

PRELIMINARY HYDROLOGY REPORT

FOR

THE COURTS CONDOMINIUMS

**NWC of Silica Dr. and 1st Ave.
Victorville, CA 92395**

Prepared for Owner/Developer:

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PCE Job No. 23-391

April 18, 2024

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Section I Introduction

This hydrology report has been prepared for the proposed multi-family condominium development. The project site is situated at northwest corner of Silica Road and 1st Avenue in City of Victorville, San Bernardino County, State of California, as shown on the location map in **Appendix A**.

Section II Methodology

The hydrologic analysis was completed in accordance with the 1986 San Bernardino County Hydrology Manual and 2010 Hydrology Manual Addendum. The rational method has been used to calculate peak flows for both the existing and proposed site conditions.

The Hydrology Manual Addendum requires the use of NOAA Atlas 14 rainfall values when completing hydrologic analyses. The Addendum also requires the use of the USDA Web Soil Survey for soil type groupings. The Web Soil Survey indicates the project site is situated within an area comprised of Bryman loamy sand, 5 to 9 percent slopes, which is identified as hydrologic soil type "C" in the Hydrology Manual.

Section III Project Description

Existing Condition:

The 8.52 net acres site is generally square in shape, measuring approximately 664 feet long and 658 feet wide. An approximately 50-foot-wide easement runs along the entire eastern perimeter of the site. The site is currently vacant with minimal vegetation. The entire site drains northwesterly towards a natural channel bisects the site in a northeasterly direction. There is 9.03 acres of offsite flow west from the site (Drainage Areas A1 & A2) and an existing 60" storm drain, and headwall carry the 277.7 cfs south of Silica Road. The offsite flow co-mingled with onsite flow which eventually discharge to an existing headwall and 60-inch storm drain running across the parking of the Bible Baptist Church north of the property. The entire site drains northwesterly towards the northwest corner. Refer to the "Existing Hydrology Map" in **Appendix D** for an illustration of the existing drainage condition.

Proposed Condition:

The proposed development is consisting of 99-units of condominium units along with amenities (a club house, desert landscape garden, mini soccer field, pickleball court, basketball court, poo, spa, waterjet park, children's playground, miniature golf court, dog park and dog walk path). The proposed development will be consistent with the existing condition in terms of the overall drainage pattern. The proposed project development will collect drainage by grate inlets and catch basins, then piped via an onsite underground storm drain system. The storm drain system will discharge to one onsite aboveground infiltration basin located at the north corner of the site to meet the regional LID structural treatment control best management practice (BMP). The project stormwater will utilize one aboveground infiltration basin to address the regional LID structural treatment control best management practice (BMP) per separate Water Quality Management Plan (**WQMP**). The aboveground infiltration will also use as a post development mitigation facility per discussion on **Section IV**. Emergency overflow from the infiltration basin will flow to the southwest corner of the site which is the historical low point of the site. The project will also consist of a new 60-inch storm drain to carry offsite flow and onsite flow. The proposed 60-inch storm drain starts at the middle of westerly boundary and ends at the existing headwall south of

the Church near middle of northerly boundary. Refer to the “Proposed Hydrology Map” in **Appendix D** for an illustration of the proposed drainage condition.

Flood Plain Mapping

The National Flood Insurance Act (1968) established the National Flood Insurance Program, which is based on the minimal requirements for floodplain management and is designed to minimize flood damage within Special Flood Hazard Areas. The Federal Emergency Management Agency (FEMA) is the agency that administrates the National Flood Insurance Program. Special Flood Hazard Areas (SFHA) are defined as areas that have a 1% chance of flooding within a given year. This is also referred to as the 100-year flood. Flood Insurance Rate Maps (FIRMs) were developed to identify areas of flood hazards within a community.

According to the Flood Insurance Rate Map (FIRM) catalog, there are FIRMs produced by FEMA for the project Site:

MAP Number: 06071C6485J

Map Revised: 9/2/2016

The entire project site falls within the “Zone X” flood plain area. The “Zone X” is defined as area outside of the 100-year floodplain. Refer to **Technical Appendix A**.

Section IV Rational Method Hydrologic Analysis

The peak flows calculations are based on rational methodology from the San Bernardino County Hydrology. As a result of the Rational Method calculations, below tables summarized the flow rates for both existing and proposed conditions. The peak flow rates are essentially the same in both existing and proposed conditions. Refer to **Appendix B and C** for existing and proposed condition rational method calculations.

EXISTING CONDITION DRAINAGE SUMMARY			
NODE	AREA Acres	Q ₁₀ (cfs)	Q ₁₀₀ (cfs)
NODE 30	17.55	21.89	41.19
Total:	17.55	21.89	41.19

PROPOSED CONDITION DRAINAGE SUMMARY			
NODE	AREA Acres	Q ₁₀ (cfs)	Q ₁₀₀ (cfs)
NODE 65	17.55	26.13	48.28
Total:	17.55	26.13	48.28

As a result of rational method calculations, the peak flow rates will increase by 4.24 cfs and 7.09 cfs for the 10-year and 100-year storm event, respectively.

Hydromodification Mitigation

Phase II of the Mojave River Watershed requires that projects to demonstrate 10-year 24-hour 85th percentile storm event will not result in hydromodification. Unit hydrograph calculations for both existing and proposed conditions were prepared for the 10-year 24-hour storm event and demonstrate that the project is exempt from hydromodification. Refer to "Preliminary project-specific Water Quality Management Plan" (P-WQMP) for detailed calculations and summary.

Table 3: Basin Summary

DMA	Area (ac)	Percent (%) Impervious	Vbmp* (CF)	Required Detention Volume** (CF) (Hydromodification)	Basin Volume Provided (CF)
1	8.52	70.2	13,740	10,564	13,900

**Refer to Form 4.2-1 LID BMP Performance Criteria for Design Capture Volume per PWQMP Report.*

***Refer to Form 4.2-2 Summary of Hydromodification Assessment per PWQMP Report and Form 4.3-9 Hydromodification Control BMPs*

Storm Drain Improvements

The proposed on-site private storm drain system will consist of 12" / 18" / 24" diameter storm drain pipes to pick up on-site inlets and convey runoff to the proposed infiltration basin. The preliminary 60-inch pipe hydraulic calculation using Manning's equation demonstrates that the proposed storm drain will have capacity to carry the on-site and off-site 100-year storm event flow. Refer to Technical **Appendix D** for supporting preliminary pipe hydraulic calculations.

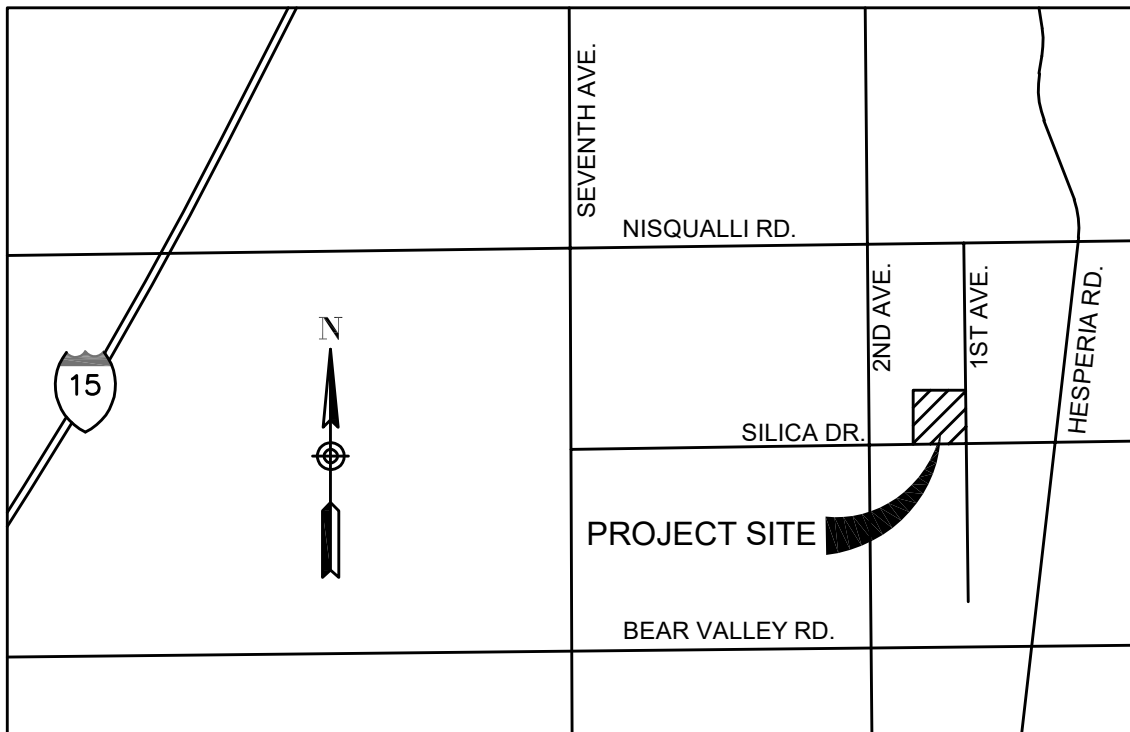
Section V Conclusion

In conclusion, the proposed development will not adversely affect the existing drainage pattern in the area and will provide adequate protection for the proposed on-site improvements and structures for up to the 100-year storm event.

APPENDIX A

VINCINITY MAP

SOIL MAP

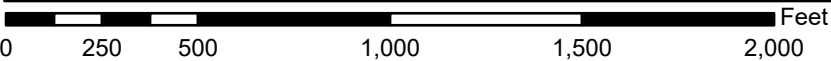
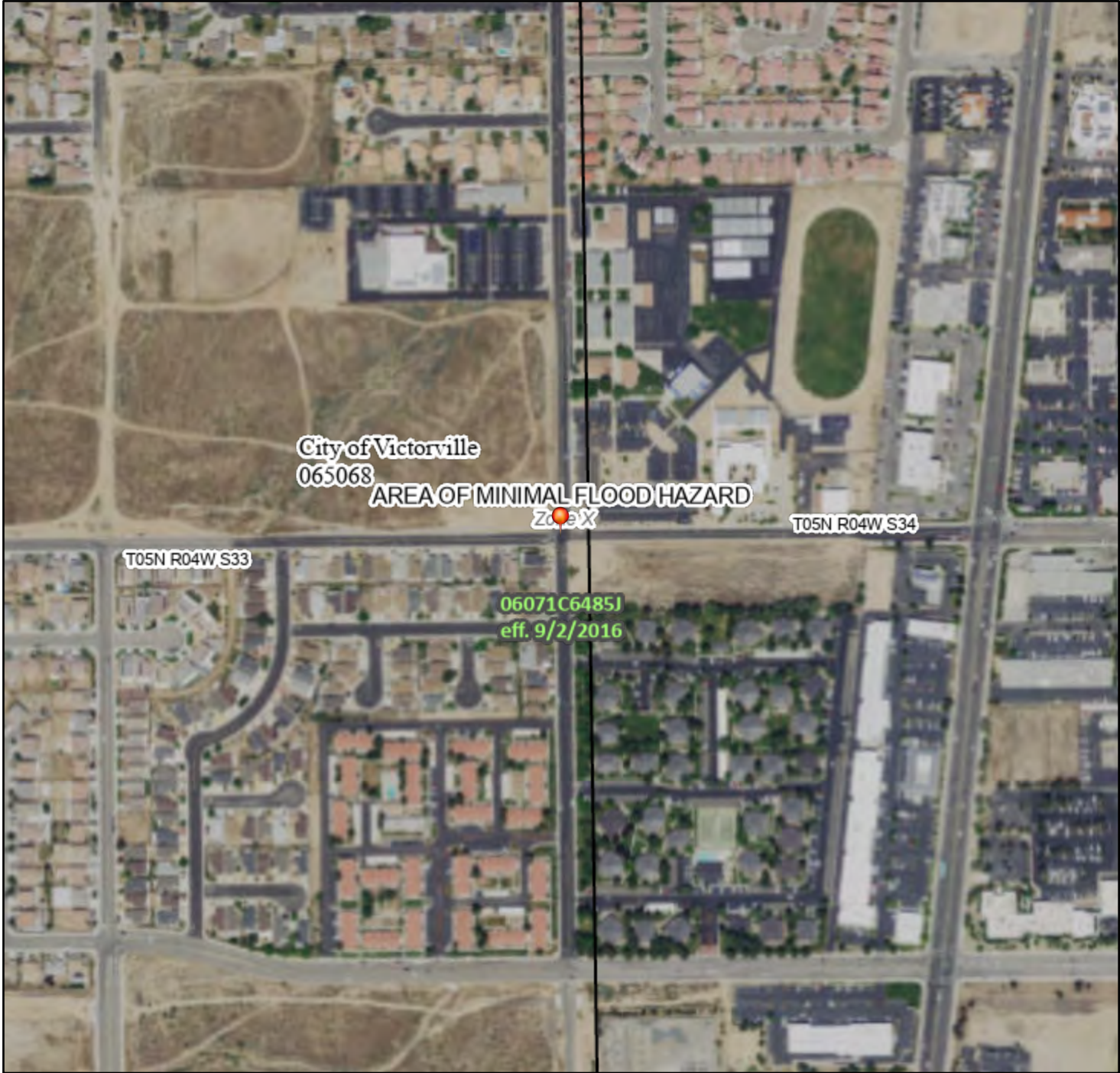


VICINITY MAP
N.T.S

National Flood Hazard Layer FIRMette



117°18'1"W 34°28'56"N



1:6,000

117°17'23"W 34°28'27"N

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Effective LOMRs
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped

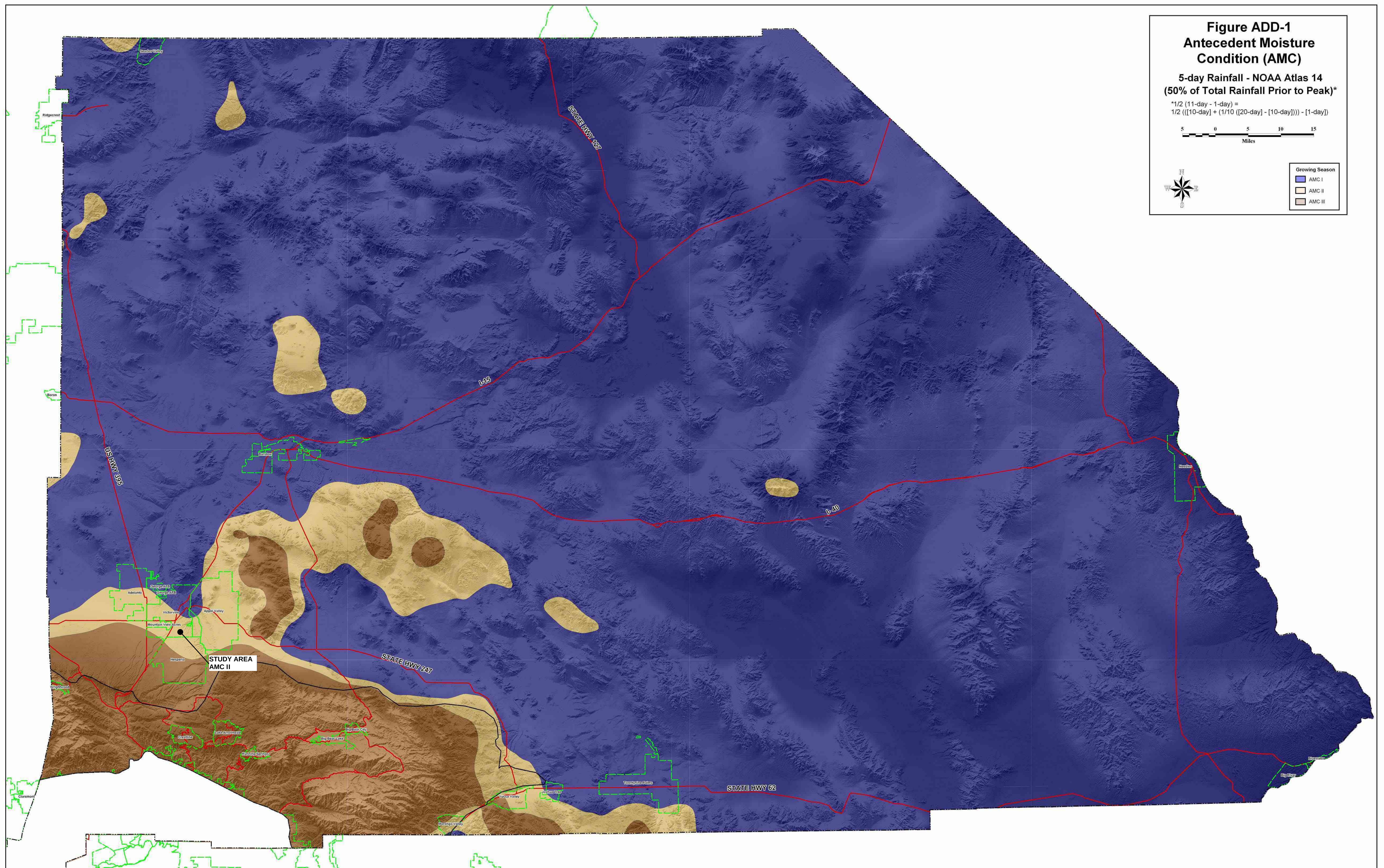


The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 4/23/2024 at 10:22 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.





NOAA Atlas 14, Volume 6, Version 2
Location name: Victorville, California, USA*
Latitude: 34.4782°, Longitude: -117.295°
Elevation: 3000 ft**
* source: ESRI Maps
** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic,
Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel
Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps_&_aerials](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.088 (0.073-0.108)	0.123 (0.102-0.151)	0.172 (0.141-0.211)	0.213 (0.174-0.263)	0.272 (0.214-0.347)	0.319 (0.247-0.417)	0.369 (0.279-0.494)	0.423 (0.311-0.583)	0.500 (0.352-0.718)	0.563 (0.383-0.836)
10-min	0.126 (0.104-0.154)	0.177 (0.146-0.216)	0.246 (0.202-0.302)	0.305 (0.249-0.377)	0.389 (0.307-0.498)	0.457 (0.354-0.597)	0.529 (0.400-0.709)	0.607 (0.446-0.835)	0.717 (0.505-1.03)	0.807 (0.549-1.20)
15-min	0.153 (0.126-0.187)	0.214 (0.176-0.262)	0.298 (0.245-0.365)	0.369 (0.301-0.456)	0.471 (0.372-0.602)	0.553 (0.428-0.722)	0.640 (0.483-0.857)	0.734 (0.539-1.01)	0.867 (0.611-1.24)	0.976 (0.664-1.45)
30-min	0.212 (0.175-0.259)	0.296 (0.245-0.363)	0.413 (0.340-0.506)	0.512 (0.418-0.633)	0.653 (0.516-0.835)	0.767 (0.593-1.00)	0.888 (0.670-1.19)	1.02 (0.747-1.40)	1.20 (0.847-1.72)	1.35 (0.921-2.01)
60-min	0.264 (0.218-0.322)	0.369 (0.305-0.452)	0.514 (0.423-0.631)	0.637 (0.520-0.788)	0.813 (0.642-1.04)	0.955 (0.739-1.25)	1.11 (0.835-1.48)	1.27 (0.931-1.74)	1.50 (1.06-2.15)	1.69 (1.15-2.50)
2-hr	0.373 (0.308-0.456)	0.502 (0.414-0.615)	0.680 (0.560-0.835)	0.831 (0.679-1.03)	1.05 (0.827-1.34)	1.22 (0.945-1.60)	1.41 (1.06-1.88)	1.60 (1.18-2.20)	1.88 (1.32-2.70)	2.11 (1.43-3.13)
3-hr	0.454 (0.375-0.555)	0.604 (0.499-0.740)	0.810 (0.667-0.995)	0.986 (0.805-1.22)	1.24 (0.975-1.58)	1.44 (1.11-1.88)	1.65 (1.24-2.21)	1.88 (1.38-2.58)	2.20 (1.55-3.15)	2.45 (1.67-3.64)
6-hr	0.622 (0.514-0.760)	0.820 (0.677-1.00)	1.09 (0.899-1.34)	1.32 (1.08-1.64)	1.65 (1.30-2.11)	1.91 (1.48-2.49)	2.18 (1.65-2.92)	2.48 (1.82-3.41)	2.89 (2.04-4.15)	3.22 (2.20-4.79)
12-hr	0.798 (0.659-0.975)	1.07 (0.881-1.31)	1.43 (1.18-1.76)	1.74 (1.42-2.16)	2.17 (1.72-2.78)	2.52 (1.95-3.29)	2.87 (2.17-3.85)	3.25 (2.39-4.48)	3.78 (2.67-5.43)	4.21 (2.87-6.25)
24-hr	1.06 (0.936-1.22)	1.44 (1.28-1.66)	1.96 (1.74-2.27)	2.40 (2.10-2.79)	3.00 (2.54-3.62)	3.48 (2.89-4.28)	3.98 (3.22-5.01)	4.50 (3.54-5.83)	5.23 (3.95-7.06)	5.81 (4.24-8.12)
2-day	1.21 (1.07-1.39)	1.67 (1.48-1.93)	2.30 (2.03-2.66)	2.82 (2.47-3.28)	3.55 (3.01-4.27)	4.12 (3.42-5.07)	4.72 (3.83-5.95)	5.36 (4.22-6.94)	6.24 (4.72-8.43)	6.95 (5.08-9.71)
3-day	1.31 (1.16-1.50)	1.82 (1.61-2.10)	2.51 (2.22-2.90)	3.09 (2.71-3.60)	3.90 (3.31-4.70)	4.54 (3.77-5.58)	5.21 (4.22-6.56)	5.92 (4.66-7.66)	6.91 (5.22-9.33)	7.71 (5.63-10.8)
4-day	1.39 (1.23-1.60)	1.94 (1.72-2.24)	2.69 (2.37-3.11)	3.31 (2.90-3.86)	4.18 (3.54-5.03)	4.86 (4.03-5.98)	5.58 (4.52-7.02)	6.33 (4.99-8.20)	7.39 (5.59-9.98)	8.24 (6.02-11.5)
7-day	1.51 (1.34-1.74)	2.10 (1.86-2.42)	2.89 (2.55-3.34)	3.55 (3.11-4.14)	4.47 (3.79-5.38)	5.20 (4.31-6.39)	5.95 (4.82-7.50)	6.75 (5.32-8.74)	7.86 (5.94-10.6)	8.75 (6.39-12.2)
10-day	1.60 (1.42-1.85)	2.22 (1.96-2.56)	3.04 (2.69-3.52)	3.74 (3.27-4.35)	4.70 (3.98-5.66)	5.46 (4.53-6.72)	6.25 (5.07-7.88)	7.09 (5.58-9.18)	8.25 (6.24-11.1)	9.18 (6.71-12.8)
20-day	1.86 (1.65-2.14)	2.58 (2.29-2.98)	3.57 (3.15-4.12)	4.39 (3.85-5.12)	5.55 (4.70-6.68)	6.47 (5.37-7.95)	7.43 (6.02-9.36)	8.44 (6.65-10.9)	9.85 (7.45-13.3)	11.0 (8.02-15.3)
30-day	2.13 (1.89-2.45)	2.96 (2.62-3.41)	4.10 (3.62-4.74)	5.07 (4.44-5.90)	6.44 (5.46-7.76)	7.54 (6.26-9.27)	8.68 (7.04-10.9)	9.90 (7.80-12.8)	11.6 (8.78-15.7)	13.0 (9.48-18.1)
45-day	2.50 (2.21-2.87)	3.47 (3.07-4.00)	4.83 (4.27-5.58)	6.00 (5.25-6.99)	7.68 (6.51-9.24)	9.04 (7.50-11.1)	10.5 (8.48-13.2)	12.0 (9.46-15.5)	14.2 (10.7-19.1)	15.9 (11.6-22.2)
60-day	2.75 (2.44-3.17)	3.81 (3.38-4.39)	5.31 (4.69-6.14)	6.61 (5.79-7.70)	8.50 (7.20-10.2)	10.0 (8.34-12.4)	11.7 (9.48-14.7)	13.5 (10.6-17.5)	16.0 (12.1-21.6)	18.1 (13.2-25.3)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

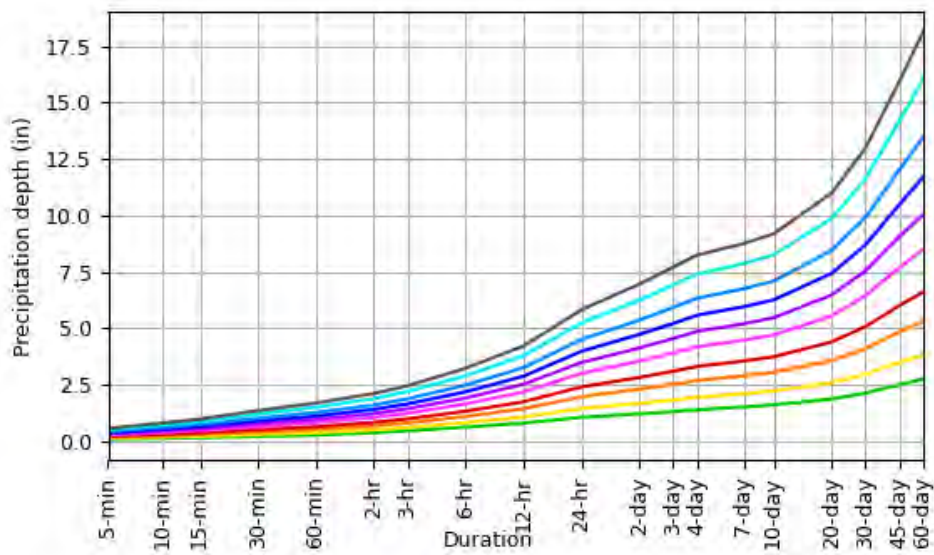
Please refer to NOAA Atlas 14 document for more information.

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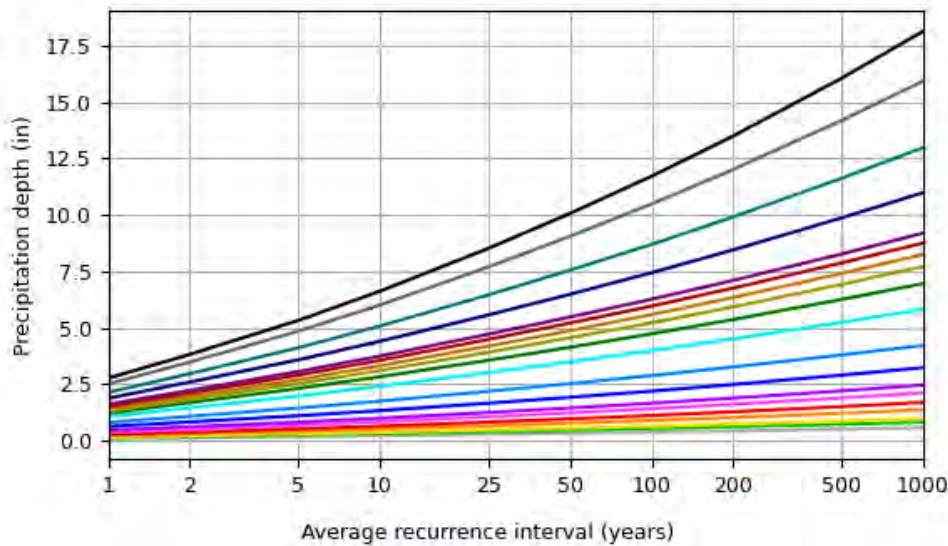
PF graphical

PDS-based depth-duration-frequency (DDF) curves

Latitude: 34.4782°, Longitude: -117.2950°



Average recurrence interval (years)
1
2
5
10
25
50
100
200
500
1000

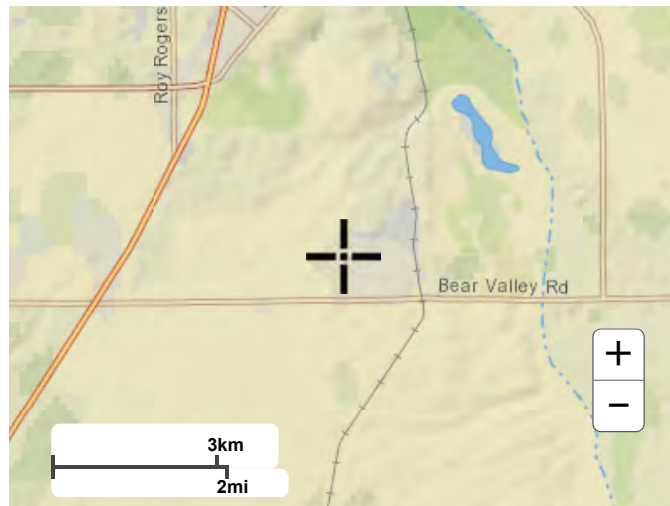


Duration	
5-min	2-day
10-min	3-day
15-min	4-day
30-min	7-day
60-min	10-day
2-hr	20-day
3-hr	30-day
6-hr	45-day
12-hr	60-day
24-hr	

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Maps & aerials

Small scale terrain



Large scale terrain



Large scale map



Large scale aerial

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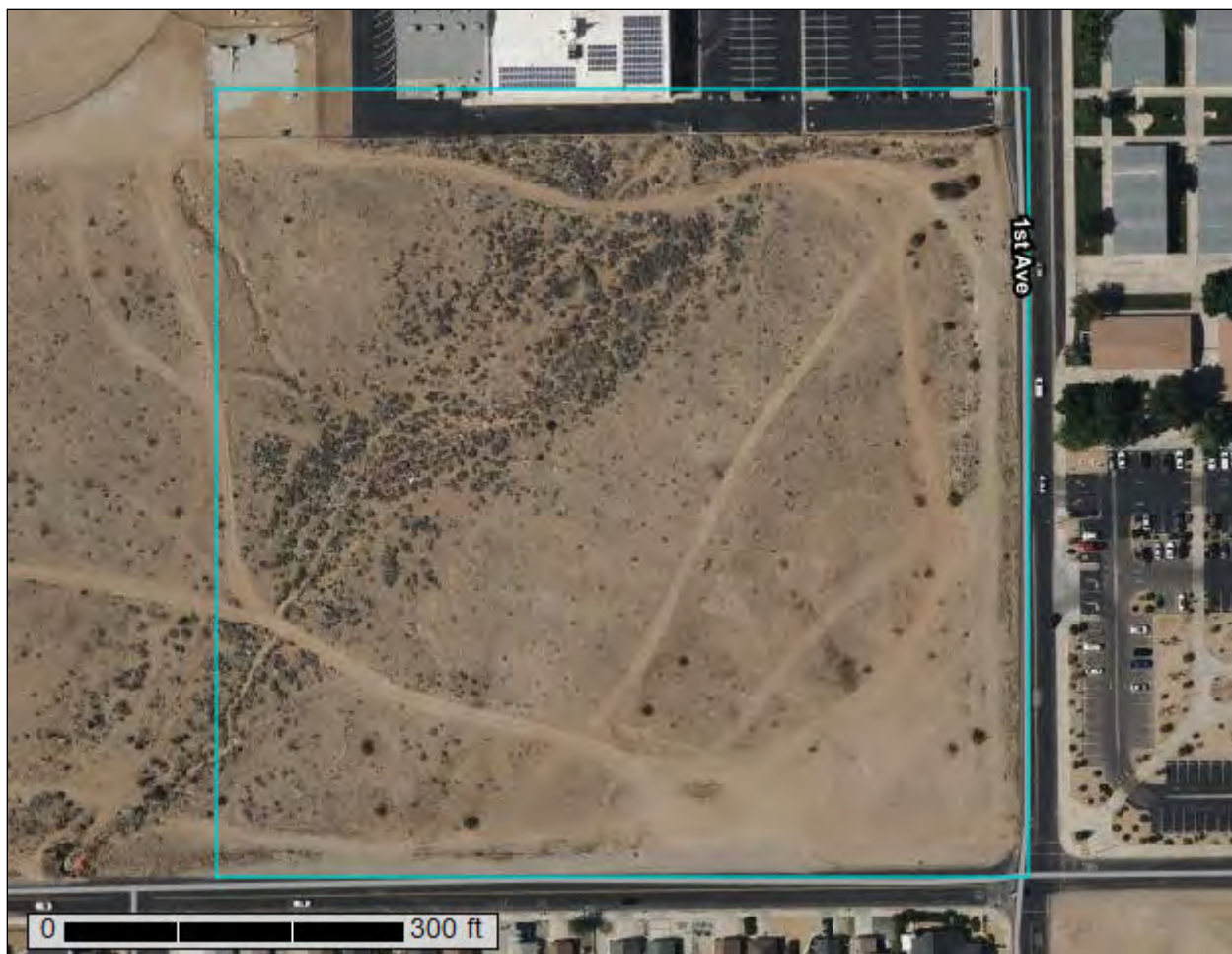
United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for San Bernardino County, California, Mojave River Area



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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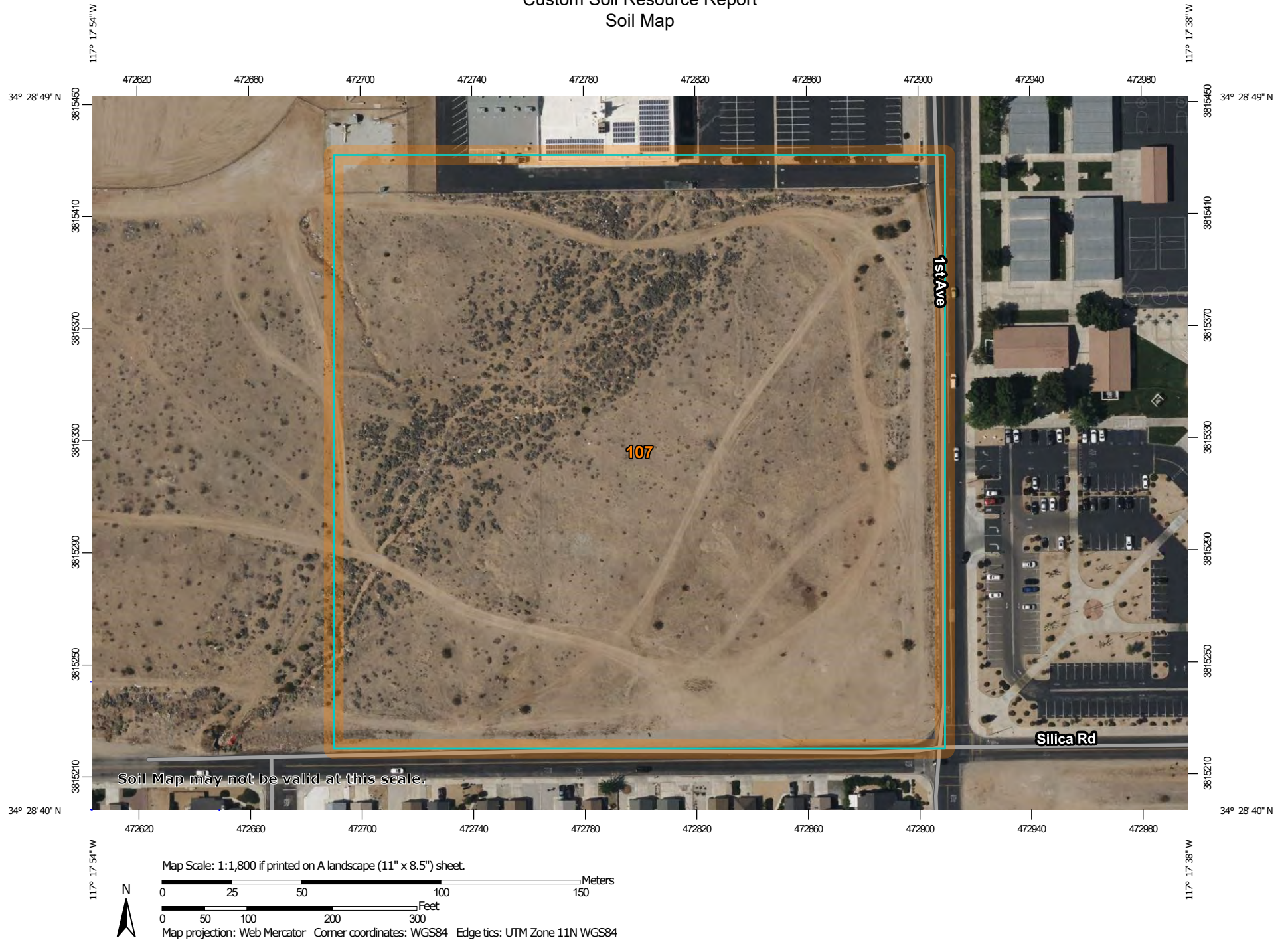
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Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



Custom Soil Resource Report

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 Bernardino County, California, Mojave River Area
Survey Area Data: Version 15, Aug 30, 2023

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

Date(s) aerial images were photographed: Mar 17, 2022—Jun 12, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

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
107	BRYMAN LOAMY FINE SAND, 5 TO 9 PERCENT SLOPES	11.5	100.0%
Totals for Area of Interest		11.5	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Custom Soil Resource Report

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

San Bernardino County, California, Mojave River Area

107—BRYMAN LOAMY FINE SAND, 5 TO 9 PERCENT SLOPES

Map Unit Setting

National map unit symbol: hkr
Elevation: 3,000 to 3,200 feet
Mean annual precipitation: 3 to 6 inches
Mean annual air temperature: 59 to 63 degrees F
Frost-free period: 180 to 280 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Bryman

Setting

Landform: Fan remnants
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite sources

Typical profile

H1 - 0 to 9 inches: loamy fine sand
H2 - 9 to 39 inches: sandy clay loam
H3 - 39 to 60 inches: loamy sand

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C 
Ecological site: R030XF012CA - Sandy
Hydric soil rating: No

Minor Components

Helendale

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

Custom Soil Resource Report

Bryman, sloping

Percent of map unit: 5 percent

Hydric soil rating: No

Cajon

Percent of map unit: 5 percent

Hydric soil rating: No

APPENDIX B

RATIONAL METHOD CALCULATIONS - EXISTING CONDITION

10-YEAR AND 100-YEAR STORM EVENTS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
(c) Copyright 1983-2015 Advanced Engineering Software (aes)
Ver. 22.0 Release Date: 07/01/2015 License ID 1510

***** DESCRIPTION OF STUDY *****

* THE COURT CONDOMINIUM *
* EXISTING CONDITION - 10YR *
* *

FILE NAME: 23391E.DAT
TIME/DATE OF STUDY: 08:30 04/30/2024

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE($\log(I; \text{IN/HR})$ vs. $\log(T_c; \text{MIN})$) = 0.7000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.6370

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

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	0.0313	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.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 10.00 TO NODE 20.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 730.00
ELEVATION DATA: UPSTREAM(FEET) = 3015.00 DOWNSTREAM(FEET) = 2988.90

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 14.283
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.740
SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	T_c (MIN.)
NATURAL DESERT COVER "JUNIPER-GRASS" (0.2%)	C	4.24	0.20	1.000	90	14.28

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 1.000
SUBAREA RUNOFF(CFS) = 5.88
TOTAL AREA(ACRES) = 4.24 PEAK FLOW RATE(CFS) = 5.88

FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE T_c (MIN.) = 14.28
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.740
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL DESERT COVER					

```

"JUNIPER-GRASS" ( 0.2%) C 4.79 0.20 1.000 90
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 4.79 SUBAREA RUNOFF(CFS) = 6.64
EFFECTIVE AREA(ACRES) = 9.03 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 9.0 PEAK FLOW RATE(CFS) = 12.51

*****
FLOW PROCESS FROM NODE 20.00 TO NODE 30.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 2988.90 DOWNSTREAM(FEET) = 2978.20
CHANNEL LENGTH THRU SUBAREA(FEET) = 495.00 CHANNEL SLOPE = 0.0216
CHANNEL BASE(FEET) = 10.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.025 MAXIMUM DEPTH(FEET) = 1.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.586
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL DESERT COVER
"JUNIPER-GRASS" ( 0.2%) C 8.52 0.20 1.000 90
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 17.83
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.08
AVERAGE FLOW DEPTH(FEET) = 0.37 TRAVEL TIME(MIN.) = 2.02
Tc(MIN.) = 16.31
SUBAREA AREA(ACRES) = 8.52 SUBAREA RUNOFF(CFS) = 10.63
EFFECTIVE AREA(ACRES) = 17.55 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 17.5 PEAK FLOW RATE(CFS) = 21.89

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.41 FLOW VELOCITY(FEET/SEC.) = 4.37
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 30.00 = 1225.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 17.5 TC(MIN.) = 16.31
EFFECTIVE AREA(ACRES) = 17.55 AREA-AVERAGED Fm(INCH/HR)= 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.000
PEAK FLOW RATE(CFS) = 21.89
=====
END OF RATIONAL METHOD ANALYSIS

```

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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Ver. 22.0 Release Date: 07/01/2015 License ID 1510

***** DESCRIPTION OF STUDY *****
* THE COURT CONDOMINIUM
* EXISTING CONDITION - 100YR *

FILE NAME: 23391E.DAT
TIME/DATE OF STUDY: 08:32 04/30/2024
=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE($\log(I; \text{IN/HR})$ vs. $\log(T_c; \text{MIN})$) = 0.7000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.1100

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

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	0.0313	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.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 10.00 TO NODE 20.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 730.00
ELEVATION DATA: UPSTREAM(FEET) = 3015.00 DOWNSTREAM(FEET) = 2988.90

$T_c = K * [(LENGTH^{**} 3.00) / (ELEVATION CHANGE)]^{**} 0.20$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 14.283
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.031
SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN	T_c (MIN.)
NATURAL DESERT COVER "JUNIPER-GRASS" (0.2%)	C	4.24	0.20	1.000	90	14.28

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 1.000
SUBAREA RUNOFF(CFS) = 10.80
TOTAL AREA(ACRES) = 4.24 PEAK FLOW RATE(CFS) = 10.80

FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

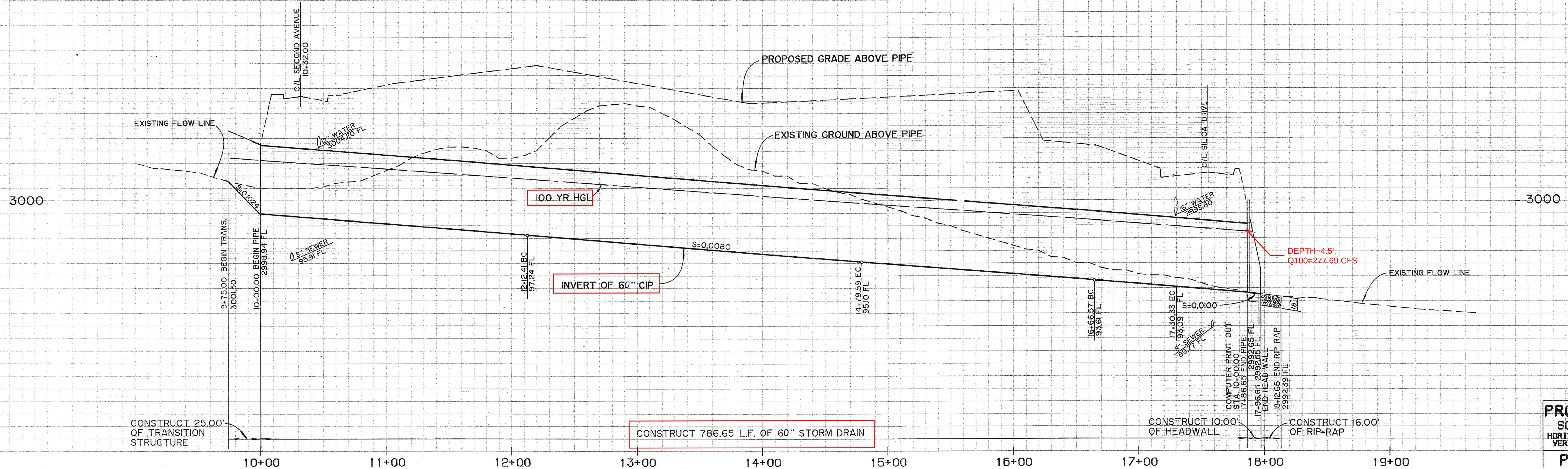
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=====
MAINLINE Tc(MIN.) = 14.28
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.031
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap        SCS
  LAND USE              GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL DESERT COVER
"JUNIPER-GRASS" ( 0.2%)  C        4.79      0.20      1.000      90
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 4.79      SUBAREA RUNOFF(CFS) = 12.21
EFFECTIVE AREA(ACRES) = 9.03      AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 9.0      PEAK FLOW RATE(CFS) = 23.01

*****
FLOW PROCESS FROM NODE      20.00 TO NODE      30.00 IS CODE = 51
-----
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM( FEET) = 2988.90  DOWNSTREAM( FEET) = 2978.20
CHANNEL LENGTH THRU SUBAREA( FEET) = 495.00  CHANNEL SLOPE = 0.0216
CHANNEL BASE( FEET) = 10.00  "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.025  MAXIMUM DEPTH( FEET) = 1.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.808
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap        SCS
  LAND USE              GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL DESERT COVER
"JUNIPER-GRASS" ( 0.2%)  C        8.52      0.20      1.000      90
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 33.02
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY( FEET/SEC.) = 5.00
AVERAGE FLOW DEPTH( FEET) = 0.52  TRAVEL TIME(MIN.) = 1.65
Tc(MIN.) = 15.93
SUBAREA AREA(ACRES) = 8.52      SUBAREA RUNOFF(CFS) = 20.00
EFFECTIVE AREA(ACRES) = 17.55      AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 17.5      PEAK FLOW RATE(CFS) = 41.19

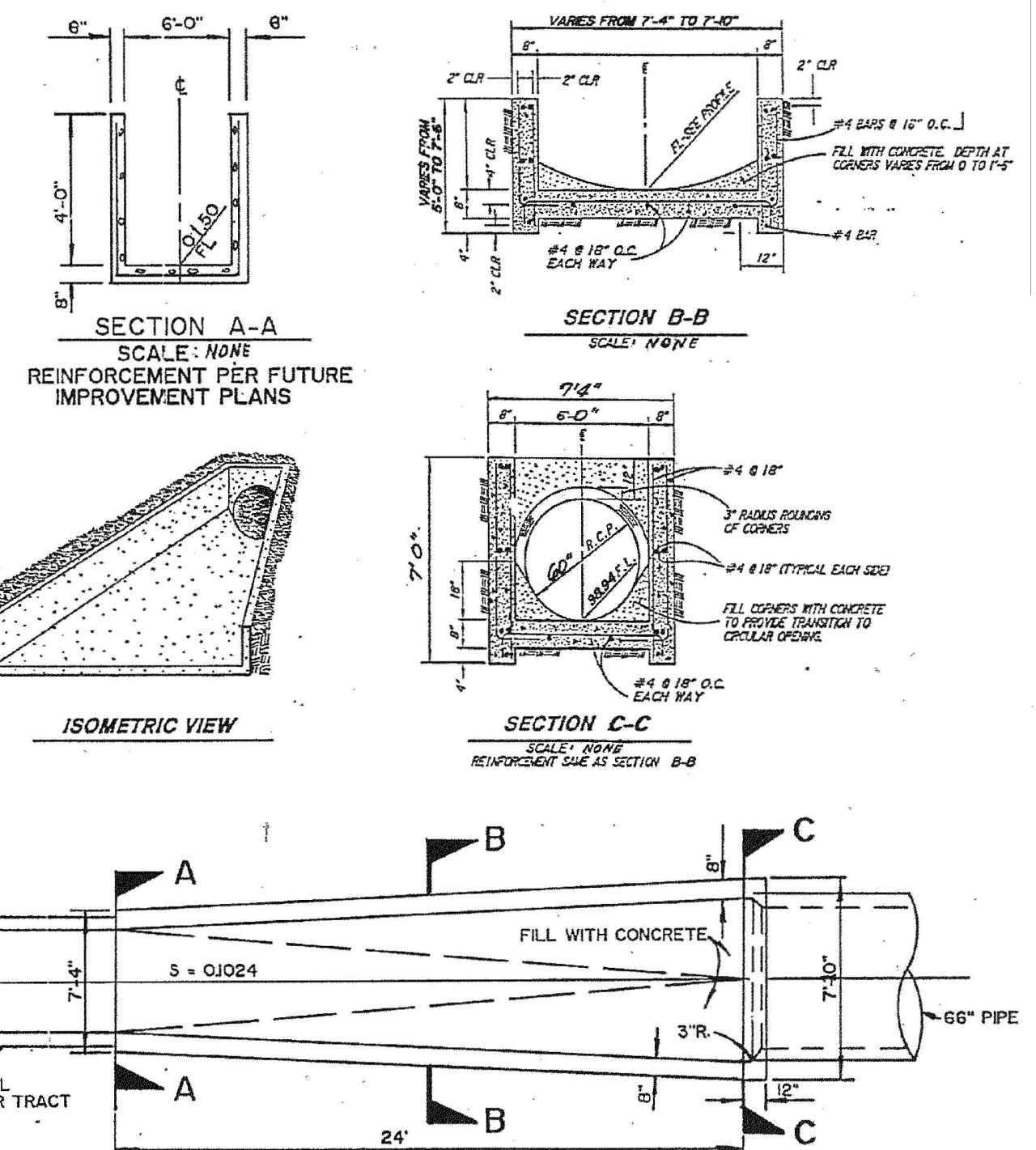
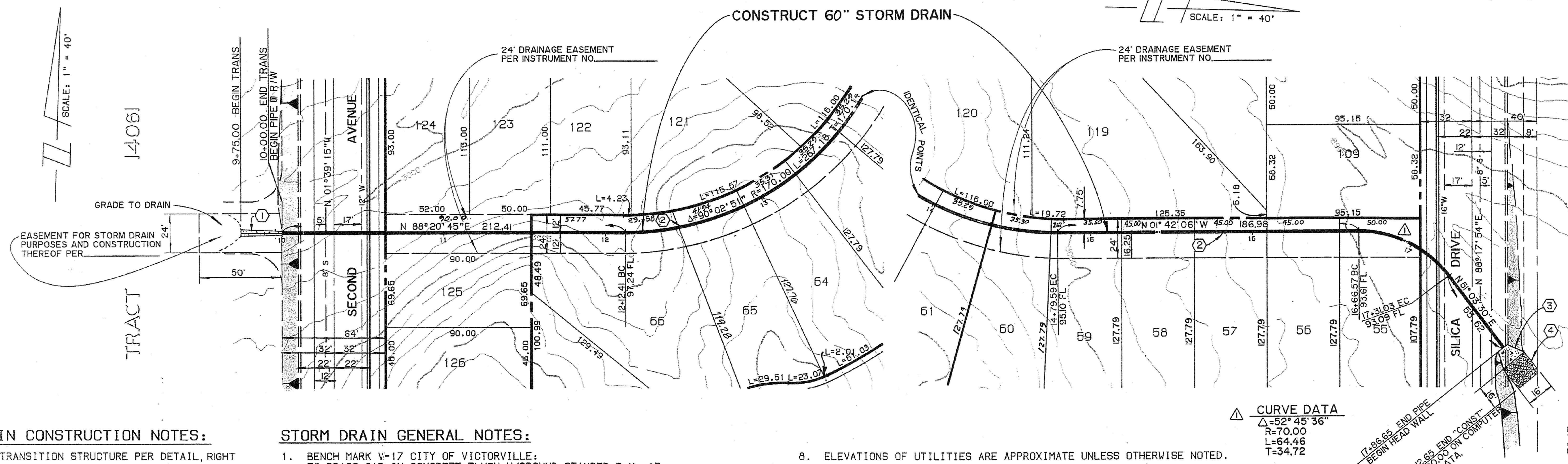
END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH( FEET) = 0.59  FLOW VELOCITY( FEET/SEC.) = 5.37
LONGEST FLOWPATH FROM NODE      10.00 TO NODE      30.00 = 1225.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 17.5  TC(MIN.) = 15.93
EFFECTIVE AREA(ACRES) = 17.55  AREA-AVERAGED Fm(INCH/HR)= 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 1.000
PEAK FLOW RATE(CFS) = 41.19
=====
END OF RATIONAL METHOD ANALYSIS

```



PROFILE
SCALE:
HORIZ. 1"=40'
VERT. 1"=4'

PLAN
SCALE:
1"=40'

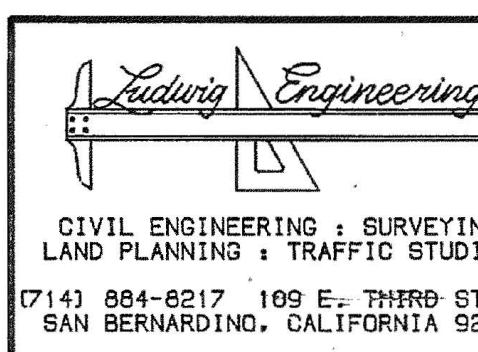


STORM DRAIN CONSTRUCTION NOTES:

- CONSTRUCT 25' TRANSITION STRUCTURE PER DETAIL, RIGHT
- INSTALL 60" CAST-IN-PLACE PIPE.
- CONSTRUCT HEADWALL PER SAN BERNARDINO COUNTY STANDARD DRAWING NO. 209, L=11'2", E=5', F=10', W=5'6".
- INSTALL RIP RAP PAD 16' X 16', USE 8" NOMINAL ROCK 16" THICK.

STORM DRAIN GENERAL NOTES:

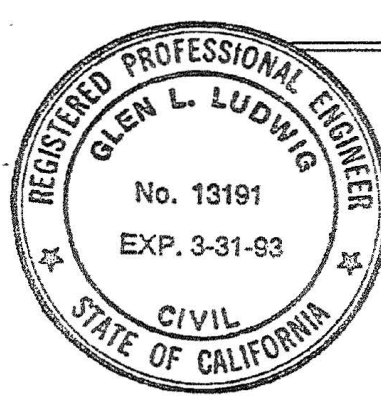
- BENCH MARK V-17 CITY OF VICTORVILLE: 3" BRASS CAP IN CONCRETE FLUSH W/GROUND STAMPED B.M. 17 LOCATED SOUTH SIDE BEAR VALLEY ROAD @ RIDGE CREST ROAD 1017' WEST OF AD DRIVEWAY 3' SOUTH OF SOUTH EP BEAR VALLEY ROAD. ELEVATION = 2975.138
- THE CONTRACTOR SHALL CONSTRUCT THE FLOOD CONTROL IMPROVEMENTS SHOWN ON THE DRAWINGS IN CONFORMANCE WITH THE REQUIREMENTS OF THE CITY OF VICTORVILLE OR THE SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT'S DETAILED SPECIFICATIONS AND DESIGN MANUAL STANDARD DRAWINGS DATED APRIL 19, 1976 AND AUGUST 1989, RESPECTIVELY.
- CONSTRUCTION INSPECTION WILL BE PERFORMED BY THE CITY OF VICTORVILLE AT 1-619-245-3411. THE CITY MUST BE NOTIFIED ONE WEEK PRIOR TO CONSTRUCTION.
- ALL STATIONING REFERS TO CENTERLINE OF STORM DRAIN UNLESS OTHERWISE NOTED.
- STATIONING FOR LATERALS AND CONNECTOR PIPE REFER TO THE CENTERLINE-INTERSECTION STATION.
- FORTY-EIGHT HOURS BEFORE EXCAVATION, CALL UNDERGROUND SERVICE ALERT 1-800-422-4133.
- ALL ELEVATIONS SHOWN ARE IN FEET AND DECIMALS THEREOF BASED ON THE CITY OF VICTORVILLE DATUM.
- ELEVATIONS OF UTILITIES ARE APPROXIMATE UNLESS OTHERWISE NOTED.
- BEDDING PIPE WITH LESS THAN TWO FEET OF COVER SHALL CONFORM TO LOS ANGELES COUNTY FLOOD CONTROL DISTRICT STANDARD DRAWINGS 2-D213.3 AND 2-D177 FOR CONCRETE BACKFILL IN TRENCHES.
- GENERAL NOTES ON SHEET 1 SHALL APPLY FOR THIS STORM DRAIN CONSTRUCTION.
- CONTRACTOR TO NEGOTIATE WITH UTILITY OWNERS FOR RELOCATION OF EXISTING UTILITIES AT CONTRACTORS EXPENSE.



FIELD BOOK REF.			
MARK	REVISIONS	APPR	DATE

CITY OF VICTORVILLE			
DESIGNED BY	DRAWN BY	CHECKED BY	RECOMMENDED BY

STREET IMPROVEMENT PLANS			
TRACT NO. 14403			
STORM DRAIN			
STA. 10+00 TO STA. 17+86.65			
CITY OF VICTORVILLE, CA.			

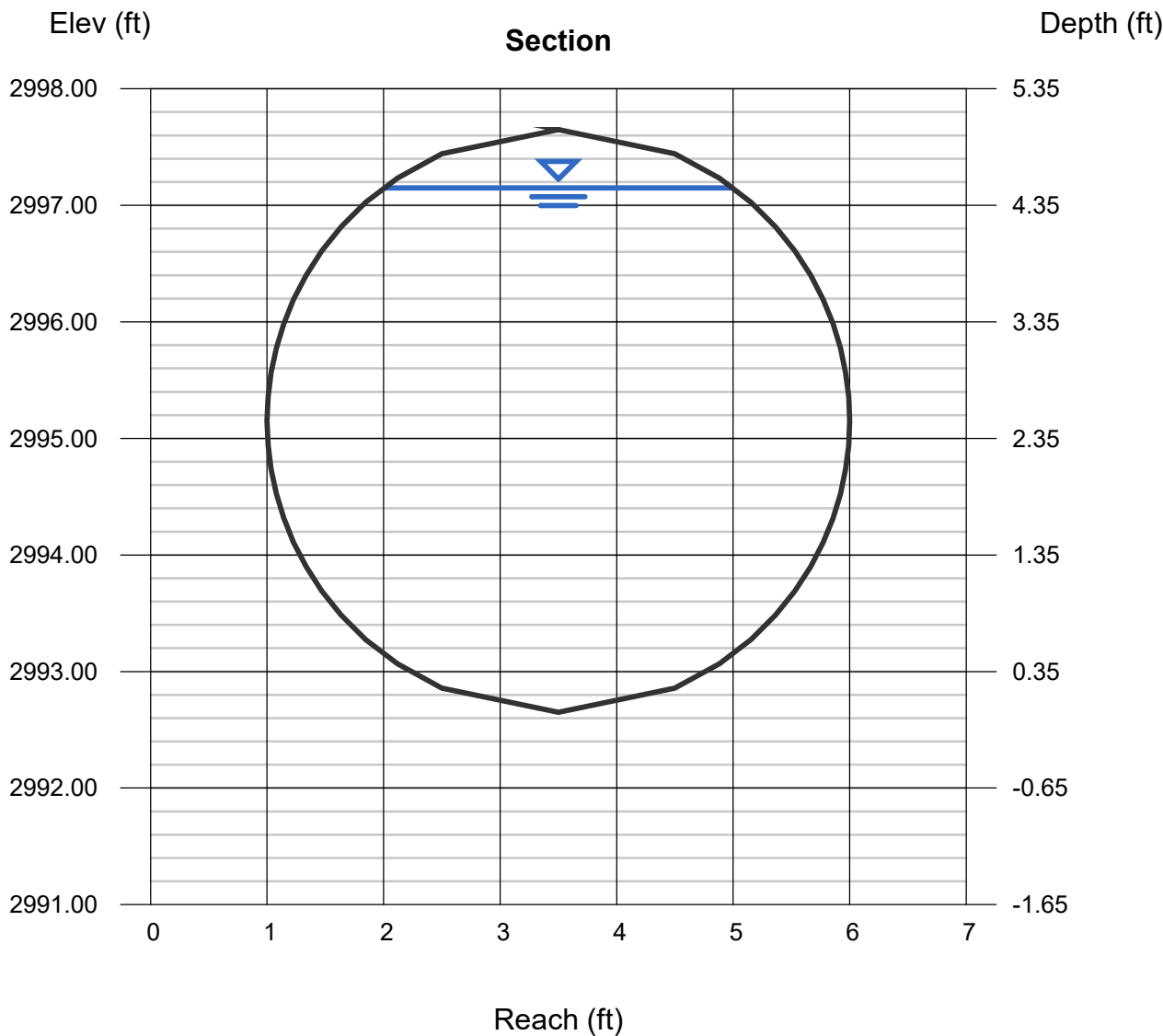


Glen L. Ludwig 8-14-90
GLEN L. LUDWIG R.C.E. 13191 DATE
REGISTRATION EXPIRES MARCH 31, 1993

Channel Report

EXISTING 60 INCH STORM DRAIN

Circular		Highlighted	
Diameter (ft)	= 5.00	Depth (ft)	= 4.50
		Q (cfs)	= 277.69
		Area (sqft)	= 18.62
Invert Elev (ft)	= 2992.65	Velocity (ft/s)	= 14.91
Slope (%)	= 1.00	Wetted Perim (ft)	= 12.50
N-Value	= 0.013	Crit Depth, Yc (ft)	= 4.58
		Top Width (ft)	= 2.99
		EGL (ft)	= 7.96
Calculations			
Compute by:	Known Depth		
Known Depth (ft)	= 4.50		
		DEPTH OF AS-BUILT PLAN	



APPENDIX C

RATIONAL METHOD CALCULATIONS - PROPOSED CONDITION

10-YEAR AND 100-YEAR STORM EVENTS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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Ver. 22.0 Release Date: 07/01/2015 License ID 1510

***** DESCRIPTION OF STUDY *****
* THE COURT CONDOMINIUM *
* PROPOSED CONDITION - 10YR *
* *

FILE NAME: 23391P.DAT
TIME/DATE OF STUDY: 08:31 04/30/2024

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.7000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.6370

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

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	0.0313	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.50 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.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 10.00 TO NODE 20.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 730.00
ELEVATION DATA: UPSTREAM(FEET) = 3015.00 DOWNSTREAM(FEET) = 2987.80

$T_c = K * [(LENGTH^{**} 3.00) / (ELEVATION CHANGE)]^{**} 0.20$
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.166
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.750
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
NATURAL DESERT COVER "MOUNTAIN BRUSH" (0.2%)	C	4.24	0.20	1.000	90	14.17

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 5.91
TOTAL AREA(ACRES) = 4.24 PEAK FLOW RATE(CFS) = 5.91

FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 81

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-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.17
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.750
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
    LAND USE         GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL DESERT COVER
"JUNIPER-GRASS" ( 0.2%) C      4.79    0.20    1.000    90
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 4.79    SUBAREA RUNOFF(CFS) = 6.68
EFFECTIVE AREA(ACRES) = 9.03    AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 9.0    PEAK FLOW RATE(CFS) = 12.59

*****
FLOW PROCESS FROM NODE    20.00 TO NODE    65.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 2987.80 DOWNSTREAM(FEET) = 2978.20
FLOW LENGTH(FEET) = 630.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 8.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.79
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 12.59
PIPE TRAVEL TIME(MIN.) = 1.35    Tc(MIN.) = 15.51
LONGEST FLOWPATH FROM NODE    10.00 TO NODE    65.00 = 1360.00 FEET.

*****
FLOW PROCESS FROM NODE    65.00 TO NODE    65.00 IS CODE = 10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
=====
*****
FLOW PROCESS FROM NODE    15.00 TO NODE    25.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 210.00
ELEVATION DATA: UPSTREAM(FEET) = 2998.00 DOWNSTREAM(FEET) = 2995.30

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.301
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.783
SUBAREA Tc AND LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS   Tc
    LAND USE         GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
CONDOMINIUMS        C      0.40    0.57    0.350    69    7.30
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA RUNOFF(CFS) = 0.93
TOTAL AREA(ACRES) = 0.40    PEAK FLOW RATE(CFS) = 0.93

*****
FLOW PROCESS FROM NODE    25.00 TO NODE    35.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 2992.30 DOWNSTREAM(FEET) = 2990.40
FLOW LENGTH(FEET) = 372.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
DEPTH OF FLOW IN 12.0 INCH PIPE IS 5.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 2.93
ESTIMATED PIPE DIAMETER(INCH) = 12.00    NUMBER OF PIPES = 1

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PIPE-FLOW(CFS) = 0.93
PIPE TRAVEL TIME(MIN.) = 2.12 Tc(MIN.) = 9.42
LONGEST FLOWPATH FROM NODE 15.00 TO NODE 35.00 = 582.00 FEET.
*****
FLOW PROCESS FROM NODE 35.00 TO NODE 35.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 9.42
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.329
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
CONDOMINIUMS C 1.43 0.57 0.350 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA(ACRES) = 1.43 SUBAREA RUNOFF(CFS) = 2.74
EFFECTIVE AREA(ACRES) = 1.83 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 1.8 PEAK FLOW RATE(CFS) = 3.51
*****
FLOW PROCESS FROM NODE 35.00 TO NODE 45.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 2990.40 DOWNSTREAM(FEET) = 2983.50
FLOW LENGTH(FEET) = 475.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 8.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.97
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.51
PIPE TRAVEL TIME(MIN.) = 1.33 Tc(MIN.) = 10.74
LONGEST FLOWPATH FROM NODE 15.00 TO NODE 45.00 = 1057.00 FEET.
*****
FLOW PROCESS FROM NODE 45.00 TO NODE 45.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 10.74
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.123
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
CONDOMINIUMS C 1.65 0.57 0.350 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA(ACRES) = 1.65 SUBAREA RUNOFF(CFS) = 2.86
EFFECTIVE AREA(ACRES) = 3.48 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 3.5 PEAK FLOW RATE(CFS) = 6.03
*****
FLOW PROCESS FROM NODE 45.00 TO NODE 55.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 2983.50 DOWNSTREAM(FEET) = 2983.00
FLOW LENGTH(FEET) = 95.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 12.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.68
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 6.03
PIPE TRAVEL TIME(MIN.) = 0.34 Tc(MIN.) = 11.08
LONGEST FLOWPATH FROM NODE 15.00 TO NODE 55.00 = 1152.00 FEET.
*****

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FLOW PROCESS FROM NODE      55.00 TO NODE      55.00 IS CODE = 81
-----
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 11.08
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.078
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
CONDOMINIUMS C 5.04 0.57 0.350 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA(ACRES) = 5.04 SUBAREA RUNOFF(CFS) = 8.53
EFFECTIVE AREA(ACRES) = 8.52 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.57 AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 8.5 PEAK FLOW RATE(CFS) = 14.41

*****
FLOW PROCESS FROM NODE      55.00 TO NODE      65.00 IS CODE = 31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 2983.00 DOWNSTREAM(FEET) = 2978.20
FLOW LENGTH(FEET) = 20.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 8.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 24.30
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 14.41
PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 11.10
LONGEST FLOWPATH FROM NODE 15.00 TO NODE 65.00 = 1172.00 FEET.

*****
FLOW PROCESS FROM NODE      65.00 TO NODE      65.00 IS CODE = 11
-----
>>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
=====
** MAIN STREAM CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 14.41 11.10 2.076 0.57( 0.20) 0.35 8.5 15.00
LONGEST FLOWPATH FROM NODE 15.00 TO NODE 65.00 = 1172.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 12.59 15.51 1.642 0.20( 0.20) 1.00 9.0 10.00
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 65.00 = 1360.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 26.13 11.10 2.076 0.32( 0.20) 0.63 15.0 15.00
2 23.68 15.51 1.642 0.29( 0.20) 0.68 17.5 10.00
TOTAL AREA(ACRES) = 17.5

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 26.13 Tc(MIN.) = 11.096
EFFECTIVE AREA(ACRES) = 14.98 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.32 AREA-AVERAGED Ap = 0.63
TOTAL AREA(ACRES) = 17.5
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 65.00 = 1360.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 17.5 TC(MIN.) = 11.10
EFFECTIVE AREA(ACRES) = 14.98 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.32 AREA-AVERAGED Ap = 0.630
PEAK FLOW RATE(CFS) = 26.13

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** PEAK FLOW RATE TABLE **

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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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Ver. 22.0 Release Date: 07/01/2015 License ID 1510

***** DESCRIPTION OF STUDY *****

* THE COURT CONDOMINIUM *
* PROPOSED CONDITION - 100YR *

FILE NAME: 23391P.DAT
TIME/DATE OF STUDY: 08:33 04/30/2024
=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE($\log(I; \text{IN/HR})$ vs. $\log(T_c; \text{MIN})$) = 0.7000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.1100

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

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	0.0313	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.50 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.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 10.00 TO NODE 20.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 730.00
ELEVATION DATA: UPSTREAM(FEET) = 3015.00 DOWNSTREAM(FEET) = 2987.80

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 14.166
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.049
SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	T_c (MIN.)
NATURAL DESERT COVER						
"MOUNTAIN BRUSH" (0.2%)	C	4.24	0.20	1.000	90	14.17

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 1.000
SUBAREA RUNOFF(CFS) = 10.87
TOTAL AREA(ACRES) = 4.24 PEAK FLOW RATE(CFS) = 10.87

FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====

MAINLINE T_c (MIN.) = 14.17
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.049
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL DESERT COVER					

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"JUNIPER-GRASS" ( 0.2%) C 4.79 0.20 1.000 90
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 4.79 SUBAREA RUNOFF(CFS) = 12.28
EFFECTIVE AREA(ACRES) = 9.03 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 9.0 PEAK FLOW RATE(CFS) = 23.15

*****
FLOW PROCESS FROM NODE 20.00 TO NODE 65.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 2987.80 DOWNSTREAM(FEET) = 2978.20
FLOW LENGTH(FEET) = 630.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 11.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.34
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 23.15
PIPE TRAVEL TIME(MIN.) = 1.12 Tc(MIN.) = 15.29
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 65.00 = 1360.00 FEET.

*****
FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
=====

*****
FLOW PROCESS FROM NODE 15.00 TO NODE 25.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 210.00
ELEVATION DATA: UPSTREAM(FEET) = 2998.00 DOWNSTREAM(FEET) = 2995.30

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.301
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.849
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
CONDOMINIUMS C 0.40 0.57 0.350 69 7.30
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA RUNOFF(CFS) = 1.67
TOTAL AREA(ACRES) = 0.40 PEAK FLOW RATE(CFS) = 1.67

*****
FLOW PROCESS FROM NODE 25.00 TO NODE 35.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 2992.30 DOWNSTREAM(FEET) = 2990.40
FLOW LENGTH(FEET) = 372.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 7.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.38
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.67
PIPE TRAVEL TIME(MIN.) = 1.83 Tc(MIN.) = 9.13
LONGEST FLOWPATH FROM NODE 15.00 TO NODE 35.00 = 582.00 FEET.

*****
FLOW PROCESS FROM NODE 35.00 TO NODE 35.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 9.13
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.146
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
CONDOMINIUMS C 1.43 0.57 0.350 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA(ACRES) = 1.43 SUBAREA RUNOFF(CFS) = 5.08

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EFFECTIVE AREA(ACRES) =      1.83   AREA-AVERAGED Fm(INCH/HR) =   0.20
AREA-AVERAGED Fp(INCH/HR) =  0.57   AREA-AVERAGED Ap =   0.35
TOTAL AREA(ACRES) =      1.8       PEAK FLOW RATE(CFS) =      6.50

*****
FLOW PROCESS FROM NODE      35.00 TO NODE      45.00 IS CODE =   31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 2990.40 DOWNSTREAM(FEET) = 2983.50
FLOW LENGTH(FEET) =   475.00 MANNING'S N =   0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS 10.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   6.95
ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES =    1
PIPE-FLOW(CFS) =      6.50
PIPE TRAVEL TIME(MIN.) =   1.14 Tc(MIN.) =   10.27
LONGEST FLOWPATH FROM NODE      15.00 TO NODE      45.00 =   1057.00 FEET.

*****
FLOW PROCESS FROM NODE      45.00 TO NODE      45.00 IS CODE =   81
-----
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) =   10.27
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =   3.818
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
LAND USE      GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN
CONDOMINIUMS      C      1.65      0.57      0.350      69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   0.350
SUBAREA AREA(ACRES) =   1.65 SUBAREA RUNOFF(CFS) =   5.38
EFFECTIVE AREA(ACRES) =   3.48 AREA-AVERAGED Fm(INCH/HR) =   0.20
AREA-AVERAGED Fp(INCH/HR) =  0.57 AREA-AVERAGED Ap =   0.35
TOTAL AREA(ACRES) =   3.5 PEAK FLOW RATE(CFS) =   11.34

*****
FLOW PROCESS FROM NODE      45.00 TO NODE      55.00 IS CODE =   31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 2983.50 DOWNSTREAM(FEET) = 2983.00
FLOW LENGTH(FEET) =   95.00 MANNING'S N =   0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 14.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   5.52
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES =    1
PIPE-FLOW(CFS) =   11.34
PIPE TRAVEL TIME(MIN.) =   0.29 Tc(MIN.) =   10.56
LONGEST FLOWPATH FROM NODE      15.00 TO NODE      55.00 =   1152.00 FEET.

*****
FLOW PROCESS FROM NODE      55.00 TO NODE      55.00 IS CODE =   81
-----
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) =   10.56
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =   3.745
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
LAND USE      GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN
CONDOMINIUMS      C      5.04      0.57      0.350      69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   0.350
SUBAREA AREA(ACRES) =   5.04 SUBAREA RUNOFF(CFS) =   16.09
EFFECTIVE AREA(ACRES) =   8.52 AREA-AVERAGED Fm(INCH/HR) =   0.20
AREA-AVERAGED Fp(INCH/HR) =  0.57 AREA-AVERAGED Ap =   0.35
TOTAL AREA(ACRES) =   8.5 PEAK FLOW RATE(CFS) =   27.20

*****
FLOW PROCESS FROM NODE      55.00 TO NODE      65.00 IS CODE =   31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 2983.00 DOWNSTREAM(FEET) = 2978.20
FLOW LENGTH(FEET) =   20.00 MANNING'S N =   0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS 10.9 INCHES

```

PIPE-FLOW VELOCITY(FEET/SEC.) = 28.37
 ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 27.20
 PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 10.57
 LONGEST FLOWPATH FROM NODE 15.00 TO NODE 65.00 = 1172.00 FEET.

FLOW PROCESS FROM NODE 65.00 TO NODE 65.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<

=====

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	27.20	10.57	3.743	0.57(0.20)	0.35	8.5	15.00

LONGEST FLOWPATH FROM NODE 15.00 TO NODE 65.00 = 1172.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	23.15	15.29	2.890	0.20(0.20)	1.00	9.0	10.00

LONGEST FLOWPATH FROM NODE 10.00 TO NODE 65.00 = 1360.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	48.28	10.57	3.743	0.32(0.20)	0.62	14.8	15.00
2	43.81	15.29	2.890	0.29(0.20)	0.68	17.5	10.00

TOTAL AREA(ACRES) = 17.5

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 48.28 Tc(MIN.) = 10.570
 EFFECTIVE AREA(ACRES) = 14.76 AREA-AVERAGED Fm(INCH/HR) = 0.20
 AREA-AVERAGED Fp(INCH/HR) = 0.32 AREA-AVERAGED Ap = 0.62
 TOTAL AREA(ACRES) = 17.5
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 65.00 = 1360.00 FEET.

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 17.5 TC(MIN.) = 10.57
 EFFECTIVE AREA(ACRES) = 14.76 AREA-AVERAGED Fm(INCH/HR)= 0.20
 AREA-AVERAGED Fp(INCH/HR) = 0.32 AREA-AVERAGED Ap = 0.625
 PEAK FLOW RATE(CFS) = 48.28

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	48.28	10.57	3.743	0.32(0.20)	0.62	14.8	15.00
2	43.81	15.29	2.890	0.29(0.20)	0.68	17.5	10.00

=====

=====

END OF RATIONAL METHOD ANALYSIS

END OF RATIONAL METHOD ANALYSIS

APPENDIX D

PIPE HYDRAULIC SIZING CALCULATIONS

Channel Report

60 INCH STORM DRAIN

Circular

Diameter (ft) = 5.00

Invert Elev (ft) = 2978.20
Slope (%) = 1.50
N-Value = 0.013

Calculations

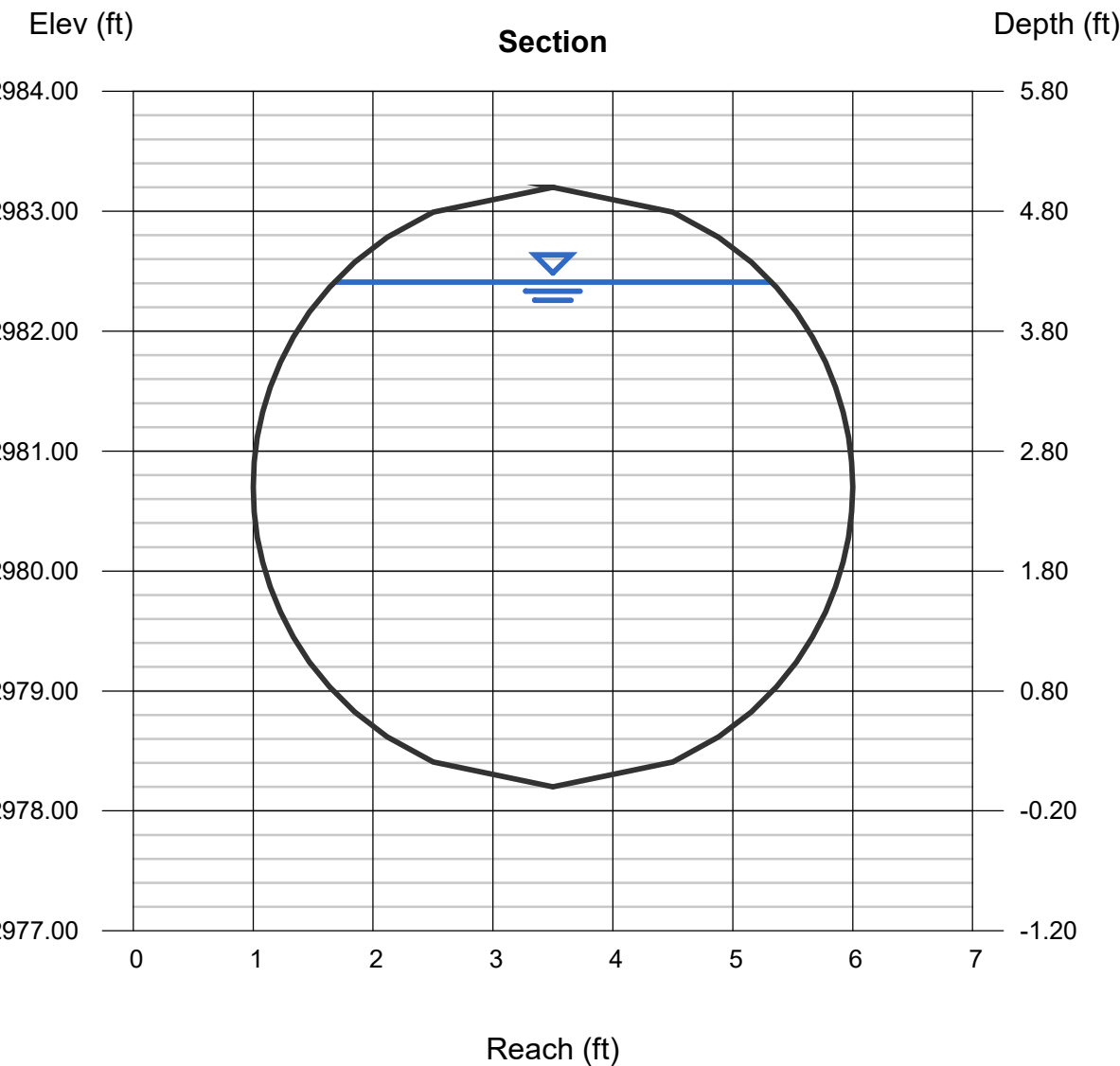
Compute by: Known Q
Known Q (cfs) = 325.97

Highlighted

Depth (ft) = 4.21
Q (cfs) = 325.97
Area (sqft) = 17.65
Velocity (ft/s) = 18.47
Wetted Perim (ft) = 11.63
Crit Depth, Yc (ft) = 4.75
Top Width (ft) = 3.64
EGL (ft) = 9.51

PROPOSED S.D.
SLOPE

ON-SITE AND
OFF-SITE FLOW
RATE COMBINED



REFERENCE DOCUMENT

MOJAVE ENGINEERING
14011 PARK AVE., SUITE 310
VICTORVILLE, CALIFORNIA 92392
(619) 241-3422

WO..... 6064
PROJECT... TR 13948
DATE..... 10/26/89

SAN BERNARDINO COUNTY UNIT HYDROGRAPH

PHYSICAL DATA INPUT SEGMENT

L = LENGTH OF LONGEST WATERCOURSE - FEET 12000
LCA = LENGTH ALONG LONGEST WATERCOURSE, MEASURED 6000
UPSTREAM TO A POINT OPPOSITE THE CENTROID OF
THE AREA - FEET
H = DIFFERENCE IN ELEVATION BETWEEN THE CONCENTRATION 180
POINT AND THE MOST REMOTE POINT OF THE BASIN - FEET
N = THE VISUALLY ESTIMATED MEAN OF MANNING'S 'N' VALUES .04
OF ALL COLLECTION STREAMS AND CHANNELS WITHIN THE
WATERSHED.
A = DRAINAGE AREA - ACRES 275

INFILTRATION RATE..... 0.30
LOW LOSS PERCENTAGE..... 0.45
ADJUSTED 5 MIN RAINFALL..... 0.55
ADJUSTED 30 MIN RAINFALL..... 0.93
ADJUSTED 1 HR RAINFALL..... 1.10
ADJUSTED 3 HR RAINFALL..... 1.50
ADJUSTED 6 HR RAINFALL..... 1.80
ADJUSTED 24 HR RAINFALL..... 3.00

'S' GRAPH SELECTED = DESERT
UNIT TIME PERIOD = 5
UNIT TIME - PERCENT OF LAG = 13.89
PEAK FLOW = 305 CFS
FLOOD VOLUME = 42 ACRE-Feet

OK SIR
10/26/89

Hydraulics

$Q_{100} = 305 \text{ CFS}$

ON-SITE AND OFF-SITE FLOW
 RATE COMBINED OF 325.97 CFS
 IS MORE CONSERVATIVE

$n = 0.015$ (SPRINK RIR OR CAST IR PIPE)
 $n = 0.013$ (RCP)
 $A = 19.64$
 $r = 1.25$
 $r^{2/3} = 1.16$

FRICTION LOSS

$$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$$

$$S = \left(\frac{Qn}{1.486 A R^{2/3}} \right)^2$$

$$S = \left(\frac{(305)(0.015)}{(1.486)(19.64)(1.16)} \right)^2$$

$S = 0.0183 = \text{HEAD LOSS PER FOOT } (S = \frac{H}{L})$

$L = 307.47' + 201 = 507.47'$

$H_L = 9.27'$

ASSUME SOFFIT CONTROL

POINT OF CONNECTION = $74.30 + 60'' = 79.30$
 OUT-LET = $63.00 + 60'' = \underline{68.00}$

AVAILABLE = 11.30
 HEAD

$9.27 < 11.30 \Rightarrow \underline{\underline{OK}}$

4011 PARK AVE., SUITE 310
VICTORVILLE, CALIFORNIA 92392
(619) 241-3422

WO..... 1008
PROJECT... B.B.C.
DATE..... 7/28/87
1078

SAN BERNARDINO COUNTY UNIT HYDROGRAPH

PHYSICAL DATA INPUT SEGMENT

L = LENGTH OF LONGEST WATERCOURSE - FEET

(12000) 16000

LCA = LENGTH ALONG LONGEST WATERCOURSE, MEASURED
UPSTREAM TO A POINT OPPOSITE THE CENTROID OF
THE AREA - FEET

(6000) 8000

H = DIFFERENCE IN ELEVATION BETWEEN THE CONCENTRATION
POINT AND THE MOST REMOTE POINT OF THE BASIN - FEET

(180) 222

N = THE VISUALLY ESTIMATED MEAN OF MANNING'S 'N' VALUES
OF ALL COLLECTION STREAMS AND CHANNELS WITHIN THE
WATERSHED.

.04

A = DRAINAGE AREA - ACRES

(275) 950

RAINFALL DATA INPUT

INFILTRATION RATE.....

(.27) 0.30

LOW LOSS PERCENTAGE.....

(.83) 0.45

ADJUSTED 5 MIN RAINFALL.....

.85

ADJUSTED 30 MIN RAINFALL.....

.93

ADJUSTED 1 HR RAINFALL.....

1.1

ADJUSTED 3 HR RAINFALL.....

1.5

ADJUSTED 6 HR RAINFALL.....

1.8

ADJUSTED 24 HR RAINFALL.....

3

'S' GRAPH SELECTED = DESERT.DAT

UNIT TIME PERIOD = 10

UNIT TIME - PERCENT OF LAG = (27.78)

PEAK FLOW = (271) CFS

FLOOD VOLUME = (27) ACRE-Feet

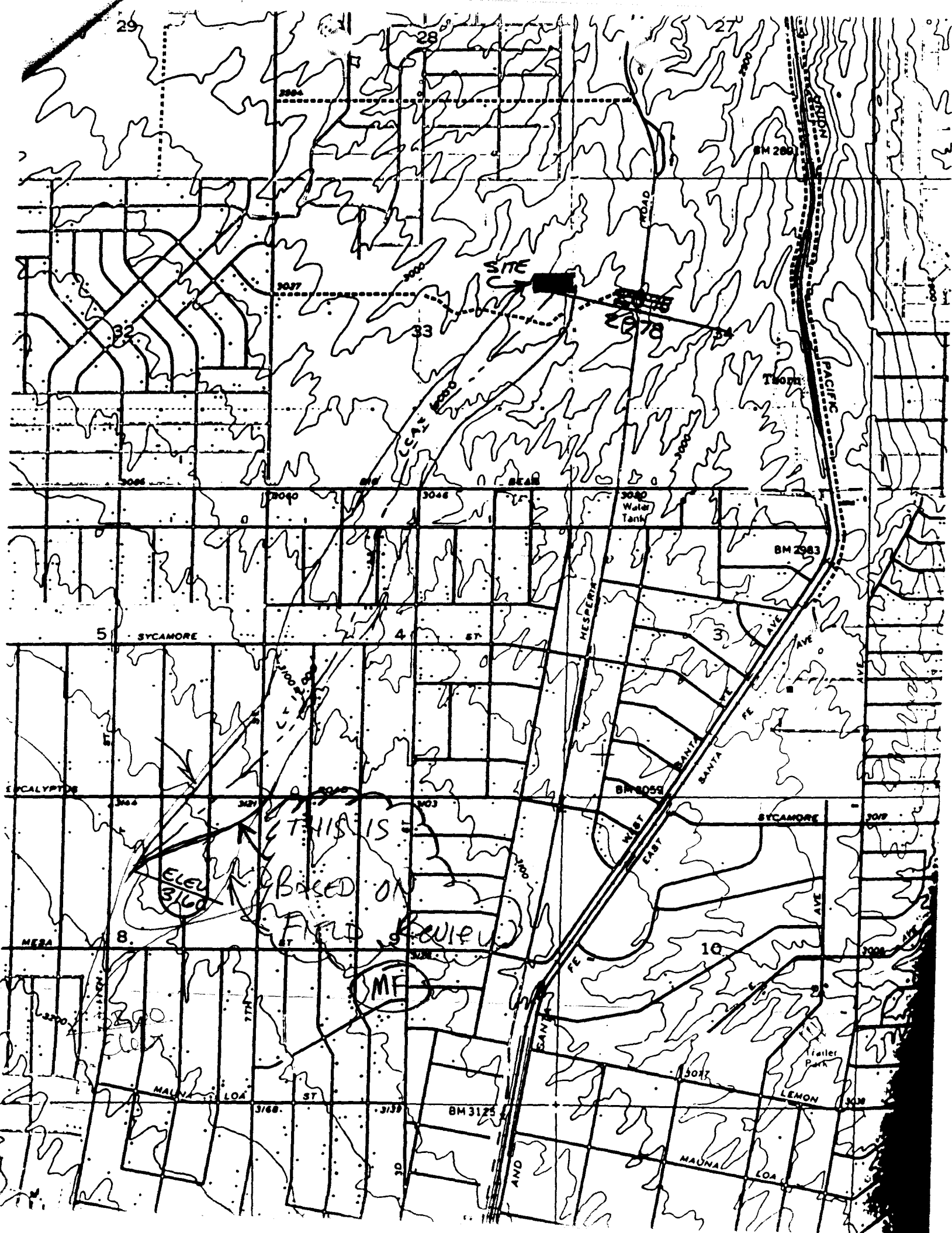
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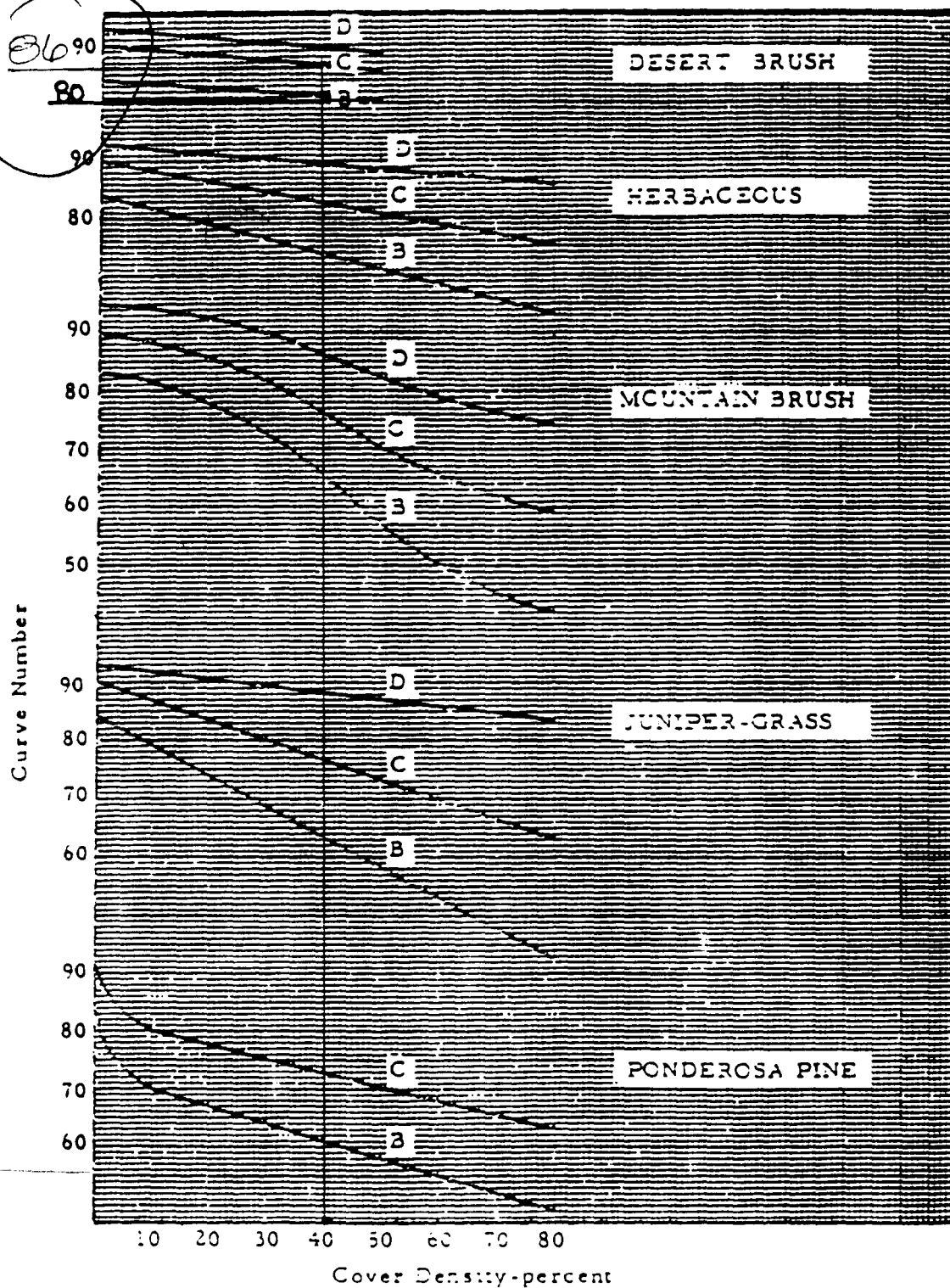
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ENGINEERING DEPARTMENT

#14

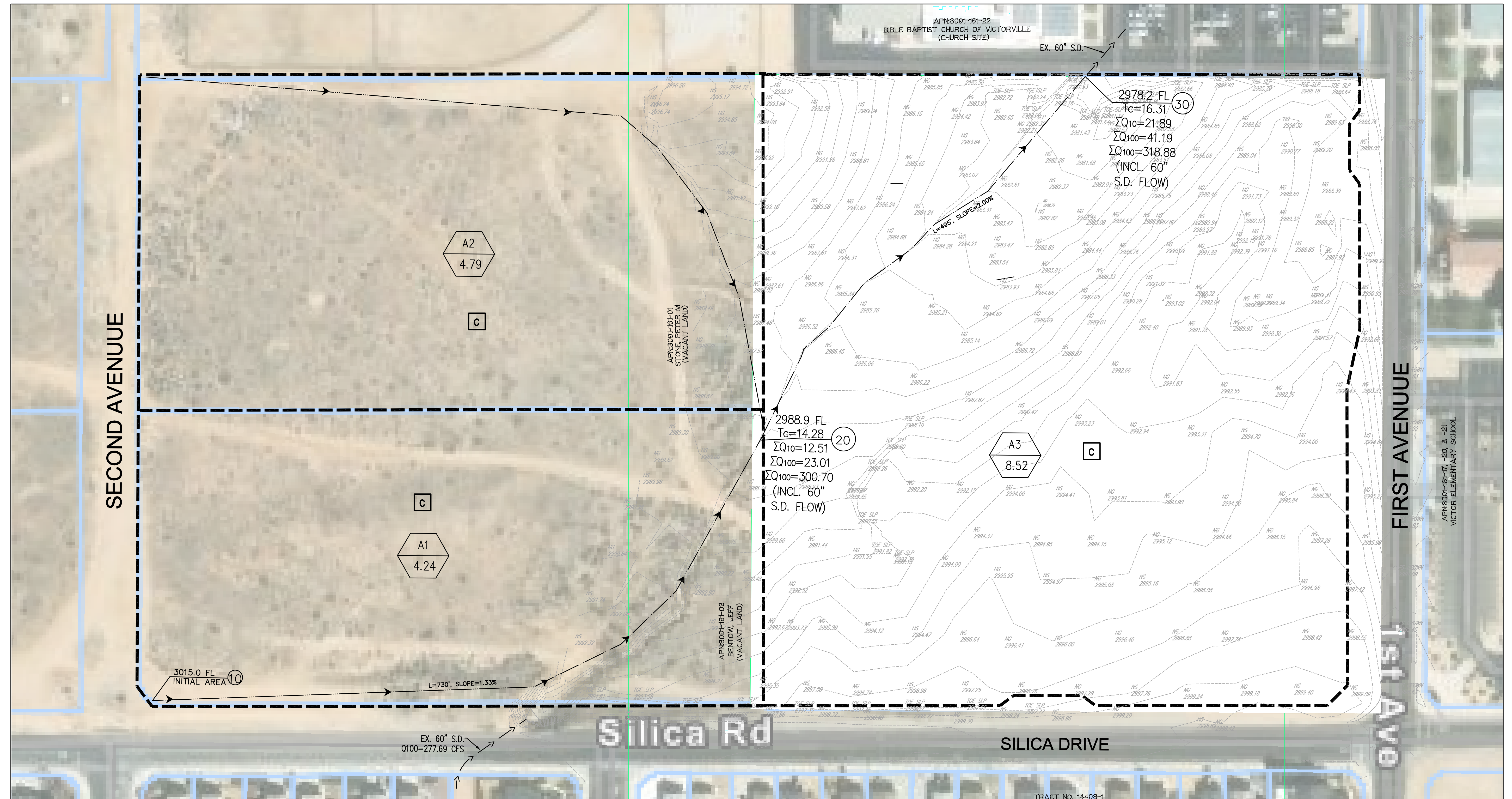




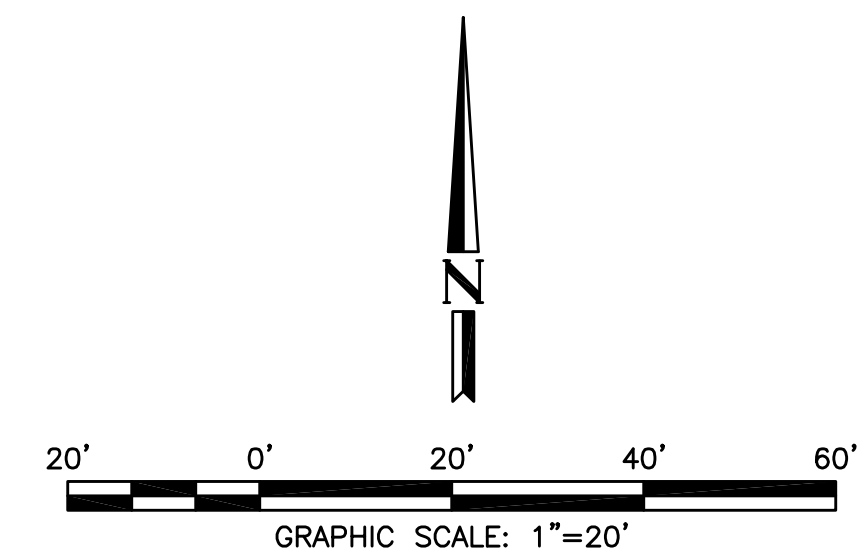


APPENDIX E

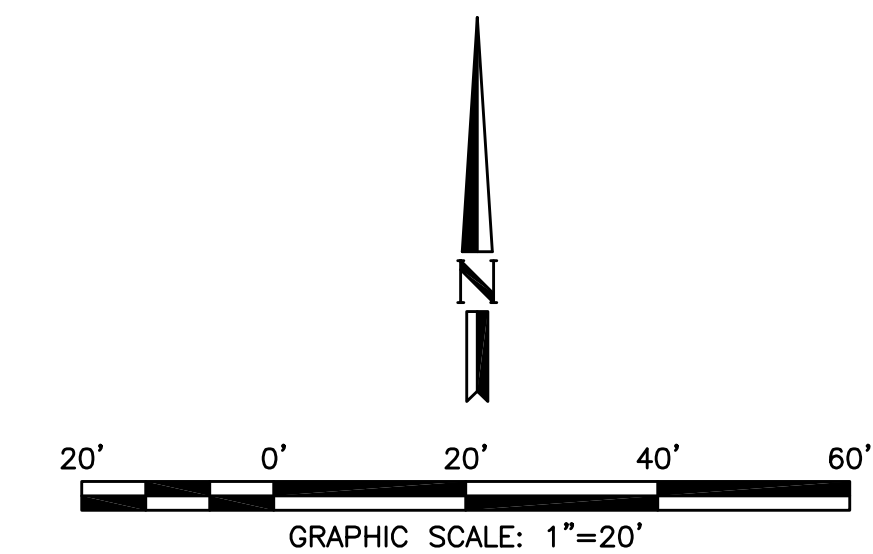
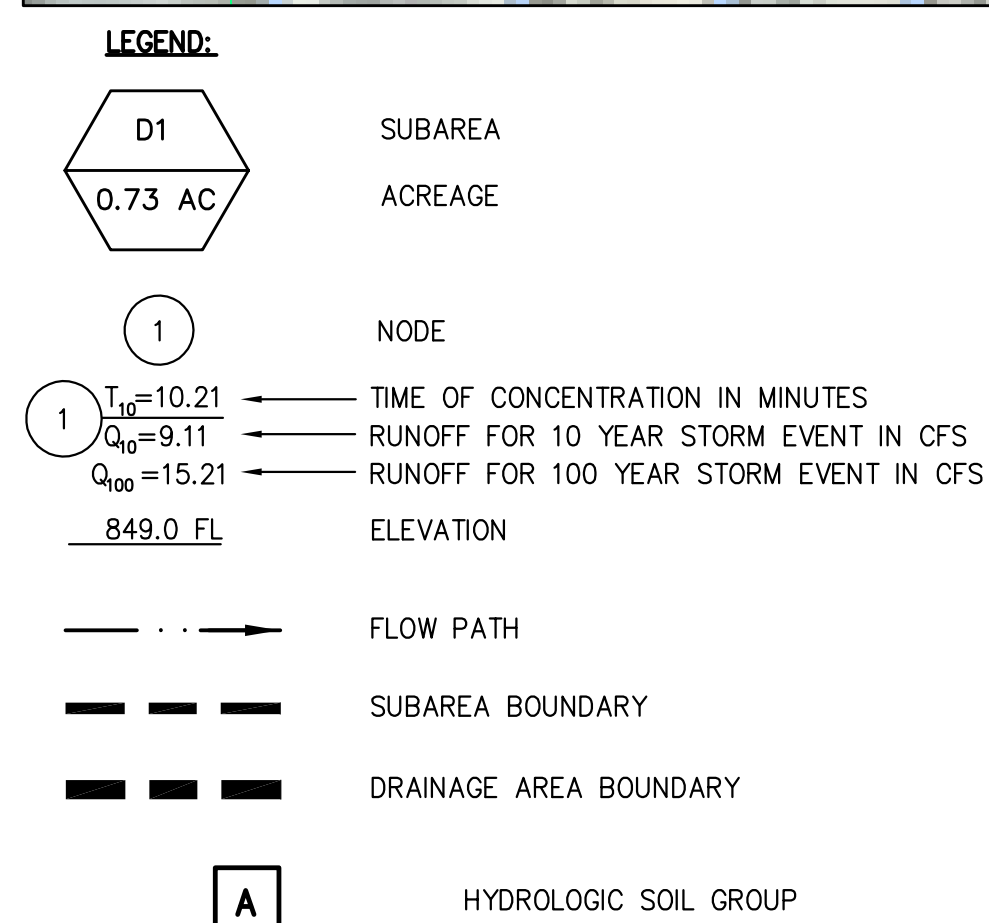
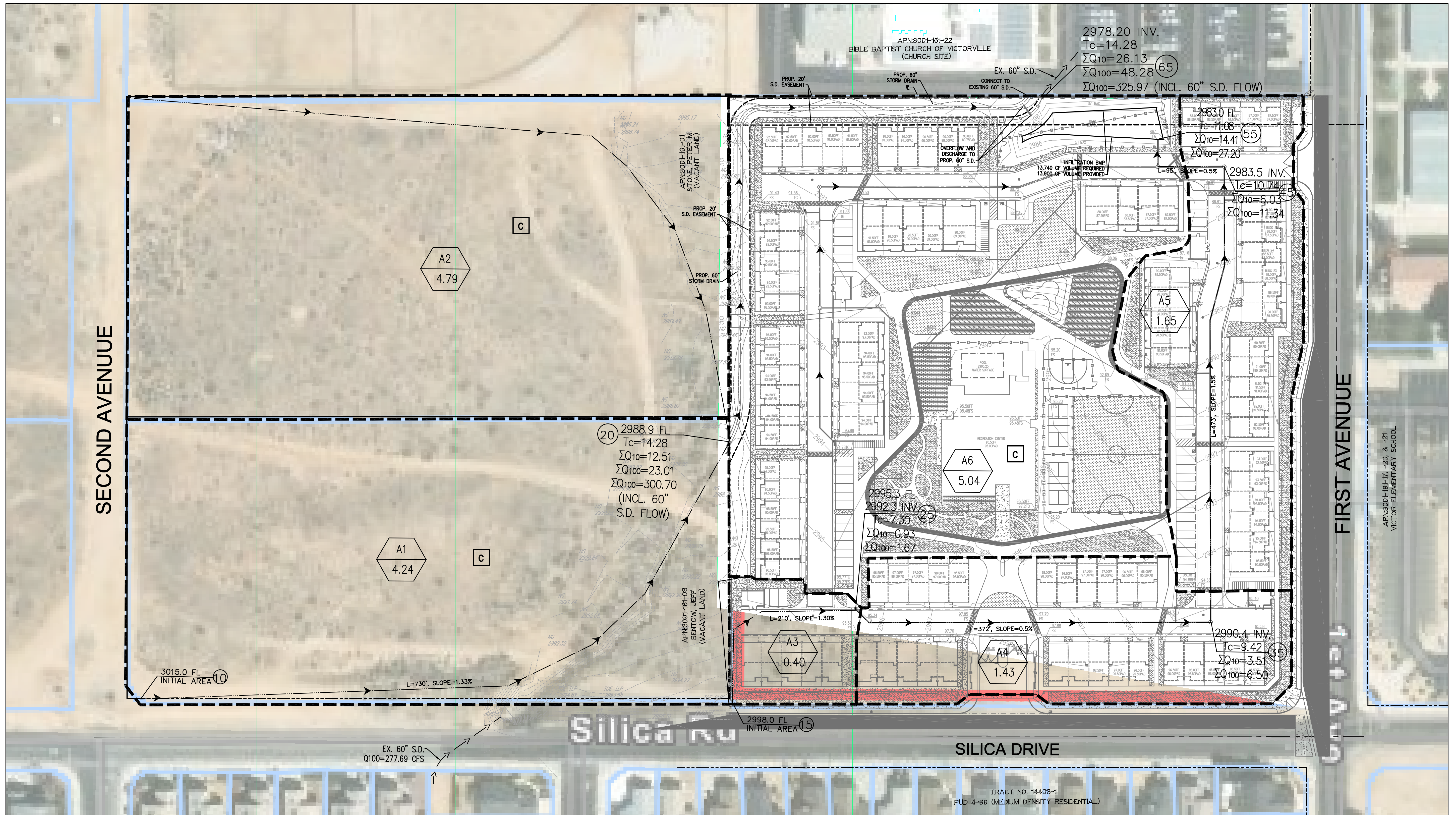
HYDROLOGY MAPS



- LEGEND:**
- D1**
0.73 AC
SUBAREA
ACREAGE
 - 1**
TIME OF CONCENTRATION IN MINUTES
RUNOFF FOR 10 YEAR STORM EVENT IN CFS
RUNOFF FOR 100 YEAR STORM EVENT IN CFS
ELEVATION
 - 1**
T_c=10.21
Q₁₀=9.11
Q₁₀₀=15.21
849.0 FL
 - FLOW PATH
 - SUBAREA BOUNDARY
 - DRAINAGE AREA BOUNDARY
 - A**
HYDROLOGIC SOIL GROUP



THE COURTS CONDOMINIUMS
NWC OF SILICA RD. AND 1ST AVE.
VICTORVILLE, CA 92395
EXISTING HYDROLOGY MAP
PEARL CITY ENGINEERING
1411 RIMPAU AVE, STE 109
CORONA, CA 92879
(949) 427-9560



THE COURTS CONDOMINIUMS
NWC OF SILICA RD. AND 1ST AVE.
VICTORVILLE, CA 92395
PROPOSED HYDROLOGY MAP

PEARL CITY ENGINEERING
1411 RIMPAU AVE, STE 109
CORONA, CA 92879
(949) 427-9560