PRELIMINARY HYDROLOGY REPORT

for

PROJECT LOKI
VICTORVILLE, CA

Prepared For:

Prologis
3546 Concours St., Suite 100
Ontario, CA 91764

Prepared By:

Langan Engineering and Environmental Services, Inc.
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Irvine, CA 92612

Michael Golias
Professional Engineer License No. C91029

1 April 2021
Langan Project No. 700089101

LANGAN

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1.0 INTRODUCTION

Project Loki consists of a logistics facility located on Gateway Drive in the City of Victorville, adjacent to the Southern California Logistics Airport. This Preliminary Hydrology Report discusses the drainage concept for the project and provides the results of preliminary hydrology calculations performed following the SWMP for the Mojave River Watershed and the City of Victorville Design Guidelines. Project Loki will comply with these guidelines by treating the Design Capture Volume (DCV) through on-site infiltration, and providing additional on-site detention for the increase in peak flow for the 10 year 24 hour event and 100 year 1 hour event.

The development meets the criteria for a priority project, therefore a WQMP will be required. A preliminary WQMP following the Mojave River Watershed Template is included as part of the pre-submittal package.

2.0 PROJECT DESCRIPTION

2.1 Site Description

The Project Loki site is located on Gateway Drive in the City of Victorville, CA and is approximately 71.4 acres. It is surrounded by the Southern California Logistics Airport to the east, Dr. Pepper/Snapple warehouse to the south, and vacant land to the west and north. The site is bordered Gateway Drive to the east, Momentum Road to the south. See Figure 1 for the site-vicinity map.

The site is currently unoccupied, and was previously used by Volkswagen for storage of vehicles as recently as 2017. The ground surface cover generally consists of gravel, and there are no existing underground utilities or surface improvements.

2.2 Planned Development

The site is within the Southern California Logistics Airport (SCLA) Specific Plan. The envisioned development is a proposed 1,080,000 SF distribution facility with auto and trailer parking spaces. Docking areas are located north and west of the proposed building. Open landscape areas surround the site with proposed infiltration basins at the north end of the site. The proposed development will be supported by off-site improvements on Gateway Drive to the east and Momentum Way to the south.

See Figure 2 for the proposed site plan. A conceptual grading plan is also provided in Appendix C.

3.0 SITE HYDROLOGY

3.1 Existing Hydrology

The site is located in the downstream portion of the Mojave River watershed, and within West Side Analysis Boundary of the SCLA Master Plan of Drainage (Michael Baker International, September 2020). See Figure 3 for the SCLA Master Plan of Drainage.

The site is relatively flat, and naturally drains from south to north via sheet flow. The existing site elevations ranges between a maximum elevation of 2869 feet in the south region of the site to a minimum elevation of 2851 feet in the northeast of the site. The site slopes range from 0.4 to 2.8 percent.

There is no existing off-site storm drainage system on Gateway Drive. See Figure 4 for the existing topography.

3.2 Proposed Hydrology

The total site drainage area is 71.4 acres. The proposed development will maintain the current overland release pathways to the north of the site. In the proposed condition, surface runoff will be conveyed via a pipe network to the proposed infiltration basins located at the low points at the north end of the site. The basins will treat the DCV via infiltration. Excess runoff will be detained in the basins, and discharge to future infrastructure in Gateway Drive via a restricted capacity outfall that limits discharge to pre-development levels. To allow the full DCV to infiltrate in the required 48 hours, the basin outfall invert will be set approximately 1.4 feet above the basin invert. This elevation will be revised based on pending percolation test results. Emergency overland release for the basins will be via sheet flow to the north.

See Figure 5 for the post-development drainage map.

4.0 PROJECT ANALYSIS

4.1 Methodology

Preliminary drainage calculations were performed using the unit hydrograph method using Civil D software, as outlined in the San Bernardino County Rational Hydrology Program, San Bernardino County Hydrology Manual, Master Plan of Drainage SCLA, and Mojave Watershed Technical Guidance for Water Quality Management Plans. A results table comparing pre-development and unmitigated post-development flow rates and runoff volumes for the design treatment storm (85% 24 hour), the10-year 24-hour, and the 100-year 1-hour storms is included as Table 1

Table 1. Preliminary Drainage Calculation Results

	existing condition			proposed condition		
storm event	100-yr	10-yr	2-yr	100-yr	10-yr	2-yr
peak runoff (cfs)	83.034	44.964	25.652	152.817	81.743	43.717
storm volume (ac.ft)	15.8492	4.6316	1.7261	15.0529	7.4217	3.856

Rainfall data for the site and surroundings was taken from NOAA data provided in the SCLA Drainage Master Plan. Per to the USGS Web Soil Survey, the site is entirely composed of type C soil (See Appendix B). The preliminary infiltration rate of 0.7 in/hr was halved per the WQMP technical guidance documents. This results in a preliminary 48 hour infiltration depth of 1.4 ft.

Preliminary calculations show that the peak flows on-site will increase by approximately 70 cfs for the 100 year storm, and 35 cfs for the 10 year storm. This increase will be mitigated by retention of the DCV, and detention of the excess volume in the infiltration basins, above the outfall elevation. Outfall capacity will be restricted to the pre-development flow rate through either an orifice at the intake, an undersized outfall pipe, or both.

4.3 Water Quality

A separate Preliminary Water Quality Management Plan (PWQMP) for the site has been prepared, which addresses post-construction water quality requirements. The full DCV will be treated on-site through infiltration. The DCV (approx. 101,000 cu ft) will be retained in the infiltration basins, which have an infiltration area of approximately 70,000 sq ft and a treatment ponding depth of 1.4 ft based on the assumed soil type. A summary of the calculations for each Drainage Management Area is included in the PWQMP. Final basin sizes will be determined based on percolation test results within the limits of the proposed basins.

To protect water quality during construction, a SWPPP will be prepared to obtain coverage under the Construction General Permit. Temporary BMPs will be implemented by the contractor in compliance with the SWPPP.

Post-construction, the infiltration basins and storm drain system will be maintained by the site owner or tenant in compliance with an Operations and Maintenance Manual to be included in the final WQMP.

5.0 CONCLUSION

The proposed infiltration/detention basins will be sized to provide storm water treatment and detention capacity to meet treatment and flow conditions for the Mojave River watershed, as presented in the WQMP technical guidance. The preliminary design presented here will be refined and updated during the plan check process, and coordinated with the grading and drainage design for off-site improvements to Gateway Drive.

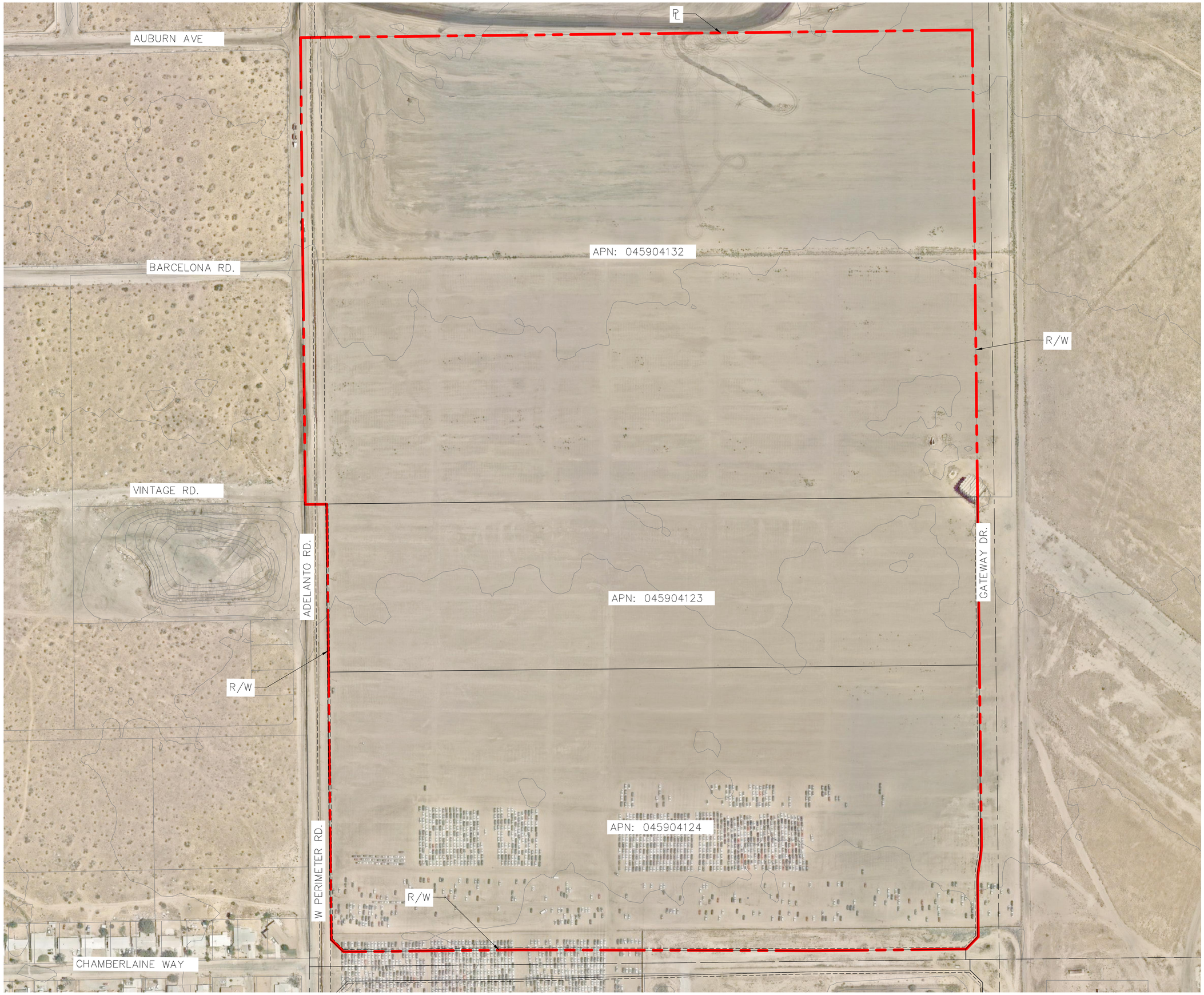
Full design details (including sizes and inverts) of the basins, collection points, conveyance piping, and restricted outfall connection will appear on the project design documents to be permitted by the City of Victorville

6.0 REFERENCES

1. National Oceanic and Atmospheric Administration Intensity Duration Frequency Curves dated 19 February 2021

2. San Bernardino Flood Control District Hydrology Manual dated August 1986

FIGURES



100 0 50 100
SCALE IN FEET

Date

Signature Date

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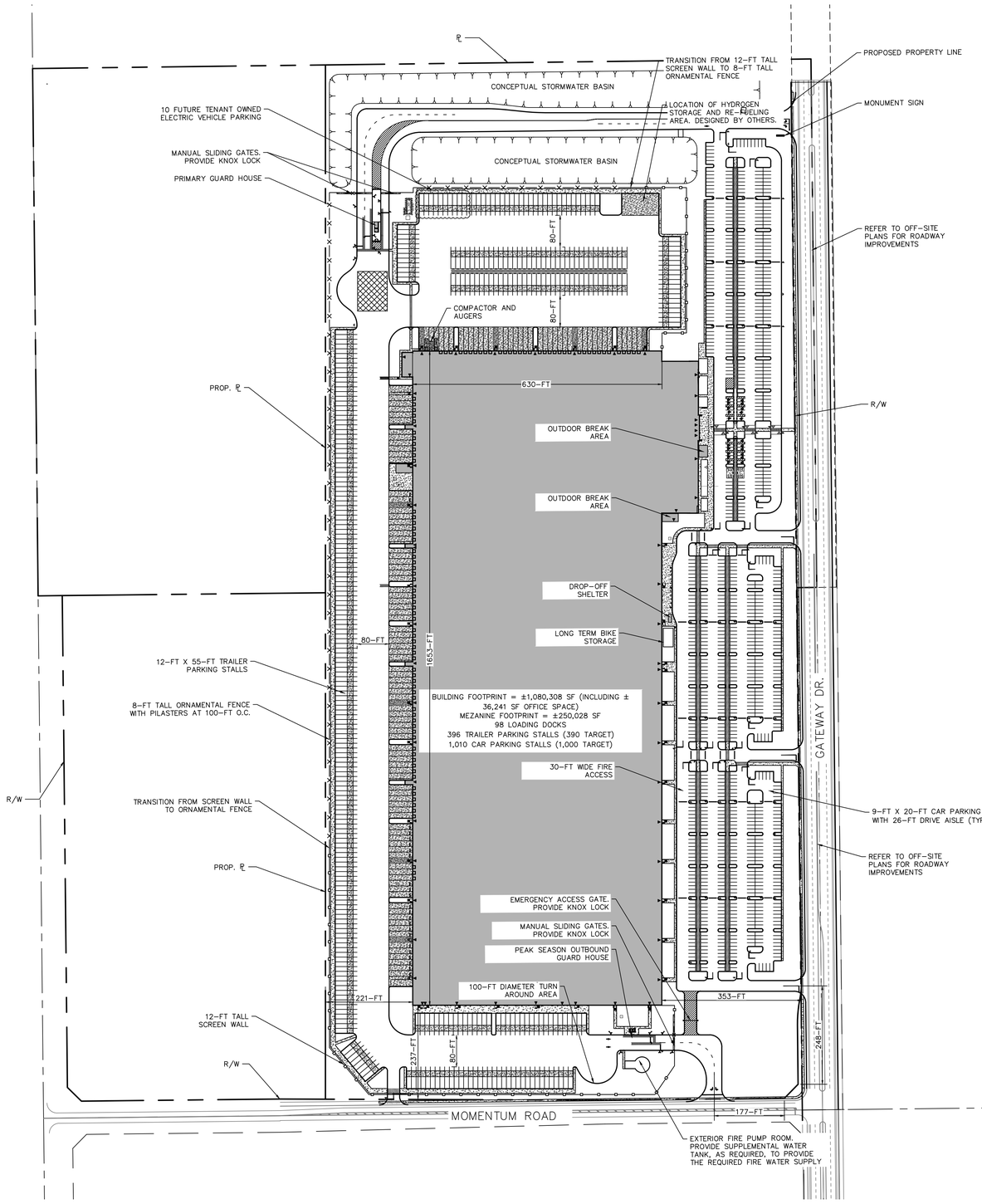
Project
PROLOGIS TNS VICTORVILLE
CITY OF VICTORVILLE
SAN BERNARDINO COUNTY CALIFORNIA

Drawing Title
SITE PLAN

Project No.	Drawing No.
700089101	CS101
Date: 2/17/2021	
Drawn By: AL	
Checked By	
	Sheet 1 of 1

LANGAN
Project No. 001234501



LEGEND

	EXISTING	PROPOSED
8-FT ORNAMENTAL FENCE WITH PILASTERS		-x-x-x-x-x-x-
12-FT TALL SCREEN WALL		-□-□-
DETENTION BASIN		Y Y
PROPERTY LINE	———	———
OUTDOOR BREAK AREA		▭

PARKING SUMMARY:

CAR PARKING PROVIDED (9FT X 20FT): 1,020
CAR PARKING REQUIRED BY CITY CODE (9FT X 20FT): 363*
COMPLIES?: YES

*BASED ON "WHOLESALE AND WAREHOUSE USES INCLUDING SPECULATIVE BUILDINGS, INCLUDING DISTRIBUTION CENTERS" AS REQUIRED PER TABLE 4.6 OF SOUTHERN CALIFORNIA LOGISTICS AIRPORT (SCLA) SPECIFIC PLAN

Off-Street Parking and Loading Requirements

Manufacturing or industrial plant, storage building or yard, industrial laboratory or similar uses	1 space for each employee during the highest shift change	1 space for each 300 sq. ft. of administrative area
Mini-warehouse	1 space per 300 sq. ft. of office area	2 spaces for an accessory residence
Wholesale and warehouse uses including speculative buildings	1 space per 1,000 sq. ft. of the first 40,000 sq. ft. and 1 space per 4,000 sq. ft. for the portion over 40,000 sq. ft.	1 space for each 300 sq. ft. of administrative area

GFA, INCLUDING MEZZ: 1,330,336 SF

PARKING REQUIRED:
1ST 40,000SF – 40 STALLS
OVER 40,000 SF – 323 STALLS

TOTAL REQUIRED: 363 STALLS

150 0 75 150
SCALE: 1 INCH = 150 FEET

Signature Date
MICHAEL GOLIAS
PROFESSIONAL ENGINEER CA LIC. No.: C91029

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CITY OF VICTORVILLE
ENGINEERING DEPARTMENT
14343 CIVIC DRIVE, VICTORVILLE, CA 92392 (760) 955-5158

NO.	REVISIONS	BY	DATE

CIVIL IMPROVEMENTS PLANS
PROJECT LOKI
OVERALL SITE PLAN

FIELD BOOK NO. (S)

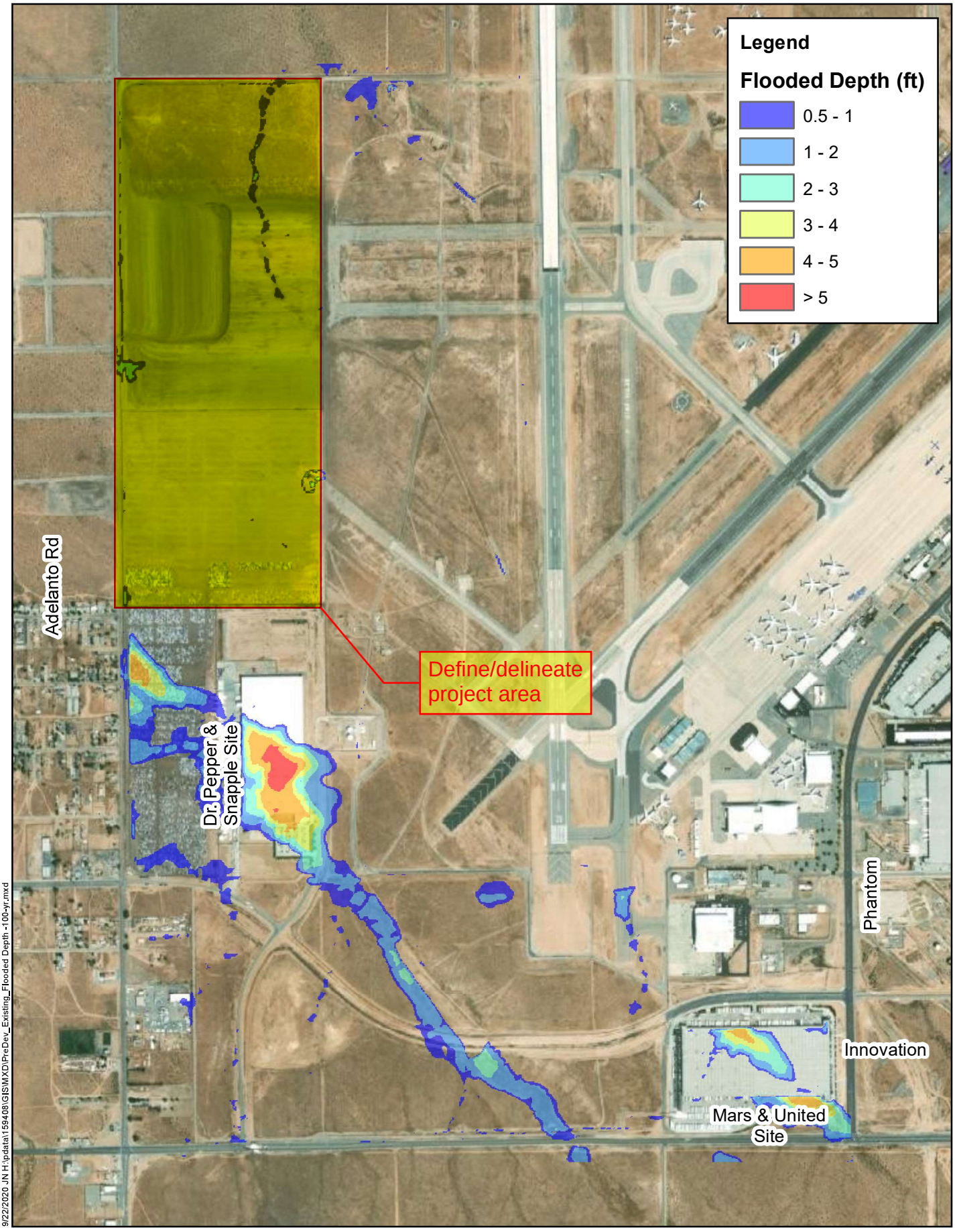
BENCH MARK:
CITY OF VICTORVILLE BENCHMARK Y-747
ELEVATION = 2905.31' (NVGD 29)
5"x8" CONCRETE MONUMENT W/4" IRON CAP STAMPED "USC&GS BM Y-747, 1945" @ 41' S/O AIRE/PRESSWAY AND 93' W/O NEVADA AVE EXTENSION

DESIGN BY: AL
DRAWN BY: JMA
CHECKED BY: MRG
DATE: 03/25/2021

SHEET NO. 3 OF 36
DRAWING NO. CS100
PROJECT NO. PSUB20-00022

APPROVED BY: CITY ENGINEER _____ DATE: _____ R.C.E. EXP. _____

Date: 3/30/2021 Time: 14:56 User: jarevalo Style Table: Langan.stb Layout: 3 Document Code: 700089101-0301-CS101-0103



9/22/2020 JN H:\pdata\159408\GIS\MXD\PreDev_Existing_Flooded Depth -100-yr.mxd

Michael Baker INTERNATIONAL

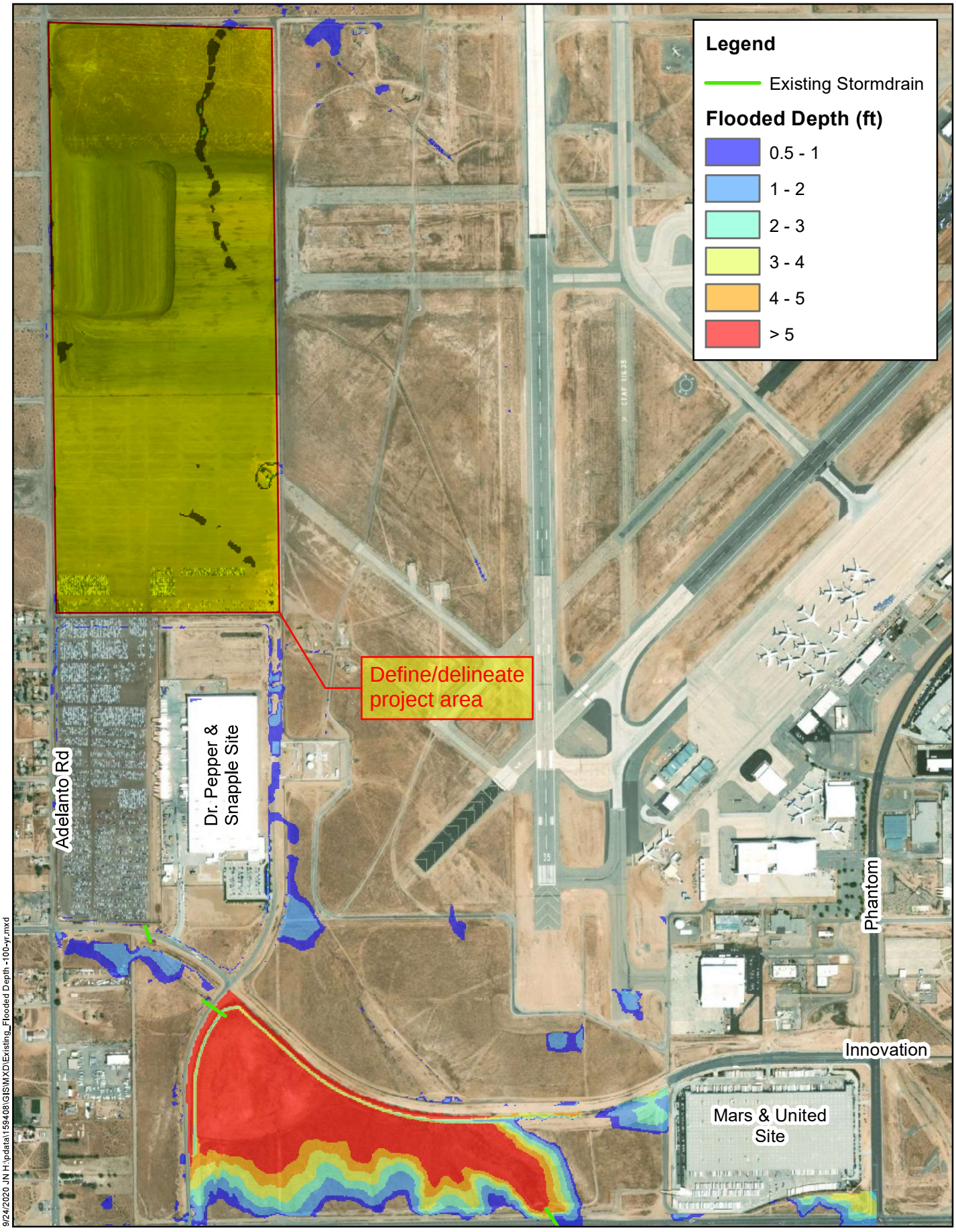
0 500 1,000 Feet

Source:

SCLA Existing Condition Hydrology

Pre Dev Existing Flood Depths - 100-YR

Figure 3-2



9/24/2020 JN H:\pdata\159408\GIS\MXD\Existing_Flooded Depth -100-yr.mxd

Michael Baker INTERNATIONAL

0 500 1,000 Feet

Source:

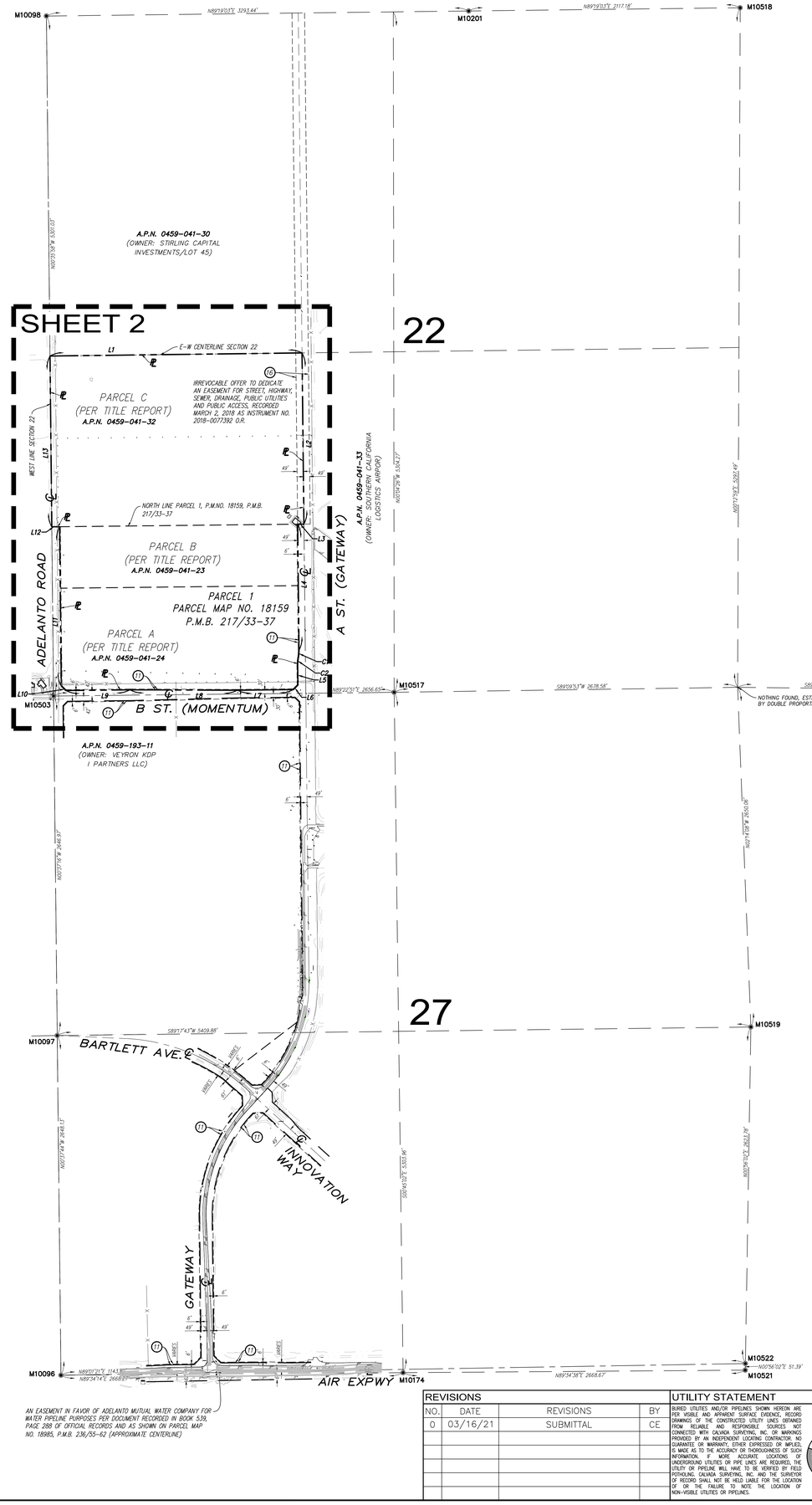
SCLA Existing Condition Hydrology

Interim Existing Flood Depths - 100-YR

Figure 3-3

A.L.T.A./N.S.P.S. LAND TITLE SURVEY

PROLOGIS TNS VICTORVILLE
VACANT LAND, VICTORVILLE, CA



LEGEND

- BACK-FLOW VALVE
- CONCRETE PAVEMENT
- FIRE HYDRANT
- FOUND MONUMENT AS NOTED
- GAS VALVE
- GATE
- GUARD POST
- GUY WIRE
- IRRIGATION CONTROL VALVE
- LIGHT STANDARD
- LIGHT STANDARD
- POWER POLE
- POWER POLE W/TRANSFORMER
- POWER POLE W/LIGHT
- SEWER MANHOLE
- SIGN
- STORM DRAIN MANHOLE
- STREET LIGHT
- UTILITY POLE
- WATER VALVE
- A.P.N. ASSESSOR'S PARCEL NUMBER
- C/L CENTERLINE
- P/L PROPERTY LINE
- R/W RIGHT OF WAY
- CENTERLINE
- CHAIN LINK FENCE
- CONCRETE/RETAINING WALL
- EASEMENT LINE
- EDGE OF PAVEMENT
- FLOW LINE
- INTERIOR LOT LINE
- MONUMENT LINE
- OVERHEAD LINE
- PROPERTY LINE
- RIGHT-OF-WAY

GRAPHIC SCALE
350 0 175 350
FEET

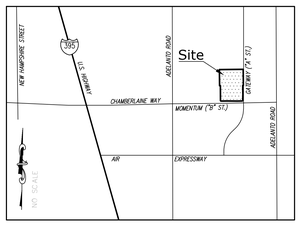
LINE TABLE		
LINE #	DIRECTION	LENGTH
L1	S89°17'42"W	1965.71'
L2	N00°13'57"W	1334.40'
L3	N89°22'45"E	49.00'
L4	S00°13'57"E	983.99'
L5	S00°13'57"E	150.00'
L6	N44°22'30"E	49.50'
L7	N89°22'31"E	436.24'
L8	S89°47'55"E	837.94'
L9	N89°22'31"E	501.11'
L10	S45°36'36"E	49.50'
L11	S00°25'58"E	1241.99'
L12	N89°22'45"E	61.00'
L13	S00°25'58"E	1,331.52'

CURVE TABLE			
CURVE #	RADIUS	DELTA	LENGTH
C1	293.00'	11°25'16"	58.41'
C2	313.00'	11°25'16"	62.39'

MONUMENT NOTES

MON.#	DESCRIPTION
M10096	FD 2" BRASS DISK STAMPED S28, S27, S33, S34 PER C.R. 242-070
M10097	FD 2" IRON PIPE WITH WASHER STAMPED 28/27, FLUSH, PER R.S. 65/98-102, ACCEPTED AS W1/4 COR.
M10098	FD 2" BRASS DISK, STAMPED S16, S15, S21, S22; ACCEPTED AS NORTHWEST CORNER SECTION 22 PER R.S. 65/98-102 & R.S. 49/91
M10174	FD 2" IRON PIPE, WITH BRASS DISK STAMPED 1/4 S27, PER P.M. 18158, P.M.B. 217/22-32 & C.R. 242-073
M10201	FD REBAR, PER R.S. 65/98-102; 0.16' S'LY FROM SECTION LINE
M10503	FD 2" BRASS DISK, DN 0.60'; STAMPED S21, S22, S28, S27 PER R.S. 01-206, R.S. 116/13
M10517	FD 4 1/2" BRASS DISK, STAMPED U.S. R-752, ACCEPTED AS NORTH 1/4 CORNER SECTION 27
M10518	FD 4 1/2" BRASS DISK DN 2.0, STAMPED U.S. R-752, ACCEPTED AS NORTHEAST CORNER SECTION 22 PER R.S. 65/98-102
M10519	FD 4 1/2" BRASS DISK STAMPED US-Q-752, ACCEPTED AS W 1/4 CORNER SECTION 26 PER R.S. 01-206, R.S. 116/13
M10520	FD NAIL AND BRASS TAG STAMPED "CITY OF VICTORVILLE"; ACCEPTED AS NORTH EAST CORNER SECTION 26 PER R.S. 01-206, R.S. 116/13 & C.R. 209-099
M10521	FD 2" BRASS DISK STAMPED S27, S26, S34, S35 PER P.M. 18158, P.M.B. 217/22-32 & C.R. 242-067
M10522	FD SPIKE & WASHER STAMPED "CITY OF VICTORVILLE"; ACCEPTED AS POINT ON CL AIR EXPRESSWAY PER C.R. 242-067

VICINITY MAP



SCHEDULE B ITEMS

BASED UPON TITLE REPORT NO. 997-30060508-TC1, DATED JANUARY 20, 2021 AS PREPARED BY FIDELITY NATIONAL TITLE COMPANY.

A.– PROPERTY TAXES FISCAL YEAR 2021-2022. **(NOT A SURVEY MATTER).**

B.– PROPERTY TAXES FISCAL YEAR 2020-2021. **(NOT A SURVEY MATTER).**

C.– THE LIEN OF SUPPLEMENTAL OR ESCAPED ASSESSMENTS OF PROPERTY TAXES, IF ANY. **(NOT A SURVEY MATTER).**

1.– WATER RIGHTS, CLAIMS OR TITLE TO WATER, WHETHER OR NOT DISCLOSED BY THE PUBLIC RECORDS. **(NONE NOTED).**

2.– EASEMENT(S) IN FAVOR OF THE PUBLIC OVER ANY EXISTING ROADS LYING WITHIN SAID LAND. **(BLANKET IN NATURE OVER EXISTING ROADS).**

3.– ANY EXISTENCE OF TOXIC OR HAZARDOUS WASTE OF ANY ALLEGED VIOLATION OF ANY LAW, ORDINANCE, OR GOVERNMENTAL REGULATION CONCERNING ENVIRONMENTAL PROTECTION AS DISCLOSED BY THE USES OF THE LAND AS SAME NOW EXISTS ON PORTIONS OF SAID PROPERTY. **(THE EXACT EXTENT, LOCATION, AND USE CANNOT BE DETERMINED FROM THE RECORD.)**

4.– AN EASEMENT FOR TELEPHONE LINES, RECORDED MARCH 14, 1928, IN BOOK 539, PAGE 288 OF O.R. **(THE EXACT LOCATION AND EXTEND OF SAID EASEMENT IS NOT DISCLOSED OF RECORD).**

5.– AN EASEMENT FOR WATER PIPELINE, RECORDED SEPTEMBER 17, 1927 IN BOOK 539, PAGE 280 OF O.R. **(THE EXACT LOCATION AND EXTEND OF SAID EASEMENT IS NOT DISCLOSED OF RECORD).**

6.– DISCREPANCIES, CONFLICTS IN BOUNDARY LINES, SHORTAGE IN AREA, ENCROACHMENTS, OR ANY OTHER MATTERS SHOWN ON MAP IN BOOK 65, PAGE 98 OF RECORDS OF SURVEY.

7.– THE LAND DESCRIBED HEREIN IS INCLUDED WITHIN A PROJECT AREA OF THE VICTOR VALLEY ECONOMIC DEVELOPMENT AUTHORITY, PER DOCUMENT RECORDED JULY 15, 1992, DOC. NO. 92-292935; RECORDED DECEMBER 29, 1993, DOC. NO. 93-565775 AND DECEMBER 19, 2007, DOC. NO. 2007-0403538 ALL OF O.R. **(NOT A SURVEY MATTER).**

8.– AN EASEMENT FOR OVERHEAD AND UNDERGROUND ELECTRICAL SUPPLY SYSTEMS AND COMMUNICATION SYSTEMS, GUYING AND ANCHORAGE SYSTEMS, LIGHTING SYSTEMS, ELECTRICAL PAD SYSTEMS, AND ELECTRIC VAULT SYSTEMS, RECORDED SEPTEMBER 05, 1997, DOC. NO. 97-325581 OF O.R. **(BLANKET IN NATURE).**

9.– COVENANTS, CONDITIONS AND RESTRICTIONS RECORDED SEPTEMBER 05, 1997, DOC. NO. 97-325581 OF O.R. **(AN EASEMENT TO SOUTHERN CALIFORNIA EDISON BLANKET IN NATURE).**

10.– COVENANTS, CONDITIONS, RESTRICTIONS AND EASEMENTS RECORDED MAY 21, 2004, DOC. NO. 2004-0360272 OF O.R. **(NOT PLOTTED – NO EASEMENT SPECIFIED).**

11.– AN EASEMENT FOR PIPELINES, AS DELINEATED ON OR AS OFFERED FOR DEDICATION ON PARCEL MAP (11) NO. 18159, IN BOOK 217, PAGES 33-37 INCLUSIVE OF PARCEL MAPS. **(PLOTTED HEREON).**

12.– MATTERS CONTAINED IN THAT CERTAIN DOCUMENT ENTITLED THIRD AMENDED AND RESTATED MASTER AGREEMENT RECORDED DECEMBER 01, 2006, DOC. NO. 2006-0813812 OF O.R. **(NOT A SURVEY MATTER).**

13.– MATTERS CONTAINED IN THAT CERTAIN DOCUMENT ENTITLED FIRST AMENDED AND RESTATED MASTER RAIL DEVELOPMENT AGREEMENT RECORDED DECEMBER 01, 2006, DOC. NO. 2006-0813813 AND DEVELOPMENT AGREEMENT ASSIGNMENT AND ASSUMPTION OF FIRST AMENDED AND RESTATED MASTER RAIL RECORDED DECEMBER 01, 2006, DOC. NO. 2006-0813815 BOTH OF O.R. **(NOT A SURVEY MATTER).**

14.– MATTERS CONTAINED IN THAT CERTAIN DOCUMENT ENTITLED MEMORANDUM OF DISPOSITION AND DEVELOPMENT AGREEMENT, RECORDED DECEMBER 01, 2006, DOC. NO. 2006-0813816 OF O.R. **(NOT A SURVEY MATTER).**

15.– MATTERS CONTAINED IN THAT CERTAIN DOCUMENT ENTITLED FOURTH AMENDED AND RESTATED MASTER AGREEMENT, RECORDED DECEMBER 27, 2010, DOC. NO. 2010-0545684 OF O.R. **(NOT A SURVEY MATTER).**

16.– AN IRREVOCABLE OFFER TO DEDICATE AN EASEMENT OVER SAID LAND FOR STREET, HIGHWAY, (16) SEWER, DRAINAGE, PUBLIC UTILITIES AND PUBLIC ACCESS, RECORDED MARCH 2, 2018 DOC. NO. 2018-0077392 OF O.R. **(PLOTTED HEREON).**

17.– PLEASE BE ADVISED THAT OUR SEARCH DID NOT DISCLOSE ANY OPEN DEEDS OF TRUST OF RECORD. IF YOU SHOULD HAVE KNOWLEDGE OF ANY OUTSTANDING OBLIGATION, PLEASE CONTACT THE TITLE DEPARTMENT IMMEDIATELY FOR FURTHER REVIEW PRIOR TO CLOSING. **(NOT A SURVEY MATTER).**

18.– ANY RIGHTS OF THE PARTIES IN POSSESSION OF A PORTION OF, OR ALL OF, SAID LAND, WHICH RIGHTS ARE NOT DISCLOSED BY THE PUBLIC RECORDS.
THE COMPANY WILL REQUIRE, FOR REVIEW, A FULL AND COMPLETE COPY OF ANY UNRECORDED AGREEMENT, CONTRACT, LICENSE AND/OR LEASE, TOGETHER WITH ALL SUPPLEMENTS, ASSIGNMENTS AND AMENDMENTS THERETO, BEFORE ISSUING ANY POLICY OF TITLE INSURANCE WITHOUT EXCEPTING THIS ITEM FROM COVERAGE.
THE COMPANY RESERVES THE RIGHT TO EXCEPT ADDITIONAL ITEMS AND/OR MAKE ADDITIONAL REQUIREMENTS AFTER REVIEWING SAID DOCUMENTS. **(NOT A SURVEY MATTER).**

19.– DISCREPANCIES, CONFLICTS IN BOUNDARY LINES, SHORTAGE IN AREA, ENCROACHMENTS, OR ANY OTHER MATTERS WHICH A CORRECT SURVEY WOULD DISCLOSE AND WHICH ARE NOT SHOWN BY THE PUBLIC RECORDS.

20.– ANY EASEMENTS NOT DISCLOSED BY THE PUBLIC RECORDS AS TO MATTERS AFFECTING TITLE TO REAL PROPERTY, WHETHER OR NOT SAID EASEMENTS ARE VISIBLE AND APPARENT. **(NONE NOTED).**

21.– MATTERS WHICH MAY BE DISCLOSED BY AN INSPECTON AND/OR BY A CORRECT ALTA/NSPS LAND TITLE SURVEY OF SAID LAND THAT IS SATISFACTORY TO THE COMPANY, AND/OR BY INQUIRY OF THE PARTIES IN POSSESSION THEREOF.

ZONING RESTRICTIONS

NOTE: INDICATED ZONING INFORMATION IS FROM THE CITY OF VICTORVILLE ZONING ORDINANCES IN EFFECT AS OF THE DATE OF THIS SURVEY. ZONING AND RESTRICTIONS SHOWN HEREON WERE OBTAINED BY A GENERAL REQUEST AT THE PUBLIC COUNTER OF THE ABOVE NAMED DEPARTMENT. NO REPRESENTATION IS MADE FOR THE ACCURACY OR COMPLETENESS OF SAID THIRD PARTY INFORMATION. THIS FIRM IS NOT AN EXPERT IN THE REPRESENTATION OF COMPLEX ZONING ORDINANCES. COMPLIANCE IS BEYOND THE SCOPE OF THIS SURVEY. ANY USER OF SAID INFORMATION IS URGED TO CONTACT THE LOCAL AGENCY DIRECTLY.

ZONE: SP1-92 (SPECIFIC PLAN – LAND USE DESIGNATION – INDUSTRIAL)

MINIMUM SETBACKS: FRONT:
FROM LOCAL OR COLLECTOR STREET: 20 FEET
FROM ARTERIAL STREET: 30 FEET
SIDE: 10 FEET
REAR: 10 FEET

HEIGHT RESTRICTIONS: 55 FEET

POSSIBLE ENCROACHMENT NOTES

THIS IS A LISTING OF OBSERVED IMPROVEMENTS THAT CROSS PROPERTY LINES. STATEMENT OF OWNERSHIP OR POSSESSION IS NOT THE INTENT OF THIS LISTING.

⚠ FENCE OVERLAPS THE PROPERTY LINE AS SHOWN

⚠ BUILDING OVERLAPS THE PROPERTY LINE AS SHOWN

ITEMS CORRESPONDING TO TABLE A ITEMS

– ITEM 14
THE NEAREST INTERSECTING STREET TO THE PROPERTY IS ADELANTO ROAD AND B STREET TO THE SOUTH WEST AS SHOWN HEREON AND IT IS ± 90 FEET.

– ITEM 16
NO EVIDENCE OF RECENT EARTH MOVING WORK, BUILDING CONSTRUCTION OR BUILDING ADDITIONS OBSERVED IN THE PROCESS OF CONDUCTING THE FIELD WORK.

– ITEM 17
NO EVIDENCE OF RECENT STREET OR SIDEWALK CONSTRUCTION OR REPAIRS OBSERVED IN THE PROCESS OF CONDUCTING THE FIELD WORK.

FLOOD NOTE: BY GRAPHIC PLOTTING ONLY, THIS PROPERTY IS IN ZONE "D" OF THE FLOOD INSURANCE RATE MAP, PANEL NO. 06071C0785H, PANEL DATED 08/28/2008. THIS PROPERTY IS AN UNDETERMINED FLOOD HAZARDS BY FEMA. BY TELEPHONE CALL TO THE NATIONAL FLOOD INSURANCE PROGRAM (800-638-6620) WE HAVE LEARNED THIS COMMUNITY DOES CURRENTLY PARTICIPATE IN THE PROGRAM. NO FIELD SURVEYING WAS PERFORMED TO DETERMINE THIS ZONE AND AN ELEVATION CERTIFICATE MAY BE NEEDED TO VERIFY THIS DETERMINATION OR APPLY FOR A VARIANCE FROM THE FEDERAL EMERGENCY MANAGEMENT AGENCY.

ZONE D: AREA OF UNDETERMINED FLOOD HAZARD.

LEGAL DESCRIPTION

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF VICTORVILLE IN THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

PARCEL A:

PARCEL 1 OF PARCEL MAP NO. 18159, FILED IN BOOK 217, PAGES 33 THROUGH 37 INCLUSIVE OF PARCEL MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID SAN BERNARDINO COUNTY, EXCEPT THAT PORTION DESCRIBED AS FOLLOWS:

THAT CERTAIN PARCEL OF LAND SITUATED IN THE CITY OF VICTORVILLE, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, BEING THAT PORTION OF PARCEL 1 OF PARCEL MAP NO. 18159, FILED IN BOOK 217, PAGES 33 THROUGH 37 INCLUSIVE OF PARCEL MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID SAN BERNARDINO COUNTY, DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHEASTERLY CORNER OF SAID PARCEL 1; THENCE ALONG THE EASTERLY LINE OF SAID PARCEL SOUTH 00°37'56" EAST 479.25 FEET TO A LINE PARALLEL WITH AND 479.25 FEET SOUTHERLY OF THE NORTHERLY LINE OF SAID PARCEL; THENCE ALONG SAID PARALLEL LINE SOUTH 89°22'46" WEST 1856.75 FEET TO THE WESTERLY LINE OF SAID PARCEL; THENCE ALONG SAID WESTERLY LINE NORTH 00°35'57" WEST 479.25 FEET TO THE NORTHWESTERLY CORNER OF SAID PARCEL; THENCE ALONG SAID NORTHERLY LINE NORTH 89°22'46" EAST 1856.48 FEET TO THE POINT OF BEGINNING.

EXCEPTING THEREFROM 10% OF THE GROSS FAIR MARKET VALUE OF OIL, GAS, OR MINERALS, AS RESERVED BY THE UNITED STATES OF AMERICA IN DOCUMENT RECORDED MAY 21, 2004 AS INSTRUMENT NO. 2004-0360272 OF OFFICIAL RECORDS OF THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA.

APN: 0459-041-24-0-000

PARCEL B:

THAT CERTAIN PARCEL OF LAND SITUATED IN THE CITY OF VICTORVILLE, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, BEING THAT PORTION OF PARCEL 1 OF PARCEL MAP NO. 18159, FILED IN BOOK 217, PAGES 33 THROUGH 37 INCLUSIVE OF PARCEL MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID SAN BERNARDINO COUNTY, DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHEASTERLY CORNER OF SAID PARCEL 1; THENCE ALONG THE EASTERLY LINE OF SAID PARCEL SOUTH 00°37'56" EAST 479.25 FEET TO A LINE PARALLEL WITH AND 479.25 FEET SOUTHERLY OF THE NORTHERLY LINE OF SAID PARCEL; THENCE ALONG SAID PARALLEL LINE SOUTH 89°22'46" WEST 1856.75 FEET TO THE WESTERLY LINE OF SAID PARCEL; THENCE ALONG SAID WESTERLY LINE NORTH 00°35'57" WEST 479.25 FEET TO THE NORTHWESTERLY CORNER OF SAID PARCEL; THENCE ALONG SAID NORTHERLY LINE NORTH 89°22'46" EAST 1856.48 FEET TO THE POINT OF BEGINNING.

EXCEPTING THEREFROM 10% OF THE GROSS FAIR MARKET VALUE OF OIL, GAS, OR MINERALS, AS RESERVED BY THE UNITED STATES OF AMERICA IN DOCUMENTS RECORDED MAY 21, 2004 AS INSTRUMENT NO. 2004-0360272, AND MAY 21, 2004 AS INSTRUMENT NO. 2004-0360273, BOTH OF OFFICIAL RECORDS OF THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA.

APN: 0459-041-23-0-000

PARCEL C

THAT PORTION OF SECTION 22 OF TOWNSHIP 6 NORTH, RANGE 5 WEST, SAN BERNARDINO MERIDIAN, IN THE CITY OF VICTORVILLE, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, BEING A PORTION OF THAT LAND CONVEYED TO SOUTHERN CALIFORNIA LOGISTICS AIRPORT AUTHORITY BY DOCUMENT RECORDED MAY 21, 2004 AS INSTRUMENT NO. 2004-0360272 OF OFFICIAL RECORDS OF THE COUNTY RECORDER OF SAID COUNTY, DESCRIBED AS FOLLOWS:

COMMENCING AT THE INTERSECTION OF THE CENTERLINE OF "A" STREET AND "B" STREET AS SHOWN ON PARCEL MAP NO. 18159, FILED IN BOOK 217, PAGES 33 THROUGH 37 INCLUSIVE OF PARCEL MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, AND SAID CENTERLINE OF "B" STREET ALSO BEING THE SOUTH LINE OF WEST HALF OF SAID SECTION 22 AS SHOWN ON SAID PARCEL MAP; THENCE NORTH 00°37'56" WEST ALONG SAID THE CENTERLINE OF "A" STREET 1319.00 FEET TO A POINT OF INTERSECTION WITH THE EASTERLY PROLONGATION OF THE NORTHERLY LINE OF PARCEL 1 OF SAID PARCEL MAP NO. 18159, AND SAID POINT BEING THE TRUE POINT OF BEGINNING; THENCE CONTINUING ALONG THE PROLONGATION OF SAID CENTERLINE OF 'A'STREET NORTH 00°37'56" WEST 1334.49 FEET TO THE EAST-WEST CENTER SECTION LINE OF SAID SECTION 22; THENCE SOUTH 89°17'38" WEST 1965.71 FEET ALONG SAID EAST-WEST CENTERLINE TO THE WEST LINE OF SAID SECTION 22; THENCE SOUTH 00°35'57" EAST 1331.56 FEET ALONG SAID WEST LINE TO A POINT OF INTERSECTION WITH THE WESTERLY PROLONGATION OF SAID NORTHERLY LINE OF PARCEL 1; THENCE NORTH 89°22'46" EAST 1966.48 FEET ALONG SAID PROLONGATION TO THE TRUE POINT OF BEGINNING.

EXCEPT THEREFROM, AN OVERRIDING ROYALTY OF 10% OF THE GROSS FAIR MARKET VALUE OF OIL, GAS, OR MINERAL EXTRACTED FROM THE PROPERTY AS SET FORTH IN THE DOCUMENT RECORDED MAY 21, 2004 AS INSTRUMENT NO. 2004-0360272 OF OFFICIAL RECORDS.

APN: 0459-041-32-0-000

ITEMS CORRESPONDING TO TABLE A ITEMS

– ITEM 14
THE NEAREST INTERSECTING STREET TO THE PROPERTY IS ADELANTO ROAD AND B STREET TO THE SOUTH WEST AS SHOWN HEREON AND IT IS ± 90 FEET.

– ITEM 16
NO EVIDENCE OF RECENT EARTH MOVING WORK, BUILDING CONSTRUCTION OR BUILDING ADDITIONS OBSERVED IN THE PROCESS OF CONDUCTING THE FIELD WORK.

– ITEM 17
NO EVIDENCE OF RECENT STREET OR SIDEWALK CONSTRUCTION OR REPAIRS OBSERVED IN THE PROCESS OF CONDUCTING THE FIELD WORK.

SURVEYOR'S NOTES

- THE UTILITIES SHOWN HEREON ARE BASED ON OBSERVED EVIDENCE ONLY. THIS SURVEY WOULD NOT SHOW UTILITIES COVERED BY CARS/TRUCKS OR RECENTLY PAVED ASPHALT/CONCRETE OR OVERGROWN BRUSH, TREES AND SHRUBS.
- THIS SURVEY HAS BEEN PREPARED FOR TITLE INSURANCE PURPOSES ONLY. THIS SURVEY DOES NOT CONTAIN SUFFICIENT DETAIL FOR DESIGN PURPOSES. THE BOUNDARY DATA AND TITLE MATTERS AS SHOWN HEREON HAVE BEEN DEVELOPED FROM THE REFERENCED TITLE REPORT.
- UNLESS THIS PLAN HAS THE SEAL AND SIGNATURE OF THE SURVEYOR AND/OR ENGINEER RESPONSIBLE FOR ITS PREPARATION, THIS IS NOT AN AUTHENTIC COPY OF THE ORIGINAL SURVEY AND SHALL NOT BE DEEMED RELIABLE.

SURVEYOR'S CERTIFICATE

TO STIRLING CAPITAL INVESTMENTS/LOT 44, LLC, A DELAWARE LIMITED LIABILITY COMPANY AND FIDELITY NATIONAL TITLE COMPANY:

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2021 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 1 (FOUND MONUMENTS ONLY), 2, 3, 4, 5, 6(a), 7(a), 7(b)(1), 7(c), 8, 9, 10, 11(a) (VISIBLE EVIDENCE ONLY), 13, 14, 16, 17, 18 AND 19 OF TABLE A THEREOF. THE FIELD WORK WAS COMPLETED ON MARCH 13, 2021.

DATE OF PLAT OR MAP: MARCH 16, 2021.

REVISIONS			
NO.	DATE	REVISIONS	BY
0	03/16/21	SUBMITTAL	CE

UTILITY STATEMENT

BURIED UTILITIES AND/OR PIPELINES SHOWN HEREON ARE PER VISIBLE AND APPARENT SURFACE EVIDENCE, RECORD DRAWINGS OF THE CONSTRUCTED UTILITY LINES OBTAINED FROM RELIABLE AND RESPONSIBLE SOURCES. NOT CONNECTED WITH CALVADA SURVEYING, INC. OR MARKINGS PROVIDED BY AN INDEPENDENT LOCATING CONTRACTOR. NO GUARANTEE OR WARRANTY, EITHER EXPRESSED OR IMPLIED, IS MADE AS TO THE ACCURACY OR THOROUGHNESS OF SUCH INFORMATION. IF MORE ACCURATE LOCATIONS OF UNDERGROUND UTILITIES OR PIPE LINES ARE REQUIRED, THE UTILITY OR PIPELINE WILL HAVE TO BE VERIFIED BY FIELD POTHOLING. CALVADA SURVEYING, INC. AND THE SURVEYOR OF RECORD SHALL NOT BE HELD LIABLE FOR THE LOCATION OF OR THE FAILURE TO NOTE THE LOCATION OF NON-VISIBLE UTILITIES OR PIPELINES.

Underground Service Alert
Call: TOLL FREE
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227–2600
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PREPARED FOR

LANGAN
LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES, INC.
18575 JAMBOREE ROAD, SUITE 150
IRVINE, CA 92612
PHONE: (949) 561-9200
FAX: (949) 561-9201

BASIS OF BEARINGS

THE BEARINGS SHOWN HEREON ARE BASED UPON THE CALIFORNIA COORDINATE SYSTEM OF 1983, CCS83, ZONE 5, (2017.50) IN ACCORDANCE TO THE CALIFORNIA PUBLIC RESOURCES CODE SECTIONS 8801–8819. SAID BEARINGS ARE DETERMINED LOCALLY UPON FIELD–OBSERVED TIES TO THE FOLLOWING CALIFORNIA SPATIAL REFERENCE NETWORK CONTINUOUS OPERATING REFERENCE STATIONS (C.O.R.S.):

C.S.R.C. SOA:
NORTHING = 2044003.43' EASTING = 6745730.79'

C.S.R.C. P586:
NORTHING = 2017796.62' EASTING = 6778350.58'

THE COMBINATION FACTOR FOR THIS PROJECT WAS APPLIED AT THE FOLLOWING POINT:
NORTHING = 6743342.69' EASTING = 2039097.89'

MAPPING ANGLE = –11°19'48.87" SCALE FACTOR = 1.000020575.

BENCHMARK

ELEVATIONS SHOWN HEREON ARE BASED UPON CITY OF VICTORVILLE BENCHMARK Y–747, ELEVATION 2905.31 FEET (NGVD 29).

DESCRIPTION: 8"X8" CONCRETE MONUMENT W/4" IRON CAP STAMPED "USC&GS BM Y–747, 1945" @ 4'E S/O AIREXPRESSWAY AND 93' W/O NEVADA AVE. EXTENSION

SITE INFORMATION

SITE NAME: PROLOGIS TNS VICTORVILLE
SITE ADDRESS: VACANT LAND VICTORVILLE, CA

PROPERTY AREA:
GROSS: 114.753 AC. OR 4,998,623 SQ. FT.
NET: (EXCLUDING EASEMENT 16 (GATEWAY)) 113.252 AC. OR 4,933,239 SQ. FT.

TOTAL GROUND FLOOR AREA OF BUILDINGS: NO BUILDINGS / VACANT LAND

PARKING COUNT: NO STRIPED PARKING STALLS ON SUBJECT PROPERTY
ASSESSOR'S PARCEL NOS.: 0459–041–24–0–000, 0459–041–23–0–000 AND 0459–041–32–0–000

SURVEYOR OF RECORD

FIELD COMPLETION DATE: MARCH 13, 2021

LICENSED LAND SURVEYOR — DONALD DUPONT — L.S. 7780 — STATE OF CALIFORNIA
L.S. 7780
Date Signed
03/16/2021

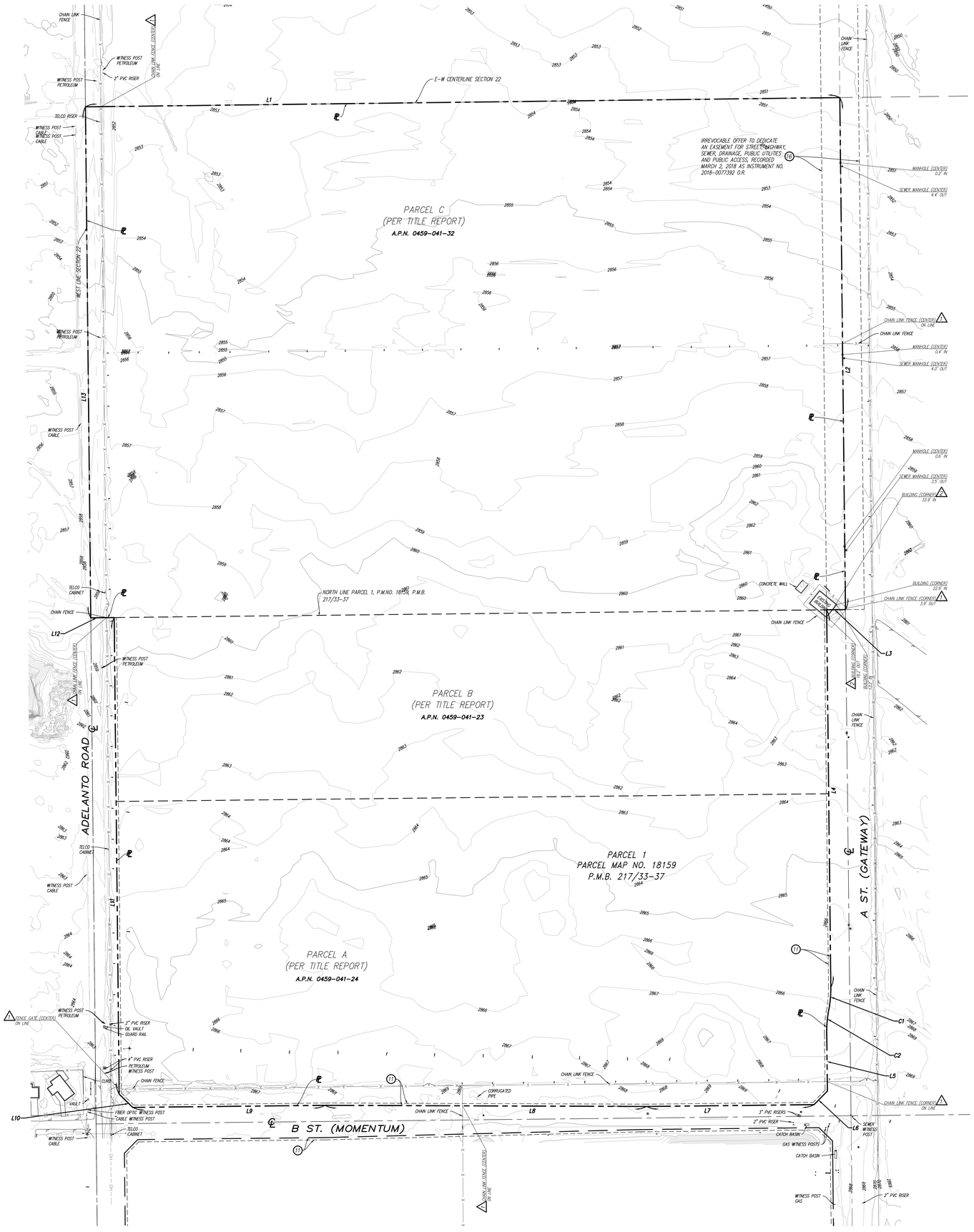
Armando D. Dupont
Registration No. 7780

CAL VADA
SURVEYING, INC.
411 Jenks Cir., Suite 205, Corona, CA 92880
Phone: 951-280-9960 Fax: 951-280-9746
Toll Free: 800-CALVADA www.calvada.com

EST. 1989 JOB NO. 21106

A.L.T.A./N.S.P.S. LAND TITLE SURVEY

PROLOGIS TNS VICTORVILLE
VACANT LAND, VICTORVILLE, CA

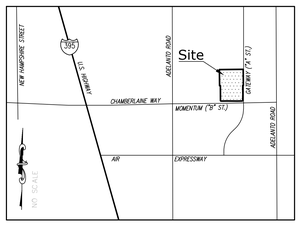


LEGEND

- BACK-FLOW VALVE
- CONCRETE PAVEMENT
- FIRE HYDRANT
- FOUND MONUMENT AS NOTED
- GAS VALVE
- GATE
- GUARD POST
- GUY WIRE
- IRRIGATION CONTROL VALVE
- LIGHT STANDARD
- LIGHT STANDARD
- POWER POLE
- POWER POLE W/TRANSFORMER
- POWER POLE W/LIGHT
- SEWER MANHOLE
- SIGN
- STORM DRAIN MANHOLE
- STREET LIGHT
- UTILITY POLE
- WATER VALVE
- APN ASSESSOR'S PARCEL NUMBER
- CENTERLINE
- PROPERTY LINE
- R/W RIGHT OF WAY
- CENTERLINE
- CHAIN LINK FENCE
- CONCRETE/RETAINING WALL
- EASEMENT LINE
- EDGE OF PAVEMENT
- FLOW LINE
- INTERIOR LOT LINE
- MONUMENT LINE
- OVERHEAD LINE
- PROPERTY LINE
- RIGHT-OF-WAY

GRAPHIC SCALE
100 0 50 100
FEET

VICINITY MAP



SCHEDULE B ITEMS

BASED UPON TITLE REPORT NO. 997-30060508-TC1, DATED JANUARY 20, 2021 AS PREPARED BY FIDELITY NATIONAL TITLE COMPANY.

A.– PROPERTY TAXES FISCAL YEAR 2021–2022. **(NOT A SURVEY MATTER).**

B.– PROPERTY TAXES FISCAL YEAR 2020–2021. **(NOT A SURVEY MATTER).**

C.– THE LIEN OF SUPPLEMENTAL OR ESCAPED ASSESSMENTS OF PROPERTY TAXES, IF ANY. **(NOT A SURVEY MATTER).**

1.– WATER RIGHTS, CLAIMS OR TITLE TO WATER, WHETHER OR NOT DISCLOSED BY THE PUBLIC RECORDS. **(NONE NOTED).**

2.– EASEMENT(S) IN FAVOR OF THE PUBLIC OVER ANY EXISTING ROADS LYING WITHIN SAID LAND. **(BLANKET IN NATURE OVER EXISTING ROADS).**

3.– ANY EXISTENCE OF TOXIC OR HAZARDOUS WASTE OF ANY ALLEGED VIOLATION OF ANY LAW, ORDINANCE, OR GOVERNMENTAL REGULATION CONCERNING ENVIRONMENTAL PROTECTION AS DISCLOSED BY THE USES OF THE LAND AS SAME NOW EXISTS ON PORTIONS OF SAID PROPERTY. **(THE EXACT EXTENT, LOCATION, AND USE CANNOT BE DETERMINED FROM THE RECORD.)**

4.– AN EASEMENT FOR TELEPHONE LINES, RECORDED MARCH 14, 1928, IN BOOK 339, PAGE 288 OF O.R. **(THE EXACT LOCATION AND EXTEND OF SAID EASEMENT IS NOT DISCLOSED OF RECORD).**

5.– AN EASEMENT FOR WATER PIPELINE, RECORDED SEPTEMBER 17, 1927 IN BOOK 539, PAGE 280 OF O.R. **(THE EXACT LOCATION AND EXTEND OF SAID EASEMENT IS NOT DISCLOSED OF RECORD).**

6.– DISCREPANCIES, CONFLICTS IN BOUNDARY LINES, SHORTAGE IN AREA, ENCROACHMENTS, OR ANY OTHER MATTERS SHOWN ON MAP IN BOOK 65, PAGE 98 OF RECORDS OF SURVEY.

7.– THE LAND DESCRIBED HEREIN IS INCLUDED WITHIN A PROJECT AREA OF THE VICTOR VALLEY ECONOMIC DEVELOPMENT AUTHORITY, PER DOCUMENT RECORDED JULY 15, 1992, DOC. NO. 92-292935; RECORDED DECEMBER 29, 1993, DOC. NO. 93-565775 AND DECEMBER 19, 2007, DOC. NO. 2007-0403538 ALL OF O.R. **(NOT A SURVEY MATTER).**

8.– AN EASEMENT FOR OVERHEAD AND UNDERGROUND ELECTRICAL SUPPLY SYSTEMS AND COMMUNICATION SYSTEMS, GUYING AND ANCHORAGE SYSTEMS, LIGHTING SYSTEMS, ELECTRICAL PAD SYSTEMS, AND ELECTRIC VAULT SYSTEMS, RECORDED SEPTEMBER 05, 1997, DOC. NO. 97-325581 OF O.R.. **(BLANKET IN NATURE).**

9.– COVENANTS, CONDITIONS AND RESTRICTIONS RECORDED SEPTEMBER 05, 1997, DOC. NO. 97-325581 OF O.R. **(AN EASEMENT TO SOUTHERN CALIFORNIA EDISON BLANKET IN NATURE).**

10.– COVENANTS, CONDITIONS, RESTRICTIONS AND EASEMENTS RECORDED MAY 21, 2004, DOC. NO. 2004-0360272 OF O.R. **(NOT PLOTTED – NO EASEMENT SPECIFIED).**

11.– AN EASEMENT FOR PIPELINES, AS DELINEATED ON OR AS OFFERED FOR DEDICATION ON PARCEL MAP NO. 18159, IN BOOK 217, PAGES 33–37 INCLUSIVE OF PARCEL MAPS. **(PLOTTED HEREON).**

12.– MATTERS CONTAINED IN THAT CERTAIN DOCUMENT ENTITLED THIRD AMENDED AND RESTATED MASTER AGREEMENT RECORDED DECEMBER 01, 2006, DOC. NO. 2006-0813812 OF O.R. **(NOT A SURVEY MATTER).**

13.– MATTERS CONTAINED IN THAT CERTAIN DOCUMENT ENTITLED FIRST AMENDED AND RESTATED MASTER RAIL DEVELOPMENT AGREEMENT RECORDED DECEMBER 01, 2006, DOC. NO. 2006-0813813 AND DEVELOPMENT AGREEMENT ASSIGNMENT AND ASSUMPTION OF FIRST AMENDED AND RESTATED MASTER RAIL RECORDED DECEMBER 01, 2006, DOC. NO. 2006-0813815 BOTH OF O.R. **(NOT A SURVEY MATTER).**

14.– MATTERS CONTAINED IN THAT CERTAIN DOCUMENT ENTITLED MEMORANDUM OF DISPOSITION AND DEVELOPMENT AGREEMENT, RECORDED DECEMBER 01, 2006, DOC. NO. 2006-0813816 OF O.R. **(NOT A SURVEY MATTER).**

15.– MATTERS CONTAINED IN THAT CERTAIN DOCUMENT ENTITLED FOURTH AMENDED AND RESTATED MASTER AGREEMENT, RECORDED DECEMBER 27, 2010, DOC. NO. 2010-0545684 OF O.R. **(NOT A SURVEY MATTER).**

16.– AN IRREVOCABLE OFFER TO DEDICATE AN EASEMENT OVER SAID LAND FOR STREET, HIGHWAY, SEWER, DRAINAGE, PUBLIC UTILITIES AND PUBLIC ACCESS, RECORDED MARCH 2, 2018 DOC. NO. 2018-0077392 OF O.R. **(PLOTTED HEREON).**

17.– PLEASE BE ADVISED THAT OUR SEARCH DID NOT DISCLOSE ANY OPEN DEEDS OF TRUST OF RECORD. IF YOU SHOULD HAVE KNOWLEDGE OF ANY OUTSTANDING OBLIGATION, PLEASE CONTACT THE TITLE DEPARTMENT IMMEDIATELY FOR FURTHER REVIEW PRIOR TO CLOSING. **(NOT A SURVEY MATTER).**

18.– ANY RIGHTS OF THE PARTIES IN POSSESSION OF A PORTION OF, OR ALL OF, SAID LAND, WHICH RIGHTS ARE NOT DISCLOSED BY THE PUBLIC RECORDS.
THE COMPANY WILL REQUIRE, FOR REVIEW, A FULL AND COMPLETE COPY OF ANY UNRECORDED AGREEMENT, CONTRACT, LICENSE AND/OR LEASE, TOGETHER WITH ALL SUPPLEMENTS, ASSIGNMENTS AND AMENDMENTS THERETO, BEFORE ISSUING ANY POLICY OF TITLE INSURANCE WITHOUT EXCEPTING THIS ITEM FROM COVERAGE.
THE COMPANY RESERVES THE RIGHT TO EXCEPT ADDITIONAL ITEMS AND/OR MAKE ADDITIONAL REQUIREMENTS AFTER REVIEWING SAID DOCUMENTS. **(NOT A SURVEY MATTER).**

19.– DISCREPANCIES, CONFLICTS IN BOUNDARY LINES, SHORTAGE IN AREA, ENCROACHMENTS, OR ANY OTHER MATTERS WHICH A CORRECT SURVEY WOULD DISCLOSE AND WHICH ARE NOT SHOWN BY THE PUBLIC RECORDS.

20.– ANY EASEMENTS NOT DISCLOSED BY THE PUBLIC RECORDS AS TO MATTERS AFFECTING TITLE TO REAL PROPERTY, WHETHER OR NOT SAID EASEMENTS ARE VISIBLE AND APPARENT. **(NONE NOTED).**

21.– MATTERS WHICH MAY BE DISCLOSED BY AN INSPECTION AND/OR BY A CORRECT ALTA/NSPS LAND TITLE SURVEY OF SAID LAND THAT IS SATISFACTORY TO THE COMPANY, AND/OR BY INQUIRY OF THE PARTIES IN POSSESSION THEREOF.

ZONING RESTRICTIONS

NOTE: INDICATED ZONING INFORMATION IS FROM THE CITY OF VICTORVILLE ZONING ORDINANCES IN EFFECT AS OF THE DATE OF THIS SURVEY. ZONING AND RESTRICTIONS SHOWN HEREON WERE OBTAINED BY A GENERAL REQUEST AT THE PUBLIC COUNTER OF THE ABOVE NAMED DEPARTMENT. NO REPRESENTATION IS MADE FOR THE ACCURACY OR COMPLETENESS OF SAID THIRD PARTY INFORMATION. THIS FIRM IS NOT AN EXPERT IN THE REPRESENTATION OF COMPLEX ZONING ORDINANCES. COMPLIANCE IS BEYOND THE SCOPE OF THIS SURVEY. ANY USER OF SAID INFORMATION IS URGED TO CONTACT THE LOCAL AGENCY DIRECTLY.

ZONE: SP1–92 (SPECIFIC PLAN – LAND USE DESIGNATION – INDUSTRIAL)

MINIMUM SETBACKS: FRONT:
FROM LOCAL OR COLLECTOR STREET: 20 FEET
FROM ARTERIAL STREET: 30 FEET
SIDE: 10 FEET
REAR: 10 FEET

HEIGHT RESTRICTIONS: 55 FEET

POSSIBLE ENCROACHMENT NOTES

THIS IS A LISTING OF OBSERVED IMPROVEMENTS THAT CROSS PROPERTY LINES. STATEMENT OF OWNERSHIP OR POSSESSION IS NOT THE INTENT OF THIS LISTING.

1 FENCE OVERLAPS THE PROPERTY LINE AS SHOWN

2 BUILDING OVERLAPS THE PROPERTY LINE AS SHOWN

ITEMS CORRESPONDING TO TABLE A ITEMS

– ITEM 14
THE NEAREST INTERSECTING STREET TO THE PROPERTY IS ADELANTO ROAD AND B STREET TO THE SOUTH WEST AS SHOWN HEREON AND IT IS ± 90 FEET.

– ITEM 16
NO EVIDENCE OF RECENT EARTH MOVING WORK, BUILDING CONSTRUCTION OR BUILDING ADDITIONS OBSERVED IN THE PROCESS OF CONDUCTING THE FIELD WORK.

– ITEM 17
NO EVIDENCE OF RECENT STREET OR SIDEWALK CONSTRUCTION OR REPAIRS OBSERVED IN THE PROCESS OF CONDUCTING THE FIELD WORK.

FLOOD NOTE: BY GRAPHIC PLOTTING ONLY, THIS PROPERTY IS IN ZONE "D" OF THE FLOOD INSURANCE RATE MAP, PANEL NO. 06071C5780H, PANEL DATED 08/28/2008. THIS PROPERTY IS AN UNDETERMINED FLOOD HAZARDS BY FEMA. BY TELEPHONE CALL TO THE NATIONAL FLOOD INSURANCE PROGRAM (800-638-6620) WE HAVE LEARNED THIS COMMUNITY DOES CURRENTLY PARTICIPATE IN THE PROGRAM. NO FIELD SURVEYING WAS PERFORMED TO DETERMINE THIS ZONE AND AN ELEVATION CERTIFICATE MAY BE NEEDED TO VERIFY THIS DETERMINATION OR APPLY FOR A VARIANCE FROM THE FEDERAL EMERGENCY MANAGEMENT AGENCY.

ZONE D: AREA OF UNDETERMINED FLOOD HAZARD.

LEGAL DESCRIPTION

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF VICTORVILLE IN THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

PARCEL A:

PARCEL 1 OF PARCEL MAP NO. 18159, FILED IN BOOK 217, PAGES 33 THROUGH 37 INCLUSIVE OF PARCEL MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID SAN BERNARDINO COUNTY, EXCEPT THAT PORTION DESCRIBED AS FOLLOWS:

THAT CERTAIN PARCEL OF LAND SITUATED IN THE CITY OF VICTORVILLE, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, BEING THAT PORTION OF PARCEL 1 OF PARCEL MAP NO. 18159, FILED IN BOOK 217, PAGES 33 THROUGH 37 INCLUSIVE OF PARCEL MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID SAN BERNARDINO COUNTY, DESCRIBED AS FOLLOWS:

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EXCEPTING THEREFROM 10% OF THE GROSS FAIR MARKET VALUE OF OIL, GAS, OR MINERALS, AS RESERVED BY THE UNITED STATES OF AMERICA IN DOCUMENT RECORDED MAY 21, 2004 AS INSTRUMENT NO. 2004-0360272 OF OFFICIAL RECORDS OF THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA.

APN: 0459-041-24-0-000

PARCEL B:

THAT CERTAIN PARCEL OF LAND SITUATED IN THE CITY OF VICTORVILLE, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, BEING THAT PORTION OF PARCEL 1 OF PARCEL MAP NO. 18159, FILED IN BOOK 217, PAGES 33 THROUGH 37 INCLUSIVE OF PARCEL MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID SAN BERNARDINO COUNTY, DESCRIBED AS FOLLOWS:

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EXCEPTING THEREFROM 10% OF THE GROSS FAIR MARKET VALUE OF OIL, GAS, OR MINERALS, AS RESERVED BY THE UNITED STATES OF AMERICA IN DOCUMENTS RECORDED MAY 21, 2004 AS INSTRUMENT NO. 2004-0360272, AND MAY 21, 2004 AS INSTRUMENT NO. 2004-0360273, BOTH OF OFFICIAL RECORDS OF THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA.

APN: 0459-041-23-0-000

PARCEL C

THAT PORTION OF SECTION 22 OF TOWNSHIP 6 NORTH, RANGE 5 WEST, SAN BERNARDINO MERIDIAN, IN THE CITY OF VICTORVILLE, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, BEING A PORTION OF THAT LAND CONVEYED TO SOUTHERN CALIFORNIA LOGISTICS AIRPORT AUTHORITY BY DOCUMENT RECORDED MAY 21, 2004 AS INSTRUMENT NO. 2004-0360272 OF OFFICIAL RECORDS OF THE COUNTY RECORDER OF SAID COUNTY, DESCRIBED AS FOLLOWS:

COMMENCING AT THE INTERSECTION OF THE CENTERLINE OF "A" STREET AND "B" STREET AS SHOWN ON PARCEL MAP NO. 18159, FILED IN BOOK 217, PAGES 33 THROUGH 37 INCLUSIVE OF PARCEL MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, AND SAID CENTERLINE OF "B" STREET ALSO BEING THE SOUTH LINE OF WEST HALF OF SAID SECTION 22 AS SHOWN ON SAID PARCEL MAP; THENCE NORTH 00°37'56" WEST ALONG SAID THE CENTERLINE OF "A" STREET 1319.00 FEET TO A POINT OF INTERSECTION WITH THE EASTERLY PROLONGATION OF THE NORTHERLY LINE OF PARCEL 1 OF SAID PARCEL MAP NO. 18159, AND SAID POINT BEING THE TRUE POINT OF BEGINNING; THENCE CONTINUING ALONG THE PROLONGATION OF SAID CENTERLINE OF "A" STREET NORTH 00°37'56" WEST 1334.49 FEET TO THE EAST–WEST CENTER SECTION LINE OF SAID SECTION 22; THENCE SOUTH 89°17'39" WEST 1965.71 FEET ALONG SAID EAST–WEST CENTERLINE TO THE WEST LINE OF SAID SECTION 22; THENCE SOUTH 00°35'57" EAST 1331.56 FEET ALONG SAID WEST LINE TO A POINT OF INTERSECTION WITH THE WESTERLY PROLONGATION OF SAID NORTHERLY LINE OF PARCEL 1; THENCE NORTH 89°22'46" EAST 1966.48 FEET ALONG SAID PROLONGATION TO THE TRUE POINT OF BEGINNING.

EXCEPT THEREFROM, AN OVERRIDING ROYALTY OF 10% OF THE GROSS FAIR MARKET VALUE OF OIL, GAS, OR MINERAL EXTRACTED FROM THE PROPERTY AS SET FORTH IN THE DOCUMENT RECORDED MAY 21, 2004 AS INSTRUMENT NO. 2004-0360272 OF OFFICIAL RECORDS.

APN: 0459-041-32-0-000

ITEMS CORRESPONDING TO TABLE A ITEMS

– ITEM 14
THE NEAREST INTERSECTING STREET TO THE PROPERTY IS ADELANTO ROAD AND B STREET TO THE SOUTH WEST AS SHOWN HEREON AND IT IS ± 90 FEET.

– ITEM 16
NO EVIDENCE OF RECENT EARTH MOVING WORK, BUILDING CONSTRUCTION OR BUILDING ADDITIONS OBSERVED IN THE PROCESS OF CONDUCTING THE FIELD WORK.

– ITEM 17
NO EVIDENCE OF RECENT STREET OR SIDEWALK CONSTRUCTION OR REPAIRS OBSERVED IN THE PROCESS OF CONDUCTING THE FIELD WORK.

SURVEYOR'S NOTES

- THE UTILITIES SHOWN HEREON ARE BASED ON OBSERVED EVIDENCE ONLY. THIS SURVEY WOULD NOT SHOW UTILITIES COVERED BY CARS/TRUCKS OR RECENTLY PAVED ASPHALT/CONCRETE OR OVERGROWN BRUSH, TREES AND SHRUBS.
- THIS SURVEY HAS BEEN PREPARED FOR TITLE INSURANCE PURPOSES ONLY. THIS SURVEY DOES NOT CONTAIN SUFFICIENT DETAIL FOR DESIGN PURPOSES. THE BOUNDARY DATA AND TITLE MATTERS AS SHOWN HEREON HAVE BEEN DEVELOPED FROM THE REFERENCED TITLE REPORT.
- UNLESS THIS PLAN HAS THE SEAL AND SIGNATURE OF THE SURVEYOR AND/OR ENGINEER RESPONSIBLE FOR ITS PREPARATION, THIS IS NOT AN AUTHENTIC COPY OF THE ORIGINAL SURVEY AND SHALL NOT BE DEEMED RELIABLE.

SURVEYOR'S CERTIFICATE

TO STIRLING CAPITAL INVESTMENTS/LOT 44, LLC, A DELAWARE LIMITED LIABILITY COMPANY AND FIDELITY NATIONAL TITLE COMPANY:

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2021 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 1 (FOUND MONUMENTS ONLY), 2, 3, 4, 5, 6(a), 7(a), 7(b)(1), 7(c), 8, 9, 10, 11(a) (VISIBLE EVIDENCE ONLY), 13, 14, 16, 17, 18 AND 19 OF TABLE A THEREOF. THE FIELD WORK WAS COMPLETED ON MARCH 13, 2021.

DATE OF PLAT OR MAP: MARCH 16, 2021.

REVISIONS			
NO.	DATE	REVISIONS	BY
0	03/16/21	SUBMITTAL	CE

UTILITY STATEMENT

BURIED UTILITIES AND/OR PIPELINES SHOWN HEREON ARE PER VISIBLE AND APPARENT SURFACE EVIDENCE, RECORD DRAWINGS OF THE CONSTRUCTED UTILITY LINES OBTAINED FROM RELIABLE AND RESPONSIBLE SOURCES. NOT CONNECTED WITH CALVADA SURVEYING, INC. OR MARKINGS PROVIDED BY AN INDEPENDENT LOCATING CONTRACTOR. NO GUARANTEE OR WARRANTY, EITHER EXPRESSED OR IMPLIED, IS MADE AS TO THE ACCURACY OR THOROUGHNESS OF SUCH INFORMATION. IF MORE ACCURATE LOCATIONS OF UNDERGROUND UTILITIES OR PIPE LINES ARE REQUIRED, THE UTILITY OR PIPELINE WILL HAVE TO BE VERIFIED BY FIELD POTHOLING. CALVADA SURVEYING, INC. AND THE SURVEYOR OF RECORD SHALL NOT BE HELD LIABLE FOR THE LOCATION OF OR THE FAILURE TO NOTE THE LOCATION OF NON-VISIBLE UTILITIES OR PIPELINES.

Underground Service Alert
Call: TOLL FREE
1–800
227–2600
TWO WORKING DAYS BEFORE YOU DIG

PREPARED FOR

LANGAN
LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES, INC.
18575 JAMBOREE ROAD, SUITE 150
IRVINE, CA 92612

PHONE: (949) 561-9200
FAX: (949) 561-9201

BASIS OF BEARINGS

THE BEARINGS SHOWN HEREON ARE BASED UPON THE CALIFORNIA COORDINATE SYSTEM OF 1983, CCS83, ZONE 5, (2017.50) IN ACCORDANCE TO THE CALIFORNIA PUBLIC RESOURCES CODE SECTIONS 8801–8819; SAID BEARINGS ARE DETERMINED LOCALLY UPON FIELD–OBSERVED TIES TO THE FOLLOWING CALIFORNIA SPATIAL REFERENCE NETWORK CONTINUOUS OPERATING REFERENCE STATIONS (C.O.R.S.):

C.S.R.C. SCIA:
NORTHING = 2044003.43' EASTING = 6745730.79'

C.S.R.C. P586:
NORTHING = 2017796.62' EASTING = 6778350.58'

THE COMBINATION FACTOR FOR THIS PROJECT WAS APPLIED AT THE FOLLOWING POINT:
NORTHING = 6743342.69' EASTING = 2039097.89'

MAPPING ANGLE = –1°19'48.87" SCALE FACTOR = 1.000020575.

BENCHMARK

ELEVATIONS SHOWN HEREON ARE BASED UPON CITY OF VICTORVILLE BENCHMARK Y–747, ELEVATION 2905.31 FEET (NGVD 29).

DESCRIPTION: 8"X8" CONCRETE MONUMENT W/4" IRON CAP STAMPED "USC&GS BM Y–747, 1945" @ 45° S/O ARROWHEADWAY AND 83' W/O NEVADA AVE EXTENSION

SITE INFORMATION

SITE NAME: PROLOGIS TNS VICTORVILLE
SITE ADDRESS: VACANT LAND VICTORVILLE, CA

PROPERTY AREA:
GROSS: 114.753 AC. OR 4,998,623 SQ. FT.
NET: (EXCLUDING EASEMENT 16 (GATEWAY)) 113.252 AC. OR 4,933,239 SQ. FT.

TOTAL GROUND FLOOR AREA OF BUILDINGS: NO BUILDINGS / VACANT LAND

PARKING COUNT: NO STRIPED PARKING STALLS ON SUBJECT PROPERTY
ASSESSOR'S PARCEL NOS.: 0459–041–24–0–000; 0459–041–23–0–000 AND 0459–041–32–0–000

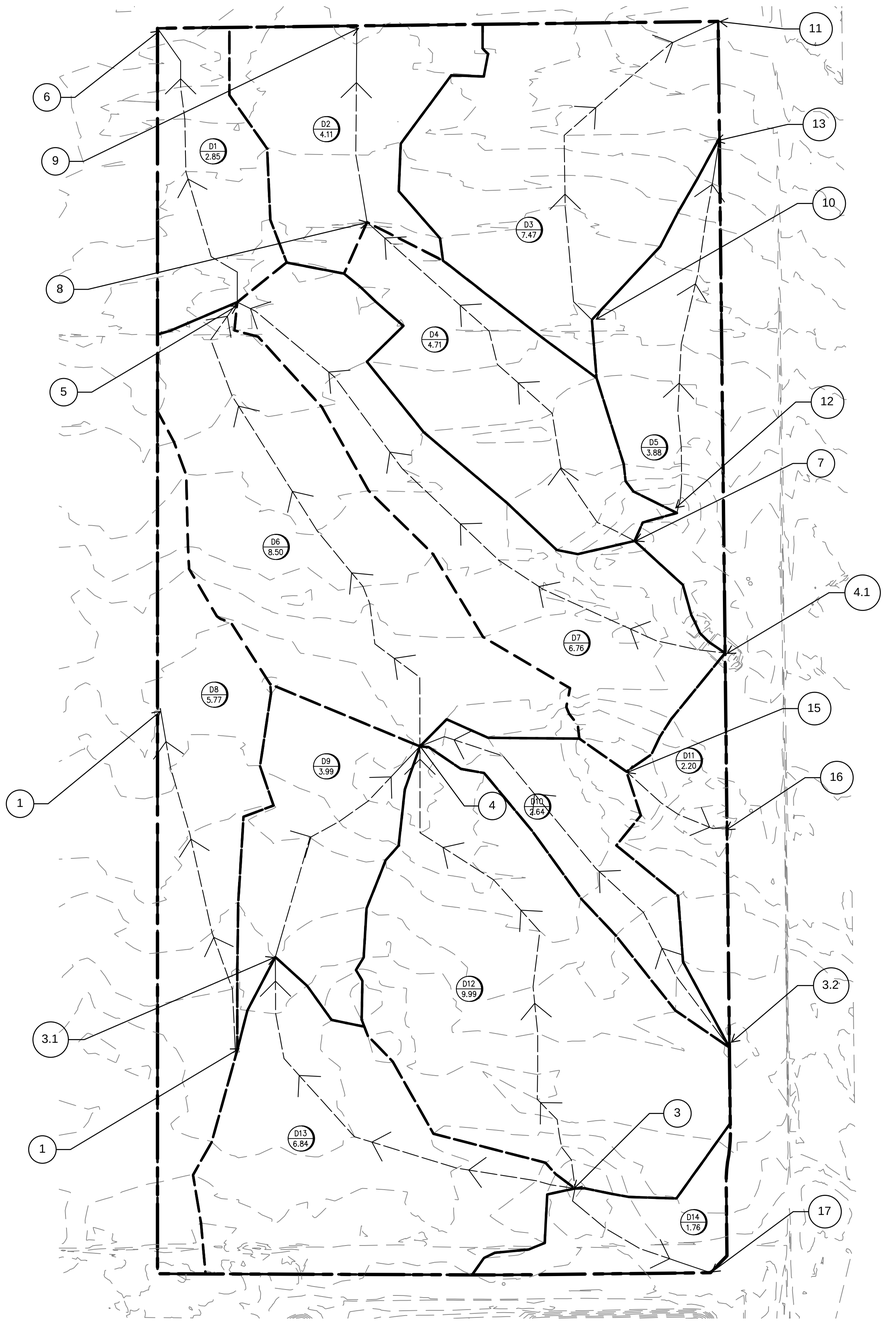
SURVEYOR OF RECORD

FIELD COMPLETION DATE: MARCH 13, 2021

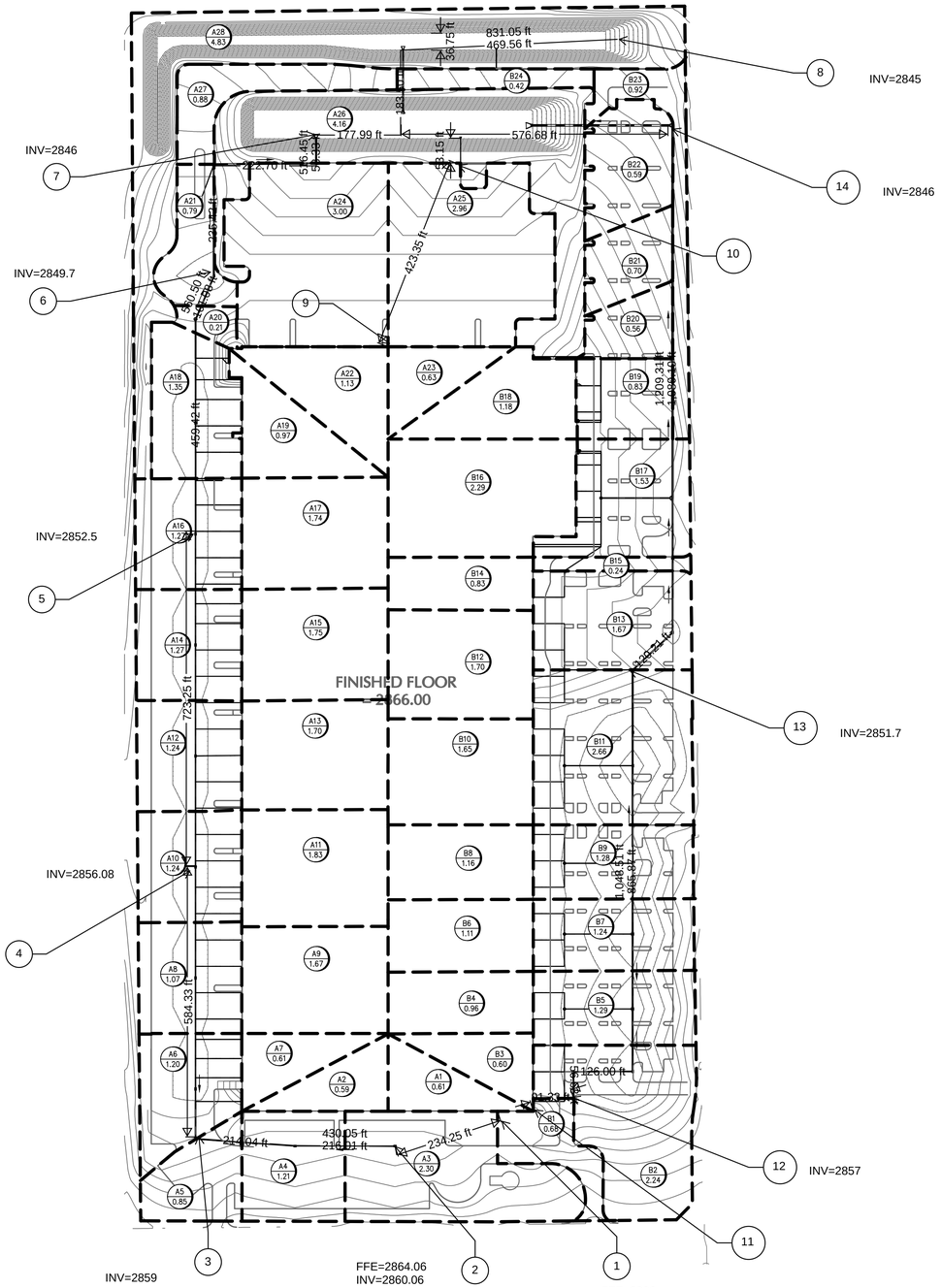
L.S. 7780
Date Signed
03/16/2021

Armando D. DuBont
Registration No. 7780

CAL VADA SURVEYING, INC.
411 Jenks Cir., Suite 205, Corona, CA 92880
Phone: 951-280-9960 Fax: 951-280-9746
Toll Free: 800-CALVADA www.calvada.com
EST. 1989 JOB NO. 21106



PRE-DEVELOPMENT CONDITION



POST-DEVELOPMENT CONDITION

150 0 50 100 150
SCALE: 1 INCH = 150 FEET

NOT FOR CONSTRUCTION

Signature Date

MICHAEL GOLIAS
PROFESSIONAL ENGINEER CA LIC. No.: C91029

LANGAN
Langan Engineering and Environmental Services, Inc.
18575 Jamboree Road, Suite 150
Irvine, CA 92612
T: 949.561.9225 F: 949.561.9201 www.langan.com

CITY OF VICTORVILLE
ENGINEERING DEPARTMENT
14343 CIVIC DRIVE, VICTORVILLE, CA. 92392 (760) 955-5158

NO.	REVISIONS	BY	DATE

CIVIL IMPROVEMENTS PLANS
PROJECT LOKI
DRAINAGE AREA PLAN

FIELD BOOK NO. (S)

BENCH MARK:
CITY OF VICTORVILLE BENCHMARK Y-747
ELEVATION = 2905.31' (NVGD 29)
8"x8" CONCRETE MONUMENT W/4" IRON CAP
STAMPED "USC&GS BM Y-747, 1945" @ 41' S/O
AIREXPRESSWAY AND 93' W/O NEVADA AVE EXTENSION

DESIGN BY: AL
DRAWN BY: JMA
CHECKED BY: MRG
DATE: 04/02/2021

SHEET NO. 31 OF 36

DRAWING NO. CA104

PROJECT NO. PSUB20-00022

APPROVED BY: CITY ENGINEER DATE: R.C.E. EXP.

APPENDIX A

Preliminary Priority Project Checklist

PRELIMINARY PRIORITY PROJECT CHECKLIST

Part 1 - Project Type	YES	NO
1. 10 or more unit homes, including single and multiple family homes, condominiums, apartments, etc.		X
2. An Industrial or commercial development with 100,000+ SF of impervious surface	X	
3. An automotive service facility - (5,000 SF or more)		X
4. A retail gasoline outlet - (5,000 SF or more)		X
5. A restaurant (5,000 SF or more)		X
6. A parking lot with either 5,000 SF of impervious surface or with 25 or more parking spaces	X	
7. A single family hillside dwelling (one acre or more surface area)		X
8. Redevelopment projects		X
9. Project location in, adjacent to or discharging directly to an ESA *AND* creates 2,500 SF or more of impervious surface area.		X

If any of the boxes in Part 1 is checked "yes", this project will require a WQMP along with a Maintenance Agreement and Transfer

Part 2 - Project Specific Concerns/Characters	YES	NO
1. A single family hillside dwelling (less than one acre) - WQMP required		X
2. An automotive service facility (less than 5,000 SF or more) - WQMP required		X
3. a retail gasoline outlet (less than 5,000 SF or more) - WQMP required		X
4. A restaurant (less than 5,000 SF or more) WQMP required		X
5. Vehicle or equipment fueling areas (retail or private)		X
6. Commercial or Industrial waste handling or storage		X
7. Outdoor handling or storage of hazardous waste materials		X
8. Outdoor manufacturing areas		X
9. Outdoor food handling or processing		X
10. Outdoor animal care, confinement or slaughter		X
11. Outdoor horticulture activities		X

If any of the boxes in Part 2 is checked "yes", this project will require a WQMP along with a Maintenance Agreement and Transfer

APPENDIX B

USGS Web Soil Survey Map

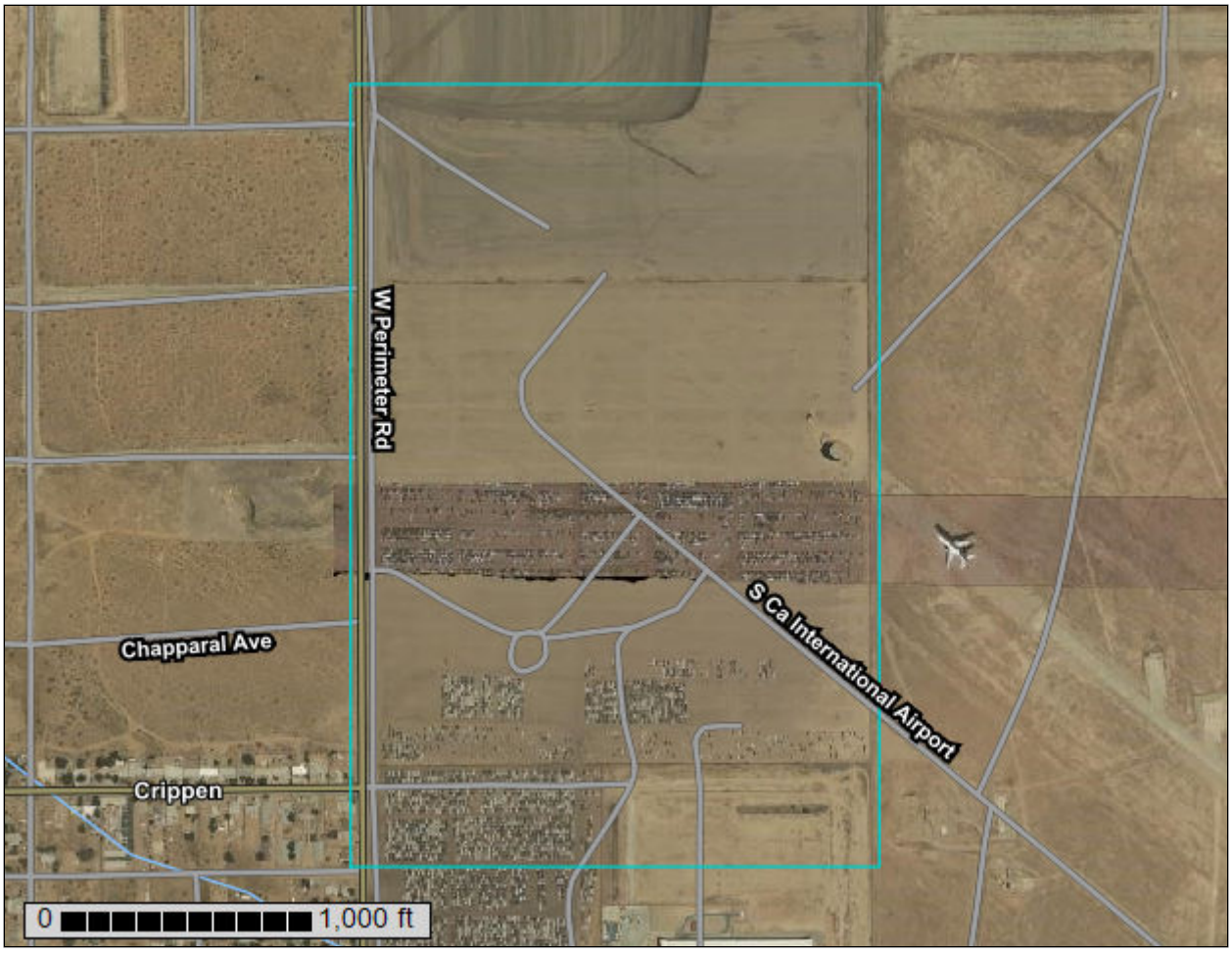
United States Department of Agriculture

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



March 2, 2021

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.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

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.

Map Scale: 1:5,560 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

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

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: San Bernardino County, California, Mojave River Area
Survey Area Data: Version 12, May 27, 2020

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

Date(s) aerial images were photographed: Jul 19, 2018—Jul 8, 2019

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
105	BRYMAN LOAMY FINE SAND, 0 TO 2 PERCENT SLOPES	151.4	100.0%
Totals for Area of Interest		**151.4**	**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.

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

105—BRYMAN LOAMY FINE SAND, 0 TO 2 PERCENT SLOPES

Map Unit Setting

National map unit symbol: hkr9
Elevation: 2,800 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: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bryman

Setting

Landform: Fan remnants
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
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 12 inches: sandy loam
H3 - 12 to 32 inches: sandy clay loam
H4 - 32 to 46 inches: sandy loam
H5 - 46 to 99 inches: loamy sand

Properties and qualities

Slope: 0 to 2 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 capacity: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: R030XF012CA - Sandy
Hydric soil rating: No

Minor Components

Bryman, gravelly surface
Percent of map unit: 5 percent
Hydric soil rating: No

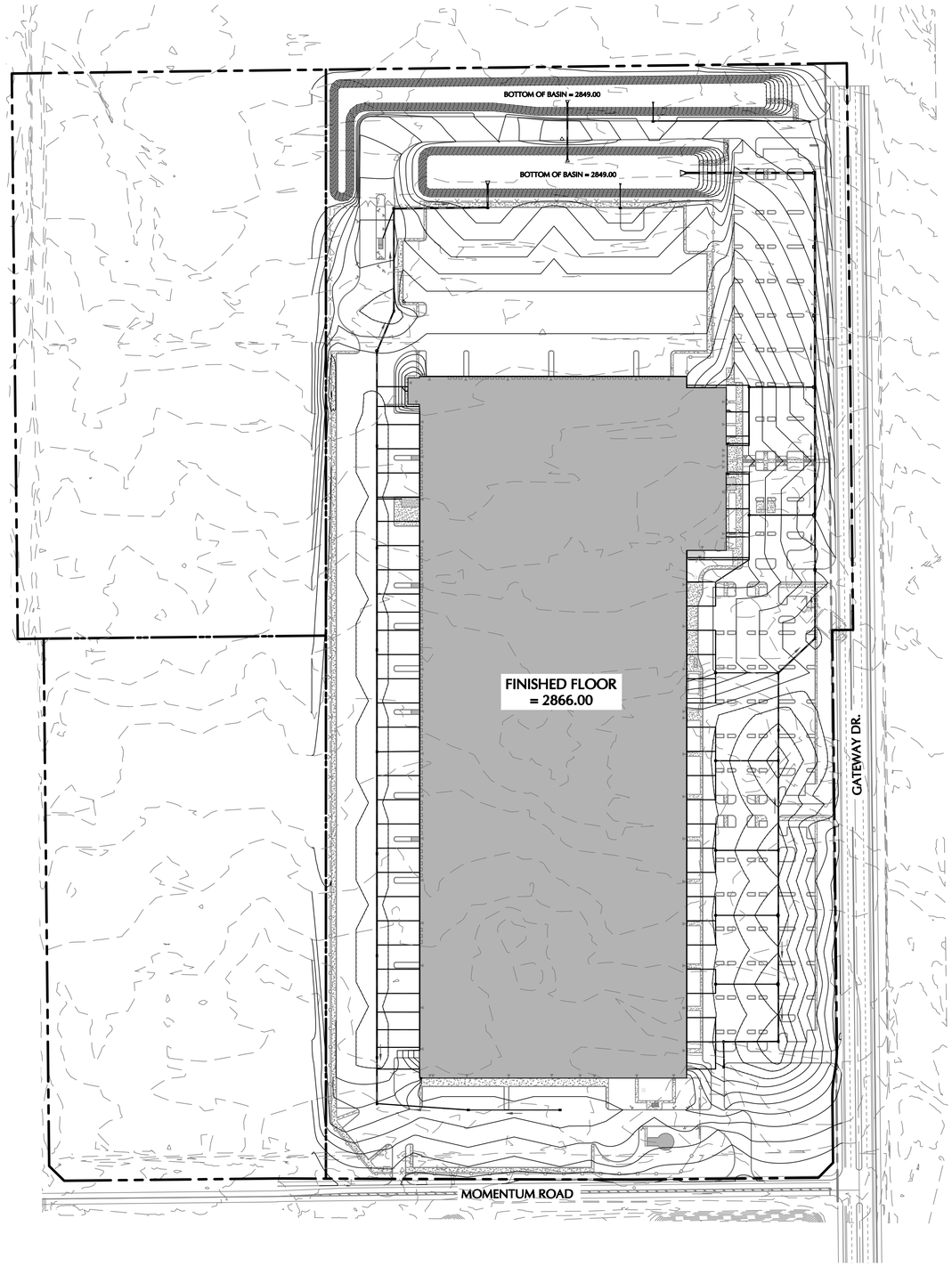
Helendale
Percent of map unit: 5 percent
Hydric soil rating: No

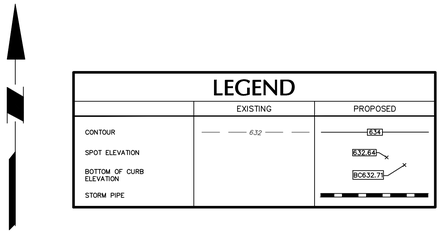
Cajon
Percent of map unit: 5 percent
Hydric soil rating: No

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

APPENDIX C

Conceptual Grading Plans





GRADING NOTES:

1. GRADING SHALL CONFORM TO SECTION 15.06 OF THE CITY OF VICTORVILLE MUNICIPAL CODE.
2. A GRADING PERMIT SHALL BE OBTAINED FROM THE CITY OF VICTORVILLE BUILDING DEPARTMENT PRIOR TO THE START OF GRADING WORK.
3. CONTRACTOR SHALL GIVE THE CITY OF VICTORVILLE ENGINEERING DEPARTMENT AT LEAST 2 WORKING DAYS NOTICE TO SCHEDULE A PRE-CONSTRICTION MEETING WITH THE INSPECTION PRIOR TO THE START OF WORK.
4. THE CONTRACTOR SHALL NOTIFY UNDERGROUND SERVICE ALERT AT 1 (800) 422-4133 AT LEAST 2 WORKING DAYS IN ADVANCE OF STARTING WORK.
5. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO FAMILIARIZE HIMSELF/HERSELF WITH SITE CONDITIONS AND OF ANY UNDERGROUND UTILITIES SHOWN OR NOT SHOWN ON THESE PLANS.
6. THE CONTRACTOR SHALL GIVE THE CITY OF VICTORVILLE ENGINEERING DEPARTMENT AT LEAST 1 WORKING DAY NOTICE PRIOR TO ALL INSPECTIONS AT (760) 955-5158. A RE-INSPECTION FEE WILL BE RENDERED ON EACH OCCASION WHEN THE CONTRACTOR IS NOT READY FOR THE INSPECTION AT THE SCHEDULED TIME. NO FURTHER INSPECTIONS WILL BE PERFORMED UNTIL SAID RE-INSPECTION FEE IS PAID.
7. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROTECT SURVEYING MOMENTS IN PLACE AND THE CONTRACTOR SHALL BE FINANCIALLY RESPONSIBLE FOR RESETTING DAMAGED OR DESTROYED MONUMENTS.
8. JOSHUA TREES SHALL BE PROTECTED IN PLACE OR REPLACED AS APPROVED BY THE PARKS DIVISION OF THE CITY OF VICTORVILLE DEPARTMENT OF COMMUNITY SERVICES AT THE CONTRACTOR'S EXPENSE.
9. NO GRADING SHALL COMMENCE PRIOR TO 7:00 A.M. EACH WORKING DAY.
10. DUST CONTROL SHALL INCLUDE:
    a. PROVISIONS FOR CONTINUOUS WATERING DURING GRADING OPERATIONS INCLUDING A 24-HOUR ON CALL OPERATOR OR AS DIRECTED BY CITY STAFF.
    b. UPON COMPLETION OF THE PROJECT, THE ENTIRE SITE IS TO BE STABILIZED BY TREATING WITH MAGNESIUM CHLORIDE OR OTHER APPROVCED METHOD AND AS APPROVED BY CITY STAFF.
11. CLEAR ALL CUT AND FILL AREAS OF VEGETATION AND ORGANIC MATERIALS TO A DEPTH OF SIX (6) INCHES OR MORE.
12. FILL SHALL BE PLACED IN LIFTS OF EITHER (8) INCHES OR LESS AND SUFFICIENT MOISTURE ADDED AND MATERIAL COMPACTED TO ACHIEVE THE REQUIRED PERCENT OF COMPACTION.
13. NO ROCKS GREATER THAN SIX (6) INCHES IN DIAMETER MAY BE PLACED IN FILL.
14. COMPACTION SHALL BE A MINIMUM OF NINETY PERCENT (90%).
15. MINIMUM SLOPE FOR ALL GRADED AREAS SHALL BE ONE PERCENT (1.00%) UNLESS ON SMOOTH PCC, THEN THE MINIMUM SLOPE SHALL BE ONE-HALF PERCENT (0.50%).
16. MAXIMUM SLOPES SHALL BE 2:1. SLOPE STABILIZATION SHALL BE PROVIDED ON ALL SLOPES IN ACCORDANCE WITH SECTION 3316 OF THE UNIFORM BUILDING CODE.
17. ALL OFF-SITE IMPROVEMENTS SHALL BE CONSTRUCTION TO CITY OF VICTORVILLE STANDARDS
18. ALL FENCES AND WALLS ARE UNDER SEPARATE PERMIT.
19. RETAINING WALLS SHALL BE CONSTRUCTED TO CITY OF VICTORVILLE STANDARDS OR WALL CALCULATIONS SUBMITTED TO THE BUILDING DEPARTMENT FOR CITY APPROVAL.
20. BUILDING PAD AND GRADING PLAN CERTIFICATION SHALL BE COMPLETED BY A LICENSED ENGINEER IN ACCORDANCE WITH SECTION 3317 OF THE UNIFORM BUILDING CODE.
21. THE MAXIMUM ALLOWABLE FOUNDATION BEARING PRESSURE SHALL BE 1500 PSF UNLESS APPROVED BY THE CITY OF VICTORVILLE BUILDING DEPARTMENT.
22. THE CONTRACTOR SHALL COMPLY WITH THE GRADING ORDINANCE SECTION 15.06.080 AND SECTION 15.06.090 AS IT RELATED TO BORROW PITS, EXPORT SITES AND HAUL ROUTES PRIOR TO ISSUANCE OF A GRADING PERMIT.
23. A PALEONTOLOGICAL MONITOR MUST BE PRESENT DURING ALL PHASES OF GRADING WHEN REQUIRED BY CITY STAFF.
24. APPROXIMATE QUANTITIES:
    CUT: 123,500 CY
    FILL: 290,000 CY
25. CONSTRUCTION ACTIVITIES OOF ONE (1) ACRE OR MORE SHALL REQUIRE A GENERAL CONSTRUCTION STORM WATER PERMIT. FOR MORE INFORMATION, YOU MAY CALL THE STATE WATER RESOURCES CONTROL BOARD – DIVISION OF WATER QUALITY AT (916) 657-1146.
26. ALL GRADING SHALL COMPLY WITH THE GRADING PLAN AND THE RECOMMENDATIONS SET FORTH IN THE SOILS REPORT.

150 0 75 150
SCALE: 1 INCH = 150 FEET

NOT FOR CONSTRUCTION

Signature Date

MICHAEL GOLIAS
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CITY OF VICTORVILLE
ENGINEERING DEPARTMENT
14343 CIVIC DRIVE, VICTORVILLE, CA. 92392 (760) 955-5158

NO.	REVISIONS	BY	DATE

CIVIL IMPROVEMENTS PLANS
PROJECT LOKI
OVERALL CONCEPTUAL GRADING & DRAINAGE PLAN

FIELD BOOK NO. (S)

BENCH MARK:
CITY OF VICTORVILLE BENCHMARK Y-747
ELEVATION = 2905.31' (NAVD 29)
6"x6" CONCRETE MONUMENT W/4" IRON CAP
STAMPED "USC&GS BM Y-747, 1945" @ 41' S/O
AIRDPRESSWAY AND 93' W/O NEVADA AVE EXTENSION

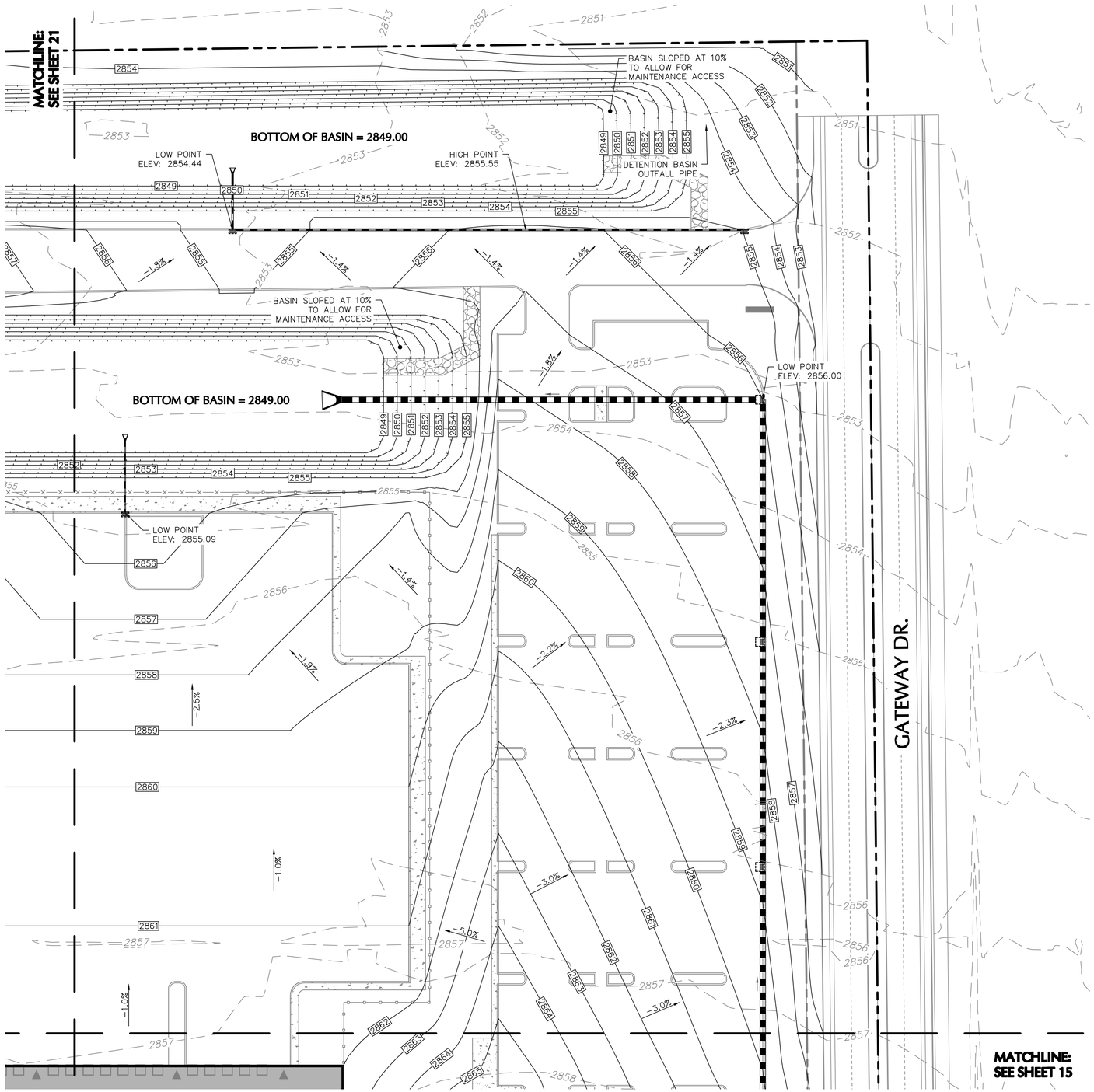
DESIGN BY: AL
DRAWN BY: JMA
CHECKED BY: MRG
DATE: 04/02/2021

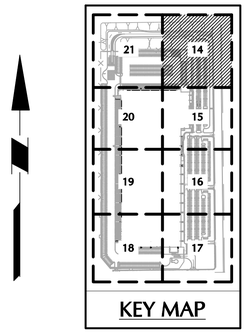
SHEET NO. 13 OF 36

DRAWING NO. CG100

PROJECT NO. PSUB20-00022

APPROVED BY: CITY ENGINEER _____ DATE: _____ R.C.E. EXP. _____





KEY MAP

LEGEND

	EXISTING	PROPOSED
CONTOUR	632	634
SPOT ELEVATION		632.64
BOTTOM OF CURB ELEVATION		BC632.73
STORM PIPE		

40 0 10 25 40
SCALE 1 INCH = 40 FEET

NOT FOR CONSTRUCTION

Signature Date

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CITY OF VICTORVILLE
ENGINEERING DEPARTMENT
14343 CIVIC DRIVE, VICTORVILLE, CA. 92392 (760) 955-5158

NO.	REVISIONS	BY	DATE

CIVIL IMPROVEMENTS PLANS
PROJECT LOKI
PARTIAL CONCEPTUAL GRADING & DRAINAGE PLAN

FIELD BOOK NO. (S)

BENCH MARK:
CITY OF VICTORVILLE BENCHMARK Y-747
ELEVATION = 2905.31' (NVGD 29)
6"x6" CONCRETE MONUMENT W/4" BRN CAP
STAMPED "USC&GS BM Y-747, 1945" @ 41' S/O
AIREXPRESSWAY AND 93' W/O NEVADA AVE EXTENSION

DESIGN BY: AL
DRAWN BY: JMA
CHECKED BY: MRG
DATE: 04/02/2021

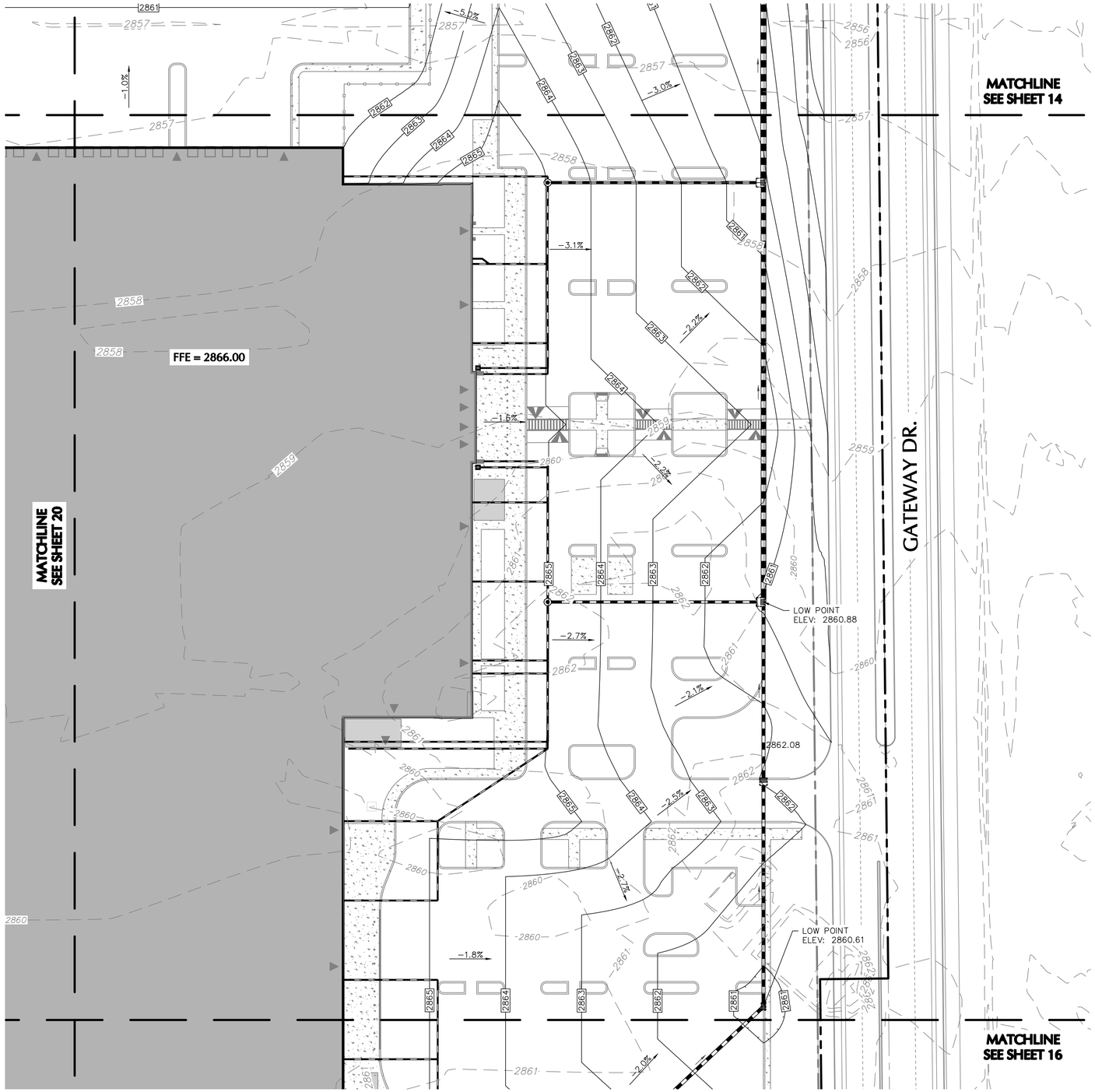
SHEET NO. 14 OF 36

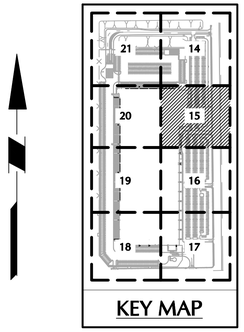
DRAWING NO. CG101

PROJECT NO. PSUB20-00022

APPROVED BY: _____ DATE: _____ R.C.E. _____ EXP.
CITY ENGINEER

Date: 4/1/2021 Time: 15:41 User: amlu Style Table: Langan.stb Layout: 14 Document Code: 700089101-0301-CG101-0101





KEY MAP

LEGEND

	EXISTING	PROPOSED
CONTOUR	632	634
SPOT ELEVATION		632.64
BOTTOM OF CURB ELEVATION		BC632.73
STORM PIPE		

40 0 10 25 40
SCALE 1 INCH = 40 FEET

NOT FOR CONSTRUCTION

Signature Date

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NO.	REVISIONS	BY	DATE

FIELD BOOK NO. (S)

BENCH MARK:
CITY OF VICTORVILLE BENCHMARK Y-747
ELEVATION = 2905.31' (NVGD 29)
5"x8" CONCRETE MONUMENT W/4" IRON CAP
STAMPED "USC&GS BM Y-747, 1945" @ 41' S/O
AREXPRESSWAY AND 93' W/O NEVADA AVE EXTENSION

CIVIL IMPROVEMENTS PLANS
PROJECT LOKI
PARTIAL CONCEPTUAL GRADING & DRAINAGE PLAN

DESIGN BY: AL
DRAWN BY: JMA
CHECKED BY: MRG
DATE: 04/02/2021

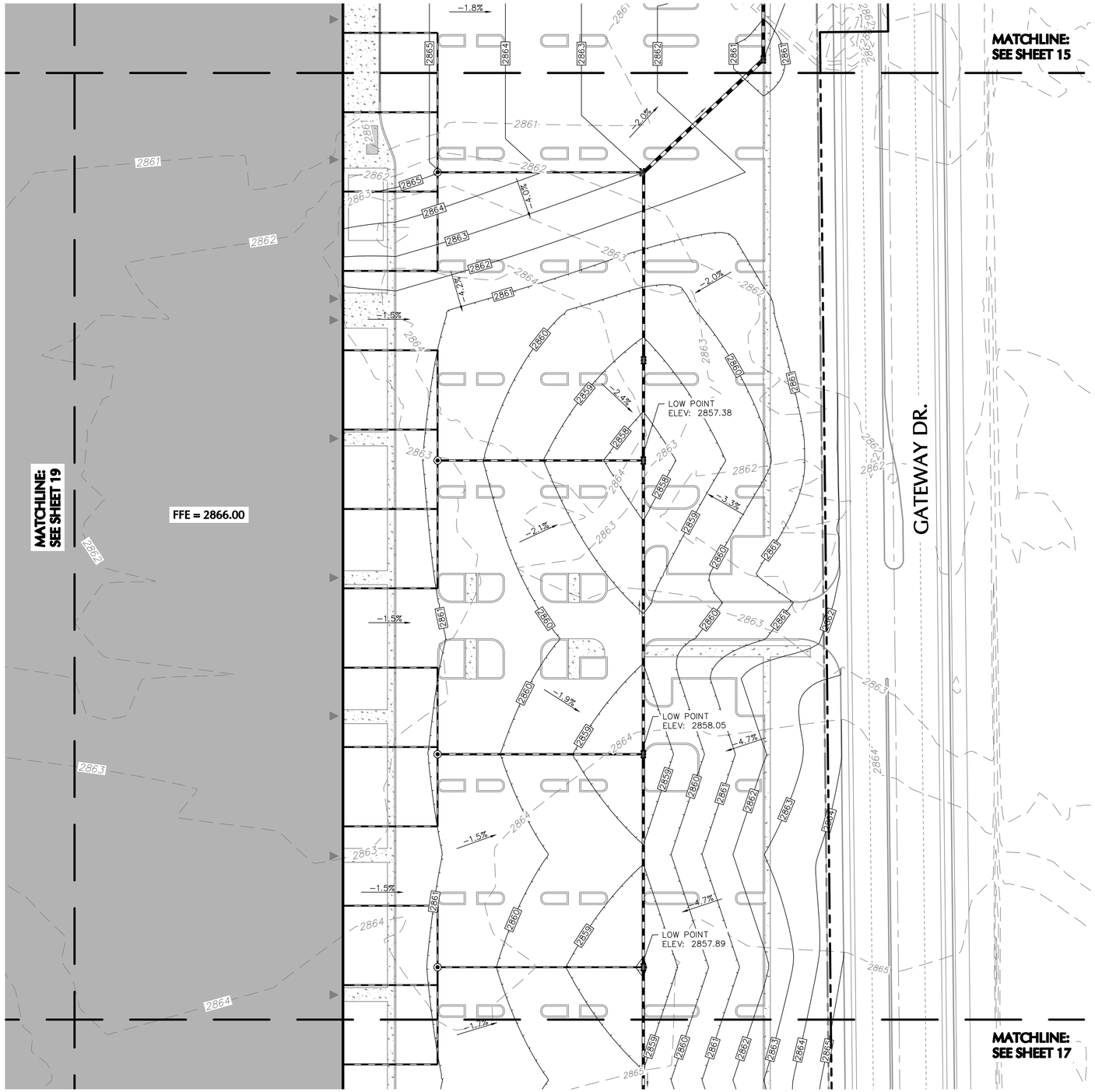
SHEET NO. 15 OF 36

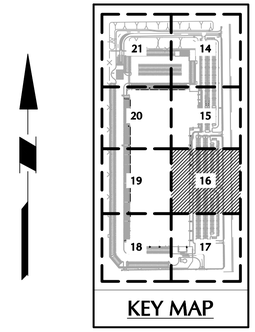
DRAWING NO. CG102

PROJECT NO. PSUB20-00022

APPROVED BY: _____ DATE: _____ R.C.E. EXP. _____
CITY ENGINEER

Date: 4/1/2021 Time: 15:41 User: amlu Style Table: Langan.stb Layout: 15 Document Code: 700089101-0301-CG101-0101





LEGEND

	EXISTING	PROPOSED
CONTOUR	6.32	6.34
SPOT ELEVATION		E32.64
BOTTOM OF CURB ELEVATION		BC6.32.73
STORM PIPE		

40 0 10 25 40
SCALE 1 INCH = 40 FEET

NOT FOR CONSTRUCTION

Signature Date

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NO.	REVISIONS	BY	DATE

CIVIL IMPROVEMENTS PLANS
PROJECT LOKI
PARTIAL CONCEPTUAL GRADING & DRAINAGE PLAN

FIELD BOOK NO. (S)

BENCH MARK:
CITY OF VICTORVILLE BENCHMARK Y-747
ELEVATION = 2905.31' (NAD 29)
8"x8" CONCRETE MONUMENT W/4" IRON CAP
STAMPED "USC&GS BM Y-747, 1945" @ 41' S/O
AIREXPRESSWAY AND 93' W/O NEVADA AVE EXTENSION

DESIGN BY: AL
DRAWN BY: JMA
CHECKED BY: MRG
DATE: 04/02/2021

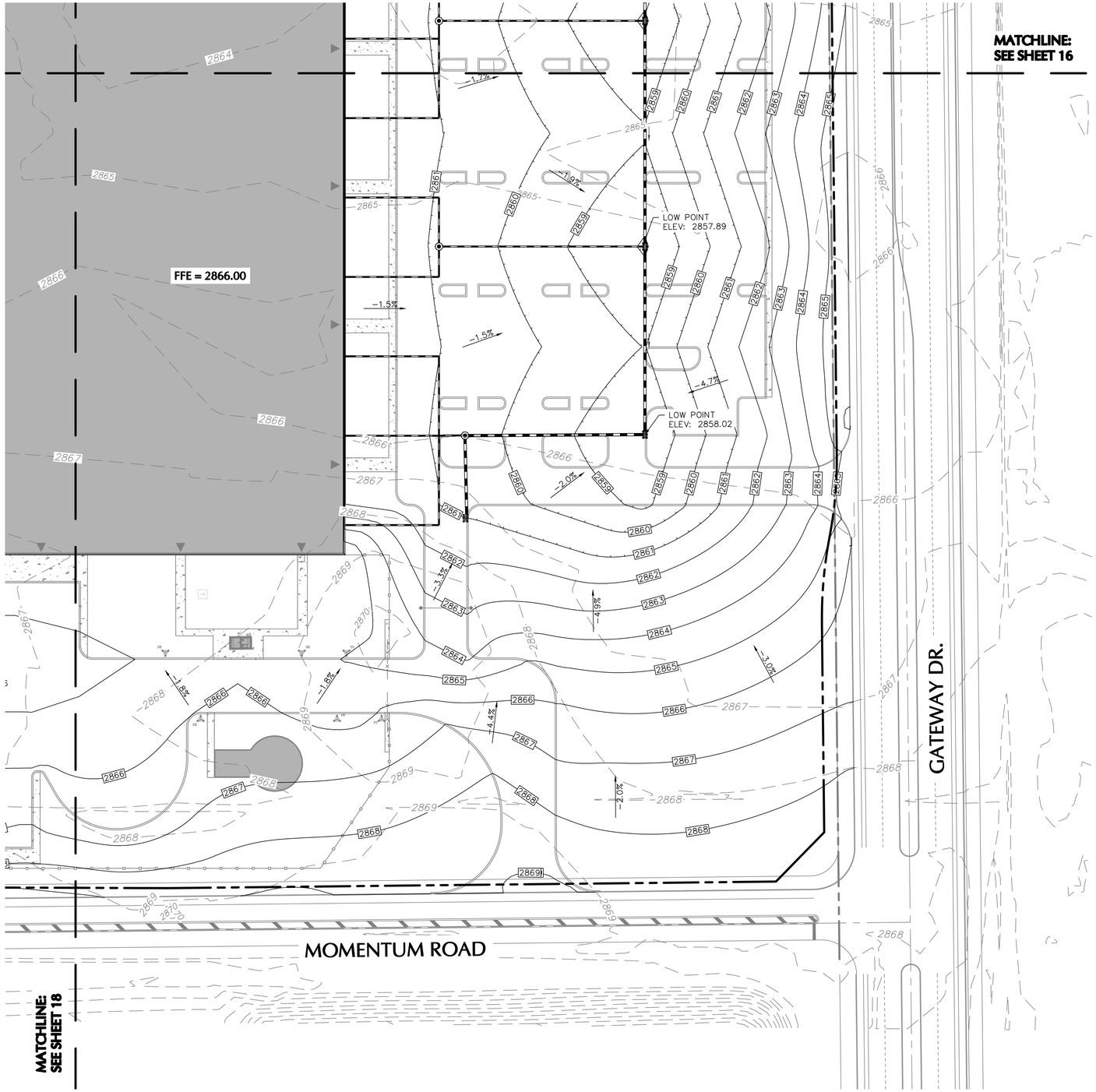
SHEET NO. 16 OF 36

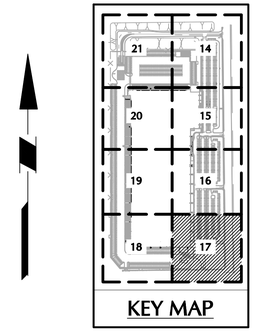
DRAWING NO. CG103

PROJECT NO. PSUB20-00022

APPROVED BY: _____ DATE: _____ R.C.E. EXP. _____
CITY ENGINEER

Date: 4/1/2021 Time: 15:41 User: amlu Style Table: Langan.stb Layout: 16 Document Code: 700089101-0301-CG101-0101





KEY MAP

LEGEND

	EXISTING	PROPOSED
CONTOUR	6.32	6.34
SPOT ELEVATION		B32.64
BOTTOM OF CURB ELEVATION		BC632.73
STORM PIPE		

40 0 10 25 40
SCALE 1 INCH = 40 FEET

NOT FOR CONSTRUCTION

Signature Date

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NO.	REVISIONS	BY	DATE

CIVIL IMPROVEMENTS PLANS
PROJECT LOKI
PARTIAL CONCEPTUAL GRADING & DRAINAGE PLAN

FIELD BOOK NO. (S)

BENCH MARK:
CITY OF VICTORVILLE BENCHMARK Y-747
ELEVATION = 2905.31' (NAVD 29)
8"x8" CONCRETE MONUMENT W/4" IRON CAP
STAMPED "USC&GS BM Y-747, 1945" @ 41' S/O
AIRE/PRESSWAY AND 53' W/O NEVADA AVE EXTENSION

DESIGN BY: AL
DRAWN BY: JMA
CHECKED BY: MRG
DATE: 04/02/2021

SHEET NO. 17 OF 36

DRAWING NO. CG104

PROJECT NO. PSUB20-00022

APPROVED BY: CITY ENGINEER _____ DATE: _____ R.C.E. EXP. _____

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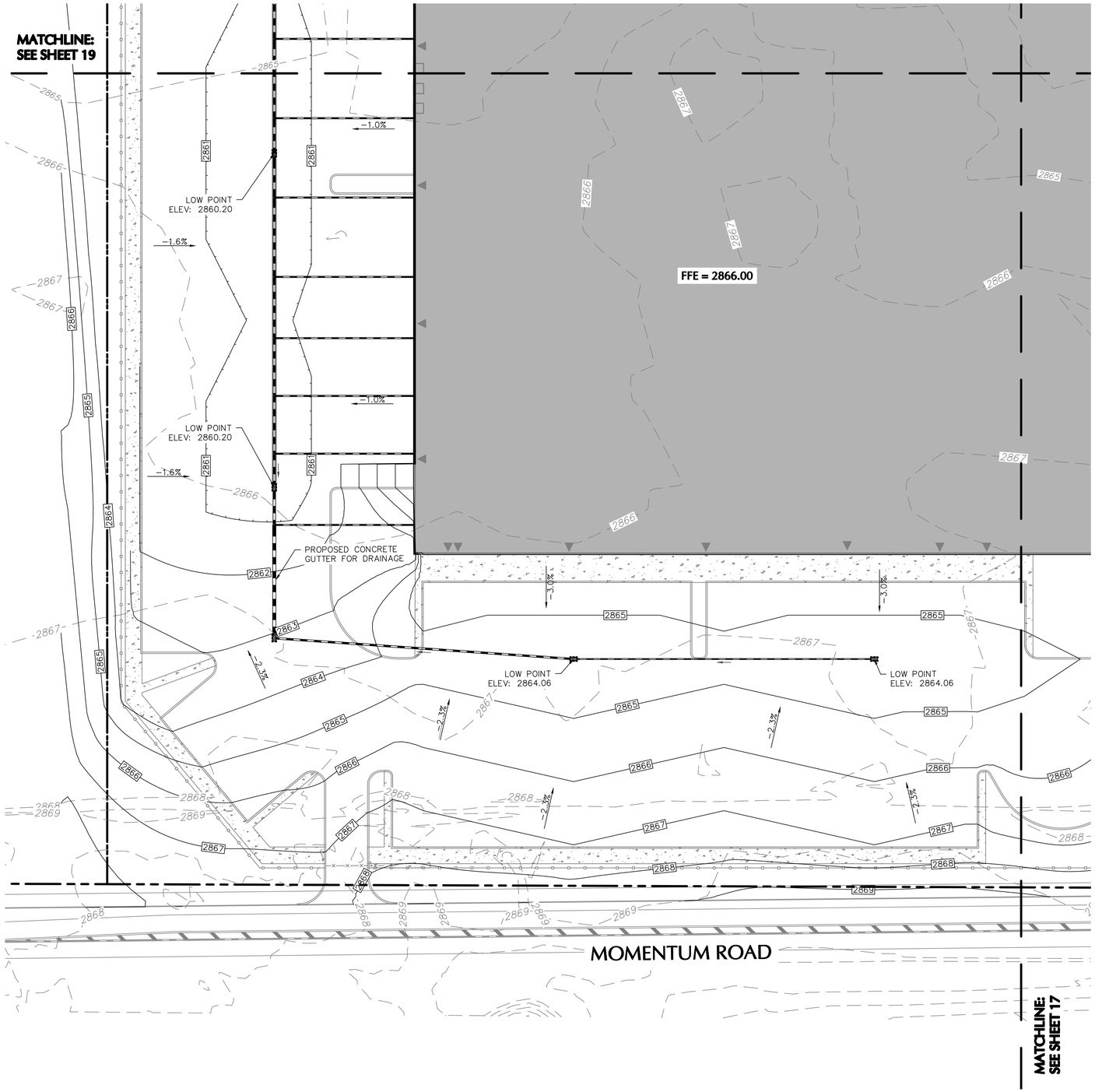

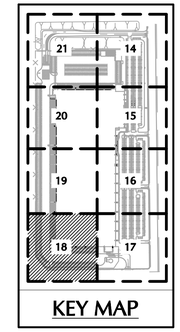

KEY MAP

LEGEND

	EXISTING	PROPOSED
CONTOUR	632	634
SPOT ELEVATION		E32.64
BOTTOM OF CURB ELEVATION		BC632.73
STORM PIPE		

40 0 10 25 40
SCALE 1 INCH = 40 FEET

NOT FOR CONSTRUCTION

Signature Date

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NO.	REVISIONS	BY	DATE

FIELD BOOK NO. (S)

BENCH MARK:
CITY OF VICTORVILLE BENCHMARK Y-747
ELEVATION = 2905.31' (NVGD 29)
6"x6" CONCRETE MONUMENT W/4" BRN CAP
STAMPED "USC&GS BM Y-747, 1945" @ 41' S/O
AIREXPRESSWAY AND 93' W/O NEVADA AVE EXTENSION

APPROVED BY:
CITY ENGINEER

DATE: R.C.E. EXP.

CIVIL IMPROVEMENTS PLANS
PROJECT LOKI
PARTIAL CONCEPTUAL GRADING & DRAINAGE PLAN

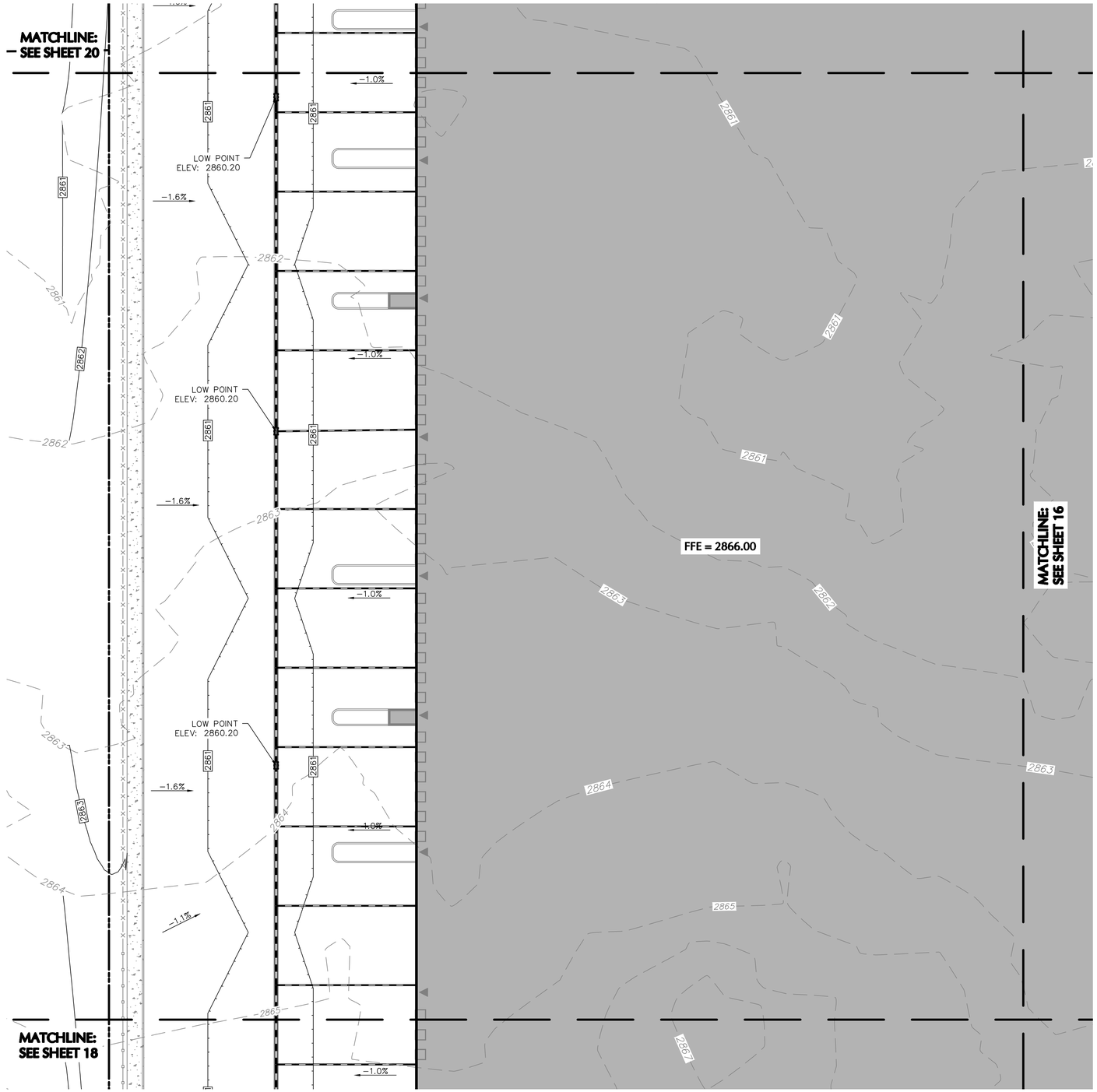
DESIGN BY: AL
DRAWN BY: JMA
CHECKED BY: MRG
DATE: 04/02/2021

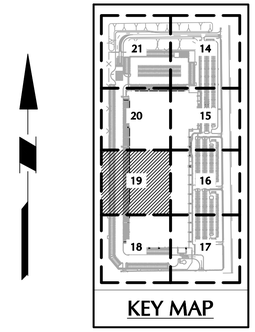
SHEET NO. 18 OF 36

DRAWING NO. CG105

PROJECT NO. PSUB20-00022

Date: 4/1/2021 Time: 15:41 User: amlu Style Table: Langan.stb Layout: 18 Document Code: 700089101-0301-CG101-0101





KEY MAP

LEGEND

	EXISTING	PROPOSED
CONTOUR	6.32	6.34
SPOT ELEVATION		E32.64
BOTTOM OF CURB ELEVATION		BC6.32.73
STORM PIPE		

40 0 10 25 40
SCALE 1 INCH = 40 FEET

NOT FOR CONSTRUCTION

Signature Date

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NO.	REVISIONS	BY	DATE.

CIVIL IMPROVEMENTS PLANS
PROJECT LOKI
PARTIAL CONCEPTUAL GRADING & DRAINAGE PLAN

FIELD BOOK NO. (S)

BENCH MARK:
CITY OF VICTORVILLE BENCHMARK Y-747
ELEVATION = 2905.31' (NAVD 29)
3"x8" CONCRETE MONUMENT W/4" IRON CAP
STAMPED "USC&GS BM Y-747, 1945" @ 41' S/O
AIREXPRESSWAY AND 93' W/O NEVADA AVE EXTENSION

DESIGN BY: AL
DRAWN BY: JMA
CHECKED BY: MRG
DATE: 04/02/2021

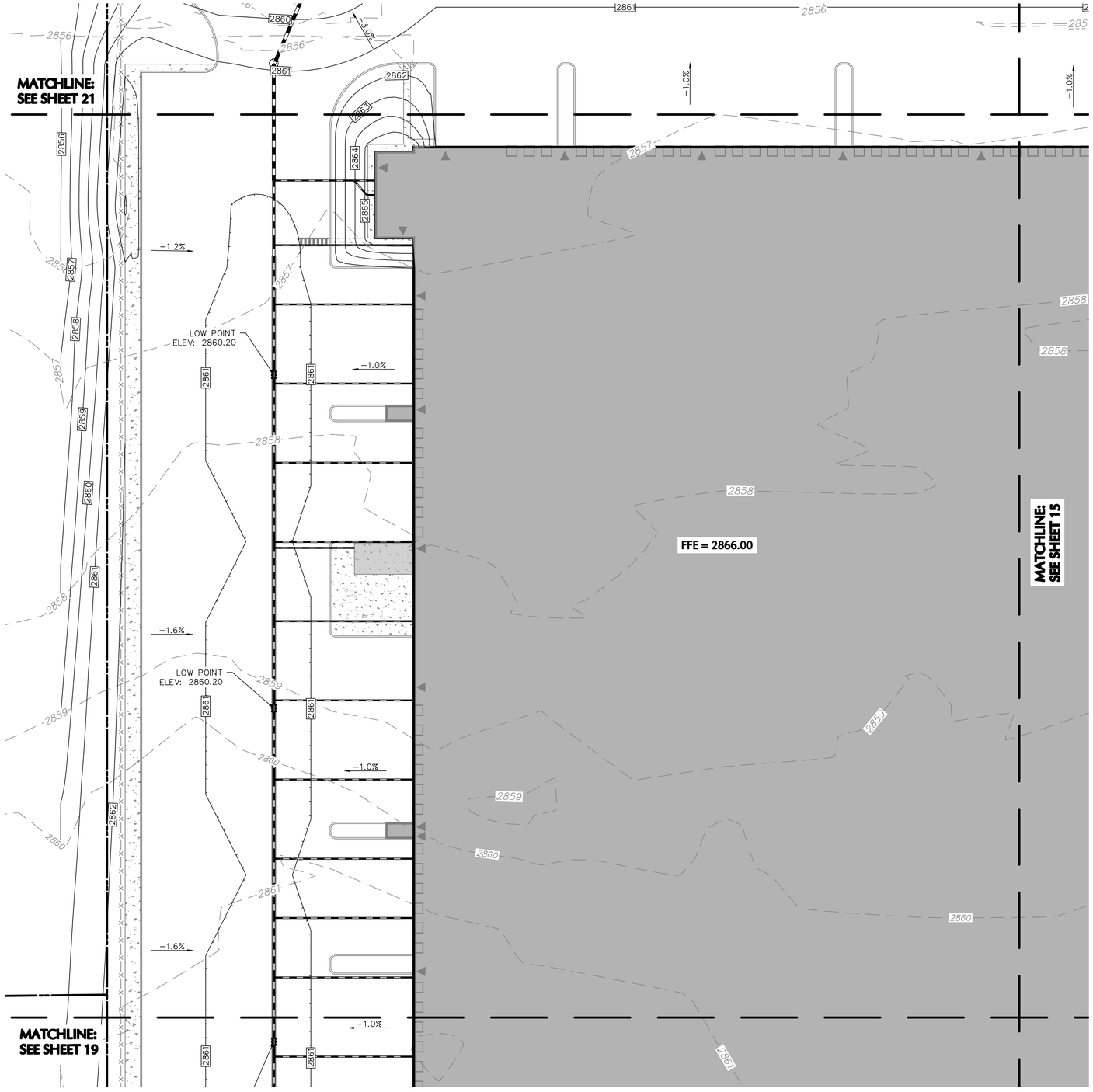
SHEET NO. 19 OF 36

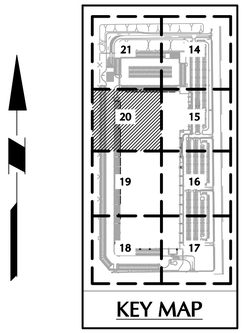
DRAWING NO. CG106

PROJECT NO. PSUB20–00022

APPROVED BY: _____ DATE: _____ R.C.E. EXP. _____
CITY ENGINEER

Date: 4/1/2021 Time: 15:41 User: amlu Style Table: Langan.stb Layout: 19 Document Code: 700089101-0301-CG101-0101





KEY MAP

LEGEND

	EXISTING	PROPOSED
CONTOUR	6.32	6.34
SPOT ELEVATION		6.32.64
BOTTOM OF CURB ELEVATION		BC6.32.73
STORM PIPE		

40 0 10 25 40
SCALE 1 INCH = 40 FEET

NOT FOR CONSTRUCTION

Signature Date

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ENGINEERING DEPARTMENT
14343 CIVIC DRIVE, VICTORVILLE, CA. 92392 (760) 955-5158

NO.	REVISIONS	BY	DATE

CIVIL IMPROVEMENTS PLANS
PROJECT LOKI
PARTIAL CONCEPTUAL GRADING & DRAINAGE PLAN

FIELD BOOK NO. (S)

BENCH MARK:
CITY OF VICTORVILLE BENCHMARK Y-747
ELEVATION = 2905.31' (NVGD 29)
3"x6" CONCRETE MONUMENT W/4" IRON CAP
STAMPED "USC&GS BM Y-747, 1945" @ 41' S/O
AIREXPRESSWAY AND 93' W/O NEVADA AVE EXTENSION

DESIGN BY: AL
DRAWN BY: JMA
CHECKED BY: MRG
DATE: 04/02/2021

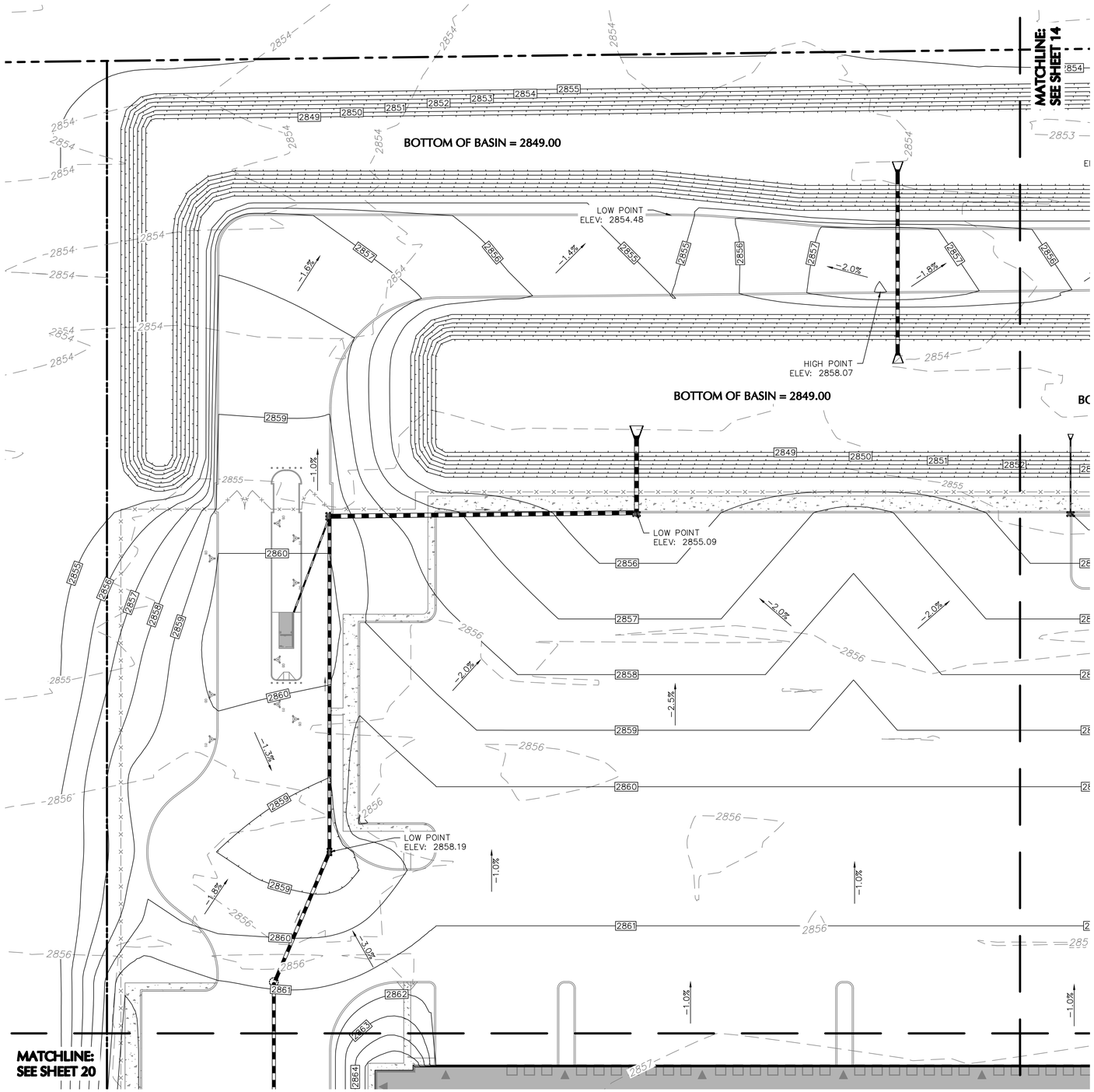
SHEET NO. 20 OF 36

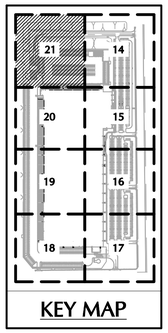
DRAWING NO. CG107

PROJECT NO. PSUB20-00022

APPROVED BY: _____ DATE: _____ R.C.E. EXP. _____
CITY ENGINEER

Date: 4/1/2021 Time: 15:41 User: amlu Style Table: Langan.stb Layout: 20 Document Code: 700089101-0301-CG101-0101





KEY MAP

LEGEND

	EXISTING	PROPOSED
CONTOUR	632	634
SPOT ELEVATION		632.64
BOTTOM OF CURB ELEVATION		BC632.73
STORM PIPE		

40 0 10 25 40
SCALE 1 INCH = 40 FEET

NOT FOR CONSTRUCTION

Signature Date

MICHAEL GOLIAS
PROFESSIONAL ENGINEER CA LIC. No.: C91029

LANGAN
Langan Engineering and Environmental Services, Inc.
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Irvine, CA 92612
T: 949.561.9225 F: 949.561.9201 www.langan.com

CITY OF VICTORVILLE
ENGINEERING DEPARTMENT
14343 CIVIC DRIVE, VICTORVILLE, CA. 92392 (760) 955-5158

NO.	REVISIONS	BY	DATE

FIELD BOOK NO. (S)

BENCH MARK:
CITY OF VICTORVILLE BENCHMARK Y-747
ELEVATION = 2905.31' (NAD 29)
8"x8" CONCRETE MONUMENT W/4" IRON CAP
STAMPED "USC&GS BM Y-747, 1945" @ 41' S/O
AIREXPRESSWAY AND 93' W/O NEVADA AVE EXTENSION

CIVIL IMPROVEMENTS PLANS
PROJECT LOKI
PARTIAL CONCEPTUAL GRADING & DRAINAGE PLAN

DESIGN BY: AL
DRAWN BY: JMA
CHECKED BY: MRG
DATE: 04/02/2021

SHEET NO. 21 OF 36

DRAWING NO. CG108

PROJECT NO. PSUB20-00022

APPROVED BY: _____ DATE: _____ R.C.E. EXP. ____
CITY ENGINEER

Date: 4/1/2021 Time: 15:41 User: amlu Style Table: Langan.stb Layout: 21 Document Code: 700089101-0301-CG101-0101

APPENDIX D

NOAA Intensity Duration Frequency Table and Curves

NOAA Atlas 14, Volume 6, Version 2
Location name: Victorville, California, USA*
Latitude: 34.5879°, Longitude: -117.373°
Elevation: 2872.39 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	**0.086** (0.071-0.106)	**0.119** (0.098-0.146)	**0.165** (0.136-0.203)	**0.205** (0.167-0.254)	**0.261** (0.206-0.335)	**0.307** (0.237-0.402)	**0.356** (0.268-0.477)	**0.408** (0.299-0.562)	**0.482** (0.339-0.691)	**0.542** (0.368-0.804)
10-min	**0.124** (0.102-0.151)	**0.171** (0.141-0.210)	**0.237** (0.195-0.292)	**0.293** (0.239-0.364)	**0.374** (0.295-0.480)	**0.440** (0.340-0.576)	**0.510** (0.384-0.683)	**0.585** (0.429-0.805)	**0.691** (0.486-0.991)	**0.776** (0.528-1.15)
15-min	**0.149** (0.123-0.183)	**0.207** (0.170-0.254)	**0.287** (0.236-0.353)	**0.355** (0.289-0.440)	**0.453** (0.357-0.580)	**0.532** (0.411-0.696)	**0.617** (0.465-0.826)	**0.707** (0.519-0.974)	**0.835** (0.588-1.20)	**0.939** (0.639-1.39)
30-min	**0.200** (0.165-0.245)	**0.277** (0.228-0.340)	**0.384** (0.316-0.473)	**0.475** (0.387-0.589)	**0.607** (0.478-0.777)	**0.713** (0.551-0.933)	**0.826** (0.623-1.11)	**0.947** (0.695-1.31)	**1.12** (0.788-1.61)	**1.26** (0.856-1.87)
60-min	**0.236** (0.194-0.288)	**0.326** (0.269-0.400)	**0.452** (0.371-0.556)	**0.559** (0.456-0.693)	**0.714** (0.563-0.914)	**0.839** (0.648-1.10)	**0.972** (0.733-1.30)	**1.11** (0.817-1.53)	**1.32** (0.926-1.89)	**1.48** (1.01-2.20)
2-hr	**0.326** (0.269-0.399)	**0.438** (0.361-0.537)	**0.594** (0.488-0.730)	**0.727** (0.592-0.901)	**0.918** (0.724-1.18)	**1.07** (0.828-1.40)	**1.23** (0.930-1.65)	**1.41** (1.03-1.94)	**1.65** (1.16-2.37)	**1.84** (1.25-2.74)
3-hr	**0.383** (0.316-0.469)	**0.510** (0.420-0.625)	**0.686** (0.564-0.843)	**0.836** (0.681-1.04)	**1.05** (0.829-1.35)	**1.22** (0.946-1.60)	**1.41** (1.06-1.88)	**1.60** (1.17-2.20)	**1.87** (1.32-2.68)	**2.08** (1.42-3.09)
6-hr	**0.504** (0.415-0.617)	**0.667** (0.550-0.818)	**0.892** (0.732-1.10)	**1.08** (0.882-1.34)	**1.35** (1.07-1.73)	**1.57** (1.21-2.05)	**1.80** (1.35-2.41)	**2.04** (1.49-2.80)	**2.37** (1.67-3.40)	**2.63** (1.79-3.91)
12-hr	**0.622** (0.513-0.762)	**0.840** (0.692-1.03)	**1.14** (0.935-1.40)	**1.39** (1.13-1.72)	**1.73** (1.37-2.22)	**2.01** (1.55-2.63)	**2.30** (1.73-3.08)	**2.59** (1.90-3.57)	**3.01** (2.12-4.31)	**3.33** (2.26-4.94)
24-hr	**0.771** (0.684-0.887)	**1.07** (0.949-1.23)	**1.47** (1.30-1.70)	**1.81** (1.58-2.10)	**2.27** (1.92-2.73)	**2.63** (2.18-3.23)	**3.00** (2.43-3.78)	**3.38** (2.67-4.38)	**3.91** (2.96-5.28)	**4.32** (3.16-6.04)
2-day	**0.877** (0.777-1.01)	**1.24** (1.10-1.43)	**1.73** (1.52-1.99)	**2.13** (1.86-2.48)	**2.68** (2.27-3.22)	**3.11** (2.58-3.82)	**3.55** (2.87-4.47)	**4.00** (3.15-5.19)	**4.62** (3.50-6.24)	**5.10** (3.73-7.13)
3-day	**0.953** (0.845-1.10)	**1.35** (1.20-1.56)	**1.90** (1.68-2.20)	**2.35** (2.06-2.74)	**2.97** (2.51-3.57)	**3.44** (2.86-4.23)	**3.93** (3.18-4.95)	**4.44** (3.50-5.75)	**5.13** (3.88-6.93)	**5.67** (4.14-7.93)
4-day	**1.00** (0.891-1.16)	**1.43** (1.27-1.65)	**2.02** (1.79-2.34)	**2.50** (2.19-2.92)	**3.16** (2.68-3.80)	**3.67** (3.04-4.51)	**4.19** (3.39-5.27)	**4.72** (3.72-6.12)	**5.46** (4.13-7.37)	**6.02** (4.40-8.42)
7-day	**1.06** (0.935-1.21)	**1.51** (1.34-1.74)	**2.14** (1.89-2.47)	**2.65** (2.32-3.09)	**3.36** (2.85-4.04)	**3.90** (3.24-4.80)	**4.45** (3.60-5.60)	**5.00** (3.94-6.48)	**5.75** (4.35-7.77)	**6.31** (4.61-8.82)
10-day	**1.10** (0.974-1.26)	**1.58** (1.40-1.82)	**2.24** (1.98-2.59)	**2.79** (2.45-3.25)	**3.56** (3.01-4.28)	**4.14** (3.43-5.08)	**4.72** (3.83-5.95)	**5.32** (4.19-6.89)	**6.12** (4.63-8.27)	**6.72** (4.91-9.39)
20-day	**1.23** (1.09-1.42)	**1.81** (1.60-2.09)	**2.64** (2.33-3.04)	**3.33** (2.92-3.88)	**4.32** (3.66-5.20)	**5.09** (4.22-6.26)	**5.88** (4.76-7.41)	**6.69** (5.27-8.66)	**7.76** (5.86-10.5)	**8.56** (6.25-12.0)
30-day	**1.36** (1.21-1.57)	**2.03** (1.80-2.34)	**3.00** (2.65-3.47)	**3.84** (3.37-4.48)	**5.07** (4.29-6.10)	**6.03** (5.01-7.42)	**7.02** (5.69-8.85)	**8.04** (6.34-10.4)	**9.41** (7.11-12.7)	**10.4** (7.61-14.6)
45-day	**1.56** (1.39-1.80)	**2.36** (2.09-2.72)	**3.54** (3.13-4.09)	**4.59** (4.02-5.34)	**6.14** (5.21-7.40)	**7.42** (6.16-9.12)	**8.73** (7.07-11.0)	**10.1** (7.95-13.1)	**12.0** (9.04-16.1)	**13.4** (9.76-18.7)
60-day	**1.71** (1.52-1.97)	**2.59** (2.29-2.98)	**3.93** (3.47-4.54)	**5.14** (4.50-5.99)	**6.95** (5.89-8.37)	**8.46** (7.03-10.4)	**10.1** (8.16-12.7)	**11.7** (9.24-15.2)	**14.0** (10.6-19.0)	**15.8** (11.6-22.1)

[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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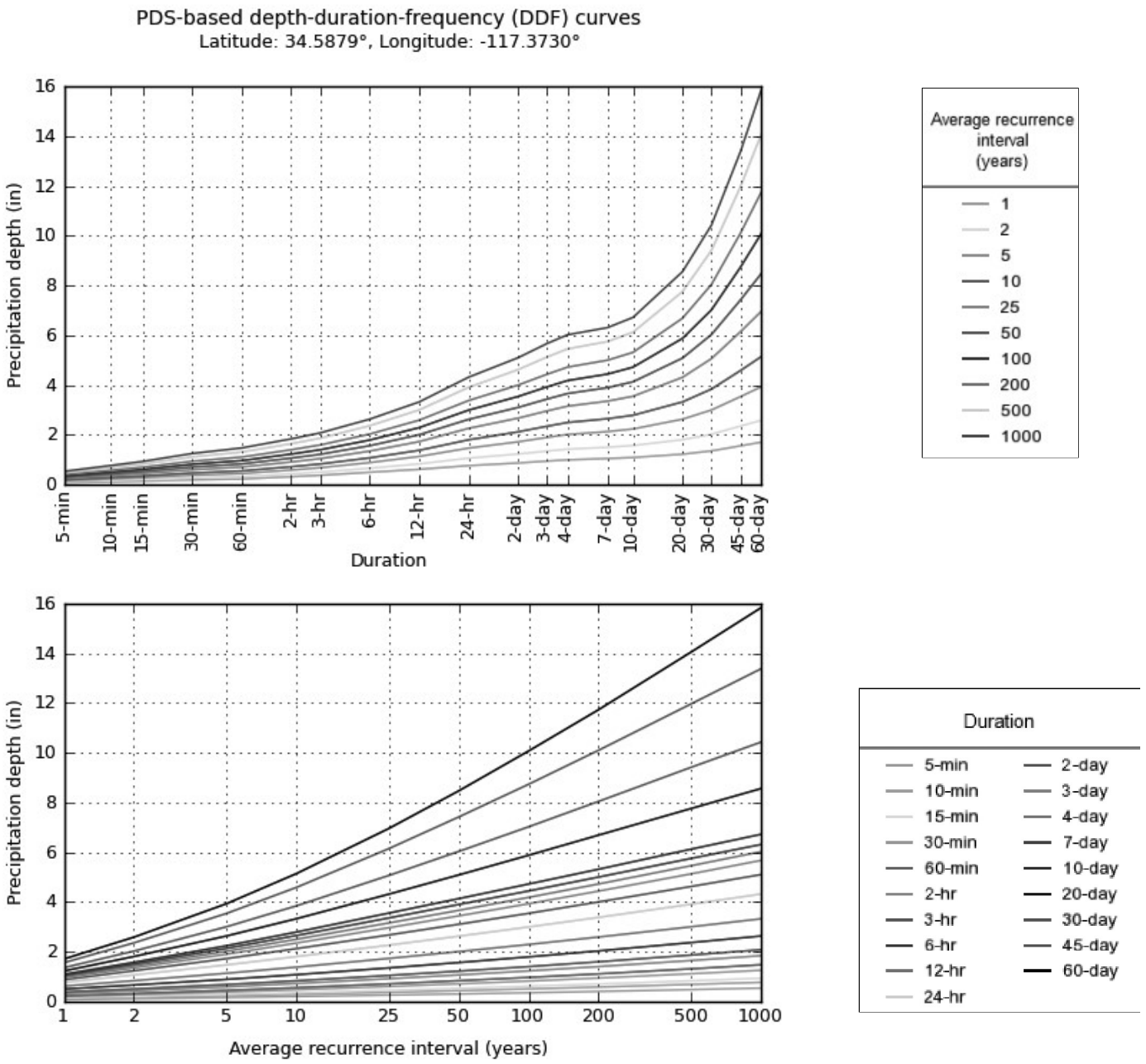
PF graphical



NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Wed Dec 26 17:14:27 2018

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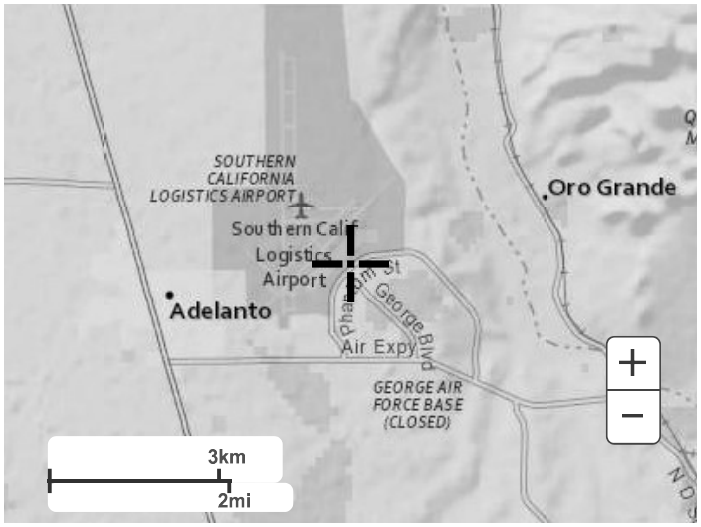
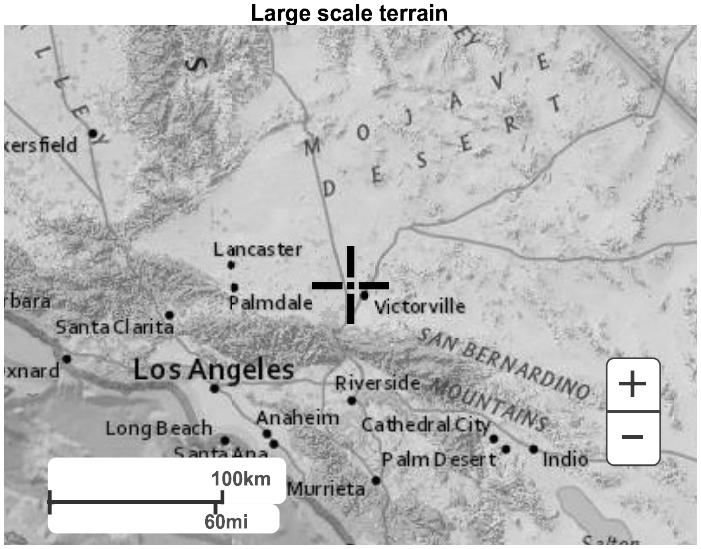
Maps & aerials

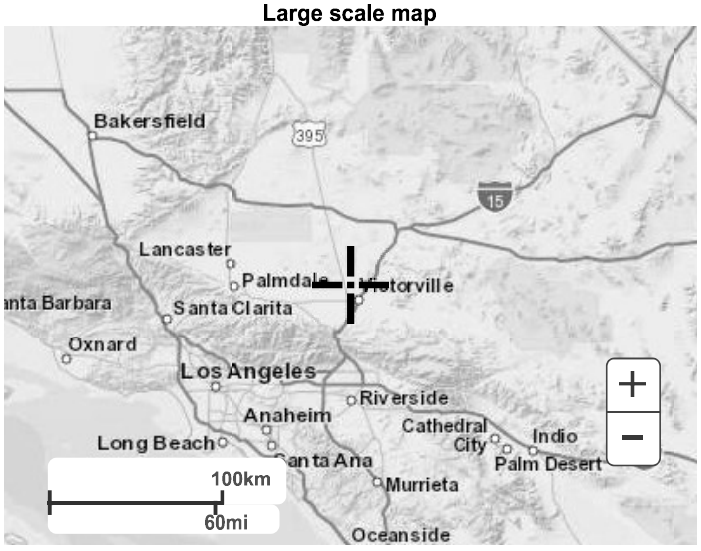
Small scale terrain



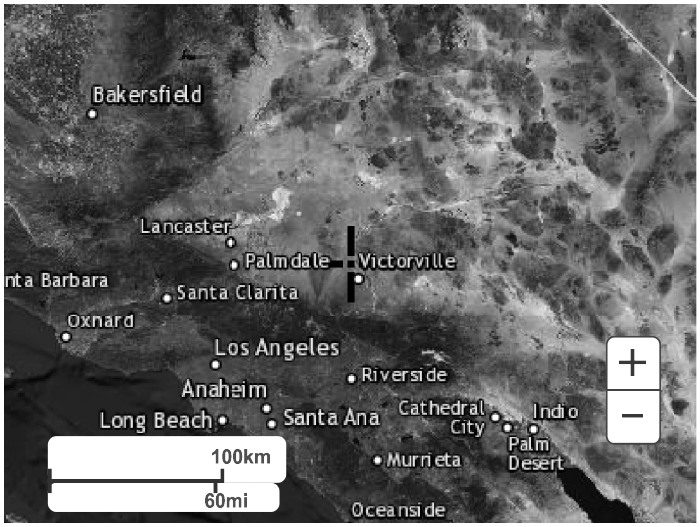
Large scale terrain



Large scale map



Large scale aerial



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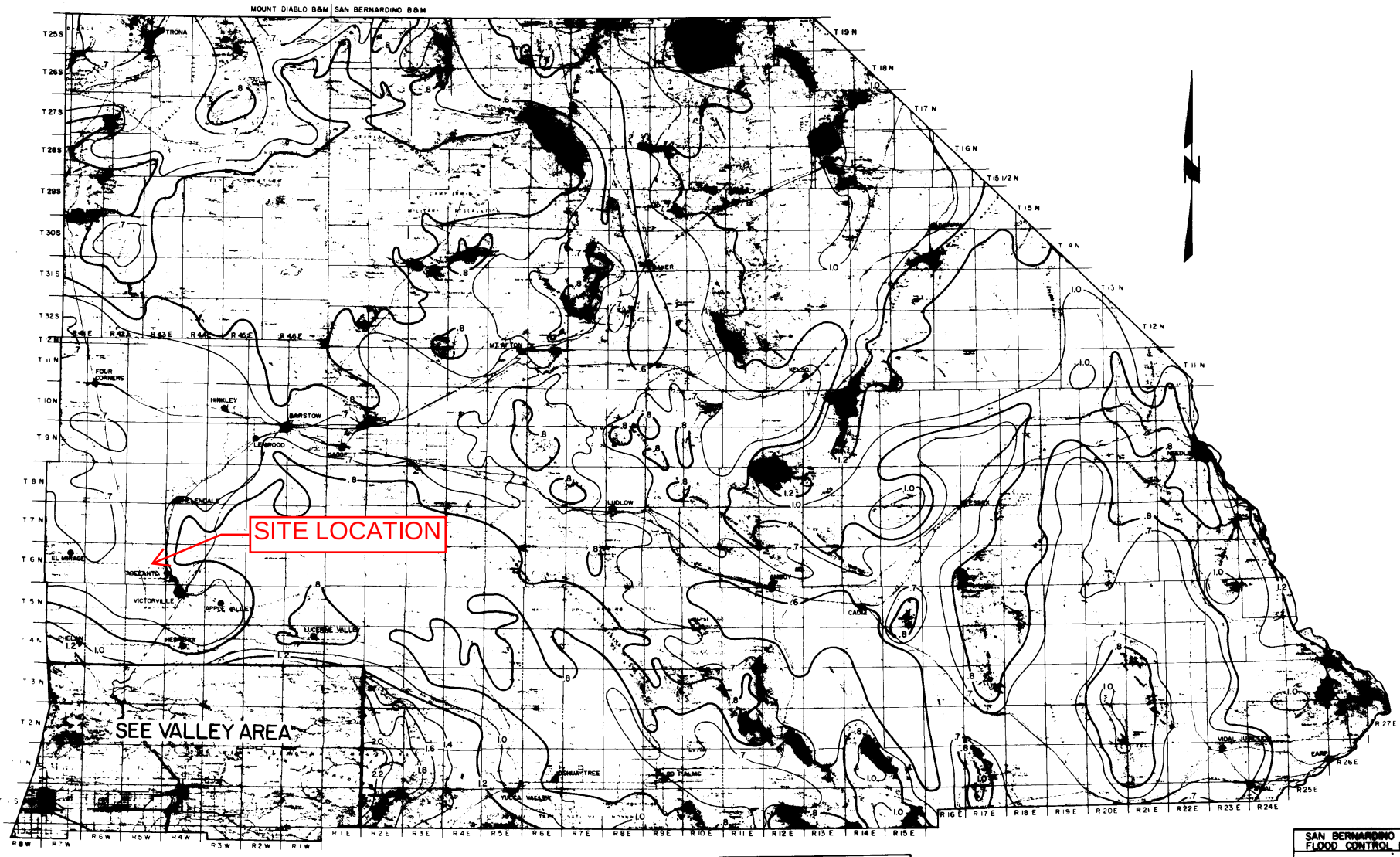
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer



SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

REDUCED DRAWING

0 1 2 3

3 INCHES ON ORIGINAL

LEGEND:

1.0 ISOLINES PRECIPITATION (INCHES)

SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT

DESERT AREA

ISOHYETALS

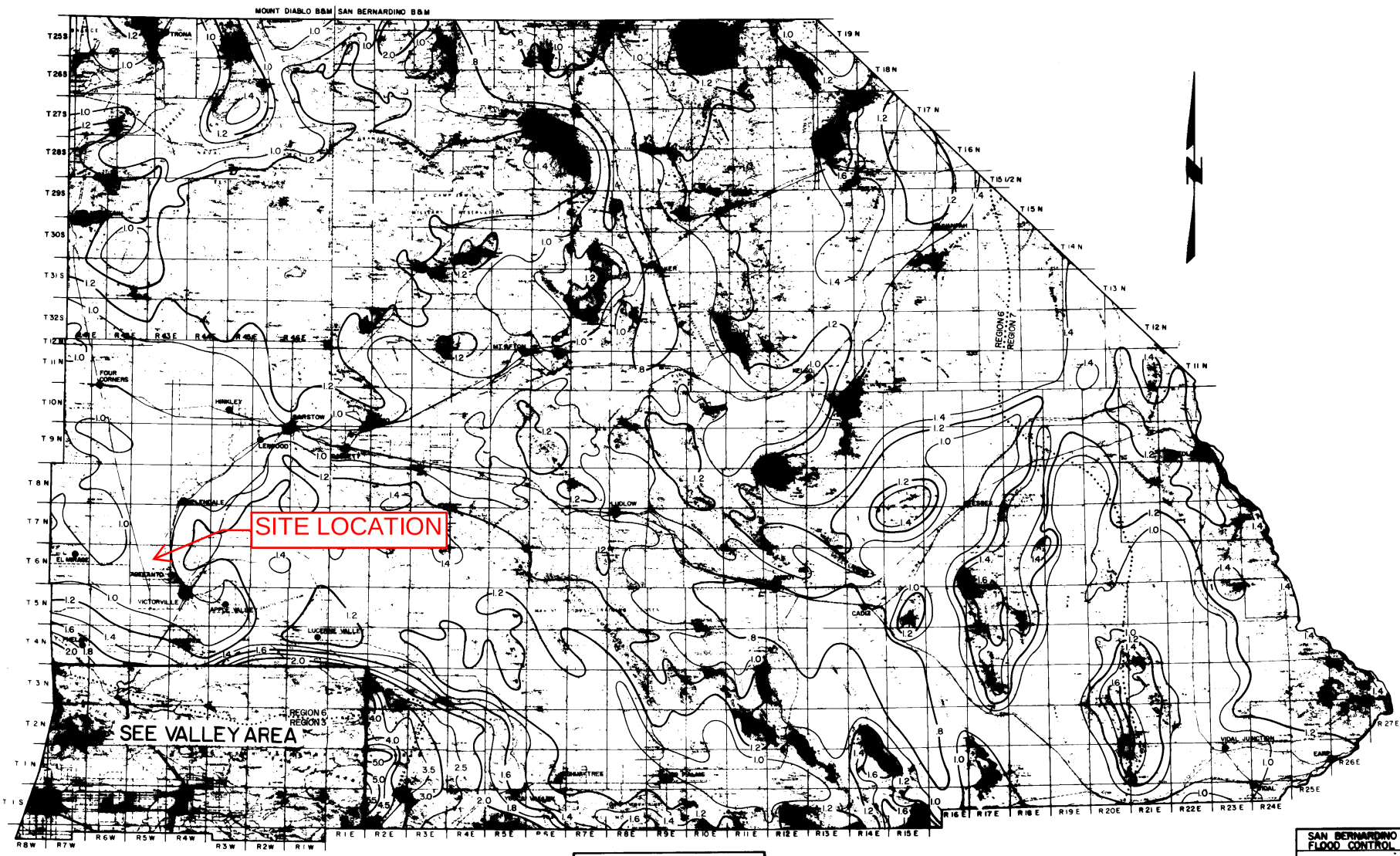
X_1 - 2 YEAR 6 HOUR

BASED ON U.S.D.C., NOAA ATLAS 2, 1973

APPROVED BY _____ FLOOD CONTROL ENGINEER

DATE	SCALE	FILE NO.	DRWG. NO.
1982	1" = 6 MI.	WRD-1	7 of 12

FIGURE B-7



SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT

DESERT AREA

ISOHYETALS

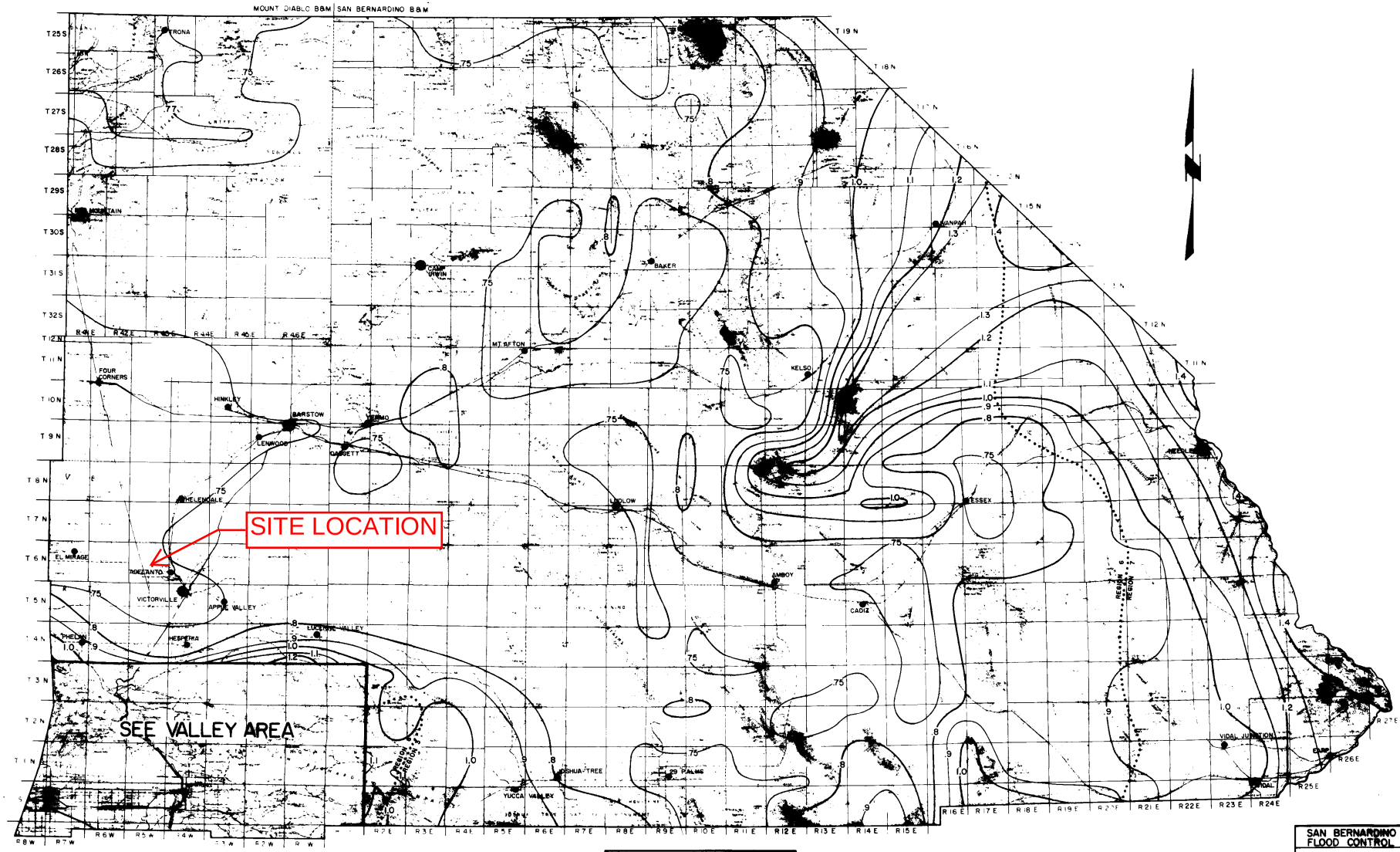
X_2 - 2 YEAR 24 HOUR

BASED ON U.S.D.C., NOAA ATLAS 2, 1973

APPROVED BY _____ FLOOD CONTROL ENGINEER

DATE	SCALE	FILE NO.	DRWG. NO.
1982	1" = 6MI.	WRD-1	8 of 12

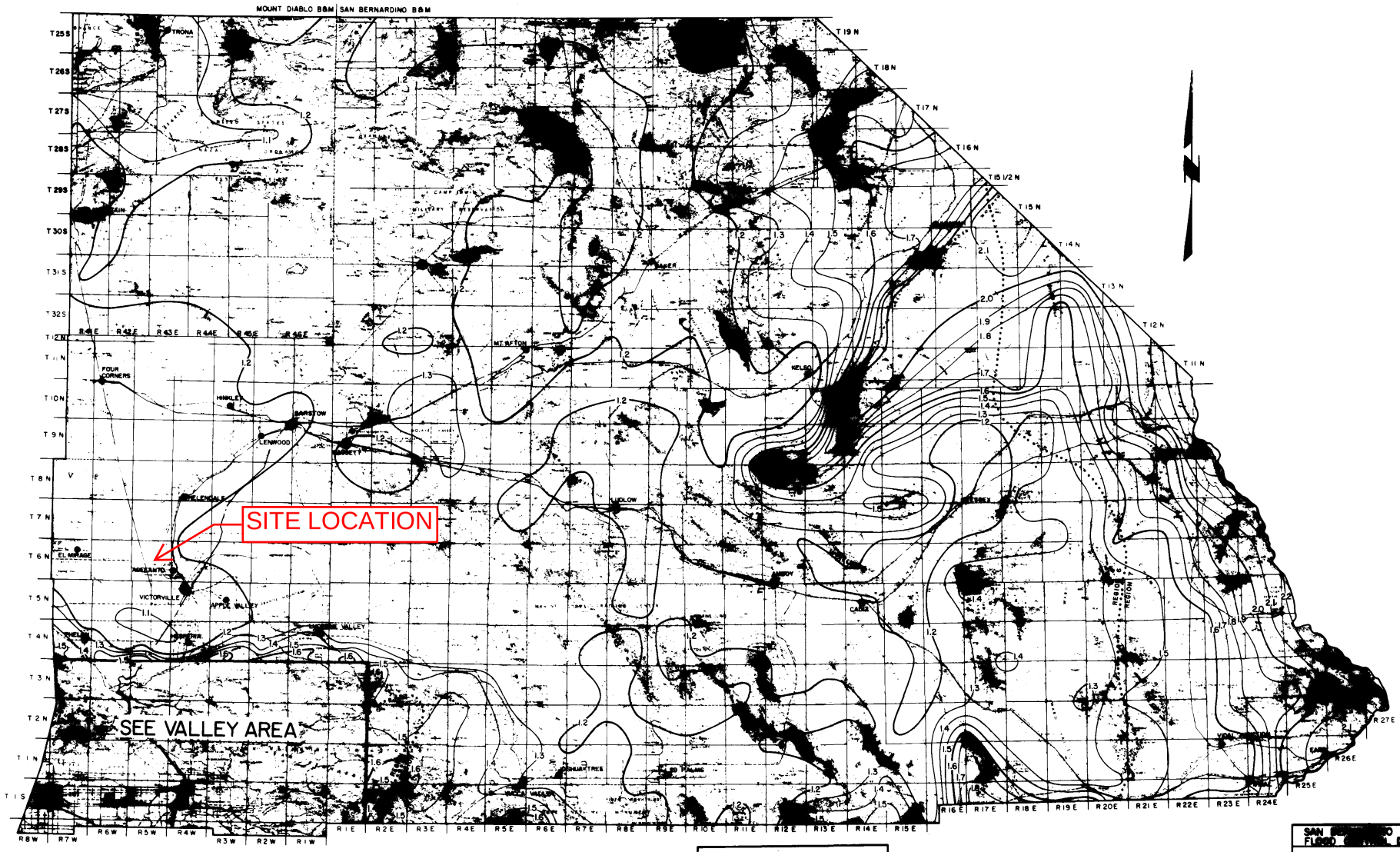
FIGURE B-8



SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

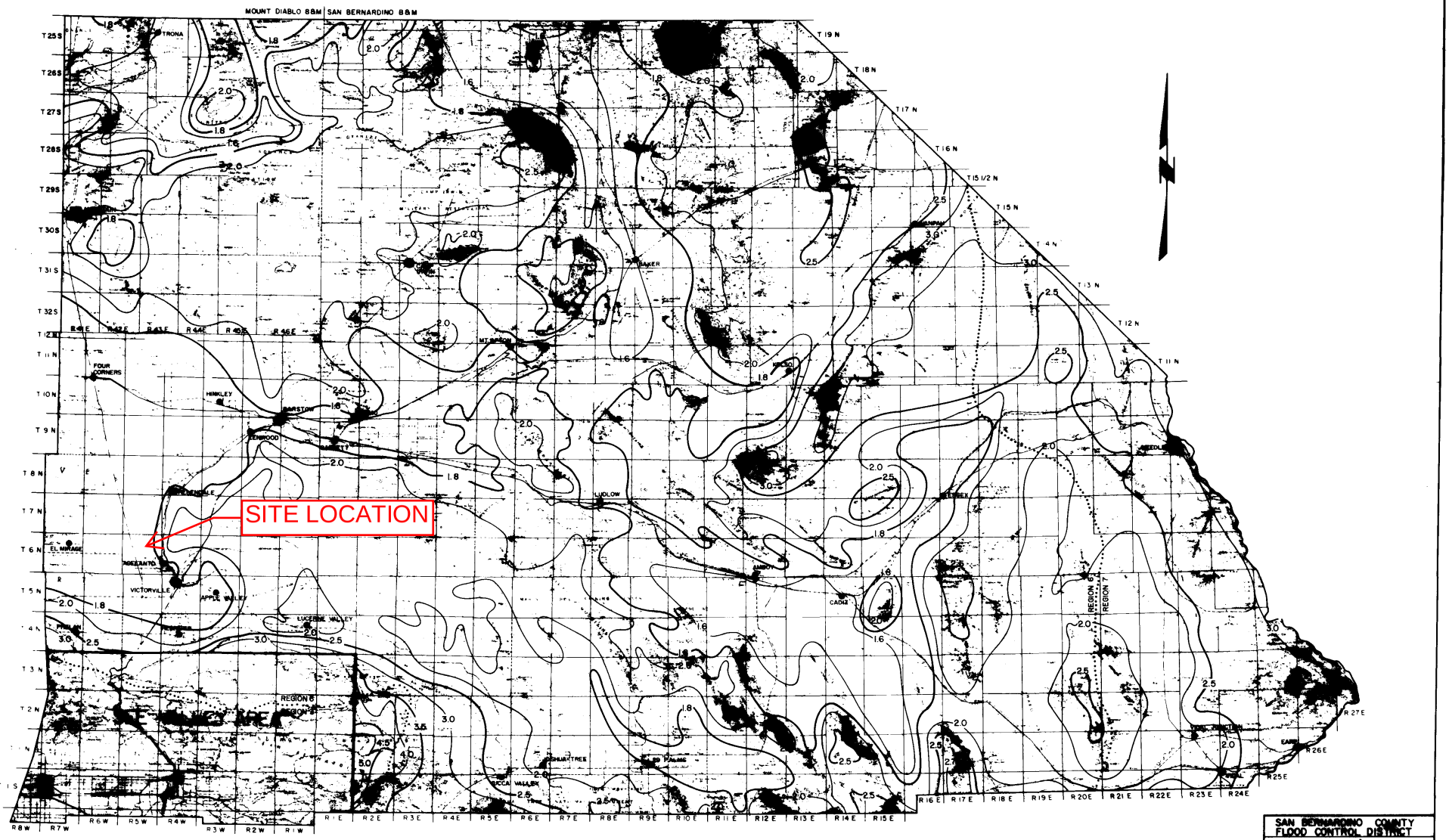
FIGURE B-9



SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

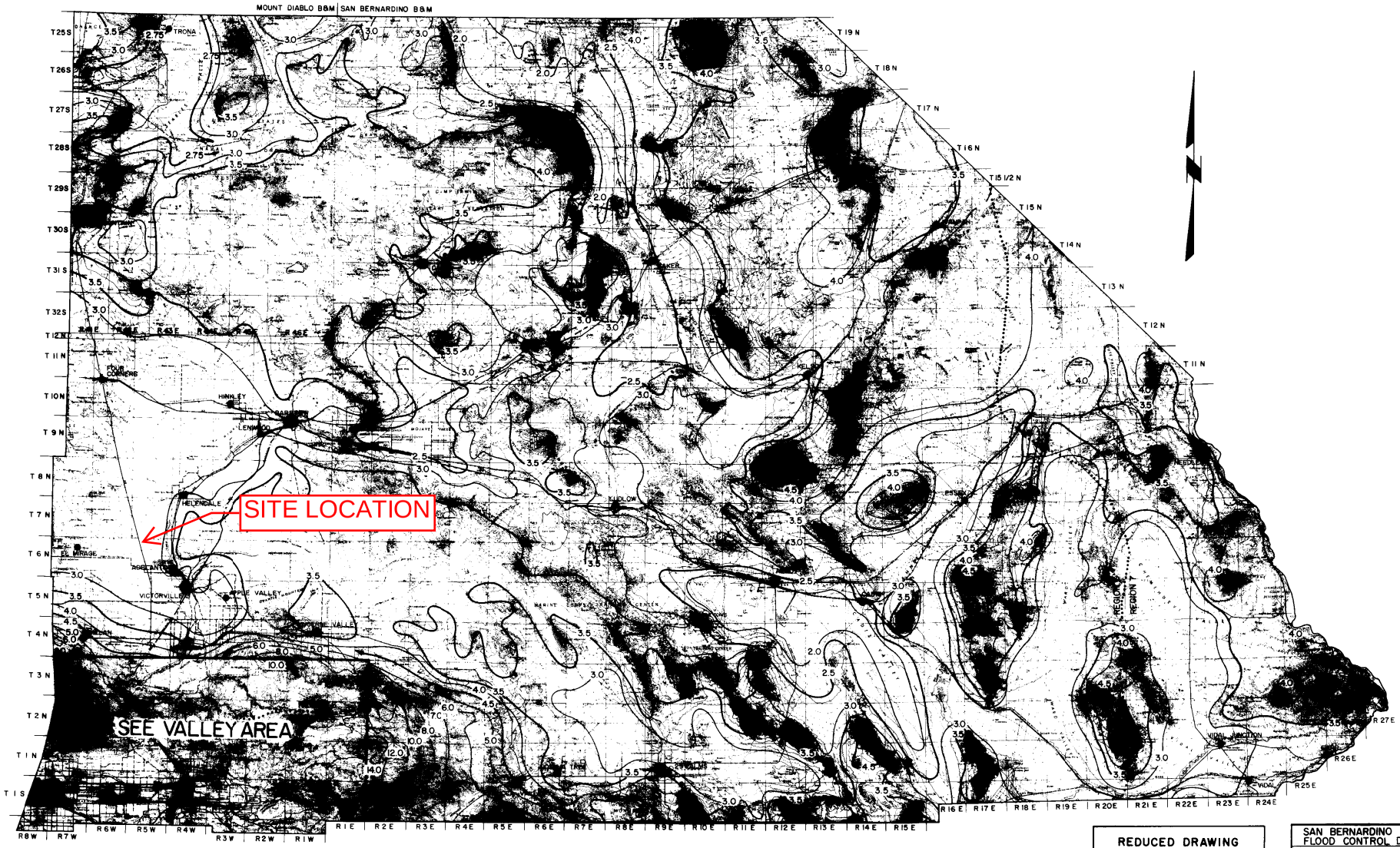
FIGURE B-10



SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

FIGURE B-11



SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

FIGURE B-12

APPENDIX E

Pre-Development Rational Analysis

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 03/31/21

PROJECT LOKI
EXISTING CONDITION 2-YR STORM
DRAINAGE AREA A

Program License Serial Number 6353

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

Rational hydrology study storm event year is 2.0
Computed rainfall intensity:
Storm year = 2.00 1 hour rainfall = 0.326 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.265(In/Hr)
Initial subarea data:
Initial area flow distance = 739.000(Ft.)
Top (of initial area) elevation = 2866.000(Ft.)
Bottom (of initial area) elevation = 2861.000(Ft.)
Difference in elevation = 5.000(Ft.)
Slope = 0.00677 s(%)= 0.68
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 20.024 min.
Rainfall intensity = 0.703(In/Hr) for a 2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.561

Subarea runoff = 2.273(CFS)
Total initial stream area = 5.770(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.265(In/Hr)
End of computations, Total Study Area = 5.77 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 86.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 03/31/21

PROJECT LOKI
EXISTING CONDITION 2-YR STORM
DRAINAGE AREA B

Program License Serial Number 6353

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

Rational hydrology study storm event year is 2.0
Computed rainfall intensity:
Storm year = 2.00 1 hour rainfall = 0.326 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 3.000 to Point/Station 4.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.265(In/Hr)
Initial subarea data:
Initial area flow distance = 999.000(Ft.)
Top (of initial area) elevation = 2870.000(Ft.)
Bottom (of initial area) elevation = 2861.000(Ft.)
Difference in elevation = 9.000(Ft.)
Slope = 0.00901 s(%)= 0.90
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 21.333 min.
Rainfall intensity = 0.672(In/Hr) for a 2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.545

```
Subarea runoff =      3.662(CFS)
Total initial stream area =        9.990(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.265(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.000 to Point/Station        4.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      9.990(Ac.)
Runoff from this stream =      3.662(CFS)
Time of concentration =   21.33 min.
Rainfall intensity =     0.672(In/Hr)
Area averaged loss rate (Fm) =    0.2651(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.000 to Point/Station        3.100
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Initial subarea data:
Initial area flow distance =   911.000(Ft.)
Top (of initial area) elevation =  2870.000(Ft.)
Bottom (of initial area) elevation =  2864.000(Ft.)
Difference in elevation =     6.000(Ft.)
Slope =    0.00659  s(%)=       0.66
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   21.890 min.
Rainfall intensity =      0.660(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.539
Subarea runoff =      2.433(CFS)
Total initial stream area =        6.840(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.265(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.100 to Point/Station        4.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
```

```
Upstream point elevation =  2864.000(Ft.)
Downstream point elevation =  2861.000(Ft.)
Channel length thru subarea  =   563.000(Ft.)
Channel base width      =  500.000(Ft.)
Slope or 'Z' of left channel bank = 100.000
Slope or 'Z' of right channel bank = 100.000
Estimated mean flow rate at midpoint of channel =      2.477(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    5.000(Ft.)
Flow(q) thru subarea =      2.477(CFS)
Depth of flow =   0.013(Ft.), Average velocity =   0.391(Ft/s)
Channel flow top width =  502.525(Ft.)
Flow Velocity =    0.39(Ft/s)
Travel time  =   23.97 min.
Time of concentration =   45.86 min.
Critical depth =      0.009(Ft.)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
The area added to the existing stream causes a
a lower flow rate of Q =      1.251(CFS)
therefore the upstream flow rate of Q =      2.433(CFS) is being used
Rainfall intensity =      0.393(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.294
Subarea runoff =      0.000(CFS) for    3.990(Ac.)
Total runoff =      2.433(CFS)
Effective area this stream =       10.83(Ac.)
Total Study Area (Main Stream No. 1) =       20.82(Ac.)
Area averaged Fm value =    0.265(In/Hr)
Depth of flow =   0.012(Ft.), Average velocity =   0.389(Ft/s)
Critical depth =      0.009(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.100 to Point/Station        4.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     10.830(Ac.)
Runoff from this stream =      2.433(CFS)
Time of concentration =   45.86 min.
Rainfall intensity =     0.393(In/Hr)
Area averaged loss rate (Fm) =    0.2651(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.200 to Point/Station        4.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Initial subarea data:
Initial area flow distance =   963.000(Ft.)
Top (of initial area) elevation =  2866.000(Ft.)
Bottom (of initial area) elevation =  2861.000(Ft.)
Difference in elevation =     5.000(Ft.)
Slope =    0.00519  s(%)=       0.52
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   23.472 min.
Rainfall intensity =      0.629(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.521
Subarea runoff =      0.864(CFS)
Total initial stream area =        2.640(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.265(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.200 to Point/Station        4.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 3
Stream flow area =      2.640(Ac.)
Runoff from this stream =      0.864(CFS)
Time of concentration =   23.47 min.
Rainfall intensity =     0.629(In/Hr)
Area averaged loss rate (Fm) =    0.2651(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:

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


1      3.66     9.990     21.33    0.265      0.672
2      2.43    10.830     45.86    0.265      0.393
3      0.86     2.640     23.47    0.265      0.629
Qmax(1) =
```

```
           1.000 *    1.000 *     3.662) +
           3.173 *    0.465 *     2.433) +
           1.120 *    0.909 *     0.864) + =       8.131
Qmax(2) =
           0.315 *    1.000 *     3.662) +
           1.000 *    1.000 *     2.433) +
           0.353 *    1.000 *     0.864) + =       3.892
Qmax(3) =
           0.893 *    1.000 *     3.662) +
           2.834 *    0.512 *     2.433) +
           1.000 *    1.000 *     0.864) + =       7.663

Total of 3 streams to confluence:
Flow rates before confluence point:
       3.662       2.433       0.864
Maximum flow rates at confluence using above data:
        8.131        3.892        7.663
Area of streams before confluence:
        9.990       10.830        2.640
Effective area values after confluence:
       17.427       23.460       18.173
Results of confluence:
Total flow rate =      8.131(CFS)
Time of concentration =    21.333 min.
Effective stream area after confluence =     17.427(Ac.)
Study area average Pervious fraction(Ap) =  1.000
Study area average soil loss rate(Fm) =    0.265(In/Hr)
Study area total (this main stream) =      23.46(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.000 to Point/Station        5.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =  2861.000(Ft.)
Downstream point elevation =  2856.000(Ft.)
Channel length thru subarea  =  1094.000(Ft.)
Channel base width      =  500.000(Ft.)
Slope or 'Z' of left channel bank = 100.000
Slope or 'Z' of right channel bank = 100.000
Estimated mean flow rate at midpoint of channel =      8.162(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    5.000(Ft.)
Flow(q) thru subarea =      8.162(CFS)
Depth of flow =   0.027(Ft.), Average velocity =   0.601(Ft/s)
Channel flow top width =  505.404(Ft.)
Flow Velocity =    0.60(Ft/s)
Travel time  =   30.34 min.
Time of concentration =   51.68 min.
Critical depth =      0.020(Ft.)
```

```
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
The area added to the existing stream causes a
a lower flow rate of Q =      2.259(CFS)
therefore the upstream flow rate of Q =      8.131(CFS) is being used
Rainfall intensity =      0.362(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.241
Subarea runoff =      0.000(CFS) for    8.500(Ac.)
Total runoff =      8.131(CFS)
Effective area this stream =       25.93(Ac.)
Total Study Area (Main Stream No. 1) =       31.96(Ac.)
Area averaged Fm value =    0.265(In/Hr)
Depth of flow =   0.027(Ft.), Average velocity =   0.600(Ft/s)
Critical depth =      0.020(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.000 to Point/Station        5.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     25.927(Ac.)
Runoff from this stream =      8.131(CFS)
Time of concentration =   51.68 min.
Rainfall intensity =     0.362(In/Hr)
Area averaged loss rate (Fm) =    0.2651(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.100 to Point/Station        5.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Initial subarea data:
Initial area flow distance =  1295.000(Ft.)
Top (of initial area) elevation =  2861.000(Ft.)
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```
Bottom (of initial area) elevation =  2856.000(Ft.)
Difference in elevation =     5.000(Ft.)
Slope =    0.00386  s(%)=       0.39
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   28.037 min.
Rainfall intensity =      0.555(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.470
Subarea runoff =      1.742(CFS)
Total initial stream area =        6.670(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.265(In/Hr)


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Process from Point/Station        4.100 to Point/Station        5.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      6.670(Ac.)
Runoff from this stream =      1.742(CFS)
Time of concentration =   28.04 min.
Rainfall intensity =     0.555(In/Hr)
Area averaged loss rate (Fm) =    0.2651(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:

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


1      8.13    25.927     51.68    0.265      0.362
2      1.74     6.670     28.04    0.265      0.555
Qmax(1) =
           1.000 *    1.000 *     8.131) +
           0.334 *    1.000 *     1.742) + =       8.713
Qmax(2) =
           2.997 *    0.543 *     8.131) +
           1.000 *    1.000 *     1.742) + =      14.963

Total of 2 streams to confluence:
Flow rates before confluence point:
       8.131       1.742
Maximum flow rates at confluence using above data:
        8.713       14.963
Area of streams before confluence:
       25.927        6.670
Effective area values after confluence:
       32.597       20.736
Results of confluence:
Total flow rate =     14.963(CFS)
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```
Time of concentration =    28.037 min.
Effective stream area after confluence =     20.736(Ac.)
Study area average Pervious fraction(Ap) =  1.000
Study area average soil loss rate(Fm) =    0.265(In/Hr)
Study area total (this main stream) =      32.60(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.000 to Point/Station        6.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =  2856.000(Ft.)
Downstream point elevation =  2854.000(Ft.)
Channel length thru subarea  =   629.000(Ft.)
Channel base width      =  500.000(Ft.)
Slope or 'Z' of left channel bank = 100.000
Slope or 'Z' of right channel bank = 100.000
Estimated mean flow rate at midpoint of channel =     14.995(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    5.000(Ft.)
Flow(q) thru subarea =     14.995(CFS)
Depth of flow =   0.043(Ft.), Average velocity =   0.686(Ft/s)
Channel flow top width =  508.673(Ft.)
Flow Velocity =    0.69(Ft/s)
Travel time  =   15.29 min.
Time of concentration =   43.33 min.
Critical depth =      0.030(Ft.)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
The area added to the existing stream causes a
a lower flow rate of Q =      3.064(CFS)
therefore the upstream flow rate of Q =     14.963(CFS) is being used
Rainfall intensity =      0.409(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.317
Subarea runoff =      0.000(CFS) for    2.850(Ac.)
Total runoff =     14.963(CFS)
Effective area this stream =       23.59(Ac.)
Total Study Area (Main Stream No. 1) =       41.48(Ac.)
Area averaged Fm value =    0.265(In/Hr)
Depth of flow =   0.043(Ft.), Average velocity =   0.685(Ft/s)
Critical depth =      0.030(Ft.)
End of computations, Total Study Area =           41.48 (Ac.)
The following figures may
```

be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 86.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 03/31/21

PROJECT LOKI
EXISTING CONDITION 2-YR STORM
DRAINAGE AREA C

Program License Serial Number 6353

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

Rational hydrology study storm event year is 2.0
Computed rainfall intensity:
Storm year = 2.00 1 hour rainfall = 0.326 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 7.000 to Point/Station 8.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.265(In/Hr)
Initial subarea data:
Initial area flow distance = 910.000(Ft.)
Top (of initial area) elevation = 2862.000(Ft.)
Bottom (of initial area) elevation = 2856.000(Ft.)
Difference in elevation = 6.000(Ft.)
Slope = 0.00659 s(%)= 0.66
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 21.875 min.
Rainfall intensity = 0.661(In/Hr) for a 2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.539

```
Subarea runoff =      1.677(CFS)
Total initial stream area =        4.710(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.265(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        8.000 to Point/Station        9.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =  2856.000(Ft.)
Downstream point elevation =  2854.000(Ft.)
Channel length thru subarea  =   414.000(Ft.)
Channel base width      =  500.000(Ft.)
Slope or 'Z' of left channel bank = 100.000
Slope or 'Z' of right channel bank = 100.000
Estimated mean flow rate at midpoint of channel =      1.722(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    5.000(Ft.)
Flow(q) thru subarea =      1.722(CFS)
Depth of flow =   0.010(Ft.), Average velocity =   0.329(Ft/s)
Channel flow top width =  502.091(Ft.)
Flow Velocity =    0.33(Ft/s)
Travel time  =   20.99 min.
Time of concentration =   42.86 min.
Critical depth =      0.007(Ft.)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
The area added to the existing stream causes a
a lower flow rate of Q =      1.170(CFS)
therefore the upstream flow rate of Q =      1.677(CFS) is being used
Rainfall intensity =      0.413(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.322
Subarea runoff =      0.000(CFS) for    4.110(Ac.)
Total runoff =      1.677(CFS)
Effective area this stream =        8.82(Ac.)
Total Study Area (Main Stream No. 1) =        8.82(Ac.)
Area averaged Fm value =    0.265(In/Hr)
Depth of flow =   0.010(Ft.), Average velocity =   0.325(Ft/s)
Critical depth =      0.007(Ft.)
End of computations, Total Study Area =            8.82 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
```

Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 86.0

San Bernardino County Rational Hydrology Program

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PROJECT LOKI
EXISTING CONDITION 2-YR STORM
DRAINAGE AREA D

Program License Serial Number 6353

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

Rational hydrology study storm event year is 2.0
Computed rainfall intensity:
Storm year = 2.00 1 hour rainfall = 0.326 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 10.000 to Point/Station 11.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.265(In/Hr)
Initial subarea data:
Initial area flow distance = 808.000(Ft.)
Top (of initial area) elevation = 2857.000(Ft.)
Bottom (of initial area) elevation = 2851.000(Ft.)
Difference in elevation = 6.000(Ft.)
Slope = 0.00743 s(%)= 0.74
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 20.369 min.
Rainfall intensity = 0.694(In/Hr) for a 2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.556

Subarea runoff = 2.887(CFS)
Total initial stream area = 7.470(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.265(In/Hr)
End of computations, Total Study Area = 7.47 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 86.0

San Bernardino County Rational Hydrology Program

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PROJECT LOKI
EXISTING CONDITION 2-YR STORM
DRAINAGE AREA E

Program License Serial Number 6353

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

Rational hydrology study storm event year is 2.0
Computed rainfall intensity:
Storm year = 2.00 1 hour rainfall = 0.326 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 12.000 to Point/Station 13.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.265(In/Hr)
Initial subarea data:
Initial area flow distance = 795.000(Ft.)
Top (of initial area) elevation = 2862.000(Ft.)
Bottom (of initial area) elevation = 2853.000(Ft.)
Difference in elevation = 9.000(Ft.)
Slope = 0.01132 s(%)= 1.13
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 18.601 min.
Rainfall intensity = 0.740(In/Hr) for a 2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.578

Subarea runoff = 1.658(CFS)
Total initial stream area = 3.880(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.265(In/Hr)
End of computations, Total Study Area = 3.88 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 86.0

San Bernardino County Rational Hydrology Program

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PROJECT LOKI
EXISTING CONDITION 2-YR STORM
DRAINAGE AREA F

Program License Serial Number 6353

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

Rational hydrology study storm event year is 2.0
Computed rainfall intensity:
Storm year = 2.00 1 hour rainfall = 0.326 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 15.000 to Point/Station 16.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.265(In/Hr)
Initial subarea data:
Initial area flow distance = 249.000(Ft.)
Top (of initial area) elevation = 2864.000(Ft.)
Bottom (of initial area) elevation = 2862.000(Ft.)
Difference in elevation = 2.000(Ft.)
Slope = 0.00803 s(%)= 0.80
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.522 min.
Rainfall intensity = 0.976(In/Hr) for a 2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.656

Subarea runoff = 1.408(CFS)
Total initial stream area = 2.200(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.265(In/Hr)
End of computations, Total Study Area = 2.20 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 86.0

San Bernardino County Rational Hydrology Program

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PROJECT LOKI
EXISTING CONDITION 2-YR STORM
DRAINAGE AREA G

Program License Serial Number 6353

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

Rational hydrology study storm event year is 2.0
Computed rainfall intensity:
Storm year = 2.00 1 hour rainfall = 0.326 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 3.000 to Point/Station 17.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.265(In/Hr)
Initial subarea data:
Initial area flow distance = 357.000(Ft.)
Top (of initial area) elevation = 2870.000(Ft.)
Bottom (of initial area) elevation = 2869.000(Ft.)
Difference in elevation = 1.000(Ft.)
Slope = 0.00280 s(%)= 0.28
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 17.855 min.
Rainfall intensity = 0.762(In/Hr) for a 2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.587

Subarea runoff = 0.786(CFS)
Total initial stream area = 1.760(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.265(In/Hr)
End of computations, Total Study Area = 1.76 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 86.0

San Bernardino County Rational Hydrology Program

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Rational Hydrology Study Date: 03/31/21

EXISTING CONDITION 10-YR STORM
DRAINAGE AREA A

Program License Serial Number 6353

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.559 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++
Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.265(In/Hr)
Initial subarea data:
Initial area flow distance = 739.000(Ft.)
Top (of initial area) elevation = 2866.000(Ft.)
Bottom (of initial area) elevation = 2861.000(Ft.)
Difference in elevation = 5.000(Ft.)
Slope = 0.00677 s(%)= 0.68
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 20.024 min.
Rainfall intensity = 1.205(In/Hr) for a 10.0 year storm

Effective runoff coefficient used for area (Q=KCIA) is C = 0.702
Subarea runoff = 4.882(CFS)
Total initial stream area = 5.770(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.265(In/Hr)
End of computations, Total Study Area = 5.77 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 86.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 03/31/21

PROJECT LOKI
EXISTING CONDITION 10-YR STORM
DRAINAGE AREA B

Program License Serial Number 6353

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.559 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 3.000 to Point/Station 4.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.265(In/Hr)
Initial subarea data:
Initial area flow distance = 999.000(Ft.)
Top (of initial area) elevation = 2870.000(Ft.)
Bottom (of initial area) elevation = 2861.000(Ft.)
Difference in elevation = 9.000(Ft.)
Slope = 0.00901 s(%)= 0.90
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 21.333 min.
Rainfall intensity = 1.153(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.693

```
Subarea runoff =      7.982(CFS)
Total initial stream area =        9.990(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.265(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.000 to Point/Station        4.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      9.990(Ac.)
Runoff from this stream =      7.982(CFS)
Time of concentration =   21.33 min.
Rainfall intensity =     1.153(In/Hr)
Area averaged loss rate (Fm) =    0.2651(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.000 to Point/Station        3.100
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Initial subarea data:
Initial area flow distance =   911.000(Ft.)
Top (of initial area) elevation =  2870.000(Ft.)
Bottom (of initial area) elevation =  2864.000(Ft.)
Difference in elevation =     6.000(Ft.)
Slope =    0.00659  s(%)=       0.66
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   21.890 min.
Rainfall intensity =      1.132(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.689
Subarea runoff =      5.338(CFS)
Total initial stream area =        6.840(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.265(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.100 to Point/Station        4.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
```

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Upstream point elevation =  2864.000(Ft.)
Downstream point elevation =  2861.000(Ft.)
Channel length thru subarea  =   563.000(Ft.)
Channel base width      =  500.000(Ft.)
Slope or 'Z' of left channel bank = 100.000
Slope or 'Z' of right channel bank = 100.000
Estimated mean flow rate at midpoint of channel =      5.387(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    5.000(Ft.)
Flow(q) thru subarea =      5.387(CFS)
Depth of flow =   0.020(Ft.), Average velocity =   0.533(Ft/s)
Channel flow top width =  504.023(Ft.)
Flow Velocity =    0.53(Ft/s)
Travel time  =   17.59 min.
Time of concentration =   39.48 min.
Critical depth =      0.015(Ft.)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
The area added to the existing stream causes a
a lower flow rate of Q =      4.719(CFS)
therefore the upstream flow rate of Q =      5.338(CFS) is being used
Rainfall intensity =      0.749(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.582
Subarea runoff =      0.000(CFS) for    3.990(Ac.)
Total runoff =      5.338(CFS)
Effective area this stream =       10.83(Ac.)
Total Study Area (Main Stream No. 1) =       20.82(Ac.)
Area averaged Fm value =    0.265(In/Hr)
Depth of flow =   0.020(Ft.), Average velocity =   0.531(Ft/s)
Critical depth =      0.015(Ft.)


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Process from Point/Station        3.100 to Point/Station        4.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     10.830(Ac.)
Runoff from this stream =      5.338(CFS)
Time of concentration =   39.48 min.
Rainfall intensity =     0.749(In/Hr)
Area averaged loss rate (Fm) =    0.2651(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.200 to Point/Station        4.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Initial subarea data:
Initial area flow distance =   963.000(Ft.)
Top (of initial area) elevation =  2866.000(Ft.)
Bottom (of initial area) elevation =  2861.000(Ft.)
Difference in elevation =     5.000(Ft.)
Slope =    0.00519  s(%)=       0.52
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   23.472 min.
Rainfall intensity =      1.078(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.679
Subarea runoff =      1.932(CFS)
Total initial stream area =        2.640(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.265(In/Hr)


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Process from Point/Station        3.200 to Point/Station        4.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 3
Stream flow area =      2.640(Ac.)
Runoff from this stream =      1.932(CFS)
Time of concentration =   23.47 min.
Rainfall intensity =     1.078(In/Hr)
Area averaged loss rate (Fm) =    0.2651(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:

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


1      7.98     9.990     21.33    0.265      1.153
2      5.34    10.830     39.48    0.265      0.749
3      1.93     2.640     23.47    0.265      1.078
Qmax(1) =
```

```
           1.000 *    1.000 *     7.982) +
           1.834 *    0.540 *     5.338) +
           1.092 *    0.909 *     1.932) + =      15.188
Qmax(2) =
           0.545 *    1.000 *     7.982) +
           1.000 *    1.000 *     5.338) +
           0.595 *    1.000 *     1.932) + =      10.842
Qmax(3) =
           0.916 *    1.000 *     7.982) +
           1.679 *    0.595 *     5.338) +
           1.000 *    1.000 *     1.932) + =      14.574

Total of 3 streams to confluence:
Flow rates before confluence point:
       7.982       5.338       1.932
Maximum flow rates at confluence using above data:
       15.188       10.842       14.574
Area of streams before confluence:
        9.990       10.830        2.640
Effective area values after confluence:
       18.241       23.460       19.069
Results of confluence:
Total flow rate =     15.188(CFS)
Time of concentration =    21.333 min.
Effective stream area after confluence =     18.241(Ac.)
Study area average Pervious fraction(Ap) =  1.000
Study area average soil loss rate(Fm) =    0.265(In/Hr)
Study area total (this main stream) =      23.46(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.000 to Point/Station        5.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________________
Upstream point elevation =  2861.000(Ft.)
Downstream point elevation =  2856.000(Ft.)
Channel length thru subarea  =  1094.000(Ft.)
Channel base width      =  500.000(Ft.)
Slope or 'Z' of left channel bank = 100.000
Slope or 'Z' of right channel bank = 100.000
Estimated mean flow rate at midpoint of channel =     15.216(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    5.000(Ft.)
Flow(q) thru subarea =     15.216(CFS)
Depth of flow =   0.039(Ft.), Average velocity =   0.769(Ft/s)
Channel flow top width =  507.849(Ft.)
Flow Velocity =    0.77(Ft/s)
Travel time  =   23.70 min.
Time of concentration =   45.03 min.
Critical depth =      0.031(Ft.)
```

```
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
The area added to the existing stream causes a
a lower flow rate of Q =     10.067(CFS)
therefore the upstream flow rate of Q =     15.188(CFS) is being used
Rainfall intensity =      0.683(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.551
Subarea runoff =      0.000(CFS) for    8.500(Ac.)
Total runoff =     15.188(CFS)
Effective area this stream =       26.74(Ac.)
Total Study Area (Main Stream No. 1) =       31.96(Ac.)
Area averaged Fm value =    0.265(In/Hr)
Depth of flow =   0.039(Ft.), Average velocity =   0.769(Ft/s)
Critical depth =      0.031(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.000 to Point/Station        5.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     26.741(Ac.)
Runoff from this stream =     15.188(CFS)
Time of concentration =   45.03 min.
Rainfall intensity =     0.683(In/Hr)
Area averaged loss rate (Fm) =    0.2651(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.100 to Point/Station        5.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Initial subarea data:
Initial area flow distance =  1295.000(Ft.)
Top (of initial area) elevation =  2861.000(Ft.)
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Bottom (of initial area) elevation =  2856.000(Ft.)
Difference in elevation =     5.000(Ft.)
Slope =    0.00386  s(%)=       0.39
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   28.037 min.
Rainfall intensity =      0.952(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.649
Subarea runoff =      4.124(CFS)
Total initial stream area =        6.670(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.265(In/Hr)


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Process from Point/Station        4.100 to Point/Station        5.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      6.670(Ac.)
Runoff from this stream =      4.124(CFS)
Time of concentration =   28.04 min.
Rainfall intensity =     0.952(In/Hr)
Area averaged loss rate (Fm) =    0.2651(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:

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


1     15.19    26.741     45.03    0.265      0.683
2      4.12     6.670     28.04    0.265      0.952
Qmax(1) =
           1.000 *    1.000 *    15.188) +
           0.609 *    1.000 *     4.124) + =      17.699
Qmax(2) =
           1.643 *    0.623 *    15.188) +
           1.000 *    1.000 *     4.124) + =      19.657

Total of 2 streams to confluence:
Flow rates before confluence point:
      15.188       4.124
Maximum flow rates at confluence using above data:
       17.699       19.657
Area of streams before confluence:
       26.741        6.670
Effective area values after confluence:
       33.411       23.319
Results of confluence:
Total flow rate =     19.657(CFS)
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```
Time of concentration =    28.037 min.
Effective stream area after confluence =     23.319(Ac.)
Study area average Pervious fraction(Ap) =  1.000
Study area average soil loss rate(Fm) =    0.265(In/Hr)
Study area total (this main stream) =      33.41(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.000 to Point/Station        6.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =  2856.000(Ft.)
Downstream point elevation =  2854.000(Ft.)
Channel length thru subarea  =   629.000(Ft.)
Channel base width      =  500.000(Ft.)
Slope or 'Z' of left channel bank = 100.000
Slope or 'Z' of right channel bank = 100.000
Estimated mean flow rate at midpoint of channel =     19.695(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    5.000(Ft.)
Flow(q) thru subarea =     19.695(CFS)
Depth of flow =   0.051(Ft.), Average velocity =   0.764(Ft/s)
Channel flow top width =  510.212(Ft.)
Flow Velocity =    0.76(Ft/s)
Travel time  =   13.73 min.
Time of concentration =   41.76 min.
Critical depth =      0.036(Ft.)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
The area added to the existing stream causes a
a lower flow rate of Q =     10.723(CFS)
therefore the upstream flow rate of Q =     19.657(CFS) is being used
Rainfall intensity =      0.720(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.569
Subarea runoff =      0.000(CFS) for    2.850(Ac.)
Total runoff =     19.657(CFS)
Effective area this stream =       26.17(Ac.)
Total Study Area (Main Stream No. 1) =       41.48(Ac.)
Area averaged Fm value =    0.265(In/Hr)
Depth of flow =   0.051(Ft.), Average velocity =   0.763(Ft/s)
Critical depth =      0.036(Ft.)
End of computations, Total Study Area =           41.48 (Ac.)
The following figures may
```

be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 86.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 03/31/21

PROJECT LOKI
EXISTING CONDITION 10-YR STORM
DRAINAGE AREA C

Program License Serial Number 6353

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.559 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 7.000 to Point/Station 8.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.265(In/Hr)
Initial subarea data:
Initial area flow distance = 910.000(Ft.)
Top (of initial area) elevation = 2862.000(Ft.)
Bottom (of initial area) elevation = 2856.000(Ft.)
Difference in elevation = 6.000(Ft.)
Slope = 0.00659 s(%)= 0.66
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 21.875 min.
Rainfall intensity = 1.133(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.689

```
Subarea runoff =      3.678(CFS)
Total initial stream area =        4.710(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.265(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        8.000 to Point/Station        9.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =  2856.000(Ft.)
Downstream point elevation =  2854.000(Ft.)
Channel length thru subarea  =   414.000(Ft.)
Channel base width      =  500.000(Ft.)
Slope or 'Z' of left channel bank = 100.000
Slope or 'Z' of right channel bank = 100.000
Estimated mean flow rate at midpoint of channel =      3.933(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    5.000(Ft.)
Flow(q) thru subarea =      3.933(CFS)
Depth of flow =   0.017(Ft.), Average velocity =   0.457(Ft/s)
Channel flow top width =  503.431(Ft.)
Flow Velocity =    0.46(Ft/s)
Travel time  =   15.10 min.
Time of concentration =   36.98 min.
Critical depth =      0.012(Ft.)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Rainfall intensity =      0.784(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.596
Subarea runoff =      0.445(CFS) for    4.110(Ac.)
Total runoff =      4.123(CFS)
Effective area this stream =        8.82(Ac.)
Total Study Area (Main Stream No. 1) =        8.82(Ac.)
Area averaged Fm value =    0.265(In/Hr)
Depth of flow =   0.018(Ft.), Average velocity =   0.466(Ft/s)
Critical depth =      0.013(Ft.)
End of computations, Total Study Area =            8.82 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.
```

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 86.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 03/31/21

PROJECT LOKI
EXISTING CONDITION 10-YR STORM
DRAINAGE AREA D

Program License Serial Number 6353

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.559 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 10.000 to Point/Station 11.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.265(In/Hr)
Initial subarea data:
Initial area flow distance = 808.000(Ft.)
Top (of initial area) elevation = 2857.000(Ft.)
Bottom (of initial area) elevation = 2851.000(Ft.)
Difference in elevation = 6.000(Ft.)
Slope = 0.00743 s(%)= 0.74
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 20.369 min.
Rainfall intensity = 1.191(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.700

Subarea runoff =   6.223(CFS)
Total initial stream area =   7.470(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =   0.265(In/Hr)
End of computations, Total Study Area =   7.47 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 86.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 03/31/21

PROJECT LOKI
EXISTING CONDITION 10-YR STORM
DRAINAGE AREA E

Program License Serial Number 6353

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.559 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 12.000 to Point/Station 13.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.265(In/Hr)
Initial subarea data:
Initial area flow distance = 795.000(Ft.)
Top (of initial area) elevation = 2862.000(Ft.)
Bottom (of initial area) elevation = 2853.000(Ft.)
Difference in elevation = 9.000(Ft.)
Slope = 0.01132 s(%)= 1.13
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 18.601 min.
Rainfall intensity = 1.269(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.712

Subarea runoff = 3.505(CFS)
Total initial stream area = 3.880(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.265(In/Hr)
End of computations, Total Study Area = 3.88 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 86.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 03/31/21

PROJECT LOKI
EXISTING CONDITION 10-YR STORM
DRAINAGE AREA F

Program License Serial Number 6353

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.559 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 15.000 to Point/Station 16.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.265(In/Hr)
Initial subarea data:
Initial area flow distance = 249.000(Ft.)
Top (of initial area) elevation = 2864.000(Ft.)
Bottom (of initial area) elevation = 2862.000(Ft.)
Difference in elevation = 2.000(Ft.)
Slope = 0.00803 s(%)= 0.80
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.522 min.
Rainfall intensity = 1.674(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.757

Subarea runoff = 2.790(CFS)
Total initial stream area = 2.200(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.265(In/Hr)
End of computations, Total Study Area = 2.20 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 86.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

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Rational Hydrology Study Date: 03/31/21

PROJECT LOKI
EXISTING CONDITION 10-YR STORM
DRAINAGE AREA G

Program License Serial Number 6353

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.559 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 3.000 to Point/Station 17.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.265(In/Hr)
Initial subarea data:
Initial area flow distance = 357.000(Ft.)
Top (of initial area) elevation = 2870.000(Ft.)
Bottom (of initial area) elevation = 2869.000(Ft.)
Difference in elevation = 1.000(Ft.)
Slope = 0.00280 s(%)= 0.28
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 17.855 min.
Rainfall intensity = 1.306(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.717

Subarea runoff = 1.649(CFS)
Total initial stream area = 1.760(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.265(In/Hr)
End of computations, Total Study Area = 1.76 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 86.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

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Rational Hydrology Study Date: 03/31/21

PROJECT LOKI
EXISTING CONDITION 100-YR STORM
DRAINAGE AREA A

Program License Serial Number 6353

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 0.972 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.265(In/Hr)
Initial subarea data:
Initial area flow distance = 739.000(Ft.)
Top (of initial area) elevation = 2866.000(Ft.)
Bottom (of initial area) elevation = 2861.000(Ft.)
Difference in elevation = 5.000(Ft.)
Slope = 0.00677 s(%)= 0.68
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 20.024 min.
Rainfall intensity = 2.095(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.786

Subarea runoff = 9.505(CFS)
Total initial stream area = 5.770(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.265(In/Hr)
End of computations, Total Study Area = 5.77 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 86.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 03/31/21

PROJECT LOKI
EXISTING CONDITION 100-YR STORM
DRAINAGEA AREA B

Program License Serial Number 6353

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 0.972 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 3.000 to Point/Station 4.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.265(In/Hr)
Initial subarea data:
Initial area flow distance = 999.000(Ft.)
Top (of initial area) elevation = 2870.000(Ft.)
Bottom (of initial area) elevation = 2861.000(Ft.)
Difference in elevation = 9.000(Ft.)
Slope = 0.00901 s(%)= 0.90
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 21.333 min.
Rainfall intensity = 2.005(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.781

```
Subarea runoff =     15.640(CFS)
Total initial stream area =        9.990(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.265(In/Hr)


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Process from Point/Station        3.000 to Point/Station        4.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      9.990(Ac.)
Runoff from this stream =     15.640(CFS)
Time of concentration =   21.33 min.
Rainfall intensity =     2.005(In/Hr)
Area averaged loss rate (Fm) =    0.2651(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000


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Process from Point/Station        3.000 to Point/Station        3.100
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Initial subarea data:
Initial area flow distance =   911.000(Ft.)
Top (of initial area) elevation =  2870.000(Ft.)
Bottom (of initial area) elevation =  2864.000(Ft.)
Difference in elevation =     6.000(Ft.)
Slope =    0.00659  s(%)=       0.66
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   21.890 min.
Rainfall intensity =      1.969(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.779
Subarea runoff =     10.488(CFS)
Total initial stream area =        6.840(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.265(In/Hr)


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Process from Point/Station        3.100 to Point/Station        4.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
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Upstream point elevation =  2864.000(Ft.)
Downstream point elevation =  2861.000(Ft.)
Channel length thru subarea  =   563.000(Ft.)
Channel base width      =  500.000(Ft.)
Slope or 'Z' of left channel bank = 100.000
Slope or 'Z' of right channel bank = 100.000
Estimated mean flow rate at midpoint of channel =     10.864(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    5.000(Ft.)
Flow(q) thru subarea =     10.864(CFS)
Depth of flow =   0.031(Ft.), Average velocity =   0.705(Ft/s)
Channel flow top width =  506.126(Ft.)
Flow Velocity =    0.71(Ft/s)
Travel time  =   13.31 min.
Time of concentration =   35.20 min.
Critical depth =      0.024(Ft.)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Rainfall intensity =      1.412(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.731
Subarea runoff =      0.690(CFS) for    3.990(Ac.)
Total runoff =     11.178(CFS)
Effective area this stream =       10.83(Ac.)
Total Study Area (Main Stream No. 1) =       20.82(Ac.)
Area averaged Fm value =    0.265(In/Hr)
Depth of flow =   0.031(Ft.), Average velocity =   0.713(Ft/s)
Critical depth =      0.025(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.100 to Point/Station        4.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     10.830(Ac.)
Runoff from this stream =     11.178(CFS)
Time of concentration =   35.20 min.
Rainfall intensity =     1.412(In/Hr)
Area averaged loss rate (Fm) =    0.2651(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000


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Process from Point/Station        3.200 to Point/Station        4.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Initial subarea data:
Initial area flow distance =   963.000(Ft.)
Top (of initial area) elevation =  2866.000(Ft.)
Bottom (of initial area) elevation =  2861.000(Ft.)
Difference in elevation =     5.000(Ft.)
Slope =    0.00519  s(%)=       0.52
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   23.472 min.
Rainfall intensity =      1.875(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.773
Subarea runoff =      3.825(CFS)
Total initial stream area =        2.640(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.265(In/Hr)


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Process from Point/Station        3.200 to Point/Station        4.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 3
Stream flow area =      2.640(Ac.)
Runoff from this stream =      3.825(CFS)
Time of concentration =   23.47 min.
Rainfall intensity =     1.875(In/Hr)
Area averaged loss rate (Fm) =    0.2651(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:

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


1     15.64     9.990     21.33    0.265      2.005
2     11.18    10.830     35.20    0.265      1.412
3      3.83     2.640     23.47    0.265      1.875
Qmax(1) =
           1.000 *    1.000 *    15.640) +
           1.517 *    0.606 *    11.178) +
           1.081 *    0.909 *     3.825) + =      29.673
```

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Qmax(2) =
           0.659 *    1.000 *    15.640) +
           1.000 *    1.000 *    11.178) +
           0.712 *    1.000 *     3.825) + =      24.213
Qmax(3) =
           0.925 *    1.000 *    15.640) +
           1.404 *    0.667 *    11.178) +
           1.000 *    1.000 *     3.825) + =      28.763

Total of 3 streams to confluence:
Flow rates before confluence point:
      15.640      11.178       3.825
Maximum flow rates at confluence using above data:
       29.673       24.213       28.763
Area of streams before confluence:
        9.990       10.830        2.640
Effective area values after confluence:
       18.953       23.460       19.852
Results of confluence:
Total flow rate =     29.673(CFS)
Time of concentration =    21.333 min.
Effective stream area after confluence =     18.953(Ac.)
Study area average Pervious fraction(Ap) =  1.000
Study area average soil loss rate(Fm) =    0.265(In/Hr)
Study area total (this main stream) =      23.46(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.000 to Point/Station        5.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________________
Upstream point elevation =  2861.000(Ft.)
Downstream point elevation =  2856.000(Ft.)
Channel length thru subarea  =  1094.000(Ft.)
Channel base width      =  500.000(Ft.)
Slope or 'Z' of left channel bank = 100.000
Slope or 'Z' of right channel bank = 100.000
Estimated mean flow rate at midpoint of channel =     29.699(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    5.000(Ft.)
Flow(q) thru subarea =     29.699(CFS)
Depth of flow =   0.059(Ft.), Average velocity =   1.002(Ft/s)
Channel flow top width =  511.715(Ft.)
Flow Velocity =    1.00(Ft/s)
Travel time  =   18.19 min.
Time of concentration =   39.52 min.
Critical depth =      0.048(Ft.)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
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```
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
The area added to the existing stream causes a
a lower flow rate of Q =     25.617(CFS)
therefore the upstream flow rate of Q =     29.673(CFS) is being used
Rainfall intensity =      1.302(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.717
Subarea runoff =      0.000(CFS) for    8.500(Ac.)
Total runoff =     29.673(CFS)
Effective area this stream =       27.45(Ac.)
Total Study Area (Main Stream No. 1) =       31.96(Ac.)
Area averaged Fm value =    0.265(In/Hr)
Depth of flow =   0.059(Ft.), Average velocity =   1.002(Ft/s)
Critical depth =      0.048(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.000 to Point/Station        5.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     27.453(Ac.)
Runoff from this stream =     29.673(CFS)
Time of concentration =   39.52 min.
Rainfall intensity =     1.302(In/Hr)
Area averaged loss rate (Fm) =    0.2651(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000


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Process from Point/Station        4.100 to Point/Station        5.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Initial subarea data:
Initial area flow distance =  1295.000(Ft.)
Top (of initial area) elevation =  2861.000(Ft.)
Bottom (of initial area) elevation =  2856.000(Ft.)
Difference in elevation =     5.000(Ft.)
Slope =    0.00386  s(%)=       0.39
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TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   28.037 min.
Rainfall intensity =      1.656(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.756
Subarea runoff =      8.347(CFS)
Total initial stream area =        6.670(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.265(In/Hr)


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Process from Point/Station        4.100 to Point/Station        5.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      6.670(Ac.)
Runoff from this stream =      8.347(CFS)
Time of concentration =   28.04 min.
Rainfall intensity =     1.656(In/Hr)
Area averaged loss rate (Fm) =    0.2651(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:

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


1     29.67    27.453     39.52    0.265      1.302
2      8.35     6.670     28.04    0.265      1.656
Qmax(1) =
           1.000 *    1.000 *    29.673) +
           0.746 *    1.000 *     8.347) + =      35.897
Qmax(2) =
           1.341 *    0.709 *    29.673) +
           1.000 *    1.000 *     8.347) + =      36.578

Total of 2 streams to confluence:
Flow rates before confluence point:
      29.673       8.347
Maximum flow rates at confluence using above data:
       35.897       36.578
Area of streams before confluence:
       27.453        6.670
Effective area values after confluence:
       34.123       26.144
Results of confluence:
Total flow rate =     36.578(CFS)
Time of concentration =    28.037 min.
Effective stream area after confluence =     26.144(Ac.)
Study area average Pervious fraction(Ap) =  1.000
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Study area average soil loss rate(Fm) =    0.265(In/Hr)
Study area total (this main stream) =      34.12(Ac.)


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Process from Point/Station        5.000 to Point/Station        6.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =  2856.000(Ft.)
Downstream point elevation =  2854.000(Ft.)
Channel length thru subarea  =   629.000(Ft.)
Channel base width      =  500.000(Ft.)
Slope or 'Z' of left channel bank = 100.000
Slope or 'Z' of right channel bank = 100.000
Estimated mean flow rate at midpoint of channel =     36.609(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    5.000(Ft.)
Flow(q) thru subarea =     36.609(CFS)
Depth of flow =   0.074(Ft.), Average velocity =   0.975(Ft/s)
Channel flow top width =  514.799(Ft.)
Flow Velocity =    0.98(Ft/s)
Travel time  =   10.75 min.
Time of concentration =   38.79 min.
Critical depth =      0.055(Ft.)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
The area added to the existing stream causes a
a lower flow rate of Q =     27.505(CFS)
therefore the upstream flow rate of Q =     36.578(CFS) is being used
Rainfall intensity =      1.319(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.719
Subarea runoff =      0.000(CFS) for    2.850(Ac.)
Total runoff =     36.578(CFS)
Effective area this stream =       28.99(Ac.)
Total Study Area (Main Stream No. 1) =       41.48(Ac.)
Area averaged Fm value =    0.265(In/Hr)
Depth of flow =   0.074(Ft.), Average velocity =   0.975(Ft/s)
Critical depth =      0.055(Ft.)
End of computations, Total Study Area =           41.48 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.
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Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 86.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 03/31/21

PROJECT LOKI
EXISTING CONDITION 100-YR STORM
DRAINAGE AREA C

Program License Serial Number 6353

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 0.972 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

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Process from Point/Station 7.000 to Point/Station 8.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.265(In/Hr)
Initial subarea data:
Initial area flow distance = 910.000(Ft.)
Top (of initial area) elevation = 2862.000(Ft.)
Bottom (of initial area) elevation = 2856.000(Ft.)
Difference in elevation = 6.000(Ft.)
Slope = 0.00659 s(%)= 0.66
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 21.875 min.
Rainfall intensity = 1.970(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.779

```
Subarea runoff =      7.226(CFS)
Total initial stream area =        4.710(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.265(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        8.000 to Point/Station        9.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =  2856.000(Ft.)
Downstream point elevation =  2854.000(Ft.)
Channel length thru subarea  =   414.000(Ft.)
Channel base width      =  500.000(Ft.)
Slope or 'Z' of left channel bank = 100.000
Slope or 'Z' of right channel bank = 100.000
Estimated mean flow rate at midpoint of channel =      8.464(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    5.000(Ft.)
Flow(q) thru subarea =      8.464(CFS)
Depth of flow =   0.027(Ft.), Average velocity =   0.620(Ft/s)
Channel flow top width =  505.432(Ft.)
Flow Velocity =    0.62(Ft/s)
Travel time  =   11.13 min.
Time of concentration =   33.01 min.
Critical depth =      0.021(Ft.)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Rainfall intensity =      1.477(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.738
Subarea runoff =      2.393(CFS) for    4.110(Ac.)
Total runoff =      9.619(CFS)
Effective area this stream =        8.82(Ac.)
Total Study Area (Main Stream No. 1) =        8.82(Ac.)
Area averaged Fm value =    0.265(In/Hr)
Depth of flow =   0.029(Ft.), Average velocity =   0.652(Ft/s)
Critical depth =      0.022(Ft.)
End of computations, Total Study Area =            8.82 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.
```

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 86.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 03/31/21

PROJECT LOKI
EXISTING CONDITION 100-YR STORM
DRAINAGE AREA D

Program License Serial Number 6353

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 0.972 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 10.000 to Point/Station 11.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.265(In/Hr)
Initial subarea data:
Initial area flow distance = 808.000(Ft.)
Top (of initial area) elevation = 2857.000(Ft.)
Bottom (of initial area) elevation = 2851.000(Ft.)
Difference in elevation = 6.000(Ft.)
Slope = 0.00743 s(%)= 0.74
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 20.369 min.
Rainfall intensity = 2.071(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.785

Subarea runoff =   12.138(CFS)
Total initial stream area =   7.470(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =   0.265(In/Hr)
End of computations, Total Study Area =   7.47 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 86.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 03/31/21

PROJECT LOKI
EXISTING CONDITION 100-YR
DRAINAGE AREA E

Program License Serial Number 6353

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 0.972 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 12.000 to Point/Station 13.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.265(In/Hr)
Initial subarea data:
Initial area flow distance = 795.000(Ft.)
Top (of initial area) elevation = 2862.000(Ft.)
Bottom (of initial area) elevation = 2853.000(Ft.)
Difference in elevation = 9.000(Ft.)
Slope = 0.01132 s(%)= 1.13
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 18.601 min.
Rainfall intensity = 2.206(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.792

Subarea runoff = 6.779(CFS)
Total initial stream area = 3.880(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.265(In/Hr)
End of computations, Total Study Area = 3.88 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 86.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

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Rational Hydrology Study Date: 03/31/21

PROJECT LOKI
EXISTING CONDITION 100-YR STORM
DRAINAGE AREA F

Program License Serial Number 6353

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 0.972 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 15.000 to Point/Station 16.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.265(In/Hr)
Initial subarea data:
Initial area flow distance = 249.000(Ft.)
Top (of initial area) elevation = 2864.000(Ft.)
Bottom (of initial area) elevation = 2862.000(Ft.)
Difference in elevation = 2.000(Ft.)
Slope = 0.00803 s(%)= 0.80
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.522 min.
Rainfall intensity = 2.911(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.818

Subarea runoff =   5.238(CFS)
Total initial stream area =   2.200(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =   0.265(In/Hr)
End of computations, Total Study Area =   2.20 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 86.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 03/31/21

PROJECT LOKI
EXISTING CONDITION 100-YR STORM
DRAINAGE AREA G

Program License Serial Number 6353

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 0.972 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 3.000 to Point/Station 17.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.265(In/Hr)
Initial subarea data:
Initial area flow distance = 357.000(Ft.)
Top (of initial area) elevation = 2870.000(Ft.)
Bottom (of initial area) elevation = 2869.000(Ft.)
Difference in elevation = 1.000(Ft.)
Slope = 0.00280 s(%)= 0.28
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 17.855 min.
Rainfall intensity = 2.271(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.795

Subarea runoff = 3.177(CFS)
Total initial stream area = 1.760(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.265(In/Hr)
End of computations, Total Study Area = 1.76 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 86.0

APPENDIX F

Post-Development Rational Analysis

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 03/31/21

PROJECT LOKI
PROPOSED CONDITION 2-YR STORM
DRAINAGE AREA A

Program License Serial Number 6353

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

Rational hydrology study storm event year is 2.0
Computed rainfall intensity:
Storm year = 2.00 1 hour rainfall = 0.326 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION ****

COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 69.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.055(In/Hr)
Initial subarea data:
Initial area flow distance = 234.000(Ft.)
Top (of initial area) elevation = 2866.000(Ft.)
Bottom (of initial area) elevation = 2864.060(Ft.)
Difference in elevation = 1.940(Ft.)
Slope = 0.00829 s(%)= 0.83
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 7.028 min.
Rainfall intensity = 1.463(In/Hr) for a 2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.866

```
Subarea runoff =      3.687(CFS)
Total initial stream area =        2.910(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.055(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.000 to Point/Station        3.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  2860.060(Ft.)
Downstream point/station elevation =  2859.000(Ft.)
Pipe length  =   214.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.687(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.687(CFS)
Normal flow depth in pipe =   10.25(In.)
Flow top width inside pipe =   13.95(In.)
Critical Depth =    9.32(In.)
Pipe flow velocity =      4.13(Ft/s)
Travel time through pipe =    0.86 min.
Time of concentration (TC) =     7.89 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.000 to Point/Station        3.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Time of concentration =     7.89 min.
Rainfall intensity =      1.349(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.863
Subarea runoff =      2.787(CFS) for    2.650(Ac.)
Total runoff =      6.474(CFS)
Effective area this stream =        5.56(Ac.)
Total Study Area (Main Stream No. 1) =        5.56(Ac.)
Area averaged Fm value =    0.055(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.000 to Point/Station        4.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
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```
Upstream point/station elevation =  2859.000(Ft.)
Downstream point/station elevation =  2856.080(Ft.)
Pipe length  =   584.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.474(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.474(CFS)
Normal flow depth in pipe =   13.01(In.)
Flow top width inside pipe =   16.12(In.)
Critical Depth =   11.80(In.)
Pipe flow velocity =      4.74(Ft/s)
Travel time through pipe =    2.06 min.
Time of concentration (TC) =     9.95 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.000 to Point/Station        4.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Time of concentration =     9.95 min.
Rainfall intensity =      1.147(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.857
Subarea runoff =      6.480(CFS) for    7.620(Ac.)
Total runoff =     12.954(CFS)
Effective area this stream =       13.18(Ac.)
Total Study Area (Main Stream No. 1) =       13.18(Ac.)
Area averaged Fm value =    0.055(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.000 to Point/Station        5.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  2856.080(Ft.)
Downstream point/station elevation =  2852.500(Ft.)
Pipe length  =   723.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.954(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    12.954(CFS)
Normal flow depth in pipe =   16.45(In.)
Flow top width inside pipe =   22.29(In.)
Critical Depth =   15.54(In.)
Pipe flow velocity =      5.65(Ft/s)
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```
Travel time through pipe =    2.13 min.
Time of concentration (TC) =    12.08 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.000 to Point/Station        5.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Time of concentration =    12.08 min.
Rainfall intensity =      1.001(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.851
Subarea runoff =      5.909(CFS) for    8.970(Ac.)
Total runoff =     18.863(CFS)
Effective area this stream =       22.15(Ac.)
Total Study Area (Main Stream No. 1) =       22.15(Ac.)
Area averaged Fm value =    0.055(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.000 to Point/Station        6.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  2852.500(Ft.)
Downstream point/station elevation =  2849.700(Ft.)
Pipe length  =   561.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    18.863(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    18.863(CFS)
Normal flow depth in pipe =   19.34(In.)
Flow top width inside pipe =   24.35(In.)
Critical Depth =   18.23(In.)
Pipe flow velocity =      6.19(Ft/s)
Travel time through pipe =    1.51 min.
Time of concentration (TC) =    13.59 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        6.000 to Point/Station        6.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
```

```
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Time of concentration =    13.59 min.
Rainfall intensity =      0.922(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.847
Subarea runoff =      1.011(CFS) for    3.320(Ac.)
Total runoff =     19.874(CFS)
Effective area this stream =       25.47(Ac.)
Total Study Area (Main Stream No. 1) =       25.47(Ac.)
Area averaged Fm value =    0.055(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        6.000 to Point/Station        7.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  2849.700(Ft.)
Downstream point/station elevation =  2846.000(Ft.)
Pipe length  =   516.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    19.874(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    19.874(CFS)
Normal flow depth in pipe =   17.58(In.)
Flow top width inside pipe =   25.74(In.)
Critical Depth =   18.71(In.)
Pipe flow velocity =      7.25(Ft/s)
Travel time through pipe =    1.19 min.
Time of concentration (TC) =    14.78 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        7.000 to Point/Station        7.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Time of concentration =    14.78 min.
Rainfall intensity =      0.869(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.843
Subarea runoff =      1.826(CFS) for    4.130(Ac.)
```

```
Total runoff =     21.701(CFS)
Effective area this stream =       29.60(Ac.)
Total Study Area (Main Stream No. 1) =       29.60(Ac.)
Area averaged Fm value =    0.055(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        7.000 to Point/Station        8.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =  2846.000(Ft.)
Downstream point elevation =  2845.000(Ft.)
Channel length thru subarea  =   754.000(Ft.)
Channel base width      =   36.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Manning's 'N'    = 0.013
Maximum depth of channel  =    8.000(Ft.)
Flow(q) thru subarea =     21.701(CFS)
Depth of flow =   0.312(Ft.), Average velocity =   1.881(Ft/s)
Channel flow top width =   37.874(Ft.)
Flow Velocity =    1.88(Ft/s)
Travel time  =    6.68 min.
Time of concentration =   21.46 min.
Critical depth =      0.223(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        7.000 to Point/Station        8.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     29.600(Ac.)
Runoff from this stream =     21.701(CFS)
Time of concentration =   21.46 min.
Rainfall intensity =     0.670(In/Hr)
Area averaged loss rate (Fm) =    0.0548(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        9.000 to Point/Station       10.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
```

```
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Initial subarea data:
Initial area flow distance =   423.000(Ft.)
Top (of initial area) elevation =  2862.000(Ft.)
Bottom (of initial area) elevation =  2855.090(Ft.)
Difference in elevation =     6.910(Ft.)
Slope =    0.01634  s(%)=       1.63
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.776 min.
Rainfall intensity =      1.363(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.864
Subarea runoff =      4.226(CFS)
Total initial stream area =        3.590(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.055(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       10.100
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  2855.090(Ft.)
Downstream point/station elevation =  2846.000(Ft.)
Pipe length  =    53.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.226(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     4.226(CFS)
Normal flow depth in pipe =    5.11(In.)
Flow top width inside pipe =    8.92(In.)
Critical depth could not be calculated.
Pipe flow velocity =     16.31(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =     7.83 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.100 to Point/Station        8.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =  2846.000(Ft.)
Downstream point elevation =  2845.000(Ft.)
Channel length thru subarea  =   712.000(Ft.)
Channel base width      =   36.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Manning's 'N'    = 0.013
Maximum depth of channel  =    8.000(Ft.)
Flow(q) thru subarea =      4.226(CFS)
Depth of flow =   0.115(Ft.), Average velocity =   1.008(Ft/s)
Channel flow top width =   36.692(Ft.)
```

```
Flow Velocity =    1.01(Ft/s)
Travel time  =   11.77 min.
Time of concentration =   19.60 min.
Critical depth =      0.075(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.100 to Point/Station        8.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      3.590(Ac.)
Runoff from this stream =      4.226(CFS)
Time of concentration =   19.60 min.
Rainfall intensity =     0.713(In/Hr)
Area averaged loss rate (Fm) =    0.0548(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


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Process from Point/Station       11.000 to Point/Station       12.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Initial subarea data:
Initial area flow distance =    91.000(Ft.)
Top (of initial area) elevation =  2866.000(Ft.)
Bottom (of initial area) elevation =  2861.000(Ft.)
Difference in elevation =     5.000(Ft.)
Slope =    0.05495  s(%)=       5.49
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    3.300 min.
Rainfall intensity =      2.483(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.880
Subarea runoff =      1.486(CFS)
Total initial stream area =        0.680(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.055(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       13.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
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```
Upstream point/station elevation =  2857.000(Ft.)
Downstream point/station elevation =  2851.000(Ft.)
Pipe length  =  1049.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.486(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     1.486(CFS)
Normal flow depth in pipe =    6.36(In.)
Flow top width inside pipe =   11.98(In.)
Critical Depth =    6.20(In.)
Pipe flow velocity =      3.51(Ft/s)
Travel time through pipe =    4.97 min.
Time of concentration (TC) =     8.27 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       13.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Time of concentration =     8.27 min.
Rainfall intensity =      1.305(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.862
Subarea runoff =     14.117(CFS) for   13.190(Ac.)
Total runoff =     15.603(CFS)
Effective area this stream =       13.87(Ac.)
Total Study Area (Main Stream No. 1) =       47.06(Ac.)
Area averaged Fm value =    0.055(In/Hr)


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Process from Point/Station       13.000 to Point/Station       14.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  2851.700(Ft.)
Downstream point/station elevation =  2846.000(Ft.)
Pipe length  =  1209.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    15.603(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    15.603(CFS)
Normal flow depth in pipe =   17.18(In.)
Flow top width inside pipe =   25.98(In.)
Critical Depth =   16.52(In.)
Pipe flow velocity =      5.84(Ft/s)
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Travel time through pipe =    3.45 min.
Time of concentration (TC) =    11.72 min.


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Process from Point/Station       14.000 to Point/Station        8.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =  2846.000(Ft.)
Downstream point elevation =  2845.000(Ft.)
Channel length thru subarea  =   400.000(Ft.)
Channel base width      =   36.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =     17.796(CFS)
Manning's 'N'    = 0.013
Maximum depth of channel  =    8.000(Ft.)
Flow(q) thru subarea =     17.796(CFS)
Depth of flow =   0.230(Ft.), Average velocity =   2.113(Ft/s)
Channel flow top width =   37.377(Ft.)
Flow Velocity =    2.11(Ft/s)
Travel time  =    3.15 min.
Time of concentration =   14.88 min.
Critical depth =      0.195(Ft.)
 Adding area flow to channel
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Rainfall intensity =      0.865(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.843
Subarea runoff =      4.333(CFS) for   13.460(Ac.)
Total runoff =     19.936(CFS)
Effective area this stream =       27.33(Ac.)
Total Study Area (Main Stream No. 1) =       60.52(Ac.)
Area averaged Fm value =    0.055(In/Hr)
Depth of flow =   0.246(Ft.), Average velocity =   2.209(Ft/s)
Critical depth =      0.211(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station        8.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 3
Stream flow area =     27.330(Ac.)
```

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Runoff from this stream =     19.936(CFS)
Time of concentration =   14.88 min.
Rainfall intensity =     0.865(In/Hr)
Area averaged loss rate (Fm) =    0.0548(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

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


1     21.70    29.600     21.46    0.055      0.670
2      4.23     3.590     19.60    0.055      0.713
3     19.94    27.330     14.88    0.055      0.865
Qmax(1) =
           1.000 *    1.000 *    21.701) +
           0.934 *    1.000 *     4.226) +
           0.759 *    1.000 *    19.936) + =      40.768
Qmax(2) =
           1.071 *    0.914 *    21.701) +
           1.000 *    1.000 *     4.226) +
           0.813 *    1.000 *    19.936) + =      41.659
Qmax(3) =
           1.318 *    0.693 *    21.701) +
           1.231 *    0.759 *     4.226) +
           1.000 *    1.000 *    19.936) + =      43.717

Total of 3 streams to confluence:
Flow rates before confluence point:
      21.701       4.226      19.936
Maximum flow rates at confluence using above data:
       40.768       41.659       43.717
Area of streams before confluence:
       29.600        3.590       27.330
Effective area values after confluence:
       60.520       57.962       50.577
Results of confluence:
Total flow rate =     43.717(CFS)
Time of concentration =    14.877 min.
Effective stream area after confluence =     50.577(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.055(In/Hr)
Study area total (this main stream) =      60.52(Ac.)
End of computations, Total Study Area =           60.52 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.100
```

Area averaged SCS curve number = 69.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 03/31/21

PROJECT LOKI
PROPOSED CONDITION 10-YR STORM
DRAINAGE AREA A

Program License Serial Number 6353

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.559 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION ****

COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 69.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.055(In/Hr)
Initial subarea data:
Initial area flow distance = 234.000(Ft.)
Top (of initial area) elevation = 2866.000(Ft.)
Bottom (of initial area) elevation = 2864.060(Ft.)
Difference in elevation = 1.940(Ft.)
Slope = 0.00829 s(%)= 0.83
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 7.028 min.
Rainfall intensity = 2.508(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.880

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Subarea runoff =      6.425(CFS)
Total initial stream area =        2.910(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.055(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.000 to Point/Station        3.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  2860.060(Ft.)
Downstream point/station elevation =  2859.000(Ft.)
Pipe length  =   214.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.425(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.425(CFS)
Normal flow depth in pipe =   12.97(In.)
Flow top width inside pipe =   16.15(In.)
Critical Depth =   11.77(In.)
Pipe flow velocity =      4.71(Ft/s)
Travel time through pipe =    0.76 min.
Time of concentration (TC) =     7.79 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.000 to Point/Station        3.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Time of concentration =     7.79 min.
Rainfall intensity =      2.335(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.879
Subarea runoff =      4.984(CFS) for    2.650(Ac.)
Total runoff =     11.409(CFS)
Effective area this stream =        5.56(Ac.)
Total Study Area (Main Stream No. 1) =        5.56(Ac.)
Area averaged Fm value =    0.055(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.000 to Point/Station        4.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
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Upstream point/station elevation =  2859.000(Ft.)
Downstream point/station elevation =  2856.080(Ft.)
Pipe length  =   584.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.409(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    11.409(CFS)
Normal flow depth in pipe =   14.98(In.)
Flow top width inside pipe =   23.25(In.)
Critical Depth =   14.53(In.)
Pipe flow velocity =      5.53(Ft/s)
Travel time through pipe =    1.76 min.
Time of concentration (TC) =     9.55 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.000 to Point/Station        4.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Time of concentration =     9.55 min.
Rainfall intensity =      2.024(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.876
Subarea runoff =     11.953(CFS) for    7.620(Ac.)
Total runoff =     23.362(CFS)
Effective area this stream =       13.18(Ac.)
Total Study Area (Main Stream No. 1) =       13.18(Ac.)
Area averaged Fm value =    0.055(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.000 to Point/Station        5.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  2856.080(Ft.)
Downstream point/station elevation =  2852.500(Ft.)
Pipe length  =   723.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    23.362(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    23.362(CFS)
Normal flow depth in pipe =   20.48(In.)
Flow top width inside pipe =   27.92(In.)
Critical Depth =   19.76(In.)
Pipe flow velocity =      6.55(Ft/s)
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Travel time through pipe =    1.84 min.
Time of concentration (TC) =    11.39 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.000 to Point/Station        5.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Time of concentration =    11.39 min.
Rainfall intensity =      1.789(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.872
Subarea runoff =     11.214(CFS) for    8.970(Ac.)
Total runoff =     34.576(CFS)
Effective area this stream =       22.15(Ac.)
Total Study Area (Main Stream No. 1) =       22.15(Ac.)
Area averaged Fm value =    0.055(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.000 to Point/Station        6.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  2852.500(Ft.)
Downstream point/station elevation =  2849.700(Ft.)
Pipe length  =   561.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    34.576(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    34.576(CFS)
Normal flow depth in pipe =   25.08(In.)
Flow top width inside pipe =   28.19(In.)
Critical Depth =   23.49(In.)
Pipe flow velocity =      7.14(Ft/s)
Travel time through pipe =    1.31 min.
Time of concentration (TC) =    12.69 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        6.000 to Point/Station        6.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
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Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Time of concentration =    12.69 min.
Rainfall intensity =      1.658(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.870
Subarea runoff =      2.174(CFS) for    3.320(Ac.)
Total runoff =     36.750(CFS)
Effective area this stream =       25.47(Ac.)
Total Study Area (Main Stream No. 1) =       25.47(Ac.)
Area averaged Fm value =    0.055(In/Hr)


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Process from Point/Station        6.000 to Point/Station        7.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  2849.700(Ft.)
Downstream point/station elevation =  2846.000(Ft.)
Pipe length  =   516.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    36.750(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    36.750(CFS)
Normal flow depth in pipe =   22.76(In.)
Flow top width inside pipe =   30.53(In.)
Critical Depth =   24.21(In.)
Pipe flow velocity =      8.42(Ft/s)
Travel time through pipe =    1.02 min.
Time of concentration (TC) =    13.72 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        7.000 to Point/Station        7.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Time of concentration =    13.72 min.
Rainfall intensity =      1.571(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.869
Subarea runoff =      3.629(CFS) for    4.130(Ac.)
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```
Total runoff =     40.379(CFS)
Effective area this stream =       29.60(Ac.)
Total Study Area (Main Stream No. 1) =       29.60(Ac.)
Area averaged Fm value =    0.055(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        7.000 to Point/Station        8.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =  2846.000(Ft.)
Downstream point elevation =  2845.000(Ft.)
Channel length thru subarea  =   754.000(Ft.)
Channel base width      =   36.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Manning's 'N'    = 0.013
Maximum depth of channel  =    8.000(Ft.)
Flow(q) thru subarea =     40.379(CFS)
Depth of flow =   0.452(Ft.), Average velocity =   2.389(Ft/s)
Channel flow top width =   38.714(Ft.)
Flow Velocity =    2.39(Ft/s)
Travel time  =    5.26 min.
Time of concentration =   18.98 min.
Critical depth =      0.336(Ft.)


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Process from Point/Station        7.000 to Point/Station        8.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     29.600(Ac.)
Runoff from this stream =     40.379(CFS)
Time of concentration =   18.98 min.
Rainfall intensity =     1.251(In/Hr)
Area averaged loss rate (Fm) =    0.0548(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        9.000 to Point/Station       10.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
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```
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Initial subarea data:
Initial area flow distance =   423.000(Ft.)
Top (of initial area) elevation =  2862.000(Ft.)
Bottom (of initial area) elevation =  2855.090(Ft.)
Difference in elevation =     6.910(Ft.)
Slope =    0.01634  s(%)=       1.63
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.776 min.
Rainfall intensity =      2.337(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.879
Subarea runoff =      7.372(CFS)
Total initial stream area =        3.590(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.055(In/Hr)


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Process from Point/Station       10.000 to Point/Station       10.100
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  2855.090(Ft.)
Downstream point/station elevation =  2846.000(Ft.)
Pipe length  =    53.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.372(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     7.372(CFS)
Normal flow depth in pipe =    6.00(In.)
Flow top width inside pipe =   12.00(In.)
Critical depth could not be calculated.
Pipe flow velocity =     18.79(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =     7.82 min.


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Process from Point/Station       10.100 to Point/Station        8.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =  2846.000(Ft.)
Downstream point elevation =  2845.000(Ft.)
Channel length thru subarea  =   712.000(Ft.)
Channel base width      =   36.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Manning's 'N'    = 0.013
Maximum depth of channel  =    8.000(Ft.)
Flow(q) thru subarea =      7.372(CFS)
Depth of flow =   0.161(Ft.), Average velocity =   1.255(Ft/s)
Channel flow top width =   36.966(Ft.)
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Flow Velocity =    1.26(Ft/s)
Travel time  =    9.45 min.
Time of concentration =   17.28 min.
Critical depth =      0.109(Ft.)


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Process from Point/Station       10.100 to Point/Station        8.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      3.590(Ac.)
Runoff from this stream =      7.372(CFS)
Time of concentration =   17.28 min.
Rainfall intensity =     1.336(In/Hr)
Area averaged loss rate (Fm) =    0.0548(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station       12.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Initial subarea data:
Initial area flow distance =    91.000(Ft.)
Top (of initial area) elevation =  2866.000(Ft.)
Bottom (of initial area) elevation =  2861.000(Ft.)
Difference in elevation =     5.000(Ft.)
Slope =    0.05495  s(%)=       5.49
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    3.300 min.
Rainfall intensity =      4.258(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.888
Subarea runoff =      2.572(CFS)
Total initial stream area =        0.680(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.055(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       13.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
```

```
Upstream point/station elevation =  2857.000(Ft.)
Downstream point/station elevation =  2851.000(Ft.)
Pipe length  =  1049.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.572(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.572(CFS)
Normal flow depth in pipe =    9.38(In.)
Flow top width inside pipe =    9.92(In.)
Critical Depth =    8.24(In.)
Pipe flow velocity =      3.91(Ft/s)
Travel time through pipe =    4.48 min.
Time of concentration (TC) =     7.78 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       13.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Time of concentration =     7.78 min.
Rainfall intensity =      2.336(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.879
Subarea runoff =     25.910(CFS) for   13.190(Ac.)
Total runoff =     28.482(CFS)
Effective area this stream =       13.87(Ac.)
Total Study Area (Main Stream No. 1) =       47.06(Ac.)
Area averaged Fm value =    0.055(In/Hr)


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Process from Point/Station       13.000 to Point/Station       14.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  2851.700(Ft.)
Downstream point/station elevation =  2846.000(Ft.)
Pipe length  =  1209.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    28.482(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    28.482(CFS)
Normal flow depth in pipe =   22.01(In.)
Flow top width inside pipe =   31.11(In.)
Critical Depth =   21.27(In.)
Pipe flow velocity =      6.77(Ft/s)
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Travel time through pipe =    2.98 min.
Time of concentration (TC) =    10.75 min.


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Process from Point/Station       14.000 to Point/Station        8.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =  2846.000(Ft.)
Downstream point elevation =  2845.000(Ft.)
Channel length thru subarea  =   400.000(Ft.)
Channel base width      =   36.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =     33.427(CFS)
Manning's 'N'    = 0.013
Maximum depth of channel  =    8.000(Ft.)
Flow(q) thru subarea =     33.427(CFS)
Depth of flow =   0.335(Ft.), Average velocity =   2.700(Ft/s)
Channel flow top width =   38.007(Ft.)
Flow Velocity =    2.70(Ft/s)
Travel time  =    2.47 min.
Time of concentration =   13.22 min.
Critical depth =      0.297(Ft.)
 Adding area flow to channel
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Rainfall intensity =      1.611(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.869
Subarea runoff =      9.804(CFS) for   13.460(Ac.)
Total runoff =     38.287(CFS)
Effective area this stream =       27.33(Ac.)
Total Study Area (Main Stream No. 1) =       60.52(Ac.)
Area averaged Fm value =    0.055(In/Hr)
Depth of flow =   0.363(Ft.), Average velocity =   2.846(Ft/s)
Critical depth =      0.324(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station        8.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 3
Stream flow area =     27.330(Ac.)
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Runoff from this stream =     38.287(CFS)
Time of concentration =   13.22 min.
Rainfall intensity =     1.611(In/Hr)
Area averaged loss rate (Fm) =    0.0548(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

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


1     40.38    29.600     18.98    0.055      1.251
2      7.37     3.590     17.28    0.055      1.336
3     38.29    27.330     13.22    0.055      1.611
Qmax(1) =
           1.000 *    1.000 *    40.379) +
           0.934 *    1.000 *     7.372) +
           0.769 *    1.000 *    38.287) + =      76.694
Qmax(2) =
           1.071 *    0.910 *    40.379) +
           1.000 *    1.000 *     7.372) +
           0.823 *    1.000 *    38.287) + =      78.266
Qmax(3) =
           1.301 *    0.697 *    40.379) +
           1.215 *    0.765 *     7.372) +
           1.000 *    1.000 *    38.287) + =      81.743

Total of 3 streams to confluence:
Flow rates before confluence point:
      40.379       7.372      38.287
Maximum flow rates at confluence using above data:
       76.694       78.266       81.743
Area of streams before confluence:
       29.600        3.590       27.330
Effective area values after confluence:
       60.520       57.868       50.704
Results of confluence:
Total flow rate =     81.743(CFS)
Time of concentration =    13.223 min.
Effective stream area after confluence =     50.704(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.055(In/Hr)
Study area total (this main stream) =      60.52(Ac.)
End of computations, Total Study Area =           60.52 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.100
```

Area averaged SCS curve number = 69.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 03/31/21

PROJECT LOKI
PROPOSED CONDITION 100-YR STORM
DRAINAGE AREA A

Program License Serial Number 6353

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 0.972 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

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Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION ****

COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 69.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.055(In/Hr)
Initial subarea data:
Initial area flow distance = 234.000(Ft.)
Top (of initial area) elevation = 2866.000(Ft.)
Bottom (of initial area) elevation = 2864.060(Ft.)
Difference in elevation = 1.940(Ft.)
Slope = 0.00829 s(%)= 0.83
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 7.028 min.
Rainfall intensity = 4.361(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.889

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Subarea runoff =     11.278(CFS)
Total initial stream area =        2.910(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.055(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.000 to Point/Station        3.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  2860.060(Ft.)
Downstream point/station elevation =  2859.000(Ft.)
Pipe length  =   214.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.278(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    11.278(CFS)
Normal flow depth in pipe =   14.91(In.)
Flow top width inside pipe =   23.29(In.)
Critical Depth =   14.46(In.)
Pipe flow velocity =      5.50(Ft/s)
Travel time through pipe =    0.65 min.
Time of concentration (TC) =     7.68 min.


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Process from Point/Station        3.000 to Point/Station        3.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Time of concentration =     7.68 min.
Rainfall intensity =      4.100(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.888
Subarea runoff =      8.962(CFS) for    2.650(Ac.)
Total runoff =     20.240(CFS)
Effective area this stream =        5.56(Ac.)
Total Study Area (Main Stream No. 1) =        5.56(Ac.)
Area averaged Fm value =    0.055(In/Hr)


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Process from Point/Station        3.000 to Point/Station        4.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
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Upstream point/station elevation =  2859.000(Ft.)
Downstream point/station elevation =  2856.080(Ft.)
Pipe length  =   584.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    20.240(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    20.240(CFS)
Normal flow depth in pipe =   20.48(In.)
Flow top width inside pipe =   23.11(In.)
Critical Depth =   18.88(In.)
Pipe flow velocity =      6.25(Ft/s)
Travel time through pipe =    1.56 min.
Time of concentration (TC) =     9.23 min.


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Process from Point/Station        4.000 to Point/Station        4.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Time of concentration =     9.23 min.
Rainfall intensity =      3.602(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.886
Subarea runoff =     21.843(CFS) for    7.620(Ac.)
Total runoff =     42.083(CFS)
Effective area this stream =       13.18(Ac.)
Total Study Area (Main Stream No. 1) =       13.18(Ac.)
Area averaged Fm value =    0.055(In/Hr)


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Process from Point/Station        4.000 to Point/Station        5.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  2856.080(Ft.)
Downstream point/station elevation =  2852.500(Ft.)
Pipe length  =   723.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    42.083(CFS)
Nearest computed pipe diameter  =     36.00(In.)
Calculated individual pipe flow  =    42.083(CFS)
Normal flow depth in pipe =   26.63(In.)
Flow top width inside pipe =   31.60(In.)
Critical Depth =   25.34(In.)
Pipe flow velocity =      7.51(Ft/s)
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Travel time through pipe =    1.60 min.
Time of concentration (TC) =    10.84 min.


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Process from Point/Station        5.000 to Point/Station        5.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Time of concentration =    10.84 min.
Rainfall intensity =      3.220(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.885
Subarea runoff =     21.022(CFS) for    8.970(Ac.)
Total runoff =     63.105(CFS)
Effective area this stream =       22.15(Ac.)
Total Study Area (Main Stream No. 1) =       22.15(Ac.)
Area averaged Fm value =    0.055(In/Hr)


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Process from Point/Station        5.000 to Point/Station        6.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  2852.500(Ft.)
Downstream point/station elevation =  2849.700(Ft.)
Pipe length  =   561.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    63.105(CFS)
Nearest computed pipe diameter  =     42.00(In.)
Calculated individual pipe flow  =    63.105(CFS)
Normal flow depth in pipe =   30.80(In.)
Flow top width inside pipe =   37.15(In.)
Critical Depth =   29.89(In.)
Pipe flow velocity =      8.35(Ft/s)
Travel time through pipe =    1.12 min.
Time of concentration (TC) =    11.96 min.


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Process from Point/Station        6.000 to Point/Station        6.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
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Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Time of concentration =    11.96 min.
Rainfall intensity =      3.006(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.884
Subarea runoff =      4.547(CFS) for    3.320(Ac.)
Total runoff =     67.652(CFS)
Effective area this stream =       25.47(Ac.)
Total Study Area (Main Stream No. 1) =       25.47(Ac.)
Area averaged Fm value =    0.055(In/Hr)


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Process from Point/Station        6.000 to Point/Station        7.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  2849.700(Ft.)
Downstream point/station elevation =  2846.000(Ft.)
Pipe length  =   516.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    67.652(CFS)
Nearest computed pipe diameter  =     39.00(In.)
Calculated individual pipe flow  =    67.652(CFS)
Normal flow depth in pipe =   30.89(In.)
Flow top width inside pipe =   31.65(In.)
Critical Depth =   31.38(In.)
Pipe flow velocity =      9.60(Ft/s)
Travel time through pipe =    0.90 min.
Time of concentration (TC) =    12.85 min.


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Process from Point/Station        7.000 to Point/Station        7.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Time of concentration =    12.85 min.
Rainfall intensity =      2.858(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.883
Subarea runoff =      7.022(CFS) for    4.130(Ac.)
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Total runoff =     74.674(CFS)
Effective area this stream =       29.60(Ac.)
Total Study Area (Main Stream No. 1) =       29.60(Ac.)
Area averaged Fm value =    0.055(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        7.000 to Point/Station        8.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =  2846.000(Ft.)
Downstream point elevation =  2845.000(Ft.)
Channel length thru subarea  =   754.000(Ft.)
Channel base width      =   36.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Manning's 'N'    = 0.013
Maximum depth of channel  =    8.000(Ft.)
Flow(q) thru subarea =     74.674(CFS)
Depth of flow =   0.652(Ft.), Average velocity =   3.017(Ft/s)
Channel flow top width =   39.913(Ft.)
Flow Velocity =    3.02(Ft/s)
Travel time  =    4.17 min.
Time of concentration =   17.02 min.
Critical depth =      0.504(Ft.)


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Process from Point/Station        7.000 to Point/Station        8.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     29.600(Ac.)
Runoff from this stream =     74.674(CFS)
Time of concentration =   17.02 min.
Rainfall intensity =     2.348(In/Hr)
Area averaged loss rate (Fm) =    0.0548(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


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Process from Point/Station        9.000 to Point/Station       10.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
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```
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Initial subarea data:
Initial area flow distance =   423.000(Ft.)
Top (of initial area) elevation =  2862.000(Ft.)
Bottom (of initial area) elevation =  2855.090(Ft.)
Difference in elevation =     6.910(Ft.)
Slope =    0.01634  s(%)=       1.63
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.776 min.
Rainfall intensity =      4.063(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.888
Subarea runoff =     12.950(CFS)
Total initial stream area =        3.590(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.055(In/Hr)


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Process from Point/Station       10.000 to Point/Station       10.100
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  2855.090(Ft.)
Downstream point/station elevation =  2846.000(Ft.)
Pipe length  =    53.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.950(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =    12.950(CFS)
Normal flow depth in pipe =    8.72(In.)
Flow top width inside pipe =   10.70(In.)
Critical depth could not be calculated.
Pipe flow velocity =     21.19(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =     7.82 min.


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Process from Point/Station       10.100 to Point/Station        8.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =  2846.000(Ft.)
Downstream point elevation =  2845.000(Ft.)
Channel length thru subarea  =   712.000(Ft.)
Channel base width      =   36.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Manning's 'N'    = 0.013
Maximum depth of channel  =    8.000(Ft.)
Flow(q) thru subarea =     12.950(CFS)
Depth of flow =   0.225(Ft.), Average velocity =   1.566(Ft/s)
Channel flow top width =   37.353(Ft.)
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Flow Velocity =    1.57(Ft/s)
Travel time  =    7.58 min.
Time of concentration =   15.40 min.
Critical depth =      0.158(Ft.)


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Process from Point/Station       10.100 to Point/Station        8.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      3.590(Ac.)
Runoff from this stream =     12.950(CFS)
Time of concentration =   15.40 min.
Rainfall intensity =     2.519(In/Hr)
Area averaged loss rate (Fm) =    0.0548(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


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Process from Point/Station       11.000 to Point/Station       12.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Initial subarea data:
Initial area flow distance =    91.000(Ft.)
Top (of initial area) elevation =  2866.000(Ft.)
Bottom (of initial area) elevation =  2861.000(Ft.)
Difference in elevation =     5.000(Ft.)
Slope =    0.05495  s(%)=       5.49
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    3.300 min.
Rainfall intensity =      7.403(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.893
Subarea runoff =      4.497(CFS)
Total initial stream area =        0.680(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.055(In/Hr)


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Process from Point/Station       12.000 to Point/Station       13.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
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```
Upstream point/station elevation =  2857.000(Ft.)
Downstream point/station elevation =  2851.000(Ft.)
Pipe length  =  1049.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.497(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.497(CFS)
Normal flow depth in pipe =   11.34(In.)
Flow top width inside pipe =   12.88(In.)
Critical Depth =   10.31(In.)
Pipe flow velocity =      4.52(Ft/s)
Travel time through pipe =    3.87 min.
Time of concentration (TC) =     7.17 min.


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Process from Point/Station       13.000 to Point/Station       13.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Time of concentration =     7.17 min.
Rainfall intensity =      4.300(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.889
Subarea runoff =     48.499(CFS) for   13.190(Ac.)
Total runoff =     52.996(CFS)
Effective area this stream =       13.87(Ac.)
Total Study Area (Main Stream No. 1) =       47.06(Ac.)
Area averaged Fm value =    0.055(In/Hr)


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Process from Point/Station       13.000 to Point/Station       14.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  2851.700(Ft.)
Downstream point/station elevation =  2846.000(Ft.)
Pipe length  =  1209.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    52.996(CFS)
Nearest computed pipe diameter  =     39.00(In.)
Calculated individual pipe flow  =    52.996(CFS)
Normal flow depth in pipe =   29.91(In.)
Flow top width inside pipe =   32.98(In.)
Critical Depth =   27.88(In.)
Pipe flow velocity =      7.77(Ft/s)
```

```
Travel time through pipe =    2.59 min.
Time of concentration (TC) =     9.76 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station        8.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =  2846.000(Ft.)
Downstream point elevation =  2845.000(Ft.)
Channel length thru subarea  =   400.000(Ft.)
Channel base width      =   36.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =     63.411(CFS)
Manning's 'N'    = 0.013
Maximum depth of channel  =    8.000(Ft.)
Flow(q) thru subarea =     63.411(CFS)
Depth of flow =   0.490(Ft.), Average velocity =   3.453(Ft/s)
Channel flow top width =   38.940(Ft.)
Flow Velocity =    3.45(Ft/s)
Travel time  =    1.93 min.
Time of concentration =   11.70 min.
Critical depth =      0.453(Ft.)
 Adding area flow to channel
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Rainfall intensity =      3.053(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.884
Subarea runoff =     20.757(CFS) for   13.460(Ac.)
Total runoff =     73.753(CFS)
Effective area this stream =       27.33(Ac.)
Total Study Area (Main Stream No. 1) =       60.52(Ac.)
Area averaged Fm value =    0.055(In/Hr)
Depth of flow =   0.536(Ft.), Average velocity =   3.657(Ft/s)
Critical depth =      0.500(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station        8.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 3
Stream flow area =     27.330(Ac.)
```

```
Runoff from this stream =     73.753(CFS)
Time of concentration =   11.70 min.
Rainfall intensity =     3.053(In/Hr)
Area averaged loss rate (Fm) =    0.0548(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

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


1     74.67    29.600     17.02    0.055      2.348
2     12.95     3.590     15.40    0.055      2.519
3     73.75    27.330     11.70    0.055      3.053
Qmax(1) =
           1.000 *    1.000 *    74.674) +
           0.931 *    1.000 *    12.950) +
           0.765 *    1.000 *    73.753) + =     143.133
Qmax(2) =
           1.074 *    0.905 *    74.674) +
           1.000 *    1.000 *    12.950) +
           0.822 *    1.000 *    73.753) + =     146.133
Qmax(3) =
           1.308 *    0.687 *    74.674) +
           1.217 *    0.760 *    12.950) +
           1.000 *    1.000 *    73.753) + =     152.817

Total of 3 streams to confluence:
Flow rates before confluence point:
      74.674      12.950      73.753
Maximum flow rates at confluence using above data:
      143.133      146.133      152.817
Area of streams before confluence:
       29.600        3.590       27.330
Effective area values after confluence:
       60.520       57.697       50.397
Results of confluence:
Total flow rate =    152.817(CFS)
Time of concentration =    11.695 min.
Effective stream area after confluence =     50.397(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.055(In/Hr)
Study area total (this main stream) =      60.52(Ac.)
End of computations, Total Study Area =           60.52 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.100
```

Area averaged SCS curve number = 69.0

APPENDIX G

Pre-Development Unit Hydrograph Analysis

U n i t H y d r o g r a p h A n a l y s i s

Study date 04/01/21

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 6353

PROJECT LOKI
EXISTING CONDITION 2-YR STORM

Storm Event Year = 2

Antecedent Moisture Condition = 1

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 2		
71.40	1	0.33
Rainfall data for year 2		
71.40	6	0.67
Rainfall data for year 2		
71.40	24	1.07

++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	SCS curve NO.(AMC 1)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
84.0	68.6	71.40	1.000	0.554	1.000	0.554

Area-averaged adjusted loss rate Fm (In/Hr) = 0.554

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC1)	S	Pervious Yield Fr
71.40	1.000	84.0	68.6	4.58	0.005

Area-averaged catchment yield fraction, Y = 0.005
Area-averaged low loss fraction, Yb = 0.995
User entry of time of concentration = 0.720 (hours)
++
Watershed area = 71.40(Ac.)
Catchment Lag time = 0.576 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 14.4676
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.301(In/Hr)
Average low loss rate fraction (Yb) = 0.829 (decimal)
Note: user entry of the Fm value
Note: user entry of the Yb value
MOUNTAIN S-Graph Selected
Computed peak 5-minute rainfall = 0.155(In)
Computed peak 30-minute rainfall = 0.265(In)
Specified peak 1-hour rainfall = 0.326(In)
Computed peak 3-hour rainfall = 0.506(In)
Specified peak 6-hour rainfall = 0.667(In)
Specified peak 24-hour rainfall = 1.070(In)

Rainfall depth area reduction factors:
Using a total area of 71.40(Ac.) (Ref: fig. E-4)

5-minute factor = 0.997 Adjusted rainfall = 0.154(In)
30-minute factor = 0.997 Adjusted rainfall = 0.264(In)
1-hour factor = 0.997 Adjusted rainfall = 0.325(In)
3-hour factor = 1.000 Adjusted rainfall = 0.505(In)
6-hour factor = 1.000 Adjusted rainfall = 0.667(In)
24-hour factor = 1.000 Adjusted rainfall = 1.070(In)

U n i t H y d r o g r a p h

++

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 863.49 (CFS))	
1	1.591	13.742
2	5.606	34.669
3	11.551	51.329
4	21.569	86.511
5	32.767	96.690
6	41.393	74.489
7	47.755	54.935
8	52.381	39.945
9	56.153	32.568
10	59.266	26.883
11	62.066	24.178
12	64.420	20.327
13	66.593	18.763
14	68.559	16.973
15	70.374	15.670
16	72.086	14.791
17	73.626	13.297
18	75.071	12.474
19	76.353	11.072
20	77.569	10.502
21	78.721	9.942
22	79.752	8.901
23	80.719	8.351
24	81.599	7.603
25	82.430	7.169
26	83.184	6.515
27	83.936	6.496
28	84.680	6.419
29	85.318	5.509
30	85.925	5.247
31	86.533	5.247
32	87.129	5.147
33	87.708	4.998
34	88.287	4.997
35	88.854	4.900
36	89.335	4.154
37	89.798	3.998
38	90.261	3.998
39	90.710	3.877
40	91.144	3.748
41	91.578	3.748
42	92.004	3.678
43	92.387	3.304
44	92.763	3.248

45	93.139	3.247
46	93.499	3.106
47	93.846	2.998
48	94.193	2.998
49	94.529	2.903
50	94.823	2.535
51	95.112	2.499
52	95.401	2.495
53	95.672	2.337
54	95.932	2.249
55	96.193	2.249
56	96.453	2.249
57	96.714	2.249
58	96.974	2.249
59	97.234	2.249
60	97.495	2.249
61	97.755	2.249
62	98.016	2.249
63	98.276	2.249
64	98.536	2.249
65	98.797	2.249
66	99.057	2.249
67	99.318	2.249
68	99.578	2.249
69	99.839	2.249
70	100.000	1.394

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.1542	0.1542
2	0.1898	0.0356
3	0.2144	0.0246
4	0.2337	0.0193
5	0.2499	0.0162
6	0.2639	0.0140
7	0.2764	0.0125
8	0.2877	0.0113
9	0.2980	0.0103
10	0.3076	0.0096
11	0.3165	0.0089
12	0.3249	0.0084
13	0.3355	0.0106
14	0.3457	0.0102
15	0.3554	0.0097
16	0.3648	0.0093
17	0.3738	0.0090
18	0.3825	0.0087
19	0.3909	0.0084
20	0.3990	0.0081
21	0.4069	0.0079

22	0.4146	0.0077
23	0.4221	0.0075
24	0.4294	0.0073
25	0.4365	0.0071
26	0.4434	0.0069
27	0.4502	0.0068
28	0.4568	0.0066
29	0.4633	0.0065
30	0.4697	0.0064
31	0.4759	0.0062
32	0.4820	0.0061
33	0.4881	0.0060
34	0.4939	0.0059
35	0.4997	0.0058
36	0.5054	0.0057
37	0.5110	0.0056
38	0.5165	0.0055
39	0.5219	0.0054
40	0.5272	0.0053
41	0.5324	0.0052
42	0.5376	0.0052
43	0.5426	0.0051
44	0.5477	0.0050
45	0.5526	0.0049
46	0.5575	0.0049
47	0.5623	0.0048
48	0.5670	0.0048
49	0.5717	0.0047
50	0.5764	0.0046
51	0.5810	0.0046
52	0.5855	0.0045
53	0.5900	0.0045
54	0.5944	0.0044
55	0.5988	0.0044
56	0.6031	0.0043
57	0.6074	0.0043
58	0.6116	0.0042
59	0.6158	0.0042
60	0.6200	0.0042
61	0.6241	0.0041
62	0.6281	0.0041
63	0.6322	0.0040
64	0.6362	0.0040
65	0.6401	0.0040
66	0.6441	0.0039
67	0.6479	0.0039
68	0.6518	0.0038
69	0.6556	0.0038
70	0.6594	0.0038
71	0.6631	0.0038

72	0.6669	0.0037
73	0.6700	0.0031
74	0.6731	0.0031
75	0.6762	0.0031
76	0.6793	0.0031
77	0.6823	0.0030
78	0.6853	0.0030
79	0.6883	0.0030
80	0.6912	0.0030
81	0.6942	0.0029
82	0.6971	0.0029
83	0.7000	0.0029
84	0.7028	0.0029
85	0.7057	0.0028
86	0.7085	0.0028
87	0.7113	0.0028
88	0.7141	0.0028
89	0.7168	0.0028
90	0.7196	0.0027
91	0.7223	0.0027
92	0.7250	0.0027
93	0.7277	0.0027
94	0.7303	0.0027
95	0.7330	0.0026
96	0.7356	0.0026
97	0.7382	0.0026
98	0.7408	0.0026
99	0.7433	0.0026
100	0.7459	0.0026
101	0.7484	0.0025
102	0.7510	0.0025
103	0.7535	0.0025
104	0.7559	0.0025
105	0.7584	0.0025
106	0.7609	0.0025
107	0.7633	0.0024
108	0.7657	0.0024
109	0.7681	0.0024
110	0.7705	0.0024
111	0.7729	0.0024
112	0.7753	0.0024
113	0.7776	0.0024
114	0.7800	0.0023
115	0.7823	0.0023
116	0.7846	0.0023
117	0.7869	0.0023
118	0.7892	0.0023
119	0.7915	0.0023
120	0.7938	0.0023
121	0.7960	0.0022

122	0.7982	0.0022
123	0.8005	0.0022
124	0.8027	0.0022
125	0.8049	0.0022
126	0.8071	0.0022
127	0.8092	0.0022
128	0.8114	0.0022
129	0.8136	0.0022
130	0.8157	0.0021
131	0.8179	0.0021
132	0.8200	0.0021
133	0.8221	0.0021
134	0.8242	0.0021
135	0.8263	0.0021
136	0.8284	0.0021
137	0.8304	0.0021
138	0.8325	0.0021
139	0.8346	0.0021
140	0.8366	0.0020
141	0.8386	0.0020
142	0.8407	0.0020
143	0.8427	0.0020
144	0.8447	0.0020
145	0.8467	0.0020
146	0.8487	0.0020
147	0.8506	0.0020
148	0.8526	0.0020
149	0.8546	0.0020
150	0.8565	0.0020
151	0.8585	0.0019
152	0.8604	0.0019
153	0.8623	0.0019
154	0.8642	0.0019
155	0.8661	0.0019
156	0.8680	0.0019
157	0.8699	0.0019
158	0.8718	0.0019
159	0.8737	0.0019
160	0.8756	0.0019
161	0.8774	0.0019
162	0.8793	0.0019
163	0.8811	0.0018
164	0.8830	0.0018
165	0.8848	0.0018
166	0.8866	0.0018
167	0.8885	0.0018
168	0.8903	0.0018
169	0.8921	0.0018
170	0.8939	0.0018
171	0.8957	0.0018

172	0.8974	0.0018
173	0.8992	0.0018
174	0.9010	0.0018
175	0.9027	0.0018
176	0.9045	0.0018
177	0.9062	0.0017
178	0.9080	0.0017
179	0.9097	0.0017
180	0.9115	0.0017
181	0.9132	0.0017
182	0.9149	0.0017
183	0.9166	0.0017
184	0.9183	0.0017
185	0.9200	0.0017
186	0.9217	0.0017
187	0.9234	0.0017
188	0.9251	0.0017
189	0.9267	0.0017
190	0.9284	0.0017
191	0.9301	0.0017
192	0.9317	0.0017
193	0.9334	0.0017
194	0.9350	0.0016
195	0.9367	0.0016
196	0.9383	0.0016
197	0.9399	0.0016
198	0.9416	0.0016
199	0.9432	0.0016
200	0.9448	0.0016
201	0.9464	0.0016
202	0.9480	0.0016
203	0.9496	0.0016
204	0.9512	0.0016
205	0.9528	0.0016
206	0.9544	0.0016
207	0.9559	0.0016
208	0.9575	0.0016
209	0.9591	0.0016
210	0.9607	0.0016
211	0.9622	0.0016
212	0.9638	0.0016
213	0.9653	0.0015
214	0.9669	0.0015
215	0.9684	0.0015
216	0.9699	0.0015
217	0.9715	0.0015
218	0.9730	0.0015
219	0.9745	0.0015
220	0.9760	0.0015
221	0.9775	0.0015

222	0.9790	0.0015
223	0.9805	0.0015
224	0.9820	0.0015
225	0.9835	0.0015
226	0.9850	0.0015
227	0.9865	0.0015
228	0.9880	0.0015
229	0.9894	0.0015
230	0.9909	0.0015
231	0.9924	0.0015
232	0.9939	0.0015
233	0.9953	0.0015
234	0.9968	0.0015
235	0.9982	0.0015
236	0.9997	0.0014
237	1.0011	0.0014
238	1.0025	0.0014
239	1.0040	0.0014
240	1.0054	0.0014
241	1.0068	0.0014
242	1.0083	0.0014
243	1.0097	0.0014
244	1.0111	0.0014
245	1.0125	0.0014
246	1.0139	0.0014
247	1.0153	0.0014
248	1.0167	0.0014
249	1.0181	0.0014
250	1.0195	0.0014
251	1.0209	0.0014
252	1.0223	0.0014
253	1.0237	0.0014
254	1.0250	0.0014
255	1.0264	0.0014
256	1.0278	0.0014
257	1.0291	0.0014
258	1.0305	0.0014
259	1.0319	0.0014
260	1.0332	0.0014
261	1.0346	0.0014
262	1.0359	0.0014
263	1.0373	0.0013
264	1.0386	0.0013
265	1.0400	0.0013
266	1.0413	0.0013
267	1.0426	0.0013
268	1.0440	0.0013
269	1.0453	0.0013
270	1.0466	0.0013
271	1.0479	0.0013

272	1.0493	0.0013
273	1.0506	0.0013
274	1.0519	0.0013
275	1.0532	0.0013
276	1.0545	0.0013
277	1.0558	0.0013
278	1.0571	0.0013
279	1.0584	0.0013
280	1.0597	0.0013
281	1.0610	0.0013
282	1.0623	0.0013
283	1.0635	0.0013
284	1.0648	0.0013
285	1.0661	0.0013
286	1.0674	0.0013
287	1.0686	0.0013
288	1.0699	0.0013

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0013	0.0011	0.0002
2	0.0013	0.0011	0.0002
3	0.0013	0.0011	0.0002
4	0.0013	0.0011	0.0002
5	0.0013	0.0011	0.0002
6	0.0013	0.0011	0.0002
7	0.0013	0.0011	0.0002
8	0.0013	0.0011	0.0002
9	0.0013	0.0011	0.0002
10	0.0013	0.0011	0.0002
11	0.0013	0.0011	0.0002
12	0.0013	0.0011	0.0002
13	0.0013	0.0011	0.0002
14	0.0013	0.0011	0.0002
15	0.0013	0.0011	0.0002
16	0.0013	0.0011	0.0002
17	0.0013	0.0011	0.0002
18	0.0013	0.0011	0.0002
19	0.0014	0.0011	0.0002
20	0.0014	0.0011	0.0002
21	0.0014	0.0011	0.0002
22	0.0014	0.0011	0.0002
23	0.0014	0.0011	0.0002
24	0.0014	0.0011	0.0002
25	0.0014	0.0011	0.0002
26	0.0014	0.0012	0.0002
27	0.0014	0.0012	0.0002
28	0.0014	0.0012	0.0002

29	0.0014	0.0012	0.0002
30	0.0014	0.0012	0.0002
31	0.0014	0.0012	0.0002
32	0.0014	0.0012	0.0002
33	0.0014	0.0012	0.0002
34	0.0014	0.0012	0.0002
35	0.0014	0.0012	0.0002
36	0.0014	0.0012	0.0002
37	0.0015	0.0012	0.0002
38	0.0015	0.0012	0.0002
39	0.0015	0.0012	0.0003
40	0.0015	0.0012	0.0003
41	0.0015	0.0012	0.0003
42	0.0015	0.0012	0.0003
43	0.0015	0.0012	0.0003
44	0.0015	0.0012	0.0003
45	0.0015	0.0012	0.0003
46	0.0015	0.0013	0.0003
47	0.0015	0.0013	0.0003
48	0.0015	0.0013	0.0003
49	0.0015	0.0013	0.0003
50	0.0015	0.0013	0.0003
51	0.0015	0.0013	0.0003
52	0.0016	0.0013	0.0003
53	0.0016	0.0013	0.0003
54	0.0016	0.0013	0.0003
55	0.0016	0.0013	0.0003
56	0.0016	0.0013	0.0003
57	0.0016	0.0013	0.0003
58	0.0016	0.0013	0.0003
59	0.0016	0.0013	0.0003
60	0.0016	0.0013	0.0003
61	0.0016	0.0013	0.0003
62	0.0016	0.0014	0.0003
63	0.0016	0.0014	0.0003
64	0.0016	0.0014	0.0003
65	0.0017	0.0014	0.0003
66	0.0017	0.0014	0.0003
67	0.0017	0.0014	0.0003
68	0.0017	0.0014	0.0003
69	0.0017	0.0014	0.0003
70	0.0017	0.0014	0.0003
71	0.0017	0.0014	0.0003
72	0.0017	0.0014	0.0003
73	0.0017	0.0014	0.0003
74	0.0017	0.0014	0.0003
75	0.0017	0.0015	0.0003
76	0.0018	0.0015	0.0003
77	0.0018	0.0015	0.0003
78	0.0018	0.0015	0.0003

79	0.0018	0.0015	0.0003
80	0.0018	0.0015	0.0003
81	0.0018	0.0015	0.0003
82	0.0018	0.0015	0.0003
83	0.0018	0.0015	0.0003
84	0.0018	0.0015	0.0003
85	0.0019	0.0015	0.0003
86	0.0019	0.0015	0.0003
87	0.0019	0.0016	0.0003
88	0.0019	0.0016	0.0003
89	0.0019	0.0016	0.0003
90	0.0019	0.0016	0.0003
91	0.0019	0.0016	0.0003
92	0.0019	0.0016	0.0003
93	0.0020	0.0016	0.0003
94	0.0020	0.0016	0.0003
95	0.0020	0.0016	0.0003
96	0.0020	0.0016	0.0003
97	0.0020	0.0017	0.0003
98	0.0020	0.0017	0.0003
99	0.0020	0.0017	0.0003
100	0.0020	0.0017	0.0003
101	0.0021	0.0017	0.0004
102	0.0021	0.0017	0.0004
103	0.0021	0.0017	0.0004
104	0.0021	0.0017	0.0004
105	0.0021	0.0018	0.0004
106	0.0021	0.0018	0.0004
107	0.0022	0.0018	0.0004
108	0.0022	0.0018	0.0004
109	0.0022	0.0018	0.0004
110	0.0022	0.0018	0.0004
111	0.0022	0.0018	0.0004
112	0.0022	0.0019	0.0004
113	0.0023	0.0019	0.0004
114	0.0023	0.0019	0.0004
115	0.0023	0.0019	0.0004
116	0.0023	0.0019	0.0004
117	0.0023	0.0019	0.0004
118	0.0024	0.0020	0.0004
119	0.0024	0.0020	0.0004
120	0.0024	0.0020	0.0004
121	0.0024	0.0020	0.0004
122	0.0024	0.0020	0.0004
123	0.0025	0.0020	0.0004
124	0.0025	0.0021	0.0004
125	0.0025	0.0021	0.0004
126	0.0025	0.0021	0.0004
127	0.0026	0.0021	0.0004
128	0.0026	0.0021	0.0004

129	0.0026	0.0022	0.0004
130	0.0026	0.0022	0.0005
131	0.0027	0.0022	0.0005
132	0.0027	0.0022	0.0005
133	0.0027	0.0023	0.0005
134	0.0028	0.0023	0.0005
135	0.0028	0.0023	0.0005
136	0.0028	0.0023	0.0005
137	0.0029	0.0024	0.0005
138	0.0029	0.0024	0.0005
139	0.0029	0.0024	0.0005
140	0.0030	0.0025	0.0005
141	0.0030	0.0025	0.0005
142	0.0030	0.0025	0.0005
143	0.0031	0.0026	0.0005
144	0.0031	0.0026	0.0005
145	0.0037	0.0031	0.0006
146	0.0038	0.0031	0.0006
147	0.0038	0.0032	0.0007
148	0.0038	0.0032	0.0007
149	0.0039	0.0032	0.0007
150	0.0040	0.0033	0.0007
151	0.0040	0.0033	0.0007
152	0.0041	0.0034	0.0007
153	0.0042	0.0034	0.0007
154	0.0042	0.0035	0.0007
155	0.0043	0.0036	0.0007
156	0.0043	0.0036	0.0007
157	0.0044	0.0037	0.0008
158	0.0045	0.0037	0.0008
159	0.0046	0.0038	0.0008
160	0.0046	0.0038	0.0008
161	0.0048	0.0039	0.0008
162	0.0048	0.0040	0.0008
163	0.0049	0.0041	0.0008
164	0.0050	0.0042	0.0009
165	0.0052	0.0043	0.0009
166	0.0052	0.0043	0.0009
167	0.0054	0.0045	0.0009
168	0.0055	0.0045	0.0009
169	0.0057	0.0047	0.0010
170	0.0058	0.0048	0.0010
171	0.0060	0.0050	0.0010
172	0.0061	0.0051	0.0010
173	0.0064	0.0053	0.0011
174	0.0065	0.0054	0.0011
175	0.0068	0.0056	0.0012
176	0.0069	0.0058	0.0012
177	0.0073	0.0060	0.0012
178	0.0075	0.0062	0.0013

179	0.0079	0.0066	0.0014
180	0.0081	0.0068	0.0014
181	0.0087	0.0072	0.0015
182	0.0090	0.0075	0.0015
183	0.0097	0.0081	0.0017
184	0.0102	0.0084	0.0017
185	0.0084	0.0069	0.0014
186	0.0089	0.0074	0.0015
187	0.0103	0.0086	0.0018
188	0.0113	0.0094	0.0019
189	0.0140	0.0116	0.0024
190	0.0162	0.0134	0.0028
191	0.0246	0.0204	0.0042
192	0.0356	0.0250	0.0106
193	0.1542	0.0250	0.1291
194	0.0193	0.0160	0.0033
195	0.0125	0.0104	0.0021
196	0.0096	0.0079	0.0016
197	0.0106	0.0088	0.0018
198	0.0093	0.0077	0.0016
199	0.0084	0.0070	0.0014
200	0.0077	0.0064	0.0013
201	0.0071	0.0059	0.0012
202	0.0066	0.0055	0.0011
203	0.0062	0.0052	0.0011
204	0.0059	0.0049	0.0010
205	0.0056	0.0046	0.0010
206	0.0053	0.0044	0.0009
207	0.0051	0.0042	0.0009
208	0.0049	0.0040	0.0008
209	0.0047	0.0039	0.0008
210	0.0045	0.0038	0.0008
211	0.0044	0.0036	0.0007
212	0.0042	0.0035	0.0007
213	0.0041	0.0034	0.0007
214	0.0040	0.0033	0.0007
215	0.0039	0.0032	0.0007
216	0.0038	0.0031	0.0006
217	0.0031	0.0026	0.0005
218	0.0031	0.0025	0.0005
219	0.0030	0.0025	0.0005
220	0.0029	0.0024	0.0005
221	0.0028	0.0024	0.0005
222	0.0028	0.0023	0.0005
223	0.0027	0.0023	0.0005
224	0.0027	0.0022	0.0005
225	0.0026	0.0022	0.0004
226	0.0026	0.0021	0.0004
227	0.0025	0.0021	0.0004
228	0.0025	0.0020	0.0004

229	0.0024	0.0020	0.0004
230	0.0024	0.0020	0.0004
231	0.0023	0.0019	0.0004
232	0.0023	0.0019	0.0004
233	0.0022	0.0019	0.0004
234	0.0022	0.0018	0.0004
235	0.0022	0.0018	0.0004
236	0.0021	0.0018	0.0004
237	0.0021	0.0018	0.0004
238	0.0021	0.0017	0.0004
239	0.0021	0.0017	0.0004
240	0.0020	0.0017	0.0003
241	0.0020	0.0017	0.0003
242	0.0020	0.0016	0.0003
243	0.0019	0.0016	0.0003
244	0.0019	0.0016	0.0003
245	0.0019	0.0016	0.0003
246	0.0019	0.0016	0.0003
247	0.0018	0.0015	0.0003
248	0.0018	0.0015	0.0003
249	0.0018	0.0015	0.0003
250	0.0018	0.0015	0.0003
251	0.0018	0.0015	0.0003
252	0.0017	0.0014	0.0003
253	0.0017	0.0014	0.0003
254	0.0017	0.0014	0.0003
255	0.0017	0.0014	0.0003
256	0.0017	0.0014	0.0003
257	0.0017	0.0014	0.0003
258	0.0016	0.0014	0.0003
259	0.0016	0.0013	0.0003
260	0.0016	0.0013	0.0003
261	0.0016	0.0013	0.0003
262	0.0016	0.0013	0.0003
263	0.0016	0.0013	0.0003
264	0.0015	0.0013	0.0003
265	0.0015	0.0013	0.0003
266	0.0015	0.0013	0.0003
267	0.0015	0.0012	0.0003
268	0.0015	0.0012	0.0003
269	0.0015	0.0012	0.0003
270	0.0015	0.0012	0.0003
271	0.0015	0.0012	0.0002
272	0.0014	0.0012	0.0002
273	0.0014	0.0012	0.0002
274	0.0014	0.0012	0.0002
275	0.0014	0.0012	0.0002
276	0.0014	0.0012	0.0002
277	0.0014	0.0011	0.0002
278	0.0014	0.0011	0.0002

279	0.0014	0.0011	0.0002
280	0.0014	0.0011	0.0002
281	0.0013	0.0011	0.0002
282	0.0013	0.0011	0.0002
283	0.0013	0.0011	0.0002
284	0.0013	0.0011	0.0002
285	0.0013	0.0011	0.0002
286	0.0013	0.0011	0.0002
287	0.0013	0.0011	0.0002
288	0.0013	0.0011	0.0002

Total soil rain loss = 0.78(In)
Total effective rainfall = 0.29(In)
Peak flow rate in flood hydrograph = 14.63(CFS)

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24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	5.0	10.0	15.0	20.0
0+ 5	0.0000	0.00	Q	|	|	|	|
0+10	0.0001	0.01	Q	|	|	|	|
0+15	0.0002	0.02	Q	|	|	|	|
0+20	0.0005	0.04	Q	|	|	|	|
0+25	0.0009	0.06	Q	|	|	|	|
0+30	0.0015	0.08	Q	|	|	|	|
0+35	0.0021	0.09	Q	|	|	|	|
0+40	0.0028	0.10	Q	|	|	|	|
0+45	0.0035	0.11	Q	|	|	|	|
0+50	0.0043	0.11	Q	|	|	|	|
0+55	0.0051	0.12	Q	|	|	|	|
1+ 0	0.0060	0.12	Q	|	|	|	|
1+ 5	0.0068	0.13	Q	|	|	|	|
1+10	0.0077	0.13	Q	|	|	|	|
1+15	0.0087	0.14	Q	|	|	|	|
1+20	0.0096	0.14	Q	|	|	|	|
1+25	0.0106	0.14	Q	|	|	|	|
1+30	0.0116	0.15	Q	|	|	|	|
1+35	0.0127	0.15	Q	|	|	|	|
1+40	0.0137	0.15	Q	|	|	|	|
1+45	0.0148	0.15	Q	|	|	|	|
1+50	0.0159	0.16	Q	|	|	|	|
1+55	0.0169	0.16	Q	|	|	|	|
2+ 0	0.0181	0.16	Q	|	|	|	|
2+ 5	0.0192	0.16	Q	|	|	|	|

2+10	0.0203	0.17	Q				
2+15	0.0215	0.17	Q				
2+20	0.0227	0.17	Q				
2+25	0.0238	0.17	Q				
2+30	0.0250	0.17	Q				
2+35	0.0262	0.18	Q				
2+40	0.0275	0.18	Q				
2+45	0.0287	0.18	Q				
2+50	0.0299	0.18	Q				
2+55	0.0312	0.18	Q				
3+ 0	0.0325	0.18	Q				
3+ 5	0.0338	0.19	Q				
3+10	0.0350	0.19	Q				
3+15	0.0363	0.19	Q				
3+20	0.0377	0.19	Q				
3+25	0.0390	0.19	Q				
3+30	0.0403	0.19	Q				
3+35	0.0417	0.20	Q				
3+40	0.0430	0.20	Q				
3+45	0.0444	0.20	QV				
3+50	0.0458	0.20	QV				
3+55	0.0471	0.20	QV				
4+ 0	0.0485	0.20	QV				
4+ 5	0.0499	0.20	QV				
4+10	0.0514	0.21	QV				
4+15	0.0528	0.21	QV				
4+20	0.0542	0.21	QV				
4+25	0.0557	0.21	QV				
4+30	0.0571	0.21	QV				
4+35	0.0586	0.21	QV				
4+40	0.0601	0.21	QV				
4+45	0.0616	0.22	QV				
4+50	0.0631	0.22	QV				
4+55	0.0646	0.22	QV				
5+ 0	0.0661	0.22	QV				
5+ 5	0.0676	0.22	QV				
5+10	0.0691	0.22	QV				
5+15	0.0707	0.22	QV				
5+20	0.0723	0.23	QV				
5+25	0.0738	0.23	QV				
5+30	0.0754	0.23	QV				
5+35	0.0770	0.23	QV				
5+40	0.0786	0.23	QV				
5+45	0.0802	0.23	QV				
5+50	0.0818	0.24	QV				
5+55	0.0835	0.24	QV				
6+ 0	0.0851	0.24	QV				
6+ 5	0.0868	0.24	Q V				
6+10	0.0884	0.24	Q V				
6+15	0.0901	0.24	Q V				

6+20	0.0917	0.24	Q V	|	|	|	|
6+25	0.0934	0.24	Q V	|	|	|	|
6+30	0.0951	0.25	Q V	|	|	|	|
6+35	0.0968	0.25	Q V	|	|	|	|
6+40	0.0985	0.25	Q V	|	|	|	|
6+45	0.1002	0.25	Q V	|	|	|	|
6+50	0.1020	0.25	Q V	|	|	|	|
6+55	0.1037	0.25	Q V	|	|	|	|
7+ 0	0.1055	0.25	Q V	|	|	|	|
7+ 5	0.1072	0.25	Q V	|	|	|	|
7+10	0.1090	0.26	Q V	|	|	|	|
7+15	0.1108	0.26	Q V	|	|	|	|
7+20	0.1125	0.26	Q V	|	|	|	|
7+25	0.1143	0.26	Q V	|	|	|	|
7+30	0.1161	0.26	Q V	|	|	|	|
7+35	0.1180	0.26	Q V	|	|	|	|
7+40	0.1198	0.27	Q V	|	|	|	|
7+45	0.1216	0.27	Q V	|	|	|	|
7+50	0.1235	0.27	Q V	|	|	|	|
7+55	0.1253	0.27	Q V	|	|	|	|
8+ 0	0.1272	0.27	Q V	|	|	|	|
8+ 5	0.1291	0.27	Q V	|	|	|	|
8+10	0.1310	0.28	Q V	|	|	|	|
8+15	0.1329	0.28	Q V	|	|	|	|
8+20	0.1348	0.28	Q V	|	|	|	|
8+25	0.1367	0.28	Q V	|	|	|	|
8+30	0.1387	0.28	Q V	|	|	|	|
8+35	0.1406	0.28	Q V	|	|	|	|
8+40	0.1426	0.29	Q V	|	|	|	|
8+45	0.1446	0.29	Q V	|	|	|	|
8+50	0.1466	0.29	Q V	|	|	|	|
8+55	0.1486	0.29	Q V	|	|	|	|
9+ 0	0.1506	0.29	Q V	|	|	|	|
9+ 5	0.1527	0.30	Q V	|	|	|	|
9+10	0.1547	0.30	Q V	|	|	|	|
9+15	0.1568	0.30	Q V	|	|	|	|
9+20	0.1589	0.30	Q V	|	|	|	|
9+25	0.1609	0.30	Q V	|	|	|	|
9+30	0.1631	0.31	Q V	|	|	|	|
9+35	0.1652	0.31	Q V	|	|	|	|
9+40	0.1673	0.31	Q V	|	|	|	|
9+45	0.1695	0.31	Q V	|	|	|	|
9+50	0.1717	0.32	Q V	|	|	|	|
9+55	0.1739	0.32	Q V	|	|	|	|
10+ 0	0.1761	0.32	Q V	|	|	|	|
10+ 5	0.1783	0.32	Q V	|	|	|	|
10+10	0.1805	0.33	Q V	|	|	|	|
10+15	0.1828	0.33	Q V	|	|	|	|
10+20	0.1851	0.33	Q V	|	|	|	|
10+25	0.1874	0.33	Q V	|	|	|	|

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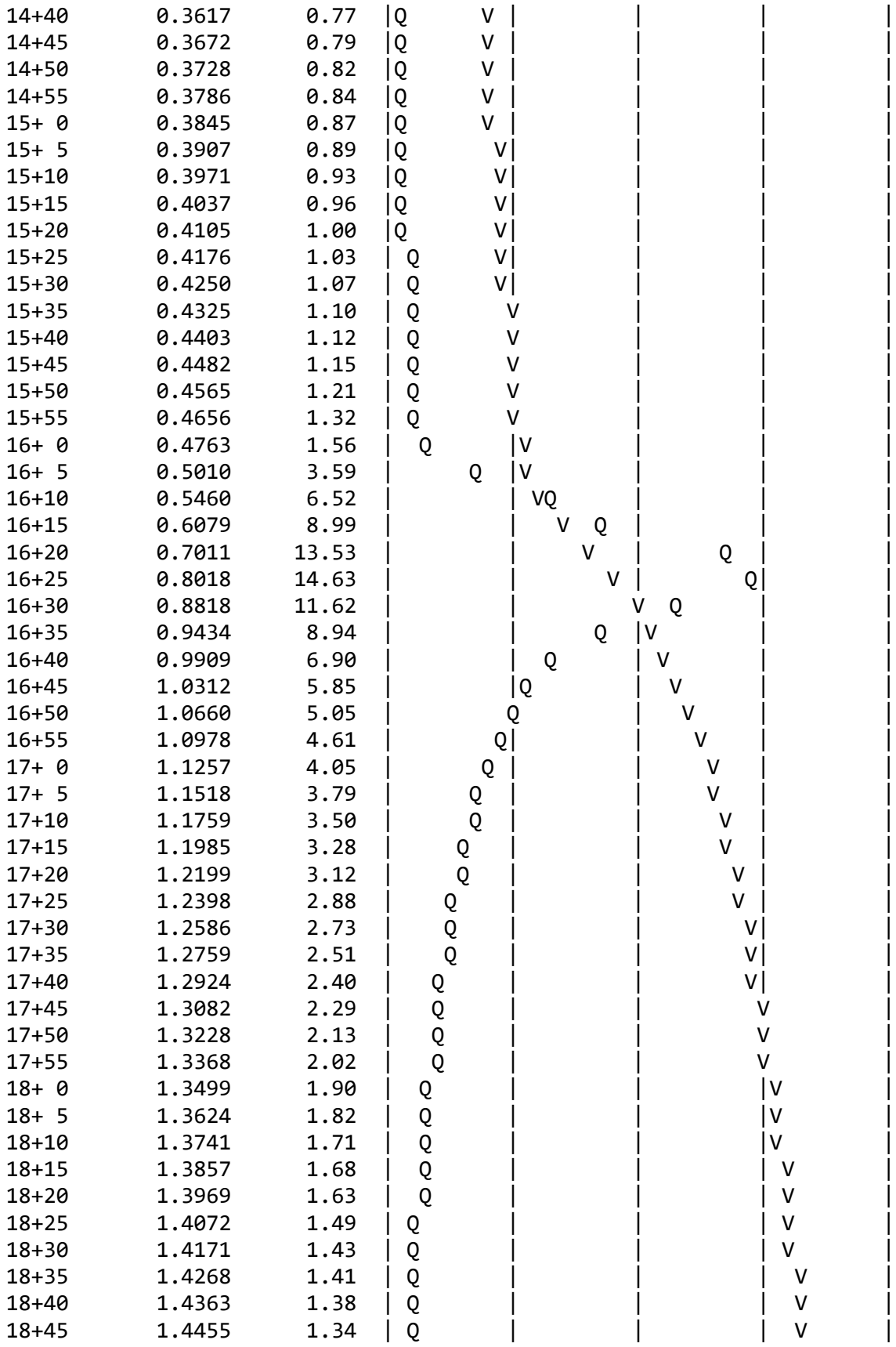
10+30       0.1897      0.34  Q   V     |           |           |           |
10+35       0.1921      0.34  Q   V     |           |           |           |
10+40       0.1944      0.34  Q   V     |           |           |           |
10+45       0.1968      0.35  Q   V     |           |           |           |
10+50       0.1992      0.35  Q   V     |           |           |           |
10+55       0.2016      0.35  Q   V     |           |           |           |
11+ 0       0.2041      0.36  Q   V     |           |           |           |
11+ 5       0.2066      0.36  Q   V     |           |           |           |
11+10       0.2091      0.36  Q   V     |           |           |           |
11+15       0.2116      0.37  Q   V     |           |           |           |
11+20       0.2141      0.37  Q   V     |           |           |           |
11+25       0.2167      0.37  Q    V    |           |           |           |
11+30       0.2193      0.38  Q    V    |           |           |           |
11+35       0.2219      0.38  Q    V    |           |           |           |
11+40       0.2246      0.38  Q    V    |           |           |           |
11+45       0.2272      0.39  Q    V    |           |           |           |
11+50       0.2300      0.39  Q    V    |           |           |           |
11+55       0.2327      0.40  Q    V    |           |           |           |
12+ 0       0.2355      0.40  Q    V    |           |           |           |
12+ 5       0.2383      0.41  Q    V    |           |           |           |
12+10       0.2411      0.42  Q    V    |           |           |           |
12+15       0.2441      0.43  Q    V    |           |           |           |
12+20       0.2471      0.44  Q    V    |           |           |           |
12+25       0.2502      0.45  Q    V    |           |           |           |
12+30       0.2534      0.47  Q    V    |           |           |           |
12+35       0.2567      0.48  Q    V    |           |           |           |
12+40       0.2601      0.49  Q     V   |           |           |           |
12+45       0.2635      0.50  Q     V   |           |           |           |
12+50       0.2669      0.50  |Q    V   |           |           |           |
12+55       0.2705      0.51  |Q    V   |           |           |           |
13+ 0       0.2741      0.52  |Q    V   |           |           |           |
13+ 5       0.2777      0.53  |Q    V   |           |           |           |
13+10       0.2814      0.54  |Q    V   |           |           |           |
13+15       0.2852      0.55  |Q    V   |           |           |           |
13+20       0.2891      0.56  |Q    V   |           |           |           |
13+25       0.2930      0.57  |Q    V   |           |           |           |
13+30       0.2970      0.58  |Q    V   |           |           |           |
13+35       0.3010      0.59  |Q    V   |           |           |           |
13+40       0.3051      0.60  |Q     V  |           |           |           |
13+45       0.3093      0.61  |Q     V  |           |           |           |
13+50       0.3136      0.62  |Q     V  |           |           |           |
13+55       0.3180      0.63  |Q     V  |           |           |           |
14+ 0       0.3224      0.65  |Q     V  |           |           |           |
14+ 5       0.3270      0.66  |Q     V  |           |           |           |
14+10       0.3316      0.67  |Q     V  |           |           |           |
14+15       0.3363      0.69  |Q     V  |           |           |           |
14+20       0.3412      0.70  |Q     V  |           |           |           |
14+25       0.3461      0.72  |Q      V |           |           |           |
14+30       0.3512      0.74  |Q      V |           |           |           |
14+35       0.3564      0.75  |Q      V |           |           |           |
```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14+50 0.3728 0.82
14+55 0.3786 0.84
15+ 0 0.3845 0.87
15+ 5 0.3907 0.89
15+10 0.3971 0.93
15+15 0.4037 0.96
15+20 0.4105 1.00
15+25 0.4176 1.03
15+30 0.4250 1.07
15+35 0.4325 1.10
15+40 0.4403 1.12
15+45 0.4482 1.15
15+50 0.4565 1.21
15+55 0.4656 1.32
16+ 0 0.4763 1.56
16+ 5 0.5010 3.59
16+10 0.5460 6.52
16+15 0.6079 8.99
16+20 0.7011 13.53
16+25 0.8018 14.63
16+30 0.8818 11.62
16+35 0.9434 8.94
16+40 0.9909 6.90
16+45 1.0312 5.85
16+50 1.0660 5.05
16+55 1.0978 4.61
17+ 0 1.1257 4.05
17+ 5 1.1518 3.79
17+10 1.1759 3.50
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17+20 1.2199 3.12
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17+30 1.2586 2.73
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17+40 1.2924 2.40
17+45 1.3082 2.29
17+50 1.3228 2.13
17+55 1.3368 2.02
18+ 0 1.3499 1.90
18+ 5 1.3624 1.82
18+10 1.3741 1.71
18+15 1.3857 1.68
18+20 1.3969 1.63
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18+30 1.4171 1.43
18+35 1.4268 1.41
18+40 1.4363 1.38
18+45 1.4455 1.34

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18+50       1.4546      1.32  | Q       |         |         |  V      |
18+55       1.4635      1.29  | Q       |         |         |  V      |
19+ 0       1.4716      1.18  | Q       |         |         |   V     |
19+ 5       1.4795      1.14  | Q       |         |         |   V     |
19+10       1.4872      1.13  | Q       |         |         |   V     |
19+15       1.4948      1.10  | Q       |         |         |   V     |
19+20       1.5022      1.07  | Q       |         |         |   V     |
19+25       1.5095      1.06  | Q       |         |         |   V     |
19+30       1.5166      1.04  | Q       |         |         |    V    |
19+35       1.5233      0.98  |Q        |         |         |    V    |
19+40       1.5299      0.96  |Q        |         |         |    V    |
19+45       1.5364      0.95  |Q        |         |         |    V    |
19+50       1.5428      0.92  |Q        |         |         |    V    |
19+55       1.5489      0.90  |Q        |         |         |    V    |
20+ 0       1.5550      0.88  |Q        |         |         |     V   |
20+ 5       1.5610      0.86  |Q        |         |         |     V   |
20+10       1.5665      0.81  |Q        |         |         |     V   |
20+15       1.5720      0.79  |Q        |         |         |     V   |
20+20       1.5773      0.78  |Q        |         |         |     V   |
20+25       1.5825      0.75  |Q        |         |         |     V   |
20+30       1.5876      0.73  |Q        |         |         |     V   |
20+35       1.5926      0.73  |Q        |         |         |     V   |
20+40       1.5976      0.72  |Q        |         |         |      V  |
20+45       1.6025      0.71  |Q        |         |         |      V  |
20+50       1.6073      0.71  |Q        |         |         |      V  |
20+55       1.6121      0.70  |Q        |         |         |      V  |
21+ 0       1.6169      0.69  |Q        |         |         |      V  |
21+ 5       1.6216      0.69  |Q        |         |         |      V  |
21+10       1.6263      0.68  |Q        |         |         |      V  |
21+15       1.6309      0.67  |Q        |         |         |      V  |
21+20       1.6355      0.67  |Q        |         |         |      V  |
21+25       1.6401      0.66  |Q        |         |         |       V |
21+30       1.6446      0.65  |Q        |         |         |       V |
21+35       1.6490      0.64  |Q        |         |         |       V |
21+40       1.6534      0.64  |Q        |         |         |       V |
21+45       1.6576      0.62  |Q        |         |         |       V |
21+50       1.6610      0.49  Q         |         |         |       V |
21+55       1.6631      0.31  Q         |         |         |       V |
22+ 0       1.6652      0.30  Q         |         |         |       V |
22+ 5       1.6672      0.29  Q         |         |         |       V |
22+10       1.6692      0.29  Q         |         |         |       V |
22+15       1.6711      0.28  Q         |         |         |       V |
22+20       1.6730      0.28  Q         |         |         |       V |
22+25       1.6749      0.27  Q         |         |         |       V |
22+30       1.6767      0.27  Q         |         |         |       V |
22+35       1.6785      0.26  Q         |         |         |       V |
22+40       1.6803      0.26  Q         |         |         |       V |
22+45       1.6820      0.26  Q         |         |         |       V |
22+50       1.6838      0.25  Q         |         |         |        V|
22+55       1.6855      0.25  Q         |         |         |        V|
```

23+ 0	1.6872	0.25	Q	|	|	|	V|
23+ 5	1.6888	0.24	Q	|	|	|	V|
23+10	1.6905	0.24	Q	|	|	|	V|
23+15	1.6921	0.24	Q	|	|	|	V|
23+20	1.6937	0.23	Q	|	|	|	V|
23+25	1.6953	0.23	Q	|	|	|	V|
23+30	1.6969	0.23	Q	|	|	|	V|
23+35	1.6985	0.23	Q	|	|	|	V|
23+40	1.7000	0.22	Q	|	|	|	V|
23+45	1.7015	0.22	Q	|	|	|	V|
23+50	1.7030	0.22	Q	|	|	|	V|
23+55	1.7045	0.22	Q	|	|	|	V|
24+ 0	1.7060	0.21	Q	|	|	|	V|
24+ 5	1.7074	0.21	Q	|	|	|	V|
24+10	1.7088	0.20	Q	|	|	|	V|
24+15	1.7101	0.19	Q	|	|	|	V|
24+20	1.7113	0.17	Q	|	|	|	V|
24+25	1.7123	0.14	Q	|	|	|	V|
24+30	1.7131	0.13	Q	|	|	|	V|
24+35	1.7139	0.11	Q	|	|	|	V|
24+40	1.7147	0.10	Q	|	|	|	V|
24+45	1.7153	0.10	Q	|	|	|	V|
24+50	1.7159	0.09	Q	|	|	|	V|
24+55	1.7165	0.08	Q	|	|	|	V|
25+ 0	1.7171	0.08	Q	|	|	|	V|
25+ 5	1.7176	0.07	Q	|	|	|	V|
25+10	1.7180	0.07	Q	|	|	|	V|
25+15	1.7185	0.07	Q	|	|	|	V|
25+20	1.7189	0.06	Q	|	|	|	V|
25+25	1.7193	0.06	Q	|	|	|	V|
25+30	1.7197	0.06	Q	|	|	|	V|
25+35	1.7201	0.05	Q	|	|	|	V|
25+40	1.7204	0.05	Q	|	|	|	V|
25+45	1.7207	0.05	Q	|	|	|	V|
25+50	1.7210	0.04	Q	|	|	|	V|
25+55	1.7213	0.04	Q	|	|	|	V|
26+ 0	1.7216	0.04	Q	|	|	|	V|
26+ 5	1.7219	0.04	Q	|	|	|	V|
26+10	1.7221	0.04	Q	|	|	|	V|
26+15	1.7224	0.03	Q	|	|	|	V|
26+20	1.7226	0.03	Q	|	|	|	V|
26+25	1.7228	0.03	Q	|	|	|	V|
26+30	1.7230	0.03	Q	|	|	|	V|
26+35	1.7232	0.03	Q	|	|	|	V|
26+40	1.7234	0.03	Q	|	|	|	V|
26+45	1.7236	0.03	Q	|	|	|	V|
26+50	1.7238	0.02	Q	|	|	|	V|
26+55	1.7239	0.02	Q	|	|	|	V|
27+ 0	1.7241	0.02	Q	|	|	|	V|
27+ 5	1.7242	0.02	Q	|	|	|	V|

27+10	1.7244	0.02	Q	|	|	|	V|
27+15	1.7245	0.02	Q	|	|	|	V|
27+20	1.7246	0.02	Q	|	|	|	V|
27+25	1.7247	0.02	Q	|	|	|	V|
27+30	1.7249	0.02	Q	|	|	|	V|
27+35	1.7250	0.02	Q	|	|	|	V|
27+40	1.7251	0.01	Q	|	|	|	V|
27+45	1.7252	0.01	Q	|	|	|	V|
27+50	1.7253	0.01	Q	|	|	|	V|
27+55	1.7253	0.01	Q	|	|	|	V|
28+ 0	1.7254	0.01	Q	|	|	|	V|
28+ 5	1.7255	0.01	Q	|	|	|	V|
28+10	1.7256	0.01	Q	|	|	|	V|
28+15	1.7256	0.01	Q	|	|	|	V|
28+20	1.7257	0.01	Q	|	|	|	V|
28+25	1.7258	0.01	Q	|	|	|	V|
28+30	1.7258	0.01	Q	|	|	|	V|
28+35	1.7259	0.01	Q	|	|	|	V|
28+40	1.7259	0.01	Q	|	|	|	V|
28+45	1.7260	0.01	Q	|	|	|	V|
28+50	1.7260	0.01	Q	|	|	|	V|
28+55	1.7260	0.01	Q	|	|	|	V|
29+ 0	1.7261	0.00	Q	|	|	|	V|
29+ 5	1.7261	0.00	Q	|	|	|	V|
29+10	1.7261	0.00	Q	|	|	|	V|
29+15	1.7262	0.00	Q	|	|	|	V|
29+20	1.7262	0.00	Q	|	|	|	V|
29+25	1.7262	0.00	Q	|	|	|	V|
29+30	1.7262	0.00	Q	|	|	|	V|
29+35	1.7262	0.00	Q	|	|	|	V|
29+40	1.7262	0.00	Q	|	|	|	V|
29+45	1.7262	0.00	Q	|	|	|	V|

U n i t H y d r o g r a p h A n a l y s i s

Study date 04/01/21

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 6353

PROJECT LOKI
EXISTING CONDITION 10-YR STORM

Storm Event Year = 10

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 10		
71.40	1	0.56
Rainfall data for year 10		
71.40	6	1.08
Rainfall data for year 10		
71.40	24	1.81

++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	SCS curve NO.(AMC 2)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
84.0	84.0	71.40	1.000	0.301	1.000	0.301

Area-averaged adjusted loss rate Fm (In/Hr) = 0.301

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
71.40	1.000	84.0	84.0	1.90	0.338

Area-averaged catchment yield fraction, Y = 0.338
Area-averaged low loss fraction, Yb = 0.662
User entry of time of concentration = 0.696 (hours)
++
Watershed area = 71.40(Ac.)
Catchment Lag time = 0.557 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 14.9665
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.301(In/Hr)
Average low loss rate fraction (Yb) = 0.662 (decimal)
MOUNTAIN S-Graph Selected
Computed peak 5-minute rainfall = 0.265(In)
Computed peak 30-minute rainfall = 0.454(In)
Specified peak 1-hour rainfall = 0.559(In)
Computed peak 3-hour rainfall = 0.837(In)
Specified peak 6-hour rainfall = 1.080(In)
Specified peak 24-hour rainfall = 1.810(In)

Rainfall depth area reduction factors:
Using a total area of 71.40(Ac.) (Ref: fig. E-4)

5-minute factor = 0.997 Adjusted rainfall = 0.264(In)
30-minute factor = 0.997 Adjusted rainfall = 0.453(In)
1-hour factor = 0.997 Adjusted rainfall = 0.557(In)
3-hour factor = 1.000 Adjusted rainfall = 0.837(In)
6-hour factor = 1.000 Adjusted rainfall = 1.080(In)
24-hour factor = 1.000 Adjusted rainfall = 1.810(In)

U n i t H y d r o g r a p h
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Interval 'S' Graph Unit Hydrograph

Number	Mean values	((CFS))
	(K = 863.49 (CFS))	
1	1.646	14.216
2	5.874	36.502
3	12.259	55.140
4	22.941	92.235
5	34.330	98.346
6	42.714	72.391
7	48.926	53.642
8	53.407	38.695
9	57.118	32.039
10	60.230	26.876
11	62.944	23.431
12	65.321	20.532
13	67.443	18.320
14	69.430	17.157
15	71.242	15.645
16	72.926	14.543
17	74.472	13.351
18	75.848	11.885
19	77.142	11.170
20	78.348	10.411
21	79.463	9.631
22	80.476	8.748
23	81.405	8.018
24	82.280	7.559
25	83.067	6.797
26	83.846	6.720
27	84.618	6.672
28	85.286	5.769
29	85.915	5.428
30	86.543	5.428
31	87.159	5.315
32	87.758	5.170
33	88.356	5.169
34	88.934	4.988
35	89.423	4.222
36	89.902	4.136
37	90.380	4.127
38	90.837	3.949
39	91.286	3.877
40	91.735	3.877
41	92.159	3.663
42	92.549	3.362
43	92.938	3.360
44	93.322	3.318
45	93.684	3.126
46	94.043	3.102

47	94.401	3.088
48	94.718	2.738
49	95.017	2.585
50	95.317	2.585
51	95.604	2.483
52	95.874	2.328
53	96.143	2.326
54	96.413	2.326
55	96.682	2.326
56	96.952	2.326
57	97.221	2.326
58	97.490	2.326
59	97.760	2.326
60	98.029	2.326
61	98.298	2.326
62	98.568	2.326
63	98.837	2.326
64	99.107	2.326
65	99.376	2.326
66	99.645	2.326
67	100.000	1.163

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.2644	0.2644
2	0.3255	0.0611
3	0.3676	0.0421
4	0.4007	0.0331
5	0.4284	0.0277
6	0.4525	0.0241
7	0.4739	0.0214
8	0.4933	0.0194
9	0.5111	0.0177
10	0.5275	0.0164
11	0.5428	0.0153
12	0.5571	0.0144
13	0.5739	0.0168
14	0.5898	0.0160
15	0.6051	0.0153
16	0.6197	0.0146
17	0.6338	0.0141
18	0.6474	0.0136
19	0.6605	0.0131
20	0.6731	0.0127
21	0.6854	0.0123
22	0.6973	0.0119
23	0.7089	0.0116
24	0.7201	0.0113
25	0.7311	0.0110
26	0.7418	0.0107

27	0.7522	0.0104
28	0.7624	0.0102
29	0.7724	0.0100
30	0.7821	0.0098
31	0.7917	0.0096
32	0.8010	0.0094
33	0.8102	0.0092
34	0.8192	0.0090
35	0.8281	0.0088
36	0.8367	0.0087
37	0.8452	0.0085
38	0.8536	0.0083
39	0.8618	0.0082
40	0.8698	0.0081
41	0.8778	0.0079
42	0.8856	0.0078
43	0.8933	0.0077
44	0.9009	0.0076
45	0.9083	0.0075
46	0.9157	0.0074
47	0.9230	0.0073
48	0.9301	0.0072
49	0.9372	0.0071
50	0.9442	0.0070
51	0.9511	0.0069
52	0.9579	0.0068
53	0.9647	0.0067
54	0.9713	0.0067
55	0.9779	0.0066
56	0.9844	0.0065
57	0.9908	0.0064
58	0.9972	0.0064
59	1.0035	0.0063
60	1.0097	0.0062
61	1.0159	0.0062
62	1.0220	0.0061
63	1.0280	0.0060
64	1.0340	0.0060
65	1.0399	0.0059
66	1.0457	0.0059
67	1.0515	0.0058
68	1.0573	0.0057
69	1.0630	0.0057
70	1.0686	0.0056
71	1.0742	0.0056
72	1.0798	0.0055
73	1.0853	0.0056
74	1.0908	0.0055
75	1.0963	0.0055
76	1.1017	0.0054

77	1.1071	0.0054
78	1.1124	0.0053
79	1.1177	0.0053
80	1.1230	0.0053
81	1.1282	0.0052
82	1.1334	0.0052
83	1.1385	0.0051
84	1.1436	0.0051
85	1.1486	0.0051
86	1.1537	0.0050
87	1.1586	0.0050
88	1.1636	0.0049
89	1.1685	0.0049
90	1.1734	0.0049
91	1.1782	0.0048
92	1.1830	0.0048
93	1.1878	0.0048
94	1.1925	0.0047
95	1.1972	0.0047
96	1.2019	0.0047
97	1.2066	0.0046
98	1.2112	0.0046
99	1.2158	0.0046
100	1.2203	0.0046
101	1.2249	0.0045
102	1.2294	0.0045
103	1.2339	0.0045
104	1.2383	0.0044
105	1.2427	0.0044
106	1.2471	0.0044
107	1.2515	0.0044
108	1.2558	0.0043
109	1.2602	0.0043
110	1.2645	0.0043
111	1.2687	0.0043
112	1.2730	0.0042
113	1.2772	0.0042
114	1.2814	0.0042
115	1.2856	0.0042
116	1.2897	0.0042
117	1.2939	0.0041
118	1.2980	0.0041
119	1.3021	0.0041
120	1.3061	0.0041
121	1.3102	0.0040
122	1.3142	0.0040
123	1.3182	0.0040
124	1.3222	0.0040
125	1.3261	0.0040
126	1.3301	0.0039

127	1.3340	0.0039
128	1.3379	0.0039
129	1.3418	0.0039
130	1.3457	0.0039
131	1.3495	0.0038
132	1.3533	0.0038
133	1.3571	0.0038
134	1.3609	0.0038
135	1.3647	0.0038
136	1.3685	0.0038
137	1.3722	0.0037
138	1.3759	0.0037
139	1.3796	0.0037
140	1.3833	0.0037
141	1.3870	0.0037
142	1.3907	0.0037
143	1.3943	0.0036
144	1.3979	0.0036
145	1.4015	0.0036
146	1.4051	0.0036
147	1.4087	0.0036
148	1.4123	0.0036
149	1.4158	0.0035
150	1.4193	0.0035
151	1.4229	0.0035
152	1.4264	0.0035
153	1.4299	0.0035
154	1.4333	0.0035
155	1.4368	0.0035
156	1.4402	0.0034
157	1.4437	0.0034
158	1.4471	0.0034
159	1.4505	0.0034
160	1.4539	0.0034
161	1.4573	0.0034
162	1.4606	0.0034
163	1.4640	0.0034
164	1.4673	0.0033
165	1.4707	0.0033
166	1.4740	0.0033
167	1.4773	0.0033
168	1.4806	0.0033
169	1.4838	0.0033
170	1.4871	0.0033
171	1.4904	0.0033
172	1.4936	0.0032
173	1.4968	0.0032
174	1.5000	0.0032
175	1.5033	0.0032
176	1.5064	0.0032

177	1.5096	0.0032
178	1.5128	0.0032
179	1.5160	0.0032
180	1.5191	0.0031
181	1.5223	0.0031
182	1.5254	0.0031
183	1.5285	0.0031
184	1.5316	0.0031
185	1.5347	0.0031
186	1.5378	0.0031
187	1.5409	0.0031
188	1.5439	0.0031
189	1.5470	0.0031
190	1.5500	0.0030
191	1.5531	0.0030
192	1.5561	0.0030
193	1.5591	0.0030
194	1.5621	0.0030
195	1.5651	0.0030
196	1.5681	0.0030
197	1.5711	0.0030
198	1.5740	0.0030
199	1.5770	0.0030
200	1.5799	0.0029
201	1.5829	0.0029
202	1.5858	0.0029
203	1.5887	0.0029
204	1.5916	0.0029
205	1.5945	0.0029
206	1.5974	0.0029
207	1.6003	0.0029
208	1.6032	0.0029
209	1.6061	0.0029
210	1.6089	0.0029
211	1.6118	0.0029
212	1.6146	0.0028
213	1.6174	0.0028
214	1.6203	0.0028
215	1.6231	0.0028
216	1.6259	0.0028
217	1.6287	0.0028
218	1.6315	0.0028
219	1.6343	0.0028
220	1.6370	0.0028
221	1.6398	0.0028
222	1.6426	0.0028
223	1.6453	0.0028
224	1.6481	0.0027
225	1.6508	0.0027
226	1.6535	0.0027

227	1.6563	0.0027
228	1.6590	0.0027
229	1.6617	0.0027
230	1.6644	0.0027
231	1.6671	0.0027
232	1.6698	0.0027
233	1.6724	0.0027
234	1.6751	0.0027
235	1.6778	0.0027
236	1.6804	0.0027
237	1.6831	0.0026
238	1.6857	0.0026
239	1.6884	0.0026
240	1.6910	0.0026
241	1.6936	0.0026
242	1.6962	0.0026
243	1.6988	0.0026
244	1.7014	0.0026
245	1.7040	0.0026
246	1.7066	0.0026
247	1.7092	0.0026
248	1.7118	0.0026
249	1.7143	0.0026
250	1.7169	0.0026
251	1.7195	0.0026
252	1.7220	0.0025
253	1.7245	0.0025
254	1.7271	0.0025
255	1.7296	0.0025
256	1.7321	0.0025
257	1.7347	0.0025
258	1.7372	0.0025
259	1.7397	0.0025
260	1.7422	0.0025
261	1.7447	0.0025
262	1.7472	0.0025
263	1.7496	0.0025
264	1.7521	0.0025
265	1.7546	0.0025
266	1.7570	0.0025
267	1.7595	0.0025
268	1.7620	0.0025
269	1.7644	0.0024
270	1.7668	0.0024
271	1.7693	0.0024
272	1.7717	0.0024
273	1.7741	0.0024
274	1.7765	0.0024
275	1.7790	0.0024
276	1.7814	0.0024

277	1.7838	0.0024
278	1.7862	0.0024
279	1.7886	0.0024
280	1.7909	0.0024
281	1.7933	0.0024
282	1.7957	0.0024
283	1.7981	0.0024
284	1.8004	0.0024
285	1.8028	0.0024
286	1.8051	0.0024
287	1.8075	0.0023
288	1.8098	0.0023

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0023	0.0016	0.0008
2	0.0023	0.0016	0.0008
3	0.0024	0.0016	0.0008
4	0.0024	0.0016	0.0008
5	0.0024	0.0016	0.0008
6	0.0024	0.0016	0.0008
7	0.0024	0.0016	0.0008
8	0.0024	0.0016	0.0008
9	0.0024	0.0016	0.0008
10	0.0024	0.0016	0.0008
11	0.0024	0.0016	0.0008
12	0.0024	0.0016	0.0008
13	0.0024	0.0016	0.0008
14	0.0024	0.0016	0.0008
15	0.0025	0.0016	0.0008
16	0.0025	0.0016	0.0008
17	0.0025	0.0016	0.0008
18	0.0025	0.0016	0.0008
19	0.0025	0.0016	0.0008
20	0.0025	0.0017	0.0008
21	0.0025	0.0017	0.0009
22	0.0025	0.0017	0.0009
23	0.0025	0.0017	0.0009
24	0.0025	0.0017	0.0009
25	0.0025	0.0017	0.0009
26	0.0026	0.0017	0.0009
27	0.0026	0.0017	0.0009
28	0.0026	0.0017	0.0009
29	0.0026	0.0017	0.0009
30	0.0026	0.0017	0.0009
31	0.0026	0.0017	0.0009
32	0.0026	0.0017	0.0009
33	0.0026	0.0017	0.0009

34	0.0026	0.0017	0.0009
35	0.0026	0.0018	0.0009
36	0.0027	0.0018	0.0009
37	0.0027	0.0018	0.0009
38	0.0027	0.0018	0.0009
39	0.0027	0.0018	0.0009
40	0.0027	0.0018	0.0009
41	0.0027	0.0018	0.0009
42	0.0027	0.0018	0.0009
43	0.0027	0.0018	0.0009
44	0.0027	0.0018	0.0009
45	0.0028	0.0018	0.0009
46	0.0028	0.0018	0.0009
47	0.0028	0.0018	0.0009
48	0.0028	0.0018	0.0009
49	0.0028	0.0019	0.0010
50	0.0028	0.0019	0.0010
51	0.0028	0.0019	0.0010
52	0.0028	0.0019	0.0010
53	0.0029	0.0019	0.0010
54	0.0029	0.0019	0.0010
55	0.0029	0.0019	0.0010
56	0.0029	0.0019	0.0010
57	0.0029	0.0019	0.0010
58	0.0029	0.0019	0.0010
59	0.0029	0.0019	0.0010
60	0.0029	0.0020	0.0010
61	0.0030	0.0020	0.0010
62	0.0030	0.0020	0.0010
63	0.0030	0.0020	0.0010
64	0.0030	0.0020	0.0010
65	0.0030	0.0020	0.0010
66	0.0030	0.0020	0.0010
67	0.0031	0.0020	0.0010
68	0.0031	0.0020	0.0010
69	0.0031	0.0020	0.0010
70	0.0031	0.0020	0.0010
71	0.0031	0.0021	0.0011
72	0.0031	0.0021	0.0011
73	0.0031	0.0021	0.0011
74	0.0032	0.0021	0.0011
75	0.0032	0.0021	0.0011
76	0.0032	0.0021	0.0011
77	0.0032	0.0021	0.0011
78	0.0032	0.0021	0.0011
79	0.0033	0.0022	0.0011
80	0.0033	0.0022	0.0011
81	0.0033	0.0022	0.0011
82	0.0033	0.0022	0.0011
83	0.0033	0.0022	0.0011

84	0.0033	0.0022	0.0011
85	0.0034	0.0022	0.0011
86	0.0034	0.0022	0.0011
87	0.0034	0.0023	0.0012
88	0.0034	0.0023	0.0012
89	0.0034	0.0023	0.0012
90	0.0035	0.0023	0.0012
91	0.0035	0.0023	0.0012
92	0.0035	0.0023	0.0012
93	0.0035	0.0023	0.0012
94	0.0035	0.0023	0.0012
95	0.0036	0.0024	0.0012
96	0.0036	0.0024	0.0012
97	0.0036	0.0024	0.0012
98	0.0036	0.0024	0.0012
99	0.0037	0.0024	0.0012
100	0.0037	0.0024	0.0012
101	0.0037	0.0025	0.0013
102	0.0037	0.0025	0.0013
103	0.0038	0.0025	0.0013
104	0.0038	0.0025	0.0013
105	0.0038	0.0025	0.0013
106	0.0038	0.0025	0.0013
107	0.0039	0.0026	0.0013
108	0.0039	0.0026	0.0013
109	0.0039	0.0026	0.0013
110	0.0040	0.0026	0.0013
111	0.0040	0.0026	0.0014
112	0.0040	0.0027	0.0014
113	0.0041	0.0027	0.0014
114	0.0041	0.0027	0.0014
115	0.0041	0.0027	0.0014
116	0.0042	0.0027	0.0014
117	0.0042	0.0028	0.0014
118	0.0042	0.0028	0.0014
119	0.0043	0.0028	0.0014
120	0.0043	0.0028	0.0015
121	0.0043	0.0029	0.0015
122	0.0044	0.0029	0.0015
123	0.0044	0.0029	0.0015
124	0.0044	0.0029	0.0015
125	0.0045	0.0030	0.0015
126	0.0045	0.0030	0.0015
127	0.0046	0.0030	0.0016
128	0.0046	0.0031	0.0016
129	0.0047	0.0031	0.0016
130	0.0047	0.0031	0.0016
131	0.0048	0.0032	0.0016
132	0.0048	0.0032	0.0016
133	0.0049	0.0032	0.0016

134	0.0049	0.0032	0.0017
135	0.0050	0.0033	0.0017
136	0.0050	0.0033	0.0017
137	0.0051	0.0034	0.0017
138	0.0051	0.0034	0.0017
139	0.0052	0.0034	0.0018
140	0.0053	0.0035	0.0018
141	0.0053	0.0035	0.0018
142	0.0054	0.0036	0.0018
143	0.0055	0.0036	0.0019
144	0.0055	0.0036	0.0019
145	0.0055	0.0037	0.0019
146	0.0056	0.0037	0.0019
147	0.0057	0.0038	0.0019
148	0.0057	0.0038	0.0019
149	0.0059	0.0039	0.0020
150	0.0059	0.0039	0.0020
151	0.0060	0.0040	0.0020
152	0.0061	0.0040	0.0021
153	0.0062	0.0041	0.0021
154	0.0063	0.0042	0.0021
155	0.0064	0.0043	0.0022
156	0.0065	0.0043	0.0022
157	0.0067	0.0044	0.0023
158	0.0067	0.0045	0.0023
159	0.0069	0.0046	0.0023
160	0.0070	0.0046	0.0024
161	0.0072	0.0047	0.0024
162	0.0073	0.0048	0.0025
163	0.0075	0.0049	0.0025
164	0.0076	0.0050	0.0026
165	0.0078	0.0052	0.0026
166	0.0079	0.0053	0.0027
167	0.0082	0.0054	0.0028
168	0.0083	0.0055	0.0028
169	0.0087	0.0057	0.0029
170	0.0088	0.0058	0.0030
171	0.0092	0.0061	0.0031
172	0.0094	0.0062	0.0032
173	0.0098	0.0065	0.0033
174	0.0100	0.0066	0.0034
175	0.0104	0.0069	0.0035
176	0.0107	0.0071	0.0036
177	0.0113	0.0074	0.0038
178	0.0116	0.0077	0.0039
179	0.0123	0.0081	0.0042
180	0.0127	0.0084	0.0043
181	0.0136	0.0090	0.0046
182	0.0141	0.0093	0.0048
183	0.0153	0.0101	0.0052

184	0.0160	0.0106	0.0054
185	0.0144	0.0095	0.0049
186	0.0153	0.0101	0.0052
187	0.0177	0.0117	0.0060
188	0.0194	0.0128	0.0066
189	0.0241	0.0159	0.0082
190	0.0277	0.0184	0.0094
191	0.0421	0.0250	0.0170
192	0.0611	0.0250	0.0361
193	0.2644	0.0250	0.2393
194	0.0331	0.0219	0.0112
195	0.0214	0.0142	0.0072
196	0.0164	0.0109	0.0056
197	0.0168	0.0111	0.0057
198	0.0146	0.0097	0.0050
199	0.0131	0.0087	0.0044
200	0.0119	0.0079	0.0040
201	0.0110	0.0073	0.0037
202	0.0102	0.0067	0.0035
203	0.0096	0.0063	0.0032
204	0.0090	0.0060	0.0030
205	0.0085	0.0056	0.0029
206	0.0081	0.0053	0.0027
207	0.0077	0.0051	0.0026
208	0.0074	0.0049	0.0025
209	0.0071	0.0047	0.0024
210	0.0068	0.0045	0.0023
211	0.0066	0.0044	0.0022
212	0.0064	0.0042	0.0022
213	0.0062	0.0041	0.0021
214	0.0060	0.0040	0.0020
215	0.0058	0.0038	0.0020
216	0.0056	0.0037	0.0019
217	0.0056	0.0037	0.0019
218	0.0054	0.0036	0.0018
219	0.0053	0.0035	0.0018
220	0.0052	0.0034	0.0017
221	0.0051	0.0033	0.0017
222	0.0049	0.0033	0.0017
223	0.0048	0.0032	0.0016
224	0.0047	0.0031	0.0016
225	0.0046	0.0031	0.0016
226	0.0046	0.0030	0.0015
227	0.0045	0.0030	0.0015
228	0.0044	0.0029	0.0015
229	0.0043	0.0029	0.0015
230	0.0042	0.0028	0.0014
231	0.0042	0.0028	0.0014
232	0.0041	0.0027	0.0014
233	0.0040	0.0027	0.0014

234	0.0040	0.0026	0.0013
235	0.0039	0.0026	0.0013
236	0.0039	0.0026	0.0013
237	0.0038	0.0025	0.0013
238	0.0038	0.0025	0.0013
239	0.0037	0.0025	0.0013
240	0.0037	0.0024	0.0012
241	0.0036	0.0024	0.0012
242	0.0036	0.0024	0.0012
243	0.0035	0.0023	0.0012
244	0.0035	0.0023	0.0012
245	0.0034	0.0023	0.0012
246	0.0034	0.0022	0.0011
247	0.0034	0.0022	0.0011
248	0.0033	0.0022	0.0011
249	0.0033	0.0022	0.0011
250	0.0032	0.0021	0.0011
251	0.0032	0.0021	0.0011
252	0.0032	0.0021	0.0011
253	0.0031	0.0021	0.0011
254	0.0031	0.0021	0.0011
255	0.0031	0.0020	0.0010
256	0.0030	0.0020	0.0010
257	0.0030	0.0020	0.0010
258	0.0030	0.0020	0.0010
259	0.0030	0.0020	0.0010
260	0.0029	0.0019	0.0010
261	0.0029	0.0019	0.0010
262	0.0029	0.0019	0.0010
263	0.0029	0.0019	0.0010
264	0.0028	0.0019	0.0010
265	0.0028	0.0019	0.0009
266	0.0028	0.0018	0.0009
267	0.0028	0.0018	0.0009
268	0.0027	0.0018	0.0009
269	0.0027	0.0018	0.0009
270	0.0027	0.0018	0.0009
271	0.0027	0.0018	0.0009
272	0.0026	0.0017	0.0009
273	0.0026	0.0017	0.0009
274	0.0026	0.0017	0.0009
275	0.0026	0.0017	0.0009
276	0.0026	0.0017	0.0009
277	0.0025	0.0017	0.0009
278	0.0025	0.0017	0.0009
279	0.0025	0.0017	0.0008
280	0.0025	0.0016	0.0008
281	0.0025	0.0016	0.0008
282	0.0025	0.0016	0.0008
283	0.0024	0.0016	0.0008

284	0.0024	0.0016	0.0008
285	0.0024	0.0016	0.0008
286	0.0024	0.0016	0.0008
287	0.0024	0.0016	0.0008
288	0.0024	0.0016	0.0008

Total soil rain loss = 1.03(In)
Total effective rainfall = 0.78(In)
Peak flow rate in flood hydrograph = 30.84(CFS)

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24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

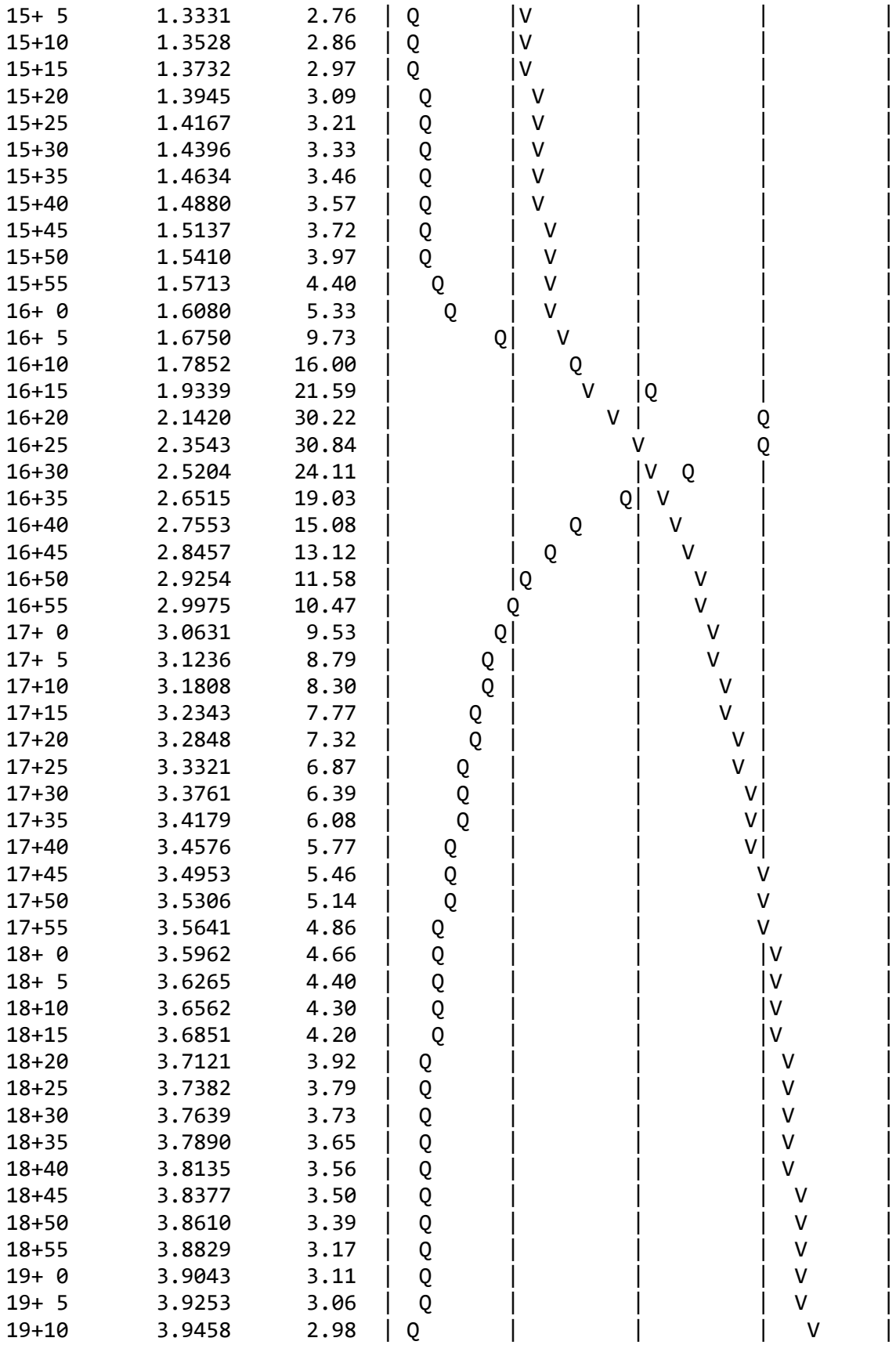
Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	10.0	20.0	30.0	40.0
0+ 5	0.0001	0.01	Q	|	|	|	|
0+10	0.0004	0.04	Q	|	|	|	|
0+15	0.0009	0.08	Q	|	|	|	|
0+20	0.0020	0.16	Q	|	|	|	|
0+25	0.0036	0.24	Q	|	|	|	|
0+30	0.0057	0.29	Q	|	|	|	|
0+35	0.0080	0.34	Q	|	|	|	|
0+40	0.0105	0.37	Q	|	|	|	|
0+45	0.0133	0.40	Q	|	|	|	|
0+50	0.0162	0.42	Q	|	|	|	|
0+55	0.0192	0.44	Q	|	|	|	|
1+ 0	0.0223	0.46	Q	|	|	|	|
1+ 5	0.0256	0.47	Q	|	|	|	|
1+10	0.0289	0.49	Q	|	|	|	|
1+15	0.0324	0.50	Q	|	|	|	|
1+20	0.0359	0.52	Q	|	|	|	|
1+25	0.0396	0.53	Q	|	|	|	|
1+30	0.0433	0.54	Q	|	|	|	|
1+35	0.0471	0.55	Q	|	|	|	|
1+40	0.0509	0.56	Q	|	|	|	|
1+45	0.0548	0.57	Q	|	|	|	|
1+50	0.0588	0.58	Q	|	|	|	|
1+55	0.0629	0.59	Q	|	|	|	|
2+ 0	0.0670	0.59	Q	|	|	|	|
2+ 5	0.0711	0.60	Q	|	|	|	|
2+10	0.0753	0.61	Q	|	|	|	|
2+15	0.0796	0.62	Q	|	|	|	|
2+20	0.0838	0.62	Q	|	|	|	|
2+25	0.0882	0.63	Q	|	|	|	|
2+30	0.0926	0.64	Q	|	|	|	|

2+35	0.0970	0.64	Q	|	|	|	|
2+40	0.1015	0.65	Q	|	|	|	|
2+45	0.1060	0.66	Q	|	|	|	|
2+50	0.1106	0.66	Q	|	|	|	|
2+55	0.1152	0.67	Q	|	|	|	|
3+ 0	0.1198	0.67	QV	|	|	|	|
3+ 5	0.1245	0.68	QV	|	|	|	|
3+10	0.1293	0.69	QV	|	|	|	|
3+15	0.1340	0.69	QV	|	|	|	|
3+20	0.1388	0.70	QV	|	|	|	|
3+25	0.1437	0.70	QV	|	|	|	|
3+30	0.1486	0.71	QV	|	|	|	|
3+35	0.1535	0.71	QV	|	|	|	|
3+40	0.1584	0.72	QV	|	|	|	|
3+45	0.1634	0.73	QV	|	|	|	|
3+50	0.1685	0.73	QV	|	|	|	|
3+55	0.1735	0.74	QV	|	|	|	|
4+ 0	0.1786	0.74	QV	|	|	|	|
4+ 5	0.1838	0.75	QV	|	|	|	|
4+10	0.1890	0.75	QV	|	|	|	|
4+15	0.1942	0.76	QV	|	|	|	|
4+20	0.1994	0.76	QV	|	|	|	|
4+25	0.2047	0.77	QV	|	|	|	|
4+30	0.2100	0.77	QV	|	|	|	|
4+35	0.2153	0.78	QV	|	|	|	|
4+40	0.2207	0.78	QV	|	|	|	|
4+45	0.2262	0.79	QV	|	|	|	|
4+50	0.2316	0.79	Q V	|	|	|	|
4+55	0.2371	0.80	Q V	|	|	|	|
5+ 0	0.2426	0.80	Q V	|	|	|	|
5+ 5	0.2482	0.81	Q V	|	|	|	|
5+10	0.2538	0.81	Q V	|	|	|	|
5+15	0.2594	0.82	Q V	|	|	|	|
5+20	0.2651	0.82	Q V	|	|	|	|
5+25	0.2708	0.83	Q V	|	|	|	|
5+30	0.2766	0.84	Q V	|	|	|	|
5+35	0.2824	0.84	Q V	|	|	|	|
5+40	0.2882	0.84	Q V	|	|	|	|
5+45	0.2940	0.85	Q V	|	|	|	|
5+50	0.2999	0.85	Q V	|	|	|	|
5+55	0.3058	0.86	Q V	|	|	|	|
6+ 0	0.3117	0.86	Q V	|	|	|	|
6+ 5	0.3177	0.86	Q V	|	|	|	|
6+10	0.3237	0.87	Q V	|	|	|	|
6+15	0.3297	0.87	Q V	|	|	|	|
6+20	0.3357	0.88	Q V	|	|	|	|
6+25	0.3418	0.88	Q V	|	|	|	|
6+30	0.3479	0.89	Q V	|	|	|	|
6+35	0.3540	0.89	Q V	|	|	|	|
6+40	0.3602	0.89	Q V	|	|	|	|

6+45	0.3664	0.90	Q V	|	|	|	|
6+50	0.3726	0.90	Q V	|	|	|	|
6+55	0.3789	0.91	Q V	|	|	|	|
7+ 0	0.3852	0.91	Q V	|	|	|	|
7+ 5	0.3915	0.92	Q V	|	|	|	|
7+10	0.3979	0.92	Q V	|	|	|	|
7+15	0.4043	0.93	Q V	|	|	|	|
7+20	0.4107	0.93	Q V	|	|	|	|
7+25	0.4171	0.94	Q V	|	|	|	|
7+30	0.4236	0.94	Q V	|	|	|	|
7+35	0.4302	0.95	Q V	|	|	|	|
7+40	0.4367	0.95	Q V	|	|	|	|
7+45	0.4434	0.96	Q V	|	|	|	|
7+50	0.4500	0.97	Q V	|	|	|	|
7+55	0.4567	0.97	Q V	|	|	|	|
8+ 0	0.4634	0.98	Q V	|	|	|	|
8+ 5	0.4702	0.98	Q V	|	|	|	|
8+10	0.4770	0.99	Q V	|	|	|	|
8+15	0.4838	0.99	Q V	|	|	|	|
8+20	0.4907	1.00	Q V	|	|	|	|
8+25	0.4976	1.01	|Q V	|	|	|	|
8+30	0.5046	1.01	|Q V	|	|	|	|
8+35	0.5116	1.02	|Q V	|	|	|	|
8+40	0.5187	1.02	|Q V	|	|	|	|
8+45	0.5258	1.03	|Q V	|	|	|	|
8+50	0.5329	1.04	|Q V	|	|	|	|
8+55	0.5401	1.04	|Q V	|	|	|	|
9+ 0	0.5474	1.05	|Q V	|	|	|	|
9+ 5	0.5547	1.06	|Q V	|	|	|	|
9+10	0.5620	1.07	|Q V	|	|	|	|
9+15	0.5694	1.07	|Q V	|	|	|	|
9+20	0.5768	1.08	|Q V	|	|	|	|
9+25	0.5843	1.09	|Q V	|	|	|	|
9+30	0.5919	1.10	|Q V	|	|	|	|
9+35	0.5995	1.10	|Q V	|	|	|	|
9+40	0.6071	1.11	|Q V	|	|	|	|
9+45	0.6148	1.12	|Q V	|	|	|	|
9+50	0.6226	1.13	|Q V	|	|	|	|
9+55	0.6304	1.14	|Q V	|	|	|	|
10+ 0	0.6383	1.14	|Q V	|	|	|	|
10+ 5	0.6462	1.15	|Q V	|	|	|	|
10+10	0.6542	1.16	|Q V	|	|	|	|
10+15	0.6623	1.17	|Q V	|	|	|	|
10+20	0.6704	1.18	|Q V	|	|	|	|
10+25	0.6786	1.19	|Q V	|	|	|	|
10+30	0.6869	1.20	|Q V	|	|	|	|
10+35	0.6952	1.21	|Q V	|	|	|	|
10+40	0.7036	1.22	|Q V	|	|	|	|
10+45	0.7121	1.23	|Q V	|	|	|	|
10+50	0.7206	1.24	|Q V	|	|	|	|

```
10+55       0.7293      1.25  |Q    V   |          |          |          |
11+ 0       0.7380      1.26  |Q    V   |          |          |          |
11+ 5       0.7467      1.27  |Q    V   |          |          |          |
11+10       0.7556      1.29  |Q    V   |          |          |          |
11+15       0.7645      1.30  |Q    V   |          |          |          |
11+20       0.7735      1.31  |Q    V   |          |          |          |
11+25       0.7827      1.32  |Q    V   |          |          |          |
11+30       0.7918      1.34  |Q    V   |          |          |          |
11+35       0.8011      1.35  |Q    V   |          |          |          |
11+40       0.8105      1.36  |Q    V   |          |          |          |
11+45       0.8200      1.38  |Q     V  |          |          |          |
11+50       0.8296      1.39  |Q     V  |          |          |          |
11+55       0.8392      1.40  |Q     V  |          |          |          |
12+ 0       0.8490      1.42  |Q     V  |          |          |          |
12+ 5       0.8589      1.43  |Q     V  |          |          |          |
12+10       0.8689      1.45  |Q     V  |          |          |          |
12+15       0.8790      1.47  |Q     V  |          |          |          |
12+20       0.8892      1.48  |Q     V  |          |          |          |
12+25       0.8995      1.49  |Q     V  |          |          |          |
12+30       0.9099      1.51  |Q     V  |          |          |          |
12+35       0.9204      1.53  |Q     V  |          |          |          |
12+40       0.9310      1.55  |Q      V |          |          |          |
12+45       0.9418      1.57  |Q      V |          |          |          |
12+50       0.9528      1.59  |Q      V |          |          |          |
12+55       0.9638      1.61  |Q      V |          |          |          |
13+ 0       0.9750      1.63  |Q      V |          |          |          |
13+ 5       0.9864      1.65  |Q      V |          |          |          |
13+10       0.9979      1.67  |Q      V |          |          |          |
13+15       1.0096      1.70  |Q      V |          |          |          |
13+20       1.0215      1.72  |Q      V |          |          |          |
13+25       1.0336      1.75  |Q      V |          |          |          |
13+30       1.0458      1.78  |Q       V|          |          |          |
13+35       1.0583      1.81  |Q       V|          |          |          |
13+40       1.0709      1.84  |Q       V|          |          |          |
13+45       1.0838      1.87  |Q       V|          |          |          |
13+50       1.0969      1.90  |Q       V|          |          |          |
13+55       1.1102      1.94  |Q       V|          |          |          |
14+ 0       1.1238      1.97  |Q       V|          |          |          |
14+ 5       1.1377      2.01  | Q      V|          |          |          |
14+10       1.1519      2.06  | Q      V|          |          |          |
14+15       1.1663      2.10  | Q       V          |          |          |
14+20       1.1811      2.15  | Q       V          |          |          |
14+25       1.1963      2.20  | Q       V          |          |          |
14+30       1.2118      2.25  | Q       V          |          |          |
14+35       1.2277      2.31  | Q       V          |          |          |
14+40       1.2440      2.37  | Q       V          |          |          |
14+45       1.2608      2.44  | Q       V          |          |          |
14+50       1.2780      2.51  | Q       |V         |          |          |
14+55       1.2958      2.58  | Q       |V         |          |          |
15+ 0       1.3142      2.66  | Q       |V         |          |          |
```



```
19+15       3.9659      2.92  | Q       |         |         |   V     |
19+20       3.9857      2.88  | Q       |         |         |   V     |
19+25       4.0049      2.78  | Q       |         |         |   V     |
19+30       4.0233      2.68  | Q       |         |         |   V     |
19+35       4.0415      2.64  | Q       |         |         |   V     |
19+40       4.0594      2.60  | Q       |         |         |    V    |
19+45       4.0768      2.52  | Q       |         |         |    V    |
19+50       4.0938      2.48  | Q       |         |         |    V    |
19+55       4.1106      2.44  | Q       |         |         |    V    |
20+ 0       4.1266      2.32  | Q       |         |         |    V    |
20+ 5       4.1421      2.26  | Q       |         |         |    V    |
20+10       4.1575      2.23  | Q       |         |         |    V    |
20+15       4.1724      2.17  | Q       |         |         |     V   |
20+20       4.1870      2.11  | Q       |         |         |     V   |
20+25       4.2013      2.09  | Q       |         |         |     V   |
20+30       4.2155      2.06  | Q       |         |         |     V   |
20+35       4.2296      2.04  | Q       |         |         |     V   |
20+40       4.2434      2.02  | Q       |         |         |     V   |
20+45       4.2572      1.99  |Q        |         |         |     V   |
20+50       4.2707      1.97  |Q        |         |         |     V   |
20+55       4.2841      1.95  |Q        |         |         |     V   |
21+ 0       4.2974      1.93  |Q        |         |         |      V  |
21+ 5       4.3105      1.90  |Q        |         |         |      V  |
21+10       4.3235      1.88  |Q        |         |         |      V  |
21+15       4.3363      1.86  |Q        |         |         |      V  |
21+20       4.3489      1.83  |Q        |         |         |      V  |
21+25       4.3612      1.79  |Q        |         |         |      V  |
21+30       4.3730      1.72  |Q        |         |         |      V  |
21+35       4.3826      1.39  |Q        |         |         |      V  |
21+40       4.3902      1.09  |Q        |         |         |      V  |
21+45       4.3975      1.07  |Q        |         |         |      V  |
21+50       4.4047      1.05  |Q        |         |         |       V |
21+55       4.4118      1.03  |Q        |         |         |       V |
22+ 0       4.4187      1.01  |Q        |         |         |       V |
22+ 5       4.4256      0.99  Q         |         |         |       V |
22+10       4.4323      0.98  Q         |         |         |       V |
22+15       4.4389      0.96  Q         |         |         |       V |
22+20       4.4455      0.95  Q         |         |         |       V |
22+25       4.4519      0.94  Q         |         |         |       V |
22+30       4.4583      0.93  Q         |         |         |       V |
22+35       4.4646      0.91  Q         |         |         |       V |
22+40       4.4708      0.90  Q         |         |         |       V |
22+45       4.4769      0.89  Q         |         |         |       V |
22+50       4.4830      0.88  Q         |         |         |       V |
22+55       4.4890      0.87  Q         |         |         |       V |
23+ 0       4.4950      0.86  Q         |         |         |       V |
23+ 5       4.5009      0.85  Q         |         |         |       V |
23+10       4.5067      0.85  Q         |         |         |       V |
23+15       4.5125      0.84  Q         |         |         |       V |
23+20       4.5182      0.83  Q         |         |         |        V|
```

23+25	4.5238	0.82	Q	|	|	|	V|
23+30	4.5294	0.81	Q	|	|	|	V|
23+35	4.5350	0.81	Q	|	|	|	V|
23+40	4.5405	0.80	Q	|	|	|	V|
23+45	4.5459	0.79	Q	|	|	|	V|
23+50	4.5514	0.78	Q	|	|	|	V|
23+55	4.5567	0.78	Q	|	|	|	V|
24+ 0	4.5620	0.77	Q	|	|	|	V|
24+ 5	4.5672	0.75	Q	|	|	|	V|
24+10	4.5722	0.72	Q	|	|	|	V|
24+15	4.5768	0.67	Q	|	|	|	V|
24+20	4.5808	0.59	Q	|	|	|	V|
24+25	4.5843	0.51	Q	|	|	|	V|
24+30	4.5874	0.45	Q	|	|	|	V|
24+35	4.5902	0.40	Q	|	|	|	V|
24+40	4.5927	0.37	Q	|	|	|	V|
24+45	4.5950	0.34	Q	|	|	|	V|
24+50	4.5972	0.31	Q	|	|	|	V|
24+55	4.5992	0.29	Q	|	|	|	V|
25+ 0	4.6011	0.27	Q	|	|	|	V|
25+ 5	4.6028	0.26	Q	|	|	|	V|
25+10	4.6045	0.24	Q	|	|	|	V|
25+15	4.6061	0.23	Q	|	|	|	V|
25+20	4.6075	0.21	Q	|	|	|	V|
25+25	4.6089	0.20	Q	|	|	|	V|
25+30	4.6102	0.19	Q	|	|	|	V|
25+35	4.6115	0.18	Q	|	|	|	V|
25+40	4.6126	0.17	Q	|	|	|	V|
25+45	4.6137	0.16	Q	|	|	|	V|
25+50	4.6148	0.15	Q	|	|	|	V|
25+55	4.6158	0.14	Q	|	|	|	V|
26+ 0	4.6167	0.14	Q	|	|	|	V|
26+ 5	4.6176	0.13	Q	|	|	|	V|
26+10	4.6185	0.12	Q	|	|	|	V|
26+15	4.6193	0.12	Q	|	|	|	V|
26+20	4.6201	0.11	Q	|	|	|	V|
26+25	4.6208	0.11	Q	|	|	|	V|
26+30	4.6215	0.10	Q	|	|	|	V|
26+35	4.6222	0.10	Q	|	|	|	V|
26+40	4.6228	0.09	Q	|	|	|	V|
26+45	4.6234	0.09	Q	|	|	|	V|
26+50	4.6240	0.08	Q	|	|	|	V|
26+55	4.6245	0.08	Q	|	|	|	V|
27+ 0	4.6250	0.08	Q	|	|	|	V|
27+ 5	4.6255	0.07	Q	|	|	|	V|
27+10	4.6260	0.07	Q	|	|	|	V|
27+15	4.6264	0.06	Q	|	|	|	V|
27+20	4.6269	0.06	Q	|	|	|	V|
27+25	4.6273	0.06	Q	|	|	|	V|
27+30	4.6276	0.05	Q	|	|	|	V|

27+35	4.6280	0.05	Q	|	|	|	V|
27+40	4.6283	0.05	Q	|	|	|	V|
27+45	4.6286	0.05	Q	|	|	|	V|
27+50	4.6289	0.04	Q	|	|	|	V|
27+55	4.6292	0.04	Q	|	|	|	V|
28+ 0	4.6294	0.04	Q	|	|	|	V|
28+ 5	4.6297	0.03	Q	|	|	|	V|
28+10	4.6299	0.03	Q	|	|	|	V|
28+15	4.6301	0.03	Q	|	|	|	V|
28+20	4.6303	0.03	Q	|	|	|	V|
28+25	4.6305	0.03	Q	|	|	|	V|
28+30	4.6306	0.02	Q	|	|	|	V|
28+35	4.6308	0.02	Q	|	|	|	V|
28+40	4.6309	0.02	Q	|	|	|	V|
28+45	4.6311	0.02	Q	|	|	|	V|
28+50	4.6312	0.02	Q	|	|	|	V|
28+55	4.6313	0.01	Q	|	|	|	V|
29+ 0	4.6314	0.01	Q	|	|	|	V|
29+ 5	4.6314	0.01	Q	|	|	|	V|
29+10	4.6315	0.01	Q	|	|	|	V|
29+15	4.6315	0.01	Q	|	|	|	V|
29+20	4.6316	0.00	Q	|	|	|	V|
29+25	4.6316	0.00	Q	|	|	|	V|
29+30	4.6316	0.00	Q	|	|	|	V|

U n i t H y d r o g r a p h A n a l y s i s

Study date 04/01/21

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 6353

PROJECT LOKI
EXISTING CONDITION 100-YR STORM

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
71.40	1	0.97
Rainfall data for year 100		
71.40	6	1.80
Rainfall data for year 100		
71.40	24	3.00

++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	SCS curve NO.(AMC 3)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
84.0	96.4	71.40	1.000	0.071	1.000	0.071

Area-averaged adjusted loss rate Fm (In/Hr) = 0.071

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
71.40	1.000	84.0	96.4	0.37	0.865

Area-averaged catchment yield fraction, Y = 0.865
Area-averaged low loss fraction, Yb = 0.135
User entry of time of concentration = 0.646 (hours)
++
Watershed area = 71.40(Ac.)
Catchment Lag time = 0.517 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 16.1124
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.071(In/Hr)
Average low loss rate fraction (Yb) = 0.135 (decimal)
MOUNTAIN S-Graph Selected
Computed peak 5-minute rainfall = 0.461(In)
Computed peak 30-minute rainfall = 0.790(In)
Specified peak 1-hour rainfall = 0.972(In)
Computed peak 3-hour rainfall = 1.418(In)
Specified peak 6-hour rainfall = 1.800(In)
Specified peak 24-hour rainfall = 3.000(In)

Rainfall depth area reduction factors:
Using a total area of 71.40(Ac.) (Ref: fig. E-4)

5-minute factor = 0.997 Adjusted rainfall = 0.460(In)
30-minute factor = 0.997 Adjusted rainfall = 0.787(In)
1-hour factor = 0.997 Adjusted rainfall = 0.969(In)
3-hour factor = 1.000 Adjusted rainfall = 1.418(In)
6-hour factor = 1.000 Adjusted rainfall = 1.800(In)
24-hour factor = 1.000 Adjusted rainfall = 3.000(In)

U n i t H y d r o g r a p h
++
Interval 'S' Graph Unit Hydrograph

Number	Mean values	((CFS))
	(K = 863.49 (CFS))	
1	1.777	15.344
2	6.498	40.768
3	14.029	65.030
4	26.118	104.386
5	37.570	98.888
6	45.522	68.659
7	51.294	49.842
8	55.636	37.493
9	59.166	30.480
10	62.260	26.720
11	64.865	22.495
12	67.200	20.160
13	69.347	18.538
14	71.302	16.884
15	73.097	15.505
16	74.743	14.209
17	76.195	12.540
18	77.557	11.760
19	78.832	11.012
20	79.965	9.781
21	81.016	9.078
22	81.980	8.321
23	82.852	7.525
24	83.689	7.235
25	84.525	7.214
26	85.256	6.318
27	85.933	5.843
28	86.610	5.843
29	87.268	5.685
30	87.913	5.565
31	88.557	5.565
32	89.141	5.044
33	89.657	4.453
34	90.172	4.452
35	90.676	4.348
36	91.160	4.176
37	91.643	4.174
38	92.108	4.012
39	92.529	3.633
40	92.947	3.617
41	93.359	3.557
42	93.748	3.355
43	94.135	3.339
44	94.511	3.253
45	94.840	2.838
46	95.162	2.783

47	95.481	2.754
48	95.776	2.546
49	96.066	2.504
50	96.356	2.504
51	96.646	2.504
52	96.936	2.504
53	97.226	2.504
54	97.516	2.504
55	97.806	2.504
56	98.096	2.504
57	98.386	2.504
58	98.676	2.504
59	98.966	2.504
60	99.256	2.504
61	99.546	2.504
62	99.836	2.504
63	100.000	1.412

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.4597	0.4597
2	0.5659	0.1063
3	0.6391	0.0732
4	0.6967	0.0576
5	0.7450	0.0482
6	0.7869	0.0419
7	0.8241	0.0372
8	0.8578	0.0337
9	0.8886	0.0309
10	0.9172	0.0285
11	0.9438	0.0266
12	0.9687	0.0250
13	0.9960	0.0272
14	1.0219	0.0259
15	1.0466	0.0247
16	1.0703	0.0237
17	1.0930	0.0227
18	1.1149	0.0219
19	1.1360	0.0211
20	1.1564	0.0204
21	1.1761	0.0197
22	1.1952	0.0191
23	1.2138	0.0186
24	1.2318	0.0180
25	1.2493	0.0176
26	1.2664	0.0171
27	1.2831	0.0167
28	1.2994	0.0163
29	1.3153	0.0159
30	1.3308	0.0155

31	1.3460	0.0152
32	1.3609	0.0149
33	1.3755	0.0146
34	1.3898	0.0143
35	1.4039	0.0140
36	1.4176	0.0138
37	1.4311	0.0134
38	1.4443	0.0132
39	1.4572	0.0130
40	1.4700	0.0128
41	1.4825	0.0125
42	1.4949	0.0123
43	1.5070	0.0122
44	1.5190	0.0120
45	1.5308	0.0118
46	1.5424	0.0116
47	1.5539	0.0115
48	1.5652	0.0113
49	1.5763	0.0111
50	1.5873	0.0110
51	1.5982	0.0109
52	1.6089	0.0107
53	1.6195	0.0106
54	1.6299	0.0105
55	1.6403	0.0103
56	1.6505	0.0102
57	1.6606	0.0101
58	1.6705	0.0100
59	1.6804	0.0099
60	1.6901	0.0097
61	1.6998	0.0096
62	1.7093	0.0095
63	1.7188	0.0094
64	1.7281	0.0093
65	1.7373	0.0092
66	1.7465	0.0092
67	1.7556	0.0091
68	1.7645	0.0090
69	1.7734	0.0089
70	1.7822	0.0088
71	1.7910	0.0087
72	1.7996	0.0086
73	1.8088	0.0092
74	1.8179	0.0091
75	1.8269	0.0090
76	1.8358	0.0089
77	1.8447	0.0089
78	1.8535	0.0088
79	1.8622	0.0087
80	1.8709	0.0087

81	1.8794	0.0086
82	1.8880	0.0085
83	1.8964	0.0085
84	1.9048	0.0084
85	1.9131	0.0083
86	1.9214	0.0083
87	1.9296	0.0082
88	1.9377	0.0081
89	1.9458	0.0081
90	1.9539	0.0080
91	1.9618	0.0080
92	1.9698	0.0079
93	1.9776	0.0079
94	1.9854	0.0078
95	1.9932	0.0078
96	2.0009	0.0077
97	2.0086	0.0077
98	2.0162	0.0076
99	2.0237	0.0076
100	2.0312	0.0075
101	2.0387	0.0075
102	2.0461	0.0074
103	2.0535	0.0074
104	2.0608	0.0073
105	2.0681	0.0073
106	2.0753	0.0072
107	2.0825	0.0072
108	2.0897	0.0072
109	2.0968	0.0071
110	2.1039	0.0071
111	2.1109	0.0070
112	2.1179	0.0070
113	2.1248	0.0070
114	2.1317	0.0069
115	2.1386	0.0069
116	2.1454	0.0068
117	2.1522	0.0068
118	2.1590	0.0068
119	2.1657	0.0067
120	2.1724	0.0067
121	2.1791	0.0067
122	2.1857	0.0066
123	2.1923	0.0066
124	2.1988	0.0066
125	2.2054	0.0065
126	2.2118	0.0065
127	2.2183	0.0065
128	2.2247	0.0064
129	2.2311	0.0064
130	2.2375	0.0064

131	2.2438	0.0063
132	2.2501	0.0063
133	2.2564	0.0063
134	2.2626	0.0062
135	2.2688	0.0062
136	2.2750	0.0062
137	2.2811	0.0062
138	2.2873	0.0061
139	2.2934	0.0061
140	2.2994	0.0061
141	2.3055	0.0060
142	2.3115	0.0060
143	2.3175	0.0060
144	2.3234	0.0060
145	2.3294	0.0059
146	2.3353	0.0059
147	2.3412	0.0059
148	2.3470	0.0059
149	2.3528	0.0058
150	2.3586	0.0058
151	2.3644	0.0058
152	2.3702	0.0058
153	2.3759	0.0057
154	2.3816	0.0057
155	2.3873	0.0057
156	2.3930	0.0057
157	2.3986	0.0056
158	2.4043	0.0056
159	2.4099	0.0056
160	2.4154	0.0056
161	2.4210	0.0056
162	2.4265	0.0055
163	2.4320	0.0055
164	2.4375	0.0055
165	2.4430	0.0055
166	2.4484	0.0054
167	2.4539	0.0054
168	2.4593	0.0054
169	2.4646	0.0054
170	2.4700	0.0054
171	2.4754	0.0053
172	2.4807	0.0053
173	2.4860	0.0053
174	2.4913	0.0053
175	2.4965	0.0053
176	2.5018	0.0052
177	2.5070	0.0052
178	2.5122	0.0052
179	2.5174	0.0052
180	2.5226	0.0052

181	2.5278	0.0052
182	2.5329	0.0051
183	2.5380	0.0051
184	2.5431	0.0051
185	2.5482	0.0051
186	2.5533	0.0051
187	2.5583	0.0051
188	2.5634	0.0050
189	2.5684	0.0050
190	2.5734	0.0050
191	2.5784	0.0050
192	2.5833	0.0050
193	2.5883	0.0050
194	2.5932	0.0049
195	2.5981	0.0049
196	2.6030	0.0049
197	2.6079	0.0049
198	2.6128	0.0049
199	2.6176	0.0049
200	2.6225	0.0048
201	2.6273	0.0048
202	2.6321	0.0048
203	2.6369	0.0048
204	2.6417	0.0048
205	2.6465	0.0048
206	2.6512	0.0048
207	2.6560	0.0047
208	2.6607	0.0047
209	2.6654	0.0047
210	2.6701	0.0047
211	2.6748	0.0047
212	2.6794	0.0047
213	2.6841	0.0047
214	2.6887	0.0046
215	2.6933	0.0046
216	2.6979	0.0046
217	2.7025	0.0046
218	2.7071	0.0046
219	2.7117	0.0046
220	2.7163	0.0046
221	2.7208	0.0045
222	2.7253	0.0045
223	2.7298	0.0045
224	2.7343	0.0045
225	2.7388	0.0045
226	2.7433	0.0045
227	2.7478	0.0045
228	2.7522	0.0045
229	2.7567	0.0044
230	2.7611	0.0044

231	2.7655	0.0044
232	2.7699	0.0044
233	2.7743	0.0044
234	2.7787	0.0044
235	2.7831	0.0044
236	2.7875	0.0044
237	2.7918	0.0043
238	2.7961	0.0043
239	2.8005	0.0043
240	2.8048	0.0043
241	2.8091	0.0043
242	2.8134	0.0043
243	2.8176	0.0043
244	2.8219	0.0043
245	2.8262	0.0043
246	2.8304	0.0042
247	2.8347	0.0042
248	2.8389	0.0042
249	2.8431	0.0042
250	2.8473	0.0042
251	2.8515	0.0042
252	2.8557	0.0042
253	2.8598	0.0042
254	2.8640	0.0042
255	2.8682	0.0042
256	2.8723	0.0041
257	2.8764	0.0041
258	2.8805	0.0041
259	2.8847	0.0041
260	2.8888	0.0041
261	2.8928	0.0041
262	2.8969	0.0041
263	2.9010	0.0041
264	2.9051	0.0041
265	2.9091	0.0041
266	2.9131	0.0040
267	2.9172	0.0040
268	2.9212	0.0040
269	2.9252	0.0040
270	2.9292	0.0040
271	2.9332	0.0040
272	2.9372	0.0040
273	2.9412	0.0040
274	2.9451	0.0040
275	2.9491	0.0040
276	2.9530	0.0039
277	2.9570	0.0039
278	2.9609	0.0039
279	2.9648	0.0039
280	2.9687	0.0039

281	2.9727	0.0039
282	2.9765	0.0039
283	2.9804	0.0039
284	2.9843	0.0039
285	2.9882	0.0039
286	2.9920	0.0039
287	2.9959	0.0039
288	2.9997	0.0038

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0038	0.0005	0.0033
2	0.0039	0.0005	0.0033
3	0.0039	0.0005	0.0033
4	0.0039	0.0005	0.0034
5	0.0039	0.0005	0.0034
6	0.0039	0.0005	0.0034
7	0.0039	0.0005	0.0034
8	0.0039	0.0005	0.0034
9	0.0039	0.0005	0.0034
10	0.0040	0.0005	0.0034
11	0.0040	0.0005	0.0034
12	0.0040	0.0005	0.0034
13	0.0040	0.0005	0.0035
14	0.0040	0.0005	0.0035
15	0.0040	0.0005	0.0035
16	0.0040	0.0005	0.0035
17	0.0041	0.0005	0.0035
18	0.0041	0.0006	0.0035
19	0.0041	0.0006	0.0035
20	0.0041	0.0006	0.0035
21	0.0041	0.0006	0.0036
22	0.0041	0.0006	0.0036
23	0.0042	0.0006	0.0036
24	0.0042	0.0006	0.0036
25	0.0042	0.0006	0.0036
26	0.0042	0.0006	0.0036
27	0.0042	0.0006	0.0036
28	0.0042	0.0006	0.0037
29	0.0042	0.0006	0.0037
30	0.0043	0.0006	0.0037
31	0.0043	0.0006	0.0037
32	0.0043	0.0006	0.0037
33	0.0043	0.0006	0.0037
34	0.0043	0.0006	0.0037
35	0.0043	0.0006	0.0038
36	0.0044	0.0006	0.0038
37	0.0044	0.0006	0.0038

38	0.0044	0.0006	0.0038
39	0.0044	0.0006	0.0038
40	0.0044	0.0006	0.0038
41	0.0045	0.0006	0.0039
42	0.0045	0.0006	0.0039
43	0.0045	0.0006	0.0039
44	0.0045	0.0006	0.0039
45	0.0045	0.0006	0.0039
46	0.0045	0.0006	0.0039
47	0.0046	0.0006	0.0040
48	0.0046	0.0006	0.0040
49	0.0046	0.0006	0.0040
50	0.0046	0.0006	0.0040
51	0.0047	0.0006	0.0040
52	0.0047	0.0006	0.0040
53	0.0047	0.0006	0.0041
54	0.0047	0.0006	0.0041
55	0.0047	0.0006	0.0041
56	0.0048	0.0006	0.0041
57	0.0048	0.0006	0.0041
58	0.0048	0.0006	0.0041
59	0.0048	0.0007	0.0042
60	0.0048	0.0007	0.0042
61	0.0049	0.0007	0.0042
62	0.0049	0.0007	0.0042
63	0.0049	0.0007	0.0043
64	0.0049	0.0007	0.0043
65	0.0050	0.0007	0.0043
66	0.0050	0.0007	0.0043
67	0.0050	0.0007	0.0043
68	0.0050	0.0007	0.0044
69	0.0051	0.0007	0.0044
70	0.0051	0.0007	0.0044
71	0.0051	0.0007	0.0044
72	0.0051	0.0007	0.0044
73	0.0052	0.0007	0.0045
74	0.0052	0.0007	0.0045
75	0.0052	0.0007	0.0045
76	0.0052	0.0007	0.0045
77	0.0053	0.0007	0.0046
78	0.0053	0.0007	0.0046
79	0.0053	0.0007	0.0046
80	0.0054	0.0007	0.0046
81	0.0054	0.0007	0.0047
82	0.0054	0.0007	0.0047
83	0.0055	0.0007	0.0047
84	0.0055	0.0007	0.0047
85	0.0055	0.0007	0.0048
86	0.0056	0.0008	0.0048
87	0.0056	0.0008	0.0048

88	0.0056	0.0008	0.0049
89	0.0057	0.0008	0.0049
90	0.0057	0.0008	0.0049
91	0.0057	0.0008	0.0050
92	0.0058	0.0008	0.0050
93	0.0058	0.0008	0.0050
94	0.0058	0.0008	0.0050
95	0.0059	0.0008	0.0051
96	0.0059	0.0008	0.0051
97	0.0060	0.0008	0.0052
98	0.0060	0.0008	0.0052
99	0.0060	0.0008	0.0052
100	0.0061	0.0008	0.0052
101	0.0061	0.0008	0.0053
102	0.0062	0.0008	0.0053
103	0.0062	0.0008	0.0054
104	0.0062	0.0008	0.0054
105	0.0063	0.0009	0.0054
106	0.0063	0.0009	0.0055
107	0.0064	0.0009	0.0055
108	0.0064	0.0009	0.0056
109	0.0065	0.0009	0.0056
110	0.0065	0.0009	0.0056
111	0.0066	0.0009	0.0057
112	0.0066	0.0009	0.0057
113	0.0067	0.0009	0.0058
114	0.0067	0.0009	0.0058
115	0.0068	0.0009	0.0059
116	0.0068	0.0009	0.0059
117	0.0069	0.0009	0.0060
118	0.0070	0.0009	0.0060
119	0.0070	0.0010	0.0061
120	0.0071	0.0010	0.0061
121	0.0072	0.0010	0.0062
122	0.0072	0.0010	0.0062
123	0.0073	0.0010	0.0063
124	0.0073	0.0010	0.0063
125	0.0074	0.0010	0.0064
126	0.0075	0.0010	0.0065
127	0.0076	0.0010	0.0065
128	0.0076	0.0010	0.0066
129	0.0077	0.0010	0.0067
130	0.0078	0.0010	0.0067
131	0.0079	0.0011	0.0068
132	0.0079	0.0011	0.0068
133	0.0080	0.0011	0.0069
134	0.0081	0.0011	0.0070
135	0.0082	0.0011	0.0071
136	0.0083	0.0011	0.0071
137	0.0084	0.0011	0.0073

138	0.0085	0.0011	0.0073
139	0.0086	0.0012	0.0074
140	0.0087	0.0012	0.0075
141	0.0088	0.0012	0.0076
142	0.0089	0.0012	0.0077
143	0.0090	0.0012	0.0078
144	0.0091	0.0012	0.0079
145	0.0086	0.0012	0.0075
146	0.0087	0.0012	0.0075
147	0.0089	0.0012	0.0077
148	0.0090	0.0012	0.0078
149	0.0092	0.0012	0.0079
150	0.0092	0.0013	0.0080
151	0.0094	0.0013	0.0082
152	0.0095	0.0013	0.0082
153	0.0097	0.0013	0.0084
154	0.0099	0.0013	0.0085
155	0.0101	0.0014	0.0087
156	0.0102	0.0014	0.0088
157	0.0105	0.0014	0.0090
158	0.0106	0.0014	0.0092
159	0.0109	0.0015	0.0094
160	0.0110	0.0015	0.0095
161	0.0113	0.0015	0.0098
162	0.0115	0.0016	0.0099
163	0.0118	0.0016	0.0102
164	0.0120	0.0016	0.0104
165	0.0123	0.0017	0.0107
166	0.0125	0.0017	0.0108
167	0.0130	0.0018	0.0112
168	0.0132	0.0018	0.0114
169	0.0138	0.0019	0.0119
170	0.0140	0.0019	0.0121
171	0.0146	0.0020	0.0126
172	0.0149	0.0020	0.0129
173	0.0155	0.0021	0.0134
174	0.0159	0.0022	0.0137
175	0.0167	0.0023	0.0144
176	0.0171	0.0023	0.0148
177	0.0180	0.0024	0.0156
178	0.0186	0.0025	0.0160
179	0.0197	0.0027	0.0171
180	0.0204	0.0028	0.0176
181	0.0219	0.0030	0.0189
182	0.0227	0.0031	0.0197
183	0.0247	0.0033	0.0214
184	0.0259	0.0035	0.0224
185	0.0250	0.0034	0.0216
186	0.0266	0.0036	0.0230
187	0.0309	0.0042	0.0267

188	0.0337	0.0046	0.0291
189	0.0419	0.0057	0.0362
190	0.0482	0.0059	0.0423
191	0.0732	0.0059	0.0673
192	0.1063	0.0059	0.1003
193	0.4597	0.0059	0.4538
194	0.0576	0.0059	0.0517
195	0.0372	0.0050	0.0322
196	0.0285	0.0039	0.0247
197	0.0272	0.0037	0.0236
198	0.0237	0.0032	0.0205
199	0.0211	0.0029	0.0182
200	0.0191	0.0026	0.0165
201	0.0176	0.0024	0.0152
202	0.0163	0.0022	0.0141
203	0.0152	0.0021	0.0132
204	0.0143	0.0019	0.0124
205	0.0134	0.0018	0.0116
206	0.0128	0.0017	0.0110
207	0.0122	0.0016	0.0105
208	0.0116	0.0016	0.0101
209	0.0111	0.0015	0.0096
210	0.0107	0.0014	0.0093
211	0.0103	0.0014	0.0089
212	0.0100	0.0013	0.0086
213	0.0096	0.0013	0.0083
214	0.0093	0.0013	0.0081
215	0.0091	0.0012	0.0078
216	0.0088	0.0012	0.0076
217	0.0092	0.0012	0.0079
218	0.0089	0.0012	0.0077
219	0.0087	0.0012	0.0075
220	0.0085	0.0012	0.0074
221	0.0083	0.0011	0.0072
222	0.0081	0.0011	0.0070
223	0.0080	0.0011	0.0069
224	0.0078	0.0011	0.0068
225	0.0077	0.0010	0.0066
226	0.0075	0.0010	0.0065
227	0.0074	0.0010	0.0064
228	0.0072	0.0010	0.0063
229	0.0071	0.0010	0.0061
230	0.0070	0.0009	0.0060
231	0.0069	0.0009	0.0059
232	0.0068	0.0009	0.0058
233	0.0067	0.0009	0.0058
234	0.0066	0.0009	0.0057
235	0.0065	0.0009	0.0056
236	0.0064	0.0009	0.0055
237	0.0063	0.0008	0.0054

238	0.0062	0.0008	0.0053
239	0.0061	0.0008	0.0053
240	0.0060	0.0008	0.0052
241	0.0059	0.0008	0.0051
242	0.0059	0.0008	0.0051
243	0.0058	0.0008	0.0050
244	0.0057	0.0008	0.0049
245	0.0056	0.0008	0.0049
246	0.0056	0.0008	0.0048
247	0.0055	0.0007	0.0048
248	0.0054	0.0007	0.0047
249	0.0054	0.0007	0.0047
250	0.0053	0.0007	0.0046
251	0.0053	0.0007	0.0046
252	0.0052	0.0007	0.0045
253	0.0052	0.0007	0.0045
254	0.0051	0.0007	0.0044
255	0.0051	0.0007	0.0044
256	0.0050	0.0007	0.0043
257	0.0050	0.0007	0.0043
258	0.0049	0.0007	0.0042
259	0.0049	0.0007	0.0042
260	0.0048	0.0007	0.0042
261	0.0048	0.0006	0.0041
262	0.0047	0.0006	0.0041
263	0.0047	0.0006	0.0040
264	0.0046	0.0006	0.0040
265	0.0046	0.0006	0.0040
266	0.0046	0.0006	0.0039
267	0.0045	0.0006	0.0039
268	0.0045	0.0006	0.0039
269	0.0044	0.0006	0.0038
270	0.0044	0.0006	0.0038
271	0.0044	0.0006	0.0038
272	0.0043	0.0006	0.0037
273	0.0043	0.0006	0.0037
274	0.0043	0.0006	0.0037
275	0.0042	0.0006	0.0037
276	0.0042	0.0006	0.0036
277	0.0042	0.0006	0.0036
278	0.0041	0.0006	0.0036
279	0.0041	0.0006	0.0036
280	0.0041	0.0006	0.0035
281	0.0041	0.0005	0.0035
282	0.0040	0.0005	0.0035
283	0.0040	0.0005	0.0035
284	0.0040	0.0005	0.0034
285	0.0039	0.0005	0.0034
286	0.0039	0.0005	0.0034
287	0.0039	0.0005	0.0034

288 0.0039 0.0005 0.0033

Total soil rain loss = 0.33(In)
Total effective rainfall = 2.67(In)
Peak flow rate in flood hydrograph = 76.89(CFS)

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24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

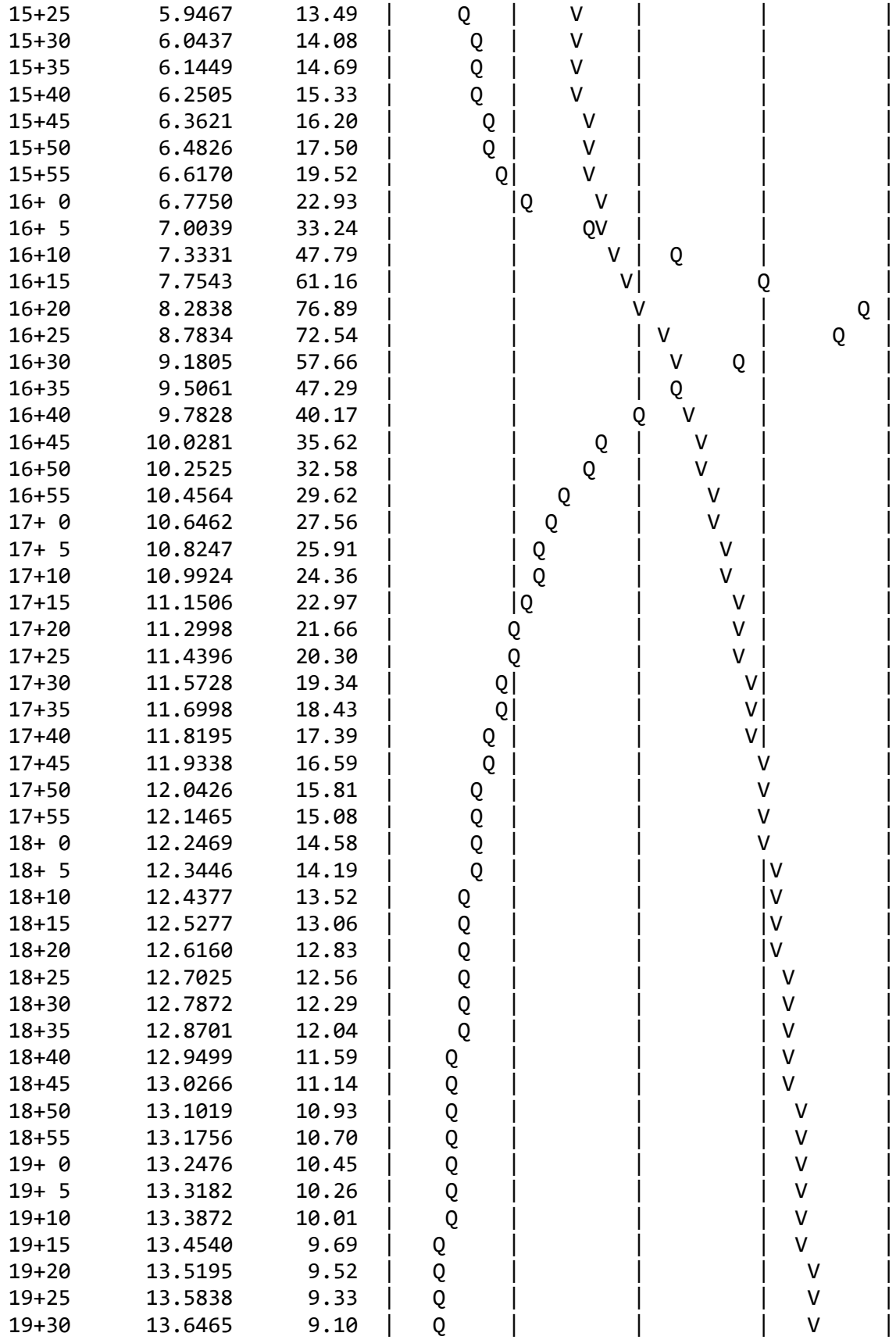
Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	20.0	40.0	60.0	80.0
0+ 5	0.0004	0.05	Q				
0+10	0.0016	0.19	Q				
0+15	0.0044	0.40	Q				
0+20	0.0096	0.75	Q				
0+25	0.0170	1.08	Q				
0+30	0.0261	1.31	Q				
0+35	0.0363	1.48	Q				
0+40	0.0474	1.61	Q				
0+45	0.0593	1.72	Q				
0+50	0.0718	1.81	Q				
0+55	0.0848	1.90	Q				
1+ 0	0.0984	1.97	Q				
1+ 5	0.1124	2.04	VQ				
1+10	0.1269	2.10	VQ				
1+15	0.1417	2.16	VQ				
1+20	0.1570	2.21	VQ				
1+25	0.1726	2.26	VQ				
1+30	0.1885	2.31	VQ				
1+35	0.2047	2.35	VQ				
1+40	0.2212	2.40	VQ				
1+45	0.2380	2.43	VQ				
1+50	0.2550	2.47	VQ				
1+55	0.2722	2.50	VQ				
2+ 0	0.2897	2.54	VQ				
2+ 5	0.3074	2.57	VQ				
2+10	0.3253	2.60	VQ				
2+15	0.3434	2.63	VQ				
2+20	0.3617	2.66	VQ				
2+25	0.3802	2.69	VQ				
2+30	0.3989	2.72	|Q				
2+35	0.4178	2.74	|Q				
2+40	0.4369	2.77	|Q				
2+45	0.4562	2.80	|Q				
2+50	0.4756	2.82	|Q				

2+55	0.4952	2.85	|Q	|	|	|	|
3+ 0	0.5150	2.87	|Q	|	|	|	|
3+ 5	0.5349	2.90	|Q	|	|	|	|
3+10	0.5551	2.92	|Q	|	|	|	|
3+15	0.5753	2.94	|Q	|	|	|	|
3+20	0.5958	2.97	|Q	|	|	|	|
3+25	0.6164	2.99	|Q	|	|	|	|
3+30	0.6372	3.01	|Q	|	|	|	|
3+35	0.6581	3.04	|Q	|	|	|	|
3+40	0.6792	3.06	|Q	|	|	|	|
3+45	0.7004	3.08	|Q	|	|	|	|
3+50	0.7218	3.10	|Q	|	|	|	|
3+55	0.7433	3.13	|Q	|	|	|	|
4+ 0	0.7650	3.15	|Q	|	|	|	|
4+ 5	0.7868	3.17	|Q	|	|	|	|
4+10	0.8088	3.19	|QV	|	|	|	|
4+15	0.8309	3.21	|QV	|	|	|	|
4+20	0.8531	3.23	|QV	|	|	|	|
4+25	0.8756	3.26	|QV	|	|	|	|
4+30	0.8981	3.28	|QV	|	|	|	|
4+35	0.9209	3.30	|QV	|	|	|	|
4+40	0.9437	3.32	|QV	|	|	|	|
4+45	0.9668	3.34	|QV	|	|	|	|
4+50	0.9900	3.37	|QV	|	|	|	|
4+55	1.0133	3.39	|QV	|	|	|	|
5+ 0	1.0368	3.41	|QV	|	|	|	|
5+ 5	1.0605	3.44	|QV	|	|	|	|
5+10	1.0843	3.46	|QV	|	|	|	|
5+15	1.1083	3.48	|QV	|	|	|	|
5+20	1.1324	3.50	|QV	|	|	|	|
5+25	1.1566	3.51	|QV	|	|	|	|
5+30	1.1809	3.53	|QV	|	|	|	|
5+35	1.2053	3.55	|Q V	|	|	|	|
5+40	1.2299	3.56	|Q V	|	|	|	|
5+45	1.2545	3.58	|Q V	|	|	|	|
5+50	1.2793	3.60	|Q V	|	|	|	|
5+55	1.3042	3.61	|Q V	|	|	|	|
6+ 0	1.3292	3.63	|Q V	|	|	|	|
6+ 5	1.3543	3.65	|Q V	|	|	|	|
6+10	1.3795	3.67	|Q V	|	|	|	|
6+15	1.4049	3.68	|Q V	|	|	|	|
6+20	1.4304	3.70	|Q V	|	|	|	|
6+25	1.4560	3.72	|Q V	|	|	|	|
6+30	1.4818	3.74	|Q V	|	|	|	|
6+35	1.5077	3.76	|Q V	|	|	|	|
6+40	1.5337	3.78	|Q V	|	|	|	|
6+45	1.5598	3.80	|Q V	|	|	|	|
6+50	1.5861	3.82	|Q V	|	|	|	|
6+55	1.6125	3.84	|Q V	|	|	|	|
7+ 0	1.6391	3.86	|Q V	|	|	|	|

7+ 5	1.6658	3.88	Q V			
7+10	1.6927	3.90	Q V			
7+15	1.7197	3.92	Q V			
7+20	1.7468	3.94	Q V			
7+25	1.7741	3.96	Q V			
7+30	1.8015	3.99	Q V			
7+35	1.8291	4.01	Q V			
7+40	1.8569	4.03	Q V			
7+45	1.8848	4.05	Q V			
7+50	1.9129	4.08	Q V			
7+55	1.9411	4.10	Q V			
8+ 0	1.9695	4.13	Q V			
8+ 5	1.9981	4.15	Q V			
8+10	2.0269	4.17	Q V			
8+15	2.0558	4.20	Q V			
8+20	2.0849	4.23	Q V			
8+25	2.1142	4.25	Q V			
8+30	2.1436	4.28	Q V			
8+35	2.1733	4.31	Q V			
8+40	2.2031	4.33	Q V			
8+45	2.2332	4.36	Q V			
8+50	2.2634	4.39	Q V			
8+55	2.2938	4.42	Q V			
9+ 0	2.3245	4.45	Q V			
9+ 5	2.3553	4.48	Q V			
9+10	2.3863	4.51	Q V			
9+15	2.4176	4.54	Q V			
9+20	2.4491	4.57	Q V			
9+25	2.4808	4.60	Q V			
9+30	2.5127	4.64	Q V			
9+35	2.5449	4.67	Q V			
9+40	2.5772	4.70	Q V			
9+45	2.6099	4.74	Q V			
9+50	2.6427	4.77	Q V			
9+55	2.6759	4.81	Q V			
10+ 0	2.7092	4.85	Q V			
10+ 5	2.7429	4.88	Q V			
10+10	2.7767	4.92	Q V			
10+15	2.8109	4.96	Q V			
10+20	2.8453	5.00	Q V			
10+25	2.8801	5.04	Q V			
10+30	2.9151	5.08	Q V			
10+35	2.9504	5.12	Q V			
10+40	2.9860	5.17	Q V			
10+45	3.0219	5.21	Q V			
10+50	3.0581	5.26	Q V			
10+55	3.0946	5.30	Q V			
11+ 0	3.1315	5.35	Q V			
11+ 5	3.1687	5.40	Q V			
11+10	3.2062	5.45	Q V			

11+15	3.2441	5.50	Q V				
11+20	3.2824	5.56	Q V				
11+25	3.3210	5.61	Q V				
11+30	3.3600	5.66	Q V				
11+35	3.3994	5.72	Q V				
11+40	3.4392	5.78	Q V				
11+45	3.4794	5.84	Q V				
11+50	3.5201	5.90	Q V				
11+55	3.5611	5.96	Q V				
12+ 0	3.6027	6.03	Q V				
12+ 5	3.6446	6.09	Q V				
12+10	3.6868	6.13	Q V				
12+15	3.7293	6.17	Q V				
12+20	3.7720	6.19	Q V				
12+25	3.8147	6.21	Q V				
12+30	3.8578	6.25	Q V				
12+35	3.9012	6.31	Q V				
12+40	3.9451	6.37	Q V				
12+45	3.9894	6.44	Q V				
12+50	4.0342	6.51	Q V				
12+55	4.0796	6.59	Q V				
13+ 0	4.1256	6.67	Q V				
13+ 5	4.1721	6.76	Q V				
13+10	4.2193	6.85	Q V				
13+15	4.2672	6.95	Q V				
13+20	4.3157	7.05	Q V				
13+25	4.3650	7.16	Q V				
13+30	4.4151	7.27	Q V				
13+35	4.4660	7.39	Q V				
13+40	4.5178	7.52	Q V				
13+45	4.5705	7.65	Q V				
13+50	4.6241	7.79	Q V				
13+55	4.6787	7.93	Q V				
14+ 0	4.7344	8.09	Q V				
14+ 5	4.7913	8.25	Q V				
14+10	4.8494	8.43	Q V				
14+15	4.9087	8.62	Q V				
14+20	4.9695	8.83	Q V				
14+25	5.0318	9.04	Q V				
14+30	5.0956	9.27	Q V				
14+35	5.1612	9.52	Q V				
14+40	5.2285	9.78	Q V				
14+45	5.2978	10.06	Q V				
14+50	5.3691	10.36	Q V				
14+55	5.4428	10.69	Q V				
15+ 0	5.5189	11.05	Q V				
15+ 5	5.5977	11.45	Q V				
15+10	5.6796	11.89	Q V				
15+15	5.7648	12.37	Q V				
15+20	5.8538	12.92	Q V				



19+35	13.7080	8.94	Q			V
19+40	13.7682	8.74	Q			V
19+45	13.8263	8.43	Q			V
19+50	13.8832	8.26	Q			V
19+55	13.9391	8.12	Q			V
20+ 0	13.9936	7.91	Q			V
20+ 5	14.0471	7.78	Q			V
20+10	14.1000	7.67	Q			V
20+15	14.1520	7.56	Q			V
20+20	14.2034	7.46	Q			V
20+25	14.2540	7.35	Q			V
20+30	14.3040	7.25	Q			V
20+35	14.3532	7.15	Q			V
20+40	14.4017	7.05	Q			V
20+45	14.4495	6.94	Q			V
20+50	14.4966	6.83	Q			V
20+55	14.5429	6.72	Q			V
21+ 0	14.5882	6.58	Q			V
21+ 5	14.6324	6.41	Q			V
21+10	14.6749	6.18	Q			V
21+15	14.7128	5.51	Q			V
21+20	14.7458	4.78	Q			V
21+25	14.7777	4.64	Q			V
21+30	14.8090	4.54	Q			V
21+35	14.8397	4.45	Q			V
21+40	14.8698	4.37	Q			V
21+45	14.8994	4.30	Q			V
21+50	14.9286	4.23	Q			V
21+55	14.9573	4.17	Q			V
22+ 0	14.9855	4.11	Q			V
22+ 5	15.0134	4.05	Q			V
22+10	15.0410	4.00	Q			V
22+15	15.0682	3.95	Q			V
22+20	15.0950	3.90	Q			V
22+25	15.1216	3.85	Q			V
22+30	15.1478	3.81	Q			V
22+35	15.1738	3.77	Q			V
22+40	15.1994	3.73	Q			V
22+45	15.2248	3.69	Q			V
22+50	15.2500	3.65	Q			V
22+55	15.2748	3.61	Q			V
23+ 0	15.2995	3.58	Q			V
23+ 5	15.3239	3.54	Q			V
23+10	15.3480	3.51	Q			V
23+15	15.3720	3.48	Q			V
23+20	15.3957	3.44	Q			V
23+25	15.4192	3.41	Q			V
23+30	15.4424	3.38	Q			V
23+35	15.4655	3.35	Q			V
23+40	15.4884	3.32	Q			V

23+45	15.5110	3.29	|Q	|	|	|	V|
23+50	15.5335	3.26	|Q	|	|	|	V|
23+55	15.5558	3.24	|Q	|	|	|	V|
24+ 0	15.5779	3.21	|Q	|	|	|	V|
24+ 5	15.5995	3.13	|Q	|	|	|	V|
24+10	15.6199	2.97	|Q	|	|	|	V|
24+15	15.6387	2.73	|Q	|	|	|	V|
24+20	15.6550	2.36	|Q	|	|	|	V|
24+25	15.6689	2.02	|Q	|	|	|	V|
24+30	15.6811	1.77	Q	|	|	|	V|
24+35	15.6921	1.59	Q	|	|	|	V|
24+40	15.7021	1.45	Q	|	|	|	V|
24+45	15.7113	1.34	Q	|	|	|	V|
24+50	15.7199	1.24	Q	|	|	|	V|
24+55	15.7278	1.16	Q	|	|	|	V|
25+ 0	15.7353	1.08	Q	|	|	|	V|
25+ 5	15.7422	1.01	Q	|	|	|	V|
25+10	15.7487	0.94	Q	|	|	|	V|
25+15	15.7548	0.89	Q	|	|	|	V|
25+20	15.7606	0.83	Q	|	|	|	V|
25+25	15.7660	0.78	Q	|	|	|	V|
25+30	15.7710	0.74	Q	|	|	|	V|
25+35	15.7758	0.69	Q	|	|	|	V|
25+40	15.7803	0.66	Q	|	|	|	V|
25+45	15.7846	0.62	Q	|	|	|	V|
25+50	15.7887	0.59	Q	|	|	|	V|
25+55	15.7925	0.56	Q	|	|	|	V|
26+ 0	15.7962	0.53	Q	|	|	|	V|
26+ 5	15.7996	0.50	Q	|	|	|	V|
26+10	15.8029	0.48	Q	|	|	|	V|
26+15	15.8060	0.45	Q	|	|	|	V|
26+20	15.8090	0.43	Q	|	|	|	V|
26+25	15.8118	0.41	Q	|	|	|	V|
26+30	15.8145	0.39	Q	|	|	|	V|
26+35	15.8170	0.37	Q	|	|	|	V|
26+40	15.8194	0.35	Q	|	|	|	V|
26+45	15.8216	0.33	Q	|	|	|	V|
26+50	15.8238	0.31	Q	|	|	|	V|
26+55	15.8258	0.29	Q	|	|	|	V|
27+ 0	15.8277	0.28	Q	|	|	|	V|
27+ 5	15.8295	0.26	Q	|	|	|	V|
27+10	15.8312	0.25	Q	|	|	|	V|
27+15	15.8328	0.23	Q	|	|	|	V|
27+20	15.8343	0.22	Q	|	|	|	V|
27+25	15.8357	0.21	Q	|	|	|	V|
27+30	15.8371	0.19	Q	|	|	|	V|
27+35	15.8383	0.18	Q	|	|	|	V|
27+40	15.8395	0.17	Q	|	|	|	V|
27+45	15.8405	0.16	Q	|	|	|	V|
27+50	15.8416	0.15	Q	|	|	|	V|

27+55	15.8425	0.14	Q	|	|	|	V|
28+ 0	15.8434	0.13	Q	|	|	|	V|
28+ 5	15.8442	0.12	Q	|	|	|	V|
28+10	15.8450	0.11	Q	|	|	|	V|
28+15	15.8456	0.10	Q	|	|	|	V|
28+20	15.8463	0.09	Q	|	|	|	V|
28+25	15.8468	0.08	Q	|	|	|	V|
28+30	15.8473	0.07	Q	|	|	|	V|
28+35	15.8478	0.06	Q	|	|	|	V|
28+40	15.8482	0.06	Q	|	|	|	V|
28+45	15.8485	0.05	Q	|	|	|	V|
28+50	15.8488	0.04	Q	|	|	|	V|
28+55	15.8490	0.03	Q	|	|	|	V|
29+ 0	15.8491	0.02	Q	|	|	|	V|
29+ 5	15.8492	0.01	Q	|	|	|	V|
29+10	15.8492	0.00	Q	|	|	|	V|

APPENDIX H

Post-Development Unit Hydrograph Analysis

U n i t H y d r o g r a p h A n a l y s i s

Study date 04/01/21

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 6353

PROJECT LOKI
PROPOSED CONDITION 2-YR STORM

Storm Event Year = 2

Antecedent Moisture Condition = 1

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 2		
71.40	1	0.33
Rainfall data for year 2		
71.40	6	0.67
Rainfall data for year 2		
71.40	24	1.07

++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	SCS curve NO.(AMC 1)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
69.0	49.8	71.40	1.000	0.812	0.300	0.244

Area-averaged adjusted loss rate Fm (In/Hr) = 0.244

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC1)	S	Pervious Yield Fr
21.42	0.300	69.0	49.8	5.35	0.000
49.98	0.700	98.0	98.0	0.20	0.803

Area-averaged catchment yield fraction, Y = 0.562
Area-averaged low loss fraction, Yb = 0.438
User entry of time of concentration = 0.250 (hours)
++
Watershed area = 71.40(Ac.)
Catchment Lag time = 0.200 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 41.6667
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.244(In/Hr)
Average low loss rate fraction (Yb) = 0.438 (decimal)
MOUNTAIN S-Graph Selected
Computed peak 5-minute rainfall = 0.155(In)
Computed peak 30-minute rainfall = 0.265(In)
Specified peak 1-hour rainfall = 0.326(In)
Computed peak 3-hour rainfall = 0.506(In)
Specified peak 6-hour rainfall = 0.667(In)
Specified peak 24-hour rainfall = 1.070(In)

Rainfall depth area reduction factors:
Using a total area of 71.40(Ac.) (Ref: fig. E-4)

5-minute factor = 0.997 Adjusted rainfall = 0.154(In)
30-minute factor = 0.997 Adjusted rainfall = 0.264(In)
1-hour factor = 0.997 Adjusted rainfall = 0.325(In)
3-hour factor = 1.000 Adjusted rainfall = 0.505(In)
6-hour factor = 1.000 Adjusted rainfall = 0.667(In)
24-hour factor = 1.000 Adjusted rainfall = 1.070(In)

U n i t H y d r o g r a p h
++

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 863.49 (CFS))	
1	5.871	50.699
2	30.212	210.176
3	50.779	177.600
4	60.815	86.662
5	67.467	57.434
6	72.580	44.153
7	76.607	34.770
8	79.833	27.862
9	82.390	22.077
10	84.550	18.651
11	86.373	15.744
12	88.067	14.622
13	89.567	12.952
14	90.873	11.283
15	92.095	10.549
16	93.185	9.412
17	94.197	8.736
18	95.083	7.656
19	95.875	6.836
20	96.625	6.476
21	97.375	6.476
22	98.125	6.476
23	98.875	6.476
24	99.625	6.476
25	100.000	3.238

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.1542	0.1542
2	0.1898	0.0356
3	0.2144	0.0246
4	0.2337	0.0193
5	0.2499	0.0162
6	0.2639	0.0140
7	0.2764	0.0125
8	0.2877	0.0113
9	0.2980	0.0103
10	0.3076	0.0096
11	0.3165	0.0089
12	0.3249	0.0084
13	0.3355	0.0106
14	0.3457	0.0102
15	0.3554	0.0097
16	0.3648	0.0093
17	0.3738	0.0090

18	0.3825	0.0087
19	0.3909	0.0084
20	0.3990	0.0081
21	0.4069	0.0079
22	0.4146	0.0077
23	0.4221	0.0075
24	0.4294	0.0073
25	0.4365	0.0071
26	0.4434	0.0069
27	0.4502	0.0068
28	0.4568	0.0066
29	0.4633	0.0065
30	0.4697	0.0064
31	0.4759	0.0062
32	0.4820	0.0061
33	0.4881	0.0060
34	0.4939	0.0059
35	0.4997	0.0058
36	0.5054	0.0057
37	0.5110	0.0056
38	0.5165	0.0055
39	0.5219	0.0054
40	0.5272	0.0053
41	0.5324	0.0052
42	0.5376	0.0052
43	0.5426	0.0051
44	0.5477	0.0050
45	0.5526	0.0049
46	0.5575	0.0049
47	0.5623	0.0048
48	0.5670	0.0048
49	0.5717	0.0047
50	0.5764	0.0046
51	0.5810	0.0046
52	0.5855	0.0045
53	0.5900	0.0045
54	0.5944	0.0044
55	0.5988	0.0044
56	0.6031	0.0043
57	0.6074	0.0043
58	0.6116	0.0042
59	0.6158	0.0042
60	0.6200	0.0042
61	0.6241	0.0041
62	0.6281	0.0041
63	0.6322	0.0040
64	0.6362	0.0040
65	0.6401	0.0040
66	0.6441	0.0039
67	0.6479	0.0039

68	0.6518	0.0038
69	0.6556	0.0038
70	0.6594	0.0038
71	0.6631	0.0038
72	0.6669	0.0037
73	0.6700	0.0031
74	0.6731	0.0031
75	0.6762	0.0031
76	0.6793	0.0031
77	0.6823	0.0030
78	0.6853	0.0030
79	0.6883	0.0030
80	0.6912	0.0030
81	0.6942	0.0029
82	0.6971	0.0029
83	0.7000	0.0029
84	0.7028	0.0029
85	0.7057	0.0028
86	0.7085	0.0028
87	0.7113	0.0028
88	0.7141	0.0028
89	0.7168	0.0028
90	0.7196	0.0027
91	0.7223	0.0027
92	0.7250	0.0027
93	0.7277	0.0027
94	0.7303	0.0027
95	0.7330	0.0026
96	0.7356	0.0026
97	0.7382	0.0026
98	0.7408	0.0026
99	0.7433	0.0026
100	0.7459	0.0026
101	0.7484	0.0025
102	0.7510	0.0025
103	0.7535	0.0025
104	0.7559	0.0025
105	0.7584	0.0025
106	0.7609	0.0025
107	0.7633	0.0024
108	0.7657	0.0024
109	0.7681	0.0024
110	0.7705	0.0024
111	0.7729	0.0024
112	0.7753	0.0024
113	0.7776	0.0024
114	0.7800	0.0023
115	0.7823	0.0023
116	0.7846	0.0023
117	0.7869	0.0023

118	0.7892	0.0023
119	0.7915	0.0023
120	0.7938	0.0023
121	0.7960	0.0022
122	0.7982	0.0022
123	0.8005	0.0022
124	0.8027	0.0022
125	0.8049	0.0022
126	0.8071	0.0022
127	0.8092	0.0022
128	0.8114	0.0022
129	0.8136	0.0022
130	0.8157	0.0021
131	0.8179	0.0021
132	0.8200	0.0021
133	0.8221	0.0021
134	0.8242	0.0021
135	0.8263	0.0021
136	0.8284	0.0021
137	0.8304	0.0021
138	0.8325	0.0021
139	0.8346	0.0021
140	0.8366	0.0020
141	0.8386	0.0020
142	0.8407	0.0020
143	0.8427	0.0020
144	0.8447	0.0020
145	0.8467	0.0020
146	0.8487	0.0020
147	0.8506	0.0020
148	0.8526	0.0020
149	0.8546	0.0020
150	0.8565	0.0020
151	0.8585	0.0019
152	0.8604	0.0019
153	0.8623	0.0019
154	0.8642	0.0019
155	0.8661	0.0019
156	0.8680	0.0019
157	0.8699	0.0019
158	0.8718	0.0019
159	0.8737	0.0019
160	0.8756	0.0019
161	0.8774	0.0019
162	0.8793	0.0019
163	0.8811	0.0018
164	0.8830	0.0018
165	0.8848	0.0018
166	0.8866	0.0018
167	0.8885	0.0018

168	0.8903	0.0018
169	0.8921	0.0018
170	0.8939	0.0018
171	0.8957	0.0018
172	0.8974	0.0018
173	0.8992	0.0018
174	0.9010	0.0018
175	0.9027	0.0018
176	0.9045	0.0018
177	0.9062	0.0017
178	0.9080	0.0017
179	0.9097	0.0017
180	0.9115	0.0017
181	0.9132	0.0017
182	0.9149	0.0017
183	0.9166	0.0017
184	0.9183	0.0017
185	0.9200	0.0017
186	0.9217	0.0017
187	0.9234	0.0017
188	0.9251	0.0017
189	0.9267	0.0017
190	0.9284	0.0017
191	0.9301	0.0017
192	0.9317	0.0017
193	0.9334	0.0017
194	0.9350	0.0016
195	0.9367	0.0016
196	0.9383	0.0016
197	0.9399	0.0016
198	0.9416	0.0016
199	0.9432	0.0016
200	0.9448	0.0016
201	0.9464	0.0016
202	0.9480	0.0016
203	0.9496	0.0016
204	0.9512	0.0016
205	0.9528	0.0016
206	0.9544	0.0016
207	0.9559	0.0016
208	0.9575	0.0016
209	0.9591	0.0016
210	0.9607	0.0016
211	0.9622	0.0016
212	0.9638	0.0016
213	0.9653	0.0015
214	0.9669	0.0015
215	0.9684	0.0015
216	0.9699	0.0015
217	0.9715	0.0015

218	0.9730	0.0015
219	0.9745	0.0015
220	0.9760	0.0015
221	0.9775	0.0015
222	0.9790	0.0015
223	0.9805	0.0015
224	0.9820	0.0015
225	0.9835	0.0015
226	0.9850	0.0015
227	0.9865	0.0015
228	0.9880	0.0015
229	0.9894	0.0015
230	0.9909	0.0015
231	0.9924	0.0015
232	0.9939	0.0015
233	0.9953	0.0015
234	0.9968	0.0015
235	0.9982	0.0015
236	0.9997	0.0014
237	1.0011	0.0014
238	1.0025	0.0014
239	1.0040	0.0014
240	1.0054	0.0014
241	1.0068	0.0014
242	1.0083	0.0014
243	1.0097	0.0014
244	1.0111	0.0014
245	1.0125	0.0014
246	1.0139	0.0014
247	1.0153	0.0014
248	1.0167	0.0014
249	1.0181	0.0014
250	1.0195	0.0014
251	1.0209	0.0014
252	1.0223	0.0014
253	1.0237	0.0014
254	1.0250	0.0014
255	1.0264	0.0014
256	1.0278	0.0014
257	1.0291	0.0014
258	1.0305	0.0014
259	1.0319	0.0014
260	1.0332	0.0014
261	1.0346	0.0014
262	1.0359	0.0014
263	1.0373	0.0013
264	1.0386	0.0013
265	1.0400	0.0013
266	1.0413	0.0013
267	1.0426	0.0013

268	1.0440	0.0013
269	1.0453	0.0013
270	1.0466	0.0013
271	1.0479	0.0013
272	1.0493	0.0013
273	1.0506	0.0013
274	1.0519	0.0013
275	1.0532	0.0013
276	1.0545	0.0013
277	1.0558	0.0013
278	1.0571	0.0013
279	1.0584	0.0013
280	1.0597	0.0013
281	1.0610	0.0013
282	1.0623	0.0013
283	1.0635	0.0013
284	1.0648	0.0013
285	1.0661	0.0013
286	1.0674	0.0013
287	1.0686	0.0013
288	1.0699	0.0013

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0013	0.0006	0.0007
2	0.0013	0.0006	0.0007
3	0.0013	0.0006	0.0007
4	0.0013	0.0006	0.0007
5	0.0013	0.0006	0.0007
6	0.0013	0.0006	0.0007
7	0.0013	0.0006	0.0007
8	0.0013	0.0006	0.0007
9	0.0013	0.0006	0.0007
10	0.0013	0.0006	0.0007
11	0.0013	0.0006	0.0007
12	0.0013	0.0006	0.0007
13	0.0013	0.0006	0.0007
14	0.0013	0.0006	0.0007
15	0.0013	0.0006	0.0007
16	0.0013	0.0006	0.0008
17	0.0013	0.0006	0.0008
18	0.0013	0.0006	0.0008
19	0.0014	0.0006	0.0008
20	0.0014	0.0006	0.0008
21	0.0014	0.0006	0.0008
22	0.0014	0.0006	0.0008
23	0.0014	0.0006	0.0008
24	0.0014	0.0006	0.0008

25	0.0014	0.0006	0.0008
26	0.0014	0.0006	0.0008
27	0.0014	0.0006	0.0008
28	0.0014	0.0006	0.0008
29	0.0014	0.0006	0.0008
30	0.0014	0.0006	0.0008
31	0.0014	0.0006	0.0008
32	0.0014	0.0006	0.0008
33	0.0014	0.0006	0.0008
34	0.0014	0.0006	0.0008
35	0.0014	0.0006	0.0008
36	0.0014	0.0006	0.0008
37	0.0015	0.0006	0.0008
38	0.0015	0.0006	0.0008
39	0.0015	0.0006	0.0008
40	0.0015	0.0006	0.0008
41	0.0015	0.0006	0.0008
42	0.0015	0.0007	0.0008
43	0.0015	0.0007	0.0008
44	0.0015	0.0007	0.0008
45	0.0015	0.0007	0.0008
46	0.0015	0.0007	0.0008
47	0.0015	0.0007	0.0009
48	0.0015	0.0007	0.0009
49	0.0015	0.0007	0.0009
50	0.0015	0.0007	0.0009
51	0.0015	0.0007	0.0009
52	0.0016	0.0007	0.0009
53	0.0016	0.0007	0.0009
54	0.0016	0.0007	0.0009
55	0.0016	0.0007	0.0009
56	0.0016	0.0007	0.0009
57	0.0016	0.0007	0.0009
58	0.0016	0.0007	0.0009
59	0.0016	0.0007	0.0009
60	0.0016	0.0007	0.0009
61	0.0016	0.0007	0.0009
62	0.0016	0.0007	0.0009
63	0.0016	0.0007	0.0009
64	0.0016	0.0007	0.0009
65	0.0017	0.0007	0.0009
66	0.0017	0.0007	0.0009
67	0.0017	0.0007	0.0009
68	0.0017	0.0007	0.0009
69	0.0017	0.0007	0.0010
70	0.0017	0.0007	0.0010
71	0.0017	0.0007	0.0010
72	0.0017	0.0008	0.0010
73	0.0017	0.0008	0.0010
74	0.0017	0.0008	0.0010

75	0.0017	0.0008	0.0010
76	0.0018	0.0008	0.0010
77	0.0018	0.0008	0.0010
78	0.0018	0.0008	0.0010
79	0.0018	0.0008	0.0010
80	0.0018	0.0008	0.0010
81	0.0018	0.0008	0.0010
82	0.0018	0.0008	0.0010
83	0.0018	0.0008	0.0010
84	0.0018	0.0008	0.0010
85	0.0019	0.0008	0.0010
86	0.0019	0.0008	0.0010
87	0.0019	0.0008	0.0011
88	0.0019	0.0008	0.0011
89	0.0019	0.0008	0.0011
90	0.0019	0.0008	0.0011
91	0.0019	0.0008	0.0011
92	0.0019	0.0008	0.0011
93	0.0020	0.0009	0.0011
94	0.0020	0.0009	0.0011
95	0.0020	0.0009	0.0011
96	0.0020	0.0009	0.0011
97	0.0020	0.0009	0.0011
98	0.0020	0.0009	0.0011
99	0.0020	0.0009	0.0011
100	0.0020	0.0009	0.0011
101	0.0021	0.0009	0.0012
102	0.0021	0.0009	0.0012
103	0.0021	0.0009	0.0012
104	0.0021	0.0009	0.0012
105	0.0021	0.0009	0.0012
106	0.0021	0.0009	0.0012
107	0.0022	0.0009	0.0012
108	0.0022	0.0009	0.0012
109	0.0022	0.0010	0.0012
110	0.0022	0.0010	0.0012
111	0.0022	0.0010	0.0013
112	0.0022	0.0010	0.0013
113	0.0023	0.0010	0.0013
114	0.0023	0.0010	0.0013
115	0.0023	0.0010	0.0013
116	0.0023	0.0010	0.0013
117	0.0023	0.0010	0.0013
118	0.0024	0.0010	0.0013
119	0.0024	0.0010	0.0013
120	0.0024	0.0010	0.0013
121	0.0024	0.0011	0.0014
122	0.0024	0.0011	0.0014
123	0.0025	0.0011	0.0014
124	0.0025	0.0011	0.0014

125	0.0025	0.0011	0.0014
126	0.0025	0.0011	0.0014
127	0.0026	0.0011	0.0014
128	0.0026	0.0011	0.0015
129	0.0026	0.0011	0.0015
130	0.0026	0.0012	0.0015
131	0.0027	0.0012	0.0015
132	0.0027	0.0012	0.0015
133	0.0027	0.0012	0.0015
134	0.0028	0.0012	0.0015
135	0.0028	0.0012	0.0016
136	0.0028	0.0012	0.0016
137	0.0029	0.0013	0.0016
138	0.0029	0.0013	0.0016
139	0.0029	0.0013	0.0016
140	0.0030	0.0013	0.0017
141	0.0030	0.0013	0.0017
142	0.0030	0.0013	0.0017
143	0.0031	0.0014	0.0017
144	0.0031	0.0014	0.0018
145	0.0037	0.0016	0.0021
146	0.0038	0.0016	0.0021
147	0.0038	0.0017	0.0021
148	0.0038	0.0017	0.0022
149	0.0039	0.0017	0.0022
150	0.0040	0.0017	0.0022
151	0.0040	0.0018	0.0023
152	0.0041	0.0018	0.0023
153	0.0042	0.0018	0.0023
154	0.0042	0.0018	0.0024
155	0.0043	0.0019	0.0024
156	0.0043	0.0019	0.0024
157	0.0044	0.0019	0.0025
158	0.0045	0.0020	0.0025
159	0.0046	0.0020	0.0026
160	0.0046	0.0020	0.0026
161	0.0048	0.0021	0.0027
162	0.0048	0.0021	0.0027
163	0.0049	0.0022	0.0028
164	0.0050	0.0022	0.0028
165	0.0052	0.0023	0.0029
166	0.0052	0.0023	0.0029
167	0.0054	0.0024	0.0030
168	0.0055	0.0024	0.0031
169	0.0057	0.0025	0.0032
170	0.0058	0.0025	0.0033
171	0.0060	0.0026	0.0034
172	0.0061	0.0027	0.0034
173	0.0064	0.0028	0.0036
174	0.0065	0.0028	0.0036

175	0.0068	0.0030	0.0038
176	0.0069	0.0030	0.0039
177	0.0073	0.0032	0.0041
178	0.0075	0.0033	0.0042
179	0.0079	0.0035	0.0044
180	0.0081	0.0036	0.0046
181	0.0087	0.0038	0.0049
182	0.0090	0.0039	0.0051
183	0.0097	0.0043	0.0055
184	0.0102	0.0044	0.0057
185	0.0084	0.0037	0.0047
186	0.0089	0.0039	0.0050
187	0.0103	0.0045	0.0058
188	0.0113	0.0049	0.0063
189	0.0140	0.0062	0.0079
190	0.0162	0.0071	0.0091
191	0.0246	0.0108	0.0138
192	0.0356	0.0156	0.0200
193	0.1542	0.0203	0.1339
194	0.0193	0.0085	0.0109
195	0.0125	0.0055	0.0070
196	0.0096	0.0042	0.0054
197	0.0106	0.0047	0.0060
198	0.0093	0.0041	0.0053
199	0.0084	0.0037	0.0047
200	0.0077	0.0034	0.0043
201	0.0071	0.0031	0.0040
202	0.0066	0.0029	0.0037
203	0.0062	0.0027	0.0035
204	0.0059	0.0026	0.0033
205	0.0056	0.0024	0.0031
206	0.0053	0.0023	0.0030
207	0.0051	0.0022	0.0029
208	0.0049	0.0021	0.0027
209	0.0047	0.0021	0.0026
210	0.0045	0.0020	0.0025
211	0.0044	0.0019	0.0025
212	0.0042	0.0019	0.0024
213	0.0041	0.0018	0.0023
214	0.0040	0.0017	0.0022
215	0.0039	0.0017	0.0022
216	0.0038	0.0017	0.0021
217	0.0031	0.0014	0.0018
218	0.0031	0.0013	0.0017
219	0.0030	0.0013	0.0017
220	0.0029	0.0013	0.0016
221	0.0028	0.0012	0.0016
222	0.0028	0.0012	0.0016
223	0.0027	0.0012	0.0015
224	0.0027	0.0012	0.0015

225	0.0026	0.0011	0.0015
226	0.0026	0.0011	0.0014
227	0.0025	0.0011	0.0014
228	0.0025	0.0011	0.0014
229	0.0024	0.0011	0.0014
230	0.0024	0.0010	0.0013
231	0.0023	0.0010	0.0013
232	0.0023	0.0010	0.0013
233	0.0022	0.0010	0.0013
234	0.0022	0.0010	0.0012
235	0.0022	0.0010	0.0012
236	0.0021	0.0009	0.0012
237	0.0021	0.0009	0.0012
238	0.0021	0.0009	0.0012
239	0.0021	0.0009	0.0012
240	0.0020	0.0009	0.0011
241	0.0020	0.0009	0.0011
242	0.0020	0.0009	0.0011
243	0.0019	0.0009	0.0011
244	0.0019	0.0008	0.0011
245	0.0019	0.0008	0.0011
246	0.0019	0.0008	0.0011
247	0.0018	0.0008	0.0010
248	0.0018	0.0008	0.0010
249	0.0018	0.0008	0.0010
250	0.0018	0.0008	0.0010
251	0.0018	0.0008	0.0010
252	0.0017	0.0008	0.0010
253	0.0017	0.0008	0.0010
254	0.0017	0.0007	0.0010
255	0.0017	0.0007	0.0009
256	0.0017	0.0007	0.0009
257	0.0017	0.0007	0.0009
258	0.0016	0.0007	0.0009
259	0.0016	0.0007	0.0009
260	0.0016	0.0007	0.0009
261	0.0016	0.0007	0.0009
262	0.0016	0.0007	0.0009
263	0.0016	0.0007	0.0009
264	0.0015	0.0007	0.0009
265	0.0015	0.0007	0.0009
266	0.0015	0.0007	0.0009
267	0.0015	0.0007	0.0008
268	0.0015	0.0007	0.0008
269	0.0015	0.0006	0.0008
270	0.0015	0.0006	0.0008
271	0.0015	0.0006	0.0008
272	0.0014	0.0006	0.0008
273	0.0014	0.0006	0.0008
274	0.0014	0.0006	0.0008

275	0.0014	0.0006	0.0008
276	0.0014	0.0006	0.0008
277	0.0014	0.0006	0.0008
278	0.0014	0.0006	0.0008
279	0.0014	0.0006	0.0008
280	0.0014	0.0006	0.0008
281	0.0013	0.0006	0.0008
282	0.0013	0.0006	0.0007
283	0.0013	0.0006	0.0007
284	0.0013	0.0006	0.0007
285	0.0013	0.0006	0.0007
286	0.0013	0.0006	0.0007
287	0.0013	0.0006	0.0007
288	0.0013	0.0006	0.0007

Total soil rain loss = 0.42(In)
Total effective rainfall = 0.65(In)
Peak flow rate in flood hydrograph = 35.49(CFS)

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24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

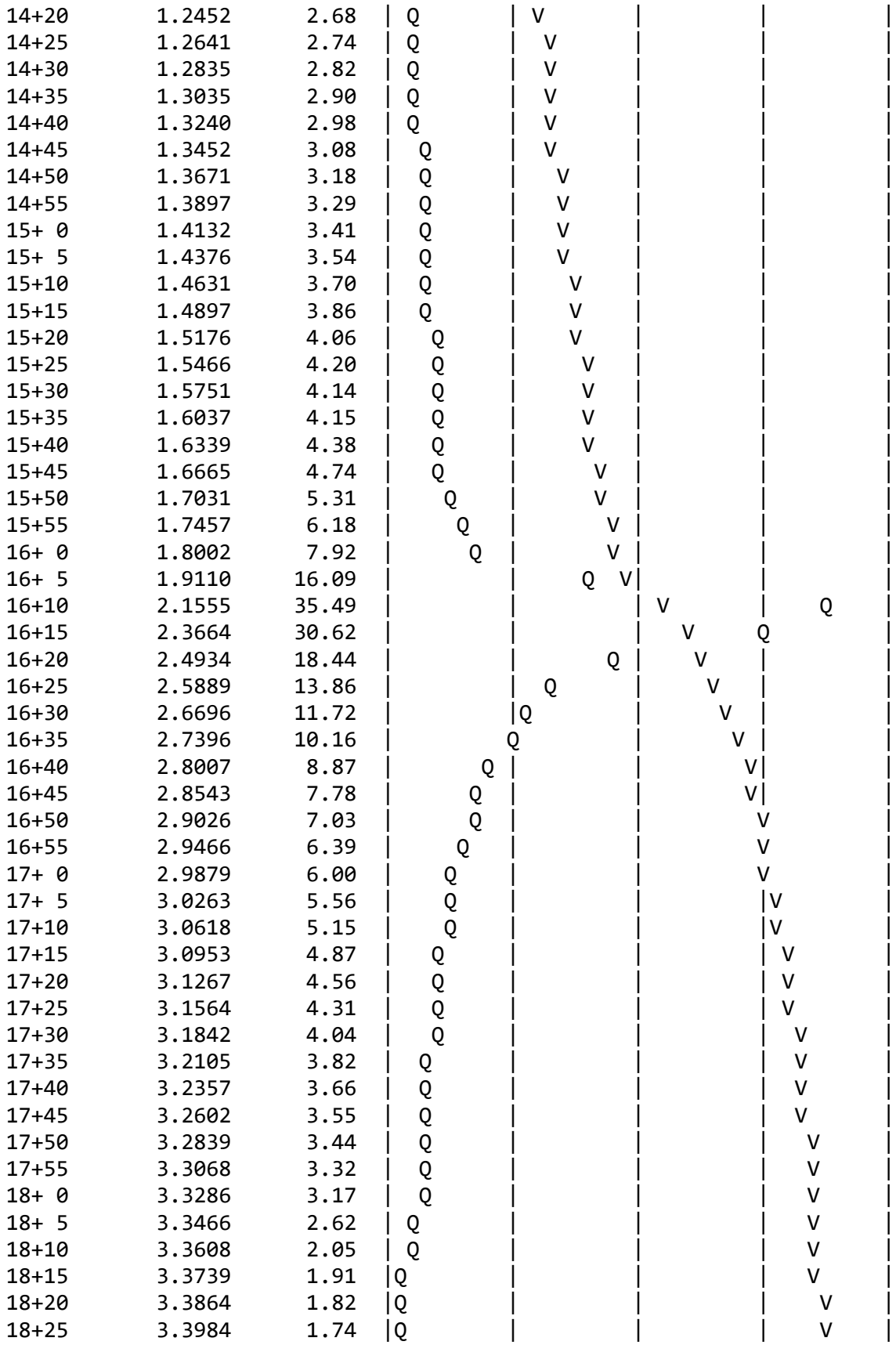
Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	10.0	20.0	30.0	40.0
0+ 5	0.0002	0.04	Q	|	|	|	|
0+10	0.0015	0.19	Q	|	|	|	|
0+15	0.0037	0.31	Q	|	|	|	|
0+20	0.0063	0.38	Q	|	|	|	|
0+25	0.0092	0.42	Q	|	|	|	|
0+30	0.0123	0.45	Q	|	|	|	|
0+35	0.0155	0.48	Q	|	|	|	|
0+40	0.0190	0.50	Q	|	|	|	|
0+45	0.0225	0.52	Q	|	|	|	|
0+50	0.0262	0.53	Q	|	|	|	|
0+55	0.0300	0.54	Q	|	|	|	|
1+ 0	0.0338	0.56	Q	|	|	|	|
1+ 5	0.0377	0.57	Q	|	|	|	|
1+10	0.0417	0.58	Q	|	|	|	|
1+15	0.0457	0.59	Q	|	|	|	|
1+20	0.0498	0.60	Q	|	|	|	|
1+25	0.0540	0.61	Q	|	|	|	|
1+30	0.0582	0.61	Q	|	|	|	|
1+35	0.0625	0.62	Q	|	|	|	|
1+40	0.0668	0.63	Q	|	|	|	|
1+45	0.0712	0.63	Q	|	|	|	|

1+50	0.0756	0.64	Q	|	|	|	|
1+55	0.0801	0.65	Q	|	|	|	|
2+ 0	0.0846	0.65	Q	|	|	|	|
2+ 5	0.0891	0.66	Q	|	|	|	|
2+10	0.0937	0.66	Q	|	|	|	|
2+15	0.0983	0.66	QV	|	|	|	|
2+20	0.1028	0.67	QV	|	|	|	|
2+25	0.1075	0.67	QV	|	|	|	|
2+30	0.1121	0.67	QV	|	|	|	|
2+35	0.1167	0.68	QV	|	|	|	|
2+40	0.1214	0.68	QV	|	|	|	|
2+45	0.1261	0.68	QV	|	|	|	|
2+50	0.1308	0.68	QV	|	|	|	|
2+55	0.1355	0.69	QV	|	|	|	|
3+ 0	0.1403	0.69	QV	|	|	|	|
3+ 5	0.1451	0.69	QV	|	|	|	|
3+10	0.1498	0.69	QV	|	|	|	|
3+15	0.1546	0.70	QV	|	|	|	|
3+20	0.1595	0.70	QV	|	|	|	|
3+25	0.1643	0.70	QV	|	|	|	|
3+30	0.1692	0.71	QV	|	|	|	|
3+35	0.1741	0.71	QV	|	|	|	|
3+40	0.1790	0.71	QV	|	|	|	|
3+45	0.1839	0.72	QV	|	|	|	|
3+50	0.1889	0.72	QV	|	|	|	|
3+55	0.1938	0.72	Q V	|	|	|	|
4+ 0	0.1988	0.73	Q V	|	|	|	|
4+ 5	0.2038	0.73	Q V	|	|	|	|
4+10	0.2089	0.73	Q V	|	|	|	|
4+15	0.2139	0.73	Q V	|	|	|	|
4+20	0.2190	0.74	Q V	|	|	|	|
4+25	0.2241	0.74	Q V	|	|	|	|
4+30	0.2293	0.75	Q V	|	|	|	|
4+35	0.2344	0.75	Q V	|	|	|	|
4+40	0.2396	0.75	Q V	|	|	|	|
4+45	0.2448	0.76	Q V	|	|	|	|
4+50	0.2500	0.76	Q V	|	|	|	|
4+55	0.2553	0.76	Q V	|	|	|	|
5+ 0	0.2605	0.77	Q V	|	|	|	|
5+ 5	0.2659	0.77	Q V	|	|	|	|
5+10	0.2712	0.77	Q V	|	|	|	|
5+15	0.2765	0.78	Q V	|	|	|	|
5+20	0.2819	0.78	Q V	|	|	|	|
5+25	0.2873	0.79	Q V	|	|	|	|
5+30	0.2928	0.79	Q V	|	|	|	|
5+35	0.2982	0.79	Q V	|	|	|	|
5+40	0.3037	0.80	Q V	|	|	|	|
5+45	0.3092	0.80	Q V	|	|	|	|
5+50	0.3148	0.81	Q V	|	|	|	|
5+55	0.3204	0.81	Q V	|	|	|	|

6+ 0	0.3260	0.81	Q V	|	|	|	|
6+ 5	0.3316	0.82	Q V	|	|	|	|
6+10	0.3373	0.82	Q V	|	|	|	|
6+15	0.3430	0.83	Q V	|	|	|	|
6+20	0.3487	0.83	Q V	|	|	|	|
6+25	0.3544	0.84	Q V	|	|	|	|
6+30	0.3602	0.84	Q V	|	|	|	|
6+35	0.3661	0.85	Q V	|	|	|	|
6+40	0.3719	0.85	Q V	|	|	|	|
6+45	0.3778	0.85	Q V	|	|	|	|
6+50	0.3837	0.86	Q V	|	|	|	|
6+55	0.3897	0.86	Q V	|	|	|	|
7+ 0	0.3957	0.87	Q V	|	|	|	|
7+ 5	0.4017	0.87	Q V	|	|	|	|
7+10	0.4077	0.88	Q V	|	|	|	|
7+15	0.4138	0.89	Q V	|	|	|	|
7+20	0.4200	0.89	Q V	|	|	|	|
7+25	0.4262	0.90	Q V	|	|	|	|
7+30	0.4324	0.90	Q V	|	|	|	|
7+35	0.4386	0.91	Q V	|	|	|	|
7+40	0.4449	0.91	Q V	|	|	|	|
7+45	0.4512	0.92	Q V	|	|	|	|
7+50	0.4576	0.92	Q V	|	|	|	|
7+55	0.4640	0.93	Q V	|	|	|	|
8+ 0	0.4704	0.94	Q V	|	|	|	|
8+ 5	0.4769	0.94	Q V	|	|	|	|
8+10	0.4835	0.95	Q V	|	|	|	|
8+15	0.4900	0.96	Q V	|	|	|	|
8+20	0.4967	0.96	Q V	|	|	|	|
8+25	0.5033	0.97	Q V	|	|	|	|
8+30	0.5101	0.98	Q V	|	|	|	|
8+35	0.5168	0.98	Q V	|	|	|	|
8+40	0.5236	0.99	Q V	|	|	|	|
8+45	0.5305	1.00	Q V	|	|	|	|
8+50	0.5374	1.00	|Q V	|	|	|	|
8+55	0.5444	1.01	|Q V	|	|	|	|
9+ 0	0.5514	1.02	|Q V	|	|	|	|
9+ 5	0.5584	1.03	|Q V	|	|	|	|
9+10	0.5655	1.03	|Q V	|	|	|	|
9+15	0.5727	1.04	|Q V	|	|	|	|
9+20	0.5799	1.05	|Q V	|	|	|	|
9+25	0.5872	1.06	|Q V	|	|	|	|
9+30	0.5946	1.07	|Q V	|	|	|	|
9+35	0.6019	1.07	|Q V	|	|	|	|
9+40	0.6094	1.08	|Q V	|	|	|	|
9+45	0.6169	1.09	|Q V	|	|	|	|
9+50	0.6245	1.10	|Q V	|	|	|	|
9+55	0.6322	1.11	|Q V	|	|	|	|
10+ 0	0.6399	1.12	|Q V	|	|	|	|
10+ 5	0.6476	1.13	|Q V	|	|	|	|

```
10+10       0.6555      1.14  |Q    V   |          |          |          |
10+15       0.6634      1.15  |Q    V   |          |          |          |
10+20       0.6714      1.16  |Q    V   |          |          |          |
10+25       0.6794      1.17  |Q     V  |          |          |          |
10+30       0.6876      1.18  |Q     V  |          |          |          |
10+35       0.6958      1.19  |Q     V  |          |          |          |
10+40       0.7041      1.20  |Q     V  |          |          |          |
10+45       0.7124      1.22  |Q     V  |          |          |          |
10+50       0.7209      1.23  |Q     V  |          |          |          |
10+55       0.7294      1.24  |Q     V  |          |          |          |
11+ 0       0.7381      1.25  |Q     V  |          |          |          |
11+ 5       0.7468      1.26  |Q     V  |          |          |          |
11+10       0.7556      1.28  |Q     V  |          |          |          |
11+15       0.7645      1.29  |Q     V  |          |          |          |
11+20       0.7734      1.31  |Q      V |          |          |          |
11+25       0.7825      1.32  |Q      V |          |          |          |
11+30       0.7917      1.33  |Q      V |          |          |          |
11+35       0.8010      1.35  |Q      V |          |          |          |
11+40       0.8104      1.37  |Q      V |          |          |          |
11+45       0.8199      1.38  |Q      V |          |          |          |
11+50       0.8296      1.40  |Q      V |          |          |          |
11+55       0.8393      1.41  |Q      V |          |          |          |
12+ 0       0.8492      1.43  |Q      V |          |          |          |
12+ 5       0.8593      1.47  |Q      V |          |          |          |
12+10       0.8699      1.55  |Q       V|          |          |          |
12+15       0.8811      1.62  |Q       V|          |          |          |
12+20       0.8926      1.67  |Q       V|          |          |          |
12+25       0.9044      1.71  |Q       V|          |          |          |
12+30       0.9164      1.75  |Q       V|          |          |          |
12+35       0.9287      1.78  |Q       V|          |          |          |
12+40       0.9412      1.81  |Q       V|          |          |          |
12+45       0.9539      1.84  |Q       V|          |          |          |
12+50       0.9668      1.88  |Q        V          |          |          |
12+55       0.9799      1.91  |Q        V          |          |          |
13+ 0       0.9933      1.94  |Q        V          |          |          |
13+ 5       1.0069      1.97  |Q        V          |          |          |
13+10       1.0207      2.01  | Q       V          |          |          |
13+15       1.0348      2.04  | Q       V          |          |          |
13+20       1.0492      2.08  | Q       V          |          |          |
13+25       1.0637      2.12  | Q       |V         |          |          |
13+30       1.0786      2.16  | Q       |V         |          |          |
13+35       1.0937      2.20  | Q       |V         |          |          |
13+40       1.1092      2.24  | Q       |V         |          |          |
13+45       1.1249      2.28  | Q       |V         |          |          |
13+50       1.1410      2.33  | Q       |V         |          |          |
13+55       1.1574      2.38  | Q       | V        |          |          |
14+ 0       1.1741      2.43  | Q       | V        |          |          |
14+ 5       1.1912      2.49  | Q       | V        |          |          |
14+10       1.2088      2.55  | Q       | V        |          |          |
14+15       1.2268      2.61  | Q       | V        |          |          |
```


14+20 1.2452 2.68
14+25 1.2641 2.74
14+30 1.2835 2.82
14+35 1.3035 2.90
14+40 1.3240 2.98
14+45 1.3452 3.08
14+50 1.3671 3.18
14+55 1.3897 3.29
15+ 0 1.4132 3.41
15+ 5 1.4376 3.54
15+10 1.4631 3.70
15+15 1.4897 3.86
15+20 1.5176 4.06
15+25 1.5466 4.20
15+30 1.5751 4.14
15+35 1.6037 4.15
15+40 1.6339 4.38
15+45 1.6665 4.74
15+50 1.7031 5.31
15+55 1.7457 6.18
16+ 0 1.8002 7.92
16+ 5 1.9110 16.09
16+10 2.1555 35.49
16+15 2.3664 30.62
16+20 2.4934 18.44
16+25 2.5889 13.86
16+30 2.6696 11.72
16+35 2.7396 10.16
16+40 2.8007 8.87
16+45 2.8543 7.78
16+50 2.9026 7.03
16+55 2.9466 6.39
17+ 0 2.9879 6.00
17+ 5 3.0263 5.56
17+10 3.0618 5.15
17+15 3.0953 4.87
17+20 3.1267 4.56
17+25 3.1564 4.31
17+30 3.1842 4.04
17+35 3.2105 3.82
17+40 3.2357 3.66
17+45 3.2602 3.55
17+50 3.2839 3.44
17+55 3.3068 3.32
18+ 0 3.3286 3.17
18+ 5 3.3466 2.62
18+10 3.3608 2.05
18+15 3.3739 1.91
18+20 3.3864 1.82
18+25 3.3984 1.74

18+30	3.4099	1.67	|Q	|	|	|	V |
18+35	3.4209	1.61	|Q	|	|	|	V |
18+40	3.4316	1.55	|Q	|	|	|	V |
18+45	3.4419	1.50	|Q	|	|	|	V |
18+50	3.4520	1.46	|Q	|	|	|	V |
18+55	3.4617	1.42	|Q	|	|	|	V |
19+ 0	3.4712	1.38	|Q	|	|	|	V |
19+ 5	3.4805	1.34	|Q	|	|	|	V |
19+10	3.4895	1.31	|Q	|	|	|	V |
19+15	3.4983	1.28	|Q	|	|	|	V |
19+20	3.5069	1.25	|Q	|	|	|	V |
19+25	3.5153	1.22	|Q	|	|	|	V |
19+30	3.5235	1.20	|Q	|	|	|	V |
19+35	3.5316	1.17	|Q	|	|	|	V |
19+40	3.5395	1.15	|Q	|	|	|	V |
19+45	3.5473	1.13	|Q	|	|	|	V |
19+50	3.5549	1.11	|Q	|	|	|	V |
19+55	3.5623	1.08	|Q	|	|	|	V |
20+ 0	3.5697	1.07	|Q	|	|	|	V |
20+ 5	3.5769	1.05	|Q	|	|	|	V |
20+10	3.5840	1.03	|Q	|	|	|	V |
20+15	3.5910	1.02	|Q	|	|	|	V |
20+20	3.5979	1.00	|Q	|	|	|	V |
20+25	3.6047	0.99	Q	|	|	|	V |
20+30	3.6114	0.97	Q	|	|	|	V |
20+35	3.6180	0.96	Q	|	|	|	V |
20+40	3.6245	0.95	Q	|	|	|	V |
20+45	3.6309	0.93	Q	|	|	|	V |
20+50	3.6373	0.92	Q	|	|	|	V |
20+55	3.6436	0.91	Q	|	|	|	V |
21+ 0	3.6497	0.90	Q	|	|	|	V |
21+ 5	3.6559	0.89	Q	|	|	|	V |
21+10	3.6619	0.88	Q	|	|	|	V |
21+15	3.6679	0.87	Q	|	|	|	V |
21+20	3.6738	0.86	Q	|	|	|	V |
21+25	3.6796	0.85	Q	|	|	|	V |
21+30	3.6854	0.84	Q	|	|	|	V |
21+35	3.6911	0.83	Q	|	|	|	V |
21+40	3.6967	0.82	Q	|	|	|	V |
21+45	3.7023	0.81	Q	|	|	|	V |
21+50	3.7079	0.80	Q	|	|	|	V |
21+55	3.7133	0.79	Q	|	|	|	V |
22+ 0	3.7187	0.79	Q	|	|	|	V |
22+ 5	3.7241	0.78	Q	|	|	|	V |
22+10	3.7294	0.77	Q	|	|	|	V |
22+15	3.7347	0.76	Q	|	|	|	V |
22+20	3.7399	0.76	Q	|	|	|	V |
22+25	3.7450	0.75	Q	|	|	|	V |
22+30	3.7502	0.74	Q	|	|	|	V |
22+35	3.7552	0.74	Q	|	|	|	V |

22+40	3.7602	0.73	Q	|	|	|	V|
22+45	3.7652	0.72	Q	|	|	|	V|
22+50	3.7702	0.72	Q	|	|	|	V|
22+55	3.7750	0.71	Q	|	|	|	V|
23+ 0	3.7799	0.70	Q	|	|	|	V|
23+ 5	3.7847	0.70	Q	|	|	|	V|
23+10	3.7895	0.69	Q	|	|	|	V|
23+15	3.7942	0.69	Q	|	|	|	V|
23+20	3.7989	0.68	Q	|	|	|	V|
23+25	3.8036	0.68	Q	|	|	|	V|
23+30	3.8082	0.67	Q	|	|	|	V|
23+35	3.8128	0.67	Q	|	|	|	V|
23+40	3.8173	0.66	Q	|	|	|	V|
23+45	3.8218	0.66	Q	|	|	|	V|
23+50	3.8263	0.65	Q	|	|	|	V|
23+55	3.8307	0.65	Q	|	|	|	V|
24+ 0	3.8351	0.64	Q	|	|	|	V|
24+ 5	3.8393	0.60	Q	|	|	|	V|
24+10	3.8424	0.45	Q	|	|	|	V|
24+15	3.8445	0.32	Q	|	|	|	V|
24+20	3.8463	0.25	Q	|	|	|	V|
24+25	3.8477	0.21	Q	|	|	|	V|
24+30	3.8489	0.18	Q	|	|	|	V|
24+35	3.8500	0.15	Q	|	|	|	V|
24+40	3.8509	0.13	Q	|	|	|	V|
24+45	3.8517	0.11	Q	|	|	|	V|
24+50	3.8523	0.10	Q	|	|	|	V|
24+55	3.8529	0.09	Q	|	|	|	V|
25+ 0	3.8535	0.08	Q	|	|	|	V|
25+ 5	3.8539	0.07	Q	|	|	|	V|
25+10	3.8543	0.06	Q	|	|	|	V|
25+15	3.8547	0.05	Q	|	|	|	V|
25+20	3.8550	0.04	Q	|	|	|	V|
25+25	3.8552	0.04	Q	|	|	|	V|
25+30	3.8554	0.03	Q	|	|	|	V|
25+35	3.8556	0.03	Q	|	|	|	V|
25+40	3.8558	0.02	Q	|	|	|	V|
25+45	3.8559	0.02	Q	|	|	|	V|
25+50	3.8560	0.01	Q	|	|	|	V|
25+55	3.8560	0.01	Q	|	|	|	V|
26+ 0	3.8560	0.00	Q	|	|	|	V|

U n i t H y d r o g r a p h A n a l y s i s

Study date 04/01/21

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 6353

PROJECT LOKI
PROPOSED CONDITION 10-YR STORM

Storm Event Year = 10

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 10		
71.40	1	0.56
Rainfall data for year 10		
71.40	6	1.08
Rainfall data for year 10		
71.40	24	1.81

++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	SCS curve NO.(AMC 2)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
69.0	69.0	71.40	1.000	0.548	0.300	0.164

Area-averaged adjusted loss rate Fm (In/Hr) = 0.164

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
21.42	0.300	69.0	69.0	4.49	0.085
49.98	0.700	98.0	98.0	0.20	0.876

Area-averaged catchment yield fraction, Y = 0.639
Area-averaged low loss fraction, Yb = 0.361
User entry of time of concentration = 0.220 (hours)
++
Watershed area = 71.40(Ac.)
Catchment Lag time = 0.176 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 47.3485
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.164(In/Hr)
Average low loss rate fraction (Yb) = 0.361 (decimal)
MOUNTAIN S-Graph Selected
Computed peak 5-minute rainfall = 0.265(In)
Computed peak 30-minute rainfall = 0.454(In)
Specified peak 1-hour rainfall = 0.559(In)
Computed peak 3-hour rainfall = 0.837(In)
Specified peak 6-hour rainfall = 1.080(In)
Specified peak 24-hour rainfall = 1.810(In)

Rainfall depth area reduction factors:
Using a total area of 71.40(Ac.) (Ref: fig. E-4)

5-minute factor = 0.997 Adjusted rainfall = 0.264(In)
30-minute factor = 0.997 Adjusted rainfall = 0.453(In)
1-hour factor = 0.997 Adjusted rainfall = 0.557(In)
3-hour factor = 1.000 Adjusted rainfall = 0.837(In)
6-hour factor = 1.000 Adjusted rainfall = 1.080(In)
24-hour factor = 1.000 Adjusted rainfall = 1.810(In)

U n i t H y d r o g r a p h
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Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 863.49 (CFS))	
1	7.186	62.049
2	35.546	244.890
3	54.752	165.842
4	64.236	81.891
5	70.726	56.040
6	75.680	42.778
7	79.492	32.920
8	82.437	25.424
9	84.856	20.889
10	86.880	17.481
11	88.750	16.141
12	90.317	13.536
13	91.745	12.333
14	93.016	10.969
15	94.173	9.991
16	95.177	8.669
17	96.063	7.648
18	96.915	7.359
19	97.767	7.359
20	98.619	7.359
21	99.472	7.359
22	100.000	4.563

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.2644	0.2644
2	0.3255	0.0611
3	0.3676	0.0421
4	0.4007	0.0331
5	0.4284	0.0277
6	0.4525	0.0241
7	0.4739	0.0214
8	0.4933	0.0194
9	0.5111	0.0177
10	0.5275	0.0164
11	0.5428	0.0153
12	0.5571	0.0144
13	0.5739	0.0168
14	0.5898	0.0160
15	0.6051	0.0153
16	0.6197	0.0146
17	0.6338	0.0141
18	0.6474	0.0136
19	0.6605	0.0131
20	0.6731	0.0127

21	0.6854	0.0123
22	0.6973	0.0119
23	0.7089	0.0116
24	0.7201	0.0113
25	0.7311	0.0110
26	0.7418	0.0107
27	0.7522	0.0104
28	0.7624	0.0102
29	0.7724	0.0100
30	0.7821	0.0098
31	0.7917	0.0096
32	0.8010	0.0094
33	0.8102	0.0092
34	0.8192	0.0090
35	0.8281	0.0088
36	0.8367	0.0087
37	0.8452	0.0085
38	0.8536	0.0083
39	0.8618	0.0082
40	0.8698	0.0081
41	0.8778	0.0079
42	0.8856	0.0078
43	0.8933	0.0077
44	0.9009	0.0076
45	0.9083	0.0075
46	0.9157	0.0074
47	0.9230	0.0073
48	0.9301	0.0072
49	0.9372	0.0071
50	0.9442	0.0070
51	0.9511	0.0069
52	0.9579	0.0068
53	0.9647	0.0067
54	0.9713	0.0067
55	0.9779	0.0066
56	0.9844	0.0065
57	0.9908	0.0064
58	0.9972	0.0064
59	1.0035	0.0063
60	1.0097	0.0062
61	1.0159	0.0062
62	1.0220	0.0061
63	1.0280	0.0060
64	1.0340	0.0060
65	1.0399	0.0059
66	1.0457	0.0059
67	1.0515	0.0058
68	1.0573	0.0057
69	1.0630	0.0057
70	1.0686	0.0056

71	1.0742	0.0056
72	1.0798	0.0055
73	1.0853	0.0056
74	1.0908	0.0055
75	1.0963	0.0055
76	1.1017	0.0054
77	1.1071	0.0054
78	1.1124	0.0053
79	1.1177	0.0053
80	1.1230	0.0053
81	1.1282	0.0052
82	1.1334	0.0052
83	1.1385	0.0051
84	1.1436	0.0051
85	1.1486	0.0051
86	1.1537	0.0050
87	1.1586	0.0050
88	1.1636	0.0049
89	1.1685	0.0049
90	1.1734	0.0049
91	1.1782	0.0048
92	1.1830	0.0048
93	1.1878	0.0048
94	1.1925	0.0047
95	1.1972	0.0047
96	1.2019	0.0047
97	1.2066	0.0046
98	1.2112	0.0046
99	1.2158	0.0046
100	1.2203	0.0046
101	1.2249	0.0045
102	1.2294	0.0045
103	1.2339	0.0045
104	1.2383	0.0044
105	1.2427	0.0044
106	1.2471	0.0044
107	1.2515	0.0044
108	1.2558	0.0043
109	1.2602	0.0043
110	1.2645	0.0043
111	1.2687	0.0043
112	1.2730	0.0042
113	1.2772	0.0042
114	1.2814	0.0042
115	1.2856	0.0042
116	1.2897	0.0042
117	1.2939	0.0041
118	1.2980	0.0041
119	1.3021	0.0041
120	1.3061	0.0041

121	1.3102	0.0040
122	1.3142	0.0040
123	1.3182	0.0040
124	1.3222	0.0040
125	1.3261	0.0040
126	1.3301	0.0039
127	1.3340	0.0039
128	1.3379	0.0039
129	1.3418	0.0039
130	1.3457	0.0039
131	1.3495	0.0038
132	1.3533	0.0038
133	1.3571	0.0038
134	1.3609	0.0038
135	1.3647	0.0038
136	1.3685	0.0038
137	1.3722	0.0037
138	1.3759	0.0037
139	1.3796	0.0037
140	1.3833	0.0037
141	1.3870	0.0037
142	1.3907	0.0037
143	1.3943	0.0036
144	1.3979	0.0036
145	1.4015	0.0036
146	1.4051	0.0036
147	1.4087	0.0036
148	1.4123	0.0036
149	1.4158	0.0035
150	1.4193	0.0035
151	1.4229	0.0035
152	1.4264	0.0035
153	1.4299	0.0035
154	1.4333	0.0035
155	1.4368	0.0035
156	1.4402	0.0034
157	1.4437	0.0034
158	1.4471	0.0034
159	1.4505	0.0034
160	1.4539	0.0034
161	1.4573	0.0034
162	1.4606	0.0034
163	1.4640	0.0034
164	1.4673	0.0033
165	1.4707	0.0033
166	1.4740	0.0033
167	1.4773	0.0033
168	1.4806	0.0033
169	1.4838	0.0033
170	1.4871	0.0033

171	1.4904	0.0033
172	1.4936	0.0032
173	1.4968	0.0032
174	1.5000	0.0032
175	1.5033	0.0032
176	1.5064	0.0032
177	1.5096	0.0032
178	1.5128	0.0032
179	1.5160	0.0032
180	1.5191	0.0031
181	1.5223	0.0031
182	1.5254	0.0031
183	1.5285	0.0031
184	1.5316	0.0031
185	1.5347	0.0031
186	1.5378	0.0031
187	1.5409	0.0031
188	1.5439	0.0031
189	1.5470	0.0031
190	1.5500	0.0030
191	1.5531	0.0030
192	1.5561	0.0030
193	1.5591	0.0030
194	1.5621	0.0030
195	1.5651	0.0030
196	1.5681	0.0030
197	1.5711	0.0030
198	1.5740	0.0030
199	1.5770	0.0030
200	1.5799	0.0029
201	1.5829	0.0029
202	1.5858	0.0029
203	1.5887	0.0029
204	1.5916	0.0029
205	1.5945	0.0029
206	1.5974	0.0029
207	1.6003	0.0029
208	1.6032	0.0029
209	1.6061	0.0029
210	1.6089	0.0029
211	1.6118	0.0029
212	1.6146	0.0028
213	1.6174	0.0028
214	1.6203	0.0028
215	1.6231	0.0028
216	1.6259	0.0028
217	1.6287	0.0028
218	1.6315	0.0028
219	1.6343	0.0028
220	1.6370	0.0028

221	1.6398	0.0028
222	1.6426	0.0028
223	1.6453	0.0028
224	1.6481	0.0027
225	1.6508	0.0027
226	1.6535	0.0027
227	1.6563	0.0027
228	1.6590	0.0027
229	1.6617	0.0027
230	1.6644	0.0027
231	1.6671	0.0027
232	1.6698	0.0027
233	1.6724	0.0027
234	1.6751	0.0027
235	1.6778	0.0027
236	1.6804	0.0027
237	1.6831	0.0026
238	1.6857	0.0026
239	1.6884	0.0026
240	1.6910	0.0026
241	1.6936	0.0026
242	1.6962	0.0026
243	1.6988	0.0026
244	1.7014	0.0026
245	1.7040	0.0026
246	1.7066	0.0026
247	1.7092	0.0026
248	1.7118	0.0026
249	1.7143	0.0026
250	1.7169	0.0026
251	1.7195	0.0026
252	1.7220	0.0025
253	1.7245	0.0025
254	1.7271	0.0025
255	1.7296	0.0025
256	1.7321	0.0025
257	1.7347	0.0025
258	1.7372	0.0025
259	1.7397	0.0025
260	1.7422	0.0025
261	1.7447	0.0025
262	1.7472	0.0025
263	1.7496	0.0025
264	1.7521	0.0025
265	1.7546	0.0025
266	1.7570	0.0025
267	1.7595	0.0025
268	1.7620	0.0025
269	1.7644	0.0024
270	1.7668	0.0024

271	1.7693	0.0024
272	1.7717	0.0024
273	1.7741	0.0024
274	1.7765	0.0024
275	1.7790	0.0024
276	1.7814	0.0024
277	1.7838	0.0024
278	1.7862	0.0024
279	1.7886	0.0024
280	1.7909	0.0024
281	1.7933	0.0024
282	1.7957	0.0024
283	1.7981	0.0024
284	1.8004	0.0024
285	1.8028	0.0024
286	1.8051	0.0024
287	1.8075	0.0023
288	1.8098	0.0023

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0023	0.0008	0.0015
2	0.0023	0.0008	0.0015
3	0.0024	0.0009	0.0015
4	0.0024	0.0009	0.0015
5	0.0024	0.0009	0.0015
6	0.0024	0.0009	0.0015
7	0.0024	0.0009	0.0015
8	0.0024	0.0009	0.0015
9	0.0024	0.0009	0.0015
10	0.0024	0.0009	0.0015
11	0.0024	0.0009	0.0015
12	0.0024	0.0009	0.0016
13	0.0024	0.0009	0.0016
14	0.0024	0.0009	0.0016
15	0.0025	0.0009	0.0016
16	0.0025	0.0009	0.0016
17	0.0025	0.0009	0.0016
18	0.0025	0.0009	0.0016
19	0.0025	0.0009	0.0016
20	0.0025	0.0009	0.0016
21	0.0025	0.0009	0.0016
22	0.0025	0.0009	0.0016
23	0.0025	0.0009	0.0016
24	0.0025	0.0009	0.0016
25	0.0025	0.0009	0.0016
26	0.0026	0.0009	0.0016
27	0.0026	0.0009	0.0016

28	0.0026	0.0009	0.0016
29	0.0026	0.0009	0.0017
30	0.0026	0.0009	0.0017
31	0.0026	0.0009	0.0017
32	0.0026	0.0009	0.0017
33	0.0026	0.0009	0.0017
34	0.0026	0.0010	0.0017
35	0.0026	0.0010	0.0017
36	0.0027	0.0010	0.0017
37	0.0027	0.0010	0.0017
38	0.0027	0.0010	0.0017
39	0.0027	0.0010	0.0017
40	0.0027	0.0010	0.0017
41	0.0027	0.0010	0.0017
42	0.0027	0.0010	0.0017
43	0.0027	0.0010	0.0017
44	0.0027	0.0010	0.0018
45	0.0028	0.0010	0.0018
46	0.0028	0.0010	0.0018
47	0.0028	0.0010	0.0018
48	0.0028	0.0010	0.0018
49	0.0028	0.0010	0.0018
50	0.0028	0.0010	0.0018
51	0.0028	0.0010	0.0018
52	0.0028	0.0010	0.0018
53	0.0029	0.0010	0.0018
54	0.0029	0.0010	0.0018
55	0.0029	0.0010	0.0018
56	0.0029	0.0010	0.0018
57	0.0029	0.0011	0.0019
58	0.0029	0.0011	0.0019
59	0.0029	0.0011	0.0019
60	0.0029	0.0011	0.0019
61	0.0030	0.0011	0.0019
62	0.0030	0.0011	0.0019
63	0.0030	0.0011	0.0019
64	0.0030	0.0011	0.0019
65	0.0030	0.0011	0.0019
66	0.0030	0.0011	0.0019
67	0.0031	0.0011	0.0020
68	0.0031	0.0011	0.0020
69	0.0031	0.0011	0.0020
70	0.0031	0.0011	0.0020
71	0.0031	0.0011	0.0020
72	0.0031	0.0011	0.0020
73	0.0031	0.0011	0.0020
74	0.0032	0.0011	0.0020
75	0.0032	0.0011	0.0020
76	0.0032	0.0012	0.0020
77	0.0032	0.0012	0.0021

78	0.0032	0.0012	0.0021
79	0.0033	0.0012	0.0021
80	0.0033	0.0012	0.0021
81	0.0033	0.0012	0.0021
82	0.0033	0.0012	0.0021
83	0.0033	0.0012	0.0021
84	0.0033	0.0012	0.0021
85	0.0034	0.0012	0.0022
86	0.0034	0.0012	0.0022
87	0.0034	0.0012	0.0022
88	0.0034	0.0012	0.0022
89	0.0034	0.0012	0.0022
90	0.0035	0.0012	0.0022
91	0.0035	0.0013	0.0022
92	0.0035	0.0013	0.0022
93	0.0035	0.0013	0.0023
94	0.0035	0.0013	0.0023
95	0.0036	0.0013	0.0023
96	0.0036	0.0013	0.0023
97	0.0036	0.0013	0.0023
98	0.0036	0.0013	0.0023
99	0.0037	0.0013	0.0023
100	0.0037	0.0013	0.0024
101	0.0037	0.0013	0.0024
102	0.0037	0.0014	0.0024
103	0.0038	0.0014	0.0024
104	0.0038	0.0014	0.0024
105	0.0038	0.0014	0.0024
106	0.0038	0.0014	0.0025
107	0.0039	0.0014	0.0025
108	0.0039	0.0014	0.0025
109	0.0039	0.0014	0.0025
110	0.0040	0.0014	0.0025
111	0.0040	0.0014	0.0026
112	0.0040	0.0015	0.0026
113	0.0041	0.0015	0.0026
114	0.0041	0.0015	0.0026
115	0.0041	0.0015	0.0026
116	0.0042	0.0015	0.0027
117	0.0042	0.0015	0.0027
118	0.0042	0.0015	0.0027
119	0.0043	0.0015	0.0027
120	0.0043	0.0016	0.0027
121	0.0043	0.0016	0.0028
122	0.0044	0.0016	0.0028
123	0.0044	0.0016	0.0028
124	0.0044	0.0016	0.0028
125	0.0045	0.0016	0.0029
126	0.0045	0.0016	0.0029
127	0.0046	0.0017	0.0029

128	0.0046	0.0017	0.0030
129	0.0047	0.0017	0.0030
130	0.0047	0.0017	0.0030
131	0.0048	0.0017	0.0031
132	0.0048	0.0017	0.0031
133	0.0049	0.0018	0.0031
134	0.0049	0.0018	0.0031
135	0.0050	0.0018	0.0032
136	0.0050	0.0018	0.0032
137	0.0051	0.0018	0.0033
138	0.0051	0.0019	0.0033
139	0.0052	0.0019	0.0033
140	0.0053	0.0019	0.0034
141	0.0053	0.0019	0.0034
142	0.0054	0.0019	0.0034
143	0.0055	0.0020	0.0035
144	0.0055	0.0020	0.0035
145	0.0055	0.0020	0.0035
146	0.0056	0.0020	0.0036
147	0.0057	0.0021	0.0036
148	0.0057	0.0021	0.0037
149	0.0059	0.0021	0.0037
150	0.0059	0.0021	0.0038
151	0.0060	0.0022	0.0039
152	0.0061	0.0022	0.0039
153	0.0062	0.0022	0.0040
154	0.0063	0.0023	0.0040
155	0.0064	0.0023	0.0041
156	0.0065	0.0023	0.0042
157	0.0067	0.0024	0.0043
158	0.0067	0.0024	0.0043
159	0.0069	0.0025	0.0044
160	0.0070	0.0025	0.0045
161	0.0072	0.0026	0.0046
162	0.0073	0.0026	0.0046
163	0.0075	0.0027	0.0048
164	0.0076	0.0027	0.0048
165	0.0078	0.0028	0.0050
166	0.0079	0.0029	0.0051
167	0.0082	0.0030	0.0052
168	0.0083	0.0030	0.0053
169	0.0087	0.0031	0.0055
170	0.0088	0.0032	0.0056
171	0.0092	0.0033	0.0059
172	0.0094	0.0034	0.0060
173	0.0098	0.0035	0.0062
174	0.0100	0.0036	0.0064
175	0.0104	0.0038	0.0067
176	0.0107	0.0039	0.0068
177	0.0113	0.0041	0.0072

178	0.0116	0.0042	0.0074
179	0.0123	0.0044	0.0078
180	0.0127	0.0046	0.0081
181	0.0136	0.0049	0.0087
182	0.0141	0.0051	0.0090
183	0.0153	0.0055	0.0098
184	0.0160	0.0058	0.0102
185	0.0144	0.0052	0.0092
186	0.0153	0.0055	0.0098
187	0.0177	0.0064	0.0113
188	0.0194	0.0070	0.0124
189	0.0241	0.0087	0.0154
190	0.0277	0.0100	0.0177
191	0.0421	0.0137	0.0284
192	0.0611	0.0137	0.0474
193	0.2644	0.0137	0.2507
194	0.0331	0.0120	0.0212
195	0.0214	0.0077	0.0137
196	0.0164	0.0059	0.0105
197	0.0168	0.0061	0.0107
198	0.0146	0.0053	0.0093
199	0.0131	0.0047	0.0084
200	0.0119	0.0043	0.0076
201	0.0110	0.0040	0.0070
202	0.0102	0.0037	0.0065
203	0.0096	0.0034	0.0061
204	0.0090	0.0033	0.0058
205	0.0085	0.0031	0.0054
206	0.0081	0.0029	0.0052
207	0.0077	0.0028	0.0049
208	0.0074	0.0027	0.0047
209	0.0071	0.0026	0.0045
210	0.0068	0.0025	0.0044
211	0.0066	0.0024	0.0042
212	0.0064	0.0023	0.0041
213	0.0062	0.0022	0.0039
214	0.0060	0.0022	0.0038
215	0.0058	0.0021	0.0037
216	0.0056	0.0020	0.0036
217	0.0056	0.0020	0.0036
218	0.0054	0.0020	0.0035
219	0.0053	0.0019	0.0034
220	0.0052	0.0019	0.0033
221	0.0051	0.0018	0.0032
222	0.0049	0.0018	0.0032
223	0.0048	0.0017	0.0031
224	0.0047	0.0017	0.0030
225	0.0046	0.0017	0.0030
226	0.0046	0.0016	0.0029
227	0.0045	0.0016	0.0029

228	0.0044	0.0016	0.0028
229	0.0043	0.0016	0.0028
230	0.0042	0.0015	0.0027
231	0.0042	0.0015	0.0027
232	0.0041	0.0015	0.0026
233	0.0040	0.0015	0.0026
234	0.0040	0.0014	0.0025
235	0.0039	0.0014	0.0025
236	0.0039	0.0014	0.0025
237	0.0038	0.0014	0.0024
238	0.0038	0.0014	0.0024
239	0.0037	0.0013	0.0024
240	0.0037	0.0013	0.0023
241	0.0036	0.0013	0.0023
242	0.0036	0.0013	0.0023
243	0.0035	0.0013	0.0022
244	0.0035	0.0013	0.0022
245	0.0034	0.0012	0.0022
246	0.0034	0.0012	0.0022
247	0.0034	0.0012	0.0021
248	0.0033	0.0012	0.0021
249	0.0033	0.0012	0.0021
250	0.0032	0.0012	0.0021
251	0.0032	0.0012	0.0020
252	0.0032	0.0011	0.0020
253	0.0031	0.0011	0.0020
254	0.0031	0.0011	0.0020
255	0.0031	0.0011	0.0020
256	0.0030	0.0011	0.0019
257	0.0030	0.0011	0.0019
258	0.0030	0.0011	0.0019
259	0.0030	0.0011	0.0019
260	0.0029	0.0011	0.0019
261	0.0029	0.0010	0.0019
262	0.0029	0.0010	0.0018
263	0.0029	0.0010	0.0018
264	0.0028	0.0010	0.0018
265	0.0028	0.0010	0.0018
266	0.0028	0.0010	0.0018
267	0.0028	0.0010	0.0018
268	0.0027	0.0010	0.0017
269	0.0027	0.0010	0.0017
270	0.0027	0.0010	0.0017
271	0.0027	0.0010	0.0017
272	0.0026	0.0010	0.0017
273	0.0026	0.0009	0.0017
274	0.0026	0.0009	0.0017
275	0.0026	0.0009	0.0016
276	0.0026	0.0009	0.0016
277	0.0025	0.0009	0.0016

278	0.0025	0.0009	0.0016
279	0.0025	0.0009	0.0016
280	0.0025	0.0009	0.0016
281	0.0025	0.0009	0.0016
282	0.0025	0.0009	0.0016
283	0.0024	0.0009	0.0016
284	0.0024	0.0009	0.0015
285	0.0024	0.0009	0.0015
286	0.0024	0.0009	0.0015
287	0.0024	0.0009	0.0015
288	0.0024	0.0009	0.0015

Total soil rain loss = 0.56(In)
Total effective rainfall = 1.25(In)
Peak flow rate in flood hydrograph = 76.53(CFS)

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24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

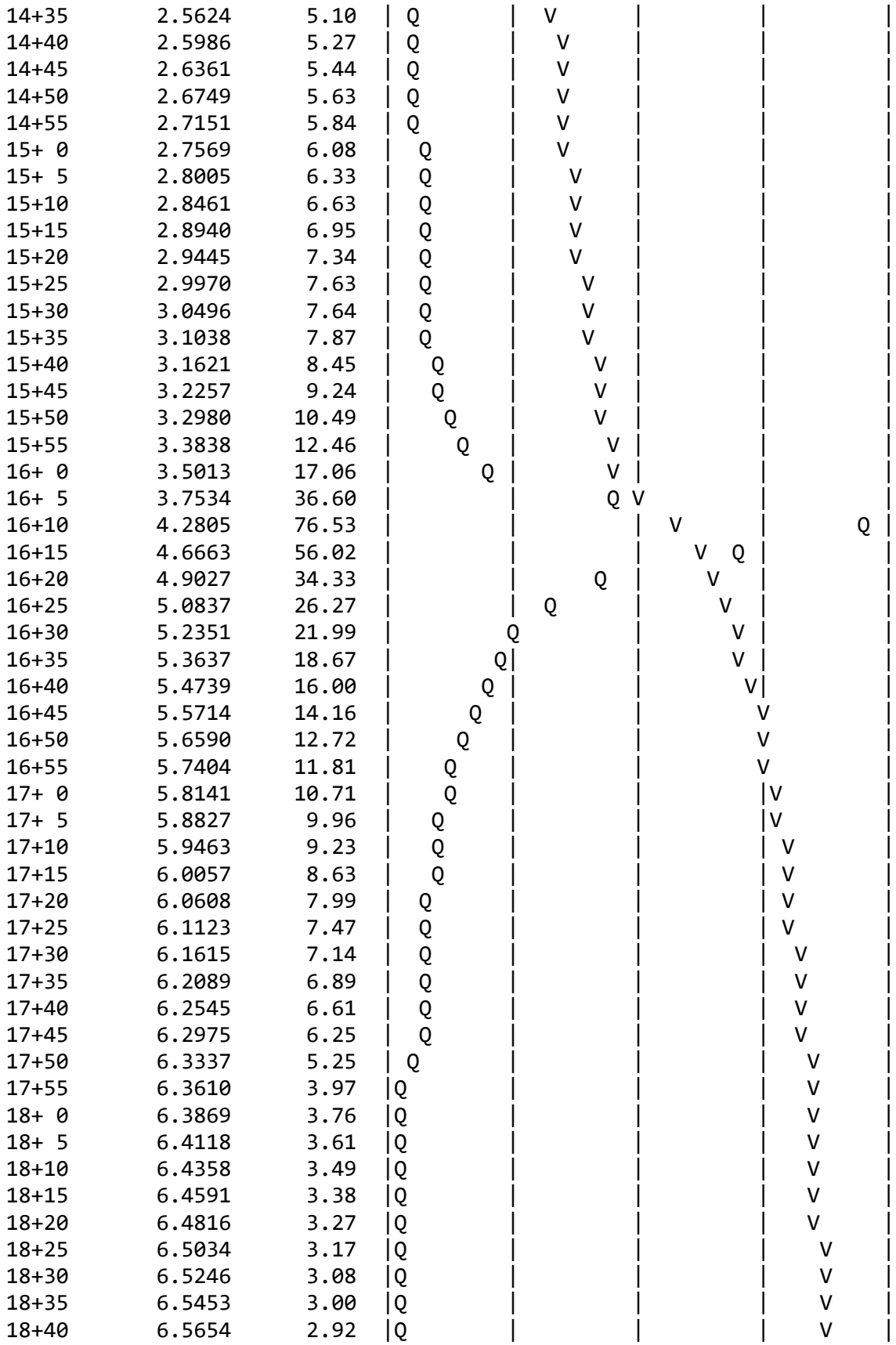
Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	20.0	40.0	60.0	80.0
0+ 5	0.0006	0.09	Q	|	|	|	|
0+10	0.0038	0.46	Q	|	|	|	|
0+15	0.0087	0.71	Q	|	|	|	|
0+20	0.0144	0.83	Q	|	|	|	|
0+25	0.0208	0.92	Q	|	|	|	|
0+30	0.0276	0.99	Q	|	|	|	|
0+35	0.0348	1.04	Q	|	|	|	|
0+40	0.0422	1.08	Q	|	|	|	|
0+45	0.0499	1.12	Q	|	|	|	|
0+50	0.0578	1.15	Q	|	|	|	|
0+55	0.0659	1.18	Q	|	|	|	|
1+ 0	0.0742	1.20	Q	|	|	|	|
1+ 5	0.0826	1.22	Q	|	|	|	|
1+10	0.0911	1.24	Q	|	|	|	|
1+15	0.0998	1.26	Q	|	|	|	|
1+20	0.1086	1.28	Q	|	|	|	|
1+25	0.1176	1.30	Q	|	|	|	|
1+30	0.1266	1.31	Q	|	|	|	|
1+35	0.1357	1.33	Q	|	|	|	|
1+40	0.1450	1.34	Q	|	|	|	|
1+45	0.1543	1.36	Q	|	|	|	|
1+50	0.1637	1.37	Q	|	|	|	|
1+55	0.1732	1.37	Q	|	|	|	|
2+ 0	0.1827	1.38	Q	|	|	|	|

2+ 5	0.1922	1.38	QV	|	|	|	|
2+10	0.2018	1.39	QV	|	|	|	|
2+15	0.2114	1.39	QV	|	|	|	|
2+20	0.2211	1.40	QV	|	|	|	|
2+25	0.2307	1.41	QV	|	|	|	|
2+30	0.2405	1.41	QV	|	|	|	|
2+35	0.2502	1.42	QV	|	|	|	|
2+40	0.2600	1.42	QV	|	|	|	|
2+45	0.2698	1.43	QV	|	|	|	|
2+50	0.2797	1.43	QV	|	|	|	|
2+55	0.2896	1.44	QV	|	|	|	|
3+ 0	0.2995	1.44	QV	|	|	|	|
3+ 5	0.3095	1.45	QV	|	|	|	|
3+10	0.3195	1.45	QV	|	|	|	|
3+15	0.3296	1.46	QV	|	|	|	|
3+20	0.3397	1.47	QV	|	|	|	|
3+25	0.3498	1.47	QV	|	|	|	|
3+30	0.3600	1.48	QV	|	|	|	|
3+35	0.3702	1.48	QV	|	|	|	|
3+40	0.3805	1.49	Q V	|	|	|	|
3+45	0.3908	1.50	Q V	|	|	|	|
3+50	0.4011	1.50	Q V	|	|	|	|
3+55	0.4115	1.51	Q V	|	|	|	|
4+ 0	0.4220	1.52	Q V	|	|	|	|
4+ 5	0.4324	1.52	Q V	|	|	|	|
4+10	0.4430	1.53	Q V	|	|	|	|
4+15	0.4535	1.53	Q V	|	|	|	|
4+20	0.4641	1.54	Q V	|	|	|	|
4+25	0.4748	1.55	Q V	|	|	|	|
4+30	0.4855	1.55	Q V	|	|	|	|
4+35	0.4963	1.56	Q V	|	|	|	|
4+40	0.5071	1.57	Q V	|	|	|	|
4+45	0.5179	1.58	Q V	|	|	|	|
4+50	0.5288	1.58	Q V	|	|	|	|
4+55	0.5398	1.59	Q V	|	|	|	|
5+ 0	0.5508	1.60	Q V	|	|	|	|
5+ 5	0.5618	1.60	Q V	|	|	|	|
5+10	0.5729	1.61	Q V	|	|	|	|
5+15	0.5841	1.62	Q V	|	|	|	|
5+20	0.5953	1.63	Q V	|	|	|	|
5+25	0.6066	1.64	Q V	|	|	|	|
5+30	0.6179	1.64	Q V	|	|	|	|
5+35	0.6292	1.65	Q V	|	|	|	|
5+40	0.6407	1.66	Q V	|	|	|	|
5+45	0.6522	1.67	Q V	|	|	|	|
5+50	0.6637	1.68	Q V	|	|	|	|
5+55	0.6753	1.68	Q V	|	|	|	|
6+ 0	0.6869	1.69	Q V	|	|	|	|
6+ 5	0.6986	1.70	Q V	|	|	|	|
6+10	0.7104	1.71	Q V	|	|	|	|

6+15	0.7223	1.72	Q V	|	|	|	|
6+20	0.7341	1.73	Q V	|	|	|	|
6+25	0.7461	1.74	Q V	|	|	|	|
6+30	0.7581	1.75	Q V	|	|	|	|
6+35	0.7702	1.75	Q V	|	|	|	|
6+40	0.7824	1.76	Q V	|	|	|	|
6+45	0.7946	1.77	Q V	|	|	|	|
6+50	0.8069	1.78	Q V	|	|	|	|
6+55	0.8192	1.79	Q V	|	|	|	|
7+ 0	0.8316	1.80	Q V	|	|	|	|
7+ 5	0.8441	1.81	Q V	|	|	|	|
7+10	0.8567	1.82	Q V	|	|	|	|
7+15	0.8693	1.83	Q V	|	|	|	|
7+20	0.8820	1.84	Q V	|	|	|	|
7+25	0.8948	1.85	Q V	|	|	|	|
7+30	0.9076	1.87	Q V	|	|	|	|
7+35	0.9205	1.88	Q V	|	|	|	|
7+40	0.9336	1.89	Q V	|	|	|	|
7+45	0.9466	1.90	Q V	|	|	|	|
7+50	0.9598	1.91	Q V	|	|	|	|
7+55	0.9730	1.92	Q V	|	|	|	|
8+ 0	0.9864	1.94	Q V	|	|	|	|
8+ 5	0.9998	1.95	Q V	|	|	|	|
8+10	1.0133	1.96	Q V	|	|	|	|
8+15	1.0269	1.97	Q V	|	|	|	|
8+20	1.0405	1.98	Q V	|	|	|	|
8+25	1.0543	2.00	Q V	|	|	|	|
8+30	1.0681	2.01	|Q V	|	|	|	|
8+35	1.0821	2.02	|Q V	|	|	|	|
8+40	1.0961	2.04	|Q V	|	|	|	|
8+45	1.1102	2.05	|Q V	|	|	|	|
8+50	1.1245	2.07	|Q V	|	|	|	|
8+55	1.1388	2.08	|Q V	|	|	|	|
9+ 0	1.1532	2.10	|Q V	|	|	|	|
9+ 5	1.1678	2.11	|Q V	|	|	|	|
9+10	1.1824	2.13	|Q V	|	|	|	|
9+15	1.1972	2.14	|Q V	|	|	|	|
9+20	1.2120	2.16	|Q V	|	|	|	|
9+25	1.2270	2.17	|Q V	|	|	|	|
9+30	1.2421	2.19	|Q V	|	|	|	|
9+35	1.2572	2.21	|Q V	|	|	|	|
9+40	1.2726	2.22	|Q V	|	|	|	|
9+45	1.2880	2.24	|Q V	|	|	|	|
9+50	1.3036	2.26	|Q V	|	|	|	|
9+55	1.3192	2.28	|Q V	|	|	|	|
10+ 0	1.3350	2.30	|Q V	|	|	|	|
10+ 5	1.3510	2.31	|Q V	|	|	|	|
10+10	1.3671	2.33	|Q V	|	|	|	|
10+15	1.3833	2.35	|Q V	|	|	|	|
10+20	1.3996	2.37	|Q V	|	|	|	|

```
10+25       1.4161      2.39  |Q     V  |          |          |          |
10+30       1.4328      2.42  |Q     V  |          |          |          |
10+35       1.4495      2.44  |Q     V  |          |          |          |
10+40       1.4665      2.46  |Q     V  |          |          |          |
10+45       1.4836      2.48  |Q     V  |          |          |          |
10+50       1.5009      2.51  |Q      V |          |          |          |
10+55       1.5183      2.53  |Q      V |          |          |          |
11+ 0       1.5359      2.56  |Q      V |          |          |          |
11+ 5       1.5536      2.58  |Q      V |          |          |          |
11+10       1.5716      2.61  |Q      V |          |          |          |
11+15       1.5897      2.63  |Q      V |          |          |          |
11+20       1.6080      2.66  |Q      V |          |          |          |
11+25       1.6265      2.69  |Q      V |          |          |          |
11+30       1.6453      2.72  |Q      V |          |          |          |
11+35       1.6642      2.75  |Q      V |          |          |          |
11+40       1.6833      2.78  |Q       V|          |          |          |
11+45       1.7026      2.81  |Q       V|          |          |          |
11+50       1.7222      2.84  |Q       V|          |          |          |
11+55       1.7420      2.87  |Q       V|          |          |          |
12+ 0       1.7620      2.91  |Q       V|          |          |          |
12+ 5       1.7822      2.94  |Q       V|          |          |          |
12+10       1.8027      2.97  |Q       V|          |          |          |
12+15       1.8233      2.99  |Q       V|          |          |          |
12+20       1.8441      3.03  |Q       V|          |          |          |
12+25       1.8653      3.07  |Q        V          |          |          |
12+30       1.8867      3.11  |Q        V          |          |          |
12+35       1.9084      3.15  |Q        V          |          |          |
12+40       1.9304      3.19  |Q        V          |          |          |
12+45       1.9526      3.24  |Q        V          |          |          |
12+50       1.9753      3.29  |Q        V          |          |          |
12+55       1.9982      3.33  |Q        V          |          |          |
13+ 0       2.0216      3.39  |Q        V          |          |          |
13+ 5       2.0452      3.44  |Q         |V          |          |          |
13+10       2.0693      3.50  |Q         |V          |          |          |
13+15       2.0938      3.55  |Q         |V          |          |          |
13+20       2.1187      3.62  |Q         |V          |          |          |
13+25       2.1440      3.68  |Q         |V          |          |          |
13+30       2.1698      3.75  |Q         |V          |          |          |
13+35       2.1961      3.82  |Q         |V          |          |          |
13+40       2.2229      3.89  |Q         |V          |          |          |
13+45       2.2503      3.97  |Q         | V         |          |          |
13+50       2.2782      4.05  | Q        | V         |          |          |
13+55       2.3067      4.14  | Q        | V         |          |          |
14+ 0       2.3358      4.23  | Q        | V         |          |          |
14+ 5       2.3657      4.33  | Q        | V         |          |          |
14+10       2.3963      4.45  | Q        | V         |          |          |
14+15       2.4277      4.56  | Q        |  V        |          |          |
14+20       2.4600      4.69  | Q        |  V        |          |          |
14+25       2.4931      4.81  | Q        |  V        |          |          |
14+30       2.5272      4.96  | Q        |  V        |          |          |
```



18+45	6.5850	2.85	|Q	|	|	|	V |
18+50	6.6042	2.78	|Q	|	|	|	V |
18+55	6.6230	2.72	|Q	|	|	|	V |
19+ 0	6.6413	2.66	|Q	|	|	|	V |
19+ 5	6.6593	2.61	|Q	|	|	|	V |
19+10	6.6769	2.56	|Q	|	|	|	V |
19+15	6.6941	2.51	|Q	|	|	|	V |
19+20	6.7111	2.46	|Q	|	|	|	V |
19+25	6.7277	2.42	|Q	|	|	|	V |
19+30	6.7441	2.37	|Q	|	|	|	V |
19+35	6.7601	2.33	|Q	|	|	|	V |
19+40	6.7759	2.29	|Q	|	|	|	V |
19+45	6.7915	2.26	|Q	|	|	|	V |
19+50	6.8068	2.22	|Q	|	|	|	V |
19+55	6.8218	2.19	|Q	|	|	|	V |
20+ 0	6.8367	2.15	|Q	|	|	|	V |
20+ 5	6.8513	2.12	|Q	|	|	|	V |
20+10	6.8657	2.09	|Q	|	|	|	V |
20+15	6.8799	2.06	|Q	|	|	|	V |
20+20	6.8939	2.03	|Q	|	|	|	V |
20+25	6.9077	2.01	|Q	|	|	|	V |
20+30	6.9214	1.98	Q	|	|	|	V |
20+35	6.9348	1.96	Q	|	|	|	V |
20+40	6.9481	1.93	Q	|	|	|	V |
20+45	6.9612	1.91	Q	|	|	|	V |
20+50	6.9742	1.88	Q	|	|	|	V |
20+55	6.9870	1.86	Q	|	|	|	V |
21+ 0	6.9997	1.84	Q	|	|	|	V |
21+ 5	7.0122	1.82	Q	|	|	|	V |
21+10	7.0246	1.80	Q	|	|	|	V |
21+15	7.0369	1.78	Q	|	|	|	V |
21+20	7.0490	1.76	Q	|	|	|	V |
21+25	7.0610	1.74	Q	|	|	|	V |
21+30	7.0728	1.72	Q	|	|	|	V |
21+35	7.0846	1.70	Q	|	|	|	V |
21+40	7.0962	1.69	Q	|	|	|	V |
21+45	7.1077	1.67	Q	|	|	|	V |
21+50	7.1191	1.65	Q	|	|	|	V |
21+55	7.1304	1.64	Q	|	|	|	V |
22+ 0	7.1416	1.62	Q	|	|	|	V |
22+ 5	7.1527	1.61	Q	|	|	|	V |
22+10	7.1636	1.59	Q	|	|	|	V |
22+15	7.1745	1.58	Q	|	|	|	V |
22+20	7.1853	1.56	Q	|	|	|	V |
22+25	7.1960	1.55	Q	|	|	|	V |
22+30	7.2065	1.54	Q	|	|	|	V |
22+35	7.2170	1.52	Q	|	|	|	V |
22+40	7.2275	1.51	Q	|	|	|	V |
22+45	7.2378	1.50	Q	|	|	|	V|
22+50	7.2480	1.49	Q	|	|	|	V|

22+55	7.2582	1.47	Q	|	|	|	V|
23+ 0	7.2682	1.46	Q	|	|	|	V|
23+ 5	7.2782	1.45	Q	|	|	|	V|
23+10	7.2881	1.44	Q	|	|	|	V|
23+15	7.2980	1.43	Q	|	|	|	V|
23+20	7.3078	1.42	Q	|	|	|	V|
23+25	7.3174	1.41	Q	|	|	|	V|
23+30	7.3271	1.40	Q	|	|	|	V|
23+35	7.3366	1.39	Q	|	|	|	V|
23+40	7.3461	1.38	Q	|	|	|	V|
23+45	7.3555	1.37	Q	|	|	|	V|
23+50	7.3648	1.36	Q	|	|	|	V|
23+55	7.3741	1.35	Q	|	|	|	V|
24+ 0	7.3833	1.34	Q	|	|	|	V|
24+ 5	7.3918	1.24	Q	|	|	|	V|
24+10	7.3978	0.86	Q	|	|	|	V|
24+15	7.4020	0.61	Q	|	|	|	V|
24+20	7.4053	0.48	Q	|	|	|	V|
24+25	7.4080	0.39	Q	|	|	|	V|
24+30	7.4102	0.33	Q	|	|	|	V|
24+35	7.4121	0.28	Q	|	|	|	V|
24+40	7.4138	0.24	Q	|	|	|	V|
24+45	7.4152	0.20	Q	|	|	|	V|
24+50	7.4164	0.18	Q	|	|	|	V|
24+55	7.4174	0.15	Q	|	|	|	V|
25+ 0	7.4183	0.13	Q	|	|	|	V|
25+ 5	7.4191	0.11	Q	|	|	|	V|
25+10	7.4197	0.09	Q	|	|	|	V|
25+15	7.4202	0.08	Q	|	|	|	V|
25+20	7.4207	0.06	Q	|	|	|	V|
25+25	7.4210	0.05	Q	|	|	|	V|
25+30	7.4213	0.04	Q	|	|	|	V|
25+35	7.4215	0.03	Q	|	|	|	V|
25+40	7.4216	0.02	Q	|	|	|	V|
25+45	7.4217	0.01	Q	|	|	|	V

U n i t H y d r o g r a p h A n a l y s i s

Study date 04/01/21

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 6353

PROJECT LOKI
PROPOSED CONDITION 100-YR STORM

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
71.40	1	0.97
Rainfall data for year 100		
71.40	6	1.80
Rainfall data for year 100		
71.40	24	3.00

++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	SCS curve NO.(AMC 3)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
69.0	86.2	71.40	1.000	0.262	0.300	0.078

Area-averaged adjusted loss rate Fm (In/Hr) = 0.078

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
21.42	0.300	69.0	86.2	1.60	0.559
49.98	0.700	98.0	98.0	0.20	0.923

Area-averaged catchment yield fraction, Y = 0.814
Area-averaged low loss fraction, Yb = 0.186
User entry of time of concentration = 0.195 (hours)
++
Watershed area = 71.40(Ac.)
Catchment Lag time = 0.156 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 53.4462
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.078(In/Hr)
Average low loss rate fraction (Yb) = 0.186 (decimal)
MOUNTAIN S-Graph Selected
Computed peak 5-minute rainfall = 0.461(In)
Computed peak 30-minute rainfall = 0.790(In)
Specified peak 1-hour rainfall = 0.972(In)
Computed peak 3-hour rainfall = 1.418(In)
Specified peak 6-hour rainfall = 1.800(In)
Specified peak 24-hour rainfall = 3.000(In)

Rainfall depth area reduction factors:
Using a total area of 71.40(Ac.) (Ref: fig. E-4)

5-minute factor = 0.997 Adjusted rainfall = 0.460(In)
30-minute factor = 0.997 Adjusted rainfall = 0.787(In)
1-hour factor = 0.997 Adjusted rainfall = 0.969(In)
3-hour factor = 1.000 Adjusted rainfall = 1.418(In)
6-hour factor = 1.000 Adjusted rainfall = 1.800(In)
24-hour factor = 1.000 Adjusted rainfall = 3.000(In)

U n i t H y d r o g r a p h
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Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 863.49 (CFS))	
1	8.801	75.995
2	40.492	273.652
3	58.263	153.454
4	67.364	78.581
5	73.750	55.142
6	78.464	40.707
7	81.999	30.527
8	84.773	23.952
9	87.062	19.769
10	89.121	17.774
11	90.831	14.769
12	92.375	13.332
13	93.732	11.722
14	94.929	10.336
15	95.949	8.807
16	96.911	8.308
17	97.874	8.307
18	98.836	8.307
19	100.000	4.154

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.4597	0.4597
2	0.5659	0.1063
3	0.6391	0.0732
4	0.6967	0.0576
5	0.7450	0.0482
6	0.7869	0.0419
7	0.8241	0.0372
8	0.8578	0.0337
9	0.8886	0.0309
10	0.9172	0.0285
11	0.9438	0.0266
12	0.9687	0.0250
13	0.9960	0.0272
14	1.0219	0.0259
15	1.0466	0.0247
16	1.0703	0.0237
17	1.0930	0.0227
18	1.1149	0.0219
19	1.1360	0.0211
20	1.1564	0.0204
21	1.1761	0.0197
22	1.1952	0.0191
23	1.2138	0.0186

24	1.2318	0.0180
25	1.2493	0.0176
26	1.2664	0.0171
27	1.2831	0.0167
28	1.2994	0.0163
29	1.3153	0.0159
30	1.3308	0.0155
31	1.3460	0.0152
32	1.3609	0.0149
33	1.3755	0.0146
34	1.3898	0.0143
35	1.4039	0.0140
36	1.4176	0.0138
37	1.4311	0.0134
38	1.4443	0.0132
39	1.4572	0.0130
40	1.4700	0.0128
41	1.4825	0.0125
42	1.4949	0.0123
43	1.5070	0.0122
44	1.5190	0.0120
45	1.5308	0.0118
46	1.5424	0.0116
47	1.5539	0.0115
48	1.5652	0.0113
49	1.5763	0.0111
50	1.5873	0.0110
51	1.5982	0.0109
52	1.6089	0.0107
53	1.6195	0.0106
54	1.6299	0.0105
55	1.6403	0.0103
56	1.6505	0.0102
57	1.6606	0.0101
58	1.6705	0.0100
59	1.6804	0.0099
60	1.6901	0.0097
61	1.6998	0.0096
62	1.7093	0.0095
63	1.7188	0.0094
64	1.7281	0.0093
65	1.7373	0.0092
66	1.7465	0.0092
67	1.7556	0.0091
68	1.7645	0.0090
69	1.7734	0.0089
70	1.7822	0.0088
71	1.7910	0.0087
72	1.7996	0.0086
73	1.8088	0.0092

74	1.8179	0.0091
75	1.8269	0.0090
76	1.8358	0.0089
77	1.8447	0.0089
78	1.8535	0.0088
79	1.8622	0.0087
80	1.8709	0.0087
81	1.8794	0.0086
82	1.8880	0.0085
83	1.8964	0.0085
84	1.9048	0.0084
85	1.9131	0.0083
86	1.9214	0.0083
87	1.9296	0.0082
88	1.9377	0.0081
89	1.9458	0.0081
90	1.9539	0.0080
91	1.9618	0.0080
92	1.9698	0.0079
93	1.9776	0.0079
94	1.9854	0.0078
95	1.9932	0.0078
96	2.0009	0.0077
97	2.0086	0.0077
98	2.0162	0.0076
99	2.0237	0.0076
100	2.0312	0.0075
101	2.0387	0.0075
102	2.0461	0.0074
103	2.0535	0.0074
104	2.0608	0.0073
105	2.0681	0.0073
106	2.0753	0.0072
107	2.0825	0.0072
108	2.0897	0.0072
109	2.0968	0.0071
110	2.1039	0.0071
111	2.1109	0.0070
112	2.1179	0.0070
113	2.1248	0.0070
114	2.1317	0.0069
115	2.1386	0.0069
116	2.1454	0.0068
117	2.1522	0.0068
118	2.1590	0.0068
119	2.1657	0.0067
120	2.1724	0.0067
121	2.1791	0.0067
122	2.1857	0.0066
123	2.1923	0.0066

124	2.1988	0.0066
125	2.2054	0.0065
126	2.2118	0.0065
127	2.2183	0.0065
128	2.2247	0.0064
129	2.2311	0.0064
130	2.2375	0.0064
131	2.2438	0.0063
132	2.2501	0.0063
133	2.2564	0.0063
134	2.2626	0.0062
135	2.2688	0.0062
136	2.2750	0.0062
137	2.2811	0.0062
138	2.2873	0.0061
139	2.2934	0.0061
140	2.2994	0.0061
141	2.3055	0.0060
142	2.3115	0.0060
143	2.3175	0.0060
144	2.3234	0.0060
145	2.3294	0.0059
146	2.3353	0.0059
147	2.3412	0.0059
148	2.3470	0.0059
149	2.3528	0.0058
150	2.3586	0.0058
151	2.3644	0.0058
152	2.3702	0.0058
153	2.3759	0.0057
154	2.3816	0.0057
155	2.3873	0.0057
156	2.3930	0.0057
157	2.3986	0.0056
158	2.4043	0.0056
159	2.4099	0.0056
160	2.4154	0.0056
161	2.4210	0.0056
162	2.4265	0.0055
163	2.4320	0.0055
164	2.4375	0.0055
165	2.4430	0.0055
166	2.4484	0.0054
167	2.4539	0.0054
168	2.4593	0.0054
169	2.4646	0.0054
170	2.4700	0.0054
171	2.4754	0.0053
172	2.4807	0.0053
173	2.4860	0.0053

174	2.4913	0.0053
175	2.4965	0.0053
176	2.5018	0.0052
177	2.5070	0.0052
178	2.5122	0.0052
179	2.5174	0.0052
180	2.5226	0.0052
181	2.5278	0.0052
182	2.5329	0.0051
183	2.5380	0.0051
184	2.5431	0.0051
185	2.5482	0.0051
186	2.5533	0.0051
187	2.5583	0.0051
188	2.5634	0.0050
189	2.5684	0.0050
190	2.5734	0.0050
191	2.5784	0.0050
192	2.5833	0.0050
193	2.5883	0.0050
194	2.5932	0.0049
195	2.5981	0.0049
196	2.6030	0.0049
197	2.6079	0.0049
198	2.6128	0.0049
199	2.6176	0.0049
200	2.6225	0.0048
201	2.6273	0.0048
202	2.6321	0.0048
203	2.6369	0.0048
204	2.6417	0.0048
205	2.6465	0.0048
206	2.6512	0.0048
207	2.6560	0.0047
208	2.6607	0.0047
209	2.6654	0.0047
210	2.6701	0.0047
211	2.6748	0.0047
212	2.6794	0.0047
213	2.6841	0.0047
214	2.6887	0.0046
215	2.6933	0.0046
216	2.6979	0.0046
217	2.7025	0.0046
218	2.7071	0.0046
219	2.7117	0.0046
220	2.7163	0.0046
221	2.7208	0.0045
222	2.7253	0.0045
223	2.7298	0.0045

224	2.7343	0.0045
225	2.7388	0.0045
226	2.7433	0.0045
227	2.7478	0.0045
228	2.7522	0.0045
229	2.7567	0.0044
230	2.7611	0.0044
231	2.7655	0.0044
232	2.7699	0.0044
233	2.7743	0.0044
234	2.7787	0.0044
235	2.7831	0.0044
236	2.7875	0.0044
237	2.7918	0.0043
238	2.7961	0.0043
239	2.8005	0.0043
240	2.8048	0.0043
241	2.8091	0.0043
242	2.8134	0.0043
243	2.8176	0.0043
244	2.8219	0.0043
245	2.8262	0.0043
246	2.8304	0.0042
247	2.8347	0.0042
248	2.8389	0.0042
249	2.8431	0.0042
250	2.8473	0.0042
251	2.8515	0.0042
252	2.8557	0.0042
253	2.8598	0.0042
254	2.8640	0.0042
255	2.8682	0.0042
256	2.8723	0.0041
257	2.8764	0.0041
258	2.8805	0.0041
259	2.8847	0.0041
260	2.8888	0.0041
261	2.8928	0.0041
262	2.8969	0.0041
263	2.9010	0.0041
264	2.9051	0.0041
265	2.9091	0.0041
266	2.9131	0.0040
267	2.9172	0.0040
268	2.9212	0.0040
269	2.9252	0.0040
270	2.9292	0.0040
271	2.9332	0.0040
272	2.9372	0.0040
273	2.9412	0.0040

274	2.9451	0.0040
275	2.9491	0.0040
276	2.9530	0.0039
277	2.9570	0.0039
278	2.9609	0.0039
279	2.9648	0.0039
280	2.9687	0.0039
281	2.9727	0.0039
282	2.9765	0.0039
283	2.9804	0.0039
284	2.9843	0.0039
285	2.9882	0.0039
286	2.9920	0.0039
287	2.9959	0.0039
288	2.9997	0.0038

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0038	0.0007	0.0031
2	0.0039	0.0007	0.0031
3	0.0039	0.0007	0.0031
4	0.0039	0.0007	0.0032
5	0.0039	0.0007	0.0032
6	0.0039	0.0007	0.0032
7	0.0039	0.0007	0.0032
8	0.0039	0.0007	0.0032
9	0.0039	0.0007	0.0032
10	0.0040	0.0007	0.0032
11	0.0040	0.0007	0.0032
12	0.0040	0.0007	0.0032
13	0.0040	0.0007	0.0033
14	0.0040	0.0007	0.0033
15	0.0040	0.0008	0.0033
16	0.0040	0.0008	0.0033
17	0.0041	0.0008	0.0033
18	0.0041	0.0008	0.0033
19	0.0041	0.0008	0.0033
20	0.0041	0.0008	0.0033
21	0.0041	0.0008	0.0034
22	0.0041	0.0008	0.0034
23	0.0042	0.0008	0.0034
24	0.0042	0.0008	0.0034
25	0.0042	0.0008	0.0034
26	0.0042	0.0008	0.0034
27	0.0042	0.0008	0.0034
28	0.0042	0.0008	0.0034
29	0.0042	0.0008	0.0035
30	0.0043	0.0008	0.0035

31	0.0043	0.0008	0.0035
32	0.0043	0.0008	0.0035
33	0.0043	0.0008	0.0035
34	0.0043	0.0008	0.0035
35	0.0043	0.0008	0.0035
36	0.0044	0.0008	0.0035
37	0.0044	0.0008	0.0036
38	0.0044	0.0008	0.0036
39	0.0044	0.0008	0.0036
40	0.0044	0.0008	0.0036
41	0.0045	0.0008	0.0036
42	0.0045	0.0008	0.0036
43	0.0045	0.0008	0.0037
44	0.0045	0.0008	0.0037
45	0.0045	0.0008	0.0037
46	0.0045	0.0008	0.0037
47	0.0046	0.0009	0.0037
48	0.0046	0.0009	0.0037
49	0.0046	0.0009	0.0038
50	0.0046	0.0009	0.0038
51	0.0047	0.0009	0.0038
52	0.0047	0.0009	0.0038
53	0.0047	0.0009	0.0038
54	0.0047	0.0009	0.0038
55	0.0047	0.0009	0.0039
56	0.0048	0.0009	0.0039
57	0.0048	0.0009	0.0039
58	0.0048	0.0009	0.0039
59	0.0048	0.0009	0.0039
60	0.0048	0.0009	0.0039
61	0.0049	0.0009	0.0040
62	0.0049	0.0009	0.0040
63	0.0049	0.0009	0.0040
64	0.0049	0.0009	0.0040
65	0.0050	0.0009	0.0040
66	0.0050	0.0009	0.0041
67	0.0050	0.0009	0.0041
68	0.0050	0.0009	0.0041
69	0.0051	0.0009	0.0041
70	0.0051	0.0009	0.0041
71	0.0051	0.0010	0.0042
72	0.0051	0.0010	0.0042
73	0.0052	0.0010	0.0042
74	0.0052	0.0010	0.0042
75	0.0052	0.0010	0.0043
76	0.0052	0.0010	0.0043
77	0.0053	0.0010	0.0043
78	0.0053	0.0010	0.0043
79	0.0053	0.0010	0.0043
80	0.0054	0.0010	0.0044

81	0.0054	0.0010	0.0044
82	0.0054	0.0010	0.0044
83	0.0055	0.0010	0.0044
84	0.0055	0.0010	0.0045
85	0.0055	0.0010	0.0045
86	0.0056	0.0010	0.0045
87	0.0056	0.0010	0.0046
88	0.0056	0.0010	0.0046
89	0.0057	0.0011	0.0046
90	0.0057	0.0011	0.0046
91	0.0057	0.0011	0.0047
92	0.0058	0.0011	0.0047
93	0.0058	0.0011	0.0047
94	0.0058	0.0011	0.0047
95	0.0059	0.0011	0.0048
96	0.0059	0.0011	0.0048
97	0.0060	0.0011	0.0048
98	0.0060	0.0011	0.0049
99	0.0060	0.0011	0.0049
100	0.0061	0.0011	0.0049
101	0.0061	0.0011	0.0050
102	0.0062	0.0011	0.0050
103	0.0062	0.0012	0.0051
104	0.0062	0.0012	0.0051
105	0.0063	0.0012	0.0051
106	0.0063	0.0012	0.0051
107	0.0064	0.0012	0.0052
108	0.0064	0.0012	0.0052
109	0.0065	0.0012	0.0053
110	0.0065	0.0012	0.0053
111	0.0066	0.0012	0.0054
112	0.0066	0.0012	0.0054
113	0.0067	0.0012	0.0054
114	0.0067	0.0013	0.0055
115	0.0068	0.0013	0.0055
116	0.0068	0.0013	0.0056
117	0.0069	0.0013	0.0056
118	0.0070	0.0013	0.0057
119	0.0070	0.0013	0.0057
120	0.0071	0.0013	0.0058
121	0.0072	0.0013	0.0058
122	0.0072	0.0013	0.0059
123	0.0073	0.0014	0.0059
124	0.0073	0.0014	0.0060
125	0.0074	0.0014	0.0060
126	0.0075	0.0014	0.0061
127	0.0076	0.0014	0.0062
128	0.0076	0.0014	0.0062
129	0.0077	0.0014	0.0063
130	0.0078	0.0014	0.0063

131	0.0079	0.0015	0.0064
132	0.0079	0.0015	0.0064
133	0.0080	0.0015	0.0065
134	0.0081	0.0015	0.0066
135	0.0082	0.0015	0.0067
136	0.0083	0.0015	0.0067
137	0.0084	0.0016	0.0068
138	0.0085	0.0016	0.0069
139	0.0086	0.0016	0.0070
140	0.0087	0.0016	0.0070
141	0.0088	0.0016	0.0072
142	0.0089	0.0017	0.0072
143	0.0090	0.0017	0.0073
144	0.0091	0.0017	0.0074
145	0.0086	0.0016	0.0070
146	0.0087	0.0016	0.0071
147	0.0089	0.0017	0.0072
148	0.0090	0.0017	0.0073
149	0.0092	0.0017	0.0074
150	0.0092	0.0017	0.0075
151	0.0094	0.0018	0.0077
152	0.0095	0.0018	0.0078
153	0.0097	0.0018	0.0079
154	0.0099	0.0018	0.0080
155	0.0101	0.0019	0.0082
156	0.0102	0.0019	0.0083
157	0.0105	0.0019	0.0085
158	0.0106	0.0020	0.0086
159	0.0109	0.0020	0.0088
160	0.0110	0.0020	0.0090
161	0.0113	0.0021	0.0092
162	0.0115	0.0021	0.0093
163	0.0118	0.0022	0.0096
164	0.0120	0.0022	0.0097
165	0.0123	0.0023	0.0100
166	0.0125	0.0023	0.0102
167	0.0130	0.0024	0.0106
168	0.0132	0.0025	0.0107
169	0.0138	0.0026	0.0112
170	0.0140	0.0026	0.0114
171	0.0146	0.0027	0.0119
172	0.0149	0.0028	0.0121
173	0.0155	0.0029	0.0126
174	0.0159	0.0030	0.0129
175	0.0167	0.0031	0.0136
176	0.0171	0.0032	0.0139
177	0.0180	0.0034	0.0147
178	0.0186	0.0035	0.0151
179	0.0197	0.0037	0.0160
180	0.0204	0.0038	0.0166

181	0.0219	0.0041	0.0178
182	0.0227	0.0042	0.0185
183	0.0247	0.0046	0.0201
184	0.0259	0.0048	0.0211
185	0.0250	0.0047	0.0203
186	0.0266	0.0050	0.0216
187	0.0309	0.0057	0.0251
188	0.0337	0.0063	0.0274
189	0.0419	0.0065	0.0353
190	0.0482	0.0065	0.0417
191	0.0732	0.0065	0.0667
192	0.1063	0.0065	0.0997
193	0.4597	0.0065	0.4531
194	0.0576	0.0065	0.0511
195	0.0372	0.0065	0.0307
196	0.0285	0.0053	0.0232
197	0.0272	0.0051	0.0222
198	0.0237	0.0044	0.0193
199	0.0211	0.0039	0.0172
200	0.0191	0.0036	0.0156
201	0.0176	0.0033	0.0143
202	0.0163	0.0030	0.0132
203	0.0152	0.0028	0.0124
204	0.0143	0.0027	0.0116
205	0.0134	0.0025	0.0109
206	0.0128	0.0024	0.0104
207	0.0122	0.0023	0.0099
208	0.0116	0.0022	0.0095
209	0.0111	0.0021	0.0091
210	0.0107	0.0020	0.0087
211	0.0103	0.0019	0.0084
212	0.0100	0.0019	0.0081
213	0.0096	0.0018	0.0078
214	0.0093	0.0017	0.0076
215	0.0091	0.0017	0.0074
216	0.0088	0.0016	0.0072
217	0.0092	0.0017	0.0075
218	0.0089	0.0017	0.0073
219	0.0087	0.0016	0.0071
220	0.0085	0.0016	0.0069
221	0.0083	0.0016	0.0068
222	0.0081	0.0015	0.0066
223	0.0080	0.0015	0.0065
224	0.0078	0.0015	0.0064
225	0.0077	0.0014	0.0062
226	0.0075	0.0014	0.0061
227	0.0074	0.0014	0.0060
228	0.0072	0.0013	0.0059
229	0.0071	0.0013	0.0058
230	0.0070	0.0013	0.0057

231	0.0069	0.0013	0.0056
232	0.0068	0.0013	0.0055
233	0.0067	0.0012	0.0054
234	0.0066	0.0012	0.0053
235	0.0065	0.0012	0.0053
236	0.0064	0.0012	0.0052
237	0.0063	0.0012	0.0051
238	0.0062	0.0012	0.0050
239	0.0061	0.0011	0.0050
240	0.0060	0.0011	0.0049
241	0.0059	0.0011	0.0048
242	0.0059	0.0011	0.0048
243	0.0058	0.0011	0.0047
244	0.0057	0.0011	0.0046
245	0.0056	0.0011	0.0046
246	0.0056	0.0010	0.0045
247	0.0055	0.0010	0.0045
248	0.0054	0.0010	0.0044
249	0.0054	0.0010	0.0044
250	0.0053	0.0010	0.0043
251	0.0053	0.0010	0.0043
252	0.0052	0.0010	0.0042
253	0.0052	0.0010	0.0042
254	0.0051	0.0010	0.0042
255	0.0051	0.0009	0.0041
256	0.0050	0.0009	0.0041
257	0.0050	0.0009	0.0040
258	0.0049	0.0009	0.0040
259	0.0049	0.0009	0.0040
260	0.0048	0.0009	0.0039
261	0.0048	0.0009	0.0039
262	0.0047	0.0009	0.0038
263	0.0047	0.0009	0.0038
264	0.0046	0.0009	0.0038
265	0.0046	0.0009	0.0037
266	0.0046	0.0008	0.0037
267	0.0045	0.0008	0.0037
268	0.0045	0.0008	0.0036
269	0.0044	0.0008	0.0036
270	0.0044	0.0008	0.0036
271	0.0044	0.0008	0.0036
272	0.0043	0.0008	0.0035
273	0.0043	0.0008	0.0035
274	0.0043	0.0008	0.0035
275	0.0042	0.0008	0.0034
276	0.0042	0.0008	0.0034
277	0.0042	0.0008	0.0034
278	0.0041	0.0008	0.0034
279	0.0041	0.0008	0.0033
280	0.0041	0.0008	0.0033

281	0.0041	0.0008	0.0033
282	0.0040	0.0007	0.0033
283	0.0040	0.0007	0.0032
284	0.0040	0.0007	0.0032
285	0.0039	0.0007	0.0032
286	0.0039	0.0007	0.0032
287	0.0039	0.0007	0.0032
288	0.0039	0.0007	0.0031

Total soil rain loss = 0.45(In)
Total effective rainfall = 2.55(In)
Peak flow rate in flood hydrograph = 155.95(CFS)

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24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	50.0	100.0	150.0	200.0
0+ 5	0.0016	0.24	Q	|	|	|	|
0+10	0.0092	1.09	Q	|	|	|	|
0+15	0.0200	1.58	Q	|	|	|	|
0+20	0.0326	1.83	Q	|	|	|	|
0+25	0.0464	2.01	Q	|	|	|	|
0+30	0.0612	2.14	Q	|	|	|	|
0+35	0.0766	2.24	Q	|	|	|	|
0+40	0.0926	2.33	Q	|	|	|	|
0+45	0.1091	2.39	Q	|	|	|	|
0+50	0.1261	2.46	Q	|	|	|	|
0+55	0.1434	2.51	Q	|	|	|	|
1+ 0	0.1610	2.56	Q	|	|	|	|
1+ 5	0.1790	2.61	Q	|	|	|	|
1+10	0.1972	2.65	Q	|	|	|	|
1+15	0.2157	2.69	Q	|	|	|	|
1+20	0.2345	2.72	Q	|	|	|	|
1+25	0.2535	2.76	Q	|	|	|	|
1+30	0.2727	2.79	Q	|	|	|	|
1+35	0.2921	2.82	Q	|	|	|	|
1+40	0.3116	2.83	Q	|	|	|	|
1+45	0.3311	2.84	Q	|	|	|	|
1+50	0.3507	2.85	Q	|	|	|	|
1+55	0.3704	2.86	Q	|	|	|	|
2+ 0	0.3902	2.87	QV	|	|	|	|
2+ 5	0.4100	2.88	QV	|	|	|	|
2+10	0.4299	2.89	QV	|	|	|	|
2+15	0.4499	2.90	QV	|	|	|	|

2+20	0.4699	2.91	QV	|	|	|	|
2+25	0.4900	2.92	QV	|	|	|	|
2+30	0.5102	2.93	QV	|	|	|	|
2+35	0.5305	2.94	QV	|	|	|	|
2+40	0.5509	2.96	QV	|	|	|	|
2+45	0.5713	2.97	QV	|	|	|	|
2+50	0.5918	2.98	QV	|	|	|	|
2+55	0.6124	2.99	QV	|	|	|	|
3+ 0	0.6331	3.00	QV	|	|	|	|
3+ 5	0.6538	3.01	QV	|	|	|	|
3+10	0.6747	3.03	QV	|	|	|	|
3+15	0.6956	3.04	QV	|	|	|	|
3+20	0.7166	3.05	QV	|	|	|	|
3+25	0.7377	3.06	QV	|	|	|	|
3+30	0.7589	3.08	Q V	|	|	|	|
3+35	0.7801	3.09	Q V	|	|	|	|
3+40	0.8015	3.10	Q V	|	|	|	|
3+45	0.8229	3.11	Q V	|	|	|	|
3+50	0.8445	3.13	Q V	|	|	|	|
3+55	0.8661	3.14	Q V	|	|	|	|
4+ 0	0.8878	3.15	Q V	|	|	|	|
4+ 5	0.9096	3.17	Q V	|	|	|	|
4+10	0.9315	3.18	Q V	|	|	|	|
4+15	0.9535	3.19	Q V	|	|	|	|
4+20	0.9756	3.21	Q V	|	|	|	|
4+25	0.9978	3.22	Q V	|	|	|	|
4+30	1.0201	3.24	Q V	|	|	|	|
4+35	1.0425	3.25	Q V	|	|	|	|
4+40	1.0649	3.27	Q V	|	|	|	|
4+45	1.0875	3.28	Q V	|	|	|	|
4+50	1.1102	3.30	Q V	|	|	|	|
4+55	1.1330	3.31	Q V	|	|	|	|
5+ 0	1.1559	3.33	Q V	|	|	|	|
5+ 5	1.1789	3.34	Q V	|	|	|	|
5+10	1.2021	3.36	Q V	|	|	|	|
5+15	1.2253	3.37	Q V	|	|	|	|
5+20	1.2486	3.39	Q V	|	|	|	|
5+25	1.2721	3.40	Q V	|	|	|	|
5+30	1.2956	3.42	Q V	|	|	|	|
5+35	1.3193	3.44	Q V	|	|	|	|
5+40	1.3431	3.46	Q V	|	|	|	|
5+45	1.3670	3.47	Q V	|	|	|	|
5+50	1.3911	3.49	Q V	|	|	|	|
5+55	1.4152	3.51	Q V	|	|	|	|
6+ 0	1.4395	3.53	Q V	|	|	|	|
6+ 5	1.4639	3.54	Q V	|	|	|	|
6+10	1.4884	3.56	Q V	|	|	|	|
6+15	1.5131	3.58	Q V	|	|	|	|
6+20	1.5378	3.60	Q V	|	|	|	|
6+25	1.5628	3.62	Q V	|	|	|	|

6+30	1.5878	3.64	Q	V	|	|	|	|
6+35	1.6130	3.66	Q	V	|	|	|	|
6+40	1.6383	3.68	Q	V	|	|	|	|
6+45	1.6638	3.70	Q	V	|	|	|	|
6+50	1.6894	3.72	Q	V	|	|	|	|
6+55	1.7151	3.74	Q	V	|	|	|	|
7+ 0	1.7410	3.76	Q	V	|	|	|	|
7+ 5	1.7670	3.78	Q	V	|	|	|	|
7+10	1.7932	3.80	Q	V	|	|	|	|
7+15	1.8195	3.82	Q	V	|	|	|	|
7+20	1.8460	3.85	Q	V	|	|	|	|
7+25	1.8726	3.87	Q	V	|	|	|	|
7+30	1.8994	3.89	Q	V	|	|	|	|
7+35	1.9264	3.91	Q	V	|	|	|	|
7+40	1.9535	3.94	Q	V	|	|	|	|
7+45	1.9808	3.96	Q	V	|	|	|	|
7+50	2.0083	3.99	Q	V	|	|	|	|
7+55	2.0359	4.01	Q	V	|	|	|	|
8+ 0	2.0637	4.04	Q	V	|	|	|	|
8+ 5	2.0917	4.06	Q	V	|	|	|	|
8+10	2.1198	4.09	Q	V	|	|	|	|
8+15	2.1482	4.11	Q	V	|	|	|	|
8+20	2.1767	4.14	Q	V	|	|	|	|
8+25	2.2054	4.17	Q	V	|	|	|	|
8+30	2.2343	4.20	Q	V	|	|	|	|
8+35	2.2634	4.23	Q	V	|	|	|	|
8+40	2.2927	4.26	Q	V	|	|	|	|
8+45	2.3222	4.28	Q	V	|	|	|	|
8+50	2.3519	4.31	Q	V	|	|	|	|
8+55	2.3819	4.34	Q	V	|	|	|	|
9+ 0	2.4120	4.38	Q	V	|	|	|	|
9+ 5	2.4423	4.41	Q	V	|	|	|	|
9+10	2.4729	4.44	Q	V	|	|	|	|
9+15	2.5037	4.47	Q	V	|	|	|	|
9+20	2.5347	4.51	Q	V	|	|	|	|
9+25	2.5660	4.54	Q	V	|	|	|	|
9+30	2.5975	4.58	Q	V	|	|	|	|
9+35	2.6293	4.61	Q	V	|	|	|	|
9+40	2.6613	4.65	Q	V	|	|	|	|
9+45	2.6935	4.68	Q	V	|	|	|	|
9+50	2.7260	4.72	Q	V	|	|	|	|
9+55	2.7588	4.76	Q	V	|	|	|	|
10+ 0	2.7919	4.80	Q	V	|	|	|	|
10+ 5	2.8252	4.84	Q	V	|	|	|	|
10+10	2.8588	4.88	Q	V	|	|	|	|
10+15	2.8927	4.92	Q	V	|	|	|	|
10+20	2.9269	4.97	Q	V	|	|	|	|
10+25	2.9614	5.01	|Q	V	|	|	|	|
10+30	2.9962	5.06	|Q	V	|	|	|	|
10+35	3.0313	5.10	|Q	V	|	|	|	|

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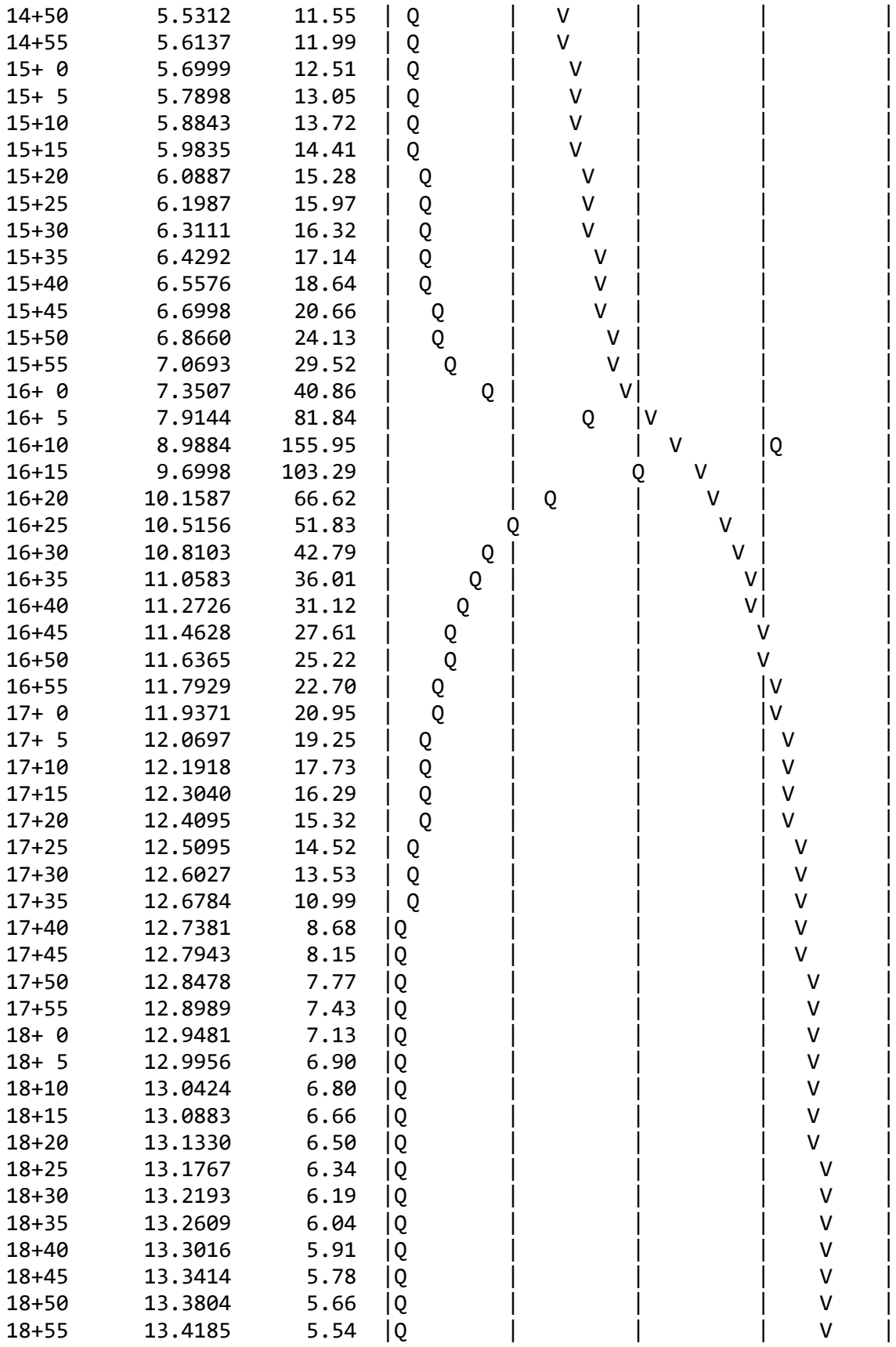
10+40       3.0668      5.15  |Q      V |          |          |          |
10+45       3.1026      5.20  |Q      V |          |          |          |
10+50       3.1387      5.25  |Q      V |          |          |          |
10+55       3.1752      5.30  |Q      V |          |          |          |
11+ 0       3.2120      5.35  |Q      V |          |          |          |
11+ 5       3.2492      5.40  |Q      V |          |          |          |
11+10       3.2868      5.46  |Q      V |          |          |          |
11+15       3.3248      5.51  |Q      V |          |          |          |
11+20       3.3631      5.57  |Q      V |          |          |          |
11+25       3.4019      5.63  |Q       V|          |          |          |
11+30       3.4411      5.69  |Q       V|          |          |          |
11+35       3.4807      5.75  |Q       V|          |          |          |
11+40       3.5208      5.82  |Q       V|          |          |          |
11+45       3.5613      5.88  |Q       V|          |          |          |
11+50       3.6023      5.95  |Q       V|          |          |          |
11+55       3.6438      6.02  |Q       V|          |          |          |
12+ 0       3.6858      6.10  |Q       V|          |          |          |
12+ 5       3.7280      6.13  |Q       V|          |          |          |
12+10       3.7699      6.08  |Q        V          |          |          |
12+15       3.8118      6.08  |Q        V          |          |          |
12+20       3.8539      6.12  |Q        V          |          |          |
12+25       3.8965      6.18  |Q        V          |          |          |
12+30       3.9395      6.25  |Q        V          |          |          |
12+35       3.9830      6.32  |Q        V          |          |          |
12+40       4.0271      6.40  |Q        V          |          |          |
12+45       4.0718      6.49  |Q        V          |          |          |
12+50       4.1171      6.58  |Q        V          |          |          |
12+55       4.1631      6.68  |Q        |V          |          |          |
13+ 0       4.2098      6.78  |Q        |V          |          |          |
13+ 5       4.2572      6.89  |Q        |V          |          |          |
13+10       4.3054      7.00  |Q        |V          |          |          |
13+15       4.3544      7.12  |Q        |V          |          |          |
13+20       4.4044      7.25  |Q        |V          |          |          |
13+25       4.4552      7.37  |Q        |V          |          |          |
13+30       4.5069      7.52  |Q        |V          |          |          |
13+35       4.5597      7.66  |Q        | V         |          |          |
13+40       4.6136      7.82  |Q        | V         |          |          |
13+45       4.6685      7.98  |Q        | V         |          |          |
13+50       4.7248      8.16  |Q        | V         |          |          |
13+55       4.7822      8.34  |Q        | V         |          |          |
14+ 0       4.8411      8.55  |Q        | V         |          |          |
14+ 5       4.9013      8.75  |Q        |  V        |          |          |
14+10       4.9633      9.00  |Q        |  V        |          |          |
14+15       5.0270      9.24  |Q        |  V        |          |          |
14+20       5.0925      9.51  |Q        |  V        |          |          |
14+25       5.1599      9.78  |Q        |  V        |          |          |
14+30       5.2293     10.09  | Q       |  V        |          |          |
14+35       5.3009     10.40  | Q       |   V       |          |          |
14+40       5.3750     10.76  | Q       |   V       |          |          |
14+45       5.4516     11.12  | Q       |   V       |          |          |
```



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19+ 0      13.4559      5.43  |Q        |         |         |    V    |
19+ 5      13.4926      5.33  |Q        |         |         |    V    |
19+10      13.5286      5.23  |Q        |         |         |    V    |
19+15      13.5640      5.13  |Q        |         |         |     V   |
19+20      13.5987      5.04  |Q        |         |         |     V   |
19+25      13.6328      4.96  Q        |         |         |     V   |
19+30      13.6664      4.88  Q        |         |         |     V   |
19+35      13.6994      4.80  Q        |         |         |     V   |
19+40      13.7319      4.72  Q        |         |         |     V   |
19+45      13.7639      4.64  Q        |         |         |     V   |
19+50      13.7954      4.57  Q        |         |         |     V   |
19+55      13.8264      4.50  Q        |         |         |     V   |
20+ 0      13.8569      4.43  Q        |         |         |     V   |
20+ 5      13.8870      4.37  Q        |         |         |     V   |
20+10      13.9166      4.31  Q        |         |         |     V   |
20+15      13.9459      4.25  Q        |         |         |      V  |
20+20      13.9748      4.19  Q        |         |         |      V  |
20+25      14.0032      4.13  Q        |         |         |      V  |
20+30      14.0313      4.08  Q        |         |         |      V  |
20+35      14.0591      4.03  Q        |         |         |      V  |
20+40      14.0865      3.98  Q        |         |         |      V  |
20+45      14.1136      3.93  Q        |         |         |      V  |
20+50      14.1403      3.88  Q        |         |         |      V  |
20+55      14.1668      3.84  Q        |         |         |      V  |
21+ 0      14.1929      3.79  Q        |         |         |      V  |
21+ 5      14.2187      3.75  Q        |         |         |      V  |
21+10      14.2443      3.71  Q        |         |         |      V  |
21+15      14.2695      3.67  Q        |         |         |      V  |
21+20      14.2945      3.63  Q        |         |         |      V  |
21+25      14.3193      3.59  Q        |         |         |       V |
21+30      14.3437      3.55  Q        |         |         |       V |
21+35      14.3680      3.52  Q        |         |         |       V |
21+40      14.3920      3.48  Q        |         |         |       V |
21+45      14.4157      3.45  Q        |         |         |       V |
21+50      14.4392      3.41  Q        |         |         |       V |
21+55      14.4625      3.38  Q        |         |         |       V |
22+ 0      14.4856      3.35  Q        |         |         |       V |
22+ 5      14.5085      3.32  Q        |         |         |       V |
22+10      14.5311      3.29  Q        |         |         |       V |
22+15      14.5535      3.26  Q        |         |         |       V |
22+20      14.5758      3.23  Q        |         |         |       V |
22+25      14.5978      3.20  Q        |         |         |       V |
22+30      14.6197      3.17  Q        |         |         |       V |
22+35      14.6414      3.15  Q        |         |         |       V |
22+40      14.6629      3.12  Q        |         |         |       V |
22+45      14.6842      3.09  Q        |         |         |        V|
22+50      14.7053      3.07  Q        |         |         |        V|
22+55      14.7263      3.04  Q        |         |         |        V|
23+ 0      14.7471      3.02  Q        |         |         |        V|
23+ 5      14.7677      3.00  Q        |         |         |        V|
```

23+10	14.7882	2.97	Q	|	|	|	V|
23+15	14.8085	2.95	Q	|	|	|	V|
23+20	14.8287	2.93	Q	|	|	|	V|
23+25	14.8487	2.91	Q	|	|	|	V|
23+30	14.8685	2.88	Q	|	|	|	V|
23+35	14.8883	2.86	Q	|	|	|	V|
23+40	14.9078	2.84	Q	|	|	|	V|
23+45	14.9273	2.82	Q	|	|	|	V|
23+50	14.9466	2.80	Q	|	|	|	V|
23+55	14.9657	2.78	Q	|	|	|	V|
24+ 0	14.9847	2.76	Q	|	|	|	V|
24+ 5	15.0020	2.51	Q	|	|	|	V|
24+10	15.0133	1.64	Q	|	|	|	V|
24+15	15.0212	1.15	Q	|	|	|	V|
24+20	15.0273	0.89	Q	|	|	|	V|
24+25	15.0322	0.71	Q	|	|	|	V|
24+30	15.0362	0.58	Q	|	|	|	V|
24+35	15.0396	0.48	Q	|	|	|	V|
24+40	15.0424	0.41	Q	|	|	|	V|
24+45	15.0447	0.34	Q	|	|	|	V|
24+50	15.0466	0.28	Q	|	|	|	V|
24+55	15.0483	0.23	Q	|	|	|	V|
25+ 0	15.0496	0.19	Q	|	|	|	V|
25+ 5	15.0506	0.15	Q	|	|	|	V|
25+10	15.0515	0.12	Q	|	|	|	V|
25+15	15.0521	0.09	Q	|	|	|	V|
25+20	15.0526	0.07	Q	|	|	|	V|
25+25	15.0528	0.04	Q	|	|	|	V|
25+30	15.0529	0.01	Q	|	|	|	V|