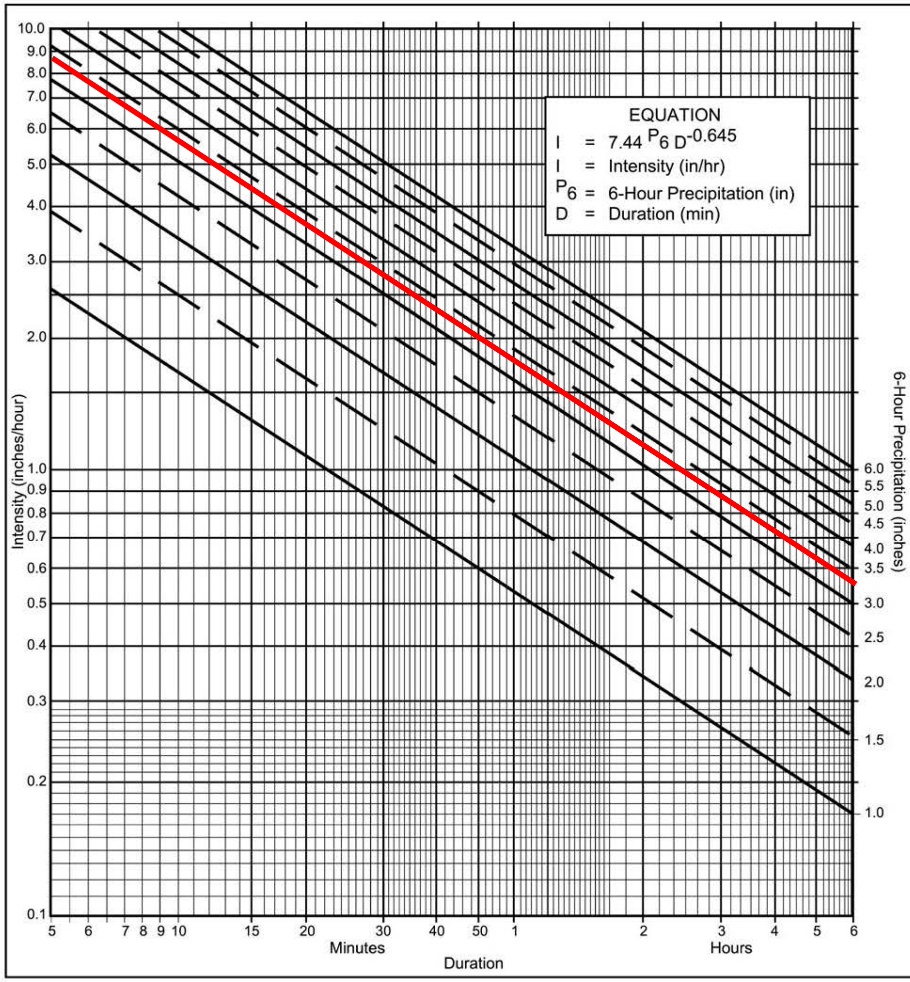
*See Table 3-1 for more detailed description



Rational Formula - Overland Time of Flow Nomograph

FIGURE **3-3**

2.5 – County of San Diego Intensity- Duration Curve



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 = 3.4 in., P_{24} = 6.6 , $\frac{P_6}{P_{24}}$ = 52 %(2)

(c) Adjusted $P_6^{(2)}$ = ______ in.

(d) t_x = ______ min.

(e) I = ______ 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

2.6 – Model Development Summary (from County of San Diego Hydrology Manual)

3.2 Developing Input Data for the Rational Method

This section describes the development of the necessary data to perform RM calculations. Section 3.3 describes the RM calculation process. Input data for calculating peak flows and T_c's with the RM should be developed as follows:

1. On a topographic base map, outline the overall drainage area boundary, showing adjacent drains, existing and proposed drains, and overland flow paths.

2. Verify the accuracy of the drainage map in the field.

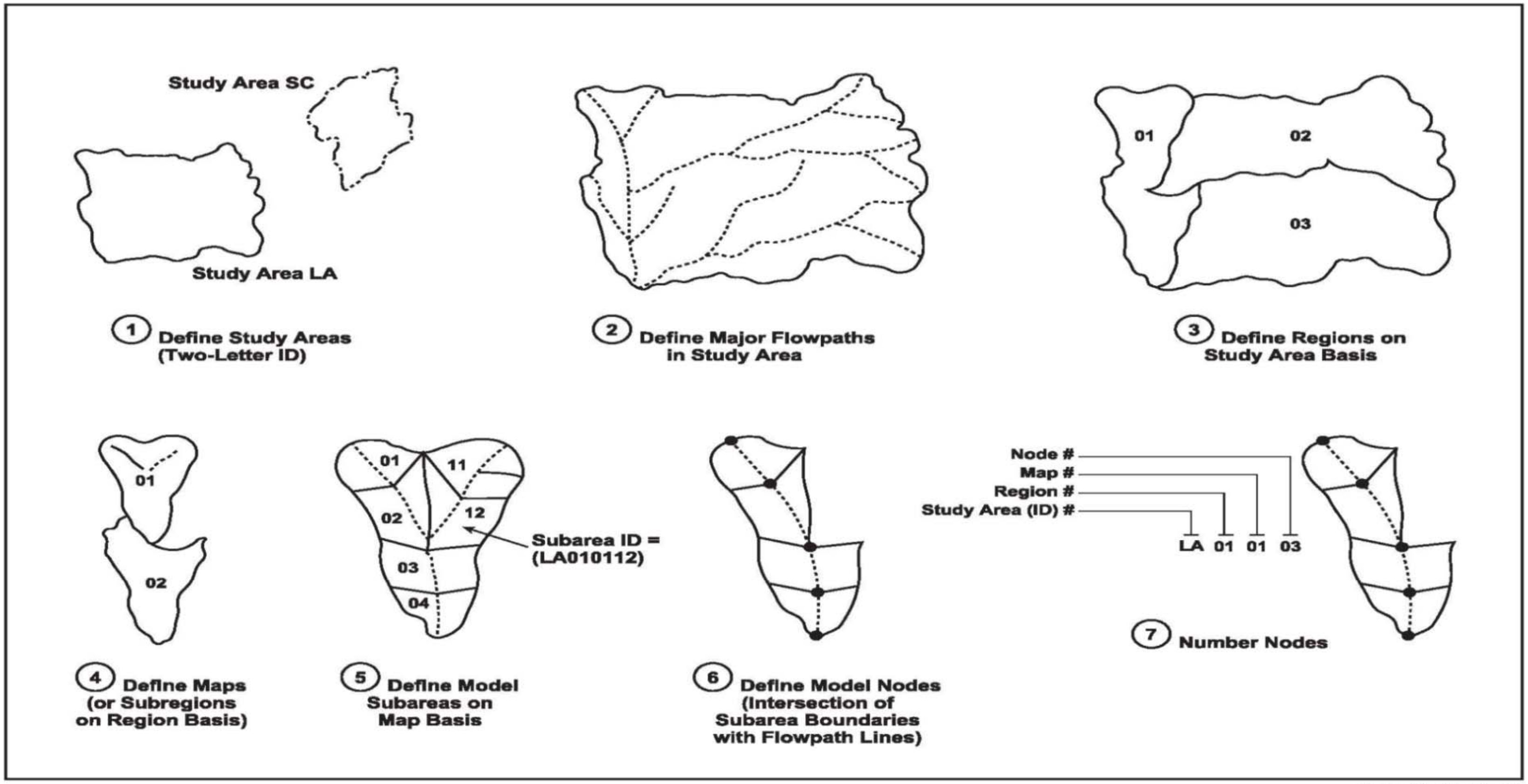
3. Divide the drainage area into subareas by locating significant points of interest. These divisions should be based on topography, soil type, and land use. Ensure that an appropriate first subarea is delineated. For natural areas, the first subarea flow path length should be less than or equal to 4,000 feet plus the overland flow length (Table 3-2). For developed areas, the initial subarea flow path length should be consistent with Table 3-2. The topography and slope within the initial subarea should be generally uniform.

4. Working from upstream to downstream, assign a number representing each subarea in the drainage system to each point of interest. Figure 3-8 provides guidelines for node numbers for geographic information system (GIS)-based studies.

5. Measure each subarea in the drainage area to determine its size in acres (A).

6. Determine the length and effective slope of the flow path in each subarea.

7. Identify the soil type for each subarea.



GIS/Hydrologic Model
Data Base Linkage Setup:
Nodes, Subareas, Links

FIGURE
3-8

8. Determine the runoff coefficient (C) for each subarea based on Table 3-1. If the subarea contains more than one type of development classification, use a proportionate average for C. In determining C for the subarea, use future land use taken from the applicable community plan, Multiple Species Conservation Plan, National Forest land use plan, etc.

9. Calculate the CA value for the subarea.

10. Calculate the Σ(CA) value(s) for the subareas upstream of the point(s) of interest.

11. Determine P_6 and P_{24} for the study using the isopluvial maps provided in Appendix B. If necessary, adjust the value for P_6 to be within 45% to 65% of the value for P_{24}.

See Section 3.3 for a description of the RM calculation process.

3.3 Performing Rational Method Calculations

This section describes the RM calculation process. Using the input data, calculation of peak flows and T_c's should be performed as follows:

1. Determine T_i for the first subarea. Use Table 3-2 or Figure 3-3 as discussed in Section 3.1.4. If the watershed is natural, the travel time to the downstream end of the first subarea can be added to T_i to obtain the T_c. Refer to paragraph 3.1.4.2 (a).

2. Determine I for the subarea using Figure 3-1. If T_i was less than 5 minutes, use the 5 minute time to determine intensity for calculating the flow.

3. Calculate the peak discharge flow rate for the subarea, where $Q_p = \Sigma(CA)\ I$.
In case that the downstream flow rate is less than the upstream flow rate, due to the long travel time that is not offset by the additional subarea runoff, use the upstream peak flow for design purposes until downstream flows increase again.

4. Estimate the T_t to the next point of interest.

5. Add the T_t to the previous T_c to obtain a new T_c.

6. Continue with step 2, above, until the final point of interest is reached.

Note: The MRM should be used to calculate the peak discharge when there is a junction from independent subareas into the drainage system.

3.4 MODIFIED RATIONAL METHOD (FOR JUNCTION ANALYSIS)

The purpose of this section is to describe the steps necessary to develop a hydrology report for a small watershed using the MRM. It is necessary to use the MRM if the watershed contains junctions of independent drainage systems. The process is based on the design manuals of the City/County of San Diego. The general process description for using this method, including an example of the application of this method, is described below.

The engineer should only use the MRM for drainage areas up to approximately 1 square mile in size. If the watershed will significantly exceed 1 square mile then the NRCS method described in Section 4 should be used. The engineer may choose to use either the RM or the MRM for calculations for up to an approximately 1-square-mile area and then transition the study to the NRCS method for additional downstream areas that exceed approximately 1 square mile. The transition process is described in Section 4.

3.4.1 Modified Rational Method General Process Description

The general process for the MRM differs from the RM only when a junction of independent drainage systems is reached. The peak Q, T_c, and I for each of the independent drainage systems at the point of the junction are calculated by the RM. The independent drainage systems are then combined using the MRM procedure described below. The peak Q, T_c, and I for each of the independent drainage systems at the point of the junction must be calculated prior to using the MRM procedure to combine the independent drainage systems, as these values will be used for the MRM calculations. After the independent drainage systems have been combined, RM calculations are continued to the next point of interest.

3.4.2 Procedure for Combining Independent Drainage Systems at a Junction

Calculate the peak Q, T_c, and I for each of the independent drainage systems at the point of the junction. These values will be used for the MRM calculations.

At the junction of two or more independent drainage systems, the respective peak flows are combined to obtain the maximum flow out of the junction at T_c. Based on the approximation that total runoff increases directly in proportion to time, a general equation may be written to determine the maximum Q and its corresponding T_c using the peak Q, T_c, and I for each of the independent drainage systems at the point immediately before the junction. The general equation requires that contributing Q's be numbered in order of increasing T_c.

Let Q_1, T_1, and I_1 correspond to the tributary area with the shortest T_c. Likewise, let Q_2, T_2, and I_2 correspond to the tributary area with the next longer T_c; Q_3, T_3, and I_3 correspond to the tributary area with the next longer T_c; and so on. When only two independent drainage systems are combined, leave Q_3, T_3, and I_3 out of the equation. Combine the independent drainage systems using the junction equation below:

Junction Equation: $\mathbf{T_1 < T_2 < T_3}$

$$Q_{T1} = Q_1 + \frac{T_1}{T_2} Q_2 + \frac{T_1}{T_3} Q_3$$

$$Q_{T2} = Q_2 + \frac{I_2}{I_1} Q_1 + \frac{T_2}{T_3} Q_3$$

$$Q_{T3} = Q_3 + \frac{I_3}{I_1} Q_1 + \frac{I_3}{I_2} Q_2$$

Calculate Q_{T1}, Q_{T2}, and Q_{T3}. Select the largest Q and use the T_c associated with that Q for further calculations (see the three Notes for options). If the largest calculated Q's are equal (e.g., $Q_{T1} = Q_{T2} > Q_{T3}$), use the shorter of the T_c's associated with that Q.

This equation may be expanded for a junction of more than three independent drainage systems using the same concept. The concept is that when Q from a selected subarea (e.g., Q_2) is combined with Q from another subarea with a shorter T_c (e.g., Q_1), the Q from the subarea with the shorter T_c is reduced by the ratio of the I's (I_2/I_1); and when Q from a selected subarea (e.g., Q_2) is combined with Q from another subarea with a longer T_c (e.g., Q_3), the Q from the subarea with the longer T_c is reduced by the ratio of the T_c's (T_2/T_3).

<u>Note #1</u>: At a junction of two independent drainage systems that have the same T_c, the tributary flows may be added to obtain the Q_p.

$$Q_p = Q_1 + Q_2 ; \text{ when } T_1 = T_2; \text{ and } T_c = T_1 = T_2$$

This can be verified by using the junction equation above. Let Q_3, T_3, and $I_3 = 0$. When T_1 and T_2 are the same, I_1 and I_2 are also the same, and T_1/T_2 and $I_2/I_1 = 1$. T_1/T_2 and I_2/I_1 are cancelled from the equations. At this point, $Q_{T1} = Q_{T2} = Q_1 + Q_2$.

<u>Note #2</u>: In the upstream part of a watershed, a conservative computation is acceptable. When the times of concentration (T_c's) are relatively close in magnitude (within 10%), use the shorter T_c for the intensity and the equation $Q = \Sigma(CA)I$.

<u>Note #3</u>: . An optional method of determining the T_c is to use the equation
$T_c = [(\Sigma\ (CA)7.44\ P_6)/Q]^{1.55}$

This equation is from $Q = \Sigma(CA)I = \Sigma(CA)(7.44\ P_6/T_c^{.645})$ and solving for T_c. The advantage in this option is that the T_c is consistent with the peak flow Q, and avoids inappropriate fluctuation in downstream flows in some cases.

CHAPTER 3 - HEC-HMS Modified-Puls Routing Analysis

Stage-Storage-Discharge Summary Table

Depth (ft)	Area (ft2)	Volume (ft3)	Ac-Ft	Q-out (cfs)	
0	400	0	0	0	
1	400	400	0.009183	0	
2	400	800	0.018365	0	
3	400	1200	0.027548	0	DCV Contained
3.2	400	1280	0.029385	0.015	
4	400	1600	0.036731	0.015	
5	400	2000	0.045914	0.015	
6	400	2400	0.055096	0.015	
7	400	2800	0.064279	0.015	
7.25	400	2900	0.066575	1.5015	
8	400	3200	0.073462	1.5015	
9	400	3600	0.082645	1.5015	

RATIONAL METHOD HYDROGRAPH PROGRAM

RUN DATE 10/21/2022
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 6 MIN.
6 HOUR RAINFALL 3.4 INCHES
BASIN AREA 0.67 ACRES
RUNOFF COEFFICIENT 0.75
PEAK DISCHARGE 3.9 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 6	DISCHARGE (CFS) = 0.1
TIME (MIN) = 12	DISCHARGE (CFS) = 0.1
TIME (MIN) = 18	DISCHARGE (CFS) = 0.1
TIME (MIN) = 24	DISCHARGE (CFS) = 0.1
TIME (MIN) = 30	DISCHARGE (CFS) = 0.1
TIME (MIN) = 36	DISCHARGE (CFS) = 0.1
TIME (MIN) = 42	DISCHARGE (CFS) = 0.1
TIME (MIN) = 48	DISCHARGE (CFS) = 0.1
TIME (MIN) = 54	DISCHARGE (CFS) = 0.1
TIME (MIN) = 60	DISCHARGE (CFS) = 0.1
TIME (MIN) = 66	DISCHARGE (CFS) = 0.1
TIME (MIN) = 72	DISCHARGE (CFS) = 0.1
TIME (MIN) = 78	DISCHARGE (CFS) = 0.1
TIME (MIN) = 84	DISCHARGE (CFS) = 0.1
TIME (MIN) = 90	DISCHARGE (CFS) = 0.1
TIME (MIN) = 96	DISCHARGE (CFS) = 0.1
TIME (MIN) = 102	DISCHARGE (CFS) = 0.1
TIME (MIN) = 108	DISCHARGE (CFS) = 0.1
TIME (MIN) = 114	DISCHARGE (CFS) = 0.2
TIME (MIN) = 120	DISCHARGE (CFS) = 0.2
TIME (MIN) = 126	DISCHARGE (CFS) = 0.2
TIME (MIN) = 132	DISCHARGE (CFS) = 0.2
TIME (MIN) = 138	DISCHARGE (CFS) = 0.2
TIME (MIN) = 144	DISCHARGE (CFS) = 0.2
TIME (MIN) = 150	DISCHARGE (CFS) = 0.2
TIME (MIN) = 156	DISCHARGE (CFS) = 0.2
TIME (MIN) = 162	DISCHARGE (CFS) = 0.2
TIME (MIN) = 168	DISCHARGE (CFS) = 0.2
TIME (MIN) = 174	DISCHARGE (CFS) = 0.2
TIME (MIN) = 180	DISCHARGE (CFS) = 0.2
TIME (MIN) = 186	DISCHARGE (CFS) = 0.3
TIME (MIN) = 192	DISCHARGE (CFS) = 0.3
TIME (MIN) = 198	DISCHARGE (CFS) = 0.3
TIME (MIN) = 204	DISCHARGE (CFS) = 0.3
TIME (MIN) = 210	DISCHARGE (CFS) = 0.4
TIME (MIN) = 216	DISCHARGE (CFS) = 0.4
TIME (MIN) = 222	DISCHARGE (CFS) = 0.5
TIME (MIN) = 228	DISCHARGE (CFS) = 0.5
TIME (MIN) = 234	DISCHARGE (CFS) = 0.8
TIME (MIN) = 240	DISCHARGE (CFS) = 1.2
TIME (MIN) = 246	DISCHARGE (CFS) = 3.9
TIME (MIN) = 252	DISCHARGE (CFS) = 0.6
TIME (MIN) = 258	DISCHARGE (CFS) = 0.4
TIME (MIN) = 264	DISCHARGE (CFS) = 0.3
TIME (MIN) = 270	DISCHARGE (CFS) = 0.3
TIME (MIN) = 276	DISCHARGE (CFS) = 0.2
TIME (MIN) = 282	DISCHARGE (CFS) = 0.2
TIME (MIN) = 288	DISCHARGE (CFS) = 0.2
TIME (MIN) = 294	DISCHARGE (CFS) = 0.2
TIME (MIN) = 300	DISCHARGE (CFS) = 0.2
TIME (MIN) = 306	DISCHARGE (CFS) = 0.2
TIME (MIN) = 312	DISCHARGE (CFS) = 0.1
TIME (MIN) = 318	DISCHARGE (CFS) = 0.1
TIME (MIN) = 324	DISCHARGE (CFS) = 0.1
TIME (MIN) = 330	DISCHARGE (CFS) = 0.1
TIME (MIN) = 336	DISCHARGE (CFS) = 0.1
TIME (MIN) = 342	DISCHARGE (CFS) = 0.1
TIME (MIN) = 348	DISCHARGE (CFS) = 0.1
TIME (MIN) = 354	DISCHARGE (CFS) = 0.1
TIME (MIN) = 360	DISCHARGE (CFS) = 0.1
TIME (MIN) = 366	DISCHARGE (CFS) = 0

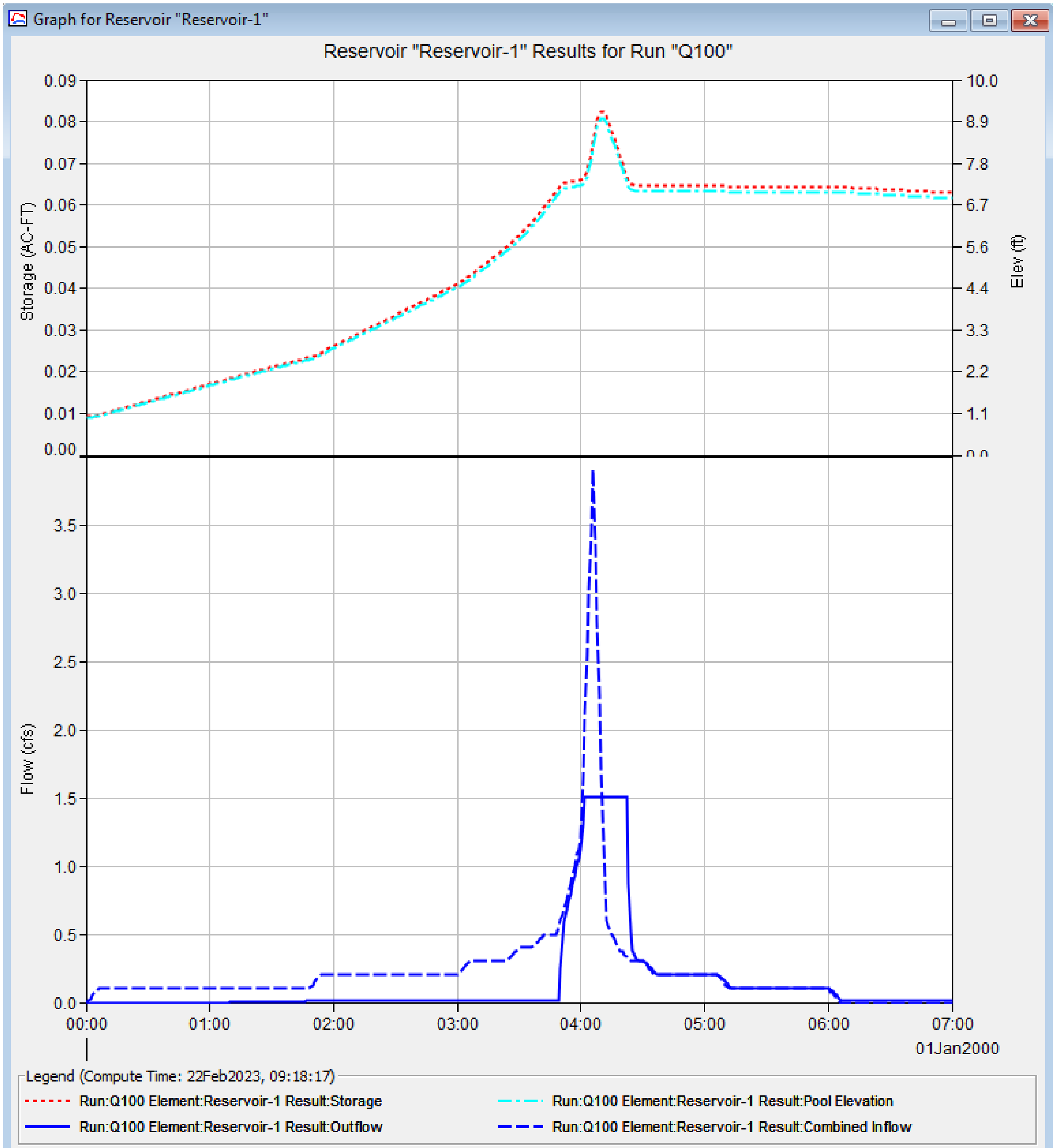
Project: Pico Simulation Run: Q100
Reservoir: Reservoir-1

Start of Run:	01Jan2000, 00:00	Basin Model:	Basin 1
End of Run:	01Jan2000, 07:00	Meteorologic Model:	Met 1
Compute Time:	22Feb2023, 09:18:17	Control Specifications:	Control 1

Volume Units: IN

Computed Results

Peak Inflow:	3.90 (CFS)	Date/Time of Peak Inflow:	01Jan2000, 04:06
Peak Discharge:	1.50 (CFS)	Date/Time of Peak Discharge:	01Jan2000, 04:10
Inflow Volume:	n/a	Peak Storage:	0.08 (ACRE-FT)
Discharge Volume:	n/a	Peak Elevation:	8.964 (FT)



Graph for Reservoir "Reservoir-1"
Reservoir "Reservoir-1" Results for Run "Q100"
Storage (AC-FT)
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
Elev (ft)
10.0
8.9
7.8
6.7
5.6
4.4
3.3
2.2
1.1
0.0
Flow (cfs)
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
01Jan2000
Legend (Compute Time: 22Feb2023, 09:18:17)
Run:Q100 Element:Reservoir-1 Result:Storage
Run:Q100 Element:Reservoir-1 Result:Pool Elevation
Run:Q100 Element:Reservoir-1 Result:Outflow
Run:Q100 Element:Reservoir-1 Result:Combined Inflow

Project: Pico Simulation Run: Q100
Reservoir: Reservoir-1

Start of Run: 01Jan2000, 00:00 Basin Model: Basin 1
End of Run: 01Jan2000, 07:00 Meteorologic Model: Met 1
Compute Time: 22Feb2023, 09:18:17 Control Specifications: Control 1

Date	Time	Inflow (CFS)	Storage (ACRE-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	00:00	0.00	0.01	1.000	0.00
01Jan2000	00:01	0.02	0.01	1.001	0.00
01Jan2000	00:02	0.03	0.01	1.005	0.00
01Jan2000	00:03	0.05	0.01	1.011	0.00
01Jan2000	00:04	0.07	0.01	1.020	0.00
01Jan2000	00:05	0.08	0.01	1.031	0.00
01Jan2000	00:06	0.10	0.01	1.045	0.00
01Jan2000	00:07	0.10	0.01	1.060	0.00
01Jan2000	00:08	0.10	0.01	1.075	0.00
01Jan2000	00:09	0.10	0.01	1.090	0.00
01Jan2000	00:10	0.10	0.01	1.105	0.00
01Jan2000	00:11	0.10	0.01	1.120	0.00
01Jan2000	00:12	0.10	0.01	1.135	0.00
01Jan2000	00:13	0.10	0.01	1.150	0.00
01Jan2000	00:14	0.10	0.01	1.165	0.00
01Jan2000	00:15	0.10	0.01	1.180	0.00
01Jan2000	00:16	0.10	0.01	1.195	0.00
01Jan2000	00:17	0.10	0.01	1.210	0.00
01Jan2000	00:18	0.10	0.01	1.225	0.00
01Jan2000	00:19	0.10	0.01	1.240	0.00
01Jan2000	00:20	0.10	0.01	1.255	0.00
01Jan2000	00:21	0.10	0.01	1.270	0.00
01Jan2000	00:22	0.10	0.01	1.285	0.00
01Jan2000	00:23	0.10	0.01	1.300	0.00
01Jan2000	00:24	0.10	0.01	1.315	0.00
01Jan2000	00:25	0.10	0.01	1.330	0.00

Date	Time	Inflow (CFS)	Storage (ACRE-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	00:26	0.10	0.01	1.345	0.00
01Jan2000	00:27	0.10	0.01	1.360	0.00
01Jan2000	00:28	0.10	0.01	1.375	0.00
01Jan2000	00:29	0.10	0.01	1.390	0.00
01Jan2000	00:30	0.10	0.01	1.405	0.00
01Jan2000	00:31	0.10	0.01	1.420	0.00
01Jan2000	00:32	0.10	0.01	1.435	0.00
01Jan2000	00:33	0.10	0.01	1.450	0.00
01Jan2000	00:34	0.10	0.01	1.465	0.00
01Jan2000	00:35	0.10	0.01	1.480	0.00
01Jan2000	00:36	0.10	0.01	1.495	0.00
01Jan2000	00:37	0.10	0.01	1.510	0.00
01Jan2000	00:38	0.10	0.01	1.525	0.00
01Jan2000	00:39	0.10	0.01	1.540	0.00
01Jan2000	00:40	0.10	0.01	1.555	0.00
01Jan2000	00:41	0.10	0.01	1.570	0.00
01Jan2000	00:42	0.10	0.01	1.585	0.00
01Jan2000	00:43	0.10	0.01	1.600	0.00
01Jan2000	00:44	0.10	0.01	1.615	0.00
01Jan2000	00:45	0.10	0.01	1.630	0.00
01Jan2000	00:46	0.10	0.02	1.645	0.00
01Jan2000	00:47	0.10	0.02	1.660	0.00
01Jan2000	00:48	0.10	0.02	1.675	0.00
01Jan2000	00:49	0.10	0.02	1.690	0.00
01Jan2000	00:50	0.10	0.02	1.705	0.00
01Jan2000	00:51	0.10	0.02	1.720	0.00
01Jan2000	00:52	0.10	0.02	1.735	0.00
01Jan2000	00:53	0.10	0.02	1.750	0.00
01Jan2000	00:54	0.10	0.02	1.765	0.00
01Jan2000	00:55	0.10	0.02	1.780	0.00
01Jan2000	00:56	0.10	0.02	1.795	0.00

Date	Time	Inflow (CFS)	Storage (ACRE-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	00:57	0.10	0.02	1.810	0.00
01Jan2000	00:58	0.10	0.02	1.825	0.00
01Jan2000	00:59	0.10	0.02	1.840	0.00
01Jan2000	01:00	0.10	0.02	1.855	0.00
01Jan2000	01:01	0.10	0.02	1.870	0.00
01Jan2000	01:02	0.10	0.02	1.885	0.00
01Jan2000	01:03	0.10	0.02	1.900	0.00
01Jan2000	01:04	0.10	0.02	1.915	0.00
01Jan2000	01:05	0.10	0.02	1.930	0.00
01Jan2000	01:06	0.10	0.02	1.945	0.00
01Jan2000	01:07	0.10	0.02	1.960	0.00
01Jan2000	01:08	0.10	0.02	1.975	0.00
01Jan2000	01:09	0.10	0.02	1.990	0.00
01Jan2000	01:10	0.10	0.02	2.005	0.00
01Jan2000	01:11	0.10	0.02	2.020	0.00
01Jan2000	01:12	0.10	0.02	2.035	0.00
01Jan2000	01:13	0.10	0.02	2.050	0.00
01Jan2000	01:14	0.10	0.02	2.065	0.00
01Jan2000	01:15	0.10	0.02	2.079	0.00
01Jan2000	01:16	0.10	0.02	2.094	0.00
01Jan2000	01:17	0.10	0.02	2.109	0.00
01Jan2000	01:18	0.10	0.02	2.124	0.00
01Jan2000	01:19	0.10	0.02	2.138	0.00
01Jan2000	01:20	0.10	0.02	2.153	0.00
01Jan2000	01:21	0.10	0.02	2.167	0.00
01Jan2000	01:22	0.10	0.02	2.182	0.00
01Jan2000	01:23	0.10	0.02	2.196	0.00
01Jan2000	01:24	0.10	0.02	2.211	0.00
01Jan2000	01:25	0.10	0.02	2.225	0.00
01Jan2000	01:26	0.10	0.02	2.239	0.00
01Jan2000	01:27	0.10	0.02	2.254	0.00

Date	Time	Inflow (CFS)	Storage (ACRE-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	01:28	0.10	0.02	2.268	0.01
01Jan2000	01:29	0.10	0.02	2.282	0.01
01Jan2000	01:30	0.10	0.02	2.296	0.01
01Jan2000	01:31	0.10	0.02	2.310	0.01
01Jan2000	01:32	0.10	0.02	2.325	0.01
01Jan2000	01:33	0.10	0.02	2.339	0.01
01Jan2000	01:34	0.10	0.02	2.353	0.01
01Jan2000	01:35	0.10	0.02	2.367	0.01
01Jan2000	01:36	0.10	0.02	2.381	0.01
01Jan2000	01:37	0.10	0.02	2.394	0.01
01Jan2000	01:38	0.10	0.02	2.408	0.01
01Jan2000	01:39	0.10	0.02	2.422	0.01
01Jan2000	01:40	0.10	0.02	2.436	0.01
01Jan2000	01:41	0.10	0.02	2.450	0.01
01Jan2000	01:42	0.10	0.02	2.463	0.01
01Jan2000	01:43	0.10	0.02	2.477	0.01
01Jan2000	01:44	0.10	0.02	2.491	0.01
01Jan2000	01:45	0.10	0.02	2.504	0.01
01Jan2000	01:46	0.10	0.02	2.518	0.01
01Jan2000	01:47	0.10	0.02	2.531	0.01
01Jan2000	01:48	0.10	0.02	2.545	0.01
01Jan2000	01:49	0.12	0.02	2.560	0.01
01Jan2000	01:50	0.13	0.02	2.577	0.01
01Jan2000	01:51	0.15	0.02	2.596	0.01
01Jan2000	01:52	0.17	0.02	2.618	0.01
01Jan2000	01:53	0.18	0.02	2.643	0.01
01Jan2000	01:54	0.20	0.02	2.669	0.01
01Jan2000	01:55	0.20	0.02	2.697	0.01
01Jan2000	01:56	0.20	0.03	2.725	0.01
01Jan2000	01:57	0.20	0.03	2.753	0.01
01Jan2000	01:58	0.20	0.03	2.781	0.01

Date	Time	Inflow (CFS)	Storage (ACRE-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	01:59	0.20	0.03	2.809	0.02
01Jan2000	02:00	0.20	0.03	2.837	0.02
01Jan2000	02:01	0.20	0.03	2.864	0.02
01Jan2000	02:02	0.20	0.03	2.892	0.02
01Jan2000	02:03	0.20	0.03	2.919	0.02
01Jan2000	02:04	0.20	0.03	2.946	0.02
01Jan2000	02:05	0.20	0.03	2.974	0.02
01Jan2000	02:06	0.20	0.03	3.001	0.02
01Jan2000	02:07	0.20	0.03	3.028	0.02
01Jan2000	02:08	0.20	0.03	3.055	0.02
01Jan2000	02:09	0.20	0.03	3.082	0.02
01Jan2000	02:10	0.20	0.03	3.109	0.02
01Jan2000	02:11	0.20	0.03	3.137	0.02
01Jan2000	02:12	0.20	0.03	3.164	0.02
01Jan2000	02:13	0.20	0.03	3.191	0.02
01Jan2000	02:14	0.20	0.03	3.218	0.02
01Jan2000	02:15	0.20	0.03	3.245	0.02
01Jan2000	02:16	0.20	0.03	3.272	0.02
01Jan2000	02:17	0.20	0.03	3.299	0.02
01Jan2000	02:18	0.20	0.03	3.327	0.02
01Jan2000	02:19	0.20	0.03	3.354	0.02
01Jan2000	02:20	0.20	0.03	3.381	0.02
01Jan2000	02:21	0.20	0.03	3.408	0.02
01Jan2000	02:22	0.20	0.03	3.435	0.02
01Jan2000	02:23	0.20	0.03	3.462	0.02
01Jan2000	02:24	0.20	0.03	3.490	0.02
01Jan2000	02:25	0.20	0.03	3.517	0.02
01Jan2000	02:26	0.20	0.03	3.544	0.02
01Jan2000	02:27	0.20	0.03	3.571	0.02
01Jan2000	02:28	0.20	0.03	3.598	0.02
01Jan2000	02:29	0.20	0.03	3.625	0.02

Date	Time	Inflow (CFS)	Storage (ACRE-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	02:30	0.20	0.03	3.652	0.02
01Jan2000	02:31	0.20	0.03	3.680	0.02
01Jan2000	02:32	0.20	0.03	3.707	0.02
01Jan2000	02:33	0.20	0.03	3.734	0.02
01Jan2000	02:34	0.20	0.03	3.761	0.02
01Jan2000	02:35	0.20	0.03	3.788	0.02
01Jan2000	02:36	0.20	0.04	3.815	0.02
01Jan2000	02:37	0.20	0.04	3.842	0.02
01Jan2000	02:38	0.20	0.04	3.870	0.02
01Jan2000	02:39	0.20	0.04	3.897	0.02
01Jan2000	02:40	0.20	0.04	3.924	0.02
01Jan2000	02:41	0.20	0.04	3.951	0.02
01Jan2000	02:42	0.20	0.04	3.978	0.02
01Jan2000	02:43	0.20	0.04	4.005	0.02
01Jan2000	02:44	0.20	0.04	4.033	0.02
01Jan2000	02:45	0.20	0.04	4.060	0.02
01Jan2000	02:46	0.20	0.04	4.087	0.02
01Jan2000	02:47	0.20	0.04	4.114	0.02
01Jan2000	02:48	0.20	0.04	4.141	0.02
01Jan2000	02:49	0.20	0.04	4.168	0.02
01Jan2000	02:50	0.20	0.04	4.195	0.02
01Jan2000	02:51	0.20	0.04	4.223	0.02
01Jan2000	02:52	0.20	0.04	4.250	0.02
01Jan2000	02:53	0.20	0.04	4.277	0.02
01Jan2000	02:54	0.20	0.04	4.304	0.02
01Jan2000	02:55	0.20	0.04	4.331	0.02
01Jan2000	02:56	0.20	0.04	4.358	0.02
01Jan2000	02:57	0.20	0.04	4.385	0.02
01Jan2000	02:58	0.20	0.04	4.413	0.02
01Jan2000	02:59	0.20	0.04	4.440	0.02
01Jan2000	03:00	0.20	0.04	4.467	0.02

Date	Time	Inflow (CFS)	Storage (ACRE-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	03:01	0.22	0.04	4.496	0.02
01Jan2000	03:02	0.23	0.04	4.526	0.02
01Jan2000	03:03	0.25	0.04	4.560	0.02
01Jan2000	03:04	0.27	0.04	4.596	0.02
01Jan2000	03:05	0.28	0.04	4.634	0.02
01Jan2000	03:06	0.30	0.04	4.675	0.02
01Jan2000	03:07	0.30	0.04	4.717	0.02
01Jan2000	03:08	0.30	0.04	4.759	0.02
01Jan2000	03:09	0.30	0.04	4.801	0.02
01Jan2000	03:10	0.30	0.04	4.843	0.02
01Jan2000	03:11	0.30	0.04	4.886	0.02
01Jan2000	03:12	0.30	0.05	4.928	0.02
01Jan2000	03:13	0.30	0.05	4.970	0.02
01Jan2000	03:14	0.30	0.05	5.012	0.02
01Jan2000	03:15	0.30	0.05	5.054	0.02
01Jan2000	03:16	0.30	0.05	5.096	0.02
01Jan2000	03:17	0.30	0.05	5.138	0.02
01Jan2000	03:18	0.30	0.05	5.181	0.02
01Jan2000	03:19	0.30	0.05	5.223	0.02
01Jan2000	03:20	0.30	0.05	5.265	0.02
01Jan2000	03:21	0.30	0.05	5.307	0.02
01Jan2000	03:22	0.30	0.05	5.349	0.02
01Jan2000	03:23	0.30	0.05	5.391	0.02
01Jan2000	03:24	0.30	0.05	5.434	0.02
01Jan2000	03:25	0.32	0.05	5.477	0.02
01Jan2000	03:26	0.33	0.05	5.523	0.02
01Jan2000	03:27	0.35	0.05	5.571	0.02
01Jan2000	03:28	0.37	0.05	5.622	0.02
01Jan2000	03:29	0.38	0.05	5.676	0.02
01Jan2000	03:30	0.40	0.05	5.731	0.02
01Jan2000	03:31	0.40	0.05	5.789	0.02

Date	Time	Inflow (CFS)	Storage (ACRE-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	03:32	0.40	0.05	5.846	0.02
01Jan2000	03:33	0.40	0.05	5.903	0.02
01Jan2000	03:34	0.40	0.05	5.960	0.02
01Jan2000	03:35	0.40	0.06	6.017	0.02
01Jan2000	03:36	0.40	0.06	6.074	0.02
01Jan2000	03:37	0.42	0.06	6.133	0.02
01Jan2000	03:38	0.43	0.06	6.194	0.02
01Jan2000	03:39	0.45	0.06	6.257	0.02
01Jan2000	03:40	0.47	0.06	6.323	0.02
01Jan2000	03:41	0.48	0.06	6.392	0.02
01Jan2000	03:42	0.50	0.06	6.462	0.02
01Jan2000	03:43	0.50	0.06	6.534	0.02
01Jan2000	03:44	0.50	0.06	6.607	0.02
01Jan2000	03:45	0.50	0.06	6.679	0.02
01Jan2000	03:46	0.50	0.06	6.751	0.02
01Jan2000	03:47	0.50	0.06	6.823	0.02
01Jan2000	03:48	0.50	0.06	6.895	0.02
01Jan2000	03:49	0.55	0.06	6.971	0.02
01Jan2000	03:50	0.60	0.06	7.038	0.24
01Jan2000	03:51	0.65	0.06	7.077	0.48
01Jan2000	03:52	0.70	0.07	7.098	0.60
01Jan2000	03:53	0.75	0.07	7.111	0.68
01Jan2000	03:54	0.80	0.07	7.121	0.74
01Jan2000	03:55	0.87	0.07	7.131	0.80
01Jan2000	03:56	0.93	0.07	7.142	0.86
01Jan2000	03:57	1.00	0.07	7.153	0.92
01Jan2000	03:58	1.07	0.07	7.164	0.99
01Jan2000	03:59	1.13	0.07	7.175	1.06
01Jan2000	04:00	1.20	0.07	7.186	1.12
01Jan2000	04:01	1.65	0.07	7.218	1.31
01Jan2000	04:02	2.10	0.07	7.288	1.50

Date	Time	Inflow (CFS)	Storage (ACRE-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	04:03	2.55	0.07	7.411	1.50
01Jan2000	04:04	3.00	0.07	7.602	1.50
01Jan2000	04:05	3.45	0.07	7.861	1.50
01Jan2000	04:06	3.90	0.08	8.186	1.50
01Jan2000	04:07	3.35	0.08	8.505	1.50
01Jan2000	04:08	2.80	0.08	8.740	1.50
01Jan2000	04:09	2.25	0.08	8.894	1.50
01Jan2000	04:10	1.70	0.08	8.964	1.50
01Jan2000	04:11	1.15	0.08	8.952	1.50
01Jan2000	04:12	0.60	0.08	8.858	1.50
01Jan2000	04:13	0.57	0.08	8.720	1.50
01Jan2000	04:14	0.53	0.08	8.577	1.50
01Jan2000	04:15	0.50	0.08	8.429	1.50
01Jan2000	04:16	0.47	0.08	8.276	1.50
01Jan2000	04:17	0.43	0.07	8.118	1.50
01Jan2000	04:18	0.40	0.07	7.955	1.50
01Jan2000	04:19	0.38	0.07	7.788	1.50
01Jan2000	04:20	0.37	0.07	7.619	1.50
01Jan2000	04:21	0.35	0.07	7.448	1.50
01Jan2000	04:22	0.33	0.07	7.273	1.50
01Jan2000	04:23	0.32	0.07	7.144	0.87
01Jan2000	04:24	0.30	0.07	7.085	0.53
01Jan2000	04:25	0.30	0.06	7.062	0.39
01Jan2000	04:26	0.30	0.06	7.053	0.33
01Jan2000	04:27	0.30	0.06	7.050	0.31
01Jan2000	04:28	0.30	0.06	7.048	0.30
01Jan2000	04:29	0.30	0.06	7.048	0.30
01Jan2000	04:30	0.30	0.06	7.047	0.30
01Jan2000	04:31	0.28	0.06	7.046	0.29
01Jan2000	04:32	0.27	0.06	7.044	0.28
01Jan2000	04:33	0.25	0.06	7.042	0.27

Date	Time	Inflow (CFS)	Storage (ACRE-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	04:34	0.23	0.06	7.039	0.25
01Jan2000	04:35	0.22	0.06	7.036	0.23
01Jan2000	04:36	0.20	0.06	7.034	0.22
01Jan2000	04:37	0.20	0.06	7.032	0.21
01Jan2000	04:38	0.20	0.06	7.031	0.20
01Jan2000	04:39	0.20	0.06	7.031	0.20
01Jan2000	04:40	0.20	0.06	7.031	0.20
01Jan2000	04:41	0.20	0.06	7.031	0.20
01Jan2000	04:42	0.20	0.06	7.031	0.20
01Jan2000	04:43	0.20	0.06	7.031	0.20
01Jan2000	04:44	0.20	0.06	7.031	0.20
01Jan2000	04:45	0.20	0.06	7.031	0.20
01Jan2000	04:46	0.20	0.06	7.031	0.20
01Jan2000	04:47	0.20	0.06	7.031	0.20
01Jan2000	04:48	0.20	0.06	7.031	0.20
01Jan2000	04:49	0.20	0.06	7.031	0.20
01Jan2000	04:50	0.20	0.06	7.031	0.20
01Jan2000	04:51	0.20	0.06	7.031	0.20
01Jan2000	04:52	0.20	0.06	7.031	0.20
01Jan2000	04:53	0.20	0.06	7.031	0.20
01Jan2000	04:54	0.20	0.06	7.031	0.20
01Jan2000	04:55	0.20	0.06	7.031	0.20
01Jan2000	04:56	0.20	0.06	7.031	0.20
01Jan2000	04:57	0.20	0.06	7.031	0.20
01Jan2000	04:58	0.20	0.06	7.031	0.20
01Jan2000	04:59	0.20	0.06	7.031	0.20
01Jan2000	05:00	0.20	0.06	7.031	0.20
01Jan2000	05:01	0.20	0.06	7.031	0.20
01Jan2000	05:02	0.20	0.06	7.031	0.20
01Jan2000	05:03	0.20	0.06	7.031	0.20
01Jan2000	05:04	0.20	0.06	7.031	0.20

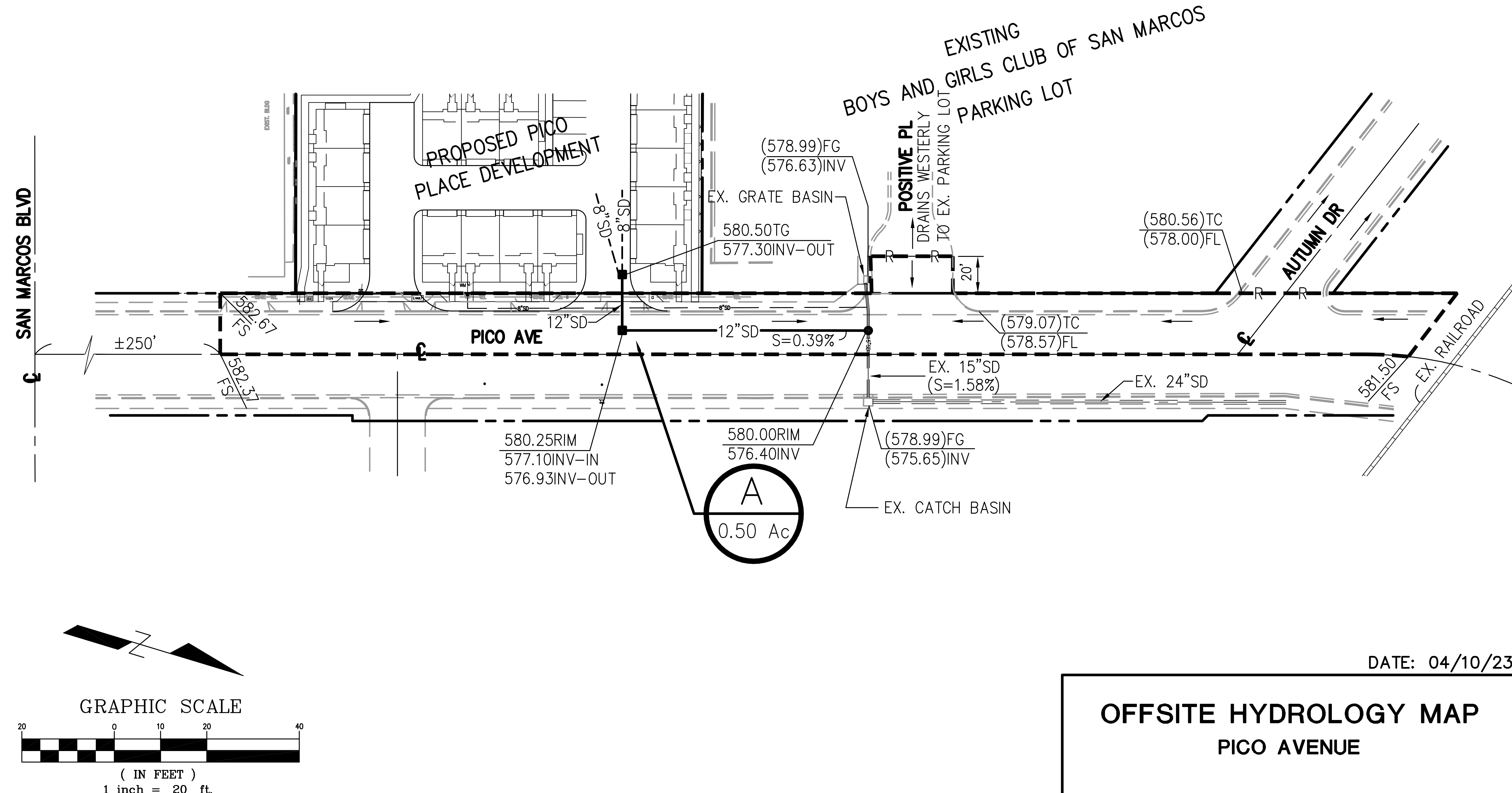
Date	Time	Inflow (CFS)	Storage (ACRE-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	05:05	0.20	0.06	7.031	0.20
01Jan2000	05:06	0.20	0.06	7.031	0.20
01Jan2000	05:07	0.18	0.06	7.029	0.19
01Jan2000	05:08	0.17	0.06	7.028	0.18
01Jan2000	05:09	0.15	0.06	7.025	0.17
01Jan2000	05:10	0.13	0.06	7.022	0.15
01Jan2000	05:11	0.12	0.06	7.020	0.13
01Jan2000	05:12	0.10	0.06	7.017	0.12
01Jan2000	05:13	0.10	0.06	7.015	0.11
01Jan2000	05:14	0.10	0.06	7.014	0.10
01Jan2000	05:15	0.10	0.06	7.014	0.10
01Jan2000	05:16	0.10	0.06	7.014	0.10
01Jan2000	05:17	0.10	0.06	7.014	0.10
01Jan2000	05:18	0.10	0.06	7.014	0.10
01Jan2000	05:19	0.10	0.06	7.014	0.10
01Jan2000	05:20	0.10	0.06	7.014	0.10
01Jan2000	05:21	0.10	0.06	7.014	0.10
01Jan2000	05:22	0.10	0.06	7.014	0.10
01Jan2000	05:23	0.10	0.06	7.014	0.10
01Jan2000	05:24	0.10	0.06	7.014	0.10
01Jan2000	05:25	0.10	0.06	7.014	0.10
01Jan2000	05:26	0.10	0.06	7.014	0.10
01Jan2000	05:27	0.10	0.06	7.014	0.10
01Jan2000	05:28	0.10	0.06	7.014	0.10
01Jan2000	05:29	0.10	0.06	7.014	0.10
01Jan2000	05:30	0.10	0.06	7.014	0.10
01Jan2000	05:31	0.10	0.06	7.014	0.10
01Jan2000	05:32	0.10	0.06	7.014	0.10
01Jan2000	05:33	0.10	0.06	7.014	0.10
01Jan2000	05:34	0.10	0.06	7.014	0.10
01Jan2000	05:35	0.10	0.06	7.014	0.10

Date	Time	Inflow (CFS)	Storage (ACRE-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	05:36	0.10	0.06	7.014	0.10
01Jan2000	05:37	0.10	0.06	7.014	0.10
01Jan2000	05:38	0.10	0.06	7.014	0.10
01Jan2000	05:39	0.10	0.06	7.014	0.10
01Jan2000	05:40	0.10	0.06	7.014	0.10
01Jan2000	05:41	0.10	0.06	7.014	0.10
01Jan2000	05:42	0.10	0.06	7.014	0.10
01Jan2000	05:43	0.10	0.06	7.014	0.10
01Jan2000	05:44	0.10	0.06	7.014	0.10
01Jan2000	05:45	0.10	0.06	7.014	0.10
01Jan2000	05:46	0.10	0.06	7.014	0.10
01Jan2000	05:47	0.10	0.06	7.014	0.10
01Jan2000	05:48	0.10	0.06	7.014	0.10
01Jan2000	05:49	0.10	0.06	7.014	0.10
01Jan2000	05:50	0.10	0.06	7.014	0.10
01Jan2000	05:51	0.10	0.06	7.014	0.10
01Jan2000	05:52	0.10	0.06	7.014	0.10
01Jan2000	05:53	0.10	0.06	7.014	0.10
01Jan2000	05:54	0.10	0.06	7.014	0.10
01Jan2000	05:55	0.10	0.06	7.014	0.10
01Jan2000	05:56	0.10	0.06	7.014	0.10
01Jan2000	05:57	0.10	0.06	7.014	0.10
01Jan2000	05:58	0.10	0.06	7.014	0.10
01Jan2000	05:59	0.10	0.06	7.014	0.10
01Jan2000	06:00	0.10	0.06	7.014	0.10
01Jan2000	06:01	0.08	0.06	7.013	0.09
01Jan2000	06:02	0.07	0.06	7.011	0.08
01Jan2000	06:03	0.05	0.06	7.008	0.07
01Jan2000	06:04	0.03	0.06	7.005	0.05
01Jan2000	06:05	0.02	0.06	7.003	0.03
01Jan2000	06:06	0.00	0.06	7.000	0.02

Date	Time	Inflow (CFS)	Storage (ACRE-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	06:07	0.00	0.06	6.997	0.02
01Jan2000	06:08	0.00	0.06	6.994	0.02
01Jan2000	06:09	0.00	0.06	6.992	0.02
01Jan2000	06:10	0.00	0.06	6.989	0.02
01Jan2000	06:11	0.00	0.06	6.986	0.02
01Jan2000	06:12	0.00	0.06	6.983	0.02
01Jan2000	06:13	0.00	0.06	6.980	0.02
01Jan2000	06:14	0.00	0.06	6.977	0.02
01Jan2000	06:15	0.00	0.06	6.974	0.02
01Jan2000	06:16	0.00	0.06	6.972	0.02
01Jan2000	06:17	0.00	0.06	6.969	0.02
01Jan2000	06:18	0.00	0.06	6.966	0.02
01Jan2000	06:19	0.00	0.06	6.963	0.02
01Jan2000	06:20	0.00	0.06	6.960	0.02
01Jan2000	06:21	0.00	0.06	6.957	0.02
01Jan2000	06:22	0.00	0.06	6.954	0.02
01Jan2000	06:23	0.00	0.06	6.952	0.02
01Jan2000	06:24	0.00	0.06	6.949	0.02
01Jan2000	06:25	0.00	0.06	6.946	0.02
01Jan2000	06:26	0.00	0.06	6.943	0.02
01Jan2000	06:27	0.00	0.06	6.940	0.02
01Jan2000	06:28	0.00	0.06	6.937	0.02
01Jan2000	06:29	0.00	0.06	6.935	0.02
01Jan2000	06:30	0.00	0.06	6.932	0.02
01Jan2000	06:31	0.00	0.06	6.929	0.02
01Jan2000	06:32	0.00	0.06	6.926	0.02
01Jan2000	06:33	0.00	0.06	6.923	0.02
01Jan2000	06:34	0.00	0.06	6.920	0.02
01Jan2000	06:35	0.00	0.06	6.917	0.02
01Jan2000	06:36	0.00	0.06	6.915	0.02
01Jan2000	06:37	0.00	0.06	6.912	0.02

Date	Time	Inflow (CFS)	Storage (ACRE-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	06:38	0.00	0.06	6.909	0.02
01Jan2000	06:39	0.00	0.06	6.906	0.02
01Jan2000	06:40	0.00	0.06	6.903	0.02
01Jan2000	06:41	0.00	0.06	6.900	0.02
01Jan2000	06:42	0.00	0.06	6.897	0.02
01Jan2000	06:43	0.00	0.06	6.895	0.02
01Jan2000	06:44	0.00	0.06	6.892	0.02
01Jan2000	06:45	0.00	0.06	6.889	0.02
01Jan2000	06:46	0.00	0.06	6.886	0.02
01Jan2000	06:47	0.00	0.06	6.883	0.02
01Jan2000	06:48	0.00	0.06	6.880	0.02
01Jan2000	06:49	0.00	0.06	6.878	0.02
01Jan2000	06:50	0.00	0.06	6.875	0.02
01Jan2000	06:51	0.00	0.06	6.872	0.02
01Jan2000	06:52	0.00	0.06	6.869	0.02
01Jan2000	06:53	0.00	0.06	6.866	0.02
01Jan2000	06:54	0.00	0.06	6.863	0.02
01Jan2000	06:55	0.00	0.06	6.860	0.02
01Jan2000	06:56	0.00	0.06	6.858	0.02
01Jan2000	06:57	0.00	0.06	6.855	0.02
01Jan2000	06:58	0.00	0.06	6.852	0.02
01Jan2000	06:59	0.00	0.06	6.849	0.02
01Jan2000	07:00	0.00	0.06	6.846	0.02

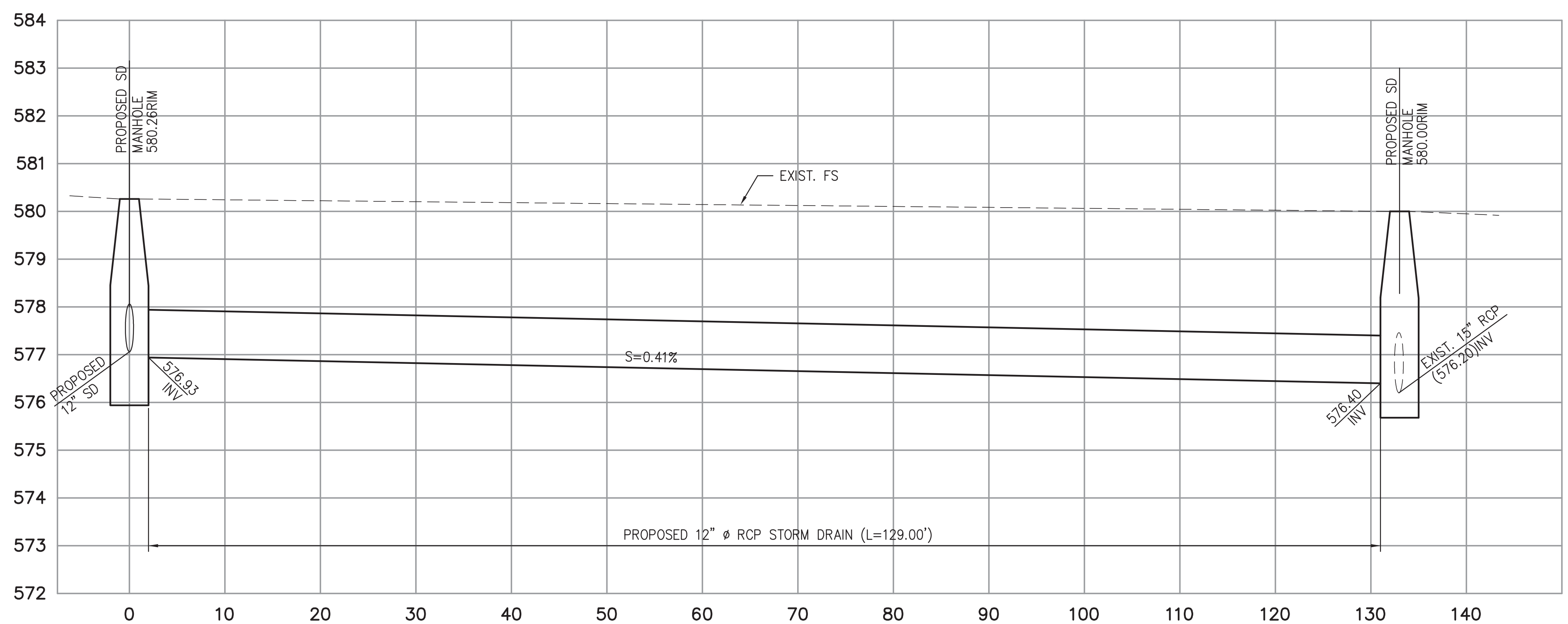
CHAPTER 4 – STORM DRAIN HYDRAULIC ANALYSIS



DATE: 04/10/23

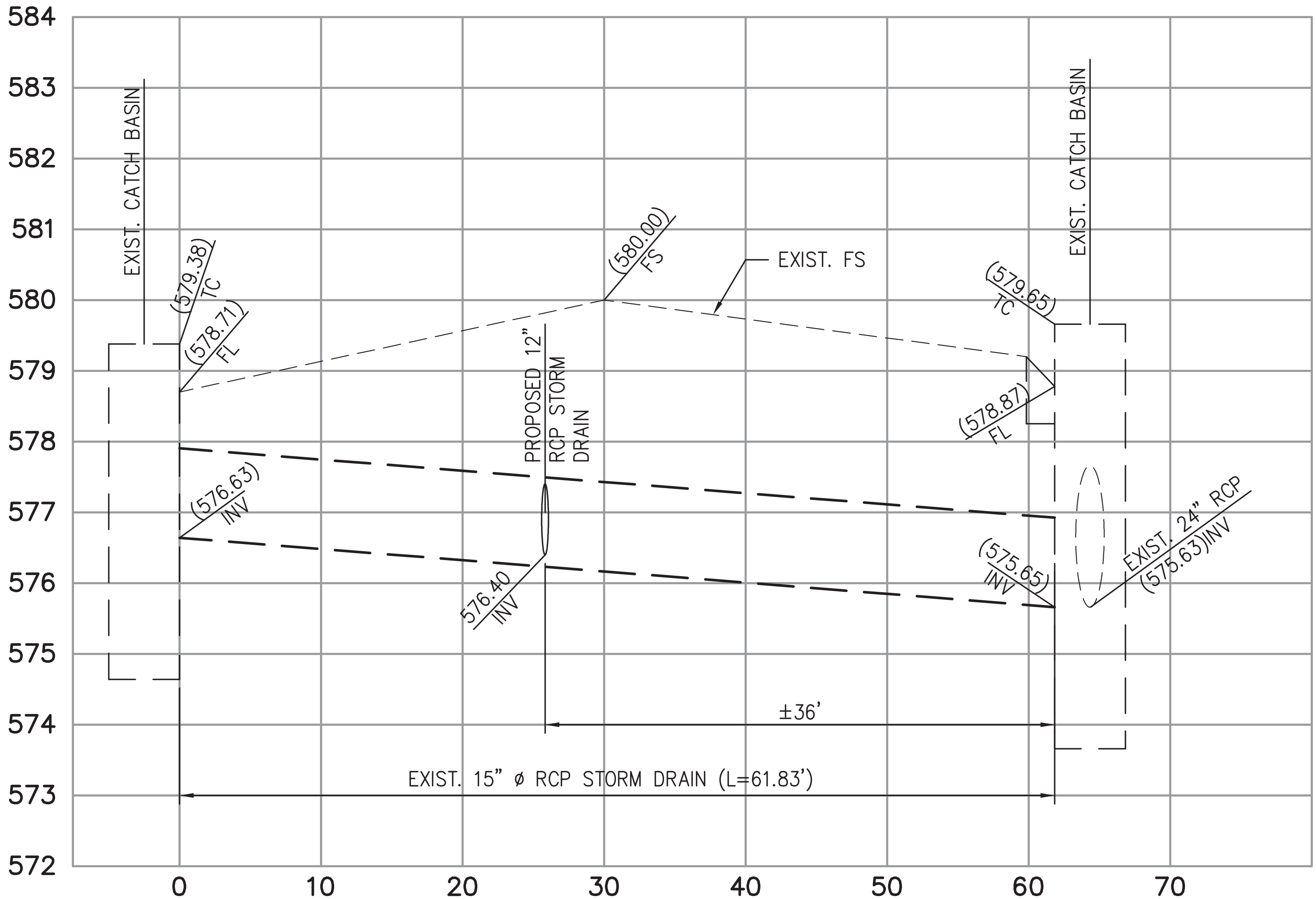
OFFSITE HYDROLOGY MAP

PICO AVENUE



SCALE:
HORZ: 1"=10'
VERT: 1"=2'

STORM DRAIN PROFILE
PROPOSED 12" ø RCP STORM DRAIN
PICO AVENUE



SCALE:

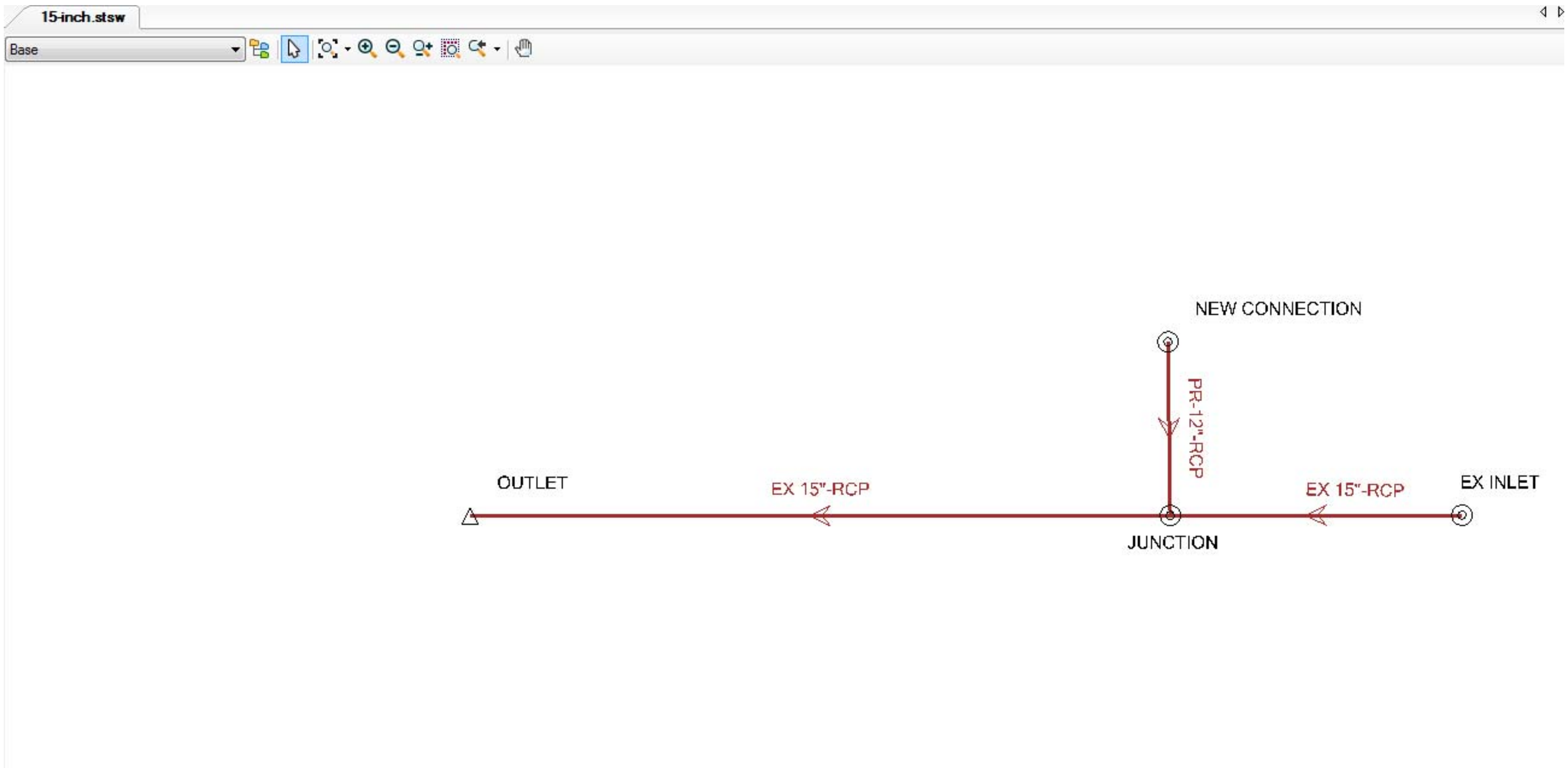
HORZ: 1"=10'

VERT: 1"=2'

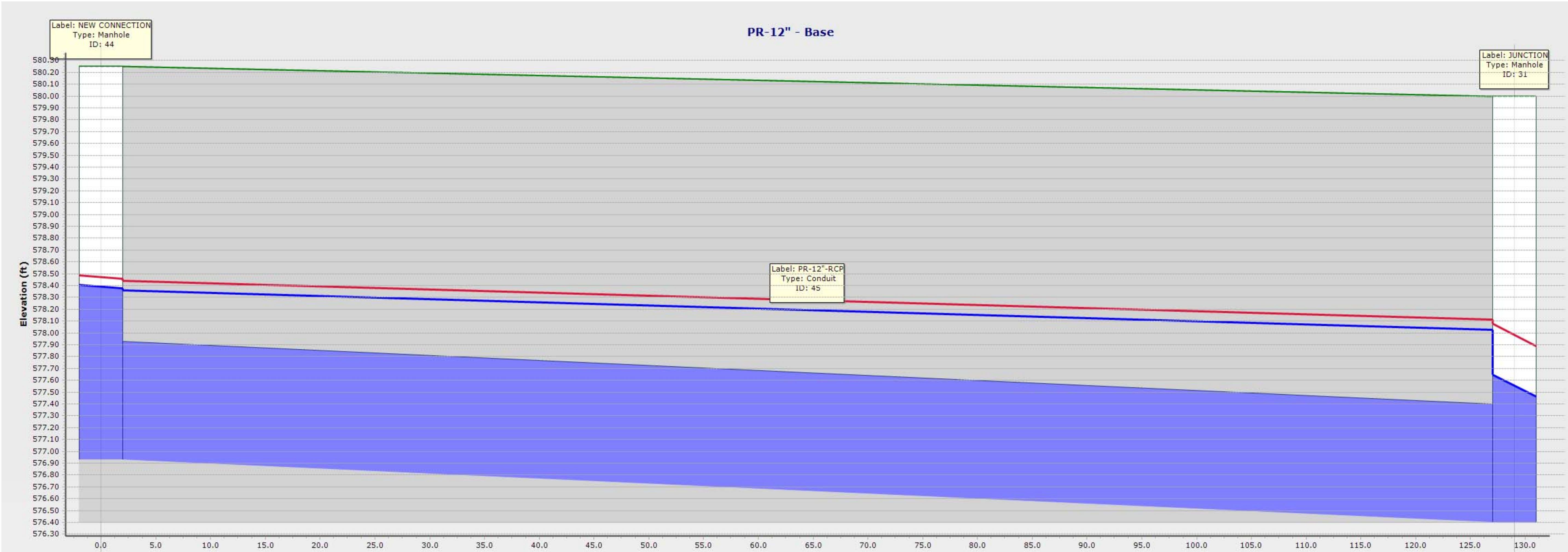
STORM DRAIN PROFILE

EXIST. 15" ø RCP STORM DRAIN

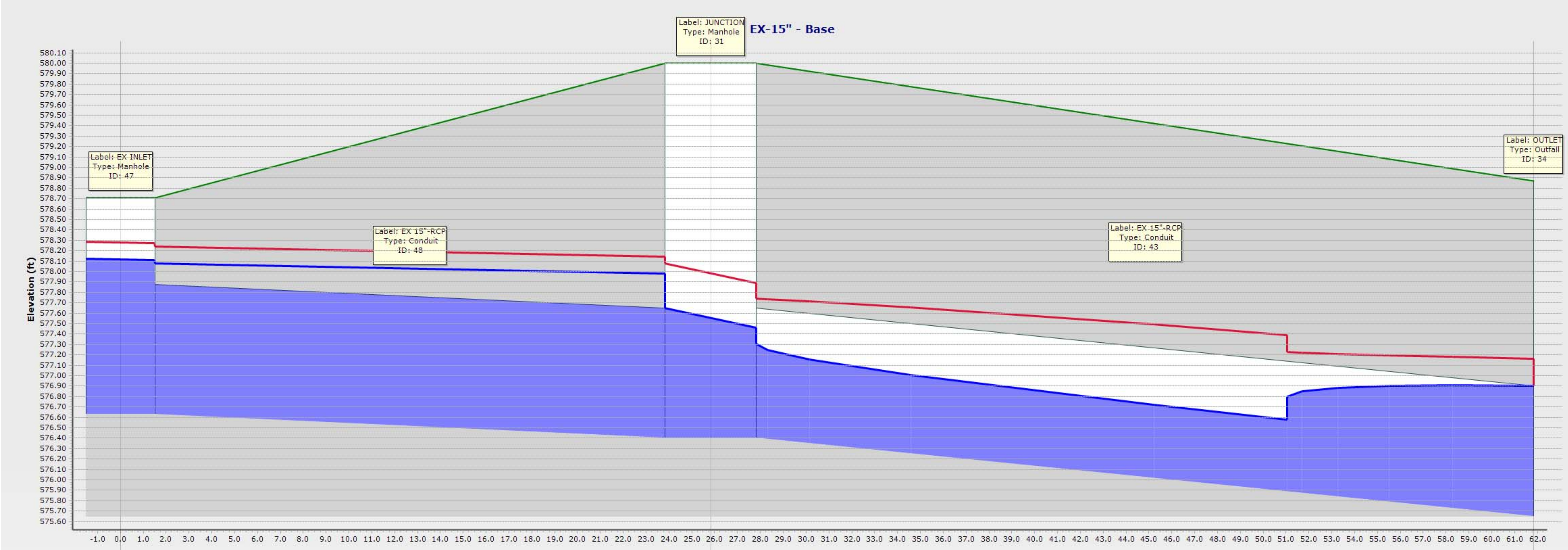
PICO AVENUE


15-inch.stsw
Base
NEW CONNECTION
PR-12"-RCP
OUTLET
EX 15"-RCP
EX 15"-RCP
EX INLET
JUNCTION

Label	-Node- Upstream Downstream	-Depth- Upstream Downstream (ft)	-EGL- Upstream Downstream (ft)	-Ground- Upstream Downstream (ft)	-HGL- Upstream Downstream (ft)	-Invert- Upstream Downstream (ft)	Section Discharge Capacity (cfs)	Flow (cfs)	Velocity (In) (ft/s)	Velocity (Out) (ft/s)
EX 15"-RCP	JUNCTION	1.25	577.89	580	577.31	576.4	5.02	5.02	5.25	4.09
	OUTLET	(N/A)	(N/A)	578.87	576.9	575.65	9.32			
PR-12"-RCP	NEW CONNECTION	1.47	578.46	580.25	578.36	576.93	1.8	1.8	2.29	2.29
	JUNCTION	1.06	578.08	580	578.03	576.4	2.28			
EX 15"-RCP	EX INLET	1.49	578.27	578.71	578.08	576.63	3.97	3.97	3.24	3.24
	JUNCTION	1.06	578.08	580	577.98	576.4	6.1			



ID\Label	45 \ PR-12"-RCP	
Link Length (ft)	129.0	
Rise (in)\Material	12.0 \ Concrete	
Flow (cfs)	1.80	
Slope (ft/ft)	0.004	
ID\Label	44 \ NEW CONNECTION	31 \ JUNCTION
Ground (ft)	580.25	580.00
Invert (ft)	576.93	576.40
Station (ft)	0.0	129.0



ID\Label		48 \ EX 15"-RCP		43 \ EX 15"-RCP	
Link Length (ft)		25.8		36.0	
Rise (in)\Material		15.0 \ Concrete		15.0 \	
Flow (cfs)		3.97		5.02	
Slope (ft/ft)		0.009		0.021	
ID\Label	47 \ EX INLET		31 \ JUNCTION		34 \ OUTLET
Ground (ft)	578.71		580.00		578.87
Invert (ft)	576.63		576.40		575.65
Station (ft)	0.0		25.8		61.8

CHAPTER 5 - 100 YEAR HYDROLOGIC ANALYSIS FOR EXISTING CONDITIONS

****

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
2003,1985,1981 HYDROLOGY MANUAL

Ver. 22.0 Release Date: 07/01/2015 License ID 1643

Analysis prepared by:

************************** DESCRIPTION OF STUDY **************************
* PICO VILLAGE *
* 100 YEAR EXISTING CONDITIONS HYDROLOGIC ANALYSIS *
* *
****

FILE NAME: PIEXREV.DAT
TIME/DATE OF STUDY: 08:43 04/14/2023

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00
6-HOUR DURATION PRECIPITATION (INCHES) = 3.400
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0312	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 1.00 TO NODE 2.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

==

*USER SPECIFIED(SUBAREA):
GENERAL COMMERCIAL RUNOFF COEFFICIENT = .7500
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 60.00
UPSTREAM ELEVATION(FEET) = 581.50
DOWNSTREAM ELEVATION(FEET) = 580.35
ELEVATION DIFFERENCE(FEET) = 1.15
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 3.929
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.958

```
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.05
  TOTAL AREA(ACRES) =      0.16   TOTAL RUNOFF(CFS) =      1.05

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    580.35  DOWNSTREAM(FEET) =    580.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =    28.00   CHANNEL SLOPE =  0.0054
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.958
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  GENERAL COMMERCIAL RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.31
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.85
  AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   0.25
  Tc(MIN.) =    4.18
  SUBAREA AREA(ACRES) =     0.08       SUBAREA RUNOFF(CFS) =    0.52
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.750
  TOTAL AREA(ACRES) =        0.2        PEAK FLOW RATE(CFS) =       1.57

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.15   FLOW VELOCITY(FEET/SEC.) =   1.98
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =      88.00 FEET.

+--------------------------------------------------------------------------+
| END ANALYSIS TO PICO AVE                                                 |
| BEGIN ANALYSIS TO WESTERN BOUNDARY                                       |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  GENERAL COMMERCIAL RUNOFF COEFFICIENT = .3400
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    580.00
  DOWNSTREAM ELEVATION(FEET) =    579.50
  ELEVATION DIFFERENCE(FEET) =      0.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.943
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    56.67
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.405
  SUBAREA RUNOFF(CFS) =      0.10
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.10

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    579.50  DOWNSTREAM(FEET) =    578.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   179.00   CHANNEL SLOPE =  0.0056
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.461
  *USER SPECIFIED(SUBAREA):
  GENERAL COMMERCIAL RUNOFF COEFFICIENT = .3400
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.39
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.79
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   3.79
  Tc(MIN.) =   14.73
  SUBAREA AREA(ACRES) =     0.38       SUBAREA RUNOFF(CFS) =    0.58
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.340
  TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       0.67

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   0.94
  LONGEST FLOWPATH FROM NODE      4.00 TO NODE      6.00 =     239.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.461
  *USER SPECIFIED(SUBAREA):
  GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8100
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4029
  SUBAREA AREA(ACRES) =    0.07   SUBAREA RUNOFF(CFS) =    0.25
  TOTAL AREA(ACRES) =        0.5   TOTAL RUNOFF(CFS) =      0.91
  TC(MIN.) =   14.73
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.5  TC(MIN.) =     14.73
  PEAK FLOW RATE(CFS)   =       0.91
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

CHAPTER 6 - 100 YEAR HYDROLOGIC ANALYSIS FOR DEVELOPED CONDITIONS

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****************************************************************************

             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
             Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                          2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2015 Advanced Engineering Software (aes)
              Ver. 22.0 Release Date: 07/01/2015  License ID 1643

                             Analysis prepared by:






 ************************** DESCRIPTION OF STUDY **************************
* PICO VILLAGE                                                             *
* 100 YEAR DEVELOPED CONDITION HYDROLOGIC ANALYSIS                         *
*                                                                          *
 **************************************************************************

  FILE NAME: PIDEV.DAT
  TIME/DATE OF STUDY: 14:07 04/14/2023
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.400
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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 0.0312 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      1.00 TO NODE      2.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    580.50
  DOWNSTREAM ELEVATION(FEET) =    579.90
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.880
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.958
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.44
  TOTAL AREA(ACRES) =      0.06   TOTAL RUNOFF(CFS) =      0.44

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    579.90  DOWNSTREAM(FEET) =    579.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   218.00   CHANNEL SLOPE =  0.0041
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.696
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.21
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.51
  AVERAGE FLOW DEPTH(FEET) =   0.33   TRAVEL TIME(MIN.) =   1.45
  Tc(MIN.) =    6.33
  SUBAREA AREA(ACRES) =     0.61       SUBAREA RUNOFF(CFS) =    3.52
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.750
  TOTAL AREA(ACRES) =        0.7         PEAK FLOW RATE(CFS) =       3.90

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.45   FLOW VELOCITY(FEET/SEC.) =   3.01
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     278.00 FEET.

+--------------------------------------------------------------------------+
| INFLOW TO DETENTION BASIN                                                |
| ROUTED FLOW VIA HMS MODEL                                                |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  10.63   RAIN INTENSITY(INCH/HOUR) =  5.51
  TOTAL AREA(ACRES) =     0.67   TOTAL RUNOFF(CFS) =      1.50

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   578.00  DOWNSTREAM(FEET) =   577.00
  FLOW LENGTH(FEET) =   107.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.04
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.50
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   11.07
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     385.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.07
  RAINFALL INTENSITY(INCH/HR) =   5.36
  TOTAL STREAM AREA(ACRES) =     0.67
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.50

+--------------------------------------------------------------------------+
| END ANALYSIS FOR PICO PROJECT SITE                                       |
| BEGIN ANALYSIS FOR OFFSITE RUNON INTERCEPT CALCULATION                   |
|                                                                          |
+--------------------------------------------------------------------------+
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8100
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    581.00
  DOWNSTREAM ELEVATION(FEET) =    580.40
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.043
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    60.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.958
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.25
  TOTAL AREA(ACRES) =      0.04   TOTAL RUNOFF(CFS) =      0.25

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    580.40  DOWNSTREAM(FEET) =    580.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    37.00   CHANNEL SLOPE =  0.0108
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.958
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8100
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.38
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.92
  AVERAGE FLOW DEPTH(FEET) =   0.08   TRAVEL TIME(MIN.) =   0.67
  Tc(MIN.) =    4.71
  SUBAREA AREA(ACRES) =     0.03       SUBAREA RUNOFF(CFS) =    0.25
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.810
  TOTAL AREA(ACRES) =        0.1         PEAK FLOW RATE(CFS) =       0.50

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   1.02
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =      97.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    4.71
  RAINFALL INTENSITY(INCH/HR) =   8.96
  TOTAL STREAM AREA(ACRES) =     0.07
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.50

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        1.50    11.07        5.365          0.67
      2        0.50     4.71        8.958          0.07

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.
```

```
  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        1.14     4.71       8.958
      2        1.80    11.07       5.365

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       1.80   Tc(MIN.) =   11.07
  TOTAL AREA(ACRES) =        0.7
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     385.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE    102.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   576.93  DOWNSTREAM(FEET) =   576.40
  FLOW LENGTH(FEET) =   129.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.17
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.80
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   11.75
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE    102.00 =     514.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.75
  RAINFALL INTENSITY(INCH/HR) =   5.16
  TOTAL STREAM AREA(ACRES) =     0.74
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.80

+--------------------------------------------------------------------------+
| END ANALYSIS FOR ONSITE HYDROLOGY                                        |
| BEGIN ANALYSIS FOR EXISTING 15-INCH SD IN PICO AVE                       |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    582.67
  DOWNSTREAM ELEVATION(FEET) =    581.97
  ELEVATION DIFFERENCE(FEET) =      0.70
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.012
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.958
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.43
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.43

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  581.97  DOWNSTREAM ELEVATION(FEET) =  578.99
  STREET LENGTH(FEET) =   281.00   CURB HEIGHT(INCHES) =  8.0
```

```
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.20
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =    9.47
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.21
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.73
  STREET FLOW TRAVEL TIME(MIN.) =   2.12   Tc(MIN.) =    5.13
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.813
  *USER SPECIFIED(SUBAREA):
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.900
  SUBAREA AREA(ACRES) =    0.45      SUBAREA RUNOFF(CFS) =    3.55
  TOTAL AREA(ACRES) =        0.5        PEAK FLOW RATE(CFS) =       3.97

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  12.46
  FLOW VELOCITY(FEET/SEC.) =  2.51   DEPTH*VELOCITY(FT*FT/SEC.) =   0.97
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     351.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.13
  RAINFALL INTENSITY(INCH/HR) =   8.81
  TOTAL STREAM AREA(ACRES) =     0.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.97

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        1.80    11.75        5.163          0.74
      2        3.97     5.13        8.813          0.50

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

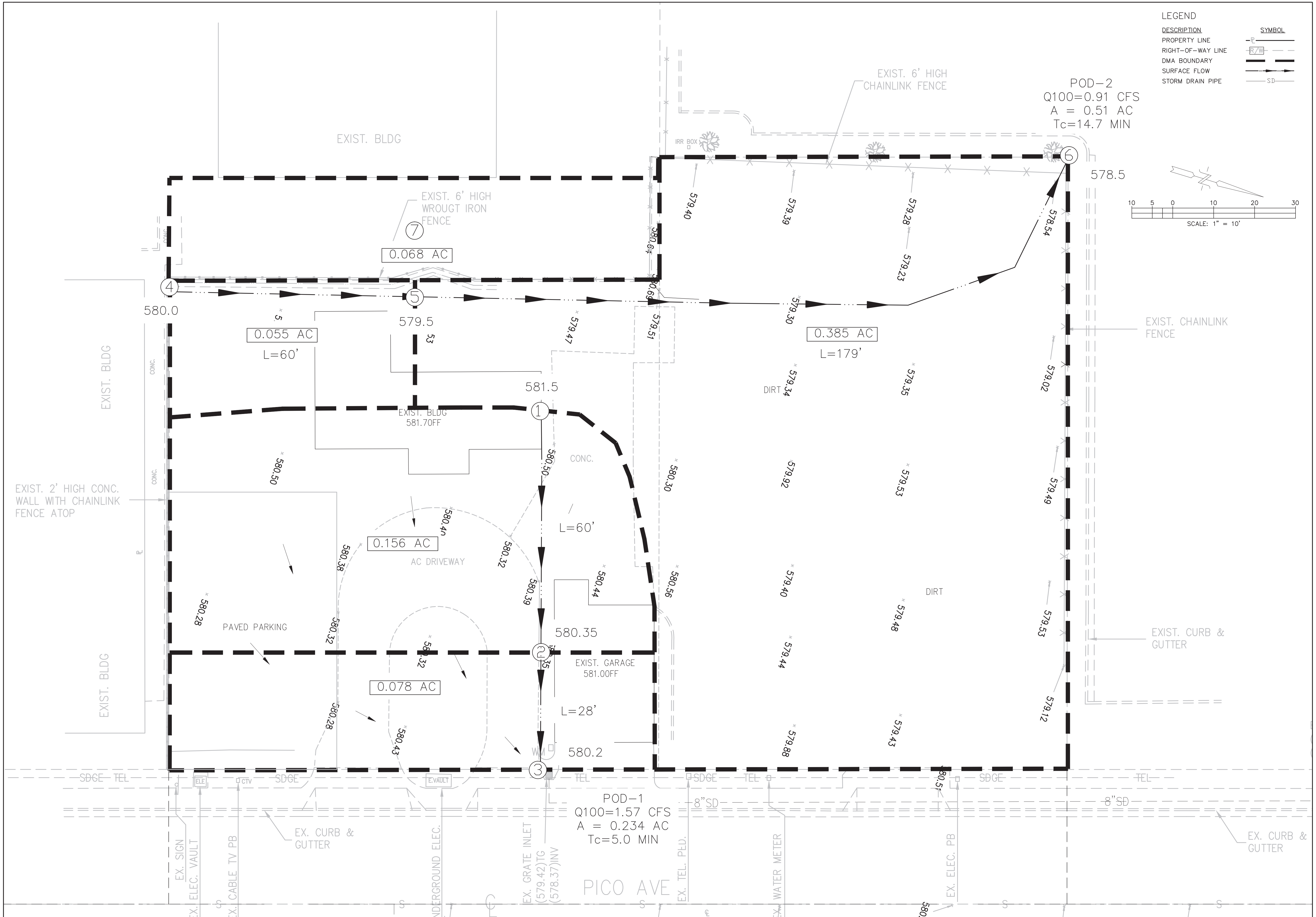
  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        5.02     5.13       8.813
      2        4.12    11.75       5.163

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.02   Tc(MIN.) =    5.13
  TOTAL AREA(ACRES) =        1.2
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE    102.00 =     514.00 FEET.

+--------------------------------------------------------------------------+
| CONFLUENCE WITH DETAINED ONSITE FLOW AT JUNCTION OF 12-INCH and 15-INCH  |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+
============================================================================
  END OF STUDY SUMMARY:
```

```
  TOTAL AREA(ACRES)     =        1.2  TC(MIN.) =      5.13
  PEAK FLOW RATE(CFS)   =       5.02
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

CHAPTER 7 - HYDROLOGY MAPS



REVISIONS

NO.	DESCRIPTION	DATE	APP'D

R·E·C Consultants, Inc.
Civil Engineering • Environmental Land Surveying
2970 Fifth Avenue, Unit 340
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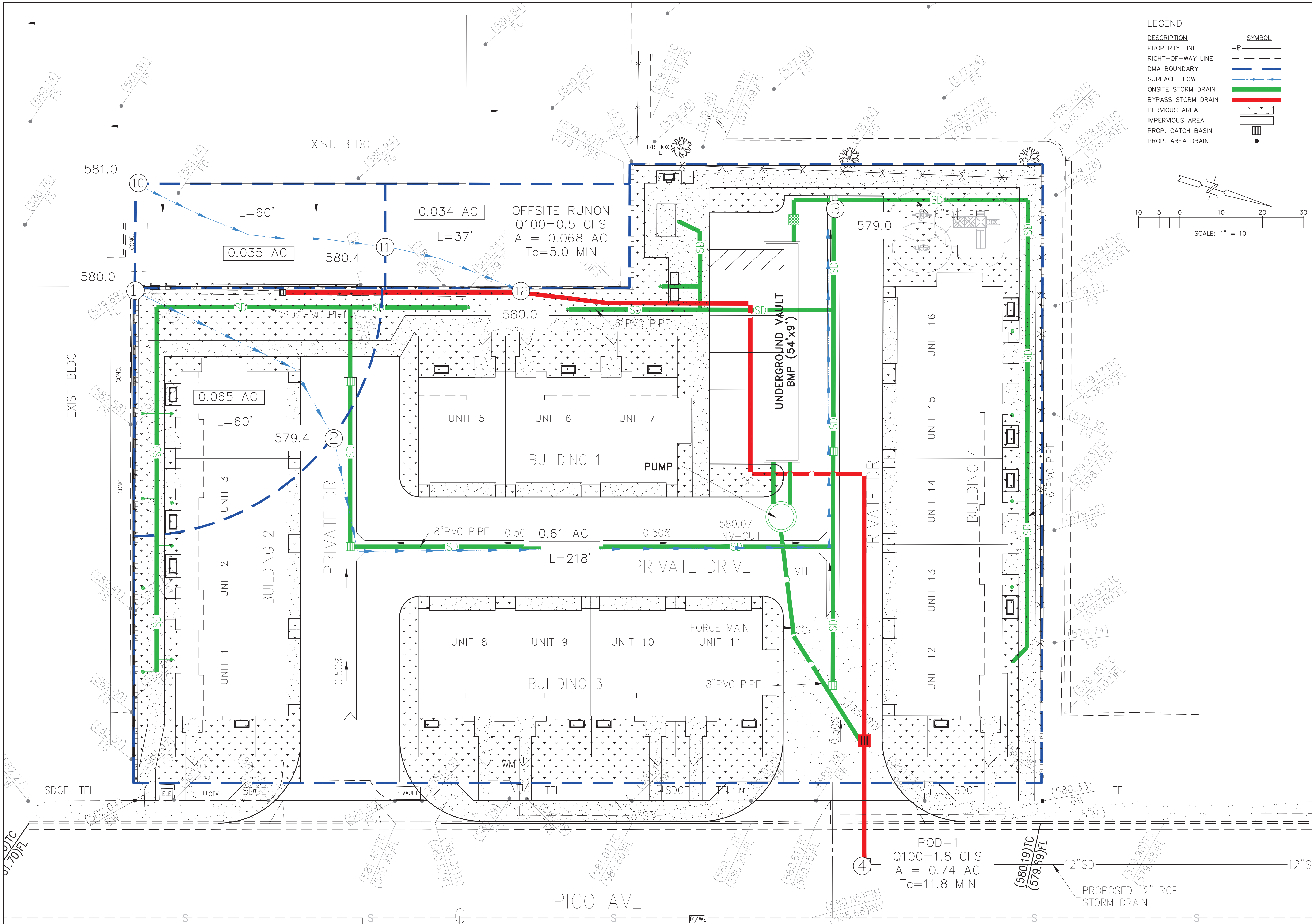
(619)232-9200 (619)232-9210 Fax

DATE: 10/10/2022
SCALE: 1" = 10'
DRAWN: E.R.F.
CHECKED: D.E.

SHEET TITLE: EX CONDITIONS - Q100 EXHIBIT

PROJECT: PICO PLACE
236-244 SAN MARCOS PICO AVENUE
SAN MARCOS, CA 92069

SHEET 1 OF 1 SHEETS



DATE: 10/10/2022
SCALE: 1" = 10'
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CHECKED: D.E.

REVISIONS
NO. | DESCRIPTION | DATE | APP'D

REC Consultants, Inc.
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SHEET TITLE
DMA/BMP PLAN - PROPOSED

PROJECT
PICO VILLAGE
236-244 SAN MARCOS PICO AVENUE
SAN MARCOS, CA 92069

SHEET 1 OF 1 SHEETS