Appendix I
Preliminary Hydrology Study

Preliminary Hydrology Report

Rialto Jurupa and Willow Industrial

APNs: 0258-111-32, 0258-111-31

March 2023

PREPARED FOR:

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Certification by Engineer

_____

Jacob Glaze, P.E. Date

Contents

Appendices

References

Hydrology Manual. County of San Bernardino, August 1986.

100.0 Introduction

Kimley-Horn and Associates has been retained to prepare a Preliminary Hydrology Report for the proposed Rialto Jurupa and Willow Industrial project in Rialto, California. The purpose of this report is to demonstrate preliminary analysis of the hydrologic and hydraulic conditions associated with the development of the project site. To do so, the following is the scope of this report:

- Discuss potential for hydromodification downstream of the site
- Discuss the pre-development discharge patterns and points
- Discuss the post-development discharge patterns and points
- Determine the pre-development flow rates for the 2-year, 10-year, 25-year, and 100-year event
- Determine the pre-development volumes for the 2-year, 10-year, and 100-year event
- Determine the post-development unmitigated flow rates for the 2-year, 10-year, and 100-year event
- Determine the post-development volumes for the 2-year, 10-year, and 100-year event
- Analyze the required post-development onsite mitigation for up to the 100-year event
- Determine the design of the infiltration/detention basin to ensure that the volume and flow rate requirements are met

Even though this report discusses stormwater, this report is not a Stormwater Pollution Prevention Plan (SWPPP), a Groundwater Study, a Geotechnical Report, nor a Water Quality Management Plan (WQMP). Each of these reports discuss separate aspects of stormwater. However, portions of the Geotechnical Report are utilized and referenced for the purpose of this report. Similarly, the stormwater mitigation requirements of the WQMP are considered for sizing the BMPs used for this project.

100.1 Project Description

The project site is located on the northwest corner of Jurupa Avenue and South Willow Avenue and is bounded by existing structures to the west, an industrial development to the north, South Willow Avenue to the east, and Jurupa Avenue to the South. The entire project site measures approximately 6.97 acres and is intended to be developed into a new industrial complex.

The existing project site is vacant, undeveloped land with poor coverage. The soils have a hydrologic soil group classification of "A", and the topography along the project site shows that runoff within the site primarily drains towards the south of the site onto Jurupa Avenue where it will enter the public storm drain system.

The proposed site is considered an industrial development and intends to develop approximately 6.97 acres into one industrial building, parking areas, loading docks, drive aisles, and landscape areas. Stormwater runoff will be collected by nearby catch basins and conveyed to an Underground 96" CMP System where it will infiltrate into the soil. Prior to entering the underground infiltration system, stormwater runoff will enter a hydrodynamic separator for pretreatment. When the required water quality volume is captured within the underground system, excess runoff will be routed offsite where it will connect to the public storm drain system. Refer to the Post-Development Exhibit in Appendix G for more information.

Due to the curb and gutter along Jurupa Avenue and South Willow Avenue, the northern industrial development, and the existing topography, no offsite runon is anticipated to enter the project site.

100.2 Methodology

100.2.1 Background

The type of soil and soil conditions are major factors affecting infiltration and storm water runoff as a result. The Natural Resources Conservation Service (NRCS) has classified soil into general hydrologic soil groups for comparing infiltration and runoff rates. Each group is based on properties that influence runoff, such as water infiltration rate, texture, natural discharge, and moisture condition. The runoff potential is based on the amount of runoff at the end of a long duration storm that occurs after wetting and swelling of the soil not protected by vegetation. Using the United States Department of Agriculture Natural Resources Conservation Service Web Soil Survey online tool, the hydrologic soil group classification for the area was determined to be A. Soil type A is defined as soils having a high infiltration rate (low runoff potential) when thoroughly wet.

In addition, based on the Percolation/Infiltration Testing prepared by Sladden Engineering dated July 2022, the site is suitable for infiltration with a measured average infiltration rate of 17.23 in/hr. Using a factor of safety of 2, the design infiltration rate for this project was computed to be 8.61 in/hr. Since the proposed underground infiltration system will have a maximum ponding depth of 8', the BMPs will be able to completely drawdown within 48 hours.

For the hydrologic analysis, the Rational Method, Unit Hydrograph Method, and Basin Routing Analysis was used to solve for the time of concentration, flow rates, and volumes following methodology described in the San Bernardino County Hydrology Manual, and the CivilDesign Engineering Software was used to compute the data. Utilizing precipitation data from NOAA Atlas 14 along with the proposed site characteristics, the rational method was used to compute the time of concentrations and peak flow rates generated from the existing and proposed 2-year, 10-year, and 100-year storm events. The time of concentration was then used to solve for the Synthetic Unit Hydrograph of the site which returned the total volume generated for the 24-hour duration of the 2-year, 10-year, and 100-year storm events. The Unit Hydrograph is then routed through the basin to perform the Basin Routing Analysis which returns the peak flow out of the proposed underground basin along with the maximum water surface elevation for up to the 100-year storm.

Antecedent moisture conditions (AMC) I, II, and III were used to calculate the peak flows and volumes for the 2-year, 10-year, and 100-year storm events respectively based on the hydrology manual. In addition, since the project is located within a location that is HCOC Exempt, hydromodification will not be a concern and no calculations for HCOCs were performed.

100.2.2 Design Methodology

To prevent potential adverse impacts downstream of the site, the project proposes to retain at minimum the difference in stormwater runoff volume for the 100-year storm between post-development and pre-development conditions. In addition, to meet water quality requirements, the project is required to retain the Design Capture Volume (DCV) onsite. Therefore, the required retention volume for this project is taken to be the greater between the DCV and the difference in runoff between the post-development and pre-development conditions. Refer to the WQMP for more information regarding the DCV.

Once the required retention volume is retained onsite, the site is allowed to release stormwater runoff offsite. However, for water quality and flood control purposes, the project proposes to attenuate flows to be no greater than the pre-development conditions. This results in additional storage volume being required in the BMPs for detention purposes. For the purposes of this Preliminary Report, the allowable flow rate for the 100-year storm event is taken to be the 25-year pre-development peak flow per the San Bernardino County Detention Basin Design Criteria. During final engineering, the allowable flow rate may change based on the capacity of the public storm drain system.

In addition, for water quality purposes, the basin must draw down the water quality volume within 48 hours. However, for flood control purposes, the basin must completely draw down within 24 hours. Since this project proposes to utilize one basin for both water quality and flood control purposes, the basin routing analysis was performed such that the starting elevation within the basin corresponded to the elevation of the water quality volume within the basin. The routing was then performed to show the basin draw back down to the water quality elevation within 24 hours after the time of peak inflow.

Furthermore, to be more conservative with the routing calculations, the analysis does not account for the exfiltration rate within the basin. However, per the Percolation/Infiltration Testing in Appendix F, the site has sufficient infiltration rates to completely draw down the water quality volume within 48 hours, and the routing analysis shows that the flood control volume within the basin will be able to draw back down to the water quality elevation within 24 hours even without exfiltration.

For hydraulic purposes, the storm drain system and inlets will be designed to be able to accommodate the design storm of a 100-year storm event, and calculations will be performed during Final Engineering.

100.2.3 Calculations Performed

Below is a summary of the calculations that were performed for hydrological and hydraulic analysis. Refer to Appendices H, I, and J for the Rational Method, Unit Hydrograph, and Basin Routing calculations respectively.

1. Rational Method
    a. 2-year storm event for pre-development and post-development conditions
    b. 10-year storm event for pre-development and post-development conditions
    c. 25-year storm event for pre-development conditions
        i. Used to determine the allowable flow rate for the 100-year storm event
    d. 100-year storm event for pre-development and post-development conditions
        i. Used to determine peak flows and time of concentration

2. Unit Hydrograph
    a. 2-year storm event for pre-development and post-development conditions
    b. 10-year storm event for pre-development and post-development conditions
    c. 100-year storm event for pre-development and post-development conditions
        i. Used to determine volume differences and generate the inflow hydrograph for the basin analysis

3. Basin Analysis
    a. 100-year storm event
        i. Used to determine peak flows for the 100-year storm event
        ii. Used to determine max water surface elevation within the basin for the 100-year storm

100.3 Drainage Characteristics

The site is in Zone X per the Federal Emergency Management Administration (FEMA) Flood Insurance Rate Maps (FIRM) map numbers 06071C8686H and 06071C8667H, dated August 28, 2008. For reference, see the FIRMette in Appendix B.

Flood Zone X is defined by FEMA as areas determined to be outside the 0.2% annual chance floodplain.

100.3.1 Pre-development (Existing) Condition

Under the existing conditions, the project site primarily drains towards the south of the site onto Jurupa Avenue where it will enter the public storm drain. The existing conditions of the project site is vacant, undeveloped land with poor coverage. Under existing conditions, the project site was subdivided into two drainage areas (A and B). Runoff from both areas sheet flows to the south towards the existing storm drain and ultimately discharges into the Rialto Channel. See the Pre-Development Hydrology Exhibit in Appendix G for more information.

Table 1 shows a summary of the pre-development (existing) flows and volumes for the project site. See the Pre-Development Hydrology Exhibit in Appendix G for more information, Appendix H for the Rational Method Calculations, and Appendix I for the Unit Hydrograph Calculations.

Table 1: Pre-development (Existing) Flows and Volumes (Refer to Pre-Development Exhibit)

Area Description	Area (acres)	Q_2 (cfs)	V_2 (cf)	Q_{10} (cfs)	V_{10} (cf)	Q_{25} (cfs)	Q_{100} (cfs)	V_{100} (cf)
A	2.30	0.95	871	2.98	8,873	3.90	5.97	31,646
B	4.27	1.74	1,616	5.48	16,470	7.18	11.02	58,749
Total	**6.57**	**2.70**	**2,487**	**8.45**	**25,343**	**11.07**	**16.99**	**90,396**

100.3.2 Post-development Condition

Runoff from the proposed site will be collected by nearby catch basins and conveyed to an Underground 96" CMP System where it will infiltrate into the soil. Prior to entering the underground infiltration system, stormwater runoff will enter a hydrodynamic separator for pretreatment. In the case of large storm events, excess runoff will be routed offsite towards the existing public storm drain system and ultimately discharge into the Rialto Channel.

Table 2 shows a summary of the post-development flows (unmitigated). For more information, refer to the Post Development Hydrology Exhibit in Appendix G, the Rational Method Calculations in Appendix H, and the Unit Hydrograph Calculations in Appendix I.

Table 2: Onsite Post-development Flows (Unmitigated)

Area Description	Area (acres)	Q_2 (cfs)	V_2 (cf)	Q_{10} (cfs)	V_{10} (cf)	Q_{100} (cfs)	V_{100} (cf)
A	6.57	10.45	41,513	16.54	67,409	26.51	108,125

For retention purposes, the project proposes to retain the greater between the DCV and the difference between the post- and pre- development volume for the 100-year storm event. The project proposes to utilize an underground infiltration chamber to retain the required volume. See the below table for a summary of the required retention volume.

Table 3: Retention Requirement

Area Description	DCV (CF)	Δ100-Year (CF)	Retention Requirement (CF)	Retention Provided (CF)
A	22,884	17,729	22,884	22,946

100.4 Stormwater Mitigation

Since infiltration is feasible, the proposed development will be required to retain the required water quality volume onsite and excess runoff will be allowed to be discharged offsite. For the purposes of this preliminary report, the project assumes that the allowable flow rate for the 100-year storm event will be no greater than the 25-year storm event for pre-development conditions for the San Bernardino County Basin Design Guidelines. The pipe capacity for the existing storm drain system that will intake the project's stormwater runoff will be analyzed during Final Engineering.

The below tables show a summary of the required retention and peak flow mitigation, the capacity of the proposed underground basin, and a summary of the basin routing analysis. Refer to Appendix J for more information on the proposed BMP and the Basin Routing Analysis.

Table 4: Stormwater Mitigation Requirements

Area Description	Retention Requirement (CF)	Allowable Outflow (cfs)
A	22,884	11.07

Table 5: Basin Volume Summary

Area Description	BMP	Retention Requirement (CF)	Provided Retention (CF)	Total Storage (CF)
A	Underground 96" CMP (90' x 63')	22,884	22,946	40,585

Table 6: Basin Routing Analysis

Area Description	Allowable Flow Rate (CFS)	100-Year Peak Flow Rate (CFS)	Max Water Surface Elevation (Ft)
A	11.07	9.11	8.00 (Above bottom of gravel backfill)

To capture to required volume and attenuate peak flows, the basin will have a 15" diameter orifice placed 5' from the bottom of the gravel backfill. The orifice opening serves to mitigate peak flows and placing the opening 5' above the bottom of the gravel backfill will prevent runoff volumes below the required retention volume from leaving the site. Refer to the CMP Section in the Post-Development exhibit for more information.

100.5 Hydraulic Analysis

The calculated peak flows from the analyses discussed above will be used to size the onsite drainage devices such as the pipes and catch basins. Sizing calculations will be performed and included in the Final Hydrology Report.

100.6 Conclusion

In conclusion, the following was covered in this report:

- The potential for hydromodification downstream of the site was discussed
- The pre-development discharge patterns and points were analyzed
- The post-development discharge patterns and points were analyzed
- The pre-development flow rates for the 2-year, 10-year, 25-year, and 100-year events were determined
- The pre-development volumes for the 2-year, 10-year, and 100-year events were determined
- The post-development unmitigated flows for the 2-year, 10-year, and 100-year events were determined
- The post-development volumes for the 2-year, 10-year, and 100-year events were determined
- The required stormwater mitigation was analyzed
- The infiltration/detention basin was designed to ensure that the volume and flow mitigation requirements are met

As discussed in the contents of this report, the development is not expected to cause a significant impact to downstream systems for storms up to the 100-year storm.

Appendix A

Vicinity Map


Vicinity Map
Project Site
S Willow Ave
S Willow Ave
S Willow Ave
Jurupa Ave
Jurupa Ave
S Willow Ave & Jurupa Ave
N
Google Earth

Appendix B

FIRM Map

National Flood Hazard Layer FIRMette

FEMA

117°22'50"W 34°3'10"N

117°22'13"W 34°2'40"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

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

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

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

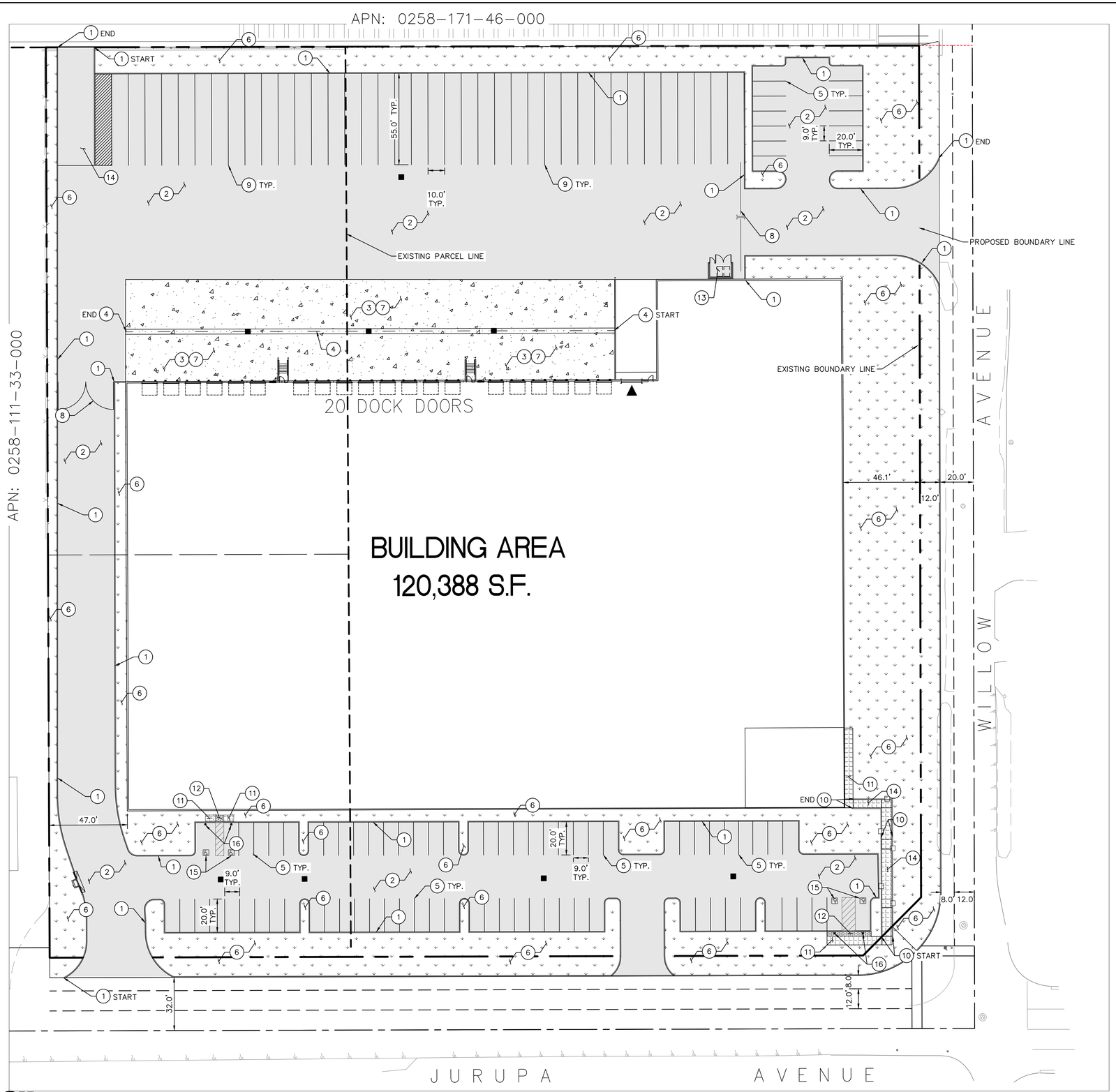
This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 10/31/2022 at 2:04 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

Appendix C

Construction Plans



LEGEND

- PROPERTY LINE
- EXISTING EASEMENT
- PROPOSED HANDRAILS
- HEAVY DUTY ASPHALT PAVING
- LANDSCAPING
- CONCRETE PAVEMENT
- CONCRETE SIDEWALK

CONSTRUCTION NOTES

1. PROPOSED CONCRETE CURB
2. PROPOSED HEAVY DUTY ASPHALT PAVEMENT
3. PROPOSED CONCRETE PAVEMENT
4. PROPOSED VALLEY GUTTER
5. PROPOSED REGULAR STRIPING. DIMENSIONS PER PLAN.
6. PROPOSED LANDSCAPING.
7. PROPOSED TRUCK DOCK AREA.
8. PROPOSED GATE. REFER TO ARCHITECTURAL PLANS FOR MORE INFORMATION.
9. PROPOSED TRAILER PARKING. DIMENSIONS PER PLAN.
10. PROPOSED HANDRAILS
11. PROPOSED CONCRETE SIDEWALK
12. PROPOSED TRUNCATED DOMES
13. PROPOSED TRASH ENCLOSURE. REFER TO ARCHITECTURAL PLANS FOR MORE INFORMATION.
14. PROPOSED CONCRETE RAMP. REFER TO GRADING PLANS FOR MORE DETAILS.
15. PROPOSED ACCESSIBLE PARKING STALL
16. PROPOSED ACCESSIBLE PARKING SIGN ON POST AND BOLLARD

NORTH

GRAPHIC SCALE IN FEET
0 15 30 60

SCALE: 1" = 30'
WHEN PRINTED AT FULL SIZE 24"X36"

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LICENSED PROFESSIONAL

NOT FOR CONSTRUCTION

KHA PROJECT	194487001
DATE	2022/10/28
SCALE	AS SHOWN
DESIGNED BY	
DRAWN BY	
CHECKED BY	

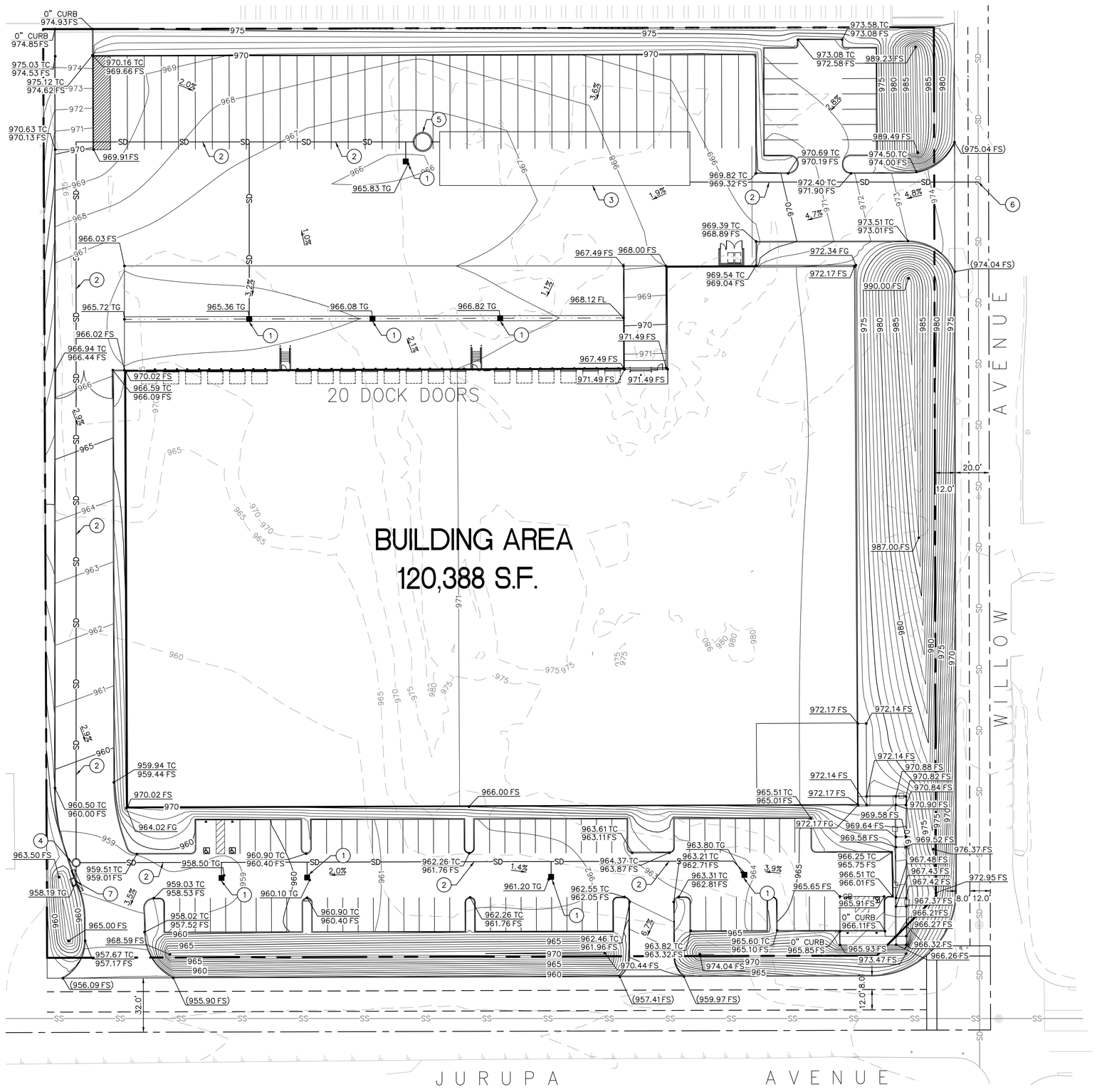
PRELIMINARY SITE PLAN

322-338 JURUPA AVE.
RIALTO, CA 92316

CITY OF RIALTO CALIFORNIA

SHEET NUMBER
C1.0

811 Know what's below. Call 811 before you dig.



GRADING LEGEND

———	PROPERTY LINE
- - - -	EASEMENT LINE
980	PROPOSED CONTOUR
980	EXISTING CONTOUR
FFE	FINISH FLOOR ELEVATION
TC	TOP OF CURB
FS	FINISH SURFACE
(974.50 TC) (975.00 FS)	EXISTING GRADE
974.50 TC 975.00 FS	PROPOSED GRADE

EARTHWORK*

CUT: 59,500 CY

FILL: 17,600 CY

NET: 41,900 CY (CUT)

*EARTHWORK QUANTITIES INCLUDE ROUGH PAVEMENT SECTION ESTIMATION

*FOR PERMITTING PURPOSES ONLY NOT FOR BID QUANTITY

CONSTRUCTION NOTES

1. PROPOSED GRATE INLET
2. PROPOSED STORM DRAIN LINE
3. PROPOSED UNDERGROUND DETENTION SYSTEM
4. PROPOSED STORM DRAIN MANHOLE
5. PROPOSED AQUA SWIRL PRE-TREATMENT
6. PROPOSED CONNECTION TO EXISTING STORM DRAIN LINE
7. PROPOSED CATCH BASIN

NORTH

GRAPHIC SCALE IN FEET
0 15 30 60

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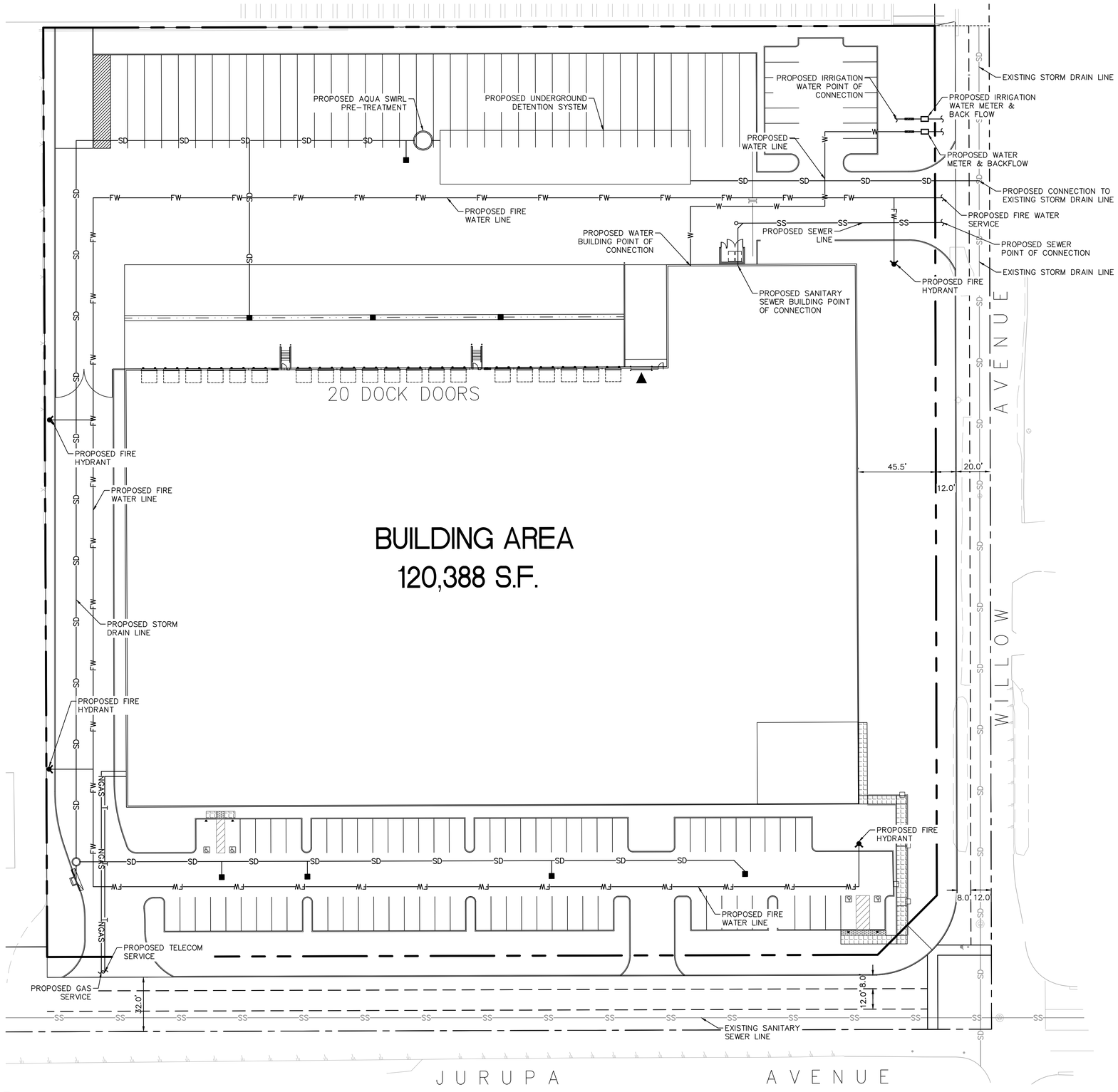

UTILITY LEGEND

- PROPERTY LINE
- EXISTING EASEMENT
- W — PROPOSED WATER LINE
- SS — PROPOSED SANITARY LINE
- FW — PROPOSED FIRE WATER LINE
- NGAS — PROPOSED GAS LINE
- T — PROPOSED TELECOM LINE
- SD — PROPOSED STORM DRAIN LINE

NORTH

GRAPHIC SCALE IN FEET
0 15 30 60

SCALE: 1" = 30'
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GENERAL LANDSCAPE NOTES

1. THE WORK SHALL BE DONE IN ACCORDANCE WITH THE PLANS AND THE MOST CURRENT EDITION OF THE APPLICABLE CITY AND/OR REGIONAL STANDARDS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN COPIES OF THESE STANDARDS, SPECIFICATIONS AND DRAWINGS, AS WELL AS ALL OTHER STANDARDS AND SPECIFICATIONS WHICH MAY BE NECESSARY TO COMPLETE AND ACCURATELY INTERPRET THESE PLANS.
2. ALL QUANTITIES LISTED IN THE LANDSCAPE SCHEDULE ARE FOR THE CONVENIENCE OF THE CONTRACTOR. IN THE CASE OF ANY DISCREPANCIES, PLANS SHALL OVERRIDE THE LANDSCAPE AND BID SCHEDULE QUANTITIES. CONTRACTOR SHALL VERIFY QUANTITIES SHOWN ON THE PLANS AND BASE THEIR BID ACCORDINGLY.
3. RESPONSIBILITY FOR ESTABLISHING SUBGRADES IS NOT INCLUDED IN THIS WORK. INSPECT SUBGRADES PRIOR TO COMMENCING WORK TO CONFIRM SUBGRADE DEPTHS AND GRADES. ADVISE LANDSCAPE ARCHITECT OF DISCREPANCIES WITH DRAWINGS OR SPECIFICATIONS. ALL PLANTING AREAS SHALL BE LEFT FREE OF CONSTRUCTION DEBRIS AND/OR TOXIC MATERIAL AND GRADED TO A LEVEL TO PERMIT LANDSCAPE CONSTRUCTION. TRENCHES OR OTHER FILLED EXCAVATIONS SHALL BE COMPACTED PRIOR TO LANDSCAPE INSTALLATION.
4. SITE GRADING NECESSITATED BY THE WORK AS IT PROGRESSES AND NOT SPECIFICALLY CALLED OUT ON THE PLANS WILL BE CONSIDERED INCIDENTAL WORK.
5. ALL LANDSCAPE AREAS SHALL BE UNIFORMLY GRADED SO THAT FINISHED SURFACES CONFORM TO THE TYPICAL SECTIONS AND PROPOSED GRADES SHOWN. FINISHED SURFACES SHALL BE REASONABLY SMOOTH, COMPACTED, AND FREE FROM IRREGULAR SURFACE DRAINAGE. THE LANDSCAPE CONTRACTOR SHALL BE RESPONSIBLE FOR ESTABLISHING THE FINISH GRADE AND SHALL BEAR FINAL RESPONSIBILITY FOR PROPER SURFACE DRAINAGE OF PLANTED AREAS.
6. AFTER ROUGH GRADING HAS OCCURRED, CONTRACTOR SHALL OBTAIN AN AGRONOMIC SOILS REPORT AND SUBMIT TO LANDSCAPE ARCHITECT FOR APPROVAL PRIOR TO AMENDMENTS AND/OR PLANTING. CONTRACTOR SHALL APPLY RECOMMENDATIONS UNLESS OTHERWISE NOTED BY LANDSCAPE ARCHITECT.
7. BACKFILL MIX SHALL BE PLACED IN 6" LIFTS AND TAMPED INTO PLACE AROUND THE PLANT. NO TRANSPLANTING SHALL BE DONE WHEN SOIL IS EXCESSIVELY WET. DO NOT COUNTERSINK AROUND CACTI OR SUCCULENTS. PROVIDE POSITIVE DRAINAGE AWAY FROM PLANT.
8. ALL TREES SHALL BE PLANTED A MINIMUM OF 5 FEET, ALL SHRUBS AND ACCENTS A MINIMUM OF 24", AND ALL GROUNDCOVERS 18" FROM EDGE OF CURBS, WALKS, WALLS, PADS, ETC., UNLESS DIRECTED OTHERWISE BY THE LANDSCAPE ARCHITECT.
9. EXCAVATE PITS, AS SHOWN ON DRAWINGS AND DETAILS. LOOSEN HARD SUBSOIL IN BOTTOM OF PIT. TEST DRAINAGE OF TREE, SHRUB AND PLANT PITS BY FILLING WITH WATER TWICE IN SUCCESSION. THE RETENTION OF WATER IN PLANTING PITS FOR MORE THAN TWENTY-FOUR (24) HOURS SHALL BE BROUGHT TO THE ATTENTION OF THE OWNER'S REPRESENTATIVE. SUBMIT IN WRITING A PROPOSAL FOR THE CORRECTION TO THE OWNER'S REPRESENTATIVE FOR APPROVAL BEFORE PROCEEDING WITH WORK.
10. IF ROCK, UNDERGROUND CONSTRUCTION, ADVERSE DRAINAGE CONDITIONS, OR OTHER OBSTRUCTIONS ARE ENCOUNTERED IN EXCAVATION FOR PLANTING OF ANY PLANT MATERIAL, NOTIFY THE OWNER'S REPRESENTATIVE. NEW LOCATIONS MAY BE SELECTED BY THE OWNER'S REPRESENTATIVE, OR INSTRUCTIONS MAY BE ISSUED TO DIRECT REMOVAL OF OBSTRUCTION. PROCEED WITH WORK ONLY AFTER APPROVAL OF THE OWNER'S REPRESENTATIVE.
11. DO NOT MAKE SUBSTITUTIONS. IF SPECIFIED LANDSCAPE MATERIAL IS NOT OBTAINABLE, SUBMIT PROOF OF NON-AVAILABILITY FROM AT LEAST FIVE SOURCES TO THE OWNER'S REPRESENTATIVE, TOGETHER WITH PROPOSAL FOR USE OF EQUIVALENT MATERIAL FOR FINAL APPROVAL.
12. ALL PLANT MATERIAL AND SPECIFICATIONS TO CONFORM TO THE AMERICAN STANDARD FOR NURSERY STOCK STANDARDS UNLESS OTHERWISE NOTED.
13. LAY OUT INDIVIDUAL TREE AND PLANT LOCATIONS AND AREAS FOR MULTIPLE PLANTINGS, STAKE LOCATIONS AND OUTLINE AREAS AND SECURE THE OWNER'S REPRESENTATIVE'S ACCEPTANCE BEFORE START OF PLANTING WORK. MAKE MINOR ADJUSTMENTS AS DIRECTED.
14. ALL SHRUBS SHALL HAVE A FULL HEAD THAT COVERS THE CAN DIAMETER (CAN FULL) AND A MINIMUM OF THREE STEMS/BRANCHES.
15. FINISH GRADE FOR PLANTED AREAS SHALL BE 1" BELOW ALL CURBS, WALKS AND PAVING WITH SMOOTH EVEN LINES AT EDGES OF STRUCTURES.
16. FINISH LANDSCAPE GRADES SHALL SLOPE AT A 2% GRADE AWAY FROM CURBS, WALKS, AND WALLS.
17. ALL LANDSCAPE AREAS SHALL RECEIVE A 3" DEPTH OF MULCH, UNLESS OTHERWISE NOTED ON THESE PLANS. TREES TO HAVE A 6' DIAMETER RING AROUND TRUNK FREE OF MULCH. MULCH SHALL EXTEND UNDER ALL SHRUBS AND PLANTS. APPLY PRE-EMERGENT HERBICIDE PRIOR TO AND AFTER MULCH INSTALLATION.
18. PROVIDE SAMPLES OF PROPOSED MULCH SHOWING COLOR, GRADATION SIZE RANGE AND TEXTURE INCLUDING PROPOSED SOURCE. PROVIDE 1/2 CUBIC FOOT SAMPLE OF EACH.
19. ANY ROCK MULCH OR DECOMPOSED GRANITE SHALL NOT CONTAIN LUMPS OR BALLS OF CLAY, CALICHE, ORGANIC MATTER OR CALCAREOUS COATING. PROVIDE WEED BARRIER UNDER ALL DG AND/OR ROCK MULCH. THE CONTRACTOR SHALL ENSURE THAT SUFFICIENT QUANTITY IS AVAILABLE FROM A SINGLE SOURCE TO COMPLETE THE PROJECT. THE OWNER'S REPRESENTATIVE SHALL APPROVE SAMPLES PRIOR TO ORDERING.
20. NO JOB WILL BE CONSIDERED COMPLETE UNTIL ALL CURBS, PAVEMENT AND SIDEWALKS HAVE BEEN SWEPT CLEAN OF ALL DIRT AND DEBRIS ACCORDING TO PLANS.
21. IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO OBTAIN ANY PERMITS REQUIRED. (SEE THE CITY GENERAL CONDITIONS)
22. ALL CONSTRUCTION ROADS AND COMPACTED AREAS DEVELOPED THROUGH CONSTRUCTION THAT ARE WITHIN THE LANDSCAPE AREAS SHALL BE SCARIFIED AND LOOSENED TO A DEPTH OF 12" PRIOR TO LANDSCAPE AND IRRIGATION WORK BEGINNING
23. PLANTINGS WITHIN THE SIGHT VISIBILITY TRIANGLE LINE SHALL BE MAINTAINED SO THAT NO LIMBS HANG LOWER THAN SEVEN (7) FEET AND SHRUBS OR OTHER PLANTS PLANTED WITHIN THE SIGHT VISIBILITY TRIANGLE LINE SHALL BE NO TALLER THAN TWO (2) FEET AT FULL GROWTH.

LANDSCAPE ARCHITECT NOTES

1. THE TERM "LANDSCAPE ARCHITECT" USED HEREIN SHALL MEAN THE LANDSCAPE ARCHITECT WHO HAS SIGNED AND SEALED THESE PLANS AND IS IN RESPONSIBLE CHARGE OF THE LANDSCAPE ARCHITECTURE DESIGN. THE TERM "CONTRACTOR" USED HEREIN SHALL MEAN ANY GENERAL CONTRACTOR OR SUBCONTRACTOR USING THESE PLANS. ANY AGENCY SIGNATURE OR APPROVAL ON THESE PLANS DOES NOT CONSTITUTE APPROVAL OF ANY OF THESE NOTES.
2. THE LANDSCAPE ARCHITECT WILL NOT PROVIDE, OBSERVE, COMMENT ON NOR ENFORCE ANY SAFETY MEASURES OR REGULATIONS. THE CONTRACTOR SHALL DESIGN, CONSTRUCT, AND MAINTAIN ALL SAFETY MEASURES AND SHALL BE SOLELY RESPONSIBLE FOR SAME AND COMPLYING WITH ALL LOCAL, STATE AND FEDERAL SAFETY AND HEALTH STANDARDS, LAWS, AND REGULATIONS. THE CONTRACTOR AGREES THAT SHE/HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOBSITE CONDITIONS AND SAFETY OF ALL PERSONS AND PROPERTY DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT. THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS.
3. THE LANDSCAPE ARCHITECT SHALL HAVE NO RESPONSIBILITY FOR ANY OF THE CONTRACTOR'S MEANS AND METHODS OF CONSTRUCTION, TECHNIQUES, EQUIPMENT CHOICE AND USAGE, SEQUENCE, SCHEDULE, SAFETY PROGRAMS, OR SAFETY PRACTICES, NOR SHALL THE LANDSCAPE ARCHITECT HAVE ANY AUTHORITY OR RESPONSIBILITY TO STOP OR DIRECT THE WORK OF ANY CONTRACTOR.
4. THE CONTRACTOR SHALL DEFEND, INDEMNIFY, AND HOLD THE LANDSCAPE ARCHITECT AND OWNER, THEIR AGENTS AND EMPLOYEES, HARMLESS FROM ANY AND ALL CLAIMS, DEMANDS, JUDGMENTS, LOSS, DAMAGES, COSTS, EXPENSES, FEES OR LIABILITY WHATSOEVER, REAL OR ALLEGED, IN CONNECTION WITH, IN WHOLE OR IN PART, DIRECTLY OR INDIRECTLY, THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR THE LANDSCAPE ARCHITECT.
5. IF THERE ARE ANY QUESTIONS REGARDING THESE PLANS, THE CONTRACTOR SHALL REQUEST IN WRITING FROM THE LANDSCAPE ARCHITECT AND THE OWNER, AN INTERPRETATION BEFORE DOING ANY RELATED OR IMPACTED WORK.
6. THE CONTRACTOR SHALL TAKE THE NECESSARY STEPS TO PROTECT THE PROPERTY FROM ANY EROSION AND SILTATION THAT RESULT FROM CONTRACTOR OPERATIONS BY APPROPRIATE MEANS UNTIL SUCH TIME THAT THE PROJECT IS COMPLETED AND ACCEPTED FOR MAINTENANCE BY WHOMEVER IS TO BE ULTIMATELY RESPONSIBLE FOR MAINTENANCE.
7. THE CONTRACTOR SHALL NOTIFY ALL UTILITY COMPANIES PRIOR TO STARTING WORK NEAR THEIR FACILITIES AND SHALL COORDINATE WORK WITH UTILITY COMPANY REPRESENTATIVES.
8. THE EXISTENCE AND LOCATION OF UNDERGROUND UTILITIES OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED FROM A SEARCH OF READILY AVAILABLE RECORDS. NO REPRESENTATION IS MADE AS TO THE ACCURACY OR COMPLETENESS OF SAID UTILITY INFORMATION. THE CONTRACTOR IS REQUIRED TO TAKE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN HEREON AND ANY OTHERS NOT OF RECORD OR NOT SHOWN ON THESE PLANS. ALL DAMAGES THERETO CAUSED BY THE CONTRACTOR SHALL BE REPAIRED TO THE APPROPRIATE SPECIFICATIONS AND STANDARDS AT THE SOLE EXPENSE OF THE CONTRACTOR.
9. THE LOCATION, ELEVATIONS, SIZE, TYPE AND CONDITION OF EXISTING IMPROVEMENTS ADJACENT TO THE PROPOSED WORK INDICATED ON THESE PLANS SHALL BE CONFIRMED BY THE CONTRACTOR BY FIELD MEASUREMENTS AND OBSERVATIONS PRIOR TO CONSTRUCTION OF NEW WORK. THE CONTRACTOR WILL IMMEDIATELY INFORM THE LANDSCAPE ARCHITECT IN WRITING IF ANY DISCREPANCIES OR CONFLICTING INFORMATION IS FOUND.
10. THE CONTRACTOR SHALL MAKE EXPLORATORY EXCAVATIONS AND LOCATE EXISTING UNDERGROUND FACILITIES AS NEEDED, SUFFICIENTLY AHEAD OF CONSTRUCTION TO PERMIT REVISIONS TO PLANS IF REVISIONS ARE NECESSARY DUE TO THE ACTUAL LOCATION, SIZE, TYPE, OR CONDITION OF EXISTING FACILITIES DIFFERING FROM WHAT IS SHOWN ON THESE PLANS.
11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVAL OF ANY DAMAGE TO THE EXISTING IMPROVEMENTS AND REPLACEMENT TO THE SATISFACTION OF THE OWNER.
12. SHOULD CONFLICTING INFORMATION BE FOUND ON THE PLANS THE CONTRACTOR SHALL NOTIFY THE LANDSCAPE ARCHITECT IN WRITING IMMEDIATELY BEFORE PROCEEDING WITH THE WORK IN QUESTION.
13. ANYTHING MENTIONED IN THE SPECIFICATIONS, IF ANY, AND NOT SHOWN ON THE DRAWINGS, OR SHOWN ON THE DRAWINGS AND NOT MENTIONED IN THE SPECIFICATIONS, SHALL BE OF LIKE EFFECT AS IF SHOWN OR MENTIONED IN BOTH.

PLANT SCHEDULE

TREES	CODE	QTY	BOTANICAL / COMMON NAME	CONT.	HEIGHT/SPREAD	CAL.	WUCOLS
	LC3	5	LAGERSTROEMIA INDICA `CHEROKEE` / CHEROKEE CRAPE MYRTLE	24" BOX	6`-7` HT. X 4`-5` SPR.	2" CAL.	MODERATE
	PR	15	PLATANUS RACEMOSA / CALIFORNIA SYCAMORE	24" BOX	10-12` HT. X 4-5` SPR.	2" CAL.	MODERATE
	TT	33	TIPUANA TIPU / TIPU TREE	24" BOX	9`-11` HT. X 4`-5` SPR.	2" CAL.	MODEATE

SHRUBS	CODE	QTY	BOTANICAL / COMMON NAME	CONT.	SPACING	WUCOLS
	AS	53	AGAVE ATTENUATA 'SUPER NOVA' / SUPER NOVA FOXTAIL AGAVE	5 GAL.	60" O.C.	LOW
	AP	86	ARTEMISIA X 'POWIS CASTLE' / POWIS CASTLE ARTEMISIA	5 GAL.	36" O.C.	LOW
	CL	509	CALLISTEMON VIMINALIS 'LITTLE JOHN' / LITTLE JOHN WEEPING BOTTLEBRUSH	5 GAL.	36" O.C.	LOW
	CD	74	CAREX DIVULSA / EUROPEAN GREY SEDGE	1 GAL.	24" O.C.	LOW
	HP	23	HESPERALOE PARVIFLORA / RED YUCCA	5 GAL.	48" O.C.	LOW
	LA	27	LAVANDULA ANGUSTIFOLIA / ENGLISH LAVENDER	5 GAL.	36" O.C.	LOW
	LF	22	LEUCOPHYLLUM FRUTESCENS / TEXAS SAGE	15 GAL.	48" O.C.	LOW
	MR	302	MUHLENBERGIA RIGENS / DEER GRASS	5 GAL.	36" O.C.	LOW
	RP	119	RHAPHIOLEPIS INDICA 'PINK LADY' / PINK LADY INDIAN HAWTHORN	5 GAL.	36" O.C.	LOW
	SB	117	SALVIA LEUCANTHA 'SANTA BARBARA' / MEXICAN BUSH SAGE	5 GAL.	36" O.C.	LOW
	WW	73	WESTRINGIA FRUTICOSA 'WYNABBIE GEM' / WYNABBIE GEM COAST ROSEMARY	5 GAL.	48" O.C.	LOW

GROUND COVERS	CODE	QTY	BOTANICAL / COMMON NAME	CONT.	SPACING	WUCOLS
	BP	429	BACCHARIS PILULARIS 'PIGEON POINT' / PIGEON POINT COYOTE BRUSH	1 GAL.	48" O.C.	LOW
	CH	160	CEANOTHUS HEARSTIORUM / HEARST CEANOTHUS	1 GAL.	36" O.C.	LOW

Know what's below. Call 811 before you dig.

DEDEAUX PROPERTIES | DONLON BUILDERS

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PHONE: 714-939-1030 FAX: 714-938-9488
WWW.KIMLEY-HORN.COM

LICENSED PROFESSIONAL

NOT FOR CONSTRUCTION

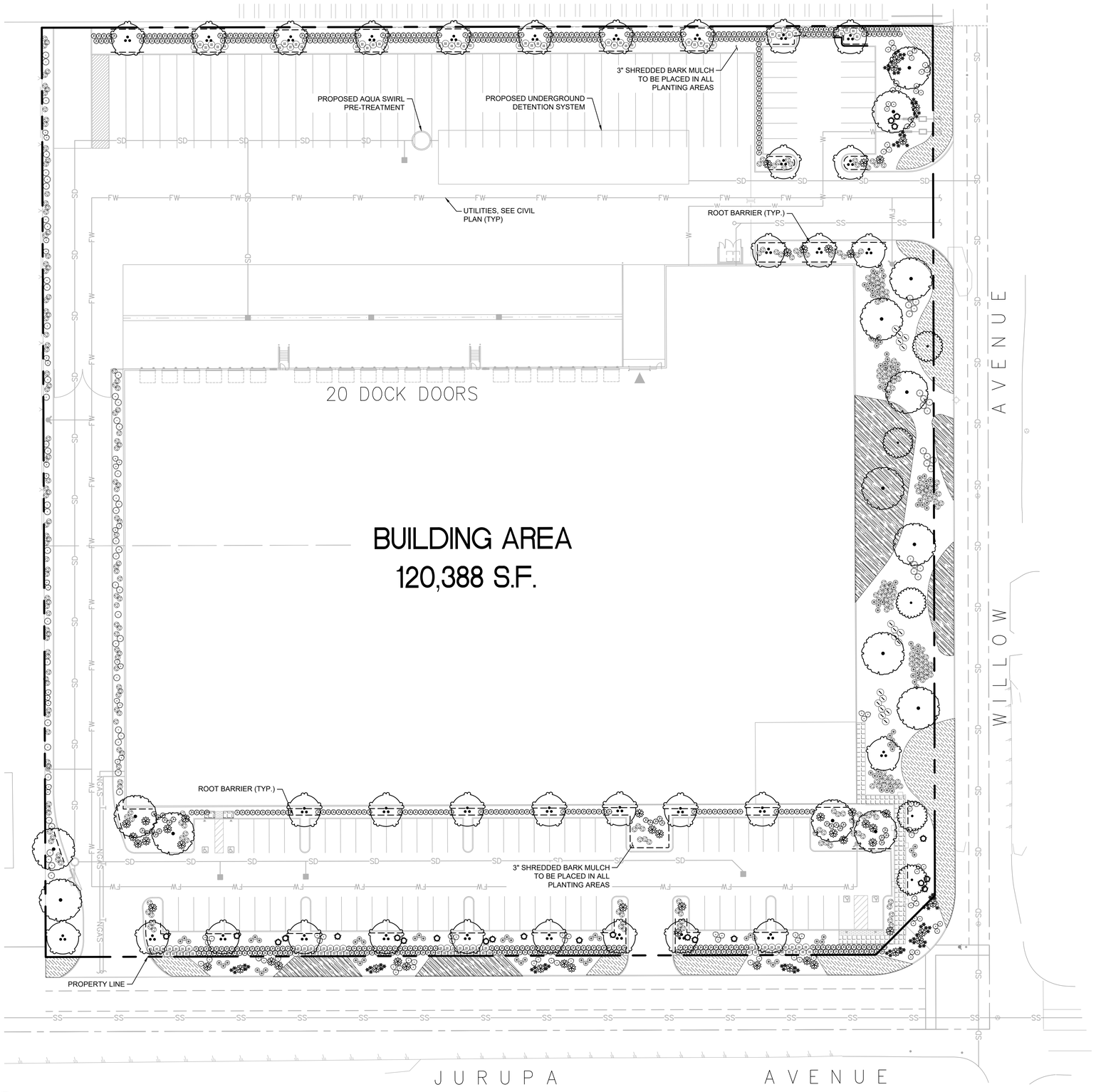
KHA PROJECT	194487001
DATE	2022/10/28
SCALE	AS SHOWN
DESIGNED BY	E.W
DRAWN BY	E.W
CHECKED BY	J.O

LANDSCAPE SCHEDULE AND NOTES

322-338 JURUPA AVE.
RIALTO, CA 92316

CITY OF RIALTO CALIFORNIA

SHEET NUMBER
L1.0



PLANT SCHEDULE (SEE SHEET L1.0 FOR FULL PLANT SCHEDULE)

TREES	CODE	QTY	BOTANICAL / COMMON NAME
	LC3	5	LAGERSTROEMIA INDICA `CHEROKEE` / CHEROKEE CRAPE MYRTLE
	PR	15	PLATANUS RACEMOSA / CALIFORNIA SYCAMORE
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	AP	86	ARTEMISIA X 'POWIS CASTLE' / POWIS CASTLE ARTEMISIA
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	CD	74	CAREX DIVULSA / EUROPEAN GREY SEDGE
	HP	23	HESPERALOE PARVIFLORA / RED YUCCA
	LA	27	LAVANDULA ANGUSTIFOLIA / ENGLISH LAVENDER
	LF	22	LEUCOPHYLLUM FRUTESCENS / TEXAS SAGE
	MR	302	MUHLENBERGIA RIGENS / DEER GRASS
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GROUND COVERS	CODE	QTY	BOTANICAL / COMMON NAME
	BP	429	BACCHARIS PILULARIS 'PIGEON POINT' / PIGEON POINT COYOTE BRUSH
	CH	160	CEANOTHUS HEARSTIORUM / HEARST CEANOTHUS

NORTH

GRAPHIC SCALE IN FEET
0 15 30 60

SCALE: 1" = 30'
WHEN PRINTED AT FULL SIZE 24"X36"

DEDEAUX PROPERTIES
DONLON BUILDERS

Kimley»Horn
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KHA PROJECT	194487001
DATE	2022/10/28
SCALE	AS SHOWN
DESIGNED BY	EW
DRAWN BY	EW
CHECKED BY	JO

LANDSCAPE PLAN

322-338 JURUPA AVE.
RIALTO, CA 92316

CITY OF RIALTO CALIFORNIA

SHEET NUMBER
L1.1

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Appendix D

Hydrology Manual and Other Reference Material

Curve (1) Numbers of Hydrologic Soil-Cover Complexes For Pervious Areas-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
NATURAL COVERS -					
Barren (Rockland, eroded and graded land)		78	86	91	93
Chaparral, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparral, Narrowleaf (Chamise and redshank)	Poor	71	82	88	91
	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Meadows or Cienegas (Areas with seasonally high water table, principal vegetation is sod forming grass)	Poor	63	77	85	88
	Fair	51	70	80	84
	Good	30	58	71	78
Open Brush (Soft wood shrubs - buckwheat, sage, etc.)	Poor	62	76	84	88
	Fair	46	66	77	83
	Good	41	63	75	81
Woodland (Coniferous or broadleaf trees predominate. Canopy density is at least 50 percent.)	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	25	55	70	77
Woodland, Grass (Coniferous or broadleaf trees with canopy density from 20 to 50 percent)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
URBAN COVERS -					
Residential or Commercial Landscaping (Lawn, shrubs, etc.)	Good	32	56	69	75
Turf (Irrigated and mowed grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
AGRICULTURAL COVERS -					
Fallow (Land plowed but not tilled or seeded)		77	86	91	94

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

CURVE NUMBERS FOR PERVIOUS AREAS

Figure C-3 (1 of 2)

Curve (1) Numbers of Hydrologic Soil-Cover Complexes For Pervious Areas-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
AGRICULTURAL COVERS (Continued)					
Legumes, Close Seeded (Alfalfa, sweetclover, timothy, etc.)	Poor	66	77	85	89
	Good	58	72	81	85
Orchards, Evergreen (Citrus, avocados, etc.)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
Pasture, Dryland (Annual grasses)	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Pasture, Irrigated (Legumes and perennial grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
Row Crops (Field crops - tomatoes, sugar beets, etc.)	Poor	72	81	88	91
	Good	67	78	85	89
Small grain (Wheat, oats, barley, etc.)	Poor	65	76	84	88
	Good	63	75	83	87

Notes:

1. All curve numbers are for Antecedent Moisture Condition (AMC) II.
2. Quality of cover definitions:

   Poor-Heavily grazed, regularly burned areas, or areas of high burn potential. Less than 50 percent of the ground surface is protected by plant cover or brush and tree canopy.

   Fair-Moderate cover with 50 percent to 75 percent of the ground surface protected.

   Good-Heavy or dense cover with more than 75 percent of the ground surface protected.
3. See Figure C-2 for definition of cover types.

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

CURVE NUMBERS FOR PERVIOUS AREAS

Figure C-3 (2 of 2)

Appendix E

NOAA Rainfall Data

NOAA Atlas 14, Volume 6, Version 2
Location name: Bloomington, California, USA*
Latitude: 34.0483°, Longitude: -117.3746°
Elevation: 964.08 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	0.105 (0.087-0.127)	0.135 (0.112-0.164)	0.176 (0.146-0.214)	0.209 (0.172-0.257)	0.256 (0.203-0.325)	0.292 (0.227-0.379)	0.329 (0.250-0.439)	0.369 (0.272-0.506)	0.424 (0.299-0.607)	0.468 (0.319-0.695)
10-min	0.150 (0.125-0.182)	0.194 (0.161-0.235)	0.252 (0.209-0.306)	0.300 (0.247-0.368)	0.366 (0.291-0.465)	0.418 (0.325-0.543)	0.472 (0.358-0.629)	0.529 (0.390-0.725)	0.608 (0.429-0.870)	0.671 (0.457-0.996)
15-min	0.181 (0.151-0.220)	0.234 (0.195-0.284)	0.304 (0.253-0.370)	0.363 (0.298-0.445)	0.443 (0.352-0.563)	0.506 (0.394-0.657)	0.571 (0.433-0.761)	0.640 (0.471-0.877)	0.735 (0.519-1.05)	0.812 (0.553-1.20)
30-min	0.271 (0.226-0.328)	0.350 (0.291-0.425)	0.455 (0.378-0.554)	0.542 (0.446-0.665)	0.662 (0.526-0.841)	0.756 (0.588-0.982)	0.854 (0.648-1.14)	0.956 (0.705-1.31)	1.10 (0.776-1.57)	1.21 (0.827-1.80)
60-min	0.393 (0.328-0.477)	0.508 (0.423-0.617)	0.661 (0.548-0.804)	0.787 (0.648-0.966)	0.961 (0.764-1.22)	1.10 (0.854-1.43)	1.24 (0.940-1.65)	1.39 (1.02-1.90)	1.60 (1.13-2.28)	1.76 (1.20-2.61)
2-hr	0.570 (0.475-0.691)	0.730 (0.608-0.886)	0.941 (0.781-1.15)	1.11 (0.917-1.37)	1.35 (1.07-1.72)	1.54 (1.19-1.99)	1.72 (1.31-2.30)	1.92 (1.42-2.63)	2.19 (1.55-3.14)	2.41 (1.64-3.57)
3-hr	0.706 (0.588-0.856)	0.902 (0.750-1.09)	1.16 (0.962-1.41)	1.37 (1.13-1.68)	1.66 (1.32-2.10)	1.88 (1.46-2.44)	2.10 (1.60-2.80)	2.34 (1.72-3.21)	2.66 (1.88-3.81)	2.92 (1.99-4.33)
6-hr	0.990 (0.825-1.20)	1.26 (1.05-1.54)	1.62 (1.35-1.98)	1.92 (1.58-2.35)	2.31 (1.84-2.94)	2.62 (2.03-3.40)	2.93 (2.22-3.90)	3.25 (2.39-4.45)	3.68 (2.60-5.27)	4.02 (2.74-5.97)
12-hr	1.32 (1.10-1.60)	1.69 (1.41-2.05)	2.17 (1.80-2.64)	2.56 (2.11-3.15)	3.09 (2.46-3.93)	3.50 (2.72-4.54)	3.91 (2.97-5.21)	4.34 (3.19-5.94)	4.91 (3.47-7.03)	5.36 (3.65-7.95)
24-hr	1.75 (1.55-2.02)	2.27 (2.01-2.62)	2.94 (2.59-3.40)	3.48 (3.05-4.06)	4.22 (3.57-5.08)	4.78 (3.97-5.88)	5.35 (4.33-6.74)	5.93 (4.68-7.68)	6.72 (5.09-9.06)	7.34 (5.37-10.2)
2-day	2.13 (1.89-2.46)	2.81 (2.48-3.24)	3.69 (3.25-4.27)	4.41 (3.86-5.14)	5.39 (4.56-6.49)	6.14 (5.10-7.56)	6.91 (5.60-8.70)	7.70 (6.07-9.97)	8.78 (6.65-11.8)	9.63 (7.04-13.4)
3-day	2.28 (2.02-2.63)	3.05 (2.70-3.52)	4.06 (3.58-4.70)	4.90 (4.28-5.71)	6.04 (5.11-7.28)	6.93 (5.75-8.52)	7.84 (6.35-9.87)	8.78 (6.92-11.4)	10.1 (7.63-13.6)	11.1 (8.12-15.5)
4-day	2.45 (2.17-2.82)	3.31 (2.93-3.82)	4.44 (3.92-5.14)	5.38 (4.71-6.28)	6.67 (5.65-8.04)	7.68 (6.37-9.45)	8.72 (7.06-11.0)	9.80 (7.72-12.7)	11.3 (8.54-15.2)	12.5 (9.12-17.4)
7-day	2.80 (2.48-3.23)	3.83 (3.39-4.42)	5.19 (4.57-6.00)	6.31 (5.52-7.36)	7.86 (6.66-9.47)	9.07 (7.53-11.2)	10.3 (8.37-13.0)	11.6 (9.18-15.1)	13.5 (10.2-18.2)	14.9 (10.9-20.8)
10-day	3.04 (2.69-3.51)	4.18 (3.70-4.83)	5.70 (5.02-6.59)	6.95 (6.08-8.11)	8.68 (7.35-10.5)	10.0 (8.33-12.4)	11.5 (9.28-14.4)	12.9 (10.2-16.7)	15.0 (11.3-20.2)	16.6 (12.2-23.2)
20-day	3.69 (3.27-4.26)	5.12 (4.53-5.91)	7.02 (6.19-8.13)	8.61 (7.53-10.0)	10.8 (9.16-13.0)	12.6 (10.4-15.4)	14.4 (11.6-18.1)	16.3 (12.8-21.1)	19.0 (14.4-25.6)	21.1 (15.5-29.5)
30-day	4.38 (3.88-5.05)	6.08 (5.37-7.01)	8.35 (7.36-9.66)	10.2 (8.96-11.9)	12.9 (10.9-15.5)	15.0 (12.4-18.4)	17.2 (13.9-21.7)	19.6 (15.4-25.3)	22.9 (17.3-30.8)	25.5 (18.7-35.6)
45-day	5.25 (4.64-6.05)	7.22 (6.38-8.33)	9.88 (8.71-11.4)	12.1 (10.6-14.1)	15.2 (12.9-18.4)	17.7 (14.7-21.8)	20.4 (16.5-25.7)	23.2 (18.3-30.1)	27.2 (20.6-36.7)	30.5 (22.3-42.5)
60-day	6.13 (5.43-7.07)	8.36 (7.39-9.65)	11.4 (10.0-13.1)	13.9 (12.2-16.2)	17.5 (14.8-21.0)	20.3 (16.9-25.0)	23.3 (18.9-29.4)	26.6 (21.0-34.5)	31.3 (23.7-42.2)	35.1 (25.7-48.9)

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

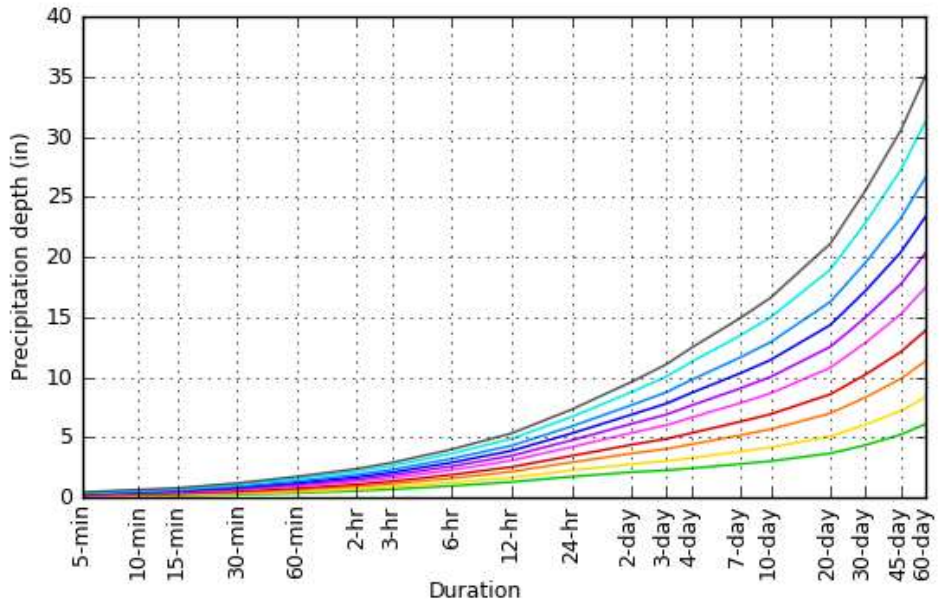
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper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

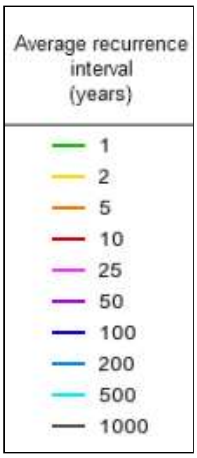
Please refer to NOAA Atlas 14 document for more information.

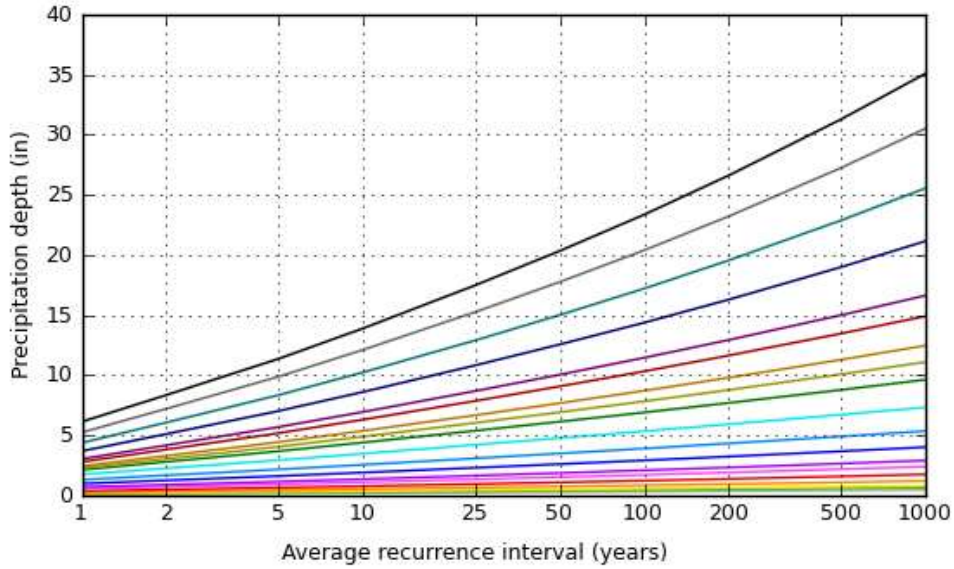
Back to Top

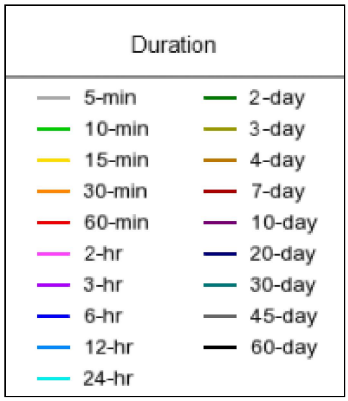
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 34.0483°, Longitude: -117.3746°









NOAA Atlas 14, Volume 6, Version 2 Created (GMT): Tue Oct 25 23:27:12 2022

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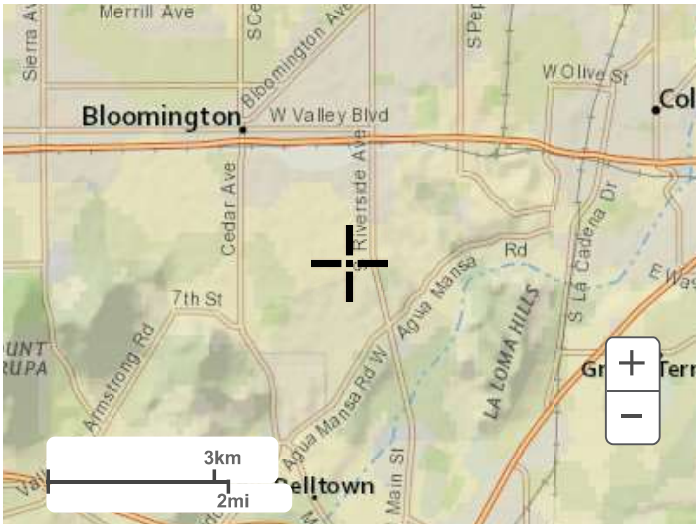
Maps & aerials

Small scale terrain



Large scale terrain

Large scale map

Large scale aerial

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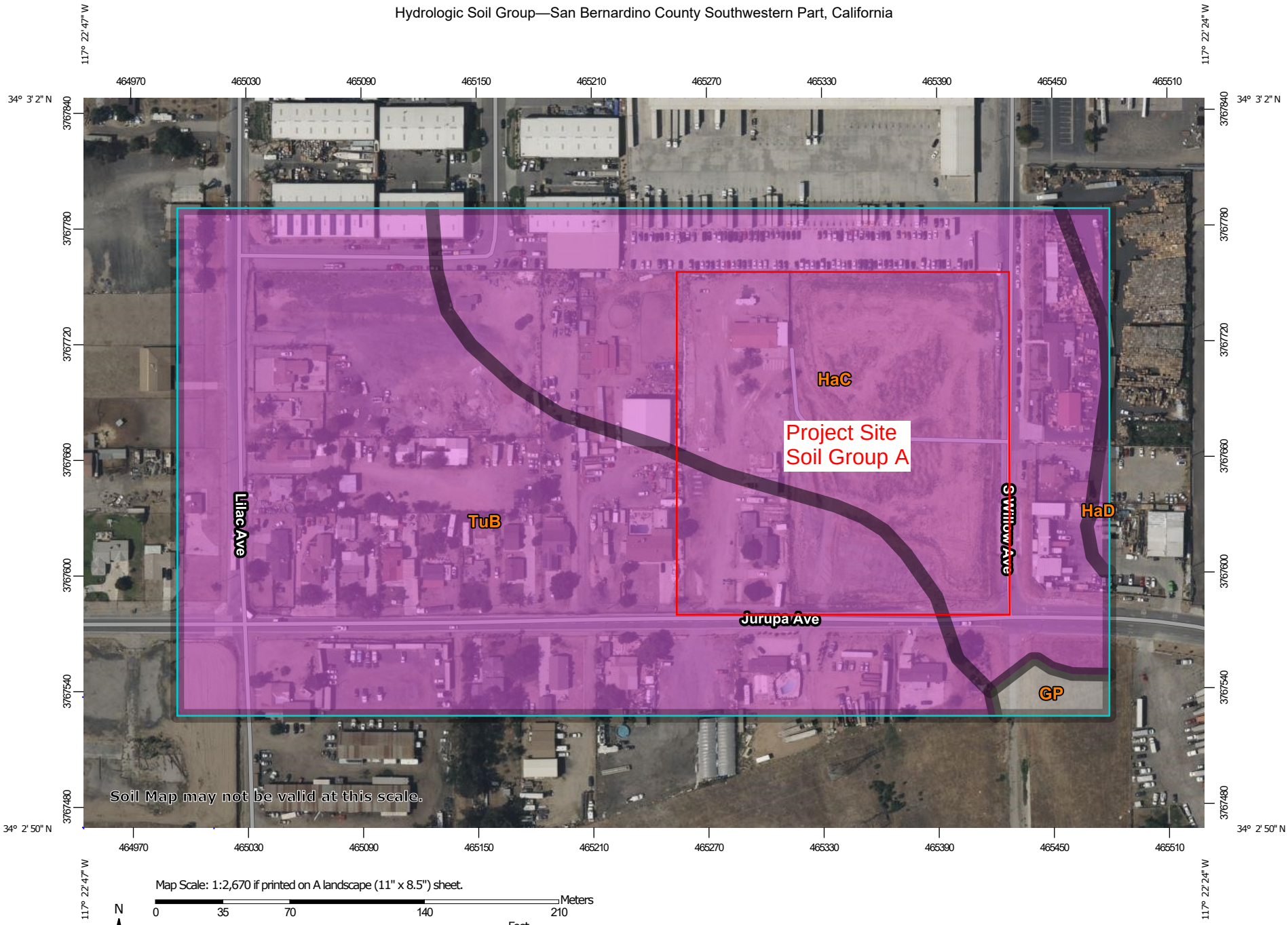
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Appendix F

Soils Reports



Map Scale: 1:2,670 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 35 70 140 210

Feet
0 100 200 400 600

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

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 Southwestern Part, California
Survey Area Data: Version 14, Sep 6, 2022

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

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

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
GP	Quarries and Pits soils		0.3	1.1%
HaC	Hanford coarse sandy loam, 2 to 9 percent slopes	A	13.2	41.5%
HaD	Hanford coarse sandy loam, 9 to 15 percent slopes	A	0.4	1.2%
TuB	Tujunga loamy sand, 0 to 5 percent slopes	A	17.8	56.2%
Totals for Area of Interest			**31.7**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

May 13, 2022 Project No. 22041-01

Mr. Benjamin Horning
Dedeaux Properties
1430 South Eastman Avenue
Commerce, CA 90023

Subject: ***Geotechnical Subsurface Due Diligence Evaluation, Proposed Industrial Development, Northwest of the Intersection of Jurupa Avenue and South Willow Avenue, Rialto, California***

In accordance with your request, LGC Geotechnical, Inc. is providing this geotechnical subsurface due diligence report for the proposed industrial development, located northwest of the intersection of Jurupa Avenue and South Willow Avenue in the City of Rialto, California. The purpose of our study was to evaluate the existing onsite geotechnical conditions and to confirm that the site can be developed from a geotechnical perspective.

Should you have any questions regarding this report, please do not hesitate to contact our office. We appreciate this opportunity to be of service.

Respectfully,

LGC Geotechnical, Inc.

Dennis Boratynec, GE 2770
Vice President

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Branden Petersen, EIT

DJB/BPP/klr

Distribution: (1) Addressee (electronic copy)

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1.0 INTRODUCTION

1.1 Purpose and Scope of Services

This report presents the results of our geotechnical due-diligence level report for the proposed industrial development located at the northwest corner of Jurupa Avenue and South Willow Avenue in the City of Rialto, California (see Site Location Map, Figure 1).

The purpose of our study was to evaluate the existing onsite geotechnical conditions and to confirm that the site can be developed from a geotechnical perspective. As part of this report, we have: 1) reviewed available geotechnical reports and geologic maps pertinent to the site (Appendix A); 2) performed a limited subsurface geotechnical evaluation of the site consisting of the excavation of eight small-diameter borings ranging in depth from approximately 25 to 50 feet below existing ground surface; 3) performed 6 exploratory test pits from approximately 6.5 to 12 feet below existing ground surface; 4) performed laboratory testing of select soil samples obtained during our subsurface evaluation; and 5) prepared this due-diligence level geotechnical evaluation report presenting our findings, conclusions and preliminary recommendations as it relates to the proposed development.

The findings and conclusions presented herein should be considered preliminary and will need to be re-evaluated once the project plans are available as part of a plan review report to be provided at a later date. It should be noted that LGC Geotechnical does not provide environmental consulting services.

1.2 Project Description and Background

The approximately 14.5-acre site is bound to the north by industrial buildings and vacant land, to the east by South Willow Avenue, to the south by Jurupa Avenue and west by various structures. The site is primarily comprised of one existing building in the north with associated parking and vacant land with a stockpile on the south.

Review of historic aerial photographs indicate that the current configuration of the buildings on the north was constructed by 2005. Previously, the site was undeveloped farmland until 1959 when a structure was built at the southeast corner of the site. The grading and stockpiling operation at the southern portion of the site started in 2016 (Historic Aerials, 2022).

Based on the provided information and conceptual site plans (GAA, 2022), the proposed industrial development will consist of one 94,000 square foot warehouse and associated parking. The proposed industrial building is anticipated to be an at-grade concrete tilt-up structure with estimated maximum column and wall loads of approximately 150 kips and 10 kips per linear foot, respectively. Please note no structural loads or preliminary grading plans were provided to us at the time of this report.

The preliminary recommendations given in this report are based upon the proposed layout and estimated structural loading information above. We understand that the project plans are currently being developed at this time; LGC Geotechnical should be provided with updated

project plans and the actual structural loads when they become available, in order to either confirm or modify the recommendations provided herein. This may include but is not limited to additional subsurface explorations, laboratory testing and analysis to provide a design level geotechnical report.

LGC Geotechnical, Inc.

FIGURE 1
Site Location Map

PROJECT NAME	Dedeaux - Willow Avenue, Rialto
PROJECT NO.	22041-01
ENG. / GEOL.	DJB
SCALE	Not to Scale
DATE	May 2022

1.3 Subsurface Exploration

A geotechnical field evaluation was performed by LGC Geotechnical. This program consisted of drilling and sampling eight small-diameter borings. The borings were drilled by CalPac Drilling under subcontract to LGC Geotechnical. The depth of the borings ranged from approximately 25 to 50 feet below existing grade. An LGC Geotechnical representative observed the drilling operations, logged the borings, and collected soil samples for laboratory testing. The borings were performed using a truck-mounted drill rig equipped with 6-inch diameter hollow-stem augers. Driven soil samples were collected by means of the Standard Penetration Test (SPT) and Modified California Drive (MCD) sampler. The MCD is a split-barrel sampler with a tapered cutting tip and lined with a series of 1-inch-tall brass rings. The SPT sampler (1.4-inch ID) and MCD sampler (2.4-inch ID, 3.0-inch OD) were driven using a 140-pound automatic hammer falling 30 inches to advance the sampler a total depth of 18 inches or until refusal. The raw blow counts for each 6-inch increment of penetration were recorded on the boring logs. Bulk samples were also collected and logged for laboratory testing at select depths. At the completion of drilling, the borings were backfilled with cuttings and where applicable the surface was capped with quick-crete.

Boring logs are presented in Appendix B and their approximate locations are depicted on Figure 2.

1.4 Laboratory Testing

Representative driven and bulk samples were retained for laboratory testing during our field evaluation. Laboratory testing included in-situ unit weight and moisture content, collapse, laboratory compaction, expansion index, and corrosion (sulfate, chloride, pH, and minimum resistivity).

The following is a summary of the laboratory test results.

- Dry density of the samples collected ranged from approximately 98 pounds per cubic foot (pcf) to 128 pcf, with an average of 113 pcf. Field moisture contents ranged from approximately 2 percent to 18 percent, with an average of 5 percent.
- Three collapse tests were performed. The stress vs. deformation plots are provided in Appendix C.
- Two Expansion Index (EI) tests were performed. Results were EI values of 0 and 3, corresponding to “Very Low” expansion potential.
- Two laboratory compaction tests of near surface samples indicate a maximum dry density ranging from 130 to 135 pcf and an optimum moisture content ranging from 6.0 to 8.5 percent.
- Corrosion testing indicated soluble sulfate contents of approximately 0.01 percent, chloride content of 40 parts per million (ppm), pH value of 8.01, and minimum resistivity value of 3,400 ohm-cm.

A summary of the laboratory test results is presented in Appendix C.

2.0 GEOTECHNICAL CONDITIONS

2.1 Regional Geology

The subject site is generally located in the northeastern portion of the broad San Bernardino Basin that is bound to the north by the San Gabriel Mountains and to the south by the Santa Ana Mountains. Regional topography is dominated by the presence of the northwest trending faults that define the mountains and hills of the Southern California region. Structurally, the site is located on the northeastern portion of the 'Perris block' of the Peninsular Ranges Geomorphic Province of Southern California. The 'Perris block' is an area of relatively low relief, consisting of a block of basement rock bounded by the Elsinore fault zone to the southwest and the San Jacinto fault zone to the northeast (USGS, 2003). The Santa Ana River flows southwest from the San Gabriel Mountains, less than a mile from the site.

2.2 Site-Specific Geology

Based on our subsurface exploration and review of pertinent geologic literature and maps, the site is generally underlain by undocumented artificial fill soils and Quaternary-aged old alluvial fan deposits (USGS, 2003). The alluvial fan deposit emanated from the San Gabriel Mountains, locally dissected by tributary drainage to the nearby Santa Ana River.

It should be noted that geotechnical explorations are only representative of the location where they are performed, and varying subsurface conditions may exist outside of each location. In addition, subsurface conditions can change over time. The soil descriptions provided above should not be construed to mean that the subsurface profile is uniform, and that soil is homogeneous within the project area. A brief description of the materials encountered during drilling is presented in the following section, and the approximate boring locations are depicted on the Boring Location Map (Figure 2). For details on the stratigraphy at the exploration locations, refer to the boring logs provided in Appendix B.

2.2.1 Undocumented Artificial Fill (Map Symbol – afu)

Undocumented artificial fill was observed in the field explorations up to approximately 15 feet below existing grade in our borings. The stockpiled fill was observed to consist of dry to moist sand with varying amounts of silt and gravel.

2.2.2 Quaternary Old Alluvial Fan Deposits (Map Symbol – Qof)

Quaternary Old Alluvial Fan deposits, generally dated Late to Middle Pleistocene, were encountered at the site below the undocumented artificial fill. Where observed, the fan deposits generally consisted of medium dense to very dense sands with varying amounts of silt and gravel, to the maximum explored depth of approximately 50 feet below existing grade.

2.3 Groundwater

Groundwater was not encountered in our borings to an approximate depth of 50 feet below existing grade. Wells present at nearby sites show groundwater being present at depth greater than 100 feet below existing grade (WDL, 2022). High groundwater is estimated at 100 feet below existing grade.

It should be noted that higher localized and seasonal perched groundwater conditions may accumulate below the surface and should be expected throughout the design life of the proposed improvements. In general, groundwater conditions below any given site may vary over time depending on numerous factors including seasonal rainfall and local irrigation, among others.

2.4 Seismic Design Parameters

The site seismic characteristics were evaluated per the guidelines set forth in Chapter 16, Section 1613 of the 2019 California Building Code (CBC) and applicable portions of ASCE 7-16 which has been adopted by the CBC. Please note that the following seismic parameters are only applicable for code-based acceleration response spectra and are not applicable for where site-specific ground motion procedures are required by ASCE 7-16. Representative site coordinates of latitude 34.051314 degrees north and longitude -117.374863 degrees west were utilized in our analyses. The maximum considered earthquake (MCE) spectral response accelerations (S_{MS} and S_{M1}) and adjusted design spectral response acceleration parameters (S_{DS} and S_{D1}) for Site Class D are provided in Table 1. The structural designer should contact the geotechnical consultant if structural conditions (e.g., number of stories, seismically isolated structures, etc.) require site-specific ground motions.

TABLE 1

Seismic Design Parameters

Selected Parameters from 2019 CBC, Section 1613 - Earthquake Loads	**Seismic Design Values**	**Notes/Exceptions**
Distance to applicable faults classifies the site as a "Near-Fault" site.		Section 11.4.1 of ASCE 7
Site Class	D*	Chapter 20 of ASCE 7
Ss (Risk-Targeted Spectral Acceleration for Short Periods)	1.661g	From SEAOC, 2022
S_1 (Risk-Targeted Spectral Accelerations for 1-Second Periods)	0.647g	From SEAOC, 2022
F_a (per Table 1613.2.3(1))	1.000	For Simplified Design Procedure of Section 12.14 of ASCE 7, F_a shall be taken as 1.4 (Section 12.14.8.1)
F_v (per Table 1613.2.3(2))	1.7	Value is only applicable per requirements/exceptions per Section 11.4.8 of ASCE 7
S_{MS} for Site Class D [Note: $S_{MS} = F_aS_S$]	1.661g	-
S_{M1} for Site Class D [Note: $S_{M1} = F_vS_1$]	1.010g	Value is only applicable per requirements/exceptions per Section 11.4.8 of ASCE 7
S_{DS} for Site Class D [Note: $S_{DS} = (^2/_3)S_{MS}$]	1.107g	-
S_{D1} for Site Class D [Note: $S_{D1} = (^2/_3)S_{M1}$]	0.733g	Value is only applicable per requirements/exceptions per Section 11.4.8 of ASCE 7
C_{RS} (Mapped Risk Coefficient at 0.2 sec)	0.925	ASCE 7 Chapter 22
C_{R1} (Mapped Risk Coefficient at 1 sec)	0.899	ASCE 7 Chapter 22
*Since site soils are Site Class D and S_1 is greater than or equal to 0.2, the seismic response coefficient Cs is determined by Eq. 12.8-2 for values of $T \leq 1.5T_s$ and taken equal to 1.5 times the value calculated in accordance with either Eq. 12.8-3 for $T_L \geq T > T_s$, or Eq. 12.8-4 for $T > T_L$. Refer to ASCE 7-16.		

A deaggregation of the PGA based on a 2,475-year average return period (MCE) indicates that an earthquake magnitude of 7.19 at a distance of approximately 10.38 km from the site would contribute the most to this ground motion. A deaggregation of the PGA based on a 475-year average return period (Design Earthquake) indicates that an earthquake magnitude of 6.93 at a distance of approximately 12.34 km from the site would contribute the most to this ground motion (USGS, 2014).

Section 1803.5.12 of the 2019 CBC (per Section 11.8.3 of ASCE 7) states that the maximum considered earthquake geometric mean (MCE_G) Peak Ground Acceleration (PGA) should be used for liquefaction potential. The PGA_M for the site is equal to 0.774g (SEAOC, 2022). The design PGA is equal to 0.516g (2/3 of PGA_M).

2.5 Faulting

The subject site is not located within a State of California Earthquake Fault Zone (i.e., Alquist-Priolo Earthquake Fault Act Zone) and no active faults are known to cross the site (CDMG, 1977; CGS, 2018). A fault is considered "active" if evidence of surface rupture in Holocene time (the last approximately 11,000 years) is present. The possibility of damage due to ground rupture is considered low since no active faults are known to cross the site. The closest known active faults that may impact the site include the San Jacinto, San Andreas, Cucamonga, and Elsinore Faults, among others.

Secondary effects of seismic shaking resulting from large earthquakes on the major faults in the Southern California region, which may affect the site, include ground lurching and shallow ground rupture, soil liquefaction, and dynamic settlement. These secondary effects of seismic shaking are a possibility throughout the Southern California region and are dependent on the distance between the site and causative fault and the onsite geology. A discussion of these secondary effects is provided in the following sections.

2.5.1 Liquefaction and Dynamic Settlement

Liquefaction is a seismic phenomenon in which loose, saturated, granular soils behave similarly to a fluid when subject to high-intensity ground shaking. Liquefaction occurs when three general conditions coexist: 1) shallow groundwater; 2) low density non-cohesive (granular) soils; and 3) high-intensity ground motion. Studies indicate that loose, saturated, near surface cohesionless soils exhibit the highest liquefaction potential, while dry, dense, cohesionless soils and cohesive soils exhibit low to negligible liquefaction potential. In general, cohesive soils are not considered susceptible to liquefaction (Bray & Sancio, 2006). Effects of liquefaction on level ground include settlement, sand boils, and bearing capacity failures below structures. Dynamic settlement of dry sands can occur as the sand particles tend to settle and densify as a result of a seismic event.

Based on our review of the San Bernardino County Land Use Plan for liquefaction susceptibility (San Bernardino, 2007), the site is not located within a zone that is considered susceptible to liquefaction. Due to the lack of groundwater in the upper 50 feet the potential for liquefaction is considered very low.

2.5.2 Lateral Spreading

Lateral spreading is a type of liquefaction induced ground failure associated with the lateral displacement of surficial blocks of sediment resulting from liquefaction in a

subsurface layer. Once liquefaction transforms the subsurface layer into a fluid mass, gravity plus the earthquake inertial forces may cause the mass to move downslope towards a free face (such as a river channel or an embankment). Lateral spreading may cause large horizontal displacements and such movement typically damages pipelines, utilities, bridges, and structures.

Due to the very low potential for liquefaction, the potential for lateral spreading is also considered very low.

2.6 Expansion Potential

Based on the results of our recent laboratory testing, site soils are anticipated to have "Very Low" expansion potential. Final expansion potential of site soils should be determined at the completion of earthwork operations. Results of expansion testing at finish grades will be utilized to confirm final foundation recommendations.

3.0 CONCLUSIONS

Based on the results of our subsurface geotechnical evaluation, it is our opinion that the proposed improvements are feasible from a geotechnical standpoint, provided that the recommendations contained in the following sections are incorporated during site grading and development. A summary of our geotechnical conclusions are as follows:

- From a geotechnical perspective, onsite soils are anticipated to be suitable for use as general compacted fill, provided they are screened of construction debris, significant organics and any oversized material (8 inches in greatest dimension).
- Groundwater was not encountered in our field evaluation. Records indicate groundwater levels recorded in the area are at depths greater than 100 feet below the ground surface.
- The subject study area is not located within a mapped State of California Earthquake Fault Zone (i.e., Alquist-Priolo Act Earthquake Fault Zone), and based upon our review of published geologic mapping, no known active or potentially active faults are known to exist within or in the immediate vicinity of the site. Therefore, the potential for ground rupture as a result of faulting is considered very low.
- The main seismic hazard that may affect the site is ground shaking from one of the active regional faults. The subject site will likely experience strong seismic ground shaking during its design life.
- Site soils are generally not susceptible to liquefaction due to a lack of groundwater and dense to very dense alluvial soils in the upper 50 feet. The site is also not located in an area with soils that are susceptible to liquefaction according to the San Bernardino County Use Plan (San Bernardino, 2007).
- Based on the results of preliminary laboratory testing, site soils are anticipated to have "Very Low" expansion potential. Final design expansion potential must be determined at the completion of grading.
- Based on the corrosion test results, soils are not considered corrosive per the Caltrans criteria (Caltrans, 2021). This should be confirmed after grading has been completed.
- Oversized material (material larger than 8 inches in maximum dimension) should be anticipated during site grading. Recommendations are provided for appropriate handling of oversized materials in Appendix E.
- Undocumented fill (existing stockpiles) and 5 feet of the underlying native soils shall be temporarily removed and placed as engineered fill. Temporary removal and recompaction will range from approximately 10 to 20 feet across the entire site. Where space is available, the envelope for removal and recompaction should extend laterally a minimum distance equal to the depth of removal and recompaction.
- Excavations into the existing site soils should be feasible with heavy construction equipment in good working order.
- From a geotechnical perspective, the proposed industrial building can be supported on a slab on grade and shallow foundation system provided recommended earthwork removal and re-compaction is performed. Additional field work, laboratory testing and analysis may have to be performed once actual building loads are known to further evaluate and confirm this.

- On-site soils will most likely be suitable for backfill of site retaining walls. Soils that will be used for retaining wall backfill should be tested and approved by the geotechnical consultant prior to the backfill of site walls.
- Based on our preliminary study, we recommend performing additional field work consisting of infiltration testing be performed.
- Final design level recommendations utilizing the site plans and structure loads should be provided as part of a comprehensive geotechnical report.

4.0 RECOMMENDATIONS

The following recommendations are to be considered preliminary and should be confirmed upon completion of grading and earthwork operations. In addition, they should be considered minimal from a geotechnical viewpoint, as there may be more restrictive requirements from the architect, structural engineer, building codes, governing agencies, or the owner.

It should be noted that the following geotechnical recommendations are intended to provide sufficient information to develop the site in general accordance with the 2019 CBC requirements. With regard to the possible occurrence of potentially catastrophic geotechnical hazards such as fault rupture, earthquake-induced landslides, liquefaction, etc. the following geotechnical recommendations should provide adequate protection for the proposed development to the extent required to reduce seismic risk to an "acceptable level." The "acceptable level" of risk is defined by the California Code of Regulations as "that level that provides reasonable protection of the public safety, though it does not necessarily ensure continued structural integrity and functionality of the project" [Section 3721(a)]. Therefore, repair and remedial work of the proposed improvement may be required after a significant seismic event. With regards to the potential for less significant geologic hazards to the proposed development, the recommendations contained herein are intended as a reasonable protection against the potential damaging effects of geotechnical phenomena such as expansive soils, fill settlement, groundwater seepage, etc. It should be understood, however, that our recommendations are intended to maintain the structural integrity of the proposed development and structures given the site geotechnical conditions, but cannot preclude the potential for some cosmetic distress or nuisance issues to develop as a result of the site geotechnical conditions.

The geotechnical recommendations contained herein must be confirmed to be suitable or modified based on the actual as-graded conditions.

4.1 Site Earthwork

We anticipate that earthwork at the site will consist of required earthwork removals, grading and construction of the proposed new improvements, including the industrial structures, subsurface utilities, and vehicular pavement areas.

We recommend that earthwork onsite be performed in accordance with the following recommendations, future grading plan review report(s), the 2019 CBC/City of Rialto requirements, and the General Earthwork and Grading Specifications for Rough Grading included in Appendix E. In case of conflict, the following recommendations shall supersede those included in Appendix E. The following recommendations may be revised within future grading plan review reports or based on the actual conditions encountered during site grading.

4.1.1 Site Preparation

Prior to grading, areas to be developed should undergo the stripping and clearing of vegetation and clearing of surface obstructions from the site. Vegetation and debris

should be removed and properly disposed of offsite. Holes resulting from removals of buried obstructions, which extend below proposed remedial and/or finish grades, should be replaced with suitable compacted fill material.

If cesspools or septic systems are encountered they should be removed in their entirety. The resulting excavation should be backfilled with properly compacted fill soils. As an alternative, cesspools can be backfilled with lean sand-cement slurry. Any encountered wells should be properly abandoned in accordance with regulatory requirements.

4.1.2 Removal and Recompaction Depths and Limits

In order to provide a relatively uniform bearing condition for the planned improvements, we recommend the site soils be temporarily removed and recompacted according to the criteria outlined below. Updated recommendations may be required based on additional field work, changes to building layouts and actual structural loads.

Existing Northern Re-Development (Hollywood Delivery Service Building)

It is our understanding that the office portion of the existing industrial building in the northern portion of the site will be demolished, and new parking stalls will be created. Within pavement and hardscape areas, removal and recompaction should extend to a depth of at least 2 feet below the existing grade or 1 feet below finished subgrade (i.e., below planned aggregate base/asphalt concrete), whichever is deeper. In general, the envelope for removal and recompaction should extend laterally a minimum distance of 2 feet beyond the edges of the proposed pavement and hardscape improvements.

New Southern Development

Undocumented fill (existing stockpile) and 5 feet of the underlying native soils shall be temporarily removed prior to placement of engineered fill. Therefore, temporary removal and recompaction will range from approximately 10 to 20 feet across the entire southern site. Where space is available, the envelope for removal and recompaction should extend laterally a minimum distance equal to the depth of removal and recompaction below finish grade or 5 feet beyond the edges of the proposed building improvements, whichever is larger. See Figure 2.

Local conditions may be encountered during excavation that could require additional over-excavation beyond the above-noted minimum in order to obtain an acceptable subgrade. The actual depths and lateral extents of grading will be determined by the geotechnical consultant, based on subsurface conditions encountered during grading. Removal areas and areas to be over-excavated should be accurately staked in the field by the Project Surveyor.

4.1.3 Temporary Excavations

Temporary excavations should be performed in accordance with project plans, specifications, and applicable Occupational Safety and Health Administration (OSHA) requirements. Excavations should be laid back or shored in accordance with OSHA requirements before personnel or equipment are allowed to enter. Based on our field investigation, the majority of site soils are anticipated to be OSHA Type "C" soils (refer to the attached boring logs). Sandy soils are present and should be considered susceptible to caving. Soil conditions should be regularly evaluated during construction to verify conditions are as anticipated. The contractor shall be responsible for providing the "competent person" required by OSHA standards to evaluate soil conditions. Close coordination with the geotechnical consultant should be maintained to facilitate construction while providing safe excavations. Excavation safety is the sole responsibility of the contractor.

Vehicular traffic, stockpiles, and equipment storage should be set back from the perimeter of excavations a minimum distance equivalent to a 1:1 projection from the bottom of the excavation or 5 feet, whichever is greater. Once an excavation has been initiated, it should be backfilled as soon as practical. Prolonged exposure of temporary excavations may result in some localized instability. Excavations should be planned so that they are not initiated without sufficient time to shore/fill them prior to weekends, holidays, or forecasted rain.

It should be noted that any excavation that extends below a 1:1 (horizontal to vertical) projection of an existing foundation will remove existing support of the structure foundation. If requested, temporary shoring parameters can be provided.

4.1.4 Subgrade Preparation

In general, areas to receive compacted fill should be scarified to a minimum depth of 6 inches, brought to a near-optimum moisture condition (generally within optimum and 2 percent above optimum moisture content), and re-compacted per project requirements. Removal bottoms and areas to receive fill should be observed and accepted by the geotechnical consultant prior to subsequent fill placement.

4.1.5 Material for Fill

From a geotechnical perspective, the onsite soils are generally considered suitable for use as general compacted fill, provided they are screened of organic materials, construction debris and any oversized material (8 inches in greatest dimension).

From a geotechnical viewpoint, import soils for general fill (i.e., non-retaining wall backfill) should consist of clean, granular soils of Very Low expansion potential (expansion index of 20 or less based on ASTM D4829). Import for retaining wall backfill should meet the criteria outlined in the paragraph below. Source samples should be

provided to the geotechnical consultant for laboratory testing a minimum of three working days prior to any planned importation.

Retaining wall backfill should consist of sandy soils with a maximum of 35 percent fines (passing the No. 200 sieve) per American Society for Testing and Materials (ASTM) Test Method D1140 (or ASTM D6913/D422) and a Very Low expansion potential (EI of 20 or less per ASTM D4829). Soils should also be screened of organic materials, construction debris, and any material greater than 3 inches in maximum dimension. The majority of the on-site soils should be suitable for retaining wall backfill due to their low fines content (i.e., silt and clay content) and very low expansion potential. Samples of retaining wall backfill should be sampled prior to construction to confirm the findings of the investigation.

Aggregate base (crushed aggregate base or crushed miscellaneous base) should conform to the requirements of Section 200-2 of the Standard Specifications for Public Works Construction ("Greenbook") for untreated base materials (except processed miscellaneous base), the City of Rialto or Caltrans Class 2 aggregate base.

The placement of demolition materials in compacted fill is acceptable from a geotechnical viewpoint provided the demolition material is broken up into pieces not larger than approximately 2 to 4 inches in maximum dimension and well blended into fill soils with essentially no resulting voids. Demolition material placed in fills must be free of construction debris (wood, organics, etc.) and reinforcing steel. If asphalt concrete fragments will be incorporated into the demolition materials, approval from an environmental viewpoint may be required and is not the purview of the geotechnical consultant. From our previous experience, we recommend that asphalt concrete fragments be limited to fill areas within planned asphalt areas (i.e., not within building pad areas).

4.1.6 Placement and Compaction of Fills

Material to be placed as fill should be brought to near-optimum moisture content (generally within optimum and 2 percent above optimum moisture content) and recompacted to at least 90 percent relative compaction (per ASTM D1557). Moisture conditioning of site soils will be required in order to achieve adequate compaction. Soils are present that will require additional moisture in order to achieve the required compaction. Drying and/or mixing the very moist soils may also be required prior to reusing the materials in compacted fills. Generally, soils are present that will require additional moisture in order to achieve the required compaction.

The optimum lift thickness to produce a uniformly compacted fill will depend on the type and size of compaction equipment used. In general, fill should be placed in uniform lifts not exceeding 8 inches in compacted thickness. Each lift should be thoroughly compacted and accepted prior to subsequent lifts. Generally, placement and compaction of fill should be performed in accordance with local grading ordinances and with observation and testing by LGC Geotechnical. Oversized material as previously defined should be removed from site fills, if encountered.

During backfill of excavations, the fill should be properly benched into firm and competent soils of temporary backcut slopes as it is placed in lifts.

Aggregate base material should be compacted to a minimum of 95 percent relative compaction at or slightly above optimum moisture content per ASTM D1557. Subgrade below aggregate base should be compacted to a minimum of 90 percent relative compaction, or in accordance with the City of Rialto requirements, per ASTM D1557 at near-optimum moisture content (generally within optimum and 2 percent above optimum moisture content), unless otherwise noted in the pavement recommendations section (see Sections 4.5 & 4.6).

If gap-graded ¾-inch rock is used for backfill (around storm drain storage chambers, retaining wall backfill, etc.) it will require compaction. Rock shall be placed in thin lifts (typically not exceeding 6 inches) and mechanically compacted with vibration with observation by geotechnical consultant. Backfill rock shall meet the requirements of ASTM D2321. Gap-graded rock is required to be wrapped in filter fabric (Mirafi 140N or approved alternative) to prevent the migration of fines into the rock backfill.

4.1.7 Trench and Retaining Wall Backfill and Compaction

The onsite soils may generally be suitable as trench backfill, provided the soils are screened of rocks and other material greater than 6 inches in diameter and organic matter. If trenches are shallow or the use of conventional equipment may result in damage to the utilities, sand having a sand equivalent (SE) of 30 or greater (per California Test Method [CTM] 217) may be used to bed and shade the pipes. Sand backfill within the pipe bedding zone may be densified by jetting or flooding and then tamping to ensure adequate compaction. Subsequent trench backfill should be compacted in uniform thin lifts by mechanical means to at least the recommended minimum relative compaction (per ASTM D1557).

Retaining wall backfill should consist of sandy soils as outlined in preceding Section 4.1.5. The limits of select sandy backfill should extend at minimum ½ the height of the retaining wall or the width of the heel (if applicable), whichever is greater, refer to Figure 3 (rear of text). Retaining wall backfill soils should be compacted in relatively uniform thin lifts to at least 90 percent relative compaction (per ASTM D1557). Jetting or flooding of retaining wall backfill materials should not be permitted.

In backfill areas where mechanical compaction of soil backfill is impractical due to space constraints, typically sand-cement slurry may be substituted for compacted backfill. The slurry should contain about one sack of cement per cubic yard. When set, such a mix typically has the consistency of compacted soil. Sand cement slurry placed near the surface within landscape areas should be evaluated for potential impacts on planned improvements.

A representative from LGC Geotechnical should observe, probe, and test the backfill to verify compliance with the project recommendations.

4.1.8 Shrinkage and Subsidence

Volumetric changes in earth quantities will occur when excavated onsite earth materials are replaced as properly compacted fill. The following is an estimate of shrinkage factors for the various soil types found onsite. These estimates are based on in-place densities of the various materials and on the estimated average degree of relative compaction that will be achieved during grading.

TABLE 2

Estimated Shrinkage

Soil Type	Allowance	Estimated Range
Alluvium	Shrinkage	0 to 10 %
Undocumented Fill (Stockpile)	Shrinkage	0 to 15%

Subsidence due to earthwork equipment is expected to be on the order of 0.1 feet. It should be stressed that these values are only estimates and that actual shrinkage factors are extremely difficult to predict. These values are estimates only and exclude losses due to removal of vegetation or debris. The effective change in volume of onsite soils will depend primarily on the type of compaction equipment, method of compaction used onsite by the contractor, and accuracy of the topographic survey. The above shrinkage estimates are intended as an aid for others in determining preliminary earthwork quantities. However, these estimates should be used with some caution since they are not absolute values. A balance area should be considered if export/import is either economically prohibitive or restricted by the governing agency.

4.2 Preliminary Foundation Recommendations

The proposed structures may be supported on spread or continuous footings and conventional slabs, provided earthwork is performed in accordance with the recommendations presented in this report. Since the site soils are anticipated to be "Very Low" expansion potential (EI of 20 or less per ASTM D4829), special design considerations from a geotechnical perspective are not anticipated, however, this must be verified based on as-graded conditions. Footings should be supported on properly compacted fill. Please note that the following foundation recommendations are preliminary and must be confirmed by LGC Geotechnical at the completion of grading.

Preliminary foundation recommendations are provided in the following sections. The foundation design must be performed by the structural engineer based on the following geotechnical parameters and minimum values provided.

4.2.1 Slab Design and Construction

From a geotechnical perspective, minimum slab thicknesses of 6 inches and 4 inches are recommended for new slabs in the warehouse areas and office areas, respectively. Slabs are to be supported on compacted fill soils properly prepared in accordance with the recommendations provided in this report. Actual slab reinforcement and thickness should be determined by the structural engineer based on the imposed loading. Additional slab-on-grade recommendations can be provided for alternative building types upon request.

The foundation designer may use a modulus of vertical subgrade reaction (k) of 200 pounds per cubic inch (pounds per square inch per inch of deflection). This value is for a 1-foot by 1-foot square loaded area and should be adjusted by the structural designer for the area of the proposed footing using the following formula:

$k = 200 \times [(B+1)/2B]^2$
k = modulus of vertical subgrade reaction, pounds per cubic inch (pci)
B = foundation width (feet)

It is recommended that subgrade soils below slabs be moisture conditioned in order to maintain the recommended moisture content up to the time of concrete placement. The recommended moisture content of the slab subgrade soils should be between optimum moisture content and approximately 2 percent above optimum moisture content to a minimum depth of 12 inches. The moisture content of the slab subgrade should be verified by the geotechnical consultant within 1 to 2 days prior to concrete placement. In addition, this moisture content should be maintained around the immediate perimeter of the slab during construction and up to occupancy of the building structures.

The following recommendations are for informational purposes only, as they are unrelated to the geotechnical performance of the foundation. The following recommendations may be superseded by the foundation engineer and/or owner. Some post-construction moisture migration should be expected below the foundation. In general, interior floor slabs with moisture sensitive floor coverings should be underlain by a minimum 10 mil thick polyolefin material vapor retarder, which has a water vapor transmission rate (permeance) of less than 0.03 perms. The need for sand and/or the sand thickness (above and/or below the vapor retarder) should be specified by the structural engineer, architect or concrete contactor. The selection and thickness of sand is not a geotechnical engineering issue and is therefore outside our purview.

4.2.2 Foundation Design Parameters

For the proposed industrial warehouse structures, minimum continuous wall and column footing widths are to be 12 inches and 24 inches, respectively, minimum foundation embedment is to extend a minimum of 18 inches below the adjacent exterior grade, and interior column footings should be embedded a minimum of 12 inches beneath the

adjacent subgrade. The following allowable bearing pressures for both continuous and column spread footings presented in Table 3 below are recommended for corresponding footing widths and embedments.

TABLE 3

Allowable Soil Bearing Pressures

Allowable Static Bearing Pressure (psf)	Minimum Footing Width (feet)	Minimum Footing Embedment* (feet)
3,000	3	2
2,500	2	1.5
2,000	1	1

* Refers to minimum depth measured below lowest adjacent grade.

These allowable bearing values indicated above (exclusive of the weight of the footings) are for total dead loads and frequently applied live loads and may be increased by ⅓ for short duration loading (i.e., wind or seismic loads). The allowable bearing pressures are applicable for level (ground slope equal to or flatter than 5H:1V) conditions only.

In utilizing the above-mentioned allowable bearing capacity and provided our earthwork recommendations are implemented, foundation settlement due to structural loads is anticipated to be on the order of 1-inch or less. Differential static settlement may be taken as half of the static settlement (i.e., ½-inch over a horizontal span of 40 feet).

4.2.3 Foundation Construction

The foundation is to be excavated into competent compacted artificial fill placed during grading operations. It is recommended that the foundation subgrade soils be evaluated by the geotechnical engineer prior to steel and/or concrete placement.

4.2.4 Lateral Load Resistance

Resistance to lateral loads can be provided by friction acting at the base of foundations and by passive earth pressure. For concrete/soil frictional resistance, an allowable coefficient of friction of 0.35 may be assumed with dead-load forces. An allowable passive lateral earth pressure of 250 psf per foot of depth (or pcf) to a maximum of 2,500 psf may be used for the sides of footings poured against properly compacted fill. Allowable passive pressure may be increased to 340 pcf (maximum of 3,400 psf) for short duration seismic loading. This passive pressure is applicable for level (ground slope equal to or flatter than 5H:1V) conditions. Frictional resistance and passive pressure may be used in combination without reduction. We recommend that the upper foot of passive

resistance be neglected if finished grade will not be covered with concrete or asphalt. The provided allowable passive pressures are based on a factor of safety of 1.5 and 1.1 for static and seismic loading conditions, respectively.

4.3 Lateral Earth Pressures for Retaining Walls

The following preliminary lateral earth pressures may be used for site retaining walls. Lateral earth pressures are provided as equivalent fluid unit weights, in pound per square foot (psf) per foot of depth or pcf. These values do not contain an appreciable factor of safety, so the retaining wall designer should apply the applicable factors of safety and/or load factors during design.

The following lateral earth pressures are presented on Table 4 for approved select granular soils with a maximum of 35 percent fines (passing the No. 200 sieve per ASTM D-421/422) and Very Low expansion potential (EI of 20 or less per ASTM D4829). Retaining wall backfill should also be limited to fill material not exceeding 3 inches in greatest dimension. The wall designer should clearly indicate on the retaining wall plans the required sandy soil backfill criteria. Most of the onsite soils should be suitable for retaining wall backfill due to the low fines content and very low expansion potential.

TABLE 4

Lateral Earth Pressures – On-site or Imported Sandy Backfill

Conditions	**Equivalent Fluid Unit Weight (pcf)**	**Equivalent Fluid Unit Weight (pcf)**
	Level Backfill	**2:1 Sloped Backfill**
	Approved Soils	**Approved Soils**
Active	35	55
At-Rest	55	70

If the wall can yield enough to mobilize the full shear strength of the soil, it can be designed for "active" pressure. If the wall cannot yield under the applied load, the earth pressure will be higher. The equivalent fluid pressure values assume free-draining conditions. If conditions other than those assumed above are anticipated, the equivalent fluid pressure values should be provided on an individual-case basis by the geotechnical consultant.

If the wall can yield enough to mobilize the full shear strength of the soil, it can be designed for "active" pressure. If the wall cannot yield under the applied load, the earth pressure will be higher. The equivalent fluid pressure values assume free-draining conditions. Retaining wall structures should be provided with appropriate drainage and appropriately waterproofed (Refer to Figure 3). Please note that waterproofing and outlet systems are not the purview of the geotechnical consultant. If conditions other than those assumed above are anticipated, the

equivalent fluid pressure values should be provided on an individual-case basis by the geotechnical consultant.

Surcharge loading effects from any adjacent structures should be evaluated by the retaining wall designer. In general, structural loads within a 1:1 (horizontal to vertical) upward projection from the bottom of the proposed retaining wall footing will surcharge the proposed retaining structure. In addition to the recommended earth pressure, retaining walls adjacent to streets should be designed to resist vehicular traffic if applicable. Uniform surcharges may be estimated using the applicable coefficient of lateral earth pressure using a rectangular distribution. A factor of 0.35 and 0.5 may be used for the active and at-rest conditions, respectively. The vertical traffic surcharge may be determined by the structural designer. The retaining wall designer should contact the geotechnical engineer for any required geotechnical input in estimating any applicable surcharge loads.

If required, the retaining wall designer may use a seismic lateral earth pressure increment of 12.5 pcf for level backfill conditions. This increment should be applied in addition to the provided static lateral earth pressure using a "normal" triangular distribution with the resultant acting at H/3 in relation to the base of the retaining structure (where H is the retained height). For the restrained, at-rest condition, the seismic increment may be added to the applicable active lateral earth pressure (in lieu of the at-rest lateral earth pressure) when analyzing short duration seismic loading. Per Section 1803.5.12 of the 2019 CBC, the seismic lateral earth pressure is applicable to structures assigned to Seismic Design Category D through F for retaining wall structures supporting more than 6 feet of backfill height. This seismic lateral earth pressure is estimated using the procedure outlined by the Structural Engineers Association of California (Lew, et al, 2010).

Soil bearing and lateral resistance (friction coefficient and passive resistance) are provided in Section 4.2. Earthwork considerations (temporary backcuts, backfill, compaction, etc.) for retaining walls are provided in Section 4.1 (Site Earthwork) and the subsequent earthwork related sub-sections.

4.4 Corrosivity to Concrete and Metal

Although not corrosion engineers (LGC Geotechnical is not a corrosion consultant), several governing agencies in Southern California require the geotechnical consultant to determine the corrosion potential of soils to buried concrete and metal facilities. We therefore present the results of our testing with regard to corrosion for the use of the client and other consultants, as they determine necessary.

Corrosion testing of near-surface bulk samples indicated soluble sulfate contents of approximately 103 ppm, chloride content of approximately 40 parts per million (ppm), pH value of approximately 8.0, and minimum resistivity value of 3,400 ohm-cm. Based on Caltrans Corrosion Guidelines (2021), soils are considered corrosive if the pH is 5.5 or less, or the chloride concentration is 500 ppm or greater, or the sulfate concentration is 1,500 ppm (0.15 percent) or greater. Based on the test results, soils are not considered corrosive using Caltrans criteria.

Based on laboratory sulfate test results, the near surface soils are designated to a class "S0" per ACI 318, Table 19.3.1.1 with respect to sulfates. Concrete in direct contact with the onsite soils can be designed according to ACI 318, Table 19.3.2.1 using the "S0" sulfate classification.

Laboratory testing may need to be performed at the completion of grading by the project corrosion engineer to further evaluate the as-graded soil corrosivity characteristics. Accordingly, revision of the corrosion potential may be needed, should future test results differ substantially from the conditions reported herein. The client and/or other members of the development team should consider this during the design and planning phase of the project and formulate an appropriate course of action.

4.5 Preliminary Asphalt Concrete Pavement Sections

For the purposes of these preliminary recommendations, we have assumed a preliminary design R-value of 40 and calculated pavement sections for Traffic Indices of 5.0 (or less), 6.0 and 7.0. R-value testing of the street and parking subgrade will need to be performed to confirm our preliminary testing results/assumptions once the asphalt areas have been graded to finish subgrade elevations and the final Traffic Index is determined by the Civil Engineer. Determination of the Traffic Index is not the purview of the geotechnical consultant. Final street sections should be confirmed by the project civil engineer based upon the projected design Traffic Index. If requested, LGC Geotechnical will provide sections for alternate TI values.

TABLE 5

Preliminary Asphalt Concrete Pavement Sections

Assumed Traffic Index	5.0 (or less)	6.0	7.0
R -Value Subgrade	40	40	40
AC Thickness	4.0 inches	4.0 inches	4.0 inches
CAB Thickness	6.0 inches	6.0 inches	8.0 inches

Increasing the thickness of asphalt or adding additional base material will reduce the likelihood of the pavement experiencing distress during its service life. The above recommendations are based on the assumption that proper maintenance and irrigation of the areas adjacent to the roadway will occur through the design life of the pavement. Failure to maintain a proper maintenance and/or irrigation program may jeopardize the integrity of the pavement.

Aggregate base material (crushed aggregate base and crushed miscellaneous base) should be compacted to a minimum of 95 percent relative compaction at or slightly above optimum moisture content per ASTM D1557. Subgrade below aggregate base should be compacted to a minimum of 90 percent relative compaction, or the City of Rialto specifications, at or slightly above optimum moisture content per ASTM D1557. Earthwork recommendations are provided in Section 4.1 "Site Earthwork" and the related sub-sections of this report.

4.6 Preliminary Portland Cement Concrete Pavement Sections

For the purposes of these preliminary recommendations, we have assumed a preliminary design R-value of 40. Preliminary minimum Portland Cement Concrete (PCC) pavement street sections are provided in Table 6 for Traffic Indices of 5.0 (or less), 6.0, and 7.0 and may be utilized in the design of the truck parking/circulation areas or loading docks. These recommendations must be confirmed with R-value testing of representative near-surface soils at the completion of grading and after underground utilities have been installed and backfilled. Final PCC sections should be confirmed by the project civil engineer based upon the projected design Traffic Index. If requested, LGC Geotechnical will provide sections for alternate TI values. The appropriate paving section must be selected by the project civil engineer/client based on design traffic indexes.

TABLE 6

Preliminary PCC Pavement Sections

Provided Traffic Index	5.0 (or less)	6.0	7.0
R -Value Subgrade	40	40	40
PCC Thickness	5.5 inches	6.5 inches	7.5 inches
95% Compacted Subgrade	12.0 inches	12.0 inches	12.0 inches

For preliminary planning purposes, the PCC pavement sections may consist of a minimum of concrete over subgrade soils compacted to 95 percent relative compaction (see Table 7 for section thicknesses). The concrete should have a minimum compressive strength of 3,500 psi and a minimum flexural strength of 530 psi at the time the pavement is subjected to traffic. To reduce the potential (but not eliminate) for cracking, paving should provide control joints at regular intervals not exceeding 15 feet in each direction, depth of ⅓ the concrete thickness. Contraction and construction joints should include a joint filler/sealer to prevent migration of water into the subgrade soils. The type of joint sealer and filler material should be specified by the pavement designer and should be maintained throughout the life of the pavement. The above section does not include steel reinforcement. If desired, steel reinforcement should be determined by the structural engineer.

The thicknesses shown are minimum thicknesses. Increasing the thickness of any or all of the above layers will reduce the likelihood of the pavement experiencing distress during its service life. The above recommendations are based on the assumption that proper maintenance and irrigation of the areas adjacent to the roadway will occur through the design life of the pavement. Failure to maintain a proper maintenance and/or irrigation program may jeopardize the integrity of the pavement.

Subgrade below the PCC pavement should be compacted to a minimum of 95 percent relative compaction per ASTM D1557 near optimum moisture content (generally within optimum and 2 percent above optimum moisture content). Earthwork recommendations are provided in Section 4.1 “Site Earthwork” and the related sub-sections of this report.

4.7 Nonstructural Concrete Flatwork

Nonstructural concrete (such as flatwork, sidewalks, etc.) has a potential for cracking due to changes in soil volume related to soil-moisture fluctuations. To reduce the potential for excessive cracking and lifting, concrete should be designed in accordance with the minimum guidelines outlined below. These guidelines will reduce the potential for irregular cracking and promote cracking along construction joints but will not eliminate all cracking or lifting. Thickening the concrete and/or adding additional reinforcement will further reduce cosmetic distress.

Nonstructural and non-vehicular concrete flatwork placed on compacted subgrade may be a 4-inches (nominal) in thickness with crack control joints spaced 8 feet apart for flatwork slabs and 6 feet apart for flatwork sidewalks. Crack control joints should be sawcut or deep open tool joint to a minimum of 1/3 the concrete thickness. The compacted subgrade below the nonstructural and non-vehicular concrete flatwork should be wet down prior to placing concrete.

To reduce the potential for nonstructural concrete flatwork to separate from entryways and doorways, the owner may elect to install dowels to tie these two elements together.

4.8 Control of Surface Water and Drainage Control

From a geotechnical perspective, we recommend that finished grade adjacent to proposed structures be sloped away from the proposed structures and towards an approved drainage device or unobstructed swale, so that it will prevent ponding within 5 feet of the foundation. Code compliance of grades is not the purview of the geotechnical consultant.

Planters with open bottoms adjacent to buildings should be avoided. Planters should not be designed adjacent to buildings unless provisions for drainage, such as catch basins, liners, and/or area drains, are made. Overwatering must be avoided.

4.9 Geotechnical Plan Review

Project plans (grading, foundation, retaining wall, etc.) should be reviewed by this office prior to construction to verify that our geotechnical recommendations have been incorporated. Additional or modified geotechnical recommendations may be required based on the proposed layout.

4.10 Geotechnical Observation and Testing

The recommendations provided in this report are based on limited subsurface observations and geotechnical analysis. The interpolated subsurface conditions should be checked in the field during construction by a representative of LGC Geotechnical. Geotechnical observation and testing is required per Section 1705 of the 2019 California Building Code (CBC).

Geotechnical observation and/or testing should be performed by LGC Geotechnical at the following stages:

- During grading (removal bottoms, fill placement, etc.);
- During retaining wall backfill and compaction;
- During utility trench backfill and compaction;
- During precise grading;
- Preparation of building pads and other concrete-flatwork subgrades, and prior to placement of aggregate base or concrete;
- After building and wall footing excavation and prior to placement of steel reinforcement and/or concrete;
- Preparation of pavement subgrade and placement of aggregate base; and
- When any unusual soil conditions are encountered during any construction operation subsequent to issuance of this report.

5.0 LIMITATIONS

Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable soils engineers and geologists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the conclusions and professional advice included in this report.

This report is based on data obtained from limited observations of the site, which have been extrapolated to characterize the site. While the scope of services performed is considered suitable to adequately characterize the site geotechnical conditions relative to the proposed development, no practical evaluation can completely eliminate uncertainty regarding the anticipated geotechnical conditions in connection with a subject site. Variations may exist and conditions not observed or described in this report may be encountered during construction.

This report is issued with the understanding that it is the responsibility of the owner, or of his/her representative, to ensure that the information and recommendations contained herein are brought to the attention of the other consultants and incorporated into the plans. The contractor should properly implement the recommendations during construction and notify the owner if they consider any of the recommendations presented herein to be unsafe, or unsuitable.

The findings of this report are valid as of the present date. However, changes in the conditions of a site can and do occur with the passage of time, whether they be due to natural processes or the works of man on this or adjacent properties. The findings, conclusions, and recommendations presented in this report can be relied upon only if LGC Geotechnical has the opportunity to observe the subsurface conditions during grading and construction of the project, in order to confirm that our preliminary findings are representative for the site. This report is intended exclusively for use by the client, any use of or reliance on this report by a third party shall be at such party's sole risk.

In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and modification.

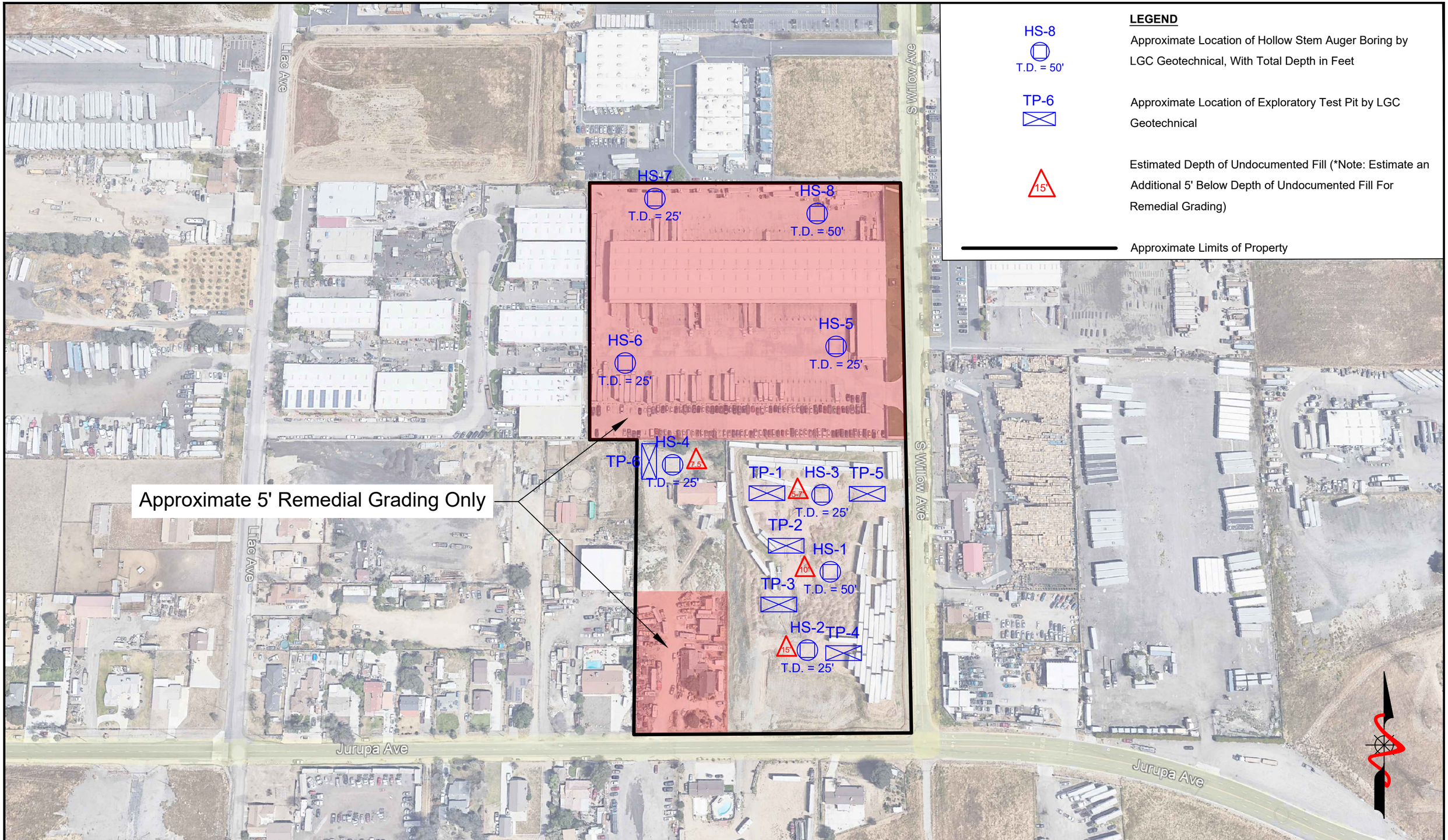

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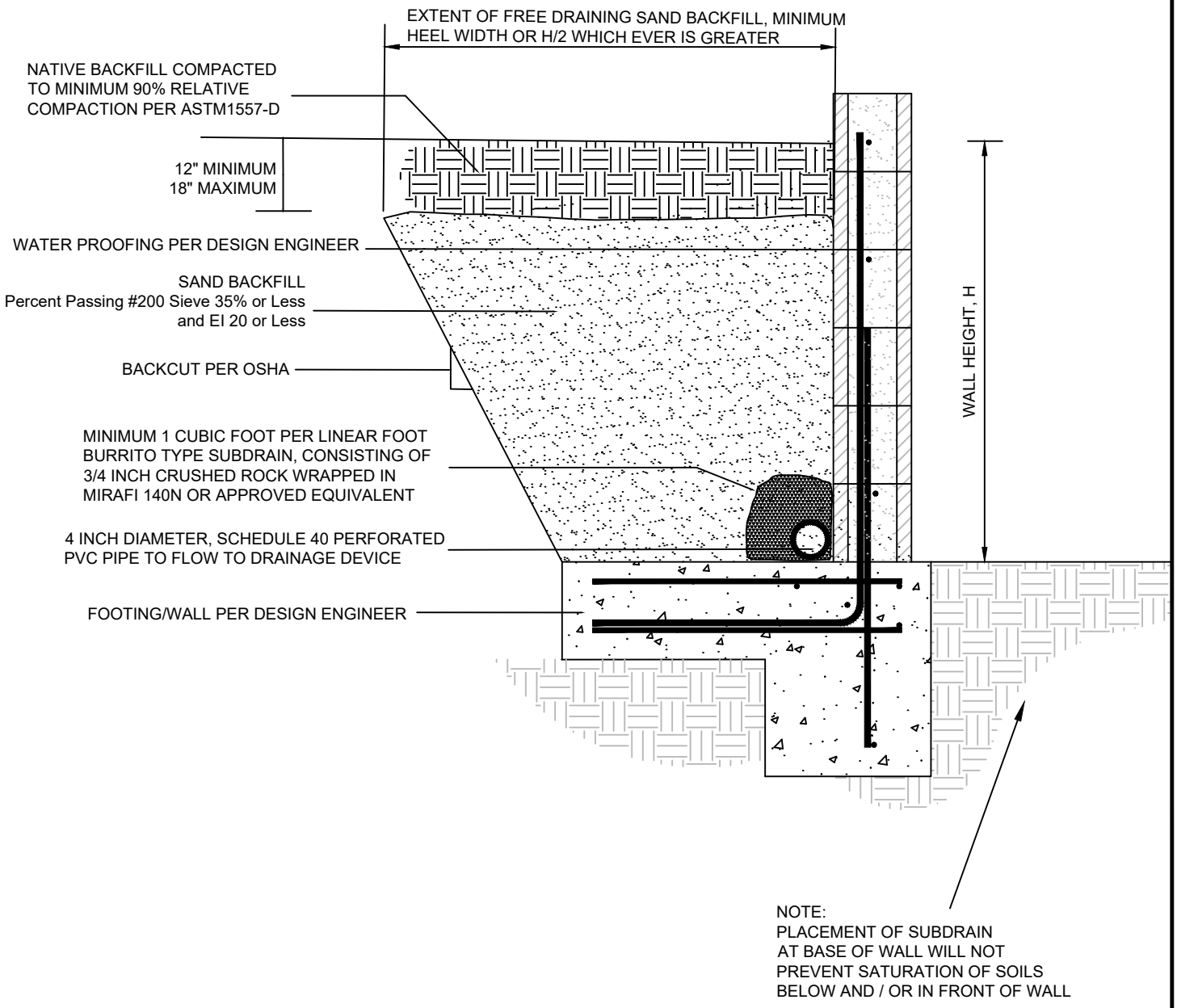
FIGURE 2
Geotechnical Exploration Location Map

PROJECT NAME	Dedeaux - Willow Avenue, Rialto
PROJECT NO.	22041-01
ENG. / GEOL.	DJB
SCALE	Not to Scale
DATE	May 2022



LGC Geotechnical, Inc.

FIGURE 3
Retaining Wall Backfill Detail

PROJECT NAME	Dedeaux - Willow Avenue, Rialto
PROJECT NO.	22041-01
ENG. / GEOL.	DJB
SCALE	Not to Scale
DATE	May 2022

Appendix A
References

APPENDIX A

References

American Society of Civil Engineers (ASCE), 2017, Minimum Design Loads for Buildings and Other Structures, ASCE/SEI 7-16, 2017.

_____, 2018, Standard 7-16, Minimum Design Loads for Buildings and Associated Criteria for Buildings and Other Structures, Supplement 1, effective: December 12, 2018.

California Department of Mines & Geology (CDMG), 1977, State of California Special Studies Zones, San Bernardino South Quadrangle, Revised Official Map Effective January 1, 1977

California Department of Water Resources, Water Data Library Station Map, Retrieved April 7, 2022, from http://wdl.water.ca.gov.

California Geological Survey (CGS), 2008, California Geological Survey Special Publication 117A: Guidelines for Evaluating and Mitigating Seismic Hazards in California, dated September 11, 2008.

_____, 2018, Earthquake Fault Zones, Special Publication 42, Revised 2018.

Caltrans, 2021, Corrosion Guidelines, Version 3.2, May 2021.

GAA Architects, 2022, Conceptual Site Plan, Scheme B, Jurupa Avenue and Willow Avenue Warehouse – Rialto, CA, dated April 22, 2022.

Historical Aerials, 2021, viewed March 29, 2022, https://www.historicaerials.com/.

San Bernardino County, 2007, San Bernardino County Land Use Plan, General Plan, Geologic Hazard Overlays.

Structural Engineers Association of California (SEAOC), 2022, OSHPD Seismic Design Maps, Retrieved April 7, 2022, from: https://seismicmaps.org/.

United States Geological Survey (USGS), 2003, Preliminary Geologic Map of the San Bernardino 30' X 60' Quadrangle, California, Version 1.0, Compiled by Douglas M. Morton and Fred K. Miller.

_____, 2014, Unified Hazard Tool, Dynamic: Conterminous U.S. 2008 (v3.3.1), Retrieved April 7, 2022, from: https://earthquake.usgs.gov/hazards/interactive/.

Appendix B
Boring and Trench Logs

Geotechnical Boring Log Borehole HS-1

Date: 3/24/2022	**Drilling Company:** Cal Pac Drilling
Project Name: Dedeaux - Rialto	**Type of Rig:** Truck Mounted
Project Number: 22041-01	**Drop:** 30" **Hole Diameter:** 6"
Elevation of Top of Hole: ~971' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 2

Logged By JMN
Sampled By JMN
Checked By DJB

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
970	0							**@0' to 10' - <u>Undocumented Artificial Fill (afu):</u>** @0' - SAND with Silt: light brown, dry; rootlets	
			R-1	4 13 14	108.7	6.1	SM	@2.5'- Silty SAND: brown, slightly moist, medium dense	
965	5	B-1	R-2	5 6 10	108.4	4.0		@5'- Silty SAND: brown, dry, medium dense	
			R-3	8 7 8	102.7	2.7		@7.5'- Silty SAND: brown, dry, medium dense	
960	10		R-4	7 10 11	105.1	1.5	SM	**@10' to T.D. - <u>Old Alluvial-Fan Deposits (Qof):</u>** @10'- Silty SAND with Gravel: brown, dry, medium dense	
955	15		SPT-1	11 18 19		1.7	SP-SM	@15'- SAND with Silt and Gravel: grayish brown, dry, dense	
950	20		R-5	10 20 20	101.2	15.0		@20'- Silty SAND: brown, very moist, dense	
945	25		SPT-2	6 8 9		5.0		@25'- Silty SAND: grayish brown, slightly moist, medium dense	
	30								

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:

B	BULK SAMPLE
R	RING SAMPLE (CA Modified Sampler)
G	GRAB SAMPLE
SPT	STANDARD PENETRATION TEST SAMPLE
▽	GROUNDWATER TABLE

TEST TYPES:

DS	DIRECT SHEAR
MD	MAXIMUM DENSITY
SA	SIEVE ANALYSIS
S&H	SIEVE AND HYDROMETER
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
-#200	% PASSING # 200 SIEVE

Last Edited: 5/3/2022

Geotechnical Boring Log Borehole HS-1

Date: 3/24/2022	**Drilling Company:** Cal Pac Drilling
Project Name: Dedeaux - Rialto	**Type of Rig:** Truck Mounted
Project Number: 22041-01	**Drop:** 30" **Hole Diameter:** 6"
Elevation of Top of Hole: ~971' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 2 of 2

Logged By JMN
Sampled By JMN
Checked By DJB

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
940	30		R-6	7 16 23	103.8	6.2	SM	@30'- Silty SAND: grayish brown, slightly moist, dense	
935	35		SPT-3	10 7 10		9.3		@35'- Silty SAND with Gravel: grayish brown, moist, medium dense	
930	40		R-7	20 27 26		6.3		@40'- Disturbed Sample: Silty SAND: grayish brown, slightly moist, dense	
925	45		SPT-4	16 15 16		18.0	ML	@45'- Silty CLAY: olive brown, very moist, hard	
920	50		R-8	12 21 24	98.4	8.9	SM	@50'- Silty SAND: grayish brown, moist, dense	
915	55							Total Depth = 50' Groundwater Not Encountered Backfilled with Cuttings on 3/24/2022	
	60								

LGC Geotechnical, Inc.

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SAMPLE TYPES:

B	BULK SAMPLE
R	RING SAMPLE (CA Modified Sampler)
G	GRAB SAMPLE
SPT	STANDARD PENETRATION TEST SAMPLE
▽	GROUNDWATER TABLE

TEST TYPES:

DS	DIRECT SHEAR
MD	MAXIMUM DENSITY
SA	SIEVE ANALYSIS
S&H	SIEVE AND HYDROMETER
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
-#200	% PASSING # 200 SIEVE

Geotechnical Boring Log Borehole HS-2

Date: 3/24/2022 | **Drilling Company:** Cal Pac Drilling

Project Name: Dedeaux - Rialto | **Type of Rig:** Truck Mounted

Project Number: 22041-01 | **Drop:** 30" | **Hole Diameter:** 6"

Elevation of Top of Hole: ~972' MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map

Logged By JMN
Sampled By JMN
Checked By DJB

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
970	0							**@0' to 15' - Undocumented Artificial Fill (afu):** @0'- SAND: light brown, dry; rootlets	
			R-1	4 6 8	109.5	7.2	SM	@2.5'- Silty SAND: brown, slightly moist, medium dense	
	5	B-1	R-2	6 8 8	109.2	6.2		@5'- Silty SAND: brown, slightly moist, medium dense	
965			R-3	8 8 4	99.6	5.8		@7.5'- Silty SAND: brown, slightly moist, loose	
	10		R-4	4 8 13	107.0	7.0		@10'- Silty SAND: brown, slightly moist, medium dense	
960								**@15' to T.D. - Old Alluvial-Fan Deposits (Qof):**	
	15		R-5	8 12 16	109.4	1.6	SP-SM	@15'- SAND with Silt and Gravel: grayish brown, dry, medium dense	
955									
	20		SPT-1	10 17 19		1.5		@20'- SAND with Silt and Gravel: grayish brown, dry, dense	
950									
	25		R-6	8 15 18				@25'- No Recovery	
945								Total Depth = 25' Groundwater Not Encountered Backfilled with Cuttings on 3/24/2022	
	30								

LGC Geotechnical, Inc.

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SAMPLE TYPES:

B	BULK SAMPLE
R	RING SAMPLE (CA Modified Sampler)
G	GRAB SAMPLE
SPT	STANDARD PENETRATION TEST SAMPLE
▽	GROUNDWATER TABLE

TEST TYPES:

DS	DIRECT SHEAR
MD	MAXIMUM DENSITY
SA	SIEVE ANALYSIS
S&H	SIEVE AND HYDROMETER
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
-#200	% PASSING # 200 SIEVE

Last Edited: 5/3/2022

Geotechnical Boring Log Borehole HS-3

Date: 3/24/2022 | **Drilling Company:** Cal Pac Drilling

Project Name: Dedeaux - Rialto | **Type of Rig:** Truck Mounted

Project Number: 22041-01 | **Drop:** 30" | **Hole Diameter:** 6"

Elevation of Top of Hole: ~974' MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map |

Logged By JMN
Sampled By JMN
Checked By DJB

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							**@0' to 5' - Undocumented Artificial Fill (afu):**	
								@0'- Silty SAND: light brown, dry; rootlets	
			R-1	8 8 8	111.0	8.0	SM	@2.5'- Silty SAND: brown, moist, medium dense	
970									
	5	B-1	R-2	6 5 6	104.9	5.2	SM	**@5' to T.D. - Old Alluvial-Fan Deposits (Qof):** @5'- Silty SAND: brown, slightly moist, loose	
			R-3	11 13 11	111.5	2.5		@7.5'- Silty SAND: brown, dry, medium dense	
965									
	10		R-4	7 9 9	110.2	3.2		@10'- Silty SAND: olive brown, dry, medium dense	CO
960									
	15		SPT-1	7 16 19		1.8	SP-SM	@15'- SAND with Silt and Gravel: grayish brown, dry, dense	
955									
	20		R-5	14 33 50/6"	118.4	1.5		@20'- SAND with Silt and Gravel: grayish brown, dry, very dense	
950									
	25		SPT-2	9 17 18		1.8		@25'- SAND with Silt and Gravel: grayish brown, dry, dense	
								Total Depth = 25' Groundwater Not Encountered Backfilled with Cuttings on 3/24/2022	
945									
	30								

LGC Geotechnical, Inc.

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SAMPLE TYPES:

B	BULK SAMPLE
R	RING SAMPLE (CA Modified Sampler)
G	GRAB SAMPLE
SPT	STANDARD PENETRATION TEST SAMPLE
▽	GROUNDWATER TABLE

TEST TYPES:

DS	DIRECT SHEAR
MD	MAXIMUM DENSITY
SA	SIEVE ANALYSIS
S&H	SIEVE AND HYDROMETER
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
-#200	% PASSING # 200 SIEVE

Last Edited: 5/3/2022

Geotechnical Boring Log Borehole HS-4

Date: 3/24/2022	**Drilling Company:** Cal Pac Drilling
Project Name: Dedeaux - Rialto	**Type of Rig:** Truck Mounted
Project Number: 22041-01	**Drop:** 30" **Hole Diameter:** 6"
Elevation of Top of Hole: ~970' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By JMN
Sampled By JMN
Checked By DJB

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							**@0' to 7.5' - Undocumented Artificial Fill (afu):**	
								@0'- SAND with Gravel: yellowish brown, dry	
			R-1	7 9 10	115.1	2.4	SM	@2.5'- Silty SAND with Gravel: brown, dry, medium dense	
965	5	B-1	R-2	7 12 10	114.1	1.8		@5'- Silty SAND with Gravel: grayish brown, dry, medium dense	
								@7.5' to T.D. - Old Alluvial-Fan Deposits (Qof):	
			R-3	8 10 14	113.3	1.9	SP-SM	@7.5'- SAND with Silt and Gravel: grayish brown, dry, medium dense	
960	10		R-4	9 17 17	103.6	2.3		@10'- SAND with Silt and Gravel: grayish brown, dry, medium dense	
955	15		R-5	11 23 31	115.4	1.8		@15'- SAND with Silt and Gravel: grayish brown, dry, dense	
950	20		SPT-1	10 24 20		1.7		@20'- SAND with Silt and Gravel: grayish brown, dry, very dense	
945	25		R-6	19 50/6"	109.9	2.0		@25'- SAND with Silt and Gravel: grayish brown, dry, very dense	
								Total Depth = 25' Groundwater Not Encountered Backfilled with Cuttings on 3/24/2022	
	30								

LGC Geotechnical, Inc.

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SAMPLE TYPES:

B	BULK SAMPLE
R	RING SAMPLE (CA Modified Sampler)
G	GRAB SAMPLE
SPT	STANDARD PENETRATION TEST SAMPLE
▽	GROUNDWATER TABLE

TEST TYPES:

DS	DIRECT SHEAR
MD	MAXIMUM DENSITY
SA	SIEVE ANALYSIS
S&H	SIEVE AND HYDROMETER
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
-#200	% PASSING # 200 SIEVE

Last Edited: 5/3/2022

Geotechnical Boring Log Borehole HS-5

Date: 4/4/2022 | **Drilling Company:** Cal Pac Drilling

Project Name: Dedeaux - Rialto | **Type of Rig:** Truck Mounted

Project Number: 22041-01 | **Drop:** 30" | **Hole Diameter:** 6"

Elevation of Top of Hole: ~975' MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map |

Logged By JMN
Sampled By JMN
Checked By DJB

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0	B-1						**@0' to 5' - Undocumented Artificial Fill (afu):** @0'- 5" of Concrete with Rebar; Silty SAND: yellowish brown, dry	
970	5		R-1	5 9 11	121.1	14.7	SM	**@5' to T.D. - Old Alluvial-Fan Deposits (Qof):** @5'- Silty SAND: brown, very moist, medium dense	
			R-2	6 10 15	114.5	3.6		@7.5'- Silty SAND: yellowish brown, dry, medium dense	CO
965	10		R-3	7 17 32	122.4	1.9	SP-SM	@10'- SAND with Silt and Gravel: grayish brown, dry, dense	
960	15		R-4	15 28 28	120.3	2.6		@15'- SAND with Silt and Gravel: grayish brown, dry, dense	
955	20		SPT-1	17 50/6"		1.9		@20'- SAND with Silt and Gravel: grayish brown, dry, very dense	
950	25		R-5	10 20 30	121.3	4.2		@25'- SAND with Silt and Gravel: grayish brown, dry, dense	
	30							Total Depth = 25' Groundwater Not Encountered Backfilled with Cuttings on 3/24/2022	

LGC Geotechnical, Inc.

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SAMPLE TYPES:

B	BULK SAMPLE
R	RING SAMPLE (CA Modified Sampler)
G	GRAB SAMPLE
SPT	STANDARD PENETRATION TEST SAMPLE
▽	GROUNDWATER TABLE

TEST TYPES:

DS	DIRECT SHEAR
MD	MAXIMUM DENSITY
SA	SIEVE ANALYSIS
S&H	SIEVE AND HYDROMETER
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
-#200	% PASSING # 200 SIEVE

Last Edited: 5/3/2022

Geotechnical Boring Log Borehole HS-6

Date: 4/4/2022 | **Drilling Company:** Cal Pac Drilling

Project Name: Dedeaux - Rialto | **Type of Rig:** Truck Mounted

Project Number: 22041-01 | **Drop:** 30" | **Hole Diameter:** 6"

Elevation of Top of Hole: ~976' MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map

Logged By JMN
Sampled By JMN
Checked By DJB

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
975	0							**@0' to 5' - <u>Undocumented Artificial Fill (afu):</u>** @0'- 8" of Concrete with Rebar; Silty SAND: reddish brown, dry	CR EI MD
970	5		R-1	4 5 9	114.4	7.9	SM	**@5' to T.D. - <u>Old Alluvial-Fan Deposits (Qof):</u>** @5'- Silty SAND: brown, moist, medium dense	
			R-2	7 12 18	119.5	3.5	SP-SM	@7.5'- SAND with Silt: light olive brown, dry, medium dense	CO
965	10		R-3	9 14 24	115.8	2.0		@10'- SAND with Silt and Gravel: grayish brown, dry, medium dense	
960	15		SPT-1	6 11 17		3.0		@15'- SAND with Silt: grayish brown, dry, dense	
955	20		R-4	5 10 24	115.5	16.9	SM	@20'- Silty SAND: grayish brown, very moist, medium dense	
950	25		SPT-2	11 20 25		2.1	SP-SM	@25'- SAND with Silt and Gravel: grayish brown, dry, very dense	
	30							Total Depth = 25' Groundwater Not Encountered Backfilled with Cuttings on 3/24/2022	

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SAMPLE TYPES:

B	BULK SAMPLE
R	RING SAMPLE (CA Modified Sampler)
G	GRAB SAMPLE
SPT	STANDARD PENETRATION TEST SAMPLE
▽	GROUNDWATER TABLE

TEST TYPES:

DS	DIRECT SHEAR
MD	MAXIMUM DENSITY
SA	SIEVE ANALYSIS
S&H	SIEVE AND HYDROMETER
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
-#200	% PASSING # 200 SIEVE

Last Edited: 5/3/2022

Geotechnical Boring Log Borehole HS-7

Date: 4/4/2022	**Drilling Company:** Cal Pac Drilling
Project Name: Dedeaux - Rialto	**Type of Rig:** Truck Mounted
Project Number: 22041-01	**Drop:** 30" **Hole Diameter:** 6"
Elevation of Top of Hole: ~976' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By JMN
Sampled By JMN
Checked By DJB

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
975	0	B-1						**@0' to 5' - Undocumented Artificial Fill (afu):** @0'- 10" of Concrete with no Rebar; Silty SAND with Gravel: reddish brown, dry, loose	
970	5		R-1	4 8 20	121.4	4.1	SP-SM	**@5' to T.D. - Old Alluvial-Fan Deposits (Qof):** @5'- SAND with Silt and Gravel: grayish brown, dry, medium dense	
			R-2	12 23 46	122.1	3.0		@7.5'- SAND with Silt and Gravel: grayish brown, dry, very dense	
965	10		R-3	16 30 50/6"	127.9	1.7		@10'- SAND with Silt and Gravel: grayish brown, dry, very dense	
960	15		R-4	8 11 17	104.7	3.0	SM	@15'- Silty SAND: grayish brown, dry, medium dense	
955	20		SPT-1	15 13 16		2.5	SP-SM	@20'- SAND with Silt and Gravel: grayish brown, dry, dense	
950	25		R-5	19 30 50/3"	121.8	2.3		@25'- SAND with Silt and Gravel: grayish brown, dry, very dense	
	30							Total Depth = 25' Groundwater Not Encountered Backfilled with Cuttings on 3/24/2022	

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R	RING SAMPLE (CA Modified Sampler)
G	GRAB SAMPLE
SPT	STANDARD PENETRATION TEST SAMPLE
▽	GROUNDWATER TABLE

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S&H	SIEVE AND HYDROMETER
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
-#200	% PASSING # 200 SIEVE

Last Edited: 5/3/2022

Geotechnical Boring Log Borehole HS-8

Date: 4/4/2022 | **Drilling Company:** Cal Pac Drilling

Project Name: Dedeaux - Rialto | **Type of Rig:** Truck Mounted

Project Number: 22041-01 | **Drop:** 30" | **Hole Diameter:** 6"

Elevation of Top of Hole: ~975' MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map

Logged By JMN
Sampled By JMN
Checked By DJB

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0	B-1						**@0' to 5' - Undocumented Artificial Fill (afu):** @0'- 9.5" of Concrete with Rebar; Silty SAND: brown, dry	EI MD
			R-1	3 5 7	116.5	5.1	SM	@3'- Silty SAND: brown, slightly moist, loose	
970	5		R-2	4 6 13	121.3	8.1	SM	**@5' to T.D. - Old Alluvial-Fan Deposits (Qof):** @5'- Silty SAND: brown, moist, medium dense	
			R-3	6 18 26	111.4	2.2	SP-SM	@7.5'- SAND with Silt and Gravel: grayish brown, dry, dense	
965	10		R-4	15 23 30	123.9	1.9	SP	@10'- SAND with Gravel: grayish brown, dry, dense	
960	15		SPT-1	8 9 11		4.0	SP-SM	@15'- SAND with Silt and Gravel: grayish brown, dry, medium dense	
955	20		R-5	7 11 20	114.4	13.8	SM	@20'- Silty SAND: olive gray, very moist, medium dense	
950	25		SPT-2	11 17 18		2.3	SP-SM	@25'- SAND with Silt and Gravel: grayish brown, dry, dense	
	30								

LGC Geotechnical, Inc.

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B	BULK SAMPLE
R	RING SAMPLE (CA Modified Sampler)
G	GRAB SAMPLE
SPT	STANDARD PENETRATION TEST SAMPLE
▽	GROUNDWATER TABLE

TEST TYPES:

DS	DIRECT SHEAR
MD	MAXIMUM DENSITY
SA	SIEVE ANALYSIS
S&H	SIEVE AND HYDROMETER
EI	EXPANSION INDEX
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CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
-#200	% PASSING # 200 SIEVE

Last Edited: 5/3/2022

Geotechnical Boring Log Borehole HS-8

Date: 4/4/2022	**Drilling Company:** Cal Pac Drilling
Project Name: Dedeaux - Rialto	**Type of Rig:** Truck Mounted
Project Number: 22041-01	**Drop:** 30" **Hole Diameter:** 6"
Elevation of Top of Hole: ~975' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 2 of 2

Logged By JMN
Sampled By JMN
Checked By DJB

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	30		R-6	21 25 50/6"	121.8	1.6	SP-SM	@30'- SAND with Silt and Gravel: grayish brown, dry, very dense	
945	35		SPT-3	14 26 37		2.1		@35'- SAND with Silt and Gravel: grayish brown, dry, very dense	
940	40		R-7	25 50/6"	114.9	2.3		@40'- SAND with Silt: grayish brown, dry, very dense	
935	45		SPT-4	8 16 18		11.0	ML	@45'- SILT with Sand: grayish brown, moist, hard	
930	50		R-8	10 19 32	105.2	9.6		@50'- SILT: olive brown, slightly moist, hard	
925	55							Total Depth = 50' Groundwater Not Encountered Backfilled with Cuttings on 3/24/2022	
	60								

LGC Geotechnical, Inc.

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:

B	BULK SAMPLE
R	RING SAMPLE (CA Modified Sampler)
G	GRAB SAMPLE
SPT	STANDARD PENETRATION TEST SAMPLE
▽	GROUNDWATER TABLE

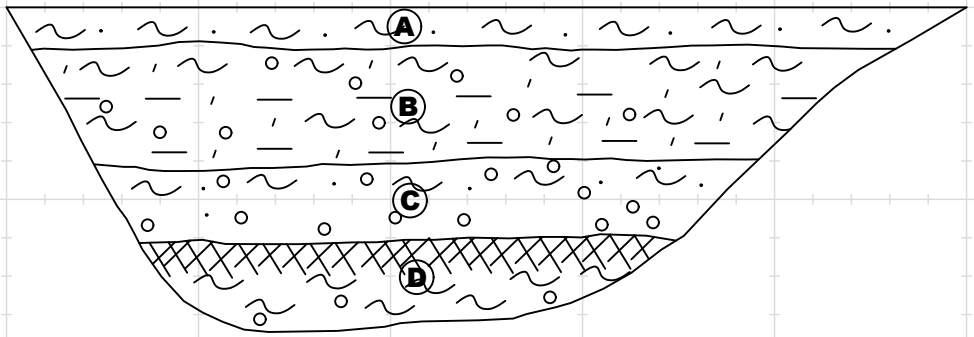
TEST TYPES:

DS	DIRECT SHEAR
MD	MAXIMUM DENSITY
SA	SIEVE ANALYSIS
S&H	SIEVE AND HYDROMETER
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
-#200	% PASSING # 200 SIEVE

Project Name: Willow Ave, Rialto	Logged By: JMO	Trench No.: TP-1	LGC Geotechnical, Inc.
Project Number: 22041-01	Date: 3/29/2022	Engineering Properties:	
Equipment: Backhoe	Location:		

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
		@ 0' to 6' - Undocumented Artificial Fill:	Afu		B-1 @ 0-2'		
	A	@ 0 - 1' Sandy SILT - yellowish brown, slightly moist to moist,		ML			
	B	@ 1 - 4' - Gravelly SAND: yellowish orange brown, dry		SP			
	C	@ 4 - 6' - Sandy Silt with Gravel: gray-orange brown, dry to slightly moist; trace Clay		ML			
	D	@ 6' to T.D. - Old Alluvial-Fan Deposits: @ 6 - 8' - Sandy SILT: brown/gray, dry, stiff with gravels over orange silt, slightly moist; trace Clay	Qof	ML	B-2 @ 7-8'		

GRAPHICAL REPRESENTATION BELOW: **Elevation: 975' MSL** **Trend: E-W**



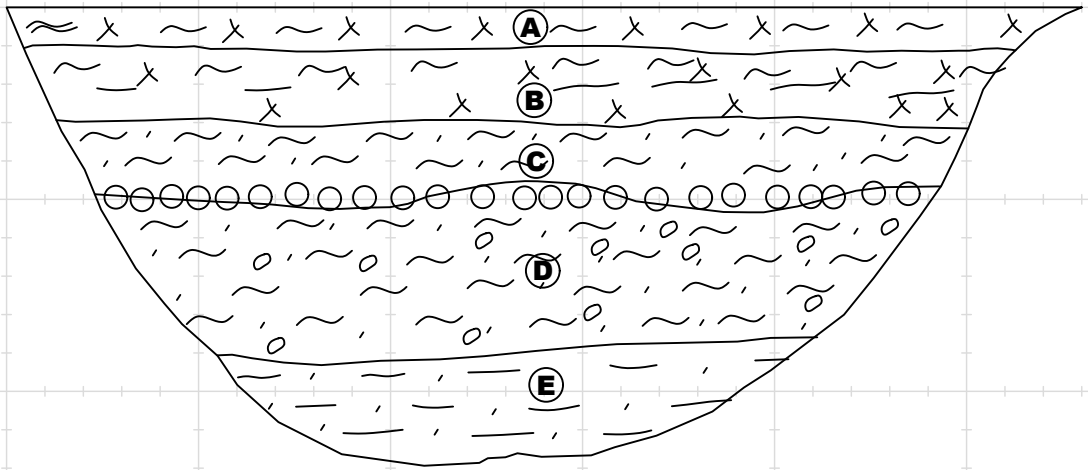
Total Depth: 8'
Groundwater: N/A
Backfilled: 3/29/22

scale: 1in = 5 ft

Project Name: Willow Ave, Rialto	Logged By: JMO	Trench No.: TP-2	LGC Geotechnical, Inc.
Project Number: 22041-01	Date: 3/29/2022	Engineering Properties:	
Equipment: Backhoe	Location:		

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
	A	@ 0' to 9' - Undocumented Artificial Fill:	Afu				
	B	@ 1 - 3' - Silty SAND with Gravel: lighter brown, dry to slightly moist, trace Clay		SM	B-1 @ 2-4'		
	C	@ 3 - 5' - Sandy SILT with Clay: darker brown, moist; rootlets		ML			
	D	@ 5 - 9' - Sandy SILT with Clay: orange brown, slightly moist; some Gravel			B-2 @ 4-6'		
	E	@ 9' to T.D. - Old Alluvial-Fan Deposits:	Qof		B-3 @ 8-10'		
		@ 9 - 12' - SAND with Gravel: yellowish gray, slightly moist; medium to coarse grained		SP			

GRAPHICAL REPRESENTATION BELOW: **Elevation: 974' MSL** **Trend: N-S**



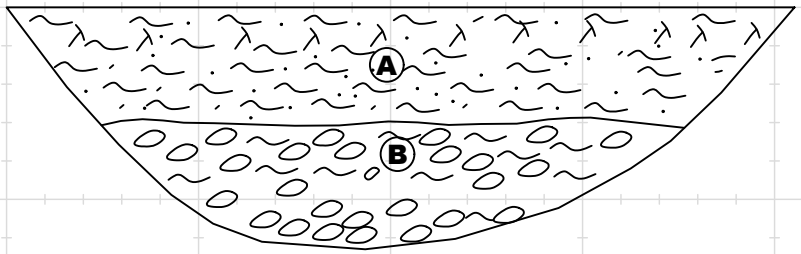
Total Depth: 12'
Groundwater: N/A
Backfilled: 3/29/22

scale: 1in = 5 ft

Project Name: Willow Ave, Rialto	Logged By: JMO	Trench No.: TP-3	
Project Number: 22041-01	Date: 3/29/2022	Engineering Properties:	
Equipment: Backhoe	Location:		

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
		@ 0' to T.D. - Undocumented Artificial Fill:	Afu				
	A	@ 0 - 3' - Sandy SILT: yellowish brown, slightly moist gravel and asphalt chunks; rootlets; trace Clay		ML	B-1 @ 2-4'		
	B	@ 3' - 6.5' - Silty SAND with Gravel: gray, dry; miscellaneous trash		SM			

GRAPHICAL REPRESENTATION BELOW: **Elevation: 970' MSL**



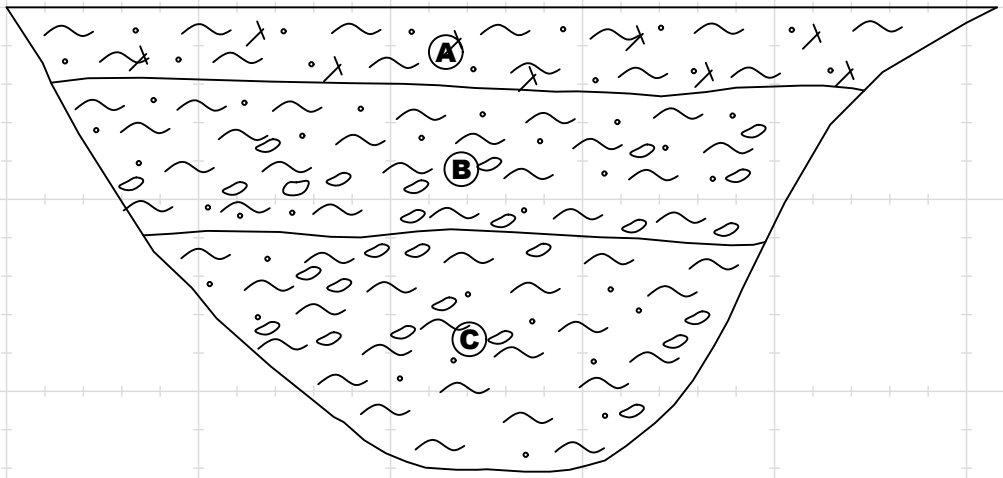
Total Depth: 6.5'
Groundwater: N/A
Backfilled: 3/29/22

scale: 1in = 5 ft

Project Name: Willow Ave, Rialto	**Logged By: JMO**	**Trench No.: TP-4**	LGC Geotechnical, Inc.
Project Number: 22041-01	**Date: 3/29/2022**	**Engineering Properties:**	
Equipment: Backhoe	**Location:**		

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
		@ 0' to T.D. - Undocumented Artificial Fill:	Afu				
	A	**@ 0 - 2' - Sand SILT with Clay: red-brown to brown, slightly moist, many gravels; miscellaneous trash; rootlets**		ML			
	B	**@ 2 - 6' - Sandy SILT with Clay: dark brown, slightly moist, stiff, many gravels, miscellaneous trash**			B-1 @ 5-6'		
	C	**@ 6 - 12' - Sandy SILT with Clay: dark gray to brown, slightly moist; miscellaneous trash**			B-2 @ 10-12'		

GRAPHICAL REPRESENTATION BELOW: **Elevation: 972' MSL** **Trend: E-W**



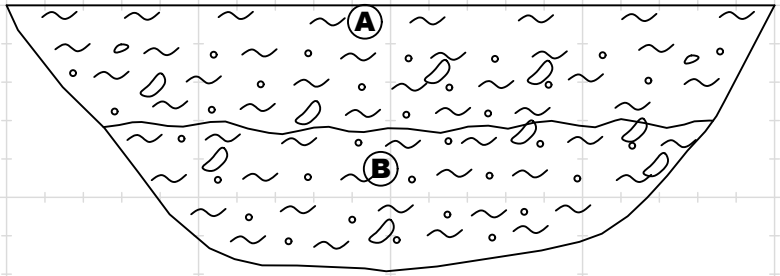
Total Depth: 12'
Groundwater: N/A
Backfilled: 3/29/22

scale: 1in = 5 ft

Project Name: Willow Ave, Rialto	Logged By: JMO	Trench No.: TP-5	LGC Geotechnical, Inc.
Project Number: 22041-01	Date: 3/29/2022	Engineering Properties:	
Equipment: Backhoe	Location:		

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
		@ 0' to 3' - Undocumented Artificial Fill:	Afu		B-1 @ 0-2'		
	A	@ 0 - 3' - Sandy SILT with Gravels: light brown to yellowish brown, very dry; trace Clay		ML			
	B	@ 3' to T.D. - Old Alluvial-Fan Deposits:	Qof		B-2 @ 2-4'		
		@ 3 - 6.5' - Sandy SILT with Gravels: light brown to yellowish brown, very dry; caliche; trace Clay		ML			

GRAPHICAL REPRESENTATION BELOW: **Elevation: 972' MSL** **Trend: N-S**



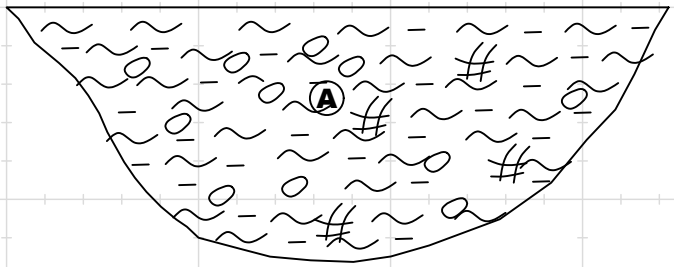
Total Depth: 6.5
Groundwater: N/A
Backfilled: 3/29/22

scale: 1in = 5 ft

Project Name: Willow Ave, Rialto	**Logged By: JMO**	**Trench No.: TP-6**	LGC Geotechnical, Inc.
Project Number: 22041-01	**Date: 3/29/2022**	**Engineering Properties:**	
Equipment: Backhoe	**Location:**		

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
	A	@ 0' to T.D. - Undocumented Artificial Fill: @ 0 - 6.5' - Silty SAND with Gravel: dark brown, slightly moist; miscellaneous trash	Afu	SM	B-1 @ 4-6'		

GRAPHICAL REPRESENTATION BELOW: **Elevation: 971' MSL**



Total Depth: 6.5'
Groundwater: N/A
Backfilled: 3/29/22

scale: 1in = 5 ft

Appendix C
Laboratory Test Results

ONE-DIMENSIONAL SWELL OR SETTLEMENT POTENTIAL OF COHESIVE SOILS

ASTM D 4546

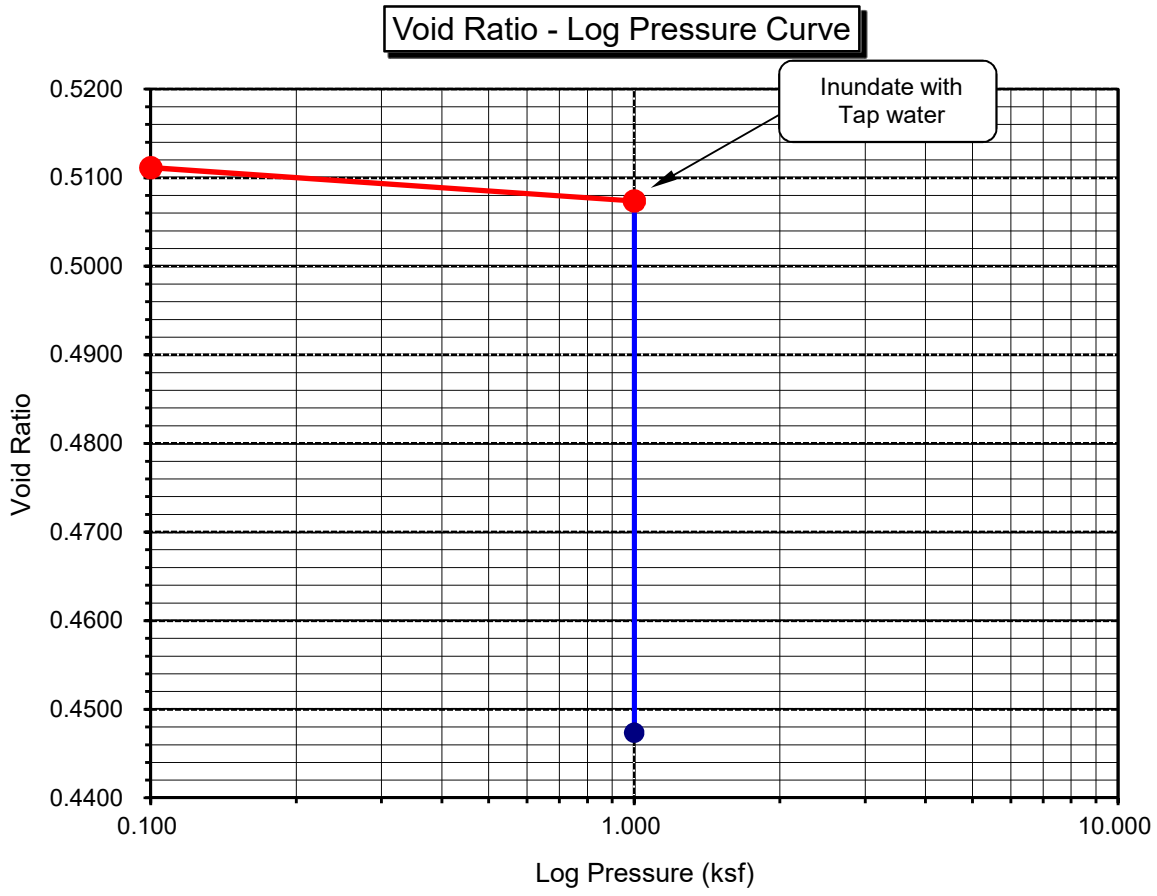
Project Name:	Dedeaux - Rialto	Tested By:	G. Bathala	Date:	04/13/22
Project No.:	22041-01	Checked By:	J. Ward	Date:	05/02/22
Boring No.:	HS-3	Sample Type:	Ring		
Sample No.:	R-4	Depth (ft.)	10.0		
Sample Description:	Olive brown silty sand (SM)				

Initial Dry Density (pcf):	111.5
Initial Moisture (%):	3.17
Initial Length (in.):	1.0000
Initial Dial Reading:	0.2716
Diameter(in):	2.415

Final Dry Density (pcf):	116.5
Final Moisture (%) :	13.0
Initial Void Ratio:	0.5113
Specific Gravity(assumed):	2.70
Initial Saturation (%)	16.7

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.100	0.2715	0.9999	0.00	-0.01	0.5111	-0.01
1.000	0.2661	0.9945	0.29	-0.55	0.5074	-0.26
H2O	0.2264	0.9548	0.29	-4.52	0.4474	-4.23

Percent Swell (+) / Settlement (-) After Inundation = -3.98



ONE-DIMENSIONAL SWELL OR SETTLEMENT POTENTIAL OF COHESIVE SOILS

ASTM D 4546

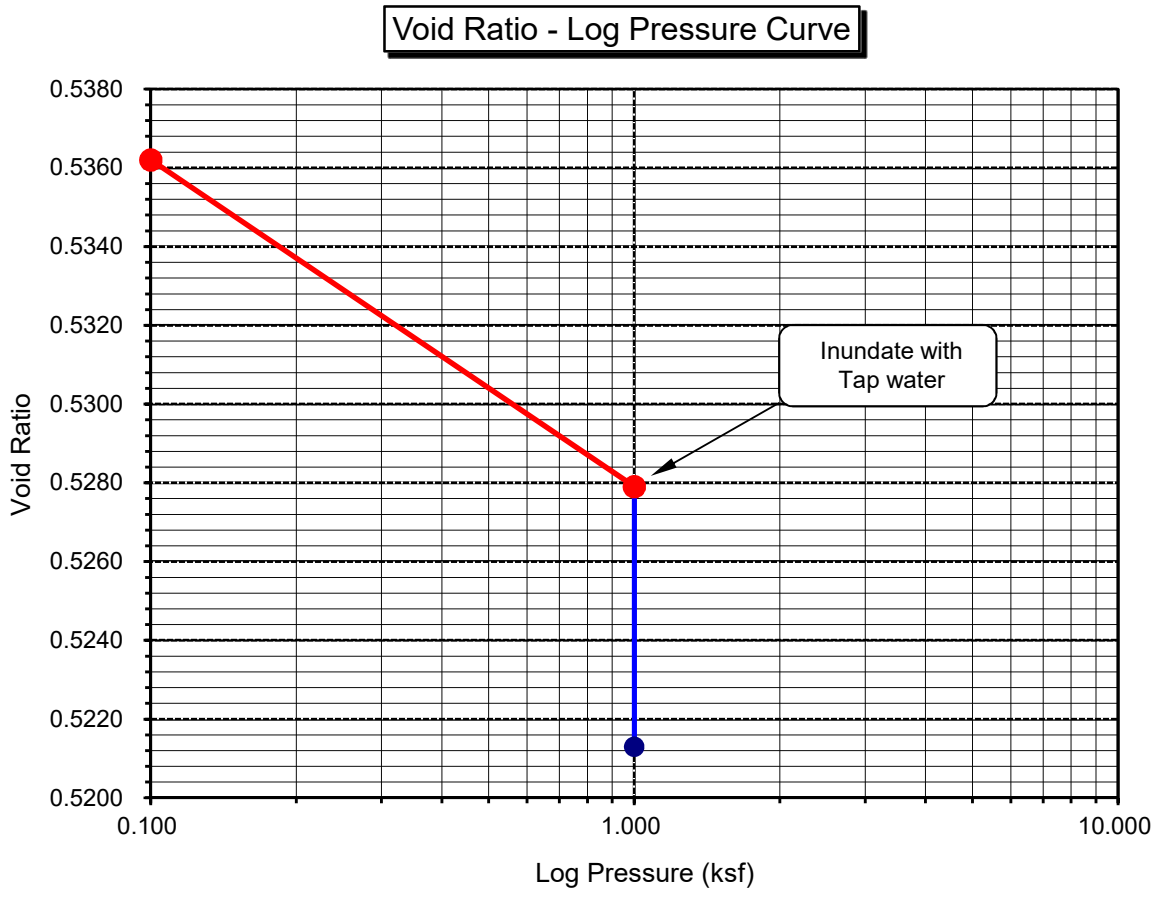
Project Name:	Dedeaux - Rialto	Tested By:	G. Bathala	Date:	04/13/22
Project No.:	22041-01	Checked By:	J. Ward	Date:	05/02/22
Boring No.:	HS-5	Sample Type:	Ring		
Sample No.:	R-2	Depth (ft.)	7.5		
Sample Description:	Yellowish brown silty sand (SM)				

Initial Dry Density (pcf):	109.7
Initial Moisture (%):	3.56
Initial Length (in.):	1.0000
Initial Dial Reading:	0.3628
Diameter(in):	2.415

Final Dry Density (pcf):	110.8
Final Moisture (%) :	14.8
Initial Void Ratio:	0.5362
Specific Gravity(assumed):	2.70
Initial Saturation (%)	17.9

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.100	0.3628	1.0000	0.00	0.00	0.5362	0.00
1.000	0.3567	0.9939	0.07	-0.61	0.5279	-0.54
H2O	0.3524	0.9896	0.07	-1.04	0.5213	-0.97

Percent Swell (+) / Settlement (-) After Inundation = -0.43



ONE-DIMENSIONAL SWELL OR SETTLEMENT POTENTIAL OF COHESIVE SOILS

ASTM D 4546

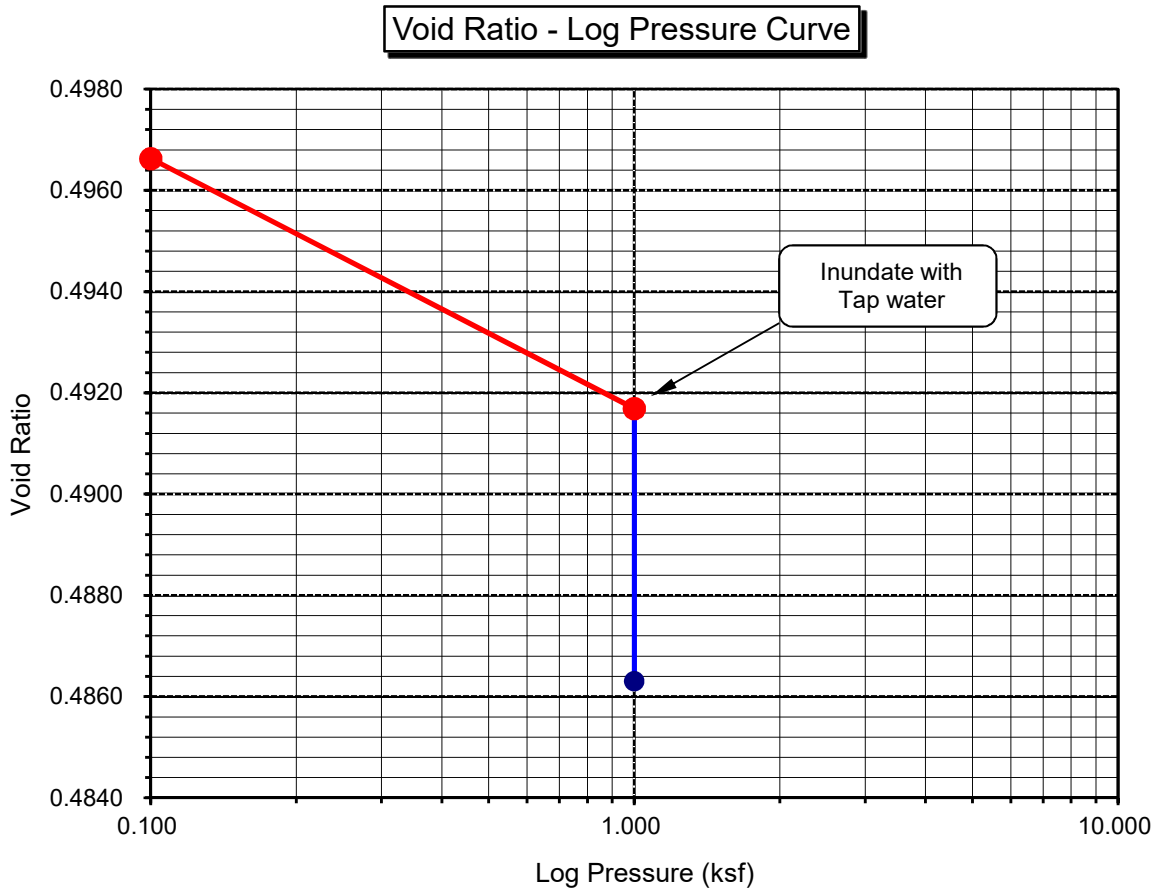
Project Name:	Dedeaux - Rialto	Tested By:	G. Bathala	Date:	04/13/22
Project No.:	22041-01	Checked By:	J. Ward	Date:	05/02/22
Boring No.:	HS-6	Sample Type:	Ring		
Sample No.:	R-2	Depth (ft.)	7.5		
Sample Description:	Light olive brown poorly-graded sand with silt (SP-SM)				

Initial Dry Density (pcf):	112.6
Initial Moisture (%):	3.49
Initial Length (in.):	1.0000
Initial Dial Reading:	0.2982
Diameter(in):	2.415

Final Dry Density (pcf):	113.4
Final Moisture (%) :	13.3
Initial Void Ratio:	0.4966
Specific Gravity(assumed):	2.70
Initial Saturation (%)	19.0

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.100	0.2982	1.0000	0.00	0.00	0.4966	0.00
1.000	0.2922	0.9940	0.27	-0.60	0.4917	-0.33
H2O	0.2886	0.9904	0.27	-0.96	0.4863	-0.69

Percent Swell (+) / Settlement (-) After Inundation = -0.36



Sladden Engineering

45090 Golf Center Parkway, Suite F, Indio, CA. 92201 (760) 863-0713 Fax (760) 863-0847
6782 Stanton Avenue, Suite C, Buena Park, CA. 90621 (714) 523-0952 Fax (714) 523-1369
450 Egan Avenue, Beaumont, CA. 92223 (951) 845-7743 Fax (951) 845-8863
www.sladdenengineering.com

June 23, 2022

Project No. 644-22030
22-06-087

Donlon Builders, Inc.
2681 Saturn Street
Brea, California 92821

Project: Proposed Industrial Building
1485 South Willow Avenue
Rialto, California

Subject: Percolation/Infiltration Testing for On-Site Stormwater Management

In accordance with your request, we have performed percolation testing on the subject site to evaluate the infiltration potential of the near surface soil to assist in stormwater management system design. It is our understanding that on-site stormwater retention including infiltration is proposed for the project.

Percolation testing was performed on June 14, 2022, within two (2) shallow tests bores excavated on the site. Testing was performed at a depth of approximately 5.0 feet below existing grade. The approximate locations of the test holes are presented on the attached Test Location Plan (Figure 1). Testing was performed by placing water within the test holes and recording the drop in the water surface with time. Testing was performed in general accordance with the *United States Bureau of Reclamation (BOR) Procedure 7300-89 (1999)*. Test results are summarized in the following table.

PERCOLATION TEST RESULTS

Test No.	Depth (Ft)	USCS	Percolation Rate (in/hr)	Infiltration Rate (in/hr)
P-1	5.0	SM/SW	120.0	20.0
P-2	5.0	SM/SW	120.0	20.0

The percolation rates determined represent the ultimate field rates that do not include a safety factor. The corresponding infiltration rates were calculated using the Porchet Method.

Based on our field investigation and our review of groundwater levels[1] within the vicinity, it is our professional opinion that groundwater should not be a controlling factor in on-site stormwater retention/infiltration system design.

If you have any questions regarding this memo or the testing summarized herein, please contact the undersigned.

Respectfully submitted,
SLADDEN ENGINEERING

James W. Minor III
Senior Geologist

PROFESSIONAL GEOLOGIST
JAMES W. MINOR III
No. 9735
STATE OF CALIFORNIA

Brett L. Anderson
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
BRETT L. ANDERSON
No. C45389
CIVIL ENGINEERING
STATE OF CALIFORNIA

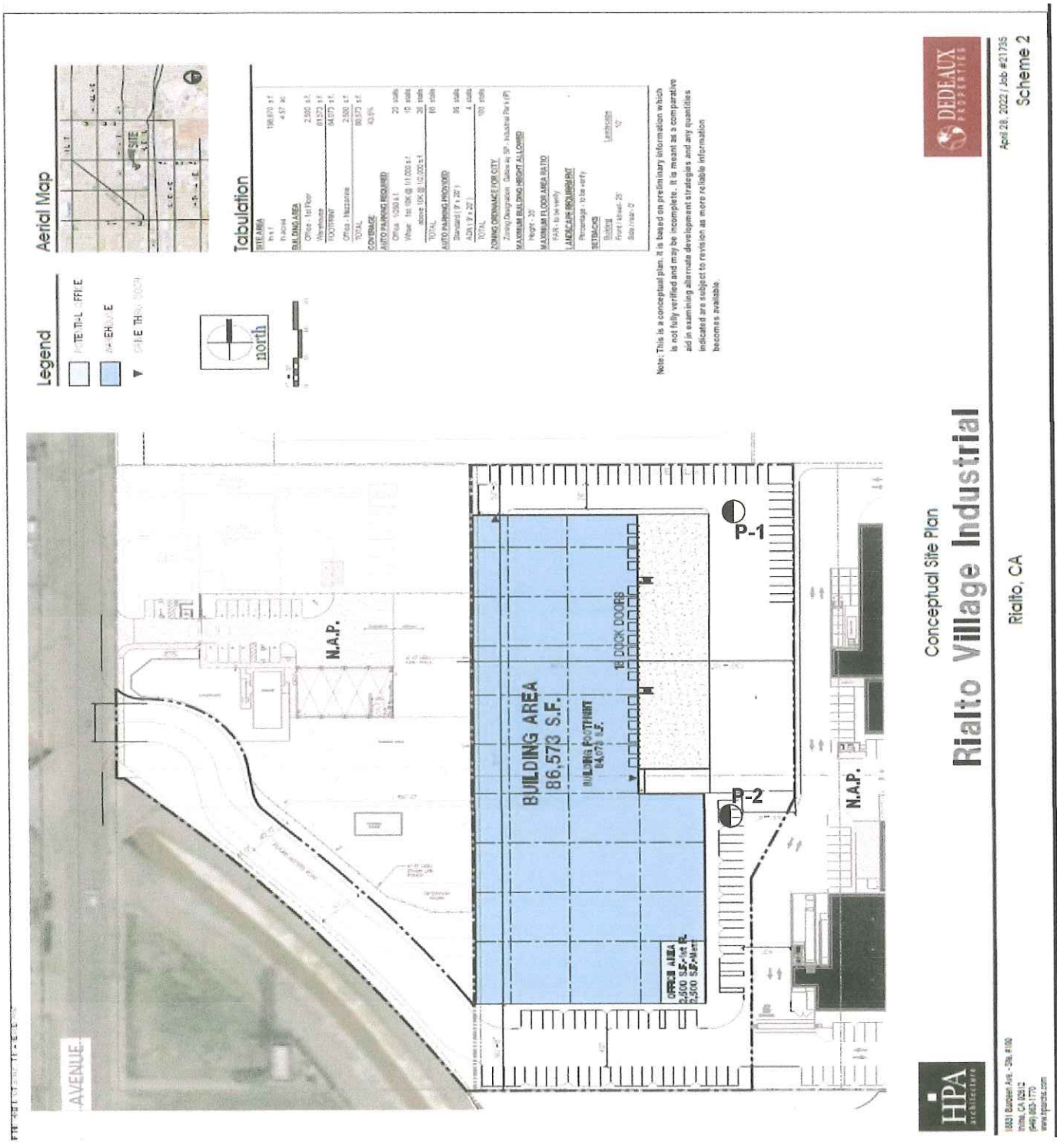
Copies: 2/Addressee

[1] California Department of Water Resources (CDWR), 2022, Historical Data by Well-Map Interface, available at: http://wdl.water.ca.gov/waterdatalibrary/Home.aspx

TEST LOCATION PLAN

LEGEND

P-2 Approximate Percolation/Infiltration Test Location



Sladden Engineering	TEST LOCATION PLAN
Project Number:	644-22030
Report Number:	22-06-087
Date:	June 23, 2022

FIGURE

1

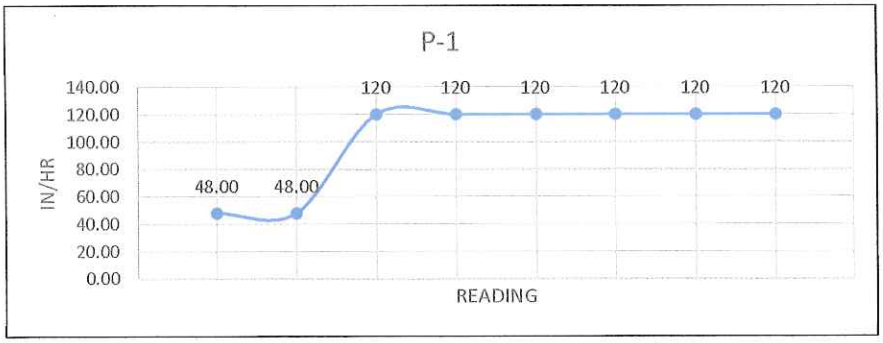
PERCOLATION/INFILTRATION TEST DATA SHEETS

STORMWATER PERCOLATION SHEET (LESS THAN 10 FT)

Project:	1485 S. Willow Avenue, Rialto	Depth (ft):	5.00
Job No. :	644-22030	USCS Soil Class:	SM/SW
Date:	6-14-22	Sandy Soil:	B.H.
Test Hole #:	P-1	Tested By:	B.H.

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
A	25.00	5.00	20	0	20	48.00
B	25.00	5.00	20	0	20	48.00

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
1	10.00	5.00	20	0	20	120
2	10.00	5.00	20	0	20	120
3	10.00	5.00	20	0	20	120
4	10.00	5.00	20	0	20	120
5	10.00	5.00	20	0	20	120
6	10.00	5.00	20	0	20	120



PERCOLATION RATE CONVERSION (PORCHET METHOD)

$$I_{t=} \quad \frac{\Delta H\ 60\ R}{\Delta t(r+2H_{avg})}$$

Δt =	10.00
D_f =	60.00
r =	4.00
D_0 =	40
D_t =	60.00
H_0 =	20
H_f =	0
ΔH =	20.00
H_{avg} =	10.00

Δt (minutes)
D_f (Final Depth to water)
r (hole radius in inches)
D_0 (Initial Depth to water)
D_t (Total Depth of test hole)
H_0 (initial height of water at selected time interval)

$$H_0 = D_t - D_0$$

H_f (final height of water at the selected time interval)

$$H_f = D_t - D_f$$

ΔH (change in head over the time interval)

$$\Delta H = H_0 - H_f$$

H_{avg} (average head height over the time interval)

$$H_{avg} = (H_0 + H_f)/2$$

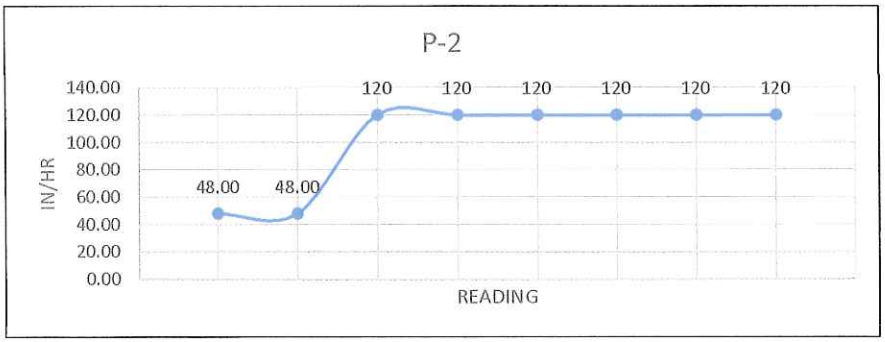
Field Rate:	120 in/hr
Infiltration Rate:	20.00 in/hr

STORMWATER PERCOLATION SHEET (LESS THAN 10 FT)

Project:	1485 S. Willow Avenue, Rialto	Depth (ft):	5.00
Job No. :	644-22030	USCS Soil Class:	SM/SW
Date:	6-14-22	Sandy Soil:	B.H.
Test Hole #:	P-2	Tested By:	B.H.

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
A	25.00	5.00	20	0	20	48.00
B	25.00	5.00	20	0	20	48.00

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
1	10.00	5.00	20	0	20	120
2	10.00	5.00	20	0	20	120
3	10.00	5.00	20	0	20	120
4	10.00	5.00	20	0	20	120
5	10.00	5.00	20	0	20	120
6	10.00	5.00	20	0	20	120



PERCOLATION RATE CONVERSION (PORCHET METHOD)

$$I_{t=} \quad \frac{\Delta H\ 60\ R}{\Delta t(r+2H_{avg})}$$

Δt =	10.00
D_f =	60.00
r =	4.00
D_0 =	40
D_t =	60.00
H_0 =	20
H_f =	0
ΔH =	20.00
H_{avg} =	10.00

Δt (minutes)
D_f (Final Depth to water)
r (hole radius in inches)
D_0 (Initial Depth to water)
D_t (Total Depth of test hole)
H_0 (initial height of water at selected time interval)

$$H_0 = D_t - D_0$$

H_f (final height of water at the selected time interval)

$$H_f = D_t - D_f$$

ΔH (change in head over the time interval)

$$\Delta H = H_0 - H_f$$

H_{avg} (average head height over the time interval)

$$H_{avg} = (H_0 + H_f)/2$$

Field Rate: 120 in/hr
Infiltration Rate: 20.00 in/hr

Appendix G

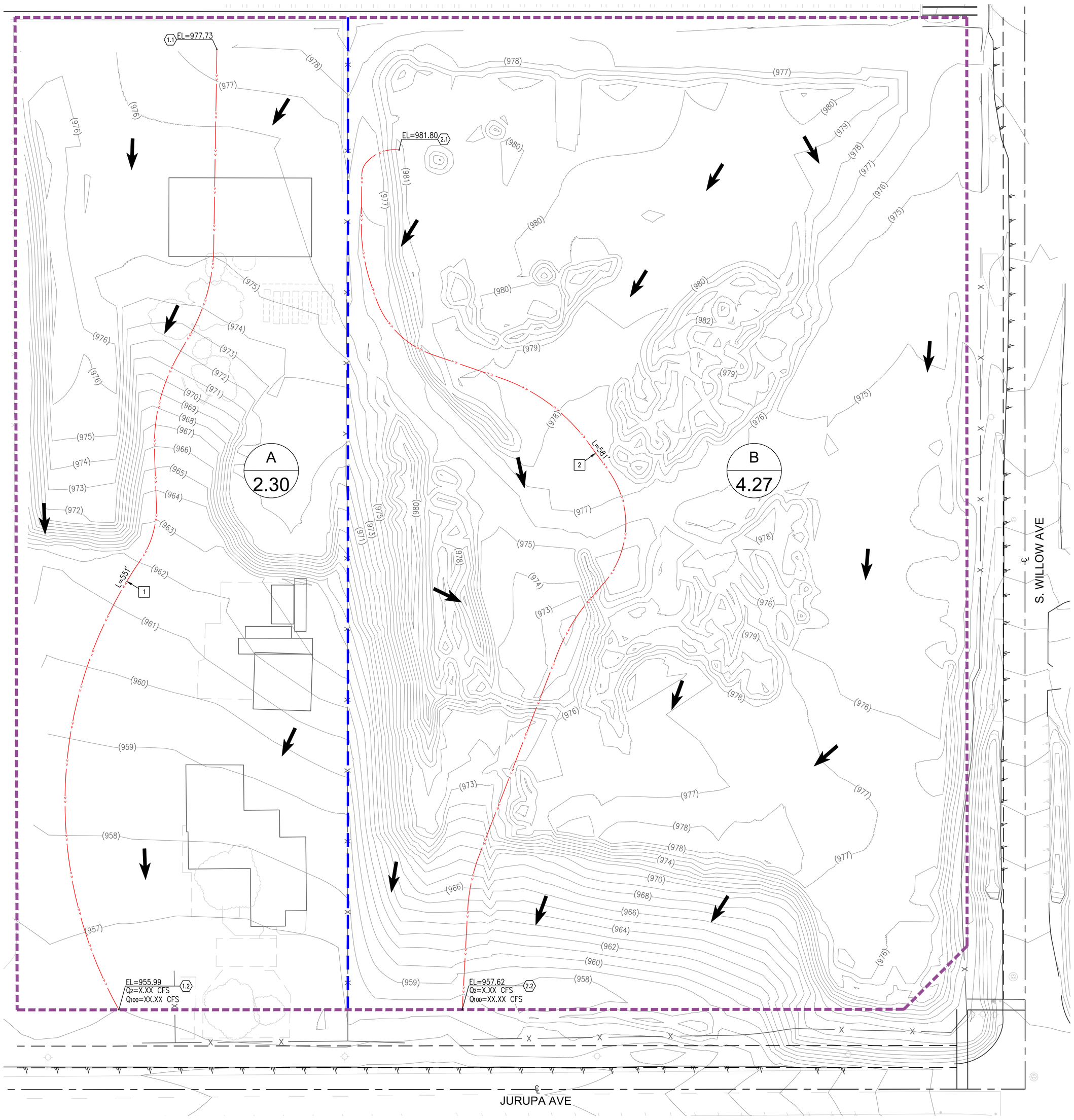
Hydrology Exhibits

CITY OF RIALTO

PRE-DEVELOPMENT HYDROLOGY EXHIBIT

FOR

JURUPA AND WILLOW INDUSTRIAL



HYDROLOGY INFORMATION

SITE AREA:	6.57 ACRES	
SOIL TYPE:	A	(NRCS WEB SOIL SURVEY)
IMPERVIOUS:	0%	(PER CALCULATIONS)
ISOHYETALS:	0.508 INCH	(2-YEAR STORM EVENT)
	1.24 INCH	(100-YEAR STORM EVENT)
CURVE NUMBER	67	(SOIL GROUP A)
FREQUENCY:	2-YEAR	(FOR STORMWATER QUALITY)
	100-YEAR	(FOR STORM DRAIN DESIGN)
METHOD:	SAN BERNARDINO COUNTY HYDROLOGY MANUAL	

LEGEND:

- DRAINAGE AREA BOUNDARY
- SUB-DRAINAGE AREA BOUNDARY
- FLOW PATH
- PROPOSED FLOW DIRECTION ARROW
- X / XXX — DRAINAGE AREA DESIGNATION; AREA (AC)
- 1 — STREAM #
- 1.1 — NODE

HYDROLOGY SUMMARY

DRAINAGE AREA NO.	TRIBUTARY AREA (SF)	TRIBUTARY AREA (AC)	IMPERVIOUS RATIO	Q_{25} (CFS)	Q_{100} (CFS)	V_{100} (CF)
A	100,024	2.30	0.00	3.90	5.97	31,646
B	185,966	4.27	0.00	7.18	11.02	58,749
TOTAL	285,990	6.57	0.00	11.08	16.99	90,396

NORTH

GRAPHIC SCALE IN FEET
0 15 30 60

PREPARED BY:
Kimley»Horn

1100 W TOWN AND COUNTRY ROAD,SUITE 700,
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JURUPA AND WILLOW INDUSTRIAL
PRE-DEVELOPMENT HYDROLOGY EXHIBIT
JURUPA AVE AND WILLOW AVE

CITY OF RIALTO

DATE: OCT 2022
SHEET 1 OF 1

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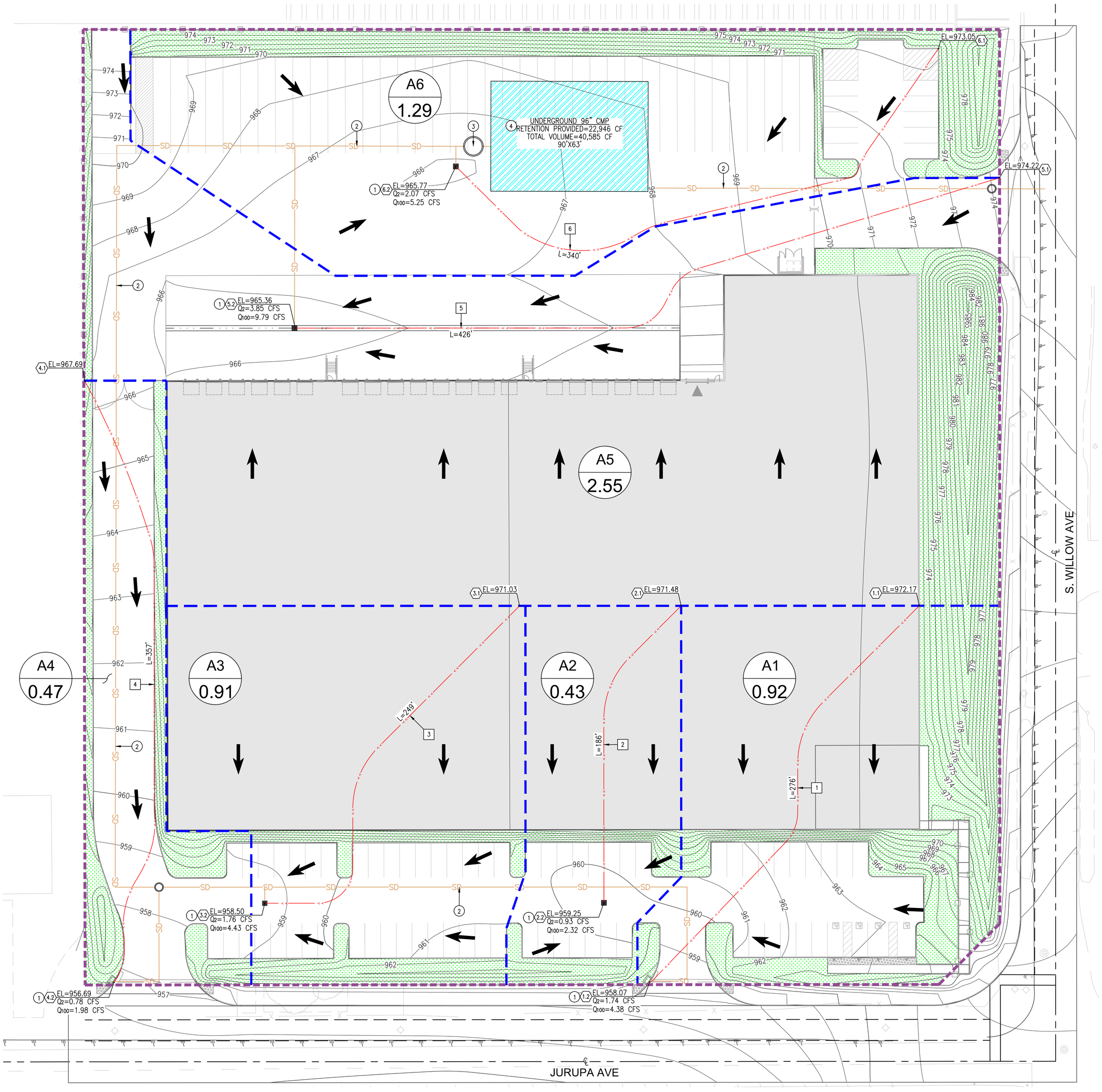
10/29/2022

CITY OF RIALTO

POST-DEVELOPMENT HYDROLOGY EXHIBIT

FOR

JURUPA AND WILLOW INDUSTRIAL



HYDROLOGY INFORMATION

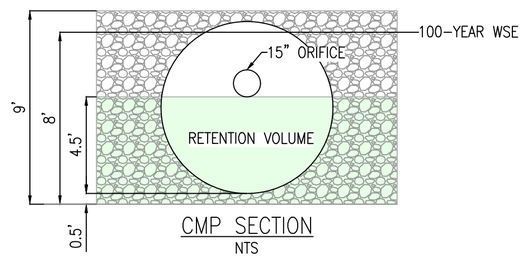
SITE AREA:	6.57 ACRES	
SOIL TYPE:	A	(NRCS WEB SOIL SURVEY)
IMPERVIOUS:	84%	(PER CALCULATIONS)
ISOHYETALS:	0.508 INCH	(2-YEAR STORM EVENT)
	1.24 INCH	(100-YEAR STORM EVENT)
CURVE NUMBER	32	(SOIL GROUP A)
FREQUENCY:	2-YEAR	(FOR STORMWATER QUALITY)
	100-YEAR	(FOR STORM DRAIN DESIGN)
METHOD:	SAN BERNARDINO COUNTY HYDROLOGY MANUAL	

LEGEND:

- DRAINAGE AREA BOUNDARY
- SUB-DRAINAGE AREA BOUNDARY
- FLOW PATH
- STORM DRAIN
- PROPOSED FLOW DIRECTION ARROW
- X — DRAINAGE AREA DESIGNATION
- X.XX — AREA (AC)
- 1 — STREAM #
- 1.1 — NODE

DRAINAGE NOTES:

1. PROPOSED CATCH BASIN
2. PROPOSED STORM DRAIN PIPE PRIVATE MAINTAINED
3. PROPOSED BMP – HYDRODYNAMIC SEPARATOR
4. PROPOSED BMP – UNDERGROUND INFILTRATION BASIN



CMP SECTION
NTS

HYDROLOGY SUMMARY								
DRAINAGE AREA NO.	TRIBUTARY AREA (SF)	TRIBUTARY AREA (AC)	IMPERVIOUS RATIO	V_{100} (CF)	DCV (CF)	ΔV_{100} (CF)	RETENTION PROVIDED (CF)	STORAGE PROVIDED (CF)
A	285,990	6.57	0.84	108,125	22,884	17,729	22,946 (UNDERGROUND 96" CMP)	40,585 (UNDERGROUND 96" CMP)

NORTH

GRAPHIC SCALE IN FEET
0 15 30 60

PREPARED BY:
Kimley»Horn

1100 W TOWN AND COUNTRY ROAD,SUITE 700,
ORANGE, CA 92868
PHONE: 714-939-1030 FAX: 714-938-9488
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JURUPA AND WILLOW INDUSTRIAL
POST-DEVELOPMENT HYDROLOGY EXHIBIT
JURUPA AVE AND WILLOW AVE

CITY OF RIALTO

DATE: MAR 2023
SHEET
1
OF 1

K:\SPA_LADV\DESIGN\122 - JURUPA AND WILLOW - INDUSTRIAL\REPORTS\HYDROLOGY HYDRAULICS\EXHIBIT\RIALTO\JURUPA POST HYDROLOGY EXHIBIT.DWG (03-30-23 7:38:07PM) Plotted by: Kim.Thieu

03/30/2023

Appendix H

Rational Method Analysis

Appendix H.I

Rational Method Analysis
Pre-Development Conditions
2-Year Storm

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2018 Version 9.0
Rational Hydrology Study Date: 10/27/22

JURUPA AND WILLOW
RATIONAL METHOD
2-YEAR STORM
PRE DEVELOPMENT - DMA A1

Program License Serial Number 6443

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

Rational hydrology study storm event year is 2.0
Computed rainfall intensity:
Storm year = 2.00 1 hour rainfall = 0.508 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 1

++
Process from Point/Station 1.100 to Point/Station 1.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 67.00
Adjusted SCS curve number for AMC 1 = 47.40
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.840(In/Hr)
Initial subarea data:
Initial area flow distance = 551.270(Ft.)
Top (of initial area) elevation = 977.730(Ft.)
Bottom (of initial area) elevation = 955.990(Ft.)
Difference in elevation = 21.740(Ft.)
Slope = 0.03944 s(%)= 3.94
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.518 min.
Rainfall intensity = 1.301(In/Hr) for a 2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.319
Subarea runoff = 0.954(CFS)
Total initial stream area = 2.300(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.840(In/Hr)
End of computations, Total Study Area = 2.30 (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 = 67.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2018 Version 9.0
Rational Hydrology Study Date: 10/27/22

JURUPA AND WILLOW
RATIONAL METHOD
2-YEAR STORM
PRE DEVELOPMENT - DMA A2

Program License Serial Number 6443

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

Rational hydrology study storm event year is 2.0
Computed rainfall intensity:
Storm year = 2.00 1 hour rainfall = 0.508 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 1

++
Process from Point/Station 2.100 to Point/Station 2.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 67.00
Adjusted SCS curve number for AMC 1 = 47.40
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.840(In/Hr)
Initial subarea data:
Initial area flow distance = 580.900(Ft.)
Top (of initial area) elevation = 981.800(Ft.)
Bottom (of initial area) elevation = 957.620(Ft.)
Difference in elevation = 24.180(Ft.)
Slope = 0.04163 s(%)= 4.16
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.645 min.
Rainfall intensity = 1.293(In/Hr) for a 2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.315
Subarea runoff = 1.741(CFS)
Total initial stream area = 4.270(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.840(In/Hr)
End of computations, Total Study Area = 4.27 (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 = 67.0

Appendix H.II

Rational Method Analysis
Pre-Development Conditions
10-Year Storm

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2018 Version 9.0
Rational Hydrology Study Date: 10/27/22

JURUPA AND WILLOW
RATIONAL METHOD
10-YEAR STORM
PRE DEVELOPMENT - DMA A1

Program License Serial Number 6443

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.787 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++
Process from Point/Station 1.100 to Point/Station 1.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 67.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.578(In/Hr)
Initial subarea data:
Initial area flow distance = 551.270(Ft.)
Top (of initial area) elevation = 977.730(Ft.)
Bottom (of initial area) elevation = 955.990(Ft.)
Difference in elevation = 21.740(Ft.)
Slope = 0.03944 s(%)= 3.94
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.518 min.
Rainfall intensity = 2.015(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.642
Subarea runoff = 2.975(CFS)
Total initial stream area = 2.300(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.578(In/Hr)
End of computations, Total Study Area = 2.30 (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 = 67.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2018 Version 9.0
Rational Hydrology Study Date: 10/27/22

JURUPA AND WILLOW
RATIONAL METHOD
10-YEAR STORM
PRE DEVELOPMENT - DMA A2

Program License Serial Number 6443

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.787 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++
Process from Point/Station 2.100 to Point/Station 2.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 67.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.578(In/Hr)
Initial subarea data:
Initial area flow distance = 580.900(Ft.)
Top (of initial area) elevation = 981.800(Ft.)
Bottom (of initial area) elevation = 957.620(Ft.)
Difference in elevation = 24.180(Ft.)
Slope = 0.04163 s(%)= 4.16
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.645 min.
Rainfall intensity = 2.003(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.640
Subarea runoff = 5.476(CFS)
Total initial stream area = 4.270(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.578(In/Hr)
End of computations, Total Study Area = 4.27 (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 = 67.0

Appendix H.III

Rational Method Analysis
Pre-Development Conditions
25-Year Storm

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2018 Version 9.0
Rational Hydrology Study Date: 10/27/22

JURUPA AND WILLOW
RATIONAL METHOD
25-YEAR STORM
PRE DEVELOPMENT - DMA A1

Program License Serial Number 6443

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

Rational hydrology study storm event year is 25.0
Computed rainfall intensity:
Storm year = 25.00 1 hour rainfall = 0.961 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 1.100 to Point/Station 1.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 67.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.578(In/Hr)
Initial subarea data:
Initial area flow distance = 551.270(Ft.)
Top (of initial area) elevation = 977.730(Ft.)
Bottom (of initial area) elevation = 955.990(Ft.)
Difference in elevation = 21.740(Ft.)
Slope = 0.03944 s(%)= 3.94
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.518 min.
Rainfall intensity = 2.461(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.688
Subarea runoff = 3.897(CFS)
Total initial stream area = 2.300(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.578(In/Hr)
End of computations, Total Study Area = 2.30 (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 = 67.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2018 Version 9.0
Rational Hydrology Study Date: 10/27/22

JURUPA AND WILLOW
RATIONAL METHOD
25-YEAR STORM
PRE DEVELOPMENT - DMA A2

Program License Serial Number 6443

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

Rational hydrology study storm event year is 25.0
Computed rainfall intensity:
Storm year = 25.00 1 hour rainfall = 0.961 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++
Process from Point/Station 2.100 to Point/Station 2.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 67.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.578(In/Hr)
Initial subarea data:
Initial area flow distance = 580.900(Ft.)
Top (of initial area) elevation = 981.800(Ft.)
Bottom (of initial area) elevation = 957.620(Ft.)
Difference in elevation = 24.180(Ft.)
Slope = 0.04163 s(%)= 4.16
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.645 min.
Rainfall intensity = 2.446(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.687
Subarea runoff = 7.177(CFS)
Total initial stream area = 4.270(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.578(In/Hr)
End of computations, Total Study Area = 4.27 (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 = 67.0

Appendix H.IV

Rational Method Analysis
Pre-Development Conditions
100-Year Storm

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2018 Version 9.0
Rational Hydrology Study Date: 10/27/22

JURUPA AND WILLOW
RATIONAL METHOD
100-YEAR STORM
PRE DEVELOPMENT - DMA A1

Program License Serial Number 6443

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.240 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 3

++
Process from Point/Station 1.100 to Point/Station 1.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 67.00
Adjusted SCS curve number for AMC 3 = 84.60
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.290(In/Hr)
Initial subarea data:
Initial area flow distance = 551.270(Ft.)
Top (of initial area) elevation = 977.730(Ft.)
Bottom (of initial area) elevation = 955.990(Ft.)
Difference in elevation = 21.740(Ft.)
Slope = 0.03944 s(%)= 3.94
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.518 min.
Rainfall intensity = 3.175(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.818
Subarea runoff = 5.973(CFS)
Total initial stream area = 2.300(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.290(In/Hr)
End of computations, Total Study Area = 2.30 (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 = 67.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2018 Version 9.0
Rational Hydrology Study Date: 10/27/22

JURUPA AND WILLOW
RATIONAL METHOD
100-YEAR STORM
PRE DEVELOPMENT - DMA A2

Program License Serial Number 6443

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.240 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 3

++
Process from Point/Station 2.100 to Point/Station 2.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 67.00
Adjusted SCS curve number for AMC 3 = 84.60
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.290(In/Hr)
Initial subarea data:
Initial area flow distance = 580.900(Ft.)
Top (of initial area) elevation = 981.800(Ft.)
Bottom (of initial area) elevation = 957.620(Ft.)
Difference in elevation = 24.180(Ft.)
Slope = 0.04163 s(%)= 4.16
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.645 min.
Rainfall intensity = 3.156(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.817
Subarea runoff = 11.015(CFS)
Total initial stream area = 4.270(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.290(In/Hr)
End of computations, Total Study Area = 4.27 (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 = 67.0

Appendix H.V

Rational Method Analysis
Post-Development Conditions
2-Year Storm

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2018 Version 9.0
Rational Hydrology Study Date: 03/30/23

JURUPA AND WILLOW
RATIONAL METHOD
2-YEAR STORM
POST DEVELOPMENT - DA A

Program License Serial Number 6443

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

Rational hydrology study storm event year is 2.0
Computed rainfall intensity:
Storm year = 2.00 1 hour rainfall = 0.508 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 1

++
Process from Point/Station 1.100 to Point/Station 1.200
**** INITIAL AREA EVALUATION ****

COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 1 = 16.60
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.100(In/Hr)
Initial subarea data:
Initial area flow distance = 275.700(Ft.)
Top (of initial area) elevation = 972.170(Ft.)
Bottom (of initial area) elevation = 958.070(Ft.)
Difference in elevation = 14.100(Ft.)
Slope = 0.05114 s(%)= 5.11
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 5.215 min.
Rainfall intensity = 2.200(In/Hr) for a 2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.859
Subarea runoff = 1.739(CFS)
Total initial stream area = 0.920(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.100(In/Hr)

++
Process from Point/Station 1.200 to Point/Station 2.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 953.570(Ft.)
Downstream point/station elevation = 952.950(Ft.)
Pipe length = 123.24(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.739(CFS)
Nearest computed pipe diameter = 12.00(In.)
Calculated individual pipe flow = 1.739(CFS)
Normal flow depth in pipe = 7.31(In.)
Flow top width inside pipe = 11.71(In.)
Critical Depth = 6.73(In.)

```
Pipe flow velocity =      3.47(Ft/s)
Travel time through pipe =    0.59 min.
Time of concentration (TC) =     5.81 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.300 to Point/Station        2.300
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.920(Ac.)
Runoff from this stream =      1.739(CFS)
Time of concentration =    5.81 min.
Rainfall intensity =     2.062(In/Hr)
Area averaged loss rate (Fm) =    0.1000(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.100 to Point/Station        2.200
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 1 = 16.60
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.100(In/Hr)
Initial subarea data:
Initial area flow distance =   186.220(Ft.)
Top (of initial area) elevation =   971.480(Ft.)
Bottom (of initial area) elevation =   959.250(Ft.)
Difference in elevation =    12.230(Ft.)
Slope =    0.06568  s(%)=       6.57
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    4.240 min.
Rainfall intensity =      2.491(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.864
Subarea runoff =      0.925(CFS)
Total initial stream area =        0.430(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.100(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.200 to Point/Station        2.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   954.750(Ft.)
Downstream point/station elevation =   952.950(Ft.)
Pipe length  =     7.52(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.925(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.925(CFS)
Normal flow depth in pipe =    2.40(In.)
Flow top width inside pipe =    5.88(In.)
Critical Depth =    5.57(In.)
Pipe flow velocity =     12.62(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =     4.25 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.300 to Point/Station        2.300
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
```

```
Stream flow area =      0.430(Ac.)
Runoff from this stream =      0.925(CFS)
Time of concentration =    4.25 min.
Rainfall intensity =     2.487(In/Hr)
Area averaged loss rate (Fm) =    0.1000(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      1.74     0.920      5.81    0.100      2.062
2      0.93     0.430      4.25    0.100      2.487
Qmax(1) =
           1.000 *    1.000 *     1.739) +
           0.822 *    1.000 *     0.925) + =       2.499
Qmax(2) =
           1.217 *    0.732 *     1.739) +
           1.000 *    1.000 *     0.925) + =       2.473

Total of 2 streams to confluence:
Flow rates before confluence point:
       1.739       0.925
Maximum flow rates at confluence using above data:
        2.499        2.473
Area of streams before confluence:
        0.920        0.430
Effective area values after confluence:
        1.350        1.103
Results of confluence:
Total flow rate =      2.499(CFS)
Time of concentration =     5.808 min.
Effective stream area after confluence =      1.350(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.100(In/Hr)
Study area total (this main stream) =       1.35(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.300 to Point/Station        3.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
____________________________________________________________________________
Upstream point/station elevation =   952.950(Ft.)
Downstream point/station elevation =   951.980(Ft.)
Pipe length  =   194.12(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.499(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.499(CFS)
Normal flow depth in pipe =    9.75(In.)
Flow top width inside pipe =    9.37(In.)
Critical Depth =    8.13(In.)
Pipe flow velocity =      3.66(Ft/s)
Travel time through pipe =    0.89 min.
Time of concentration (TC) =     6.69 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.300 to Point/Station        3.300
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.350(Ac.)
Runoff from this stream =      2.499(CFS)
Time of concentration =    6.69 min.
Rainfall intensity =     1.894(In/Hr)
Area averaged loss rate (Fm) =    0.1000(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.100 to Point/Station        3.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 1 = 16.60
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.100(In/Hr)
Initial subarea data:
Initial area flow distance =   249.450(Ft.)
Top (of initial area) elevation =   971.030(Ft.)
Bottom (of initial area) elevation =   958.500(Ft.)
Difference in elevation =    12.530(Ft.)
Slope =    0.05023  s(%)=       5.02
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    5.029 min.
Rainfall intensity =      2.248(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.860
Subarea runoff =      1.760(CFS)
Total initial stream area =        0.910(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.100(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.200 to Point/Station        3.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   954.000(Ft.)
Downstream point/station elevation =   951.980(Ft.)
Pipe length  =     7.71(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.760(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     1.760(CFS)
Normal flow depth in pipe =    3.39(In.)
Flow top width inside pipe =    5.95(In.)
Critical depth could not be calculated.
Pipe flow velocity =     15.36(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =     5.04 min.


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Process from Point/Station        3.300 to Point/Station        3.300
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.910(Ac.)
Runoff from this stream =      1.760(CFS)
Time of concentration =    5.04 min.
Rainfall intensity =     2.246(In/Hr)
Area averaged loss rate (Fm) =    0.1000(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      2.50     1.350      6.69    0.100      1.894
2      1.76     0.910      5.04    0.100      2.246
Qmax(1) =
           1.000 *    1.000 *     2.499) +
           0.836 *    1.000 *     1.760) + =       3.970
```

```
Qmax(2) =
          1.196 *    0.753 *     2.499) +
          1.000 *    1.000 *     1.760) + =       4.010

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.499       1.760
Maximum flow rates at confluence using above data:
        3.970        4.010
Area of streams before confluence:
        1.350        0.910
Effective area values after confluence:
        2.260        1.926
Results of confluence:
Total flow rate =      4.010(CFS)
Time of concentration =     5.037 min.
Effective stream area after confluence =      1.926(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.100(In/Hr)
Study area total (this main stream) =       2.26(Ac.)


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Process from Point/Station        3.300 to Point/Station        4.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   951.980(Ft.)
Downstream point/station elevation =   951.680(Ft.)
Pipe length  =    60.53(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.010(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.010(CFS)
Normal flow depth in pipe =   10.95(In.)
Flow top width inside pipe =   13.32(In.)
Critical Depth =    9.71(In.)
Pipe flow velocity =      4.18(Ft/s)
Travel time through pipe =    0.24 min.
Time of concentration (TC) =     5.28 min.


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Process from Point/Station        4.300 to Point/Station        4.300
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.926(Ac.)
Runoff from this stream =      4.010(CFS)
Time of concentration =    5.28 min.
Rainfall intensity =     2.184(In/Hr)
Area averaged loss rate (Fm) =    0.1000(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


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Process from Point/Station        4.100 to Point/Station        4.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 1 = 16.60
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.100(In/Hr)
Initial subarea data:
Initial area flow distance =   356.760(Ft.)
Top (of initial area) elevation =   967.690(Ft.)
Bottom (of initial area) elevation =   956.690(Ft.)
```

```
Difference in elevation =    11.000(Ft.)
Slope =    0.03083  s(%)=       3.08
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.398 min.
Rainfall intensity =      1.946(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.854
Subarea runoff =      0.781(CFS)
Total initial stream area =        0.470(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.100(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.200 to Point/Station        4.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   952.190(Ft.)
Downstream point/station elevation =   951.680(Ft.)
Pipe length  =    80.12(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.781(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     0.781(CFS)
Normal flow depth in pipe =    4.98(In.)
Flow top width inside pipe =    8.95(In.)
Critical Depth =    4.84(In.)
Pipe flow velocity =      3.11(Ft/s)
Travel time through pipe =    0.43 min.
Time of concentration (TC) =     6.83 min.


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Process from Point/Station        4.300 to Point/Station        4.300
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.470(Ac.)
Runoff from this stream =      0.781(CFS)
Time of concentration =    6.83 min.
Rainfall intensity =     1.872(In/Hr)
Area averaged loss rate (Fm) =    0.1000(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      4.01     1.926      5.28    0.100      2.184
2      0.78     0.470      6.83    0.100      1.872
Qmax(1) =
           1.000 *    1.000 *     4.010) +
           1.176 *    0.773 *     0.781) + =       4.720
Qmax(2) =
           0.850 *    1.000 *     4.010) +
           1.000 *    1.000 *     0.781) + =       4.190

Total of 2 streams to confluence:
Flow rates before confluence point:
       4.010       0.781
Maximum flow rates at confluence using above data:
        4.720        4.190
Area of streams before confluence:
        1.926        0.470
Effective area values after confluence:
        2.289        2.396
Results of confluence:
Total flow rate =      4.720(CFS)
Time of concentration =     5.278 min.
Effective stream area after confluence =      2.289(Ac.)
```

```
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.100(In/Hr)
Study area total (this main stream) =       2.40(Ac.)


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Process from Point/Station        4.300 to Point/Station        5.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   951.680(Ft.)
Downstream point/station elevation =   948.920(Ft.)
Pipe length  =   551.65(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.720(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     4.720(CFS)
Normal flow depth in pipe =   10.42(In.)
Flow top width inside pipe =   17.78(In.)
Critical Depth =   10.03(In.)
Pipe flow velocity =      4.45(Ft/s)
Travel time through pipe =    2.06 min.
Time of concentration (TC) =     7.34 min.


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Process from Point/Station        5.300 to Point/Station        5.300
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.289(Ac.)
Runoff from this stream =      4.720(CFS)
Time of concentration =    7.34 min.
Rainfall intensity =     1.792(In/Hr)
Area averaged loss rate (Fm) =    0.1000(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


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Process from Point/Station        5.100 to Point/Station        5.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 1 = 16.60
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.100(In/Hr)
Initial subarea data:
Initial area flow distance =   425.850(Ft.)
Top (of initial area) elevation =   974.220(Ft.)
Bottom (of initial area) elevation =   965.360(Ft.)
Difference in elevation =     8.860(Ft.)
Slope =    0.02081  s(%)=       2.08
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.429 min.
Rainfall intensity =      1.779(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.849
Subarea runoff =      3.853(CFS)
Total initial stream area =        2.550(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.100(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.200 to Point/Station        5.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   960.860(Ft.)
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Downstream point/station elevation =   948.920(Ft.)
Pipe length  =   102.81(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.853(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     3.853(CFS)
Normal flow depth in pipe =    5.46(In.)
Flow top width inside pipe =    8.79(In.)
Critical depth could not be calculated.
Pipe flow velocity =     13.74(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =     7.55 min.


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Process from Point/Station        5.300 to Point/Station        5.300
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.550(Ac.)
Runoff from this stream =      3.853(CFS)
Time of concentration =    7.55 min.
Rainfall intensity =     1.761(In/Hr)
Area averaged loss rate (Fm) =    0.1000(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      4.72     2.289      7.34    0.100      1.792
2      3.85     2.550      7.55    0.100      1.761
Qmax(1) =
           1.000 *    1.000 *     4.720) +
           1.018 *    0.972 *     3.853) + =       8.534
Qmax(2) =
           0.982 *    1.000 *     4.720) +
           1.000 *    1.000 *     3.853) + =       8.489

Total of 2 streams to confluence:
Flow rates before confluence point:
       4.720       3.853
Maximum flow rates at confluence using above data:
        8.534        8.489
Area of streams before confluence:
        2.289        2.550
Effective area values after confluence:
        4.768        4.839
Results of confluence:
Total flow rate =      8.534(CFS)
Time of concentration =     7.343 min.
Effective stream area after confluence =      4.768(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.100(In/Hr)
Study area total (this main stream) =       4.84(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.300 to Point/Station        6.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   948.920(Ft.)
Downstream point/station elevation =   948.460(Ft.)
Pipe length  =    92.17(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.534(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     8.534(CFS)
Normal flow depth in pipe =   13.73(In.)
Flow top width inside pipe =   19.98(In.)
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Critical Depth =   13.01(In.)
Pipe flow velocity =      5.12(Ft/s)
Travel time through pipe =    0.30 min.
Time of concentration (TC) =     7.64 min.


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Process from Point/Station        6.300 to Point/Station        6.300
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      4.768(Ac.)
Runoff from this stream =      8.534(CFS)
Time of concentration =    7.64 min.
Rainfall intensity =     1.749(In/Hr)
Area averaged loss rate (Fm) =    0.1000(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


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Process from Point/Station        6.100 to Point/Station        6.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 1 = 16.60
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.100(In/Hr)
Initial subarea data:
Initial area flow distance =   339.580(Ft.)
Top (of initial area) elevation =   973.050(Ft.)
Bottom (of initial area) elevation =   965.770(Ft.)
Difference in elevation =     7.280(Ft.)
Slope =    0.02144  s(%)=       2.14
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.745 min.
Rainfall intensity =      1.885(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.852
Subarea runoff =      2.073(CFS)
Total initial stream area =        1.290(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.100(In/Hr)


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Process from Point/Station        6.200 to Point/Station        6.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   961.270(Ft.)
Downstream point/station elevation =   948.460(Ft.)
Pipe length  =    10.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.073(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     2.073(CFS)
Normal flow depth in pipe =    2.36(In.)
Flow top width inside pipe =    5.86(In.)
Critical depth could not be calculated.
Pipe flow velocity =     28.92(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =     6.75 min.


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Process from Point/Station        6.300 to Point/Station        6.300
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
```

```
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.290(Ac.)
Runoff from this stream =      2.073(CFS)
Time of concentration =    6.75 min.
Rainfall intensity =     1.884(In/Hr)
Area averaged loss rate (Fm) =    0.1000(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      8.53     4.768      7.64    0.100      1.749
2      2.07     1.290      6.75    0.100      1.884
Qmax(1) =
           1.000 *    1.000 *     8.534) +
           0.924 *    1.000 *     2.073) + =      10.449
Qmax(2) =
           1.082 *    0.883 *     8.534) +
           1.000 *    1.000 *     2.073) + =      10.229

Total of 2 streams to confluence:
Flow rates before confluence point:
       8.534       2.073
Maximum flow rates at confluence using above data:
       10.449       10.229
Area of streams before confluence:
        4.768        1.290
Effective area values after confluence:
        6.058        5.502
Results of confluence:
Total flow rate =     10.449(CFS)
Time of concentration =     7.643 min.
Effective stream area after confluence =      6.058(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.100(In/Hr)
Study area total (this main stream) =       6.06(Ac.)


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Process from Point/Station        6.300 to Point/Station        6.400
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   948.460(Ft.)
Downstream point/station elevation =   948.360(Ft.)
Pipe length  =    20.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.449(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    10.449(CFS)
Normal flow depth in pipe =   16.08(In.)
Flow top width inside pipe =   17.79(In.)
Critical Depth =   14.45(In.)
Pipe flow velocity =      5.29(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =     7.71 min.
End of computations, Total Study Area =            6.57 (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 =  32.0
```

Appendix H.V

Rational Method Analysis
Post-Development Conditions
10-Year Storm

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2018 Version 9.0
Rational Hydrology Study Date: 03/31/23

JURUPA AND WILLOW
RATIONAL METHOD
10-YEAR STORM
POST DEVELOPMENT - DA A

Program License Serial Number 6443

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.787 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 1.100 to Point/Station 1.200
**** INITIAL AREA EVALUATION ****

COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.098(In/Hr)
Initial subarea data:
Initial area flow distance = 275.700(Ft.)
Top (of initial area) elevation = 972.170(Ft.)
Bottom (of initial area) elevation = 958.070(Ft.)
Difference in elevation = 14.100(Ft.)
Slope = 0.05114 s(%)= 5.11
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 5.215 min.
Rainfall intensity = 3.408(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.874
Subarea runoff = 2.741(CFS)
Total initial stream area = 0.920(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.098(In/Hr)

++

Process from Point/Station 1.200 to Point/Station 2.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 953.570(Ft.)
Downstream point/station elevation = 952.950(Ft.)
Pipe length = 123.24(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.741(CFS)
Nearest computed pipe diameter = 15.00(In.)
Calculated individual pipe flow = 2.741(CFS)
Normal flow depth in pipe = 8.36(In.)
Flow top width inside pipe = 14.90(In.)
Critical Depth = 7.98(In.)
Pipe flow velocity = 3.90(Ft/s)

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Travel time through pipe =    0.53 min.
Time of concentration (TC) =     5.74 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.300 to Point/Station        2.300
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.920(Ac.)
Runoff from this stream =      2.741(CFS)
Time of concentration =    5.74 min.
Rainfall intensity =     3.217(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


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Process from Point/Station        2.100 to Point/Station        2.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =   186.220(Ft.)
Top (of initial area) elevation =   971.480(Ft.)
Bottom (of initial area) elevation =   959.250(Ft.)
Difference in elevation =    12.230(Ft.)
Slope =    0.06568  s(%)=       6.57
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    4.240 min.
Rainfall intensity =      3.859(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.877
Subarea runoff =      1.455(CFS)
Total initial stream area =        0.430(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


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Process from Point/Station        2.200 to Point/Station        2.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   954.750(Ft.)
Downstream point/station elevation =   952.950(Ft.)
Pipe length  =     7.52(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.455(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     1.455(CFS)
Normal flow depth in pipe =    3.11(In.)
Flow top width inside pipe =    6.00(In.)
Critical depth could not be calculated.
Pipe flow velocity =     14.18(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =     4.25 min.


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Process from Point/Station        2.300 to Point/Station        2.300
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.430(Ac.)
Runoff from this stream =      1.455(CFS)
```

```
Time of concentration =    4.25 min.
Rainfall intensity =     3.854(In/Hr)
Area averaged loss rate (Fm) =    0.0978(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      2.74     0.920      5.74    0.098      3.217
2      1.46     0.430      4.25    0.098      3.854
Qmax(1) =
           1.000 *    1.000 *     2.741) +
           0.830 *    1.000 *     1.455) + =       3.949
Qmax(2) =
           1.204 *    0.740 *     2.741) +
           1.000 *    1.000 *     1.455) + =       3.898

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.741       1.455
Maximum flow rates at confluence using above data:
        3.949        3.898
Area of streams before confluence:
        0.920        0.430
Effective area values after confluence:
        1.350        1.111
Results of confluence:
Total flow rate =      3.949(CFS)
Time of concentration =     5.742 min.
Effective stream area after confluence =      1.350(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.098(In/Hr)
Study area total (this main stream) =       1.35(Ac.)


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Process from Point/Station        2.300 to Point/Station        3.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
____________________________________________________________________________
Upstream point/station elevation =   952.950(Ft.)
Downstream point/station elevation =   951.980(Ft.)
Pipe length  =   194.12(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.949(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.949(CFS)
Normal flow depth in pipe =   10.77(In.)
Flow top width inside pipe =   13.50(In.)
Critical Depth =    9.64(In.)
Pipe flow velocity =      4.19(Ft/s)
Travel time through pipe =    0.77 min.
Time of concentration (TC) =     6.51 min.


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Process from Point/Station        3.300 to Point/Station        3.300
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.350(Ac.)
Runoff from this stream =      3.949(CFS)
Time of concentration =    6.51 min.
Rainfall intensity =     2.982(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


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Process from Point/Station        3.100 to Point/Station        3.200
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =   249.450(Ft.)
Top (of initial area) elevation =   971.030(Ft.)
Bottom (of initial area) elevation =   958.500(Ft.)
Difference in elevation =    12.530(Ft.)
Slope =    0.05023  s(%)=       5.02
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    5.029 min.
Rainfall intensity =      3.483(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.875
Subarea runoff =      2.773(CFS)
Total initial stream area =        0.910(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


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Process from Point/Station        3.200 to Point/Station        3.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________
Upstream point/station elevation =   954.000(Ft.)
Downstream point/station elevation =   951.980(Ft.)
Pipe length  =     7.71(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.773(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     2.773(CFS)
Normal flow depth in pipe =    4.74(In.)
Flow top width inside pipe =    4.89(In.)
Critical depth could not be calculated.
Pipe flow velocity =     16.66(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =     5.04 min.


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Process from Point/Station        3.300 to Point/Station        3.300
**** CONFLUENCE OF MINOR STREAMS ****
_____________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.910(Ac.)
Runoff from this stream =      2.773(CFS)
Time of concentration =    5.04 min.
Rainfall intensity =     3.480(In/Hr)
Area averaged loss rate (Fm) =    0.0978(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      3.95     1.350      6.51    0.098      2.982
2      2.77     0.910      5.04    0.098      3.480
Qmax(1) =
           1.000 *    1.000 *     3.949) +
           0.853 *    1.000 *     2.773) + =       6.314
Qmax(2) =
           1.173 *    0.773 *     3.949) +
           1.000 *    1.000 *     2.773) + =       6.353
```

```
Total of 2 streams to confluence:
Flow rates before confluence point:
       3.949       2.773
Maximum flow rates at confluence using above data:
        6.314        6.353
Area of streams before confluence:
        1.350        0.910
Effective area values after confluence:
        2.260        1.954
Results of confluence:
Total flow rate =      6.353(CFS)
Time of concentration =     5.037 min.
Effective stream area after confluence =      1.954(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.098(In/Hr)
Study area total (this main stream) =       2.26(Ac.)


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Process from Point/Station        3.300 to Point/Station        4.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   951.980(Ft.)
Downstream point/station elevation =   951.680(Ft.)
Pipe length  =    60.53(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.353(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.353(CFS)
Normal flow depth in pipe =   12.86(In.)
Flow top width inside pipe =   16.26(In.)
Critical Depth =   11.69(In.)
Pipe flow velocity =      4.71(Ft/s)
Travel time through pipe =    0.21 min.
Time of concentration (TC) =     5.25 min.


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Process from Point/Station        4.300 to Point/Station        4.300
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.954(Ac.)
Runoff from this stream =      6.353(CFS)
Time of concentration =    5.25 min.
Rainfall intensity =     3.394(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


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Process from Point/Station        4.100 to Point/Station        4.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =   356.760(Ft.)
Top (of initial area) elevation =   967.690(Ft.)
Bottom (of initial area) elevation =   956.690(Ft.)
Difference in elevation =    11.000(Ft.)
Slope =    0.03083  s(%)=       3.08
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.398 min.
```

```
Rainfall intensity =      3.015(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.871
Subarea runoff =      1.234(CFS)
Total initial stream area =        0.470(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


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Process from Point/Station        4.200 to Point/Station        4.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   952.190(Ft.)
Downstream point/station elevation =   951.680(Ft.)
Pipe length  =    80.12(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.234(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.234(CFS)
Normal flow depth in pipe =    6.90(In.)
Flow top width inside pipe =    7.61(In.)
Critical Depth =    6.14(In.)
Pipe flow velocity =      3.40(Ft/s)
Travel time through pipe =    0.39 min.
Time of concentration (TC) =     6.79 min.


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Process from Point/Station        4.300 to Point/Station        4.300
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.470(Ac.)
Runoff from this stream =      1.234(CFS)
Time of concentration =    6.79 min.
Rainfall intensity =     2.909(In/Hr)
Area averaged loss rate (Fm) =    0.0978(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      6.35     1.954      5.25    0.098      3.394
2      1.23     0.470      6.79    0.098      2.909
Qmax(1) =
           1.000 *    1.000 *     6.353) +
           1.173 *    0.773 *     1.234) + =       7.472
Qmax(2) =
           0.853 *    1.000 *     6.353) +
           1.000 *    1.000 *     1.234) + =       6.652

Total of 2 streams to confluence:
Flow rates before confluence point:
       6.353       1.234
Maximum flow rates at confluence using above data:
        7.472        6.652
Area of streams before confluence:
        1.954        0.470
Effective area values after confluence:
        2.317        2.424
Results of confluence:
Total flow rate =      7.472(CFS)
Time of concentration =     5.251 min.
Effective stream area after confluence =      2.317(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.098(In/Hr)
Study area total (this main stream) =       2.42(Ac.)
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Process from Point/Station        4.300 to Point/Station        5.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   951.680(Ft.)
Downstream point/station elevation =   948.920(Ft.)
Pipe length  =   551.65(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.472(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     7.472(CFS)
Normal flow depth in pipe =   12.54(In.)
Flow top width inside pipe =   20.60(In.)
Critical Depth =   12.16(In.)
Pipe flow velocity =      4.99(Ft/s)
Travel time through pipe =    1.84 min.
Time of concentration (TC) =     7.09 min.


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Process from Point/Station        5.300 to Point/Station        5.300
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.317(Ac.)
Runoff from this stream =      7.472(CFS)
Time of concentration =    7.09 min.
Rainfall intensity =     2.834(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


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Process from Point/Station        5.100 to Point/Station        5.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =   425.850(Ft.)
Top (of initial area) elevation =   974.220(Ft.)
Bottom (of initial area) elevation =   965.360(Ft.)
Difference in elevation =     8.860(Ft.)
Slope =    0.02081  s(%)=       2.08
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.429 min.
Rainfall intensity =      2.756(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.868
Subarea runoff =      6.101(CFS)
Total initial stream area =        2.550(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


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Process from Point/Station        5.200 to Point/Station        5.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   960.860(Ft.)
Downstream point/station elevation =   948.920(Ft.)
Pipe length  =   102.81(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.101(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     6.101(CFS)
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Normal flow depth in pipe =    6.02(In.)
Flow top width inside pipe =   12.00(In.)
Critical depth could not be calculated.
Pipe flow velocity =     15.48(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =     7.54 min.


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Process from Point/Station        5.300 to Point/Station        5.300
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.550(Ac.)
Runoff from this stream =      6.101(CFS)
Time of concentration =    7.54 min.
Rainfall intensity =     2.732(In/Hr)
Area averaged loss rate (Fm) =    0.0978(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      7.47     2.317      7.09    0.098      2.834
2      6.10     2.550      7.54    0.098      2.732
Qmax(1) =
           1.000 *    1.000 *     7.472) +
           1.039 *    0.941 *     6.101) + =      13.434
Qmax(2) =
           0.963 *    1.000 *     7.472) +
           1.000 *    1.000 *     6.101) + =      13.295

Total of 2 streams to confluence:
Flow rates before confluence point:
       7.472       6.101
Maximum flow rates at confluence using above data:
       13.434       13.295
Area of streams before confluence:
        2.317        2.550
Effective area values after confluence:
        4.716        4.867
Results of confluence:
Total flow rate =     13.434(CFS)
Time of concentration =     7.094 min.
Effective stream area after confluence =      4.716(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.098(In/Hr)
Study area total (this main stream) =       4.87(Ac.)


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Process from Point/Station        5.300 to Point/Station        6.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   948.920(Ft.)
Downstream point/station elevation =   948.460(Ft.)
Pipe length  =    92.17(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    13.434(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    13.434(CFS)
Normal flow depth in pipe =   16.85(In.)
Flow top width inside pipe =   21.95(In.)
Critical Depth =   15.84(In.)
Pipe flow velocity =      5.70(Ft/s)
Travel time through pipe =    0.27 min.
Time of concentration (TC) =     7.36 min.
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Process from Point/Station        6.300 to Point/Station        6.300
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      4.716(Ac.)
Runoff from this stream =     13.434(CFS)
Time of concentration =    7.36 min.
Rainfall intensity =     2.771(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


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Process from Point/Station        6.100 to Point/Station        6.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =   339.580(Ft.)
Top (of initial area) elevation =   973.050(Ft.)
Bottom (of initial area) elevation =   965.770(Ft.)
Difference in elevation =     7.280(Ft.)
Slope =    0.02144  s(%)=       2.14
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.745 min.
Rainfall intensity =      2.921(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.870
Subarea runoff =      3.277(CFS)
Total initial stream area =        1.290(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


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Process from Point/Station        6.200 to Point/Station        6.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   961.270(Ft.)
Downstream point/station elevation =   948.460(Ft.)
Pipe length  =    10.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.277(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     3.277(CFS)
Normal flow depth in pipe =    3.06(In.)
Flow top width inside pipe =    6.00(In.)
Critical depth could not be calculated.
Pipe flow velocity =     32.59(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =     6.75 min.


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Process from Point/Station        6.300 to Point/Station        6.300
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.290(Ac.)
Runoff from this stream =      3.277(CFS)
Time of concentration =    6.75 min.
Rainfall intensity =     2.919(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
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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     13.43     4.716      7.36    0.098      2.771
2      3.28     1.290      6.75    0.098      2.919
Qmax(1) =
           1.000 *    1.000 *    13.434) +
           0.947 *    1.000 *     3.277) + =      16.539
Qmax(2) =
           1.055 *    0.917 *    13.434) +
           1.000 *    1.000 *     3.277) + =      16.276

Total of 2 streams to confluence:
Flow rates before confluence point:
      13.434       3.277
Maximum flow rates at confluence using above data:
       16.539       16.276
Area of streams before confluence:
        4.716        1.290
Effective area values after confluence:
        6.006        5.614
Results of confluence:
Total flow rate =     16.539(CFS)
Time of concentration =     7.363 min.
Effective stream area after confluence =      6.006(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.098(In/Hr)
Study area total (this main stream) =       6.01(Ac.)


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Process from Point/Station        6.300 to Point/Station        6.400
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   948.460(Ft.)
Downstream point/station elevation =   948.360(Ft.)
Pipe length  =    20.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    16.539(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    16.539(CFS)
Normal flow depth in pipe =   17.53(In.)
Flow top width inside pipe =   25.77(In.)
Critical Depth =   17.02(In.)
Pipe flow velocity =      6.05(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =     7.42 min.
End of computations, Total Study Area =            6.57 (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 =  32.0
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Appendix H.VI

Rational Method Analysis
Post-Development Conditions
100-Year Storm

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2018 Version 9.0
Rational Hydrology Study Date: 03/30/23

JURUPA AND WILLOW
RATIONAL METHOD
100-YEAR STORM
POST DEVELOPMENT - DA A

Program License Serial Number 6443

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.240 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 3

++
Process from Point/Station 1.100 to Point/Station 1.200
**** INITIAL AREA EVALUATION ****

COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.079(In/Hr)
Initial subarea data:
Initial area flow distance = 275.700(Ft.)
Top (of initial area) elevation = 972.170(Ft.)
Bottom (of initial area) elevation = 958.070(Ft.)
Difference in elevation = 14.100(Ft.)
Slope = 0.05114 s(%)= 5.11
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 5.215 min.
Rainfall intensity = 5.370(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.887
Subarea runoff = 4.381(CFS)
Total initial stream area = 0.920(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.079(In/Hr)

++
Process from Point/Station 1.200 to Point/Station 2.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 953.570(Ft.)
Downstream point/station elevation = 952.950(Ft.)
Pipe length = 123.24(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 4.381(CFS)
Nearest computed pipe diameter = 15.00(In.)
Calculated individual pipe flow = 4.381(CFS)
Normal flow depth in pipe = 11.74(In.)
Flow top width inside pipe = 12.37(In.)
Critical Depth = 10.18(In.)

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Pipe flow velocity =      4.25(Ft/s)
Travel time through pipe =    0.48 min.
Time of concentration (TC) =     5.70 min.


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Process from Point/Station        2.300 to Point/Station        2.300
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.920(Ac.)
Runoff from this stream =      4.381(CFS)
Time of concentration =    5.70 min.
Rainfall intensity =     5.092(In/Hr)
Area averaged loss rate (Fm) =    0.0785(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


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Process from Point/Station        2.100 to Point/Station        2.200
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.079(In/Hr)
Initial subarea data:
Initial area flow distance =   186.220(Ft.)
Top (of initial area) elevation =   971.480(Ft.)
Bottom (of initial area) elevation =   959.250(Ft.)
Difference in elevation =    12.230(Ft.)
Slope =    0.06568  s(%)=       6.57
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    4.240 min.
Rainfall intensity =      6.080(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.888
Subarea runoff =      2.322(CFS)
Total initial stream area =        0.430(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.079(In/Hr)


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Process from Point/Station        2.200 to Point/Station        2.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   954.750(Ft.)
Downstream point/station elevation =   952.950(Ft.)
Pipe length  =     7.52(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.322(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     2.322(CFS)
Normal flow depth in pipe =    4.23(In.)
Flow top width inside pipe =    5.47(In.)
Critical depth could not be calculated.
Pipe flow velocity =     15.68(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =     4.25 min.


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Process from Point/Station        2.300 to Point/Station        2.300
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
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Stream flow area =      0.430(Ac.)
Runoff from this stream =      2.322(CFS)
Time of concentration =    4.25 min.
Rainfall intensity =     6.073(In/Hr)
Area averaged loss rate (Fm) =    0.0785(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      4.38     0.920      5.70    0.079      5.092
2      2.32     0.430      4.25    0.079      6.073
Qmax(1) =
           1.000 *    1.000 *     4.381) +
           0.836 *    1.000 *     2.322) + =       6.323
Qmax(2) =
           1.196 *    0.746 *     4.381) +
           1.000 *    1.000 *     2.322) + =       6.228

Total of 2 streams to confluence:
Flow rates before confluence point:
       4.381       2.322
Maximum flow rates at confluence using above data:
        6.323        6.228
Area of streams before confluence:
        0.920        0.430
Effective area values after confluence:
        1.350        1.116
Results of confluence:
Total flow rate =      6.323(CFS)
Time of concentration =     5.699 min.
Effective stream area after confluence =      1.350(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.079(In/Hr)
Study area total (this main stream) =       1.35(Ac.)


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Process from Point/Station        2.300 to Point/Station        3.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   952.950(Ft.)
Downstream point/station elevation =   951.980(Ft.)
Pipe length  =   194.12(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.323(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.323(CFS)
Normal flow depth in pipe =   12.77(In.)
Flow top width inside pipe =   16.34(In.)
Critical Depth =   11.66(In.)
Pipe flow velocity =      4.72(Ft/s)
Travel time through pipe =    0.69 min.
Time of concentration (TC) =     6.38 min.


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Process from Point/Station        3.300 to Point/Station        3.300
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.350(Ac.)
Runoff from this stream =      6.323(CFS)
Time of concentration =    6.38 min.
Rainfall intensity =     4.756(In/Hr)
Area averaged loss rate (Fm) =    0.0785(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
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Process from Point/Station        3.100 to Point/Station        3.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.079(In/Hr)
Initial subarea data:
Initial area flow distance =   249.450(Ft.)
Top (of initial area) elevation =   971.030(Ft.)
Bottom (of initial area) elevation =   958.500(Ft.)
Difference in elevation =    12.530(Ft.)
Slope =    0.05023  s(%)=       5.02
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    5.029 min.
Rainfall intensity =      5.488(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.887
Subarea runoff =      4.431(CFS)
Total initial stream area =        0.910(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.079(In/Hr)


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Process from Point/Station        3.200 to Point/Station        3.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   954.000(Ft.)
Downstream point/station elevation =   951.980(Ft.)
Pipe length  =     7.71(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.431(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     4.431(CFS)
Normal flow depth in pipe =    4.62(In.)
Flow top width inside pipe =    9.00(In.)
Critical depth could not be calculated.
Pipe flow velocity =     19.39(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =     5.04 min.


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Process from Point/Station        3.300 to Point/Station        3.300
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.910(Ac.)
Runoff from this stream =      4.431(CFS)
Time of concentration =    5.04 min.
Rainfall intensity =     5.484(In/Hr)
Area averaged loss rate (Fm) =    0.0785(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      6.32     1.350      6.38    0.079      4.756
2      4.43     0.910      5.04    0.079      5.484
Qmax(1) =
           1.000 *    1.000 *     6.323) +
           0.865 *    1.000 *     4.431) + =      10.157
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```
Qmax(2) =
          1.156 *    0.789 *     6.323) +
          1.000 *    1.000 *     4.431) + =      10.194

Total of 2 streams to confluence:
Flow rates before confluence point:
       6.323       4.431
Maximum flow rates at confluence using above data:
       10.157       10.194
Area of streams before confluence:
        1.350        0.910
Effective area values after confluence:
        2.260        1.975
Results of confluence:
Total flow rate =     10.194(CFS)
Time of concentration =     5.036 min.
Effective stream area after confluence =      1.975(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.079(In/Hr)
Study area total (this main stream) =       2.26(Ac.)


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Process from Point/Station        3.300 to Point/Station        4.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   951.980(Ft.)
Downstream point/station elevation =   951.680(Ft.)
Pipe length  =    60.53(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.194(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    10.194(CFS)
Normal flow depth in pipe =   15.77(In.)
Flow top width inside pipe =   18.16(In.)
Critical Depth =   14.26(In.)
Pipe flow velocity =      5.26(Ft/s)
Travel time through pipe =    0.19 min.
Time of concentration (TC) =     5.23 min.


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Process from Point/Station        4.300 to Point/Station        4.300
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.975(Ac.)
Runoff from this stream =     10.194(CFS)
Time of concentration =    5.23 min.
Rainfall intensity =     5.362(In/Hr)
Area averaged loss rate (Fm) =    0.0785(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


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Process from Point/Station        4.100 to Point/Station        4.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.079(In/Hr)
Initial subarea data:
Initial area flow distance =   356.760(Ft.)
Top (of initial area) elevation =   967.690(Ft.)
Bottom (of initial area) elevation =   956.690(Ft.)
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```
Difference in elevation =    11.000(Ft.)
Slope =    0.03083  s(%)=       3.08
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.398 min.
Rainfall intensity =      4.750(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.885
Subarea runoff =      1.976(CFS)
Total initial stream area =        0.470(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.079(In/Hr)


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Process from Point/Station        4.200 to Point/Station        4.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   952.190(Ft.)
Downstream point/station elevation =   951.680(Ft.)
Pipe length  =    80.12(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.976(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     1.976(CFS)
Normal flow depth in pipe =    7.36(In.)
Flow top width inside pipe =   11.69(In.)
Critical Depth =    7.19(In.)
Pipe flow velocity =      3.91(Ft/s)
Travel time through pipe =    0.34 min.
Time of concentration (TC) =     6.74 min.


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Process from Point/Station        4.300 to Point/Station        4.300
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.470(Ac.)
Runoff from this stream =      1.976(CFS)
Time of concentration =    6.74 min.
Rainfall intensity =     4.604(In/Hr)
Area averaged loss rate (Fm) =    0.0785(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     10.19     1.975      5.23    0.079      5.362
2      1.98     0.470      6.74    0.079      4.604
Qmax(1) =
           1.000 *    1.000 *    10.194) +
           1.168 *    0.776 *     1.976) + =      11.983
Qmax(2) =
           0.857 *    1.000 *    10.194) +
           1.000 *    1.000 *     1.976) + =      10.707

Total of 2 streams to confluence:
Flow rates before confluence point:
      10.194       1.976
Maximum flow rates at confluence using above data:
       11.983       10.707
Area of streams before confluence:
        1.975        0.470
Effective area values after confluence:
        2.339        2.445
Results of confluence:
Total flow rate =     11.983(CFS)
Time of concentration =     5.227 min.
Effective stream area after confluence =      2.339(Ac.)
```

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Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.079(In/Hr)
Study area total (this main stream) =       2.44(Ac.)


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Process from Point/Station        4.300 to Point/Station        5.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   951.680(Ft.)
Downstream point/station elevation =   948.920(Ft.)
Pipe length  =   551.65(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.983(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    11.983(CFS)
Normal flow depth in pipe =   15.49(In.)
Flow top width inside pipe =   22.96(In.)
Critical Depth =   14.93(In.)
Pipe flow velocity =      5.59(Ft/s)
Travel time through pipe =    1.65 min.
Time of concentration (TC) =     6.87 min.


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Process from Point/Station        5.300 to Point/Station        5.300
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.339(Ac.)
Runoff from this stream =     11.983(CFS)
Time of concentration =    6.87 min.
Rainfall intensity =     4.550(In/Hr)
Area averaged loss rate (Fm) =    0.0785(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.100 to Point/Station        5.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.079(In/Hr)
Initial subarea data:
Initial area flow distance =   425.850(Ft.)
Top (of initial area) elevation =   974.220(Ft.)
Bottom (of initial area) elevation =   965.360(Ft.)
Difference in elevation =     8.860(Ft.)
Slope =    0.02081  s(%)=       2.08
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.429 min.
Rainfall intensity =      4.343(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.884
Subarea runoff =      9.786(CFS)
Total initial stream area =        2.550(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.079(In/Hr)


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Process from Point/Station        5.200 to Point/Station        5.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   960.860(Ft.)
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Downstream point/station elevation =   948.920(Ft.)
Pipe length  =   102.81(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.786(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     9.786(CFS)
Normal flow depth in pipe =    8.17(In.)
Flow top width inside pipe =   11.19(In.)
Critical depth could not be calculated.
Pipe flow velocity =     17.20(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =     7.53 min.


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Process from Point/Station        5.300 to Point/Station        5.300
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.550(Ac.)
Runoff from this stream =      9.786(CFS)
Time of concentration =    7.53 min.
Rainfall intensity =     4.308(In/Hr)
Area averaged loss rate (Fm) =    0.0785(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     11.98     2.339      6.87    0.079      4.550
2      9.79     2.550      7.53    0.079      4.308
Qmax(1) =
           1.000 *    1.000 *    11.983) +
           1.057 *    0.913 *     9.786) + =      21.428
Qmax(2) =
           0.946 *    1.000 *    11.983) +
           1.000 *    1.000 *     9.786) + =      21.120

Total of 2 streams to confluence:
Flow rates before confluence point:
      11.983       9.786
Maximum flow rates at confluence using above data:
       21.428       21.120
Area of streams before confluence:
        2.339        2.550
Effective area values after confluence:
        4.667        4.889
Results of confluence:
Total flow rate =     21.428(CFS)
Time of concentration =     6.873 min.
Effective stream area after confluence =      4.667(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.079(In/Hr)
Study area total (this main stream) =       4.89(Ac.)


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Process from Point/Station        5.300 to Point/Station        6.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   948.920(Ft.)
Downstream point/station elevation =   948.460(Ft.)
Pipe length  =    92.17(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    21.428(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    21.428(CFS)
Normal flow depth in pipe =   21.66(In.)
Flow top width inside pipe =   21.52(In.)
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Critical Depth =   19.45(In.)
Pipe flow velocity =      6.27(Ft/s)
Travel time through pipe =    0.24 min.
Time of concentration (TC) =     7.12 min.


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Process from Point/Station        6.300 to Point/Station        6.300
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      4.667(Ac.)
Runoff from this stream =     21.428(CFS)
Time of concentration =    7.12 min.
Rainfall intensity =     4.456(In/Hr)
Area averaged loss rate (Fm) =    0.0785(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


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Process from Point/Station        6.100 to Point/Station        6.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.079(In/Hr)
Initial subarea data:
Initial area flow distance =   339.580(Ft.)
Top (of initial area) elevation =   973.050(Ft.)
Bottom (of initial area) elevation =   965.770(Ft.)
Difference in elevation =     7.280(Ft.)
Slope =    0.02144  s(%)=       2.14
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.745 min.
Rainfall intensity =      4.602(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.885
Subarea runoff =      5.251(CFS)
Total initial stream area =        1.290(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.079(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        6.200 to Point/Station        6.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   961.270(Ft.)
Downstream point/station elevation =   948.460(Ft.)
Pipe length  =    10.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.251(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     5.251(CFS)
Normal flow depth in pipe =    4.16(In.)
Flow top width inside pipe =    5.53(In.)
Critical depth could not be calculated.
Pipe flow velocity =     36.14(Ft/s)
Travel time through pipe =    0.00 min.
Time of concentration (TC) =     6.75 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        6.300 to Point/Station        6.300
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
```

```
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.290(Ac.)
Runoff from this stream =      5.251(CFS)
Time of concentration =    6.75 min.
Rainfall intensity =     4.600(In/Hr)
Area averaged loss rate (Fm) =    0.0785(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     21.43     4.667      7.12    0.079      4.456
2      5.25     1.290      6.75    0.079      4.600
Qmax(1) =
           1.000 *    1.000 *    21.428) +
           0.968 *    1.000 *     5.251) + =      26.512
Qmax(2) =
           1.033 *    0.948 *    21.428) +
           1.000 *    1.000 *     5.251) + =      26.242

Total of 2 streams to confluence:
Flow rates before confluence point:
      21.428       5.251
Maximum flow rates at confluence using above data:
       26.512       26.242
Area of streams before confluence:
        4.667        1.290
Effective area values after confluence:
        5.957        5.716
Results of confluence:
Total flow rate =     26.512(CFS)
Time of concentration =     7.118 min.
Effective stream area after confluence =      5.957(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.079(In/Hr)
Study area total (this main stream) =       5.96(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        6.300 to Point/Station        6.400
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   948.460(Ft.)
Downstream point/station elevation =   948.360(Ft.)
Pipe length  =    20.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    26.512(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    26.512(CFS)
Normal flow depth in pipe =   22.55(In.)
Flow top width inside pipe =   25.93(In.)
Critical Depth =   21.07(In.)
Pipe flow velocity =      6.70(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =     7.17 min.
End of computations, Total Study Area =            6.57 (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 =  32.0
```

Appendix I

Synthetic Unit Hydrograph Method Analysis

Appendix I.I

Synthetic Unit Hydrograph Method Analysis
Pre-Development Conditions
2-Year Storm

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

Study date 10/27/22

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

Program License Serial Number 6443

JURUPA AND WILLOW
UNIT HYDROGRAPH
2-YEAR STORM
PRE DEVELOPMENT - DMA A1

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 10	2.30	1	0.79
Rainfall data for year 2	2.30	6	1.26
Rainfall data for year 2	2.30	24	2.27
Rainfall data for year 100	2.30	1	1.24
Rainfall data for year 100	2.30	6	2.93
Rainfall data for year 100	2.30	24	5.35

++

******** 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)
67.0	47.4	2.30	1.000	0.840	1.000	0.840

Area-averaged adjusted loss rate Fm (In/Hr) = 0.840

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC1)	S	Pervious Yield Fr
2.30	1.000	67.0	47.4	11.10	0.000

Area-averaged catchment yield fraction, Y = 0.000
Area-averaged low loss fraction, Yb = 1.000
User entry of time of concentration = 0.209 (hours)
++
Watershed area = 2.30(Ac.)
Catchment Lag time = 0.167 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 49.8405
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.840(In/Hr)
Average low loss rate fraction (Yb) = 1.000 (decimal)
VALLEY UNDEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.174(In)
Computed peak 30-minute rainfall = 0.356(In)
Specified peak 1-hour rainfall = 0.470(In)
Computed peak 3-hour rainfall = 0.861(In)
Specified peak 6-hour rainfall = 1.260(In)
Specified peak 24-hour rainfall = 2.270(In)

Rainfall depth area reduction factors:
Using a total area of 2.30(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.174(In)
30-minute factor = 1.000 Adjusted rainfall = 0.356(In)
1-hour factor = 1.000 Adjusted rainfall = 0.470(In)
3-hour factor = 1.000 Adjusted rainfall = 0.861(In)
6-hour factor = 1.000 Adjusted rainfall = 1.260(In)
24-hour factor = 1.000 Adjusted rainfall = 2.270(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 = 27.82 (CFS))	
1	6.095	1.695
2	32.108	7.236
3	60.973	8.029
4	73.986	3.620
5	80.796	1.894
6	85.530	1.317
7	88.938	0.948
8	91.547	0.726
9	93.456	0.531
10	95.005	0.431
11	96.313	0.364
12	97.317	0.279
13	98.122	0.224
14	98.728	0.169
15	99.227	0.139
16	99.725	0.139
17	100.000	0.076

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.1741	0.1741
2	0.2297	0.0556
3	0.2701	0.0404
4	0.3031	0.0329
5	0.3314	0.0283

6	0.3564	0.0251
7	0.3791	0.0227
8	0.3999	0.0208
9	0.4192	0.0193
10	0.4372	0.0180
11	0.4542	0.0170
12	0.4703	0.0161
13	0.4915	0.0212
14	0.5119	0.0204
15	0.5317	0.0198
16	0.5509	0.0192
17	0.5696	0.0187
18	0.5878	0.0182
19	0.6056	0.0177
20	0.6229	0.0173
21	0.6398	0.0169
22	0.6564	0.0166
23	0.6727	0.0162
24	0.6886	0.0159
25	0.7042	0.0156
26	0.7196	0.0154
27	0.7347	0.0151
28	0.7495	0.0148
29	0.7641	0.0146
30	0.7785	0.0144
31	0.7927	0.0142
32	0.8066	0.0140
33	0.8204	0.0138
34	0.8340	0.0136
35	0.8474	0.0134
36	0.8606	0.0132
37	0.8737	0.0131
38	0.8866	0.0129
39	0.8994	0.0128
40	0.9120	0.0126
41	0.9244	0.0125
42	0.9368	0.0123
43	0.9490	0.0122
44	0.9610	0.0121
45	0.9730	0.0120
46	0.9848	0.0118
47	0.9965	0.0117
48	1.0082	0.0116
49	1.0197	0.0115
50	1.0310	0.0114
51	1.0423	0.0113
52	1.0535	0.0112
53	1.0646	0.0111
54	1.0756	0.0110
55	1.0865	0.0109
56	1.0973	0.0108
57	1.1081	0.0107
58	1.1187	0.0106
59	1.1293	0.0106
60	1.1398	0.0105
61	1.1502	0.0104
62	1.1605	0.0103
63	1.1708	0.0103
64	1.1810	0.0102
65	1.1911	0.0101
66	1.2011	0.0100
67	1.2111	0.0100
68	1.2210	0.0099
69	1.2308	0.0098
70	1.2406	0.0098
71	1.2503	0.0097
72	1.2600	0.0097
73	1.2674	0.0074
74	1.2747	0.0073

75	1.2820	0.0073
76	1.2893	0.0072
77	1.2964	0.0072
78	1.3036	0.0071
79	1.3106	0.0071
80	1.3176	0.0070
81	1.3246	0.0070
82	1.3315	0.0069
83	1.3384	0.0069
84	1.3452	0.0068
85	1.3520	0.0068
86	1.3587	0.0067
87	1.3654	0.0067
88	1.3721	0.0066
89	1.3787	0.0066
90	1.3852	0.0066
91	1.3917	0.0065
92	1.3982	0.0065
93	1.4046	0.0064
94	1.4110	0.0064
95	1.4174	0.0064
96	1.4237	0.0063
97	1.4300	0.0063
98	1.4362	0.0062
99	1.4424	0.0062
100	1.4486	0.0062
101	1.4547	0.0061
102	1.4608	0.0061
103	1.4669	0.0061
104	1.4729	0.0060
105	1.4789	0.0060
106	1.4849	0.0060
107	1.4908	0.0059
108	1.4967	0.0059
109	1.5026	0.0059
110	1.5084	0.0058
111	1.5142	0.0058
112	1.5200	0.0058
113	1.5258	0.0057
114	1.5315	0.0057
115	1.5372	0.0057
116	1.5428	0.0057
117	1.5485	0.0056
118	1.5541	0.0056
119	1.5597	0.0056
120	1.5652	0.0056
121	1.5707	0.0055
122	1.5762	0.0055
123	1.5817	0.0055
124	1.5872	0.0054
125	1.5926	0.0054
126	1.5980	0.0054
127	1.6033	0.0054
128	1.6087	0.0053
129	1.6140	0.0053
130	1.6193	0.0053
131	1.6246	0.0053
132	1.6299	0.0053
133	1.6351	0.0052
134	1.6403	0.0052
135	1.6455	0.0052
136	1.6506	0.0052
137	1.6558	0.0051
138	1.6609	0.0051
139	1.6660	0.0051
140	1.6711	0.0051
141	1.6762	0.0051
142	1.6812	0.0050
143	1.6862	0.0050

144	1.6912	0.0050
145	1.6962	0.0050
146	1.7011	0.0050
147	1.7061	0.0049
148	1.7110	0.0049
149	1.7159	0.0049
150	1.7208	0.0049
151	1.7256	0.0049
152	1.7305	0.0048
153	1.7353	0.0048
154	1.7401	0.0048
155	1.7449	0.0048
156	1.7497	0.0048
157	1.7544	0.0048
158	1.7592	0.0047
159	1.7639	0.0047
160	1.7686	0.0047
161	1.7733	0.0047
162	1.7779	0.0047
163	1.7826	0.0047
164	1.7872	0.0046
165	1.7918	0.0046
166	1.7965	0.0046
167	1.8010	0.0046
168	1.8056	0.0046
169	1.8102	0.0046
170	1.8147	0.0045
171	1.8192	0.0045
172	1.8237	0.0045
173	1.8282	0.0045
174	1.8327	0.0045
175	1.8372	0.0045
176	1.8416	0.0045
177	1.8461	0.0044
178	1.8505	0.0044
179	1.8549	0.0044
180	1.8593	0.0044
181	1.8637	0.0044
182	1.8680	0.0044
183	1.8724	0.0044
184	1.8767	0.0043
185	1.8811	0.0043
186	1.8854	0.0043
187	1.8897	0.0043
188	1.8939	0.0043
189	1.8982	0.0043
190	1.9025	0.0043
191	1.9067	0.0042
192	1.9110	0.0042
193	1.9152	0.0042
194	1.9194	0.0042
195	1.9236	0.0042
196	1.9278	0.0042
197	1.9319	0.0042
198	1.9361	0.0042
199	1.9402	0.0041
200	1.9444	0.0041
201	1.9485	0.0041
202	1.9526	0.0041
203	1.9567	0.0041
204	1.9608	0.0041
205	1.9649	0.0041
206	1.9689	0.0041
207	1.9730	0.0041
208	1.9770	0.0040
209	1.9811	0.0040
210	1.9851	0.0040
211	1.9891	0.0040
212	1.9931	0.0040

213	1.9971	0.0040
214	2.0010	0.0040
215	2.0050	0.0040
216	2.0090	0.0040
217	2.0129	0.0039
218	2.0168	0.0039
219	2.0208	0.0039
220	2.0247	0.0039
221	2.0286	0.0039
222	2.0325	0.0039
223	2.0364	0.0039
224	2.0402	0.0039
225	2.0441	0.0039
226	2.0479	0.0039
227	2.0518	0.0038
228	2.0556	0.0038
229	2.0594	0.0038
230	2.0633	0.0038
231	2.0671	0.0038
232	2.0709	0.0038
233	2.0746	0.0038
234	2.0784	0.0038
235	2.0822	0.0038
236	2.0859	0.0038
237	2.0897	0.0037
238	2.0934	0.0037
239	2.0972	0.0037
240	2.1009	0.0037
241	2.1046	0.0037
242	2.1083	0.0037
243	2.1120	0.0037
244	2.1157	0.0037
245	2.1194	0.0037
246	2.1230	0.0037
247	2.1267	0.0037
248	2.1303	0.0037
249	2.1340	0.0036
250	2.1376	0.0036
251	2.1412	0.0036
252	2.1449	0.0036
253	2.1485	0.0036
254	2.1521	0.0036
255	2.1557	0.0036
256	2.1593	0.0036
257	2.1628	0.0036
258	2.1664	0.0036
259	2.1700	0.0036
260	2.1735	0.0036
261	2.1771	0.0035
262	2.1806	0.0035
263	2.1841	0.0035
264	2.1877	0.0035
265	2.1912	0.0035
266	2.1947	0.0035
267	2.1982	0.0035
268	2.2017	0.0035
269	2.2052	0.0035
270	2.2086	0.0035
271	2.2121	0.0035
272	2.2156	0.0035
273	2.2190	0.0035
274	2.2225	0.0034
275	2.2259	0.0034
276	2.2293	0.0034
277	2.2328	0.0034
278	2.2362	0.0034
279	2.2396	0.0034
280	2.2430	0.0034
281	2.2464	0.0034

282	2.2498	0.0034
283	2.2532	0.0034
284	2.2566	0.0034
285	2.2599	0.0034
286	2.2633	0.0034
287	2.2666	0.0034
288	2.2700	0.0034

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0034	0.0033	0.0000
2	0.0034	0.0034	0.0000
3	0.0034	0.0034	0.0000
4	0.0034	0.0034	0.0000
5	0.0034	0.0034	0.0000
6	0.0034	0.0034	0.0000
7	0.0034	0.0034	0.0000
8	0.0034	0.0034	0.0000
9	0.0034	0.0034	0.0000
10	0.0034	0.0034	0.0000
11	0.0035	0.0035	0.0000
12	0.0035	0.0035	0.0000
13	0.0035	0.0035	0.0000
14	0.0035	0.0035	0.0000
15	0.0035	0.0035	0.0000
16	0.0035	0.0035	0.0000
17	0.0035	0.0035	0.0000
18	0.0035	0.0035	0.0000
19	0.0035	0.0035	0.0000
20	0.0036	0.0036	0.0000
21	0.0036	0.0036	0.0000
22	0.0036	0.0036	0.0000
23	0.0036	0.0036	0.0000
24	0.0036	0.0036	0.0000
25	0.0036	0.0036	0.0000
26	0.0036	0.0036	0.0000
27	0.0036	0.0036	0.0000
28	0.0037	0.0037	0.0000
29	0.0037	0.0037	0.0000
30	0.0037	0.0037	0.0000
31	0.0037	0.0037	0.0000
32	0.0037	0.0037	0.0000
33	0.0037	0.0037	0.0000
34	0.0037	0.0037	0.0000
35	0.0037	0.0037	0.0000
36	0.0038	0.0038	0.0000
37	0.0038	0.0038	0.0000
38	0.0038	0.0038	0.0000
39	0.0038	0.0038	0.0000
40	0.0038	0.0038	0.0000
41	0.0038	0.0038	0.0000
42	0.0038	0.0038	0.0000
43	0.0039	0.0039	0.0000
44	0.0039	0.0039	0.0000
45	0.0039	0.0039	0.0000
46	0.0039	0.0039	0.0000
47	0.0039	0.0039	0.0000
48	0.0039	0.0039	0.0000
49	0.0040	0.0040	0.0000
50	0.0040	0.0040	0.0000
51	0.0040	0.0040	0.0000
52	0.0040	0.0040	0.0000
53	0.0040	0.0040	0.0000
54	0.0040	0.0040	0.0000
55	0.0041	0.0041	0.0000
56	0.0041	0.0041	0.0000
57	0.0041	0.0041	0.0000

58	0.0041	0.0041	0.0000
59	0.0041	0.0041	0.0000
60	0.0041	0.0041	0.0000
61	0.0042	0.0042	0.0000
62	0.0042	0.0042	0.0000
63	0.0042	0.0042	0.0000
64	0.0042	0.0042	0.0000
65	0.0042	0.0042	0.0000
66	0.0042	0.0042	0.0000
67	0.0043	0.0043	0.0000
68	0.0043	0.0043	0.0000
69	0.0043	0.0043	0.0000
70	0.0043	0.0043	0.0000
71	0.0044	0.0044	0.0000
72	0.0044	0.0044	0.0000
73	0.0044	0.0044	0.0000
74	0.0044	0.0044	0.0000
75	0.0044	0.0044	0.0000
76	0.0045	0.0045	0.0000
77	0.0045	0.0045	0.0000
78	0.0045	0.0045	0.0000
79	0.0045	0.0045	0.0000
80	0.0045	0.0045	0.0000
81	0.0046	0.0046	0.0000
82	0.0046	0.0046	0.0000
83	0.0046	0.0046	0.0000
84	0.0046	0.0046	0.0000
85	0.0047	0.0047	0.0000
86	0.0047	0.0047	0.0000
87	0.0047	0.0047	0.0000
88	0.0047	0.0047	0.0000
89	0.0048	0.0048	0.0000
90	0.0048	0.0048	0.0000
91	0.0048	0.0048	0.0000
92	0.0048	0.0048	0.0000
93	0.0049	0.0049	0.0000
94	0.0049	0.0049	0.0000
95	0.0049	0.0049	0.0000
96	0.0050	0.0050	0.0000
97	0.0050	0.0050	0.0000
98	0.0050	0.0050	0.0000
99	0.0051	0.0051	0.0000
100	0.0051	0.0051	0.0000
101	0.0051	0.0051	0.0000
102	0.0051	0.0051	0.0000
103	0.0052	0.0052	0.0000
104	0.0052	0.0052	0.0000
105	0.0053	0.0053	0.0000
106	0.0053	0.0053	0.0000
107	0.0053	0.0053	0.0000
108	0.0053	0.0053	0.0000
109	0.0054	0.0054	0.0000
110	0.0054	0.0054	0.0000
111	0.0055	0.0055	0.0000
112	0.0055	0.0055	0.0000
113	0.0056	0.0056	0.0000
114	0.0056	0.0056	0.0000
115	0.0056	0.0056	0.0000
116	0.0057	0.0057	0.0000
117	0.0057	0.0057	0.0000
118	0.0057	0.0057	0.0000
119	0.0058	0.0058	0.0000
120	0.0058	0.0058	0.0000
121	0.0059	0.0059	0.0000
122	0.0059	0.0059	0.0000
123	0.0060	0.0060	0.0000
124	0.0060	0.0060	0.0000
125	0.0061	0.0061	0.0000
126	0.0061	0.0061	0.0000

127	0.0062	0.0062	0.0000
128	0.0062	0.0062	0.0000
129	0.0063	0.0063	0.0000
130	0.0064	0.0064	0.0000
131	0.0064	0.0064	0.0000
132	0.0065	0.0065	0.0000
133	0.0066	0.0066	0.0000
134	0.0066	0.0066	0.0000
135	0.0067	0.0067	0.0000
136	0.0067	0.0067	0.0000
137	0.0068	0.0068	0.0000
138	0.0069	0.0069	0.0000
139	0.0070	0.0070	0.0000
140	0.0070	0.0070	0.0000
141	0.0071	0.0071	0.0000
142	0.0072	0.0072	0.0000
143	0.0073	0.0073	0.0000
144	0.0073	0.0073	0.0000
145	0.0097	0.0097	0.0000
146	0.0097	0.0097	0.0000
147	0.0098	0.0098	0.0000
148	0.0099	0.0099	0.0000
149	0.0100	0.0100	0.0000
150	0.0101	0.0101	0.0000
151	0.0103	0.0103	0.0000
152	0.0103	0.0103	0.0000
153	0.0105	0.0105	0.0000
154	0.0106	0.0106	0.0000
155	0.0107	0.0107	0.0000
156	0.0108	0.0108	0.0000
157	0.0110	0.0110	0.0000
158	0.0111	0.0111	0.0000
159	0.0113	0.0113	0.0000
160	0.0114	0.0114	0.0000
161	0.0116	0.0116	0.0000
162	0.0117	0.0117	0.0000
163	0.0120	0.0119	0.0000
164	0.0121	0.0121	0.0000
165	0.0123	0.0123	0.0000
166	0.0125	0.0125	0.0000
167	0.0128	0.0128	0.0000
168	0.0129	0.0129	0.0000
169	0.0132	0.0132	0.0000
170	0.0134	0.0134	0.0000
171	0.0138	0.0138	0.0000
172	0.0140	0.0140	0.0000
173	0.0144	0.0144	0.0000
174	0.0146	0.0146	0.0000
175	0.0151	0.0151	0.0000
176	0.0154	0.0154	0.0000
177	0.0159	0.0159	0.0000
178	0.0162	0.0162	0.0000
179	0.0169	0.0169	0.0000
180	0.0173	0.0173	0.0000
181	0.0182	0.0182	0.0000
182	0.0187	0.0187	0.0000
183	0.0198	0.0198	0.0000
184	0.0204	0.0204	0.0000
185	0.0161	0.0161	0.0000
186	0.0170	0.0170	0.0000
187	0.0193	0.0193	0.0000
188	0.0208	0.0208	0.0000
189	0.0251	0.0251	0.0000
190	0.0283	0.0283	0.0000
191	0.0404	0.0404	0.0000
192	0.0556	0.0556	0.0000
193	0.1741	0.0700	0.1041
194	0.0329	0.0329	0.0000
195	0.0227	0.0227	0.0000

196	0.0180	0.0180	0.0000
197	0.0212	0.0212	0.0000
198	0.0192	0.0192	0.0000
199	0.0177	0.0177	0.0000
200	0.0166	0.0166	0.0000
201	0.0156	0.0156	0.0000
202	0.0148	0.0148	0.0000
203	0.0142	0.0142	0.0000
204	0.0136	0.0136	0.0000
205	0.0131	0.0131	0.0000
206	0.0126	0.0126	0.0000
207	0.0122	0.0122	0.0000
208	0.0118	0.0118	0.0000
209	0.0115	0.0115	0.0000
210	0.0112	0.0112	0.0000
211	0.0109	0.0109	0.0000
212	0.0106	0.0106	0.0000
213	0.0104	0.0104	0.0000
214	0.0102	0.0102	0.0000
215	0.0100	0.0100	0.0000
216	0.0098	0.0098	0.0000
217	0.0074	0.0074	0.0000
218	0.0072	0.0072	0.0000
219	0.0071	0.0071	0.0000
220	0.0069	0.0069	0.0000
221	0.0068	0.0068	0.0000
222	0.0066	0.0066	0.0000
223	0.0065	0.0065	0.0000
224	0.0064	0.0064	0.0000
225	0.0063	0.0063	0.0000
226	0.0062	0.0062	0.0000
227	0.0061	0.0061	0.0000
228	0.0060	0.0060	0.0000
229	0.0059	0.0059	0.0000
230	0.0058	0.0058	0.0000
231	0.0057	0.0057	0.0000
232	0.0056	0.0056	0.0000
233	0.0055	0.0055	0.0000
234	0.0054	0.0054	0.0000
235	0.0054	0.0054	0.0000
236	0.0053	0.0053	0.0000
237	0.0052	0.0052	0.0000
238	0.0052	0.0052	0.0000
239	0.0051	0.0051	0.0000
240	0.0050	0.0050	0.0000
241	0.0050	0.0050	0.0000
242	0.0049	0.0049	0.0000
243	0.0049	0.0049	0.0000
244	0.0048	0.0048	0.0000
245	0.0048	0.0048	0.0000
246	0.0047	0.0047	0.0000
247	0.0047	0.0047	0.0000
248	0.0046	0.0046	0.0000
249	0.0046	0.0046	0.0000
250	0.0045	0.0045	0.0000
251	0.0045	0.0045	0.0000
252	0.0044	0.0044	0.0000
253	0.0044	0.0044	0.0000
254	0.0043	0.0043	0.0000
255	0.0043	0.0043	0.0000
256	0.0043	0.0043	0.0000
257	0.0042	0.0042	0.0000
258	0.0042	0.0042	0.0000
259	0.0041	0.0041	0.0000
260	0.0041	0.0041	0.0000
261	0.0041	0.0041	0.0000
262	0.0040	0.0040	0.0000
263	0.0040	0.0040	0.0000
264	0.0040	0.0040	0.0000

265	0.0039	0.0039	0.0000
266	0.0039	0.0039	0.0000
267	0.0039	0.0039	0.0000
268	0.0039	0.0039	0.0000
269	0.0038	0.0038	0.0000
270	0.0038	0.0038	0.0000
271	0.0038	0.0038	0.0000
272	0.0037	0.0037	0.0000
273	0.0037	0.0037	0.0000
274	0.0037	0.0037	0.0000
275	0.0037	0.0037	0.0000
276	0.0036	0.0036	0.0000
277	0.0036	0.0036	0.0000
278	0.0036	0.0036	0.0000
279	0.0036	0.0036	0.0000
280	0.0035	0.0035	0.0000
281	0.0035	0.0035	0.0000
282	0.0035	0.0035	0.0000
283	0.0035	0.0035	0.0000
284	0.0034	0.0034	0.0000
285	0.0034	0.0034	0.0000
286	0.0034	0.0034	0.0000
287	0.0034	0.0034	0.0000
288	0.0034	0.0034	0.0000

Total soil rain loss = 2.17(In)
Total effective rainfall = 0.10(In)
Peak flow rate in flood hydrograph = 0.84(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	2.5	5.0	7.5	10.0
0+ 5	0.0000	0.00	Q	|	|	|	|
0+10	0.0000	0.00	Q	|	|	|	|
0+15	0.0000	0.00	Q	|	|	|	|
0+20	0.0000	0.00	Q	|	|	|	|
0+25	0.0000	0.00	Q	|	|	|	|
0+30	0.0000	0.00	Q	|	|	|	|
0+35	0.0000	0.00	Q	|	|	|	|
0+40	0.0000	0.00	Q	|	|	|	|
0+45	0.0000	0.00	Q	|	|	|	|
0+50	0.0000	0.00	Q	|	|	|	|
0+55	0.0000	0.00	Q	|	|	|	|
1+ 0	0.0000	0.00	Q	|	|	|	|
1+ 5	0.0000	0.00	Q	|	|	|	|
1+10	0.0000	0.00	Q	|	|	|	|
1+15	0.0000	0.00	Q	|	|	|	|
1+20	0.0000	0.00	Q	|	|	|	|
1+25	0.0000	0.00	Q	|	|	|	|
1+30	0.0000	0.00	Q	|	|	|	|
1+35	0.0000	0.00	Q	|	|	|	|
1+40	0.0000	0.00	Q	|	|	|	|
1+45	0.0000	0.00	Q	|	|	|	|
1+50	0.0000	0.00	Q	|	|	|	|
1+55	0.0000	0.00	Q	|	|	|	|
2+ 0	0.0000	0.00	Q	|	|	|	|
2+ 5	0.0000	0.00	Q	|	|	|	|
2+10	0.0000	0.00	Q	|	|	|	|
2+15	0.0000	0.00	Q	|	|	|	|
2+20	0.0000	0.00	Q	|	|	|	|
2+25	0.0000	0.00	Q	|	|	|	|
2+30	0.0000	0.00	Q	|	|	|	|

2+35	0.0000	0.00	Q				
2+40	0.0000	0.00	Q				
2+45	0.0000	0.00	Q				
2+50	0.0000	0.00	Q				
2+55	0.0000	0.00	Q				
3+ 0	0.0000	0.00	Q				
3+ 5	0.0000	0.00	Q				
3+10	0.0000	0.00	Q				
3+15	0.0000	0.00	Q				
3+20	0.0000	0.00	Q				
3+25	0.0000	0.00	Q				
3+30	0.0000	0.00	Q				
3+35	0.0000	0.00	Q				
3+40	0.0000	0.00	Q				
3+45	0.0000	0.00	Q				
3+50	0.0000	0.00	Q				
3+55	0.0000	0.00	Q				
4+ 0	0.0000	0.00	Q				
4+ 5	0.0000	0.00	Q				
4+10	0.0000	0.00	Q				
4+15	0.0000	0.00	Q				
4+20	0.0000	0.00	Q				
4+25	0.0000	0.00	Q				
4+30	0.0000	0.00	Q				
4+35	0.0000	0.00	Q				
4+40	0.0000	0.00	Q				
4+45	0.0000	0.00	Q				
4+50	0.0000	0.00	Q				
4+55	0.0000	0.00	Q				
5+ 0	0.0000	0.00	Q				
5+ 5	0.0000	0.00	Q				
5+10	0.0000	0.00	Q				
5+15	0.0000	0.00	Q				
5+20	0.0000	0.00	Q				
5+25	0.0000	0.00	Q				
5+30	0.0000	0.00	Q				
5+35	0.0000	0.00	Q				
5+40	0.0000	0.00	Q				
5+45	0.0000	0.00	Q				
5+50	0.0000	0.00	Q				
5+55	0.0000	0.00	Q				
6+ 0	0.0000	0.00	Q				
6+ 5	0.0000	0.00	Q				
6+10	0.0000	0.00	Q				
6+15	0.0000	0.00	Q				
6+20	0.0000	0.00	Q				
6+25	0.0000	0.00	Q				
6+30	0.0000	0.00	Q				
6+35	0.0000	0.00	Q				
6+40	0.0000	0.00	Q				
6+45	0.0000	0.00	Q				
6+50	0.0000	0.00	Q				
6+55	0.0000	0.00	Q				
7+ 0	0.0000	0.00	Q				
7+ 5	0.0000	0.00	Q				
7+10	0.0000	0.00	Q				
7+15	0.0000	0.00	Q				
7+20	0.0000	0.00	Q				
7+25	0.0000	0.00	Q				
7+30	0.0000	0.00	Q				
7+35	0.0000	0.00	Q				
7+40	0.0000	0.00	Q				
7+45	0.0000	0.00	Q				
7+50	0.0000	0.00	Q				
7+55	0.0000	0.00	Q				
8+ 0	0.0000	0.00	Q				
8+ 5	0.0000	0.00	Q				
8+10	0.0000	0.00	Q				
8+15	0.0000	0.00	Q				

8+20	0.0000	0.00	Q				
8+25	0.0000	0.00	Q				
8+30	0.0000	0.00	Q				
8+35	0.0000	0.00	Q				
8+40	0.0000	0.00	Q				
8+45	0.0000	0.00	Q				
8+50	0.0000	0.00	Q				
8+55	0.0000	0.00	Q				
9+ 0	0.0000	0.00	Q				
9+ 5	0.0000	0.00	Q				
9+10	0.0000	0.00	Q				
9+15	0.0000	0.00	Q				
9+20	0.0000	0.00	Q				
9+25	0.0000	0.00	Q				
9+30	0.0000	0.00	Q				
9+35	0.0000	0.00	Q				
9+40	0.0000	0.00	Q				
9+45	0.0000	0.00	Q				
9+50	0.0000	0.00	Q				
9+55	0.0000	0.00	Q				
10+ 0	0.0000	0.00	Q				
10+ 5	0.0000	0.00	Q				
10+10	0.0000	0.00	Q				
10+15	0.0000	0.00	Q				
10+20	0.0000	0.00	Q				
10+25	0.0000	0.00	Q				
10+30	0.0000	0.00	Q				
10+35	0.0000	0.00	Q				
10+40	0.0000	0.00	Q				
10+45	0.0000	0.00	Q				
10+50	0.0000	0.00	Q				
10+55	0.0000	0.00	Q				
11+ 0	0.0000	0.00	Q				
11+ 5	0.0000	0.00	Q				
11+10	0.0000	0.00	Q				
11+15	0.0000	0.00	Q				
11+20	0.0000	0.00	Q				
11+25	0.0000	0.00	Q				
11+30	0.0000	0.00	Q				
11+35	0.0000	0.00	Q				
11+40	0.0000	0.00	Q				
11+45	0.0000	0.00	Q				
11+50	0.0000	0.00	Q				
11+55	0.0000	0.00	Q				
12+ 0	0.0000	0.00	Q				
12+ 5	0.0000	0.00	Q				
12+10	0.0000	0.00	Q				
12+15	0.0000	0.00	Q				
12+20	0.0000	0.00	Q				
12+25	0.0000	0.00	Q				
12+30	0.0000	0.00	Q				
12+35	0.0000	0.00	Q				
12+40	0.0000	0.00	Q				
12+45	0.0000	0.00	Q				
12+50	0.0000	0.00	Q				
12+55	0.0000	0.00	Q				
13+ 0	0.0000	0.00	Q				
13+ 5	0.0000	0.00	Q				
13+10	0.0000	0.00	Q				
13+15	0.0000	0.00	Q				
13+20	0.0000	0.00	Q				
13+25	0.0000	0.00	Q				
13+30	0.0000	0.00	Q				
13+35	0.0000	0.00	Q				
13+40	0.0000	0.00	Q				
13+45	0.0000	0.00	Q				
13+50	0.0000	0.00	Q				
13+55	0.0000	0.00	Q				
14+ 0	0.0000	0.00	Q				

```
14+ 5       0.0000      0.00  Q        |         |         |         |
14+10       0.0000      0.00  Q        |         |         |         |
14+15       0.0000      0.00  Q        |         |         |         |
14+20       0.0000      0.00  Q        |         |         |         |
14+25       0.0000      0.00  Q        |         |         |         |
14+30       0.0000      0.00  Q        |         |         |         |
14+35       0.0000      0.00  Q        |         |         |         |
14+40       0.0000      0.00  Q        |         |         |         |
14+45       0.0000      0.00  Q        |         |         |         |
14+50       0.0000      0.00  Q        |         |         |         |
14+55       0.0000      0.00  Q        |         |         |         |
15+ 0       0.0000      0.00  Q        |         |         |         |
15+ 5       0.0000      0.00  Q        |         |         |         |
15+10       0.0000      0.00  Q        |         |         |         |
15+15       0.0000      0.00  Q        |         |         |         |
15+20       0.0000      0.00  Q        |         |         |         |
15+25       0.0000      0.00  Q        |         |         |         |
15+30       0.0000      0.00  Q        |         |         |         |
15+35       0.0000      0.00  Q        |         |         |         |
15+40       0.0000      0.00  Q        |         |         |         |
15+45       0.0000      0.00  Q        |         |         |         |
15+50       0.0000      0.00  Q        |         |         |         |
15+55       0.0000      0.00  Q        |         |         |         |
16+ 0       0.0000      0.00  Q        |         |         |         |
16+ 5       0.0012      0.18  Q V      |         |         |         |
16+10       0.0064      0.75  |  Q     | V       |         |         |
16+15       0.0122      0.84  |  Q     |         |   V     |         |
16+20       0.0148      0.38  |Q       |         |       V |         |
16+25       0.0161      0.20  Q        |         |         | V       |
16+30       0.0171      0.14  Q        |         |         |   V     |
16+35       0.0178      0.10  Q        |         |         |    V    |
16+40       0.0183      0.08  Q        |         |         |     V   |
16+45       0.0187      0.06  Q        |         |         |      V  |
16+50       0.0190      0.04  Q        |         |         |      V  |
16+55       0.0192      0.04  Q        |         |         |       V |
17+ 0       0.0194      0.03  Q        |         |         |       V |
17+ 5       0.0196      0.02  Q        |         |         |        V|
17+10       0.0197      0.02  Q        |         |         |        V|
17+15       0.0198      0.01  Q        |         |         |        V|
17+20       0.0199      0.01  Q        |         |         |        V|
17+25       0.0200      0.01  Q        |         |         |        V|
17+30       0.0200      0.00  Q        |         |         |        V|
17+35       0.0200      0.00  Q        |         |         |        V|
17+40       0.0200      0.00  Q        |         |         |        V|
17+45       0.0200      0.00  Q        |         |         |        V|
17+50       0.0200      0.00  Q        |         |         |        V|
17+55       0.0200      0.00  Q        |         |         |        V|
18+ 0       0.0200      0.00  Q        |         |         |        V|
18+ 5       0.0200      0.00  Q        |         |         |        V|
18+10       0.0200      0.00  Q        |         |         |        V|
18+15       0.0200      0.00  Q        |         |         |        V|
18+20       0.0200      0.00  Q        |         |         |        V|
18+25       0.0200      0.00  Q        |         |         |        V|
18+30       0.0200      0.00  Q        |         |         |        V|
18+35       0.0200      0.00  Q        |         |         |        V|
18+40       0.0200      0.00  Q        |         |         |        V|
18+45       0.0200      0.00  Q        |         |         |        V|
18+50       0.0200      0.00  Q        |         |         |        V|
18+55       0.0200      0.00  Q        |         |         |        V|
19+ 0       0.0200      0.00  Q        |         |         |        V|
19+ 5       0.0200      0.00  Q        |         |         |        V|
19+10       0.0200      0.00  Q        |         |         |        V|
19+15       0.0200      0.00  Q        |         |         |        V|
19+20       0.0200      0.00  Q        |         |         |        V|
19+25       0.0200      0.00  Q        |         |         |        V|
19+30       0.0200      0.00  Q        |         |         |        V|
19+35       0.0200      0.00  Q        |         |         |        V|
19+40       0.0200      0.00  Q        |         |         |        V|
19+45       0.0200      0.00  Q        |         |         |        V|
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19+50	0.0200	0.00	Q	|	|	|	V|
19+55	0.0200	0.00	Q	|	|	|	V|
20+ 0	0.0200	0.00	Q	|	|	|	V|
20+ 5	0.0200	0.00	Q	|	|	|	V|
20+10	0.0200	0.00	Q	|	|	|	V|
20+15	0.0200	0.00	Q	|	|	|	V|
20+20	0.0200	0.00	Q	|	|	|	V|
20+25	0.0200	0.00	Q	|	|	|	V|
20+30	0.0200	0.00	Q	|	|	|	V|
20+35	0.0200	0.00	Q	|	|	|	V|
20+40	0.0200	0.00	Q	|	|	|	V|
20+45	0.0200	0.00	Q	|	|	|	V|
20+50	0.0200	0.00	Q	|	|	|	V|
20+55	0.0200	0.00	Q	|	|	|	V|
21+ 0	0.0200	0.00	Q	|	|	|	V|
21+ 5	0.0200	0.00	Q	|	|	|	V|
21+10	0.0200	0.00	Q	|	|	|	V|
21+15	0.0200	0.00	Q	|	|	|	V|
21+20	0.0200	0.00	Q	|	|	|	V|
21+25	0.0200	0.00	Q	|	|	|	V|
21+30	0.0200	0.00	Q	|	|	|	V|
21+35	0.0200	0.00	Q	|	|	|	V|
21+40	0.0200	0.00	Q	|	|	|	V|
21+45	0.0200	0.00	Q	|	|	|	V|
21+50	0.0200	0.00	Q	|	|	|	V|
21+55	0.0200	0.00	Q	|	|	|	V|
22+ 0	0.0200	0.00	Q	|	|	|	V|
22+ 5	0.0200	0.00	Q	|	|	|	V|
22+10	0.0200	0.00	Q	|	|	|	V|
22+15	0.0200	0.00	Q	|	|	|	V|
22+20	0.0200	0.00	Q	|	|	|	V|
22+25	0.0200	0.00	Q	|	|	|	V|
22+30	0.0200	0.00	Q	|	|	|	V|
22+35	0.0200	0.00	Q	|	|	|	V|
22+40	0.0200	0.00	Q	|	|	|	V|
22+45	0.0200	0.00	Q	|	|	|	V|
22+50	0.0200	0.00	Q	|	|	|	V|
22+55	0.0200	0.00	Q	|	|	|	V|
23+ 0	0.0200	0.00	Q	|	|	|	V|
23+ 5	0.0200	0.00	Q	|	|	|	V|
23+10	0.0200	0.00	Q	|	|	|	V|
23+15	0.0200	0.00	Q	|	|	|	V|
23+20	0.0200	0.00	Q	|	|	|	V|
23+25	0.0200	0.00	Q	|	|	|	V|
23+30	0.0200	0.00	Q	|	|	|	V|
23+35	0.0200	0.00	Q	|	|	|	V|
23+40	0.0200	0.00	Q	|	|	|	V|
23+45	0.0200	0.00	Q	|	|	|	V|
23+50	0.0200	0.00	Q	|	|	|	V|
23+55	0.0200	0.00	Q	|	|	|	V|
24+ 0	0.0200	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 10/27/22

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

Program License Serial Number 6443

JURUPA AND WILLOW
UNIT HYDROGRAPH
2-YEAR STORM
PRE DEVELOPMENT - DMA A2

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 10			
4.27	1	0.79	
Rainfall data for year 2			
4.27	6	1.26	
Rainfall data for year 2			
4.27	24	2.27	
Rainfall data for year 100			
4.27	1	1.24	
Rainfall data for year 100			
4.27	6	2.93	
Rainfall data for year 100			
4.27	24	5.35	

++

******** 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)
67.0	47.4	4.27	1.000	0.840	1.000	0.840

Area-averaged adjusted loss rate Fm (In/Hr) = 0.840

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC1)	S	Pervious Yield Fr
4.27	1.000	67.0	47.4	11.10	0.000

Area-averaged catchment yield fraction, Y = 0.000
Area-averaged low loss fraction, Yb = 1.000
User entry of time of concentration = 0.211 (hours)
++
Watershed area = 4.27(Ac.)
Catchment Lag time = 0.169 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 49.3681
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.840(In/Hr)
Average low loss rate fraction (Yb) = 1.000 (decimal)
VALLEY UNDEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.174(In)
Computed peak 30-minute rainfall = 0.356(In)
Specified peak 1-hour rainfall = 0.470(In)
Computed peak 3-hour rainfall = 0.861(In)
Specified peak 6-hour rainfall = 1.260(In)
Specified peak 24-hour rainfall = 2.270(In)

Rainfall depth area reduction factors:
Using a total area of 4.27(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.174(In)
30-minute factor = 1.000 Adjusted rainfall = 0.356(In)
1-hour factor = 1.000 Adjusted rainfall = 0.470(In)
3-hour factor = 1.000 Adjusted rainfall = 0.861(In)
6-hour factor = 1.000 Adjusted rainfall = 1.260(In)
24-hour factor = 1.000 Adjusted rainfall = 2.270(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 = 51.64 (CFS))	
1	6.007	3.102
2	31.616	13.225
3	60.517	14.924
4	73.703	6.809
5	80.560	3.541
6	85.320	2.458
7	88.752	1.772
8	91.388	1.361
9	93.325	1.000
10	94.869	0.797
11	96.201	0.688
12	97.217	0.525
13	98.037	0.423
14	98.662	0.323
15	99.158	0.256
16	99.652	0.255
17	100.000	0.180

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.1741	0.1741
2	0.2297	0.0556
3	0.2701	0.0404
4	0.3030	0.0329
5	0.3313	0.0283

6	0.3564	0.0251
7	0.3791	0.0227
8	0.3999	0.0208
9	0.4192	0.0193
10	0.4372	0.0180
11	0.4542	0.0170
12	0.4703	0.0161
13	0.4914	0.0212
14	0.5119	0.0204
15	0.5317	0.0198
16	0.5509	0.0192
17	0.5696	0.0187
18	0.5878	0.0182
19	0.6055	0.0177
20	0.6229	0.0173
21	0.6398	0.0169
22	0.6564	0.0166
23	0.6726	0.0162
24	0.6886	0.0159
25	0.7042	0.0156
26	0.7196	0.0154
27	0.7347	0.0151
28	0.7495	0.0148
29	0.7641	0.0146
30	0.7785	0.0144
31	0.7927	0.0142
32	0.8066	0.0140
33	0.8204	0.0138
34	0.8340	0.0136
35	0.8474	0.0134
36	0.8606	0.0132
37	0.8737	0.0131
38	0.8866	0.0129
39	0.8994	0.0128
40	0.9120	0.0126
41	0.9244	0.0125
42	0.9368	0.0123
43	0.9490	0.0122
44	0.9610	0.0121
45	0.9730	0.0120
46	0.9848	0.0118
47	0.9965	0.0117
48	1.0081	0.0116
49	1.0196	0.0115
50	1.0310	0.0114
51	1.0423	0.0113
52	1.0535	0.0112
53	1.0646	0.0111
54	1.0756	0.0110
55	1.0865	0.0109
56	1.0973	0.0108
57	1.1081	0.0107
58	1.1187	0.0106
59	1.1293	0.0106
60	1.1398	0.0105
61	1.1502	0.0104
62	1.1605	0.0103
63	1.1708	0.0103
64	1.1810	0.0102
65	1.1911	0.0101
66	1.2011	0.0100
67	1.2111	0.0100
68	1.2210	0.0099
69	1.2308	0.0098
70	1.2406	0.0098
71	1.2503	0.0097
72	1.2600	0.0097
73	1.2674	0.0074
74	1.2747	0.0073

75	1.2820	0.0073
76	1.2892	0.0072
77	1.2964	0.0072
78	1.3035	0.0071
79	1.3106	0.0071
80	1.3176	0.0070
81	1.3246	0.0070
82	1.3315	0.0069
83	1.3384	0.0069
84	1.3452	0.0068
85	1.3520	0.0068
86	1.3587	0.0067
87	1.3654	0.0067
88	1.3721	0.0066
89	1.3787	0.0066
90	1.3852	0.0066
91	1.3917	0.0065
92	1.3982	0.0065
93	1.4046	0.0064
94	1.4110	0.0064
95	1.4174	0.0064
96	1.4237	0.0063
97	1.4300	0.0063
98	1.4362	0.0062
99	1.4424	0.0062
100	1.4486	0.0062
101	1.4547	0.0061
102	1.4608	0.0061
103	1.4669	0.0061
104	1.4729	0.0060
105	1.4789	0.0060
106	1.4849	0.0060
107	1.4908	0.0059
108	1.4967	0.0059
109	1.5026	0.0059
110	1.5084	0.0058
111	1.5142	0.0058
112	1.5200	0.0058
113	1.5258	0.0057
114	1.5315	0.0057
115	1.5372	0.0057
116	1.5428	0.0057
117	1.5485	0.0056
118	1.5541	0.0056
119	1.5597	0.0056
120	1.5652	0.0056
121	1.5707	0.0055
122	1.5762	0.0055
123	1.5817	0.0055
124	1.5871	0.0054
125	1.5926	0.0054
126	1.5980	0.0054
127	1.6033	0.0054
128	1.6087	0.0053
129	1.6140	0.0053
130	1.6193	0.0053
131	1.6246	0.0053
132	1.6298	0.0053
133	1.6351	0.0052
134	1.6403	0.0052
135	1.6455	0.0052
136	1.6506	0.0052
137	1.6558	0.0051
138	1.6609	0.0051
139	1.6660	0.0051
140	1.6711	0.0051
141	1.6761	0.0051
142	1.6812	0.0050
143	1.6862	0.0050

144	1.6912	0.0050
145	1.6962	0.0050
146	1.7011	0.0050
147	1.7061	0.0049
148	1.7110	0.0049
149	1.7159	0.0049
150	1.7208	0.0049
151	1.7256	0.0049
152	1.7305	0.0048
153	1.7353	0.0048
154	1.7401	0.0048
155	1.7449	0.0048
156	1.7497	0.0048
157	1.7544	0.0048
158	1.7592	0.0047
159	1.7639	0.0047
160	1.7686	0.0047
161	1.7733	0.0047
162	1.7779	0.0047
163	1.7826	0.0047
164	1.7872	0.0046
165	1.7918	0.0046
166	1.7964	0.0046
167	1.8010	0.0046
168	1.8056	0.0046
169	1.8102	0.0046
170	1.8147	0.0045
171	1.8192	0.0045
172	1.8237	0.0045
173	1.8282	0.0045
174	1.8327	0.0045
175	1.8372	0.0045
176	1.8416	0.0045
177	1.8461	0.0044
178	1.8505	0.0044
179	1.8549	0.0044
180	1.8593	0.0044
181	1.8637	0.0044
182	1.8680	0.0044
183	1.8724	0.0044
184	1.8767	0.0043
185	1.8810	0.0043
186	1.8854	0.0043
187	1.8897	0.0043
188	1.8939	0.0043
189	1.8982	0.0043
190	1.9025	0.0043
191	1.9067	0.0042
192	1.9109	0.0042
193	1.9152	0.0042
194	1.9194	0.0042
195	1.9236	0.0042
196	1.9278	0.0042
197	1.9319	0.0042
198	1.9361	0.0042
199	1.9402	0.0041
200	1.9444	0.0041
201	1.9485	0.0041
202	1.9526	0.0041
203	1.9567	0.0041
204	1.9608	0.0041
205	1.9649	0.0041
206	1.9689	0.0041
207	1.9730	0.0041
208	1.9770	0.0040
209	1.9810	0.0040
210	1.9851	0.0040
211	1.9891	0.0040
212	1.9931	0.0040

213	1.9971	0.0040
214	2.0010	0.0040
215	2.0050	0.0040
216	2.0090	0.0040
217	2.0129	0.0039
218	2.0168	0.0039
219	2.0208	0.0039
220	2.0247	0.0039
221	2.0286	0.0039
222	2.0325	0.0039
223	2.0363	0.0039
224	2.0402	0.0039
225	2.0441	0.0039
226	2.0479	0.0039
227	2.0518	0.0038
228	2.0556	0.0038
229	2.0594	0.0038
230	2.0632	0.0038
231	2.0671	0.0038
232	2.0708	0.0038
233	2.0746	0.0038
234	2.0784	0.0038
235	2.0822	0.0038
236	2.0859	0.0038
237	2.0897	0.0037
238	2.0934	0.0037
239	2.0972	0.0037
240	2.1009	0.0037
241	2.1046	0.0037
242	2.1083	0.0037
243	2.1120	0.0037
244	2.1157	0.0037
245	2.1193	0.0037
246	2.1230	0.0037
247	2.1267	0.0037
248	2.1303	0.0037
249	2.1340	0.0036
250	2.1376	0.0036
251	2.1412	0.0036
252	2.1449	0.0036
253	2.1485	0.0036
254	2.1521	0.0036
255	2.1557	0.0036
256	2.1592	0.0036
257	2.1628	0.0036
258	2.1664	0.0036
259	2.1700	0.0036
260	2.1735	0.0036
261	2.1771	0.0035
262	2.1806	0.0035
263	2.1841	0.0035
264	2.1876	0.0035
265	2.1912	0.0035
266	2.1947	0.0035
267	2.1982	0.0035
268	2.2017	0.0035
269	2.2051	0.0035
270	2.2086	0.0035
271	2.2121	0.0035
272	2.2156	0.0035
273	2.2190	0.0035
274	2.2225	0.0034
275	2.2259	0.0034
276	2.2293	0.0034
277	2.2328	0.0034
278	2.2362	0.0034
279	2.2396	0.0034
280	2.2430	0.0034
281	2.2464	0.0034

282	2.2498	0.0034
283	2.2532	0.0034
284	2.2565	0.0034
285	2.2599	0.0034
286	2.2633	0.0034
287	2.2666	0.0034
288	2.2700	0.0034

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0034	0.0033	0.0000
2	0.0034	0.0034	0.0000
3	0.0034	0.0034	0.0000
4	0.0034	0.0034	0.0000
5	0.0034	0.0034	0.0000
6	0.0034	0.0034	0.0000
7	0.0034	0.0034	0.0000
8	0.0034	0.0034	0.0000
9	0.0034	0.0034	0.0000
10	0.0034	0.0034	0.0000
11	0.0035	0.0035	0.0000
12	0.0035	0.0035	0.0000
13	0.0035	0.0035	0.0000
14	0.0035	0.0035	0.0000
15	0.0035	0.0035	0.0000
16	0.0035	0.0035	0.0000
17	0.0035	0.0035	0.0000
18	0.0035	0.0035	0.0000
19	0.0035	0.0035	0.0000
20	0.0036	0.0036	0.0000
21	0.0036	0.0036	0.0000
22	0.0036	0.0036	0.0000
23	0.0036	0.0036	0.0000
24	0.0036	0.0036	0.0000
25	0.0036	0.0036	0.0000
26	0.0036	0.0036	0.0000
27	0.0036	0.0036	0.0000
28	0.0037	0.0037	0.0000
29	0.0037	0.0037	0.0000
30	0.0037	0.0037	0.0000
31	0.0037	0.0037	0.0000
32	0.0037	0.0037	0.0000
33	0.0037	0.0037	0.0000
34	0.0037	0.0037	0.0000
35	0.0037	0.0037	0.0000
36	0.0038	0.0038	0.0000
37	0.0038	0.0038	0.0000
38	0.0038	0.0038	0.0000
39	0.0038	0.0038	0.0000
40	0.0038	0.0038	0.0000
41	0.0038	0.0038	0.0000
42	0.0038	0.0038	0.0000
43	0.0039	0.0039	0.0000
44	0.0039	0.0039	0.0000
45	0.0039	0.0039	0.0000
46	0.0039	0.0039	0.0000
47	0.0039	0.0039	0.0000
48	0.0039	0.0039	0.0000
49	0.0040	0.0040	0.0000
50	0.0040	0.0040	0.0000
51	0.0040	0.0040	0.0000
52	0.0040	0.0040	0.0000
53	0.0040	0.0040	0.0000
54	0.0040	0.0040	0.0000
55	0.0041	0.0041	0.0000
56	0.0041	0.0041	0.0000
57	0.0041	0.0041	0.0000

58	0.0041	0.0041	0.0000
59	0.0041	0.0041	0.0000
60	0.0041	0.0041	0.0000
61	0.0042	0.0042	0.0000
62	0.0042	0.0042	0.0000
63	0.0042	0.0042	0.0000
64	0.0042	0.0042	0.0000
65	0.0042	0.0042	0.0000
66	0.0042	0.0042	0.0000
67	0.0043	0.0043	0.0000
68	0.0043	0.0043	0.0000
69	0.0043	0.0043	0.0000
70	0.0043	0.0043	0.0000
71	0.0044	0.0044	0.0000
72	0.0044	0.0044	0.0000
73	0.0044	0.0044	0.0000
74	0.0044	0.0044	0.0000
75	0.0044	0.0044	0.0000
76	0.0045	0.0045	0.0000
77	0.0045	0.0045	0.0000
78	0.0045	0.0045	0.0000
79	0.0045	0.0045	0.0000
80	0.0045	0.0045	0.0000
81	0.0046	0.0046	0.0000
82	0.0046	0.0046	0.0000
83	0.0046	0.0046	0.0000
84	0.0046	0.0046	0.0000
85	0.0047	0.0047	0.0000
86	0.0047	0.0047	0.0000
87	0.0047	0.0047	0.0000
88	0.0047	0.0047	0.0000
89	0.0048	0.0048	0.0000
90	0.0048	0.0048	0.0000
91	0.0048	0.0048	0.0000
92	0.0048	0.0048	0.0000
93	0.0049	0.0049	0.0000
94	0.0049	0.0049	0.0000
95	0.0049	0.0049	0.0000
96	0.0050	0.0050	0.0000
97	0.0050	0.0050	0.0000
98	0.0050	0.0050	0.0000
99	0.0051	0.0051	0.0000
100	0.0051	0.0051	0.0000
101	0.0051	0.0051	0.0000
102	0.0051	0.0051	0.0000
103	0.0052	0.0052	0.0000
104	0.0052	0.0052	0.0000
105	0.0053	0.0053	0.0000
106	0.0053	0.0053	0.0000
107	0.0053	0.0053	0.0000
108	0.0053	0.0053	0.0000
109	0.0054	0.0054	0.0000
110	0.0054	0.0054	0.0000
111	0.0055	0.0055	0.0000
112	0.0055	0.0055	0.0000
113	0.0056	0.0056	0.0000
114	0.0056	0.0056	0.0000
115	0.0056	0.0056	0.0000
116	0.0057	0.0057	0.0000
117	0.0057	0.0057	0.0000
118	0.0057	0.0057	0.0000
119	0.0058	0.0058	0.0000
120	0.0058	0.0058	0.0000
121	0.0059	0.0059	0.0000
122	0.0059	0.0059	0.0000
123	0.0060	0.0060	0.0000
124	0.0060	0.0060	0.0000
125	0.0061	0.0061	0.0000
126	0.0061	0.0061	0.0000

127	0.0062	0.0062	0.0000
128	0.0062	0.0062	0.0000
129	0.0063	0.0063	0.0000
130	0.0064	0.0064	0.0000
131	0.0064	0.0064	0.0000
132	0.0065	0.0065	0.0000
133	0.0066	0.0066	0.0000
134	0.0066	0.0066	0.0000
135	0.0067	0.0067	0.0000
136	0.0067	0.0067	0.0000
137	0.0068	0.0068	0.0000
138	0.0069	0.0069	0.0000
139	0.0070	0.0070	0.0000
140	0.0070	0.0070	0.0000
141	0.0071	0.0071	0.0000
142	0.0072	0.0072	0.0000
143	0.0073	0.0073	0.0000
144	0.0073	0.0073	0.0000
145	0.0097	0.0097	0.0000
146	0.0097	0.0097	0.0000
147	0.0098	0.0098	0.0000
148	0.0099	0.0099	0.0000
149	0.0100	0.0100	0.0000
150	0.0101	0.0101	0.0000
151	0.0103	0.0103	0.0000
152	0.0103	0.0103	0.0000
153	0.0105	0.0105	0.0000
154	0.0106	0.0106	0.0000
155	0.0107	0.0107	0.0000
156	0.0108	0.0108	0.0000
157	0.0110	0.0110	0.0000
158	0.0111	0.0111	0.0000
159	0.0113	0.0113	0.0000
160	0.0114	0.0114	0.0000
161	0.0116	0.0116	0.0000
162	0.0117	0.0117	0.0000
163	0.0120	0.0120	0.0000
164	0.0121	0.0121	0.0000
165	0.0123	0.0123	0.0000
166	0.0125	0.0125	0.0000
167	0.0128	0.0128	0.0000
168	0.0129	0.0129	0.0000
169	0.0132	0.0132	0.0000
170	0.0134	0.0134	0.0000
171	0.0138	0.0138	0.0000
172	0.0140	0.0140	0.0000
173	0.0144	0.0144	0.0000
174	0.0146	0.0146	0.0000
175	0.0151	0.0151	0.0000
176	0.0154	0.0154	0.0000
177	0.0159	0.0159	0.0000
178	0.0162	0.0162	0.0000
179	0.0169	0.0169	0.0000
180	0.0173	0.0173	0.0000
181	0.0182	0.0182	0.0000
182	0.0187	0.0187	0.0000
183	0.0198	0.0198	0.0000
184	0.0204	0.0204	0.0000
185	0.0161	0.0161	0.0000
186	0.0170	0.0170	0.0000
187	0.0193	0.0193	0.0000
188	0.0208	0.0208	0.0000
189	0.0251	0.0251	0.0000
190	0.0283	0.0283	0.0000
191	0.0404	0.0404	0.0000
192	0.0556	0.0556	0.0000
193	0.1741	0.0700	0.1041
194	0.0329	0.0329	0.0000
195	0.0227	0.0227	0.0000

196	0.0180	0.0180	0.0000
197	0.0212	0.0212	0.0000
198	0.0192	0.0192	0.0000
199	0.0177	0.0177	0.0000
200	0.0166	0.0166	0.0000
201	0.0156	0.0156	0.0000
202	0.0148	0.0148	0.0000
203	0.0142	0.0142	0.0000
204	0.0136	0.0136	0.0000
205	0.0131	0.0131	0.0000
206	0.0126	0.0126	0.0000
207	0.0122	0.0122	0.0000
208	0.0118	0.0118	0.0000
209	0.0115	0.0115	0.0000
210	0.0112	0.0112	0.0000
211	0.0109	0.0109	0.0000
212	0.0106	0.0106	0.0000
213	0.0104	0.0104	0.0000
214	0.0102	0.0102	0.0000
215	0.0100	0.0100	0.0000
216	0.0098	0.0098	0.0000
217	0.0074	0.0074	0.0000
218	0.0072	0.0072	0.0000
219	0.0071	0.0071	0.0000
220	0.0069	0.0069	0.0000
221	0.0068	0.0068	0.0000
222	0.0066	0.0066	0.0000
223	0.0065	0.0065	0.0000
224	0.0064	0.0064	0.0000
225	0.0063	0.0063	0.0000
226	0.0062	0.0062	0.0000
227	0.0061	0.0061	0.0000
228	0.0060	0.0060	0.0000
229	0.0059	0.0059	0.0000
230	0.0058	0.0058	0.0000
231	0.0057	0.0057	0.0000
232	0.0056	0.0056	0.0000
233	0.0055	0.0055	0.0000
234	0.0054	0.0054	0.0000
235	0.0054	0.0054	0.0000
236	0.0053	0.0053	0.0000
237	0.0052	0.0052	0.0000
238	0.0052	0.0052	0.0000
239	0.0051	0.0051	0.0000
240	0.0050	0.0050	0.0000
241	0.0050	0.0050	0.0000
242	0.0049	0.0049	0.0000
243	0.0049	0.0049	0.0000
244	0.0048	0.0048	0.0000
245	0.0048	0.0048	0.0000
246	0.0047	0.0047	0.0000
247	0.0047	0.0047	0.0000
248	0.0046	0.0046	0.0000
249	0.0046	0.0046	0.0000
250	0.0045	0.0045	0.0000
251	0.0045	0.0045	0.0000
252	0.0044	0.0044	0.0000
253	0.0044	0.0044	0.0000
254	0.0043	0.0043	0.0000
255	0.0043	0.0043	0.0000
256	0.0043	0.0043	0.0000
257	0.0042	0.0042	0.0000
258	0.0042	0.0042	0.0000
259	0.0041	0.0041	0.0000
260	0.0041	0.0041	0.0000
261	0.0041	0.0041	0.0000
262	0.0040	0.0040	0.0000
263	0.0040	0.0040	0.0000
264	0.0040	0.0040	0.0000

265	0.0039	0.0039	0.0000
266	0.0039	0.0039	0.0000
267	0.0039	0.0039	0.0000
268	0.0039	0.0039	0.0000
269	0.0038	0.0038	0.0000
270	0.0038	0.0038	0.0000
271	0.0038	0.0038	0.0000
272	0.0037	0.0037	0.0000
273	0.0037	0.0037	0.0000
274	0.0037	0.0037	0.0000
275	0.0037	0.0037	0.0000
276	0.0036	0.0036	0.0000
277	0.0036	0.0036	0.0000
278	0.0036	0.0036	0.0000
279	0.0036	0.0036	0.0000
280	0.0035	0.0035	0.0000
281	0.0035	0.0035	0.0000
282	0.0035	0.0035	0.0000
283	0.0035	0.0035	0.0000
284	0.0034	0.0034	0.0000
285	0.0034	0.0034	0.0000
286	0.0034	0.0034	0.0000
287	0.0034	0.0034	0.0000
288	0.0034	0.0034	0.0000

Total soil rain loss = 2.17(In)
Total effective rainfall = 0.10(In)
Peak flow rate in flood hydrograph = 1.55(CFS)

++

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	2.5	5.0	7.5	10.0
0+ 5	0.0000	0.00	Q	|	|	|	|
0+10	0.0000	0.00	Q	|	|	|	|
0+15	0.0000	0.00	Q	|	|	|	|
0+20	0.0000	0.00	Q	|	|	|	|
0+25	0.0000	0.00	Q	|	|	|	|
0+30	0.0000	0.00	Q	|	|	|	|
0+35	0.0000	0.00	Q	|	|	|	|
0+40	0.0000	0.00	Q	|	|	|	|
0+45	0.0000	0.00	Q	|	|	|	|
0+50	0.0000	0.00	Q	|	|	|	|
0+55	0.0000	0.00	Q	|	|	|	|
1+ 0	0.0000	0.00	Q	|	|	|	|
1+ 5	0.0000	0.00	Q	|	|	|	|
1+10	0.0000	0.00	Q	|	|	|	|
1+15	0.0000	0.00	Q	|	|	|	|
1+20	0.0000	0.00	Q	|	|	|	|
1+25	0.0000	0.00	Q	|	|	|	|
1+30	0.0000	0.00	Q	|	|	|	|
1+35	0.0000	0.00	Q	|	|	|	|
1+40	0.0000	0.00	Q	|	|	|	|
1+45	0.0000	0.00	Q	|	|	|	|
1+50	0.0000	0.00	Q	|	|	|	|
1+55	0.0000	0.00	Q	|	|	|	|
2+ 0	0.0000	0.00	Q	|	|	|	|
2+ 5	0.0000	0.00	Q	|	|	|	|
2+10	0.0000	0.00	Q	|	|	|	|
2+15	0.0000	0.00	Q	|	|	|	|
2+20	0.0000	0.00	Q	|	|	|	|
2+25	0.0000	0.00	Q	|	|	|	|
2+30	0.0000	0.00	Q	|	|	|	|

2+35	0.0000	0.00	Q				
2+40	0.0000	0.00	Q				
2+45	0.0000	0.00	Q				
2+50	0.0000	0.00	Q				
2+55	0.0000	0.00	Q				
3+ 0	0.0000	0.00	Q				
3+ 5	0.0000	0.00	Q				
3+10	0.0000	0.00	Q				
3+15	0.0000	0.00	Q				
3+20	0.0000	0.00	Q				
3+25	0.0000	0.00	Q				
3+30	0.0000	0.00	Q				
3+35	0.0000	0.00	Q				
3+40	0.0000	0.00	Q				
3+45	0.0000	0.00	Q				
3+50	0.0000	0.00	Q				
3+55	0.0000	0.00	Q				
4+ 0	0.0000	0.00	Q				
4+ 5	0.0000	0.00	Q				
4+10	0.0000	0.00	Q				
4+15	0.0000	0.00	Q				
4+20	0.0000	0.00	Q				
4+25	0.0000	0.00	Q				
4+30	0.0000	0.00	Q				
4+35	0.0000	0.00	Q				
4+40	0.0000	0.00	Q				
4+45	0.0000	0.00	Q				
4+50	0.0000	0.00	Q				
4+55	0.0000	0.00	Q				
5+ 0	0.0000	0.00	Q				
5+ 5	0.0000	0.00	Q				
5+10	0.0000	0.00	Q				
5+15	0.0000	0.00	Q				
5+20	0.0000	0.00	Q				
5+25	0.0000	0.00	Q				
5+30	0.0000	0.00	Q				
5+35	0.0000	0.00	Q				
5+40	0.0000	0.00	Q				
5+45	0.0000	0.00	Q				
5+50	0.0000	0.00	Q				
5+55	0.0000	0.00	Q				
6+ 0	0.0000	0.00	Q				
6+ 5	0.0000	0.00	Q				
6+10	0.0000	0.00	Q				
6+15	0.0000	0.00	Q				
6+20	0.0000	0.00	Q				
6+25	0.0000	0.00	Q				
6+30	0.0000	0.00	Q				
6+35	0.0000	0.00	Q				
6+40	0.0000	0.00	Q				
6+45	0.0000	0.00	Q				
6+50	0.0000	0.00	Q				
6+55	0.0000	0.00	Q				
7+ 0	0.0000	0.00	Q				
7+ 5	0.0000	0.00	Q				
7+10	0.0000	0.00	Q				
7+15	0.0000	0.00	Q				
7+20	0.0000	0.00	Q				
7+25	0.0000	0.00	Q				
7+30	0.0000	0.00	Q				
7+35	0.0000	0.00	Q				
7+40	0.0000	0.00	Q				
7+45	0.0000	0.00	Q				
7+50	0.0000	0.00	Q				
7+55	0.0000	0.00	Q				
8+ 0	0.0000	0.00	Q				
8+ 5	0.0000	0.00	Q				
8+10	0.0000	0.00	Q				
8+15	0.0000	0.00	Q				

8+20	0.0000	0.00	Q				
8+25	0.0000	0.00	Q				
8+30	0.0000	0.00	Q				
8+35	0.0000	0.00	Q				
8+40	0.0000	0.00	Q				
8+45	0.0000	0.00	Q				
8+50	0.0000	0.00	Q				
8+55	0.0000	0.00	Q				
9+ 0	0.0000	0.00	Q				
9+ 5	0.0000	0.00	Q				
9+10	0.0000	0.00	Q				
9+15	0.0000	0.00	Q				
9+20	0.0000	0.00	Q				
9+25	0.0000	0.00	Q				
9+30	0.0000	0.00	Q				
9+35	0.0000	0.00	Q				
9+40	0.0000	0.00	Q				
9+45	0.0000	0.00	Q				
9+50	0.0000	0.00	Q				
9+55	0.0000	0.00	Q				
10+ 0	0.0000	0.00	Q				
10+ 5	0.0000	0.00	Q				
10+10	0.0000	0.00	Q				
10+15	0.0000	0.00	Q				
10+20	0.0000	0.00	Q				
10+25	0.0000	0.00	Q				
10+30	0.0000	0.00	Q				
10+35	0.0000	0.00	Q				
10+40	0.0000	0.00	Q				
10+45	0.0000	0.00	Q				
10+50	0.0000	0.00	Q				
10+55	0.0000	0.00	Q				
11+ 0	0.0000	0.00	Q				
11+ 5	0.0000	0.00	Q				
11+10	0.0000	0.00	Q				
11+15	0.0000	0.00	Q				
11+20	0.0000	0.00	Q				
11+25	0.0000	0.00	Q				
11+30	0.0000	0.00	Q				
11+35	0.0000	0.00	Q				
11+40	0.0000	0.00	Q				
11+45	0.0000	0.00	Q				
11+50	0.0000	0.00	Q				
11+55	0.0000	0.00	Q				
12+ 0	0.0000	0.00	Q				
12+ 5	0.0000	0.00	Q				
12+10	0.0000	0.00	Q				
12+15	0.0000	0.00	Q				
12+20	0.0000	0.00	Q				
12+25	0.0000	0.00	Q				
12+30	0.0000	0.00	Q				
12+35	0.0000	0.00	Q				
12+40	0.0000	0.00	Q				
12+45	0.0000	0.00	Q				
12+50	0.0000	0.00	Q				
12+55	0.0000	0.00	Q				
13+ 0	0.0000	0.00	Q				
13+ 5	0.0000	0.00	Q				
13+10	0.0000	0.00	Q				
13+15	0.0000	0.00	Q				
13+20	0.0000	0.00	Q				
13+25	0.0000	0.00	Q				
13+30	0.0000	0.00	Q				
13+35	0.0000	0.00	Q				
13+40	0.0000	0.00	Q				
13+45	0.0000	0.00	Q				
13+50	0.0000	0.00	Q				
13+55	0.0000	0.00	Q				
14+ 0	0.0000	0.00	Q				

```
14+ 5       0.0000      0.00  Q         |         |         |         |
14+10       0.0000      0.00  Q         |         |         |         |
14+15       0.0000      0.00  Q         |         |         |         |
14+20       0.0000      0.00  Q         |         |         |         |
14+25       0.0000      0.00  Q         |         |         |         |
14+30       0.0000      0.00  Q         |         |         |         |
14+35       0.0000      0.00  Q         |         |         |         |
14+40       0.0000      0.00  Q         |         |         |         |
14+45       0.0000      0.00  Q         |         |         |         |
14+50       0.0000      0.00  Q         |         |         |         |
14+55       0.0000      0.00  Q         |         |         |         |
15+ 0       0.0000      0.00  Q         |         |         |         |
15+ 5       0.0000      0.00  Q         |         |         |         |
15+10       0.0000      0.00  Q         |         |         |         |
15+15       0.0000      0.00  Q         |         |         |         |
15+20       0.0000      0.00  Q         |         |         |         |
15+25       0.0000      0.00  Q         |         |         |         |
15+30       0.0000      0.00  Q         |         |         |         |
15+35       0.0000      0.00  Q         |         |         |         |
15+40       0.0000      0.00  Q         |         |         |         |
15+45       0.0000      0.00  Q         |         |         |         |
15+50       0.0000      0.00  Q         |         |         |         |
15+55       0.0000      0.00  Q         |         |         |         |
16+ 0       0.0000      0.00  Q         |         |         |         |
16+ 5       0.0023      0.32  |QV       |         |         |         |
16+10       0.0118      1.38  |    Q    | V       |         |         |
16+15       0.0224      1.55  |     Q   |         |   V     |         |
16+20       0.0273      0.71  | Q       |         |         V|         |
16+25       0.0299      0.37  |Q        |         |          | V       |
16+30       0.0316      0.26  |Q        |         |          |   V     |
16+35       0.0329      0.18  Q         |         |          |    V    |
16+40       0.0339      0.14  Q         |         |          |     V   |
16+45       0.0346      0.10  Q         |         |          |      V  |
16+50       0.0352      0.08  Q         |         |          |      V  |
16+55       0.0357      0.07  Q         |         |          |       V |
17+ 0       0.0360      0.05  Q         |         |          |       V |
17+ 5       0.0363      0.04  Q         |         |          |        V|
17+10       0.0366      0.03  Q         |         |          |        V|
17+15       0.0368      0.03  Q         |         |          |        V|
17+20       0.0369      0.03  Q         |         |          |        V|
17+25       0.0371      0.02  Q         |         |          |        V|
17+30       0.0371      0.00  Q         |         |          |        V|
17+35       0.0371      0.00  Q         |         |          |        V|
17+40       0.0371      0.00  Q         |         |          |        V|
17+45       0.0371      0.00  Q         |         |          |        V|
17+50       0.0371      0.00  Q         |         |          |        V|
17+55       0.0371      0.00  Q         |         |          |        V|
18+ 0       0.0371      0.00  Q         |         |          |        V|
18+ 5       0.0371      0.00  Q         |         |          |        V|
18+10       0.0371      0.00  Q         |         |          |        V|
18+15       0.0371      0.00  Q         |         |          |        V|
18+20       0.0371      0.00  Q         |         |          |        V|
18+25       0.0371      0.00  Q         |         |          |        V|
18+30       0.0371      0.00  Q         |         |          |        V|
18+35       0.0371      0.00  Q         |         |          |        V|
18+40       0.0371      0.00  Q         |         |          |        V|
18+45       0.0371      0.00  Q         |         |          |        V|
18+50       0.0371      0.00  Q         |         |          |        V|
18+55       0.0371      0.00  Q         |         |          |        V|
19+ 0       0.0371      0.00  Q         |         |          |        V|
19+ 5       0.0371      0.00  Q         |         |          |        V|
19+10       0.0371      0.00  Q         |         |          |        V|
19+15       0.0371      0.00  Q         |         |          |        V|
19+20       0.0371      0.00  Q         |         |          |        V|
19+25       0.0371      0.00  Q         |         |          |        V|
19+30       0.0371      0.00  Q         |         |          |        V|
19+35       0.0371      0.00  Q         |         |          |        V|
19+40       0.0371      0.00  Q         |         |          |        V|
19+45       0.0371      0.00  Q         |         |          |        V|
```

19+50	0.0371	0.00	Q	|	|	|	V|
19+55	0.0371	0.00	Q	|	|	|	V|
20+ 0	0.0371	0.00	Q	|	|	|	V|
20+ 5	0.0371	0.00	Q	|	|	|	V|
20+10	0.0371	0.00	Q	|	|	|	V|
20+15	0.0371	0.00	Q	|	|	|	V|
20+20	0.0371	0.00	Q	|	|	|	V|
20+25	0.0371	0.00	Q	|	|	|	V|
20+30	0.0371	0.00	Q	|	|	|	V|
20+35	0.0371	0.00	Q	|	|	|	V|
20+40	0.0371	0.00	Q	|	|	|	V|
20+45	0.0371	0.00	Q	|	|	|	V|
20+50	0.0371	0.00	Q	|	|	|	V|
20+55	0.0371	0.00	Q	|	|	|	V|
21+ 0	0.0371	0.00	Q	|	|	|	V|
21+ 5	0.0371	0.00	Q	|	|	|	V|
21+10	0.0371	0.00	Q	|	|	|	V|
21+15	0.0371	0.00	Q	|	|	|	V|
21+20	0.0371	0.00	Q	|	|	|	V|
21+25	0.0371	0.00	Q	|	|	|	V|
21+30	0.0371	0.00	Q	|	|	|	V|
21+35	0.0371	0.00	Q	|	|	|	V|
21+40	0.0371	0.00	Q	|	|	|	V|
21+45	0.0371	0.00	Q	|	|	|	V|
21+50	0.0371	0.00	Q	|	|	|	V|
21+55	0.0371	0.00	Q	|	|	|	V|
22+ 0	0.0371	0.00	Q	|	|	|	V|
22+ 5	0.0371	0.00	Q	|	|	|	V|
22+10	0.0371	0.00	Q	|	|	|	V|
22+15	0.0371	0.00	Q	|	|	|	V|
22+20	0.0371	0.00	Q	|	|	|	V|
22+25	0.0371	0.00	Q	|	|	|	V|
22+30	0.0371	0.00	Q	|	|	|	V|
22+35	0.0371	0.00	Q	|	|	|	V|
22+40	0.0371	0.00	Q	|	|	|	V|
22+45	0.0371	0.00	Q	|	|	|	V|
22+50	0.0371	0.00	Q	|	|	|	V|
22+55	0.0371	0.00	Q	|	|	|	V|
23+ 0	0.0371	0.00	Q	|	|	|	V|
23+ 5	0.0371	0.00	Q	|	|	|	V|
23+10	0.0371	0.00	Q	|	|	|	V|
23+15	0.0371	0.00	Q	|	|	|	V|
23+20	0.0371	0.00	Q	|	|	|	V|
23+25	0.0371	0.00	Q	|	|	|	V|
23+30	0.0371	0.00	Q	|	|	|	V|
23+35	0.0371	0.00	Q	|	|	|	V|
23+40	0.0371	0.00	Q	|	|	|	V|
23+45	0.0371	0.00	Q	|	|	|	V|
23+50	0.0371	0.00	Q	|	|	|	V|
23+55	0.0371	0.00	Q	|	|	|	V|
24+ 0	0.0371	0.00	Q	|	|	|	V|

Appendix I.II

Synthetic Unit Hydrograph Method Analysis
Pre-Development Conditions
10-Year Storm

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

Study date 10/27/22

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

Program License Serial Number 6443

JURUPA AND WILLOW
UNIT HYDROGRAPH
10-YEAR STORM
PRE DEVELOPMENT - DMA A1

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		
2.30	1	0.79
Rainfall data for year 2		
2.30	6	1.26
Rainfall data for year 2		
2.30	24	2.27
Rainfall data for year 100		
2.30	1	1.24
Rainfall data for year 100		
2.30	6	2.93
Rainfall data for year 100		
2.30	24	5.35

++

******** 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)
67.0	67.0	2.30	1.000	0.578	1.000	0.578

Area-averaged adjusted loss rate Fm (In/Hr) = 0.578

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
2.30	1.000	67.0	67.0	4.93	0.246

Area-averaged catchment yield fraction, Y = 0.246
Area-averaged low loss fraction, Yb = 0.754
User entry of time of concentration = 0.209 (hours)
++
Watershed area = 2.30(Ac.)
Catchment Lag time = 0.167 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 49.8405
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.578(In/Hr)
Average low loss rate fraction (Yb) = 0.754 (decimal)
VALLEY UNDEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.291(In)
Computed peak 30-minute rainfall = 0.596(In)
Specified peak 1-hour rainfall = 0.787(In)
Computed peak 3-hour rainfall = 1.371(In)
Specified peak 6-hour rainfall = 1.947(In)
Specified peak 24-hour rainfall = 3.537(In)

Rainfall depth area reduction factors:
Using a total area of 2.30(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.291(In)
30-minute factor = 1.000 Adjusted rainfall = 0.596(In)
1-hour factor = 1.000 Adjusted rainfall = 0.787(In)
3-hour factor = 1.000 Adjusted rainfall = 1.371(In)
6-hour factor = 1.000 Adjusted rainfall = 1.947(In)
24-hour factor = 1.000 Adjusted rainfall = 3.537(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 = 27.82 (CFS))	
1	6.095	1.695
2	32.108	7.236
3	60.973	8.029
4	73.986	3.620
5	80.796	1.894
6	85.530	1.317
7	88.938	0.948
8	91.547	0.726
9	93.456	0.531
10	95.005	0.431
11	96.313	0.364
12	97.317	0.279
13	98.122	0.224
14	98.728	0.169
15	99.227	0.139
16	99.725	0.139
17	100.000	0.076

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.2912	0.2912
2	0.3843	0.0931
3	0.4520	0.0677
4	0.5071	0.0551
5	0.5544	0.0473

6	0.5964	0.0419
7	0.6343	0.0379
8	0.6691	0.0348
9	0.7014	0.0323
10	0.7316	0.0302
11	0.7600	0.0284
12	0.7869	0.0269
13	0.8194	0.0325
14	0.8507	0.0313
15	0.8809	0.0302
16	0.9101	0.0292
17	0.9385	0.0283
18	0.9660	0.0275
19	0.9928	0.0268
20	1.0188	0.0261
21	1.0443	0.0254
22	1.0691	0.0249
23	1.0934	0.0243
24	1.1172	0.0238
25	1.1405	0.0233
26	1.1634	0.0228
27	1.1858	0.0224
28	1.2078	0.0220
29	1.2294	0.0216
30	1.2507	0.0213
31	1.2716	0.0209
32	1.2922	0.0206
33	1.3124	0.0203
34	1.3324	0.0200
35	1.3521	0.0197
36	1.3715	0.0194
37	1.3906	0.0191
38	1.4095	0.0189
39	1.4281	0.0186
40	1.4465	0.0184
41	1.4647	0.0182
42	1.4826	0.0180
43	1.5004	0.0177
44	1.5179	0.0175
45	1.5352	0.0173
46	1.5524	0.0172
47	1.5694	0.0170
48	1.5862	0.0168
49	1.6028	0.0166
50	1.6192	0.0165
51	1.6355	0.0163
52	1.6517	0.0161
53	1.6676	0.0160
54	1.6835	0.0158
55	1.6992	0.0157
56	1.7147	0.0155
57	1.7301	0.0154
58	1.7454	0.0153
59	1.7606	0.0152
60	1.7756	0.0150
61	1.7905	0.0149
62	1.8053	0.0148
63	1.8199	0.0147
64	1.8345	0.0145
65	1.8489	0.0144
66	1.8632	0.0143
67	1.8775	0.0142
68	1.8916	0.0141
69	1.9056	0.0140
70	1.9195	0.0139
71	1.9333	0.0138
72	1.9470	0.0137
73	1.9586	0.0116
74	1.9701	0.0115

75	1.9816	0.0114
76	1.9929	0.0113
77	2.0042	0.0113
78	2.0153	0.0112
79	2.0264	0.0111
80	2.0374	0.0110
81	2.0483	0.0109
82	2.0592	0.0109
83	2.0700	0.0108
84	2.0807	0.0107
85	2.0913	0.0106
86	2.1019	0.0106
87	2.1124	0.0105
88	2.1228	0.0104
89	2.1331	0.0104
90	2.1434	0.0103
91	2.1536	0.0102
92	2.1638	0.0102
93	2.1739	0.0101
94	2.1839	0.0100
95	2.1939	0.0100
96	2.2038	0.0099
97	2.2137	0.0099
98	2.2235	0.0098
99	2.2332	0.0097
100	2.2429	0.0097
101	2.2526	0.0096
102	2.2621	0.0096
103	2.2717	0.0095
104	2.2811	0.0095
105	2.2905	0.0094
106	2.2999	0.0094
107	2.3092	0.0093
108	2.3185	0.0093
109	2.3277	0.0092
110	2.3369	0.0092
111	2.3460	0.0091
112	2.3551	0.0091
113	2.3641	0.0090
114	2.3731	0.0090
115	2.3821	0.0089
116	2.3910	0.0089
117	2.3998	0.0089
118	2.4086	0.0088
119	2.4174	0.0088
120	2.4261	0.0087
121	2.4348	0.0087
122	2.4435	0.0086
123	2.4521	0.0086
124	2.4606	0.0086
125	2.4692	0.0085
126	2.4776	0.0085
127	2.4861	0.0084
128	2.4945	0.0084
129	2.5029	0.0084
130	2.5112	0.0083
131	2.5195	0.0083
132	2.5278	0.0083
133	2.5360	0.0082
134	2.5442	0.0082
135	2.5524	0.0082
136	2.5605	0.0081
137	2.5686	0.0081
138	2.5766	0.0081
139	2.5847	0.0080
140	2.5926	0.0080
141	2.6006	0.0080
142	2.6085	0.0079
143	2.6164	0.0079

144	2.6243	0.0079
145	2.6321	0.0078
146	2.6399	0.0078
147	2.6477	0.0078
148	2.6554	0.0077
149	2.6632	0.0077
150	2.6708	0.0077
151	2.6785	0.0077
152	2.6861	0.0076
153	2.6937	0.0076
154	2.7013	0.0076
155	2.7088	0.0075
156	2.7163	0.0075
157	2.7238	0.0075
158	2.7313	0.0075
159	2.7387	0.0074
160	2.7461	0.0074
161	2.7535	0.0074
162	2.7608	0.0074
163	2.7682	0.0073
164	2.7755	0.0073
165	2.7827	0.0073
166	2.7900	0.0073
167	2.7972	0.0072
168	2.8044	0.0072
169	2.8116	0.0072
170	2.8187	0.0072
171	2.8259	0.0071
172	2.8330	0.0071
173	2.8401	0.0071
174	2.8471	0.0071
175	2.8542	0.0070
176	2.8612	0.0070
177	2.8682	0.0070
178	2.8751	0.0070
179	2.8821	0.0069
180	2.8890	0.0069
181	2.8959	0.0069
182	2.9028	0.0069
183	2.9096	0.0069
184	2.9165	0.0068
185	2.9233	0.0068
186	2.9301	0.0068
187	2.9369	0.0068
188	2.9436	0.0068
189	2.9503	0.0067
190	2.9571	0.0067
191	2.9637	0.0067
192	2.9704	0.0067
193	2.9771	0.0067
194	2.9837	0.0066
195	2.9903	0.0066
196	2.9969	0.0066
197	3.0035	0.0066
198	3.0100	0.0066
199	3.0166	0.0065
200	3.0231	0.0065
201	3.0296	0.0065
202	3.0361	0.0065
203	3.0425	0.0065
204	3.0490	0.0064
205	3.0554	0.0064
206	3.0618	0.0064
207	3.0682	0.0064
208	3.0746	0.0064
209	3.0809	0.0064
210	3.0873	0.0063
211	3.0936	0.0063
212	3.0999	0.0063

213	3.1062	0.0063
214	3.1125	0.0063
215	3.1187	0.0063
216	3.1250	0.0062
217	3.1312	0.0062
218	3.1374	0.0062
219	3.1436	0.0062
220	3.1498	0.0062
221	3.1559	0.0062
222	3.1621	0.0061
223	3.1682	0.0061
224	3.1743	0.0061
225	3.1804	0.0061
226	3.1865	0.0061
227	3.1925	0.0061
228	3.1986	0.0060
229	3.2046	0.0060
230	3.2106	0.0060
231	3.2166	0.0060
232	3.2226	0.0060
233	3.2286	0.0060
234	3.2346	0.0060
235	3.2405	0.0059
236	3.2464	0.0059
237	3.2524	0.0059
238	3.2583	0.0059
239	3.2642	0.0059
240	3.2700	0.0059
241	3.2759	0.0059
242	3.2817	0.0058
243	3.2876	0.0058
244	3.2934	0.0058
245	3.2992	0.0058
246	3.3050	0.0058
247	3.3108	0.0058
248	3.3165	0.0058
249	3.3223	0.0058
250	3.3280	0.0057
251	3.3337	0.0057
252	3.3395	0.0057
253	3.3452	0.0057
254	3.3508	0.0057
255	3.3565	0.0057
256	3.3622	0.0057
257	3.3678	0.0056
258	3.3735	0.0056
259	3.3791	0.0056
260	3.3847	0.0056
261	3.3903	0.0056
262	3.3959	0.0056
263	3.4015	0.0056
264	3.4070	0.0056
265	3.4126	0.0056
266	3.4181	0.0055
267	3.4237	0.0055
268	3.4292	0.0055
269	3.4347	0.0055
270	3.4402	0.0055
271	3.4457	0.0055
272	3.4511	0.0055
273	3.4566	0.0055
274	3.4620	0.0054
275	3.4675	0.0054
276	3.4729	0.0054
277	3.4783	0.0054
278	3.4837	0.0054
279	3.4891	0.0054
280	3.4945	0.0054
281	3.4998	0.0054

282	3.5052	0.0054
283	3.5105	0.0053
284	3.5159	0.0053
285	3.5212	0.0053
286	3.5265	0.0053
287	3.5318	0.0053
288	3.5371	0.0053

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0053	0.0040	0.0013
2	0.0053	0.0040	0.0013
3	0.0053	0.0040	0.0013
4	0.0053	0.0040	0.0013
5	0.0054	0.0040	0.0013
6	0.0054	0.0040	0.0013
7	0.0054	0.0041	0.0013
8	0.0054	0.0041	0.0013
9	0.0054	0.0041	0.0013
10	0.0054	0.0041	0.0013
11	0.0055	0.0041	0.0013
12	0.0055	0.0041	0.0013
13	0.0055	0.0041	0.0014
14	0.0055	0.0041	0.0014
15	0.0055	0.0042	0.0014
16	0.0055	0.0042	0.0014
17	0.0056	0.0042	0.0014
18	0.0056	0.0042	0.0014
19	0.0056	0.0042	0.0014
20	0.0056	0.0042	0.0014
21	0.0056	0.0042	0.0014
22	0.0056	0.0043	0.0014
23	0.0057	0.0043	0.0014
24	0.0057	0.0043	0.0014
25	0.0057	0.0043	0.0014
26	0.0057	0.0043	0.0014
27	0.0058	0.0043	0.0014
28	0.0058	0.0043	0.0014
29	0.0058	0.0044	0.0014
30	0.0058	0.0044	0.0014
31	0.0058	0.0044	0.0014
32	0.0058	0.0044	0.0014
33	0.0059	0.0044	0.0014
34	0.0059	0.0044	0.0015
35	0.0059	0.0045	0.0015
36	0.0059	0.0045	0.0015
37	0.0060	0.0045	0.0015
38	0.0060	0.0045	0.0015
39	0.0060	0.0045	0.0015
40	0.0060	0.0045	0.0015
41	0.0060	0.0046	0.0015
42	0.0061	0.0046	0.0015
43	0.0061	0.0046	0.0015
44	0.0061	0.0046	0.0015
45	0.0061	0.0046	0.0015
46	0.0062	0.0046	0.0015
47	0.0062	0.0047	0.0015
48	0.0062	0.0047	0.0015
49	0.0062	0.0047	0.0015
50	0.0063	0.0047	0.0015
51	0.0063	0.0047	0.0015
52	0.0063	0.0048	0.0016
53	0.0063	0.0048	0.0016
54	0.0064	0.0048	0.0016
55	0.0064	0.0048	0.0016
56	0.0064	0.0048	0.0016
57	0.0064	0.0049	0.0016

58	0.0065	0.0049	0.0016
59	0.0065	0.0049	0.0016
60	0.0065	0.0049	0.0016
61	0.0066	0.0049	0.0016
62	0.0066	0.0050	0.0016
63	0.0066	0.0050	0.0016
64	0.0066	0.0050	0.0016
65	0.0067	0.0050	0.0016
66	0.0067	0.0050	0.0016
67	0.0067	0.0051	0.0017
68	0.0068	0.0051	0.0017
69	0.0068	0.0051	0.0017
70	0.0068	0.0051	0.0017
71	0.0069	0.0052	0.0017
72	0.0069	0.0052	0.0017
73	0.0069	0.0052	0.0017
74	0.0069	0.0052	0.0017
75	0.0070	0.0053	0.0017
76	0.0070	0.0053	0.0017
77	0.0071	0.0053	0.0017
78	0.0071	0.0053	0.0017
79	0.0071	0.0054	0.0018
80	0.0072	0.0054	0.0018
81	0.0072	0.0054	0.0018
82	0.0072	0.0054	0.0018
83	0.0073	0.0055	0.0018
84	0.0073	0.0055	0.0018
85	0.0074	0.0055	0.0018
86	0.0074	0.0056	0.0018
87	0.0074	0.0056	0.0018
88	0.0075	0.0056	0.0018
89	0.0075	0.0057	0.0018
90	0.0075	0.0057	0.0019
91	0.0076	0.0057	0.0019
92	0.0076	0.0057	0.0019
93	0.0077	0.0058	0.0019
94	0.0077	0.0058	0.0019
95	0.0078	0.0059	0.0019
96	0.0078	0.0059	0.0019
97	0.0079	0.0059	0.0019
98	0.0079	0.0060	0.0019
99	0.0080	0.0060	0.0020
100	0.0080	0.0060	0.0020
101	0.0081	0.0061	0.0020
102	0.0081	0.0061	0.0020
103	0.0082	0.0062	0.0020
104	0.0082	0.0062	0.0020
105	0.0083	0.0062	0.0020
106	0.0083	0.0063	0.0020
107	0.0084	0.0063	0.0021
108	0.0084	0.0063	0.0021
109	0.0085	0.0064	0.0021
110	0.0085	0.0064	0.0021
111	0.0086	0.0065	0.0021
112	0.0086	0.0065	0.0021
113	0.0087	0.0066	0.0021
114	0.0088	0.0066	0.0022
115	0.0089	0.0067	0.0022
116	0.0089	0.0067	0.0022
117	0.0090	0.0068	0.0022
118	0.0090	0.0068	0.0022
119	0.0091	0.0069	0.0022
120	0.0092	0.0069	0.0023
121	0.0093	0.0070	0.0023
122	0.0093	0.0070	0.0023
123	0.0094	0.0071	0.0023
124	0.0095	0.0071	0.0023
125	0.0096	0.0072	0.0024
126	0.0096	0.0073	0.0024

127	0.0097	0.0073	0.0024
128	0.0098	0.0074	0.0024
129	0.0099	0.0075	0.0024
130	0.0100	0.0075	0.0025
131	0.0101	0.0076	0.0025
132	0.0102	0.0077	0.0025
133	0.0103	0.0078	0.0025
134	0.0104	0.0078	0.0025
135	0.0105	0.0079	0.0026
136	0.0106	0.0080	0.0026
137	0.0107	0.0081	0.0026
138	0.0108	0.0081	0.0027
139	0.0109	0.0082	0.0027
140	0.0110	0.0083	0.0027
141	0.0112	0.0084	0.0028
142	0.0113	0.0085	0.0028
143	0.0114	0.0086	0.0028
144	0.0115	0.0087	0.0028
145	0.0137	0.0103	0.0034
146	0.0138	0.0104	0.0034
147	0.0140	0.0106	0.0035
148	0.0141	0.0106	0.0035
149	0.0143	0.0108	0.0035
150	0.0144	0.0109	0.0036
151	0.0147	0.0111	0.0036
152	0.0148	0.0111	0.0036
153	0.0150	0.0113	0.0037
154	0.0152	0.0114	0.0037
155	0.0154	0.0116	0.0038
156	0.0155	0.0117	0.0038
157	0.0158	0.0119	0.0039
158	0.0160	0.0120	0.0039
159	0.0163	0.0123	0.0040
160	0.0165	0.0124	0.0041
161	0.0168	0.0127	0.0041
162	0.0170	0.0128	0.0042
163	0.0173	0.0131	0.0043
164	0.0175	0.0132	0.0043
165	0.0180	0.0135	0.0044
166	0.0182	0.0137	0.0045
167	0.0186	0.0140	0.0046
168	0.0189	0.0142	0.0046
169	0.0194	0.0146	0.0048
170	0.0197	0.0148	0.0048
171	0.0203	0.0153	0.0050
172	0.0206	0.0155	0.0051
173	0.0213	0.0160	0.0052
174	0.0216	0.0163	0.0053
175	0.0224	0.0169	0.0055
176	0.0228	0.0172	0.0056
177	0.0238	0.0179	0.0059
178	0.0243	0.0183	0.0060
179	0.0254	0.0192	0.0063
180	0.0261	0.0197	0.0064
181	0.0275	0.0207	0.0068
182	0.0283	0.0214	0.0070
183	0.0302	0.0228	0.0074
184	0.0313	0.0236	0.0077
185	0.0269	0.0203	0.0066
186	0.0284	0.0214	0.0070
187	0.0323	0.0243	0.0079
188	0.0348	0.0262	0.0086
189	0.0419	0.0316	0.0103
190	0.0473	0.0357	0.0117
191	0.0677	0.0482	0.0195
192	0.0931	0.0482	0.0449
193	0.2912	0.0482	0.2430
194	0.0551	0.0415	0.0136
195	0.0379	0.0286	0.0093

196	0.0302	0.0228	0.0074
197	0.0325	0.0245	0.0080
198	0.0292	0.0220	0.0072
199	0.0268	0.0202	0.0066
200	0.0249	0.0187	0.0061
201	0.0233	0.0176	0.0057
202	0.0220	0.0166	0.0054
203	0.0209	0.0158	0.0051
204	0.0200	0.0150	0.0049
205	0.0191	0.0144	0.0047
206	0.0184	0.0139	0.0045
207	0.0177	0.0134	0.0044
208	0.0172	0.0129	0.0042
209	0.0166	0.0125	0.0041
210	0.0161	0.0122	0.0040
211	0.0157	0.0118	0.0039
212	0.0153	0.0115	0.0038
213	0.0149	0.0112	0.0037
214	0.0145	0.0110	0.0036
215	0.0142	0.0107	0.0035
216	0.0139	0.0105	0.0034
217	0.0116	0.0087	0.0029
218	0.0113	0.0085	0.0028
219	0.0111	0.0084	0.0027
220	0.0109	0.0082	0.0027
221	0.0106	0.0080	0.0026
222	0.0104	0.0079	0.0026
223	0.0102	0.0077	0.0025
224	0.0100	0.0076	0.0025
225	0.0099	0.0074	0.0024
226	0.0097	0.0073	0.0024
227	0.0095	0.0072	0.0023
228	0.0094	0.0071	0.0023
229	0.0092	0.0070	0.0023
230	0.0091	0.0068	0.0022
231	0.0089	0.0067	0.0022
232	0.0088	0.0066	0.0022
233	0.0087	0.0065	0.0021
234	0.0086	0.0065	0.0021
235	0.0084	0.0064	0.0021
236	0.0083	0.0063	0.0021
237	0.0082	0.0062	0.0020
238	0.0081	0.0061	0.0020
239	0.0080	0.0060	0.0020
240	0.0079	0.0060	0.0020
241	0.0078	0.0059	0.0019
242	0.0077	0.0058	0.0019
243	0.0077	0.0058	0.0019
244	0.0076	0.0057	0.0019
245	0.0075	0.0056	0.0018
246	0.0074	0.0056	0.0018
247	0.0073	0.0055	0.0018
248	0.0073	0.0055	0.0018
249	0.0072	0.0054	0.0018
250	0.0071	0.0054	0.0017
251	0.0070	0.0053	0.0017
252	0.0070	0.0053	0.0017
253	0.0069	0.0052	0.0017
254	0.0068	0.0052	0.0017
255	0.0068	0.0051	0.0017
256	0.0067	0.0051	0.0017
257	0.0067	0.0050	0.0016
258	0.0066	0.0050	0.0016
259	0.0065	0.0049	0.0016
260	0.0065	0.0049	0.0016
261	0.0064	0.0048	0.0016
262	0.0064	0.0048	0.0016
263	0.0063	0.0048	0.0016
264	0.0063	0.0047	0.0015

265	0.0062	0.0047	0.0015
266	0.0062	0.0047	0.0015
267	0.0061	0.0046	0.0015
268	0.0061	0.0046	0.0015
269	0.0060	0.0045	0.0015
270	0.0060	0.0045	0.0015
271	0.0059	0.0045	0.0015
272	0.0059	0.0044	0.0015
273	0.0059	0.0044	0.0014
274	0.0058	0.0044	0.0014
275	0.0058	0.0044	0.0014
276	0.0057	0.0043	0.0014
277	0.0057	0.0043	0.0014
278	0.0057	0.0043	0.0014
279	0.0056	0.0042	0.0014
280	0.0056	0.0042	0.0014
281	0.0056	0.0042	0.0014
282	0.0055	0.0042	0.0014
283	0.0055	0.0041	0.0013
284	0.0054	0.0041	0.0013
285	0.0054	0.0041	0.0013
286	0.0054	0.0041	0.0013
287	0.0053	0.0040	0.0013
288	0.0053	0.0040	0.0013

Total soil rain loss = 2.47(In)
Total effective rainfall = 1.07(In)
Peak flow rate in flood hydrograph = 2.31(CFS)

++

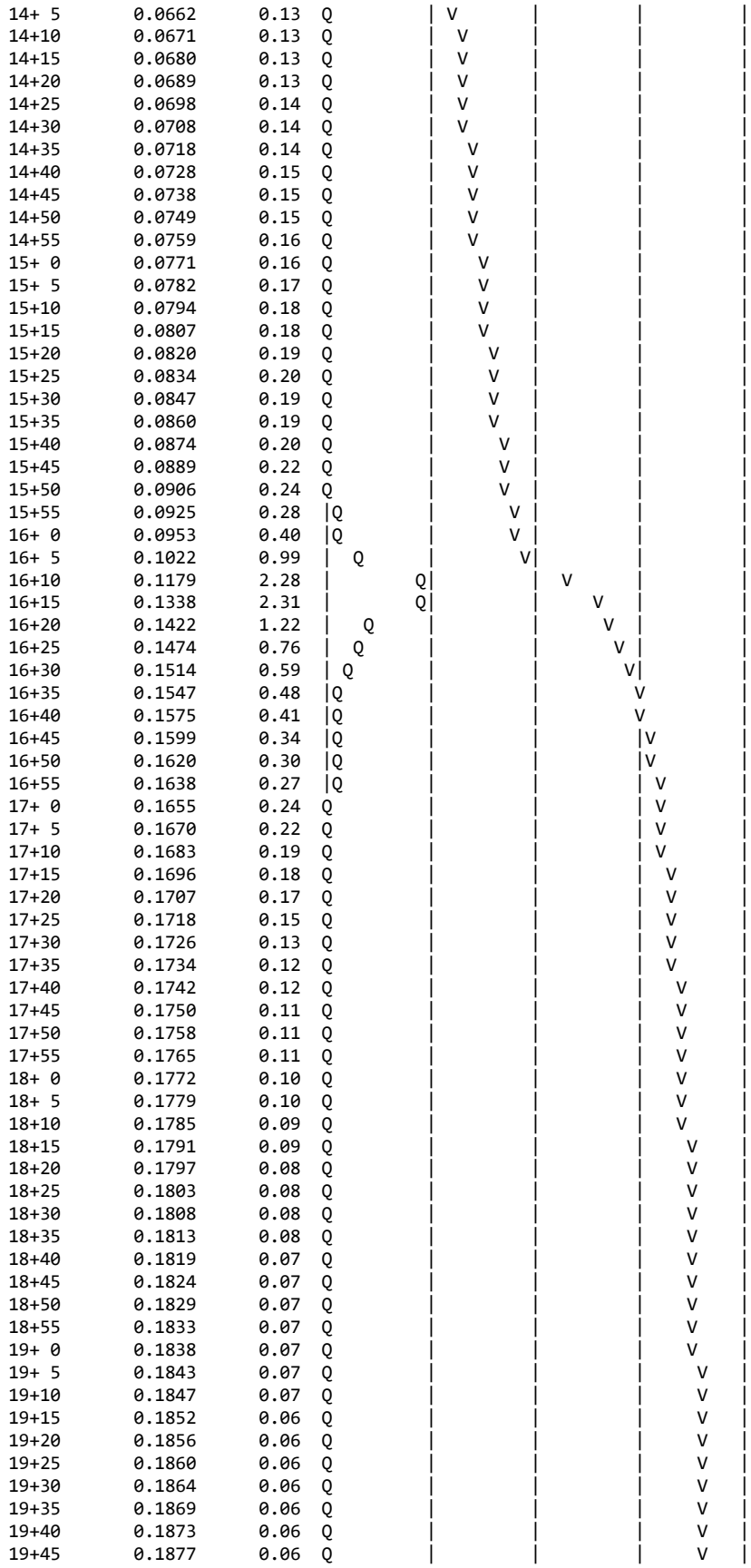
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0000	0.00	Q	|	|	|	|
0+10	0.0001	0.01	Q	|	|	|	|
0+15	0.0002	0.02	Q	|	|	|	|
0+20	0.0004	0.03	Q	|	|	|	|
0+25	0.0006	0.03	Q	|	|	|	|
0+30	0.0009	0.03	Q	|	|	|	|
0+35	0.0011	0.03	Q	|	|	|	|
0+40	0.0013	0.03	Q	|	|	|	|
0+45	0.0015	0.03	Q	|	|	|	|
0+50	0.0018	0.04	Q	|	|	|	|
0+55	0.0020	0.04	Q	|	|	|	|
1+ 0	0.0023	0.04	Q	|	|	|	|
1+ 5	0.0025	0.04	Q	|	|	|	|
1+10	0.0028	0.04	Q	|	|	|	|
1+15	0.0030	0.04	Q	|	|	|	|
1+20	0.0033	0.04	Q	|	|	|	|
1+25	0.0036	0.04	Q	|	|	|	|
1+30	0.0038	0.04	Q	|	|	|	|
1+35	0.0041	0.04	Q	|	|	|	|
1+40	0.0043	0.04	Q	|	|	|	|
1+45	0.0046	0.04	Q	|	|	|	|
1+50	0.0049	0.04	Q	|	|	|	|
1+55	0.0051	0.04	QV	|	|	|	|
2+ 0	0.0054	0.04	QV	|	|	|	|
2+ 5	0.0057	0.04	QV	|	|	|	|
2+10	0.0059	0.04	QV	|	|	|	|
2+15	0.0062	0.04	QV	|	|	|	|
2+20	0.0065	0.04	QV	|	|	|	|
2+25	0.0067	0.04	QV	|	|	|	|
2+30	0.0070	0.04	QV	|	|	|	|

2+35	0.0073	0.04	QV	|	|	|	|
2+40	0.0076	0.04	QV	|	|	|	|
2+45	0.0078	0.04	QV	|	|	|	|
2+50	0.0081	0.04	QV	|	|	|	|
2+55	0.0084	0.04	QV	|	|	|	|
3+ 0	0.0087	0.04	QV	|	|	|	|
3+ 5	0.0089	0.04	QV	|	|	|	|
3+10	0.0092	0.04	QV	|	|	|	|
3+15	0.0095	0.04	QV	|	|	|	|
3+20	0.0098	0.04	QV	|	|	|	|
3+25	0.0101	0.04	QV	|	|	|	|
3+30	0.0103	0.04	Q V	|	|	|	|
3+35	0.0106	0.04	Q V	|	|	|	|
3+40	0.0109	0.04	Q V	|	|	|	|
3+45	0.0112	0.04	Q V	|	|	|	|
3+50	0.0115	0.04	Q V	|	|	|	|
3+55	0.0118	0.04	Q V	|	|	|	|
4+ 0	0.0121	0.04	Q V	|	|	|	|
4+ 5	0.0124	0.04	Q V	|	|	|	|
4+10	0.0127	0.04	Q V	|	|	|	|
4+15	0.0129	0.04	Q V	|	|	|	|
4+20	0.0132	0.04	Q V	|	|	|	|
4+25	0.0135	0.04	Q V	|	|	|	|
4+30	0.0138	0.04	Q V	|	|	|	|
4+35	0.0141	0.04	Q V	|	|	|	|
4+40	0.0144	0.04	Q V	|	|	|	|
4+45	0.0147	0.04	Q V	|	|	|	|
4+50	0.0150	0.04	Q V	|	|	|	|
4+55	0.0153	0.04	Q V	|	|	|	|
5+ 0	0.0156	0.04	Q V	|	|	|	|
5+ 5	0.0159	0.04	Q V	|	|	|	|
5+10	0.0162	0.04	Q V	|	|	|	|
5+15	0.0166	0.04	Q V	|	|	|	|
5+20	0.0169	0.04	Q V	|	|	|	|
5+25	0.0172	0.05	Q V	|	|	|	|
5+30	0.0175	0.05	Q V	|	|	|	|
5+35	0.0178	0.05	Q V	|	|	|	|
5+40	0.0181	0.05	Q V	|	|	|	|
5+45	0.0184	0.05	Q V	|	|	|	|
5+50	0.0187	0.05	Q V	|	|	|	|
5+55	0.0191	0.05	Q V	|	|	|	|
6+ 0	0.0194	0.05	Q V	|	|	|	|
6+ 5	0.0197	0.05	Q V	|	|	|	|
6+10	0.0200	0.05	Q V	|	|	|	|
6+15	0.0204	0.05	Q V	|	|	|	|
6+20	0.0207	0.05	Q V	|	|	|	|
6+25	0.0210	0.05	Q V	|	|	|	|
6+30	0.0213	0.05	Q V	|	|	|	|
6+35	0.0217	0.05	Q V	|	|	|	|
6+40	0.0220	0.05	Q V	|	|	|	|
6+45	0.0223	0.05	Q V	|	|	|	|
6+50	0.0227	0.05	Q V	|	|	|	|
6+55	0.0230	0.05	Q V	|	|	|	|
7+ 0	0.0234	0.05	Q V	|	|	|	|
7+ 5	0.0237	0.05	Q V	|	|	|	|
7+10	0.0240	0.05	Q V	|	|	|	|
7+15	0.0244	0.05	Q V	|	|	|	|
7+20	0.0247	0.05	Q V	|	|	|	|
7+25	0.0251	0.05	Q V	|	|	|	|
7+30	0.0254	0.05	Q V	|	|	|	|
7+35	0.0258	0.05	Q V	|	|	|	|
7+40	0.0261	0.05	Q V	|	|	|	|
7+45	0.0265	0.05	Q V	|	|	|	|
7+50	0.0268	0.05	Q V	|	|	|	|
7+55	0.0272	0.05	Q V	|	|	|	|
8+ 0	0.0276	0.05	Q V	|	|	|	|
8+ 5	0.0279	0.05	Q V	|	|	|	|
8+10	0.0283	0.05	Q V	|	|	|	|
8+15	0.0287	0.05	Q V	|	|	|	|

```
 8+20      0.0290      0.05  Q    V    |         |         |         |
 8+25      0.0294      0.05  Q    V    |         |         |         |
 8+30      0.0298      0.05  Q    V    |         |         |         |
 8+35      0.0302      0.05  Q    V    |         |         |         |
 8+40      0.0305      0.06  Q    V    |         |         |         |
 8+45      0.0309      0.06  Q     V   |         |         |         |
 8+50      0.0313      0.06  Q     V   |         |         |         |
 8+55      0.0317      0.06  Q     V   |         |         |         |
 9+ 0      0.0321      0.06  Q     V   |         |         |         |
 9+ 5      0.0325      0.06  Q     V   |         |         |         |
 9+10      0.0329      0.06  Q     V   |         |         |         |
 9+15      0.0333      0.06  Q     V   |         |         |         |
 9+20      0.0337      0.06  Q     V   |         |         |         |
 9+25      0.0341      0.06  Q     V   |         |         |         |
 9+30      0.0345      0.06  Q     V   |         |         |         |
 9+35      0.0349      0.06  Q     V   |         |         |         |
 9+40      0.0353      0.06  Q     V   |         |         |         |
 9+45      0.0357      0.06  Q     V   |         |         |         |
 9+50      0.0361      0.06  Q      V  |         |         |         |
 9+55      0.0366      0.06  Q      V  |         |         |         |
10+ 0      0.0370      0.06  Q      V  |         |         |         |
10+ 5      0.0374      0.06  Q      V  |         |         |         |
10+10      0.0378      0.06  Q      V  |         |         |         |
10+15      0.0383      0.06  Q      V  |         |         |         |
10+20      0.0387      0.06  Q      V  |         |         |         |
10+25      0.0391      0.06  Q      V  |         |         |         |
10+30      0.0396      0.06  Q      V  |         |         |         |
10+35      0.0400      0.07  Q      V  |         |         |         |
10+40      0.0405      0.07  Q      V  |         |         |         |
10+45      0.0409      0.07  Q       V |         |         |         |
10+50      0.0414      0.07  Q       V |         |         |         |
10+55      0.0419      0.07  Q       V |         |         |         |
11+ 0      0.0423      0.07  Q       V |         |         |         |
11+ 5      0.0428      0.07  Q       V |         |         |         |
11+10      0.0433      0.07  Q       V |         |         |         |
11+15      0.0438      0.07  Q       V |         |         |         |
11+20      0.0442      0.07  Q       V |         |         |         |
11+25      0.0447      0.07  Q       V |         |         |         |
11+30      0.0452      0.07  Q       V |         |         |         |
11+35      0.0457      0.07  Q       V |         |         |         |
11+40      0.0462      0.07  Q        V|         |         |         |
11+45      0.0467      0.07  Q        V|         |         |         |
11+50      0.0473      0.07  Q        V|         |         |         |
11+55      0.0478      0.08  Q        V|         |         |         |
12+ 0      0.0483      0.08  Q        V|         |         |         |
12+ 5      0.0488      0.08  Q        V|         |         |         |
12+10      0.0494      0.08  Q        V|         |         |         |
12+15      0.0500      0.09  Q        V|         |         |         |
12+20      0.0506      0.09  Q        V|         |         |         |
12+25      0.0513      0.09  Q         V         |         |         |
12+30      0.0519      0.09  Q         V         |         |         |
12+35      0.0526      0.10  Q         V         |         |         |
12+40      0.0532      0.10  Q         V         |         |         |
12+45      0.0539      0.10  Q         V         |         |         |
12+50      0.0546      0.10  Q         V         |         |         |
12+55      0.0553      0.10  Q         V         |         |         |
13+ 0      0.0560      0.10  Q         V         |         |         |
13+ 5      0.0567      0.10  Q         |V        |         |         |
13+10      0.0575      0.11  Q         |V        |         |         |
13+15      0.0582      0.11  Q         |V        |         |         |
13+20      0.0589      0.11  Q         |V        |         |         |
13+25      0.0597      0.11  Q         |V        |         |         |
13+30      0.0605      0.11  Q         |V        |         |         |
13+35      0.0612      0.11  Q         |V        |         |         |
13+40      0.0620      0.11  Q         | V       |         |         |
13+45      0.0628      0.12  Q         | V       |         |         |
13+50      0.0637      0.12  Q         | V       |         |         |
13+55      0.0645      0.12  Q         | V       |         |         |
14+ 0      0.0653      0.12  Q         | V       |         |         |
```



```
   19+50       0.1881      0.06  Q        |         |         |     V   |
   19+55       0.1885      0.06  Q        |         |         |     V   |
   20+ 0       0.1889      0.06  Q        |         |         |     V   |
   20+ 5       0.1892      0.06  Q        |         |         |      V  |
   20+10       0.1896      0.06  Q        |         |         |      V  |
   20+15       0.1900      0.05  Q        |         |         |      V  |
   20+20       0.1904      0.05  Q        |         |         |      V  |
   20+25       0.1907      0.05  Q        |         |         |      V  |
   20+30       0.1911      0.05  Q        |         |         |      V  |
   20+35       0.1915      0.05  Q        |         |         |      V  |
   20+40       0.1918      0.05  Q        |         |         |      V  |
   20+45       0.1922      0.05  Q        |         |         |      V  |
   20+50       0.1925      0.05  Q        |         |         |      V  |
   20+55       0.1928      0.05  Q        |         |         |      V  |
   21+ 0       0.1932      0.05  Q        |         |         |      V  |
   21+ 5       0.1935      0.05  Q        |         |         |      V  |
   21+10       0.1939      0.05  Q        |         |         |      V  |
   21+15       0.1942      0.05  Q        |         |         |      V  |
   21+20       0.1945      0.05  Q        |         |         |       V |
   21+25       0.1948      0.05  Q        |         |         |       V |
   21+30       0.1952      0.05  Q        |         |         |       V |
   21+35       0.1955      0.05  Q        |         |         |       V |
   21+40       0.1958      0.05  Q        |         |         |       V |
   21+45       0.1961      0.05  Q        |         |         |       V |
   21+50       0.1964      0.04  Q        |         |         |       V |
   21+55       0.1967      0.04  Q        |         |         |       V |
   22+ 0       0.1970      0.04  Q        |         |         |       V |
   22+ 5       0.1973      0.04  Q        |         |         |       V |
   22+10       0.1976      0.04  Q        |         |         |       V |
   22+15       0.1979      0.04  Q        |         |         |       V |
   22+20       0.1982      0.04  Q        |         |         |       V |
   22+25       0.1985      0.04  Q        |         |         |       V |
   22+30       0.1988      0.04  Q        |         |         |       V |
   22+35       0.1991      0.04  Q        |         |         |       V |
   22+40       0.1994      0.04  Q        |         |         |        V|
   22+45       0.1996      0.04  Q        |         |         |        V|
   22+50       0.1999      0.04  Q        |         |         |        V|
   22+55       0.2002      0.04  Q        |         |         |        V|
   23+ 0       0.2005      0.04  Q        |         |         |        V|
   23+ 5       0.2008      0.04  Q        |         |         |        V|
   23+10       0.2010      0.04  Q        |         |         |        V|
   23+15       0.2013      0.04  Q        |         |         |        V|
   23+20       0.2016      0.04  Q        |         |         |        V|
   23+25       0.2018      0.04  Q        |         |         |        V|
   23+30       0.2021      0.04  Q        |         |         |        V|
   23+35       0.2024      0.04  Q        |         |         |        V|
   23+40       0.2026      0.04  Q        |         |         |        V|
   23+45       0.2029      0.04  Q        |         |         |        V|
   23+50       0.2031      0.04  Q        |         |         |        V|
   23+55       0.2034      0.04  Q        |         |         |        V|
   24+ 0       0.2037      0.04  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 10/27/22

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

Program License Serial Number 6443

JURUPA AND WILLOW
UNIT HYDROGRAPH
10-YEAR STORM
PRE DEVELOPMENT - DMA A2

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		
4.27	1	0.79
Rainfall data for year 2		
4.27	6	1.26
Rainfall data for year 2		
4.27	24	2.27
Rainfall data for year 100		
4.27	1	1.24
Rainfall data for year 100		
4.27	6	2.93
Rainfall data for year 100		
4.27	24	5.35

++

******** 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)
67.0	67.0	4.27	1.000	0.578	1.000	0.578

Area-averaged adjusted loss rate Fm (In/Hr) = 0.578

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
4.27	1.000	67.0	67.0	4.93	0.246

Area-averaged catchment yield fraction, Y = 0.246
Area-averaged low loss fraction, Yb = 0.754
User entry of time of concentration = 0.211 (hours)
++
Watershed area = 4.27(Ac.)
Catchment Lag time = 0.169 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 49.3681
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.578(In/Hr)
Average low loss rate fraction (Yb) = 0.754 (decimal)
VALLEY UNDEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.291(In)
Computed peak 30-minute rainfall = 0.596(In)
Specified peak 1-hour rainfall = 0.787(In)
Computed peak 3-hour rainfall = 1.371(In)
Specified peak 6-hour rainfall = 1.947(In)
Specified peak 24-hour rainfall = 3.537(In)

Rainfall depth area reduction factors:
Using a total area of 4.27(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.291(In)
30-minute factor = 1.000 Adjusted rainfall = 0.596(In)
1-hour factor = 1.000 Adjusted rainfall = 0.787(In)
3-hour factor = 1.000 Adjusted rainfall = 1.371(In)
6-hour factor = 1.000 Adjusted rainfall = 1.947(In)
24-hour factor = 1.000 Adjusted rainfall = 3.537(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 = 51.64 (CFS))	
1	6.007	3.102
2	31.616	13.225
3	60.517	14.924
4	73.703	6.809
5	80.560	3.541
6	85.320	2.458
7	88.752	1.772
8	91.388	1.361
9	93.325	1.000
10	94.869	0.797
11	96.201	0.688
12	97.217	0.525
13	98.037	0.423
14	98.662	0.323
15	99.158	0.256
16	99.652	0.255
17	100.000	0.180

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.2912	0.2912
2	0.3843	0.0930
3	0.4519	0.0677
4	0.5070	0.0551
5	0.5544	0.0473

6	0.5963	0.0419
7	0.6342	0.0379
8	0.6690	0.0348
9	0.7013	0.0323
10	0.7315	0.0302
11	0.7599	0.0284
12	0.7868	0.0269
13	0.8193	0.0325
14	0.8506	0.0313
15	0.8808	0.0302
16	0.9101	0.0292
17	0.9384	0.0283
18	0.9659	0.0275
19	0.9927	0.0268
20	1.0188	0.0261
21	1.0442	0.0255
22	1.0691	0.0249
23	1.0934	0.0243
24	1.1172	0.0238
25	1.1405	0.0233
26	1.1633	0.0228
27	1.1858	0.0224
28	1.2078	0.0220
29	1.2294	0.0216
30	1.2506	0.0213
31	1.2716	0.0209
32	1.2921	0.0206
33	1.3124	0.0203
34	1.3324	0.0200
35	1.3520	0.0197
36	1.3714	0.0194
37	1.3906	0.0191
38	1.4094	0.0189
39	1.4281	0.0186
40	1.4465	0.0184
41	1.4646	0.0182
42	1.4826	0.0180
43	1.5003	0.0177
44	1.5179	0.0175
45	1.5352	0.0173
46	1.5524	0.0172
47	1.5694	0.0170
48	1.5861	0.0168
49	1.6028	0.0166
50	1.6192	0.0165
51	1.6355	0.0163
52	1.6517	0.0161
53	1.6676	0.0160
54	1.6835	0.0158
55	1.6992	0.0157
56	1.7147	0.0155
57	1.7301	0.0154
58	1.7454	0.0153
59	1.7606	0.0152
60	1.7756	0.0150
61	1.7905	0.0149
62	1.8053	0.0148
63	1.8199	0.0147
64	1.8345	0.0145
65	1.8489	0.0144
66	1.8632	0.0143
67	1.8775	0.0142
68	1.8916	0.0141
69	1.9056	0.0140
70	1.9195	0.0139
71	1.9333	0.0138
72	1.9470	0.0137
73	1.9586	0.0116
74	1.9701	0.0115

75	1.9816	0.0114
76	1.9929	0.0113
77	2.0041	0.0113
78	2.0153	0.0112
79	2.0264	0.0111
80	2.0374	0.0110
81	2.0483	0.0109
82	2.0592	0.0109
83	2.0700	0.0108
84	2.0807	0.0107
85	2.0913	0.0106
86	2.1019	0.0106
87	2.1123	0.0105
88	2.1228	0.0104
89	2.1331	0.0104
90	2.1434	0.0103
91	2.1536	0.0102
92	2.1638	0.0102
93	2.1739	0.0101
94	2.1839	0.0100
95	2.1939	0.0100
96	2.2038	0.0099
97	2.2137	0.0099
98	2.2235	0.0098
99	2.2332	0.0097
100	2.2429	0.0097
101	2.2525	0.0096
102	2.2621	0.0096
103	2.2716	0.0095
104	2.2811	0.0095
105	2.2905	0.0094
106	2.2999	0.0094
107	2.3092	0.0093
108	2.3185	0.0093
109	2.3277	0.0092
110	2.3369	0.0092
111	2.3460	0.0091
112	2.3551	0.0091
113	2.3641	0.0090
114	2.3731	0.0090
115	2.3821	0.0089
116	2.3910	0.0089
117	2.3998	0.0089
118	2.4086	0.0088
119	2.4174	0.0088
120	2.4261	0.0087
121	2.4348	0.0087
122	2.4434	0.0086
123	2.4521	0.0086
124	2.4606	0.0086
125	2.4691	0.0085
126	2.4776	0.0085
127	2.4861	0.0084
128	2.4945	0.0084
129	2.5029	0.0084
130	2.5112	0.0083
131	2.5195	0.0083
132	2.5278	0.0083
133	2.5360	0.0082
134	2.5442	0.0082
135	2.5523	0.0082
136	2.5605	0.0081
137	2.5686	0.0081
138	2.5766	0.0081
139	2.5846	0.0080
140	2.5926	0.0080
141	2.6006	0.0080
142	2.6085	0.0079
143	2.6164	0.0079

144	2.6243	0.0079
145	2.6321	0.0078
146	2.6399	0.0078
147	2.6477	0.0078
148	2.6554	0.0077
149	2.6631	0.0077
150	2.6708	0.0077
151	2.6785	0.0077
152	2.6861	0.0076
153	2.6937	0.0076
154	2.7013	0.0076
155	2.7088	0.0075
156	2.7163	0.0075
157	2.7238	0.0075
158	2.7313	0.0075
159	2.7387	0.0074
160	2.7461	0.0074
161	2.7535	0.0074
162	2.7608	0.0074
163	2.7682	0.0073
164	2.7755	0.0073
165	2.7827	0.0073
166	2.7900	0.0073
167	2.7972	0.0072
168	2.8044	0.0072
169	2.8116	0.0072
170	2.8187	0.0072
171	2.8259	0.0071
172	2.8330	0.0071
173	2.8401	0.0071
174	2.8471	0.0071
175	2.8541	0.0070
176	2.8612	0.0070
177	2.8681	0.0070
178	2.8751	0.0070
179	2.8821	0.0069
180	2.8890	0.0069
181	2.8959	0.0069
182	2.9028	0.0069
183	2.9096	0.0069
184	2.9165	0.0068
185	2.9233	0.0068
186	2.9301	0.0068
187	2.9368	0.0068
188	2.9436	0.0068
189	2.9503	0.0067
190	2.9570	0.0067
191	2.9637	0.0067
192	2.9704	0.0067
193	2.9771	0.0067
194	2.9837	0.0066
195	2.9903	0.0066
196	2.9969	0.0066
197	3.0035	0.0066
198	3.0100	0.0066
199	3.0166	0.0065
200	3.0231	0.0065
201	3.0296	0.0065
202	3.0361	0.0065
203	3.0425	0.0065
204	3.0490	0.0064
205	3.0554	0.0064
206	3.0618	0.0064
207	3.0682	0.0064
208	3.0746	0.0064
209	3.0809	0.0064
210	3.0873	0.0063
211	3.0936	0.0063
212	3.0999	0.0063

213	3.1062	0.0063
214	3.1125	0.0063
215	3.1187	0.0063
216	3.1250	0.0062
217	3.1312	0.0062
218	3.1374	0.0062
219	3.1436	0.0062
220	3.1498	0.0062
221	3.1559	0.0062
222	3.1621	0.0061
223	3.1682	0.0061
224	3.1743	0.0061
225	3.1804	0.0061
226	3.1865	0.0061
227	3.1925	0.0061
228	3.1986	0.0060
229	3.2046	0.0060
230	3.2106	0.0060
231	3.2166	0.0060
232	3.2226	0.0060
233	3.2286	0.0060
234	3.2346	0.0060
235	3.2405	0.0059
236	3.2464	0.0059
237	3.2524	0.0059
238	3.2583	0.0059
239	3.2641	0.0059
240	3.2700	0.0059
241	3.2759	0.0059
242	3.2817	0.0058
243	3.2876	0.0058
244	3.2934	0.0058
245	3.2992	0.0058
246	3.3050	0.0058
247	3.3108	0.0058
248	3.3165	0.0058
249	3.3223	0.0058
250	3.3280	0.0057
251	3.3337	0.0057
252	3.3395	0.0057
253	3.3452	0.0057
254	3.3508	0.0057
255	3.3565	0.0057
256	3.3622	0.0057
257	3.3678	0.0056
258	3.3735	0.0056
259	3.3791	0.0056
260	3.3847	0.0056
261	3.3903	0.0056
262	3.3959	0.0056
263	3.4015	0.0056
264	3.4070	0.0056
265	3.4126	0.0056
266	3.4181	0.0055
267	3.4236	0.0055
268	3.4292	0.0055
269	3.4347	0.0055
270	3.4402	0.0055
271	3.4456	0.0055
272	3.4511	0.0055
273	3.4566	0.0055
274	3.4620	0.0054
275	3.4675	0.0054
276	3.4729	0.0054
277	3.4783	0.0054
278	3.4837	0.0054
279	3.4891	0.0054
280	3.4945	0.0054
281	3.4998	0.0054

282	3.5052	0.0054
283	3.5105	0.0053
284	3.5159	0.0053
285	3.5212	0.0053
286	3.5265	0.0053
287	3.5318	0.0053
288	3.5371	0.0053

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0053	0.0040	0.0013
2	0.0053	0.0040	0.0013
3	0.0053	0.0040	0.0013
4	0.0053	0.0040	0.0013
5	0.0054	0.0040	0.0013
6	0.0054	0.0040	0.0013
7	0.0054	0.0041	0.0013
8	0.0054	0.0041	0.0013
9	0.0054	0.0041	0.0013
10	0.0054	0.0041	0.0013
11	0.0055	0.0041	0.0013
12	0.0055	0.0041	0.0013
13	0.0055	0.0041	0.0014
14	0.0055	0.0041	0.0014
15	0.0055	0.0042	0.0014
16	0.0055	0.0042	0.0014
17	0.0056	0.0042	0.0014
18	0.0056	0.0042	0.0014
19	0.0056	0.0042	0.0014
20	0.0056	0.0042	0.0014
21	0.0056	0.0042	0.0014
22	0.0056	0.0043	0.0014
23	0.0057	0.0043	0.0014
24	0.0057	0.0043	0.0014
25	0.0057	0.0043	0.0014
26	0.0057	0.0043	0.0014
27	0.0058	0.0043	0.0014
28	0.0058	0.0043	0.0014
29	0.0058	0.0044	0.0014
30	0.0058	0.0044	0.0014
31	0.0058	0.0044	0.0014
32	0.0058	0.0044	0.0014
33	0.0059	0.0044	0.0014
34	0.0059	0.0044	0.0015
35	0.0059	0.0045	0.0015
36	0.0059	0.0045	0.0015
37	0.0060	0.0045	0.0015
38	0.0060	0.0045	0.0015
39	0.0060	0.0045	0.0015
40	0.0060	0.0045	0.0015
41	0.0060	0.0046	0.0015
42	0.0061	0.0046	0.0015
43	0.0061	0.0046	0.0015
44	0.0061	0.0046	0.0015
45	0.0061	0.0046	0.0015
46	0.0062	0.0046	0.0015
47	0.0062	0.0047	0.0015
48	0.0062	0.0047	0.0015
49	0.0062	0.0047	0.0015
50	0.0063	0.0047	0.0015
51	0.0063	0.0047	0.0015
52	0.0063	0.0048	0.0016
53	0.0063	0.0048	0.0016
54	0.0064	0.0048	0.0016
55	0.0064	0.0048	0.0016
56	0.0064	0.0048	0.0016
57	0.0064	0.0049	0.0016

58	0.0065	0.0049	0.0016
59	0.0065	0.0049	0.0016
60	0.0065	0.0049	0.0016
61	0.0066	0.0049	0.0016
62	0.0066	0.0050	0.0016
63	0.0066	0.0050	0.0016
64	0.0066	0.0050	0.0016
65	0.0067	0.0050	0.0016
66	0.0067	0.0050	0.0016
67	0.0067	0.0051	0.0017
68	0.0068	0.0051	0.0017
69	0.0068	0.0051	0.0017
70	0.0068	0.0051	0.0017
71	0.0069	0.0052	0.0017
72	0.0069	0.0052	0.0017
73	0.0069	0.0052	0.0017
74	0.0069	0.0052	0.0017
75	0.0070	0.0053	0.0017
76	0.0070	0.0053	0.0017
77	0.0071	0.0053	0.0017
78	0.0071	0.0053	0.0017
79	0.0071	0.0054	0.0018
80	0.0072	0.0054	0.0018
81	0.0072	0.0054	0.0018
82	0.0072	0.0054	0.0018
83	0.0073	0.0055	0.0018
84	0.0073	0.0055	0.0018
85	0.0074	0.0055	0.0018
86	0.0074	0.0056	0.0018
87	0.0074	0.0056	0.0018
88	0.0075	0.0056	0.0018
89	0.0075	0.0057	0.0018
90	0.0075	0.0057	0.0019
91	0.0076	0.0057	0.0019
92	0.0076	0.0057	0.0019
93	0.0077	0.0058	0.0019
94	0.0077	0.0058	0.0019
95	0.0078	0.0059	0.0019
96	0.0078	0.0059	0.0019
97	0.0079	0.0059	0.0019
98	0.0079	0.0060	0.0019
99	0.0080	0.0060	0.0020
100	0.0080	0.0060	0.0020
101	0.0081	0.0061	0.0020
102	0.0081	0.0061	0.0020
103	0.0082	0.0062	0.0020
104	0.0082	0.0062	0.0020
105	0.0083	0.0062	0.0020
106	0.0083	0.0063	0.0020
107	0.0084	0.0063	0.0021
108	0.0084	0.0063	0.0021
109	0.0085	0.0064	0.0021
110	0.0085	0.0064	0.0021
111	0.0086	0.0065	0.0021
112	0.0086	0.0065	0.0021
113	0.0087	0.0066	0.0021
114	0.0088	0.0066	0.0022
115	0.0089	0.0067	0.0022
116	0.0089	0.0067	0.0022
117	0.0090	0.0068	0.0022
118	0.0090	0.0068	0.0022
119	0.0091	0.0069	0.0022
120	0.0092	0.0069	0.0023
121	0.0093	0.0070	0.0023
122	0.0093	0.0070	0.0023
123	0.0094	0.0071	0.0023
124	0.0095	0.0071	0.0023
125	0.0096	0.0072	0.0024
126	0.0096	0.0073	0.0024

127	0.0097	0.0073	0.0024
128	0.0098	0.0074	0.0024
129	0.0099	0.0075	0.0024
130	0.0100	0.0075	0.0025
131	0.0101	0.0076	0.0025
132	0.0102	0.0077	0.0025
133	0.0103	0.0078	0.0025
134	0.0104	0.0078	0.0025
135	0.0105	0.0079	0.0026
136	0.0106	0.0080	0.0026
137	0.0107	0.0081	0.0026
138	0.0108	0.0081	0.0027
139	0.0109	0.0082	0.0027
140	0.0110	0.0083	0.0027
141	0.0112	0.0084	0.0028
142	0.0113	0.0085	0.0028
143	0.0114	0.0086	0.0028
144	0.0115	0.0087	0.0028
145	0.0137	0.0103	0.0034
146	0.0138	0.0104	0.0034
147	0.0140	0.0106	0.0035
148	0.0141	0.0106	0.0035
149	0.0143	0.0108	0.0035
150	0.0144	0.0109	0.0036
151	0.0147	0.0111	0.0036
152	0.0148	0.0111	0.0036
153	0.0150	0.0113	0.0037
154	0.0152	0.0114	0.0037
155	0.0154	0.0116	0.0038
156	0.0155	0.0117	0.0038
157	0.0158	0.0119	0.0039
158	0.0160	0.0120	0.0039
159	0.0163	0.0123	0.0040
160	0.0165	0.0124	0.0041
161	0.0168	0.0127	0.0041
162	0.0170	0.0128	0.0042
163	0.0173	0.0131	0.0043
164	0.0175	0.0132	0.0043
165	0.0180	0.0135	0.0044
166	0.0182	0.0137	0.0045
167	0.0186	0.0140	0.0046
168	0.0189	0.0142	0.0046
169	0.0194	0.0146	0.0048
170	0.0197	0.0148	0.0048
171	0.0203	0.0153	0.0050
172	0.0206	0.0155	0.0051
173	0.0213	0.0160	0.0052
174	0.0216	0.0163	0.0053
175	0.0224	0.0169	0.0055
176	0.0228	0.0172	0.0056
177	0.0238	0.0179	0.0059
178	0.0243	0.0183	0.0060
179	0.0255	0.0192	0.0063
180	0.0261	0.0197	0.0064
181	0.0275	0.0207	0.0068
182	0.0283	0.0214	0.0070
183	0.0302	0.0228	0.0074
184	0.0313	0.0236	0.0077
185	0.0269	0.0203	0.0066
186	0.0284	0.0214	0.0070
187	0.0323	0.0243	0.0079
188	0.0348	0.0262	0.0086
189	0.0419	0.0316	0.0103
190	0.0473	0.0357	0.0117
191	0.0677	0.0482	0.0195
192	0.0930	0.0482	0.0449
193	0.2912	0.0482	0.2430
194	0.0551	0.0415	0.0136
195	0.0379	0.0286	0.0093

196	0.0302	0.0228	0.0074
197	0.0325	0.0245	0.0080
198	0.0292	0.0220	0.0072
199	0.0268	0.0202	0.0066
200	0.0249	0.0187	0.0061
201	0.0233	0.0176	0.0057
202	0.0220	0.0166	0.0054
203	0.0209	0.0158	0.0051
204	0.0200	0.0150	0.0049
205	0.0191	0.0144	0.0047
206	0.0184	0.0139	0.0045
207	0.0177	0.0134	0.0044
208	0.0172	0.0129	0.0042
209	0.0166	0.0125	0.0041
210	0.0161	0.0122	0.0040
211	0.0157	0.0118	0.0039
212	0.0153	0.0115	0.0038
213	0.0149	0.0112	0.0037
214	0.0145	0.0110	0.0036
215	0.0142	0.0107	0.0035
216	0.0139	0.0105	0.0034
217	0.0116	0.0087	0.0029
218	0.0113	0.0085	0.0028
219	0.0111	0.0084	0.0027
220	0.0109	0.0082	0.0027
221	0.0106	0.0080	0.0026
222	0.0104	0.0079	0.0026
223	0.0102	0.0077	0.0025
224	0.0100	0.0076	0.0025
225	0.0099	0.0074	0.0024
226	0.0097	0.0073	0.0024
227	0.0095	0.0072	0.0023
228	0.0094	0.0071	0.0023
229	0.0092	0.0070	0.0023
230	0.0091	0.0068	0.0022
231	0.0089	0.0067	0.0022
232	0.0088	0.0066	0.0022
233	0.0087	0.0065	0.0021
234	0.0086	0.0065	0.0021
235	0.0084	0.0064	0.0021
236	0.0083	0.0063	0.0021
237	0.0082	0.0062	0.0020
238	0.0081	0.0061	0.0020
239	0.0080	0.0060	0.0020
240	0.0079	0.0060	0.0020
241	0.0078	0.0059	0.0019
242	0.0077	0.0058	0.0019
243	0.0077	0.0058	0.0019
244	0.0076	0.0057	0.0019
245	0.0075	0.0056	0.0018
246	0.0074	0.0056	0.0018
247	0.0073	0.0055	0.0018
248	0.0073	0.0055	0.0018
249	0.0072	0.0054	0.0018
250	0.0071	0.0054	0.0017
251	0.0070	0.0053	0.0017
252	0.0070	0.0053	0.0017
253	0.0069	0.0052	0.0017
254	0.0068	0.0052	0.0017
255	0.0068	0.0051	0.0017
256	0.0067	0.0051	0.0017
257	0.0067	0.0050	0.0016
258	0.0066	0.0050	0.0016
259	0.0065	0.0049	0.0016
260	0.0065	0.0049	0.0016
261	0.0064	0.0048	0.0016
262	0.0064	0.0048	0.0016
263	0.0063	0.0048	0.0016
264	0.0063	0.0047	0.0015

265	0.0062	0.0047	0.0015
266	0.0062	0.0047	0.0015
267	0.0061	0.0046	0.0015
268	0.0061	0.0046	0.0015
269	0.0060	0.0045	0.0015
270	0.0060	0.0045	0.0015
271	0.0059	0.0045	0.0015
272	0.0059	0.0044	0.0015
273	0.0059	0.0044	0.0014
274	0.0058	0.0044	0.0014
275	0.0058	0.0044	0.0014
276	0.0057	0.0043	0.0014
277	0.0057	0.0043	0.0014
278	0.0057	0.0043	0.0014
279	0.0056	0.0042	0.0014
280	0.0056	0.0042	0.0014
281	0.0056	0.0042	0.0014
282	0.0055	0.0042	0.0014
283	0.0055	0.0041	0.0013
284	0.0054	0.0041	0.0013
285	0.0054	0.0041	0.0013
286	0.0054	0.0041	0.0013
287	0.0053	0.0040	0.0013
288	0.0053	0.0040	0.0013

Total soil rain loss = 2.47(In)
Total effective rainfall = 1.07(In)
Peak flow rate in flood hydrograph = 4.30(CFS)

++

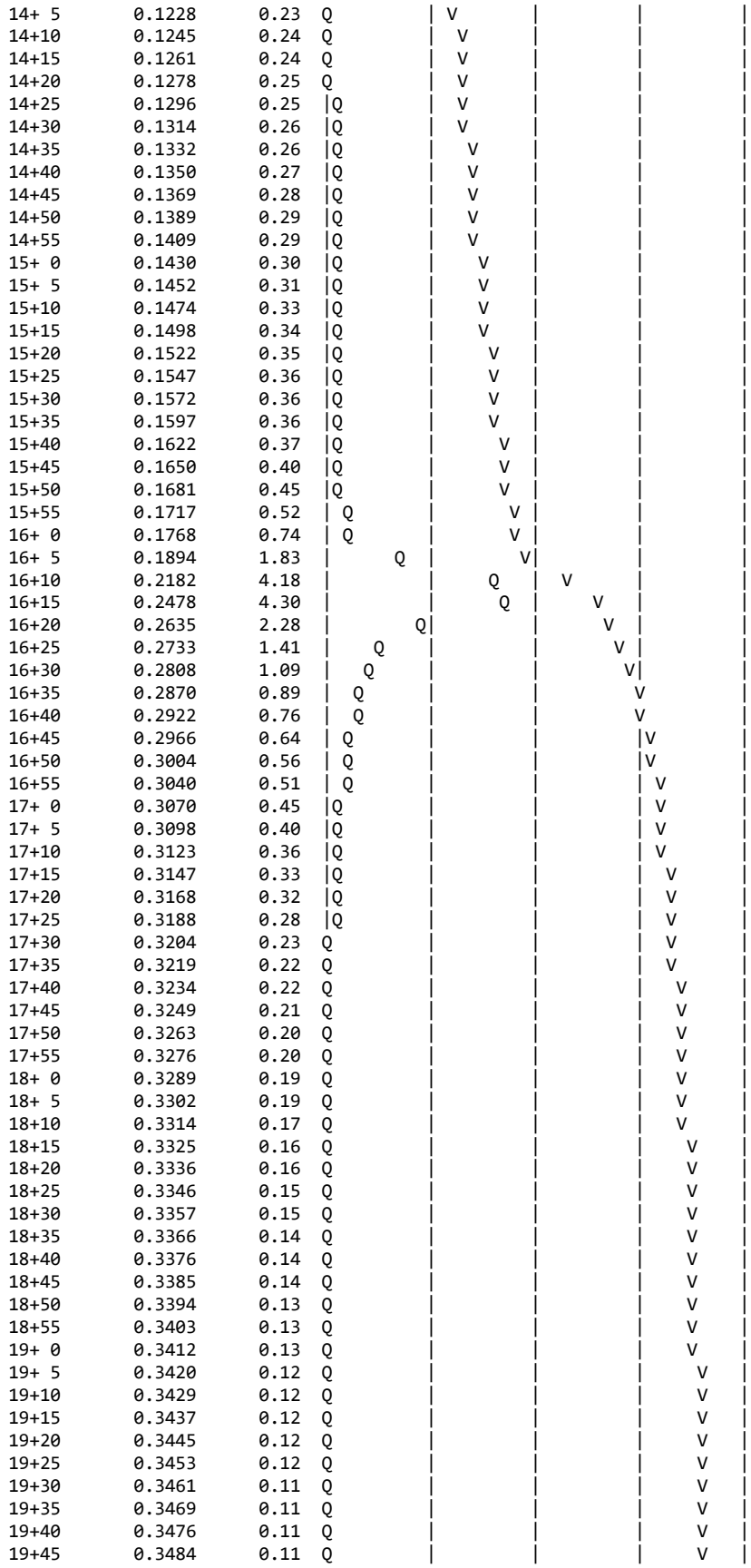
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0000	0.00	Q	|	|	|	|
0+10	0.0002	0.02	Q	|	|	|	|
0+15	0.0005	0.04	Q	|	|	|	|
0+20	0.0008	0.05	Q	|	|	|	|
0+25	0.0012	0.05	Q	|	|	|	|
0+30	0.0016	0.06	Q	|	|	|	|
0+35	0.0020	0.06	Q	|	|	|	|
0+40	0.0024	0.06	Q	|	|	|	|
0+45	0.0029	0.06	Q	|	|	|	|
0+50	0.0033	0.07	Q	|	|	|	|
0+55	0.0038	0.07	Q	|	|	|	|
1+ 0	0.0042	0.07	Q	|	|	|	|
1+ 5	0.0047	0.07	Q	|	|	|	|
1+10	0.0052	0.07	Q	|	|	|	|
1+15	0.0056	0.07	Q	|	|	|	|
1+20	0.0061	0.07	Q	|	|	|	|
1+25	0.0066	0.07	Q	|	|	|	|
1+30	0.0071	0.07	Q	|	|	|	|
1+35	0.0076	0.07	Q	|	|	|	|
1+40	0.0081	0.07	Q	|	|	|	|
1+45	0.0085	0.07	Q	|	|	|	|
1+50	0.0090	0.07	Q	|	|	|	|
1+55	0.0095	0.07	QV	|	|	|	|
2+ 0	0.0100	0.07	QV	|	|	|	|
2+ 5	0.0105	0.07	QV	|	|	|	|
2+10	0.0110	0.07	QV	|	|	|	|
2+15	0.0115	0.07	QV	|	|	|	|
2+20	0.0120	0.07	QV	|	|	|	|
2+25	0.0125	0.07	QV	|	|	|	|
2+30	0.0130	0.07	QV	|	|	|	|

2+35	0.0135	0.07	QV	|	|	|	|
2+40	0.0140	0.07	QV	|	|	|	|
2+45	0.0145	0.07	QV	|	|	|	|
2+50	0.0150	0.07	QV	|	|	|	|
2+55	0.0156	0.07	QV	|	|	|	|
3+ 0	0.0161	0.07	QV	|	|	|	|
3+ 5	0.0166	0.07	QV	|	|	|	|
3+10	0.0171	0.08	QV	|	|	|	|
3+15	0.0176	0.08	QV	|	|	|	|
3+20	0.0181	0.08	QV	|	|	|	|
3+25	0.0187	0.08	QV	|	|	|	|
3+30	0.0192	0.08	Q V	|	|	|	|
3+35	0.0197	0.08	Q V	|	|	|	|
3+40	0.0203	0.08	Q V	|	|	|	|
3+45	0.0208	0.08	Q V	|	|	|	|
3+50	0.0213	0.08	Q V	|	|	|	|
3+55	0.0219	0.08	Q V	|	|	|	|
4+ 0	0.0224	0.08	Q V	|	|	|	|
4+ 5	0.0229	0.08	Q V	|	|	|	|
4+10	0.0235	0.08	Q V	|	|	|	|
4+15	0.0240	0.08	Q V	|	|	|	|
4+20	0.0246	0.08	Q V	|	|	|	|
4+25	0.0251	0.08	Q V	|	|	|	|
4+30	0.0257	0.08	Q V	|	|	|	|
4+35	0.0262	0.08	Q V	|	|	|	|
4+40	0.0268	0.08	Q V	|	|	|	|
4+45	0.0273	0.08	Q V	|	|	|	|
4+50	0.0279	0.08	Q V	|	|	|	|
4+55	0.0284	0.08	Q V	|	|	|	|
5+ 0	0.0290	0.08	Q V	|	|	|	|
5+ 5	0.0296	0.08	Q V	|	|	|	|
5+10	0.0301	0.08	Q V	|	|	|	|
5+15	0.0307	0.08	Q V	|	|	|	|
5+20	0.0313	0.08	Q V	|	|	|	|
5+25	0.0319	0.08	Q V	|	|	|	|
5+30	0.0324	0.08	Q V	|	|	|	|
5+35	0.0330	0.08	Q V	|	|	|	|
5+40	0.0336	0.08	Q V	|	|	|	|
5+45	0.0342	0.09	Q V	|	|	|	|
5+50	0.0348	0.09	Q V	|	|	|	|
5+55	0.0354	0.09	Q V	|	|	|	|
6+ 0	0.0360	0.09	Q V	|	|	|	|
6+ 5	0.0366	0.09	Q V	|	|	|	|
6+10	0.0372	0.09	Q V	|	|	|	|
6+15	0.0378	0.09	Q V	|	|	|	|
6+20	0.0384	0.09	Q V	|	|	|	|
6+25	0.0390	0.09	Q V	|	|	|	|
6+30	0.0396	0.09	Q V	|	|	|	|
6+35	0.0402	0.09	Q V	|	|	|	|
6+40	0.0408	0.09	Q V	|	|	|	|
6+45	0.0415	0.09	Q V	|	|	|	|
6+50	0.0421	0.09	Q V	|	|	|	|
6+55	0.0427	0.09	Q V	|	|	|	|
7+ 0	0.0433	0.09	Q V	|	|	|	|
7+ 5	0.0440	0.09	Q V	|	|	|	|
7+10	0.0446	0.09	Q V	|	|	|	|
7+15	0.0452	0.09	Q V	|	|	|	|
7+20	0.0459	0.09	Q V	|	|	|	|
7+25	0.0465	0.09	Q V	|	|	|	|
7+30	0.0472	0.09	Q V	|	|	|	|
7+35	0.0478	0.09	Q V	|	|	|	|
7+40	0.0485	0.10	Q V	|	|	|	|
7+45	0.0492	0.10	Q V	|	|	|	|
7+50	0.0498	0.10	Q V	|	|	|	|
7+55	0.0505	0.10	Q V	|	|	|	|
8+ 0	0.0512	0.10	Q V	|	|	|	|
8+ 5	0.0518	0.10	Q V	|	|	|	|
8+10	0.0525	0.10	Q V	|	|	|	|
8+15	0.0532	0.10	Q V	|	|	|	|

```
 8+20      0.0539      0.10  Q    V    |         |         |         |
 8+25      0.0546      0.10  Q    V    |         |         |         |
 8+30      0.0553      0.10  Q    V    |         |         |         |
 8+35      0.0560      0.10  Q    V    |         |         |         |
 8+40      0.0567      0.10  Q    V    |         |         |         |
 8+45      0.0574      0.10  Q     V   |         |         |         |
 8+50      0.0581      0.10  Q     V   |         |         |         |
 8+55      0.0588      0.10  Q     V   |         |         |         |
 9+ 0      0.0596      0.10  Q     V   |         |         |         |
 9+ 5      0.0603      0.11  Q     V   |         |         |         |
 9+10      0.0610      0.11  Q     V   |         |         |         |
 9+15      0.0617      0.11  Q     V   |         |         |         |
 9+20      0.0625      0.11  Q     V   |         |         |         |
 9+25      0.0632      0.11  Q     V   |         |         |         |
 9+30      0.0640      0.11  Q     V   |         |         |         |
 9+35      0.0648      0.11  Q     V   |         |         |         |
 9+40      0.0655      0.11  Q     V   |         |         |         |
 9+45      0.0663      0.11  Q     V   |         |         |         |
 9+50      0.0671      0.11  Q      V  |         |         |         |
 9+55      0.0678      0.11  Q      V  |         |         |         |
10+ 0      0.0686      0.11  Q      V  |         |         |         |
10+ 5      0.0694      0.12  Q      V  |         |         |         |
10+10      0.0702      0.12  Q      V  |         |         |         |
10+15      0.0710      0.12  Q      V  |         |         |         |
10+20      0.0718      0.12  Q      V  |         |         |         |
10+25      0.0726      0.12  Q      V  |         |         |         |
10+30      0.0735      0.12  Q      V  |         |         |         |
10+35      0.0743      0.12  Q      V  |         |         |         |
10+40      0.0751      0.12  Q      V  |         |         |         |
10+45      0.0760      0.12  Q       V |         |         |         |
10+50      0.0768      0.12  Q       V |         |         |         |
10+55      0.0777      0.12  Q       V |         |         |         |
11+ 0      0.0786      0.13  Q       V |         |         |         |
11+ 5      0.0794      0.13  Q       V |         |         |         |
11+10      0.0803      0.13  Q       V |         |         |         |
11+15      0.0812      0.13  Q       V |         |         |         |
11+20      0.0821      0.13  Q       V |         |         |         |
11+25      0.0830      0.13  Q       V |         |         |         |
11+30      0.0839      0.13  Q       V |         |         |         |
11+35      0.0849      0.13  Q       V |         |         |         |
11+40      0.0858      0.14  Q        V|         |         |         |
11+45      0.0868      0.14  Q        V|         |         |         |
11+50      0.0877      0.14  Q        V|         |         |         |
11+55      0.0887      0.14  Q        V|         |         |         |
12+ 0      0.0897      0.14  Q        V|         |         |         |
12+ 5      0.0907      0.14  Q        V|         |         |         |
12+10      0.0917      0.15  Q        V|         |         |         |
12+15      0.0928      0.16  Q        V|         |         |         |
12+20      0.0940      0.17  Q        V|         |         |         |
12+25      0.0952      0.17  Q         V         |         |         |
12+30      0.0964      0.17  Q         V         |         |         |
12+35      0.0976      0.18  Q         V         |         |         |
12+40      0.0988      0.18  Q         V         |         |         |
12+45      0.1001      0.18  Q         V         |         |         |
12+50      0.1013      0.18  Q         V         |         |         |
12+55      0.1026      0.19  Q         V         |         |         |
13+ 0      0.1039      0.19  Q         V         |         |         |
13+ 5      0.1053      0.19  Q         |V        |         |         |
13+10      0.1066      0.20  Q         |V        |         |         |
13+15      0.1080      0.20  Q         |V        |         |         |
13+20      0.1094      0.20  Q         |V        |         |         |
13+25      0.1108      0.20  Q         |V        |         |         |
13+30      0.1122      0.21  Q         |V        |         |         |
13+35      0.1136      0.21  Q         |V        |         |         |
13+40      0.1151      0.21  Q         | V       |         |         |
13+45      0.1166      0.22  Q         | V       |         |         |
13+50      0.1181      0.22  Q         | V       |         |         |
13+55      0.1197      0.22  Q         | V       |         |         |
14+ 0      0.1212      0.23  Q         | V       |         |         |
```



```
  19+50      0.3491     0.11  Q        |         |         |     V   |
  19+55      0.3499     0.11  Q        |         |         |     V   |
  20+ 0      0.3506     0.10  Q        |         |         |     V   |
  20+ 5      0.3513     0.10  Q        |         |         |      V  |
  20+10      0.3520     0.10  Q        |         |         |      V  |
  20+15      0.3527     0.10  Q        |         |         |      V  |
  20+20      0.3534     0.10  Q        |         |         |      V  |
  20+25      0.3541     0.10  Q        |         |         |      V  |
  20+30      0.3547     0.10  Q        |         |         |      V  |
  20+35      0.3554     0.10  Q        |         |         |      V  |
  20+40      0.3561     0.10  Q        |         |         |      V  |
  20+45      0.3567     0.09  Q        |         |         |      V  |
  20+50      0.3574     0.09  Q        |         |         |      V  |
  20+55      0.3580     0.09  Q        |         |         |      V  |
  21+ 0      0.3586     0.09  Q        |         |         |      V  |
  21+ 5      0.3593     0.09  Q        |         |         |      V  |
  21+10      0.3599     0.09  Q        |         |         |      V  |
  21+15      0.3605     0.09  Q        |         |         |      V  |
  21+20      0.3611     0.09  Q        |         |         |       V |
  21+25      0.3617     0.09  Q        |         |         |       V |
  21+30      0.3623     0.09  Q        |         |         |       V |
  21+35      0.3629     0.09  Q        |         |         |       V |
  21+40      0.3635     0.08  Q        |         |         |       V |
  21+45      0.3640     0.08  Q        |         |         |       V |
  21+50      0.3646     0.08  Q        |         |         |       V |
  21+55      0.3652     0.08  Q        |         |         |       V |
  22+ 0      0.3657     0.08  Q        |         |         |       V |
  22+ 5      0.3663     0.08  Q        |         |         |       V |
  22+10      0.3668     0.08  Q        |         |         |       V |
  22+15      0.3674     0.08  Q        |         |         |       V |
  22+20      0.3679     0.08  Q        |         |         |       V |
  22+25      0.3685     0.08  Q        |         |         |       V |
  22+30      0.3690     0.08  Q        |         |         |       V |
  22+35      0.3696     0.08  Q        |         |         |       V |
  22+40      0.3701     0.08  Q        |         |         |        V|
  22+45      0.3706     0.08  Q        |         |         |        V|
  22+50      0.3711     0.08  Q        |         |         |        V|
  22+55      0.3716     0.08  Q        |         |         |        V|
  23+ 0      0.3722     0.07  Q        |         |         |        V|
  23+ 5      0.3727     0.07  Q        |         |         |        V|
  23+10      0.3732     0.07  Q        |         |         |        V|
  23+15      0.3737     0.07  Q        |         |         |        V|
  23+20      0.3742     0.07  Q        |         |         |        V|
  23+25      0.3747     0.07  Q        |         |         |        V|
  23+30      0.3752     0.07  Q        |         |         |        V|
  23+35      0.3757     0.07  Q        |         |         |        V|
  23+40      0.3761     0.07  Q        |         |         |        V|
  23+45      0.3766     0.07  Q        |         |         |        V|
  23+50      0.3771     0.07  Q        |         |         |        V|
  23+55      0.3776     0.07  Q        |         |         |        V|
  24+ 0      0.3781     0.07  Q        |         |         |        V|
-------------------------------------------------------------------------
```

Appendix I.III

Synthetic Unit Hydrograph Method Analysis
Pre-Development Conditions
100-Year Storm

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

Study date 10/27/22

++

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

Program License Serial Number 6443

JURUPA AND WILLOW
UNIT HYDROGRAPH
100-YEAR STORM
PRE DEVELOPMENT - DMA A1

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 10		
2.30	1	0.79
Rainfall data for year 2		
2.30	6	1.26
Rainfall data for year 2		
2.30	24	2.27
Rainfall data for year 100		
2.30	1	1.24
Rainfall data for year 100		
2.30	6	2.93
Rainfall data for year 100		
2.30	24	5.35

++

******** 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)
67.0	84.6	2.30	1.000	0.290	1.000	0.290

Area-averaged adjusted loss rate Fm (In/Hr) = 0.290

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
2.30	1.000	67.0	84.6	1.82	0.683

Area-averaged catchment yield fraction, Y = 0.683
Area-averaged low loss fraction, Yb = 0.317
User entry of time of concentration = 0.209 (hours)
++
Watershed area = 2.30(Ac.)
Catchment Lag time = 0.167 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 49.8405
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.290(In/Hr)
Average low loss rate fraction (Yb) = 0.317 (decimal)
VALLEY UNDEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.459(In)
Computed peak 30-minute rainfall = 0.940(In)
Specified peak 1-hour rainfall = 1.240(In)
Computed peak 3-hour rainfall = 2.101(In)
Specified peak 6-hour rainfall = 2.930(In)
Specified peak 24-hour rainfall = 5.350(In)

Rainfall depth area reduction factors:
Using a total area of 2.30(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.459(In)
30-minute factor = 1.000 Adjusted rainfall = 0.940(In)
1-hour factor = 1.000 Adjusted rainfall = 1.240(In)
3-hour factor = 1.000 Adjusted rainfall = 2.101(In)
6-hour factor = 1.000 Adjusted rainfall = 2.930(In)
24-hour factor = 1.000 Adjusted rainfall = 5.350(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 = 27.82 (CFS))	
1	6.095	1.695
2	32.108	7.236
3	60.973	8.029
4	73.986	3.620
5	80.796	1.894
6	85.530	1.317
7	88.938	0.948
8	91.547	0.726
9	93.456	0.531
10	95.005	0.431
11	96.313	0.364
12	97.317	0.279
13	98.122	0.224
14	98.728	0.169
15	99.227	0.139
16	99.725	0.139
17	100.000	0.076

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.4589	0.4589
2	0.6055	0.1466
3	0.7121	0.1066
4	0.7990	0.0868
5	0.8736	0.0746

6	0.9396	0.0661
7	0.9994	0.0598
8	1.0542	0.0548
9	1.1051	0.0509
10	1.1527	0.0476
11	1.1975	0.0448
12	1.2399	0.0424
13	1.2884	0.0486
14	1.3351	0.0467
15	1.3800	0.0450
16	1.4235	0.0434
17	1.4655	0.0420
18	1.5063	0.0408
19	1.5459	0.0396
20	1.5844	0.0385
21	1.6219	0.0375
22	1.6586	0.0366
23	1.6943	0.0358
24	1.7293	0.0350
25	1.7635	0.0342
26	1.7970	0.0335
27	1.8299	0.0329
28	1.8621	0.0322
29	1.8937	0.0316
30	1.9248	0.0311
31	1.9553	0.0305
32	1.9854	0.0300
33	2.0149	0.0295
34	2.0440	0.0291
35	2.0726	0.0286
36	2.1008	0.0282
37	2.1286	0.0278
38	2.1561	0.0274
39	2.1831	0.0270
40	2.2098	0.0267
41	2.2361	0.0263
42	2.2622	0.0260
43	2.2878	0.0257
44	2.3132	0.0254
45	2.3383	0.0251
46	2.3631	0.0248
47	2.3876	0.0245
48	2.4119	0.0242
49	2.4359	0.0240
50	2.4596	0.0237
51	2.4831	0.0235
52	2.5063	0.0232
53	2.5293	0.0230
54	2.5521	0.0228
55	2.5747	0.0226
56	2.5971	0.0224
57	2.6192	0.0222
58	2.6412	0.0220
59	2.6629	0.0218
60	2.6845	0.0216
61	2.7059	0.0214
62	2.7271	0.0212
63	2.7481	0.0210
64	2.7690	0.0208
65	2.7896	0.0207
66	2.8101	0.0205
67	2.8305	0.0204
68	2.8507	0.0202
69	2.8707	0.0200
70	2.8906	0.0199
71	2.9104	0.0197
72	2.9300	0.0196
73	2.9476	0.0176
74	2.9651	0.0175

75	2.9824	0.0173
76	2.9996	0.0172
77	3.0167	0.0171
78	3.0336	0.0170
79	3.0505	0.0168
80	3.0672	0.0167
81	3.0838	0.0166
82	3.1002	0.0165
83	3.1166	0.0164
84	3.1329	0.0163
85	3.1490	0.0161
86	3.1650	0.0160
87	3.1810	0.0159
88	3.1968	0.0158
89	3.2125	0.0157
90	3.2282	0.0156
91	3.2437	0.0155
92	3.2591	0.0154
93	3.2745	0.0153
94	3.2897	0.0152
95	3.3049	0.0152
96	3.3199	0.0151
97	3.3349	0.0150
98	3.3498	0.0149
99	3.3646	0.0148
100	3.3793	0.0147
101	3.3939	0.0146
102	3.4085	0.0146
103	3.4230	0.0145
104	3.4374	0.0144
105	3.4517	0.0143
106	3.4659	0.0142
107	3.4801	0.0142
108	3.4942	0.0141
109	3.5082	0.0140
110	3.5221	0.0139
111	3.5360	0.0139
112	3.5498	0.0138
113	3.5635	0.0137
114	3.5772	0.0137
115	3.5908	0.0136
116	3.6043	0.0135
117	3.6178	0.0135
118	3.6312	0.0134
119	3.6445	0.0133
120	3.6578	0.0133
121	3.6710	0.0132
122	3.6841	0.0131
123	3.6972	0.0131
124	3.7103	0.0130
125	3.7232	0.0130
126	3.7361	0.0129
127	3.7490	0.0128
128	3.7618	0.0128
129	3.7745	0.0127
130	3.7872	0.0127
131	3.7998	0.0126
132	3.8124	0.0126
133	3.8249	0.0125
134	3.8374	0.0125
135	3.8498	0.0124
136	3.8621	0.0124
137	3.8744	0.0123
138	3.8867	0.0123
139	3.8989	0.0122
140	3.9111	0.0122
141	3.9232	0.0121
142	3.9352	0.0121
143	3.9472	0.0120

144	3.9592	0.0120
145	3.9711	0.0119
146	3.9830	0.0119
147	3.9948	0.0118
148	4.0066	0.0118
149	4.0183	0.0117
150	4.0300	0.0117
151	4.0417	0.0116
152	4.0533	0.0116
153	4.0648	0.0116
154	4.0764	0.0115
155	4.0878	0.0115
156	4.0993	0.0114
157	4.1107	0.0114
158	4.1220	0.0114
159	4.1333	0.0113
160	4.1446	0.0113
161	4.1558	0.0112
162	4.1670	0.0112
163	4.1782	0.0112
164	4.1893	0.0111
165	4.2004	0.0111
166	4.2114	0.0110
167	4.2224	0.0110
168	4.2334	0.0110
169	4.2443	0.0109
170	4.2552	0.0109
171	4.2660	0.0109
172	4.2768	0.0108
173	4.2876	0.0108
174	4.2984	0.0107
175	4.3091	0.0107
176	4.3198	0.0107
177	4.3304	0.0106
178	4.3410	0.0106
179	4.3516	0.0106
180	4.3621	0.0105
181	4.3726	0.0105
182	4.3831	0.0105
183	4.3936	0.0104
184	4.4040	0.0104
185	4.4144	0.0104
186	4.4247	0.0103
187	4.4350	0.0103
188	4.4453	0.0103
189	4.4556	0.0103
190	4.4658	0.0102
191	4.4760	0.0102
192	4.4861	0.0102
193	4.4963	0.0101
194	4.5064	0.0101
195	4.5164	0.0101
196	4.5265	0.0100
197	4.5365	0.0100
198	4.5465	0.0100
199	4.5565	0.0100
200	4.5664	0.0099
201	4.5763	0.0099
202	4.5862	0.0099
203	4.5960	0.0098
204	4.6058	0.0098
205	4.6156	0.0098
206	4.6254	0.0098
207	4.6351	0.0097
208	4.6448	0.0097
209	4.6545	0.0097
210	4.6642	0.0097
211	4.6738	0.0096
212	4.6834	0.0096

213	4.6930	0.0096
214	4.7026	0.0096
215	4.7121	0.0095
216	4.7216	0.0095
217	4.7311	0.0095
218	4.7405	0.0095
219	4.7500	0.0094
220	4.7594	0.0094
221	4.7688	0.0094
222	4.7781	0.0094
223	4.7875	0.0093
224	4.7968	0.0093
225	4.8061	0.0093
226	4.8153	0.0093
227	4.8246	0.0092
228	4.8338	0.0092
229	4.8430	0.0092
230	4.8522	0.0092
231	4.8613	0.0092
232	4.8704	0.0091
233	4.8795	0.0091
234	4.8886	0.0091
235	4.8977	0.0091
236	4.9067	0.0090
237	4.9157	0.0090
238	4.9247	0.0090
239	4.9337	0.0090
240	4.9427	0.0090
241	4.9516	0.0089
242	4.9605	0.0089
243	4.9694	0.0089
244	4.9783	0.0089
245	4.9871	0.0089
246	4.9960	0.0088
247	5.0048	0.0088
248	5.0136	0.0088
249	5.0223	0.0088
250	5.0311	0.0088
251	5.0398	0.0087
252	5.0485	0.0087
253	5.0572	0.0087
254	5.0659	0.0087
255	5.0746	0.0087
256	5.0832	0.0086
257	5.0918	0.0086
258	5.1004	0.0086
259	5.1090	0.0086
260	5.1175	0.0086
261	5.1261	0.0085
262	5.1346	0.0085
263	5.1431	0.0085
264	5.1516	0.0085
265	5.1600	0.0085
266	5.1685	0.0084
267	5.1769	0.0084
268	5.1853	0.0084
269	5.1937	0.0084
270	5.2021	0.0084
271	5.2105	0.0084
272	5.2188	0.0083
273	5.2271	0.0083
274	5.2354	0.0083
275	5.2437	0.0083
276	5.2520	0.0083
277	5.2603	0.0083
278	5.2685	0.0082
279	5.2767	0.0082
280	5.2849	0.0082
281	5.2931	0.0082

282	5.3013	0.0082
283	5.3094	0.0082
284	5.3176	0.0081
285	5.3257	0.0081
286	5.3338	0.0081
287	5.3419	0.0081
288	5.3500	0.0081

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0081	0.0026	0.0055
2	0.0081	0.0026	0.0055
3	0.0081	0.0026	0.0055
4	0.0081	0.0026	0.0056
5	0.0082	0.0026	0.0056
6	0.0082	0.0026	0.0056
7	0.0082	0.0026	0.0056
8	0.0082	0.0026	0.0056
9	0.0083	0.0026	0.0056
10	0.0083	0.0026	0.0057
11	0.0083	0.0026	0.0057
12	0.0083	0.0026	0.0057
13	0.0084	0.0027	0.0057
14	0.0084	0.0027	0.0057
15	0.0084	0.0027	0.0058
16	0.0084	0.0027	0.0058
17	0.0085	0.0027	0.0058
18	0.0085	0.0027	0.0058
19	0.0085	0.0027	0.0058
20	0.0086	0.0027	0.0058
21	0.0086	0.0027	0.0059
22	0.0086	0.0027	0.0059
23	0.0087	0.0027	0.0059
24	0.0087	0.0028	0.0059
25	0.0087	0.0028	0.0059
26	0.0087	0.0028	0.0060
27	0.0088	0.0028	0.0060
28	0.0088	0.0028	0.0060
29	0.0088	0.0028	0.0060
30	0.0089	0.0028	0.0060
31	0.0089	0.0028	0.0061
32	0.0089	0.0028	0.0061
33	0.0090	0.0028	0.0061
34	0.0090	0.0028	0.0061
35	0.0090	0.0029	0.0062
36	0.0090	0.0029	0.0062
37	0.0091	0.0029	0.0062
38	0.0091	0.0029	0.0062
39	0.0092	0.0029	0.0062
40	0.0092	0.0029	0.0063
41	0.0092	0.0029	0.0063
42	0.0092	0.0029	0.0063
43	0.0093	0.0029	0.0063
44	0.0093	0.0030	0.0064
45	0.0094	0.0030	0.0064
46	0.0094	0.0030	0.0064
47	0.0094	0.0030	0.0064
48	0.0095	0.0030	0.0065
49	0.0095	0.0030	0.0065
50	0.0095	0.0030	0.0065
51	0.0096	0.0030	0.0065
52	0.0096	0.0030	0.0066
53	0.0097	0.0031	0.0066
54	0.0097	0.0031	0.0066
55	0.0097	0.0031	0.0066
56	0.0098	0.0031	0.0067
57	0.0098	0.0031	0.0067

58	0.0098	0.0031	0.0067
59	0.0099	0.0031	0.0068
60	0.0099	0.0032	0.0068
61	0.0100	0.0032	0.0068
62	0.0100	0.0032	0.0068
63	0.0101	0.0032	0.0069
64	0.0101	0.0032	0.0069
65	0.0102	0.0032	0.0069
66	0.0102	0.0032	0.0070
67	0.0103	0.0033	0.0070
68	0.0103	0.0033	0.0070
69	0.0103	0.0033	0.0071
70	0.0104	0.0033	0.0071
71	0.0104	0.0033	0.0071
72	0.0105	0.0033	0.0072
73	0.0105	0.0033	0.0072
74	0.0106	0.0034	0.0072
75	0.0106	0.0034	0.0073
76	0.0107	0.0034	0.0073
77	0.0107	0.0034	0.0073
78	0.0108	0.0034	0.0074
79	0.0109	0.0034	0.0074
80	0.0109	0.0035	0.0074
81	0.0110	0.0035	0.0075
82	0.0110	0.0035	0.0075
83	0.0111	0.0035	0.0076
84	0.0111	0.0035	0.0076
85	0.0112	0.0036	0.0076
86	0.0112	0.0036	0.0077
87	0.0113	0.0036	0.0077
88	0.0114	0.0036	0.0077
89	0.0114	0.0036	0.0078
90	0.0115	0.0036	0.0078
91	0.0116	0.0037	0.0079
92	0.0116	0.0037	0.0079
93	0.0117	0.0037	0.0080
94	0.0117	0.0037	0.0080
95	0.0118	0.0038	0.0081
96	0.0119	0.0038	0.0081
97	0.0120	0.0038	0.0082
98	0.0120	0.0038	0.0082
99	0.0121	0.0038	0.0083
100	0.0122	0.0039	0.0083
101	0.0123	0.0039	0.0084
102	0.0123	0.0039	0.0084
103	0.0124	0.0039	0.0085
104	0.0125	0.0040	0.0085
105	0.0126	0.0040	0.0086
106	0.0126	0.0040	0.0086
107	0.0127	0.0040	0.0087
108	0.0128	0.0041	0.0087
109	0.0129	0.0041	0.0088
110	0.0130	0.0041	0.0089
111	0.0131	0.0042	0.0089
112	0.0131	0.0042	0.0090
113	0.0133	0.0042	0.0091
114	0.0133	0.0042	0.0091
115	0.0135	0.0043	0.0092
116	0.0135	0.0043	0.0092
117	0.0137	0.0043	0.0093
118	0.0137	0.0044	0.0094
119	0.0139	0.0044	0.0095
120	0.0139	0.0044	0.0095
121	0.0141	0.0045	0.0096
122	0.0142	0.0045	0.0097
123	0.0143	0.0045	0.0098
124	0.0144	0.0046	0.0098
125	0.0146	0.0046	0.0099
126	0.0146	0.0046	0.0100

127	0.0148	0.0047	0.0101
128	0.0149	0.0047	0.0102
129	0.0151	0.0048	0.0103
130	0.0152	0.0048	0.0103
131	0.0153	0.0049	0.0105
132	0.0154	0.0049	0.0105
133	0.0156	0.0050	0.0107
134	0.0157	0.0050	0.0107
135	0.0159	0.0051	0.0109
136	0.0160	0.0051	0.0109
137	0.0163	0.0052	0.0111
138	0.0164	0.0052	0.0112
139	0.0166	0.0053	0.0113
140	0.0167	0.0053	0.0114
141	0.0170	0.0054	0.0116
142	0.0171	0.0054	0.0117
143	0.0173	0.0055	0.0118
144	0.0175	0.0055	0.0119
145	0.0196	0.0062	0.0134
146	0.0197	0.0063	0.0135
147	0.0200	0.0064	0.0137
148	0.0202	0.0064	0.0138
149	0.0205	0.0065	0.0140
150	0.0207	0.0066	0.0141
151	0.0210	0.0067	0.0144
152	0.0212	0.0067	0.0145
153	0.0216	0.0068	0.0147
154	0.0218	0.0069	0.0149
155	0.0222	0.0070	0.0151
156	0.0224	0.0071	0.0153
157	0.0228	0.0072	0.0156
158	0.0230	0.0073	0.0157
159	0.0235	0.0075	0.0160
160	0.0237	0.0075	0.0162
161	0.0242	0.0077	0.0166
162	0.0245	0.0078	0.0167
163	0.0251	0.0080	0.0171
164	0.0254	0.0081	0.0173
165	0.0260	0.0083	0.0178
166	0.0263	0.0084	0.0180
167	0.0270	0.0086	0.0185
168	0.0274	0.0087	0.0187
169	0.0282	0.0090	0.0193
170	0.0286	0.0091	0.0196
171	0.0295	0.0094	0.0202
172	0.0300	0.0095	0.0205
173	0.0311	0.0099	0.0212
174	0.0316	0.0100	0.0216
175	0.0329	0.0104	0.0224
176	0.0335	0.0106	0.0229
177	0.0350	0.0111	0.0239
178	0.0358	0.0113	0.0244
179	0.0375	0.0119	0.0256
180	0.0385	0.0122	0.0263
181	0.0408	0.0129	0.0278
182	0.0420	0.0133	0.0287
183	0.0450	0.0143	0.0307
184	0.0467	0.0148	0.0319
185	0.0424	0.0135	0.0290
186	0.0448	0.0142	0.0306
187	0.0509	0.0161	0.0347
188	0.0548	0.0174	0.0374
189	0.0661	0.0210	0.0451
190	0.0746	0.0237	0.0509
191	0.1066	0.0242	0.0824
192	0.1466	0.0242	0.1225
193	0.4589	0.0242	0.4347
194	0.0868	0.0242	0.0627
195	0.0598	0.0190	0.0408

196	0.0476	0.0151	0.0325
197	0.0486	0.0154	0.0332
198	0.0434	0.0138	0.0296
199	0.0396	0.0126	0.0270
200	0.0366	0.0116	0.0250
201	0.0342	0.0109	0.0234
202	0.0322	0.0102	0.0220
203	0.0305	0.0097	0.0208
204	0.0291	0.0092	0.0199
205	0.0278	0.0088	0.0190
206	0.0267	0.0085	0.0182
207	0.0257	0.0082	0.0175
208	0.0248	0.0079	0.0169
209	0.0240	0.0076	0.0164
210	0.0232	0.0074	0.0159
211	0.0226	0.0072	0.0154
212	0.0220	0.0070	0.0150
213	0.0214	0.0068	0.0146
214	0.0208	0.0066	0.0142
215	0.0204	0.0065	0.0139
216	0.0199	0.0063	0.0136
217	0.0176	0.0056	0.0120
218	0.0172	0.0055	0.0117
219	0.0168	0.0053	0.0115
220	0.0165	0.0052	0.0112
221	0.0161	0.0051	0.0110
222	0.0158	0.0050	0.0108
223	0.0155	0.0049	0.0106
224	0.0152	0.0048	0.0104
225	0.0150	0.0048	0.0102
226	0.0147	0.0047	0.0100
227	0.0145	0.0046	0.0099
228	0.0142	0.0045	0.0097
229	0.0140	0.0044	0.0096
230	0.0138	0.0044	0.0094
231	0.0136	0.0043	0.0093
232	0.0134	0.0043	0.0091
233	0.0132	0.0042	0.0090
234	0.0130	0.0041	0.0089
235	0.0128	0.0041	0.0088
236	0.0127	0.0040	0.0087
237	0.0125	0.0040	0.0085
238	0.0124	0.0039	0.0084
239	0.0122	0.0039	0.0083
240	0.0121	0.0038	0.0082
241	0.0119	0.0038	0.0081
242	0.0118	0.0037	0.0080
243	0.0116	0.0037	0.0080
244	0.0115	0.0037	0.0079
245	0.0114	0.0036	0.0078
246	0.0113	0.0036	0.0077
247	0.0112	0.0035	0.0076
248	0.0110	0.0035	0.0075
249	0.0109	0.0035	0.0075
250	0.0108	0.0034	0.0074
251	0.0107	0.0034	0.0073
252	0.0106	0.0034	0.0072
253	0.0105	0.0033	0.0072
254	0.0104	0.0033	0.0071
255	0.0103	0.0033	0.0070
256	0.0102	0.0032	0.0070
257	0.0101	0.0032	0.0069
258	0.0100	0.0032	0.0069
259	0.0100	0.0032	0.0068
260	0.0099	0.0031	0.0067
261	0.0098	0.0031	0.0067
262	0.0097	0.0031	0.0066
263	0.0096	0.0031	0.0066
264	0.0096	0.0030	0.0065

265	0.0095	0.0030	0.0065
266	0.0094	0.0030	0.0064
267	0.0093	0.0030	0.0064
268	0.0093	0.0029	0.0063
269	0.0092	0.0029	0.0063
270	0.0091	0.0029	0.0062
271	0.0091	0.0029	0.0062
272	0.0090	0.0029	0.0061
273	0.0089	0.0028	0.0061
274	0.0089	0.0028	0.0061
275	0.0088	0.0028	0.0060
276	0.0088	0.0028	0.0060
277	0.0087	0.0028	0.0059
278	0.0086	0.0027	0.0059
279	0.0086	0.0027	0.0059
280	0.0085	0.0027	0.0058
281	0.0085	0.0027	0.0058
282	0.0084	0.0027	0.0057
283	0.0084	0.0027	0.0057
284	0.0083	0.0026	0.0057
285	0.0083	0.0026	0.0056
286	0.0082	0.0026	0.0056
287	0.0082	0.0026	0.0056
288	0.0081	0.0026	0.0055

Total soil rain loss = 1.54(In)
Total effective rainfall = 3.81(In)
Peak flow rate in flood hydrograph = 4.82(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	2.5	5.0	7.5	10.0
0+ 5	0.0001	0.01	Q	|	|	|	|
0+10	0.0004	0.05	Q	|	|	|	|
0+15	0.0010	0.09	Q	|	|	|	|
0+20	0.0018	0.11	Q	|	|	|	|
0+25	0.0027	0.12	Q	|	|	|	|
0+30	0.0036	0.13	Q	|	|	|	|
0+35	0.0046	0.14	Q	|	|	|	|
0+40	0.0055	0.14	Q	|	|	|	|
0+45	0.0065	0.15	Q	|	|	|	|
0+50	0.0076	0.15	Q	|	|	|	|
0+55	0.0086	0.15	Q	|	|	|	|
1+ 0	0.0097	0.15	Q	|	|	|	|
1+ 5	0.0107	0.15	Q	|	|	|	|
1+10	0.0118	0.16	Q	|	|	|	|
1+15	0.0129	0.16	Q	|	|	|	|
1+20	0.0140	0.16	Q	|	|	|	|
1+25	0.0151	0.16	Q	|	|	|	|
1+30	0.0162	0.16	Q	|	|	|	|
1+35	0.0173	0.16	Q	|	|	|	|
1+40	0.0184	0.16	QV	|	|	|	|
1+45	0.0195	0.16	QV	|	|	|	|
1+50	0.0206	0.16	QV	|	|	|	|
1+55	0.0217	0.16	QV	|	|	|	|
2+ 0	0.0229	0.16	QV	|	|	|	|
2+ 5	0.0240	0.16	QV	|	|	|	|
2+10	0.0251	0.16	QV	|	|	|	|
2+15	0.0262	0.16	QV	|	|	|	|
2+20	0.0274	0.17	QV	|	|	|	|
2+25	0.0285	0.17	QV	|	|	|	|
2+30	0.0297	0.17	QV	|	|	|	|

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2+35      0.0308     0.17  QV       |        |        |        |
2+40      0.0320     0.17  QV       |        |        |        |
2+45      0.0331     0.17  QV       |        |        |        |
2+50      0.0343     0.17  QV       |        |        |        |
2+55      0.0355     0.17  QV       |        |        |        |
3+ 0      0.0366     0.17  Q V      |        |        |        |
3+ 5      0.0378     0.17  Q V      |        |        |        |
3+10      0.0390     0.17  Q V      |        |        |        |
3+15      0.0402     0.17  Q V      |        |        |        |
3+20      0.0414     0.17  Q V      |        |        |        |
3+25      0.0426     0.17  Q V      |        |        |        |
3+30      0.0437     0.17  Q V      |        |        |        |
3+35      0.0449     0.17  Q V      |        |        |        |
3+40      0.0462     0.17  Q V      |        |        |        |
3+45      0.0474     0.18  Q V      |        |        |        |
3+50      0.0486     0.18  Q V      |        |        |        |
3+55      0.0498     0.18  Q V      |        |        |        |
4+ 0      0.0510     0.18  Q V      |        |        |        |
4+ 5      0.0522     0.18  Q V      |        |        |        |
4+10      0.0535     0.18  Q V      |        |        |        |
4+15      0.0547     0.18  Q V      |        |        |        |
4+20      0.0560     0.18  Q  V     |        |        |        |
4+25      0.0572     0.18  Q  V     |        |        |        |
4+30      0.0585     0.18  Q  V     |        |        |        |
4+35      0.0597     0.18  Q  V     |        |        |        |
4+40      0.0610     0.18  Q  V     |        |        |        |
4+45      0.0623     0.18  Q  V     |        |        |        |
4+50      0.0635     0.18  Q  V     |        |        |        |
4+55      0.0648     0.19  Q  V     |        |        |        |
5+ 0      0.0661     0.19  Q  V     |        |        |        |
5+ 5      0.0674     0.19  Q  V     |        |        |        |
5+10      0.0687     0.19  Q  V     |        |        |        |
5+15      0.0700     0.19  Q  V     |        |        |        |
5+20      0.0713     0.19  Q  V     |        |        |        |
5+25      0.0726     0.19  Q  V     |        |        |        |
5+30      0.0739     0.19  Q   V    |        |        |        |
5+35      0.0752     0.19  Q   V    |        |        |        |
5+40      0.0766     0.19  Q   V    |        |        |        |
5+45      0.0779     0.19  Q   V    |        |        |        |
5+50      0.0792     0.19  Q   V    |        |        |        |
5+55      0.0806     0.20  Q   V    |        |        |        |
6+ 0      0.0819     0.20  Q   V    |        |        |        |
6+ 5      0.0833     0.20  Q   V    |        |        |        |
6+10      0.0846     0.20  Q   V    |        |        |        |
6+15      0.0860     0.20  Q   V    |        |        |        |
6+20      0.0874     0.20  Q   V    |        |        |        |
6+25      0.0888     0.20  Q   V    |        |        |        |
6+30      0.0902     0.20  Q   V    |        |        |        |
6+35      0.0916     0.20  Q    V   |        |        |        |
6+40      0.0930     0.20  Q    V   |        |        |        |
6+45      0.0944     0.20  Q    V   |        |        |        |
6+50      0.0958     0.21  Q    V   |        |        |        |
6+55      0.0972     0.21  Q    V   |        |        |        |
7+ 0      0.0987     0.21  Q    V   |        |        |        |
7+ 5      0.1001     0.21  Q    V   |        |        |        |
7+10      0.1016     0.21  Q    V   |        |        |        |
7+15      0.1030     0.21  Q    V   |        |        |        |
7+20      0.1045     0.21  Q    V   |        |        |        |
7+25      0.1059     0.21  Q    V   |        |        |        |
7+30      0.1074     0.21  Q    V   |        |        |        |
7+35      0.1089     0.22  Q    V   |        |        |        |
7+40      0.1104     0.22  Q     V  |        |        |        |
7+45      0.1119     0.22  Q     V  |        |        |        |
7+50      0.1134     0.22  Q     V  |        |        |        |
7+55      0.1149     0.22  Q     V  |        |        |        |
8+ 0      0.1165     0.22  Q     V  |        |        |        |
8+ 5      0.1180     0.22  Q     V  |        |        |        |
8+10      0.1195     0.22  Q     V  |        |        |        |
8+15      0.1211     0.23  Q     V  |        |        |        |
```

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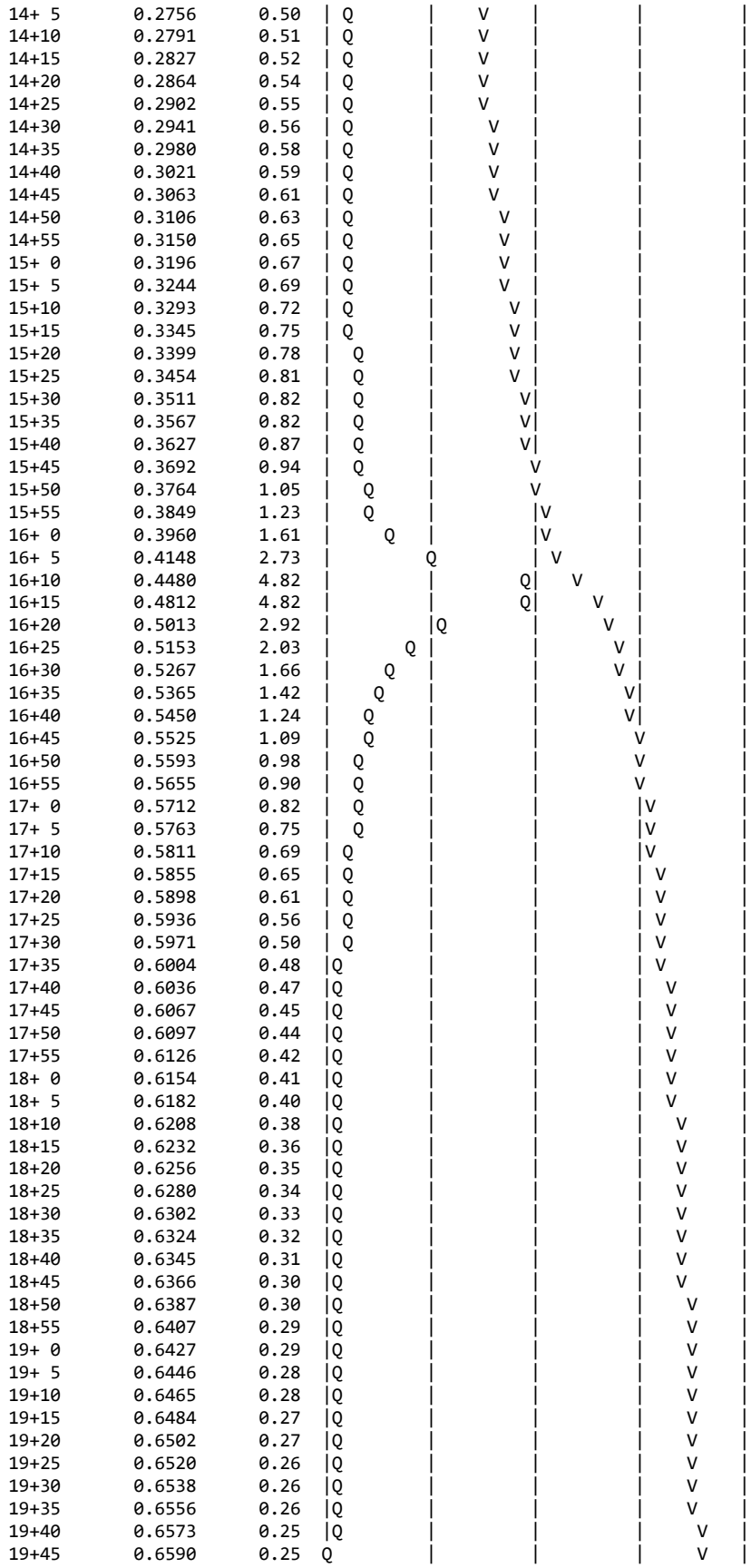
 8+20      0.1227      0.23  Q     V   |         |         |         |
 8+25      0.1242      0.23  Q     V   |         |         |         |
 8+30      0.1258      0.23  Q     V   |         |         |         |
 8+35      0.1274      0.23  Q     V   |         |         |         |
 8+40      0.1290      0.23  Q      V  |         |         |         |
 8+45      0.1306      0.23  Q      V  |         |         |         |
 8+50      0.1322      0.24  Q      V  |         |         |         |
 8+55      0.1339      0.24  Q      V  |         |         |         |
 9+ 0      0.1355      0.24  Q      V  |         |         |         |
 9+ 5      0.1372      0.24  Q      V  |         |         |         |
 9+10      0.1388      0.24  Q      V  |         |         |         |
 9+15      0.1405      0.24  Q      V  |         |         |         |
 9+20      0.1422      0.24  Q      V  |         |         |         |
 9+25      0.1439      0.25  Q      V  |         |         |         |
 9+30      0.1456      0.25  Q      V  |         |         |         |
 9+35      0.1473      0.25  |Q      V |         |         |         |
 9+40      0.1491      0.25  |Q      V |         |         |         |
 9+45      0.1508      0.25  |Q      V |         |         |         |
 9+50      0.1526      0.26  |Q      V |         |         |         |
 9+55      0.1543      0.26  |Q      V |         |         |         |
10+ 0      0.1561      0.26  |Q      V |         |         |         |
10+ 5      0.1579      0.26  |Q      V |         |         |         |
10+10      0.1597      0.26  |Q      V |         |         |         |
10+15      0.1616      0.27  |Q      V |         |         |         |
10+20      0.1634      0.27  |Q      V |         |         |         |
10+25      0.1653      0.27  |Q       V|         |         |         |
10+30      0.1671      0.27  |Q       V|         |         |         |
10+35      0.1690      0.27  |Q       V|         |         |         |
10+40      0.1709      0.28  |Q       V|         |         |         |
10+45      0.1728      0.28  |Q       V|         |         |         |
10+50      0.1748      0.28  |Q       V|         |         |         |
10+55      0.1767      0.28  |Q       V|         |         |         |
11+ 0      0.1787      0.29  |Q       V|         |         |         |
11+ 5      0.1807      0.29  |Q       V|         |         |         |
11+10      0.1827      0.29  |Q        V         |         |         |
11+15      0.1847      0.29  |Q        V         |         |         |
11+20      0.1867      0.30  |Q        V         |         |         |
11+25      0.1888      0.30  |Q        V         |         |         |
11+30      0.1909      0.30  |Q        V         |         |         |
11+35      0.1930      0.31  |Q        V         |         |         |
11+40      0.1951      0.31  |Q        V         |         |         |
11+45      0.1973      0.31  |Q        V         |         |         |
11+50      0.1994      0.31  |Q        V         |         |         |
11+55      0.2016      0.32  |Q        |V        |         |         |
12+ 0      0.2038      0.32  |Q        |V        |         |         |
12+ 5      0.2061      0.33  |Q        |V        |         |         |
12+10      0.2084      0.34  |Q        |V        |         |         |
12+15      0.2109      0.35  |Q        |V        |         |         |
12+20      0.2134      0.36  |Q        |V        |         |         |
12+25      0.2159      0.37  |Q        |V        |         |         |
12+30      0.2185      0.38  |Q        |V        |         |         |
12+35      0.2211      0.38  |Q        | V       |         |         |
12+40      0.2238      0.39  |Q        | V       |         |         |
12+45      0.2265      0.39  |Q        | V       |         |         |
12+50      0.2292      0.40  |Q        | V       |         |         |
12+55      0.2320      0.40  |Q        | V       |         |         |
13+ 0      0.2348      0.41  |Q        | V       |         |         |
13+ 5      0.2377      0.41  |Q        |  V      |         |         |
13+10      0.2406      0.42  |Q        |  V      |         |         |
13+15      0.2435      0.43  |Q        |  V      |         |         |
13+20      0.2465      0.43  |Q        |  V      |         |         |
13+25      0.2495      0.44  |Q        |  V      |         |         |
13+30      0.2526      0.45  |Q        |  V      |         |         |
13+35      0.2557      0.45  |Q        |   V     |         |         |
13+40      0.2588      0.46  |Q        |   V     |         |         |
13+45      0.2621      0.47  |Q        |   V     |         |         |
13+50      0.2654      0.48  |Q        |   V     |         |         |
13+55      0.2687      0.48  |Q        |   V     |         |         |
14+ 0      0.2721      0.49  |Q        |   V     |         |         |
```



```
  19+50       0.6607      0.24  Q        |         |         |     V   |
  19+55       0.6624      0.24  Q        |         |         |     V   |
  20+ 0       0.6640      0.24  Q        |         |         |     V   |
  20+ 5       0.6656      0.24  Q        |         |         |     V   |
  20+10       0.6672      0.23  Q        |         |         |     V   |
  20+15       0.6688      0.23  Q        |         |         |     V   |
  20+20       0.6704      0.23  Q        |         |         |     V   |
  20+25       0.6719      0.22  Q        |         |         |     V   |
  20+30       0.6735      0.22  Q        |         |         |     V   |
  20+35       0.6750      0.22  Q        |         |         |     V   |
  20+40       0.6765      0.22  Q        |         |         |      V  |
  20+45       0.6779      0.21  Q        |         |         |      V  |
  20+50       0.6794      0.21  Q        |         |         |      V  |
  20+55       0.6808      0.21  Q        |         |         |      V  |
  21+ 0       0.6823      0.21  Q        |         |         |      V  |
  21+ 5       0.6837      0.21  Q        |         |         |      V  |
  21+10       0.6851      0.20  Q        |         |         |      V  |
  21+15       0.6865      0.20  Q        |         |         |      V  |
  21+20       0.6879      0.20  Q        |         |         |      V  |
  21+25       0.6892      0.20  Q        |         |         |      V  |
  21+30       0.6906      0.20  Q        |         |         |      V  |
  21+35       0.6919      0.19  Q        |         |         |      V  |
  21+40       0.6932      0.19  Q        |         |         |      V  |
  21+45       0.6945      0.19  Q        |         |         |       V |
  21+50       0.6959      0.19  Q        |         |         |       V |
  21+55       0.6971      0.19  Q        |         |         |       V |
  22+ 0       0.6984      0.19  Q        |         |         |       V |
  22+ 5       0.6997      0.18  Q        |         |         |       V |
  22+10       0.7010      0.18  Q        |         |         |       V |
  22+15       0.7022      0.18  Q        |         |         |       V |
  22+20       0.7035      0.18  Q        |         |         |       V |
  22+25       0.7047      0.18  Q        |         |         |       V |
  22+30       0.7059      0.18  Q        |         |         |       V |
  22+35       0.7071      0.18  Q        |         |         |       V |
  22+40       0.7083      0.17  Q        |         |         |       V |
  22+45       0.7095      0.17  Q        |         |         |       V |
  22+50       0.7107      0.17  Q        |         |         |       V |
  22+55       0.7119      0.17  Q        |         |         |        V|
  23+ 0       0.7130      0.17  Q        |         |         |        V|
  23+ 5       0.7142      0.17  Q        |         |         |        V|
  23+10       0.7154      0.17  Q        |         |         |        V|
  23+15       0.7165      0.17  Q        |         |         |        V|
  23+20       0.7176      0.17  Q        |         |         |        V|
  23+25       0.7188      0.16  Q        |         |         |        V|
  23+30       0.7199      0.16  Q        |         |         |        V|
  23+35       0.7210      0.16  Q        |         |         |        V|
  23+40       0.7221      0.16  Q        |         |         |        V|
  23+45       0.7232      0.16  Q        |         |         |        V|
  23+50       0.7243      0.16  Q        |         |         |        V|
  23+55       0.7254      0.16  Q        |         |         |        V|
  24+ 0       0.7265      0.16  Q        |         |         |        V|
-------------------------------------------------------------------------
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U n i t H y d r o g r a p h A n a l y s i s

Study date 10/27/22

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

Program License Serial Number 6443

JURUPA AND WILLOW
UNIT HYDROGRAPH
100-YEAR STORM
PRE DEVELOPMENT - DMA A2

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 10		
4.27	1	0.79
Rainfall data for year 2		
4.27	6	1.26
Rainfall data for year 2		
4.27	24	2.27
Rainfall data for year 100		
4.27	1	1.24
Rainfall data for year 100		
4.27	6	2.93
Rainfall data for year 100		
4.27	24	5.35

++

******** 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)
67.0	84.6	4.27	1.000	0.290	1.000	0.290

Area-averaged adjusted loss rate Fm (In/Hr) = 0.290

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
4.27	1.000	67.0	84.6	1.82	0.683

Area-averaged catchment yield fraction, Y = 0.683
Area-averaged low loss fraction, Yb = 0.317
User entry of time of concentration = 0.211 (hours)
++
Watershed area = 4.27(Ac.)
Catchment Lag time = 0.169 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 49.3681
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.290(In/Hr)
Average low loss rate fraction (Yb) = 0.317 (decimal)
VALLEY UNDEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.459(In)
Computed peak 30-minute rainfall = 0.940(In)
Specified peak 1-hour rainfall = 1.240(In)
Computed peak 3-hour rainfall = 2.101(In)
Specified peak 6-hour rainfall = 2.930(In)
Specified peak 24-hour rainfall = 5.350(In)

Rainfall depth area reduction factors:
Using a total area of 4.27(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.459(In)
30-minute factor = 1.000 Adjusted rainfall = 0.940(In)
1-hour factor = 1.000 Adjusted rainfall = 1.240(In)
3-hour factor = 1.000 Adjusted rainfall = 2.101(In)
6-hour factor = 1.000 Adjusted rainfall = 2.930(In)
24-hour factor = 1.000 Adjusted rainfall = 5.350(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 = 51.64 (CFS))	
1	6.007	3.102
2	31.616	13.225
3	60.517	14.924
4	73.703	6.809
5	80.560	3.541
6	85.320	2.458
7	88.752	1.772
8	91.388	1.361
9	93.325	1.000
10	94.869	0.797
11	96.201	0.688
12	97.217	0.525
13	98.037	0.423
14	98.662	0.323
15	99.158	0.256
16	99.652	0.255
17	100.000	0.180

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.4588	0.4588
2	0.6054	0.1466
3	0.7121	0.1066
4	0.7989	0.0868
5	0.8735	0.0746

6	0.9396	0.0661
7	0.9993	0.0598
8	1.0541	0.0548
9	1.1050	0.0509
10	1.1526	0.0476
11	1.1973	0.0448
12	1.2398	0.0424
13	1.2883	0.0486
14	1.3350	0.0467
15	1.3799	0.0450
16	1.4234	0.0434
17	1.4654	0.0420
18	1.5062	0.0408
19	1.5458	0.0396
20	1.5843	0.0385
21	1.6219	0.0375
22	1.6585	0.0366
23	1.6943	0.0358
24	1.7292	0.0350
25	1.7634	0.0342
26	1.7970	0.0335
27	1.8298	0.0329
28	1.8620	0.0322
29	1.8937	0.0316
30	1.9248	0.0311
31	1.9553	0.0305
32	1.9853	0.0300
33	2.0149	0.0295
34	2.0440	0.0291
35	2.0726	0.0286
36	2.1008	0.0282
37	2.1286	0.0278
38	2.1560	0.0274
39	2.1831	0.0270
40	2.2098	0.0267
41	2.2361	0.0263
42	2.2621	0.0260
43	2.2878	0.0257
44	2.3132	0.0254
45	2.3383	0.0251
46	2.3631	0.0248
47	2.3876	0.0245
48	2.4118	0.0242
49	2.4358	0.0240
50	2.4596	0.0237
51	2.4831	0.0235
52	2.5063	0.0232
53	2.5293	0.0230
54	2.5521	0.0228
55	2.5747	0.0226
56	2.5970	0.0224
57	2.6192	0.0222
58	2.6412	0.0220
59	2.6629	0.0218
60	2.6845	0.0216
61	2.7059	0.0214
62	2.7271	0.0212
63	2.7481	0.0210
64	2.7689	0.0208
65	2.7896	0.0207
66	2.8101	0.0205
67	2.8305	0.0204
68	2.8507	0.0202
69	2.8707	0.0200
70	2.8906	0.0199
71	2.9104	0.0197
72	2.9300	0.0196
73	2.9476	0.0176
74	2.9650	0.0175

75	2.9824	0.0173
76	2.9996	0.0172
77	3.0167	0.0171
78	3.0336	0.0170
79	3.0504	0.0168
80	3.0672	0.0167
81	3.0837	0.0166
82	3.1002	0.0165
83	3.1166	0.0164
84	3.1328	0.0163
85	3.1490	0.0161
86	3.1650	0.0160
87	3.1810	0.0159
88	3.1968	0.0158
89	3.2125	0.0157
90	3.2281	0.0156
91	3.2437	0.0155
92	3.2591	0.0154
93	3.2744	0.0153
94	3.2897	0.0152
95	3.3048	0.0152
96	3.3199	0.0151
97	3.3349	0.0150
98	3.3498	0.0149
99	3.3646	0.0148
100	3.3793	0.0147
101	3.3939	0.0146
102	3.4085	0.0146
103	3.4230	0.0145
104	3.4374	0.0144
105	3.4517	0.0143
106	3.4659	0.0142
107	3.4801	0.0142
108	3.4942	0.0141
109	3.5082	0.0140
110	3.5221	0.0139
111	3.5360	0.0139
112	3.5498	0.0138
113	3.5635	0.0137
114	3.5772	0.0137
115	3.5908	0.0136
116	3.6043	0.0135
117	3.6178	0.0135
118	3.6312	0.0134
119	3.6445	0.0133
120	3.6578	0.0133
121	3.6710	0.0132
122	3.6841	0.0131
123	3.6972	0.0131
124	3.7102	0.0130
125	3.7232	0.0130
126	3.7361	0.0129
127	3.7490	0.0128
128	3.7617	0.0128
129	3.7745	0.0127
130	3.7872	0.0127
131	3.7998	0.0126
132	3.8124	0.0126
133	3.8249	0.0125
134	3.8373	0.0125
135	3.8498	0.0124
136	3.8621	0.0124
137	3.8744	0.0123
138	3.8867	0.0123
139	3.8989	0.0122
140	3.9110	0.0122
141	3.9232	0.0121
142	3.9352	0.0121
143	3.9472	0.0120

144	3.9592	0.0120
145	3.9711	0.0119
146	3.9830	0.0119
147	3.9948	0.0118
148	4.0066	0.0118
149	4.0183	0.0117
150	4.0300	0.0117
151	4.0417	0.0116
152	4.0533	0.0116
153	4.0648	0.0116
154	4.0763	0.0115
155	4.0878	0.0115
156	4.0993	0.0114
157	4.1106	0.0114
158	4.1220	0.0114
159	4.1333	0.0113
160	4.1446	0.0113
161	4.1558	0.0112
162	4.1670	0.0112
163	4.1782	0.0112
164	4.1893	0.0111
165	4.2003	0.0111
166	4.2114	0.0110
167	4.2224	0.0110
168	4.2333	0.0110
169	4.2443	0.0109
170	4.2552	0.0109
171	4.2660	0.0109
172	4.2768	0.0108
173	4.2876	0.0108
174	4.2984	0.0107
175	4.3091	0.0107
176	4.3197	0.0107
177	4.3304	0.0106
178	4.3410	0.0106
179	4.3516	0.0106
180	4.3621	0.0105
181	4.3726	0.0105
182	4.3831	0.0105
183	4.3935	0.0104
184	4.4040	0.0104
185	4.4143	0.0104
186	4.4247	0.0103
187	4.4350	0.0103
188	4.4453	0.0103
189	4.4555	0.0103
190	4.4658	0.0102
191	4.4760	0.0102
192	4.4861	0.0102
193	4.4963	0.0101
194	4.5064	0.0101
195	4.5164	0.0101
196	4.5265	0.0100
197	4.5365	0.0100
198	4.5465	0.0100
199	4.5564	0.0100
200	4.5664	0.0099
201	4.5763	0.0099
202	4.5861	0.0099
203	4.5960	0.0098
204	4.6058	0.0098
205	4.6156	0.0098
206	4.6254	0.0098
207	4.6351	0.0097
208	4.6448	0.0097
209	4.6545	0.0097
210	4.6642	0.0097
211	4.6738	0.0096
212	4.6834	0.0096

213	4.6930	0.0096
214	4.7025	0.0096
215	4.7121	0.0095
216	4.7216	0.0095
217	4.7311	0.0095
218	4.7405	0.0095
219	4.7500	0.0094
220	4.7594	0.0094
221	4.7687	0.0094
222	4.7781	0.0094
223	4.7874	0.0093
224	4.7968	0.0093
225	4.8060	0.0093
226	4.8153	0.0093
227	4.8245	0.0092
228	4.8338	0.0092
229	4.8430	0.0092
230	4.8521	0.0092
231	4.8613	0.0092
232	4.8704	0.0091
233	4.8795	0.0091
234	4.8886	0.0091
235	4.8977	0.0091
236	4.9067	0.0090
237	4.9157	0.0090
238	4.9247	0.0090
239	4.9337	0.0090
240	4.9427	0.0090
241	4.9516	0.0089
242	4.9605	0.0089
243	4.9694	0.0089
244	4.9783	0.0089
245	4.9871	0.0089
246	4.9960	0.0088
247	5.0048	0.0088
248	5.0136	0.0088
249	5.0223	0.0088
250	5.0311	0.0088
251	5.0398	0.0087
252	5.0485	0.0087
253	5.0572	0.0087
254	5.0659	0.0087
255	5.0745	0.0087
256	5.0832	0.0086
257	5.0918	0.0086
258	5.1004	0.0086
259	5.1090	0.0086
260	5.1175	0.0086
261	5.1261	0.0085
262	5.1346	0.0085
263	5.1431	0.0085
264	5.1516	0.0085
265	5.1600	0.0085
266	5.1685	0.0084
267	5.1769	0.0084
268	5.1853	0.0084
269	5.1937	0.0084
270	5.2021	0.0084
271	5.2104	0.0084
272	5.2188	0.0083
273	5.2271	0.0083
274	5.2354	0.0083
275	5.2437	0.0083
276	5.2520	0.0083
277	5.2602	0.0083
278	5.2685	0.0082
279	5.2767	0.0082
280	5.2849	0.0082
281	5.2931	0.0082

282	5.3013	0.0082
283	5.3094	0.0082
284	5.3176	0.0081
285	5.3257	0.0081
286	5.3338	0.0081
287	5.3419	0.0081
288	5.3500	0.0081

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0081	0.0026	0.0055
2	0.0081	0.0026	0.0055
3	0.0081	0.0026	0.0055
4	0.0081	0.0026	0.0056
5	0.0082	0.0026	0.0056
6	0.0082	0.0026	0.0056
7	0.0082	0.0026	0.0056
8	0.0082	0.0026	0.0056
9	0.0083	0.0026	0.0056
10	0.0083	0.0026	0.0057
11	0.0083	0.0026	0.0057
12	0.0083	0.0026	0.0057
13	0.0084	0.0027	0.0057
14	0.0084	0.0027	0.0057
15	0.0084	0.0027	0.0058
16	0.0084	0.0027	0.0058
17	0.0085	0.0027	0.0058
18	0.0085	0.0027	0.0058
19	0.0085	0.0027	0.0058
20	0.0086	0.0027	0.0058
21	0.0086	0.0027	0.0059
22	0.0086	0.0027	0.0059
23	0.0087	0.0027	0.0059
24	0.0087	0.0028	0.0059
25	0.0087	0.0028	0.0059
26	0.0087	0.0028	0.0060
27	0.0088	0.0028	0.0060
28	0.0088	0.0028	0.0060
29	0.0088	0.0028	0.0060
30	0.0089	0.0028	0.0060
31	0.0089	0.0028	0.0061
32	0.0089	0.0028	0.0061
33	0.0090	0.0028	0.0061
34	0.0090	0.0028	0.0061
35	0.0090	0.0029	0.0062
36	0.0090	0.0029	0.0062
37	0.0091	0.0029	0.0062
38	0.0091	0.0029	0.0062
39	0.0092	0.0029	0.0062
40	0.0092	0.0029	0.0063
41	0.0092	0.0029	0.0063
42	0.0092	0.0029	0.0063
43	0.0093	0.0029	0.0063
44	0.0093	0.0030	0.0064
45	0.0094	0.0030	0.0064
46	0.0094	0.0030	0.0064
47	0.0094	0.0030	0.0064
48	0.0095	0.0030	0.0065
49	0.0095	0.0030	0.0065
50	0.0095	0.0030	0.0065
51	0.0096	0.0030	0.0065
52	0.0096	0.0030	0.0066
53	0.0097	0.0031	0.0066
54	0.0097	0.0031	0.0066
55	0.0097	0.0031	0.0066
56	0.0098	0.0031	0.0067
57	0.0098	0.0031	0.0067

58	0.0098	0.0031	0.0067
59	0.0099	0.0031	0.0068
60	0.0099	0.0032	0.0068
61	0.0100	0.0032	0.0068
62	0.0100	0.0032	0.0068
63	0.0101	0.0032	0.0069
64	0.0101	0.0032	0.0069
65	0.0102	0.0032	0.0069
66	0.0102	0.0032	0.0070
67	0.0103	0.0033	0.0070
68	0.0103	0.0033	0.0070
69	0.0103	0.0033	0.0071
70	0.0104	0.0033	0.0071
71	0.0104	0.0033	0.0071
72	0.0105	0.0033	0.0072
73	0.0105	0.0033	0.0072
74	0.0106	0.0034	0.0072
75	0.0106	0.0034	0.0073
76	0.0107	0.0034	0.0073
77	0.0107	0.0034	0.0073
78	0.0108	0.0034	0.0074
79	0.0109	0.0034	0.0074
80	0.0109	0.0035	0.0074
81	0.0110	0.0035	0.0075
82	0.0110	0.0035	0.0075
83	0.0111	0.0035	0.0076
84	0.0111	0.0035	0.0076
85	0.0112	0.0036	0.0076
86	0.0112	0.0036	0.0077
87	0.0113	0.0036	0.0077
88	0.0114	0.0036	0.0077
89	0.0114	0.0036	0.0078
90	0.0115	0.0036	0.0078
91	0.0116	0.0037	0.0079
92	0.0116	0.0037	0.0079
93	0.0117	0.0037	0.0080
94	0.0117	0.0037	0.0080
95	0.0118	0.0038	0.0081
96	0.0119	0.0038	0.0081
97	0.0120	0.0038	0.0082
98	0.0120	0.0038	0.0082
99	0.0121	0.0038	0.0083
100	0.0122	0.0039	0.0083
101	0.0123	0.0039	0.0084
102	0.0123	0.0039	0.0084
103	0.0124	0.0039	0.0085
104	0.0125	0.0040	0.0085
105	0.0126	0.0040	0.0086
106	0.0126	0.0040	0.0086
107	0.0127	0.0040	0.0087
108	0.0128	0.0041	0.0087
109	0.0129	0.0041	0.0088
110	0.0130	0.0041	0.0089
111	0.0131	0.0042	0.0089
112	0.0131	0.0042	0.0090
113	0.0133	0.0042	0.0091
114	0.0133	0.0042	0.0091
115	0.0135	0.0043	0.0092
116	0.0135	0.0043	0.0092
117	0.0137	0.0043	0.0093
118	0.0137	0.0044	0.0094
119	0.0139	0.0044	0.0095
120	0.0139	0.0044	0.0095
121	0.0141	0.0045	0.0096
122	0.0142	0.0045	0.0097
123	0.0143	0.0045	0.0098
124	0.0144	0.0046	0.0098
125	0.0146	0.0046	0.0099
126	0.0146	0.0046	0.0100

127	0.0148	0.0047	0.0101
128	0.0149	0.0047	0.0102
129	0.0151	0.0048	0.0103
130	0.0152	0.0048	0.0103
131	0.0153	0.0049	0.0105
132	0.0154	0.0049	0.0105
133	0.0156	0.0050	0.0107
134	0.0157	0.0050	0.0107
135	0.0159	0.0051	0.0109
136	0.0160	0.0051	0.0109
137	0.0163	0.0052	0.0111
138	0.0164	0.0052	0.0112
139	0.0166	0.0053	0.0113
140	0.0167	0.0053	0.0114
141	0.0170	0.0054	0.0116
142	0.0171	0.0054	0.0117
143	0.0173	0.0055	0.0118
144	0.0175	0.0055	0.0119
145	0.0196	0.0062	0.0134
146	0.0197	0.0063	0.0135
147	0.0200	0.0064	0.0137
148	0.0202	0.0064	0.0138
149	0.0205	0.0065	0.0140
150	0.0207	0.0066	0.0141
151	0.0210	0.0067	0.0144
152	0.0212	0.0067	0.0145
153	0.0216	0.0068	0.0147
154	0.0218	0.0069	0.0149
155	0.0222	0.0070	0.0151
156	0.0224	0.0071	0.0153
157	0.0228	0.0072	0.0156
158	0.0230	0.0073	0.0157
159	0.0235	0.0075	0.0160
160	0.0237	0.0075	0.0162
161	0.0242	0.0077	0.0166
162	0.0245	0.0078	0.0167
163	0.0251	0.0080	0.0171
164	0.0254	0.0081	0.0173
165	0.0260	0.0083	0.0178
166	0.0263	0.0084	0.0180
167	0.0270	0.0086	0.0185
168	0.0274	0.0087	0.0187
169	0.0282	0.0090	0.0193
170	0.0286	0.0091	0.0196
171	0.0295	0.0094	0.0202
172	0.0300	0.0095	0.0205
173	0.0311	0.0099	0.0212
174	0.0316	0.0100	0.0216
175	0.0329	0.0104	0.0224
176	0.0335	0.0106	0.0229
177	0.0350	0.0111	0.0239
178	0.0358	0.0114	0.0244
179	0.0375	0.0119	0.0256
180	0.0385	0.0122	0.0263
181	0.0408	0.0129	0.0278
182	0.0420	0.0133	0.0287
183	0.0450	0.0143	0.0307
184	0.0467	0.0148	0.0319
185	0.0424	0.0135	0.0290
186	0.0448	0.0142	0.0306
187	0.0509	0.0161	0.0347
188	0.0548	0.0174	0.0374
189	0.0661	0.0210	0.0451
190	0.0746	0.0237	0.0509
191	0.1066	0.0242	0.0824
192	0.1466	0.0242	0.1224
193	0.4588	0.0242	0.4347
194	0.0868	0.0242	0.0627
195	0.0598	0.0190	0.0408

196	0.0476	0.0151	0.0325
197	0.0486	0.0154	0.0332
198	0.0434	0.0138	0.0296
199	0.0396	0.0126	0.0270
200	0.0366	0.0116	0.0250
201	0.0342	0.0109	0.0234
202	0.0322	0.0102	0.0220
203	0.0305	0.0097	0.0208
204	0.0291	0.0092	0.0199
205	0.0278	0.0088	0.0190
206	0.0267	0.0085	0.0182
207	0.0257	0.0082	0.0175
208	0.0248	0.0079	0.0169
209	0.0240	0.0076	0.0164
210	0.0232	0.0074	0.0159
211	0.0226	0.0072	0.0154
212	0.0220	0.0070	0.0150
213	0.0214	0.0068	0.0146
214	0.0208	0.0066	0.0142
215	0.0204	0.0065	0.0139
216	0.0199	0.0063	0.0136
217	0.0176	0.0056	0.0120
218	0.0172	0.0055	0.0117
219	0.0168	0.0053	0.0115
220	0.0165	0.0052	0.0112
221	0.0161	0.0051	0.0110
222	0.0158	0.0050	0.0108
223	0.0155	0.0049	0.0106
224	0.0152	0.0048	0.0104
225	0.0150	0.0048	0.0102
226	0.0147	0.0047	0.0100
227	0.0145	0.0046	0.0099
228	0.0142	0.0045	0.0097
229	0.0140	0.0044	0.0096
230	0.0138	0.0044	0.0094
231	0.0136	0.0043	0.0093
232	0.0134	0.0043	0.0091
233	0.0132	0.0042	0.0090
234	0.0130	0.0041	0.0089
235	0.0128	0.0041	0.0088
236	0.0127	0.0040	0.0087
237	0.0125	0.0040	0.0085
238	0.0124	0.0039	0.0084
239	0.0122	0.0039	0.0083
240	0.0121	0.0038	0.0082
241	0.0119	0.0038	0.0081
242	0.0118	0.0037	0.0080
243	0.0116	0.0037	0.0080
244	0.0115	0.0037	0.0079
245	0.0114	0.0036	0.0078
246	0.0113	0.0036	0.0077
247	0.0112	0.0035	0.0076
248	0.0110	0.0035	0.0075
249	0.0109	0.0035	0.0075
250	0.0108	0.0034	0.0074
251	0.0107	0.0034	0.0073
252	0.0106	0.0034	0.0072
253	0.0105	0.0033	0.0072
254	0.0104	0.0033	0.0071
255	0.0103	0.0033	0.0070
256	0.0102	0.0032	0.0070
257	0.0101	0.0032	0.0069
258	0.0100	0.0032	0.0069
259	0.0100	0.0032	0.0068
260	0.0099	0.0031	0.0067
261	0.0098	0.0031	0.0067
262	0.0097	0.0031	0.0066
263	0.0096	0.0031	0.0066
264	0.0096	0.0030	0.0065

265	0.0095	0.0030	0.0065
266	0.0094	0.0030	0.0064
267	0.0093	0.0030	0.0064
268	0.0093	0.0029	0.0063
269	0.0092	0.0029	0.0063
270	0.0091	0.0029	0.0062
271	0.0091	0.0029	0.0062
272	0.0090	0.0029	0.0061
273	0.0089	0.0028	0.0061
274	0.0089	0.0028	0.0061
275	0.0088	0.0028	0.0060
276	0.0088	0.0028	0.0060
277	0.0087	0.0028	0.0059
278	0.0086	0.0027	0.0059
279	0.0086	0.0027	0.0059
280	0.0085	0.0027	0.0058
281	0.0085	0.0027	0.0058
282	0.0084	0.0027	0.0057
283	0.0084	0.0027	0.0057
284	0.0083	0.0026	0.0057
285	0.0083	0.0026	0.0056
286	0.0082	0.0026	0.0056
287	0.0082	0.0026	0.0056
288	0.0081	0.0026	0.0055

Total soil rain loss = 1.54(In)
Total effective rainfall = 3.81(In)
Peak flow rate in flood hydrograph = 8.96(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	2.5	5.0	7.5	10.0
0+ 5	0.0001	0.02	Q	|	|	|	|
0+10	0.0007	0.09	Q	|	|	|	|
0+15	0.0019	0.17	Q	|	|	|	|
0+20	0.0034	0.21	Q	|	|	|	|
0+25	0.0050	0.23	Q	|	|	|	|
0+30	0.0067	0.24	Q	|	|	|	|
0+35	0.0084	0.26	VQ	|	|	|	|
0+40	0.0102	0.26	VQ	|	|	|	|
0+45	0.0121	0.27	VQ	|	|	|	|
0+50	0.0140	0.28	VQ	|	|	|	|
0+55	0.0159	0.28	VQ	|	|	|	|
1+ 0	0.0179	0.28	VQ	|	|	|	|
1+ 5	0.0198	0.29	VQ	|	|	|	|
1+10	0.0218	0.29	VQ	|	|	|	|
1+15	0.0238	0.29	VQ	|	|	|	|
1+20	0.0259	0.29	VQ	|	|	|	|
1+25	0.0279	0.30	VQ	|	|	|	|
1+30	0.0300	0.30	VQ	|	|	|	|
1+35	0.0320	0.30	VQ	|	|	|	|
1+40	0.0341	0.30	|Q	|	|	|	|
1+45	0.0361	0.30	|Q	|	|	|	|
1+50	0.0382	0.30	|Q	|	|	|	|
1+55	0.0403	0.30	|Q	|	|	|	|
2+ 0	0.0424	0.30	|Q	|	|	|	|
2+ 5	0.0445	0.30	|Q	|	|	|	|
2+10	0.0466	0.30	|Q	|	|	|	|
2+15	0.0487	0.31	|Q	|	|	|	|
2+20	0.0508	0.31	|Q	|	|	|	|
2+25	0.0529	0.31	|Q	|	|	|	|
2+30	0.0550	0.31	|Q	|	|	|	|

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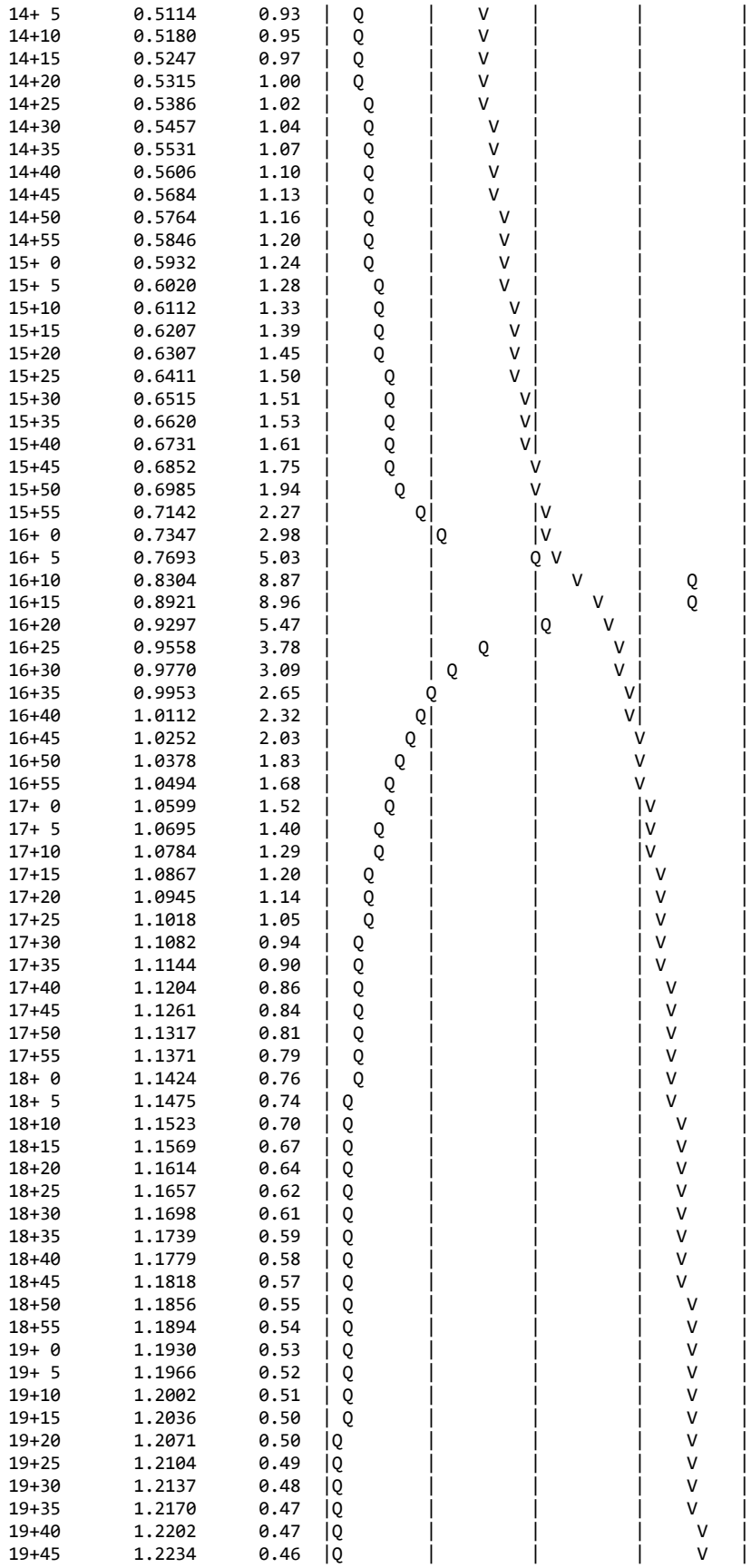
2+35       0.0572      0.31  |Q        |         |         |         |
2+40       0.0593      0.31  |Q        |         |         |         |
2+45       0.0615      0.31  |Q        |         |         |         |
2+50       0.0636      0.31  |Q        |         |         |         |
2+55       0.0658      0.31  |Q        |         |         |         |
3+ 0       0.0680      0.32  |QV       |         |         |         |
3+ 5       0.0701      0.32  |QV       |         |         |         |
3+10       0.0723      0.32  |QV       |         |         |         |
3+15       0.0745      0.32  |QV       |         |         |         |
3+20       0.0767      0.32  |QV       |         |         |         |
3+25       0.0789      0.32  |QV       |         |         |         |
3+30       0.0812      0.32  |QV       |         |         |         |
3+35       0.0834      0.32  |QV       |         |         |         |
3+40       0.0856      0.32  |QV       |         |         |         |
3+45       0.0879      0.33  |QV       |         |         |         |
3+50       0.0901      0.33  |QV       |         |         |         |
3+55       0.0924      0.33  |QV       |         |         |         |
4+ 0       0.0947      0.33  |QV       |         |         |         |
4+ 5       0.0969      0.33  |QV       |         |         |         |
4+10       0.0992      0.33  |QV       |         |         |         |
4+15       0.1015      0.33  |QV       |         |         |         |
4+20       0.1038      0.33  |Q V      |         |         |         |
4+25       0.1061      0.34  |Q V      |         |         |         |
4+30       0.1085      0.34  |Q V      |         |         |         |
4+35       0.1108      0.34  |Q V      |         |         |         |
4+40       0.1131      0.34  |Q V      |         |         |         |
4+45       0.1155      0.34  |Q V      |         |         |         |
4+50       0.1179      0.34  |Q V      |         |         |         |
4+55       0.1202      0.34  |Q V      |         |         |         |
5+ 0       0.1226      0.35  |Q V      |         |         |         |
5+ 5       0.1250      0.35  |Q V      |         |         |         |
5+10       0.1274      0.35  |Q V      |         |         |         |
5+15       0.1298      0.35  |Q V      |         |         |         |
5+20       0.1323      0.35  |Q V      |         |         |         |
5+25       0.1347      0.35  |Q V      |         |         |         |
5+30       0.1371      0.35  |Q  V     |         |         |         |
5+35       0.1396      0.36  |Q  V     |         |         |         |
5+40       0.1420      0.36  |Q  V     |         |         |         |
5+45       0.1445      0.36  |Q  V     |         |         |         |
5+50       0.1470      0.36  |Q  V     |         |         |         |
5+55       0.1495      0.36  |Q  V     |         |         |         |
6+ 0       0.1520      0.36  |Q  V     |         |         |         |
6+ 5       0.1545      0.37  |Q  V     |         |         |         |
6+10       0.1571      0.37  |Q  V     |         |         |         |
6+15       0.1596      0.37  |Q  V     |         |         |         |
6+20       0.1622      0.37  |Q  V     |         |         |         |
6+25       0.1648      0.37  |Q  V     |         |         |         |
6+30       0.1673      0.37  |Q  V     |         |         |         |
6+35       0.1699      0.38  |Q   V    |         |         |         |
6+40       0.1725      0.38  |Q   V    |         |         |         |
6+45       0.1752      0.38  |Q   V    |         |         |         |
6+50       0.1778      0.38  |Q   V    |         |         |         |
6+55       0.1804      0.38  |Q   V    |         |         |         |
7+ 0       0.1831      0.39  |Q   V    |         |         |         |
7+ 5       0.1858      0.39  |Q   V    |         |         |         |
7+10       0.1885      0.39  |Q   V    |         |         |         |
7+15       0.1912      0.39  |Q   V    |         |         |         |
7+20       0.1939      0.39  |Q   V    |         |         |         |
7+25       0.1966      0.40  |Q   V    |         |         |         |
7+30       0.1993      0.40  |Q   V    |         |         |         |
7+35       0.2021      0.40  |Q   V    |         |         |         |
7+40       0.2049      0.40  |Q    V   |         |         |         |
7+45       0.2077      0.40  |Q    V   |         |         |         |
7+50       0.2105      0.41  |Q    V   |         |         |         |
7+55       0.2133      0.41  |Q    V   |         |         |         |
8+ 0       0.2161      0.41  |Q    V   |         |         |         |
8+ 5       0.2190      0.41  |Q    V   |         |         |         |
8+10       0.2218      0.42  |Q    V   |         |         |         |
8+15       0.2247      0.42  |Q    V   |         |         |         |
```

8+20	0.2276	0.42	Q V			
8+25	0.2306	0.42	Q V			
8+30	0.2335	0.43	Q V			
8+35	0.2364	0.43	Q V			
8+40	0.2394	0.43	Q V			
8+45	0.2424	0.43	Q V			
8+50	0.2454	0.44	Q V			
8+55	0.2485	0.44	Q V			
9+ 0	0.2515	0.44	Q V			
9+ 5	0.2546	0.45	Q V			
9+10	0.2577	0.45	Q V			
9+15	0.2608	0.45	Q V			
9+20	0.2639	0.45	Q V			
9+25	0.2671	0.46	Q V			
9+30	0.2702	0.46	Q V			
9+35	0.2734	0.46	Q V			
9+40	0.2766	0.47	Q V			
9+45	0.2799	0.47	Q V			
9+50	0.2832	0.47	Q V			
9+55	0.2864	0.48	Q V			
10+ 0	0.2898	0.48	Q V			
10+ 5	0.2931	0.48	Q V			
10+10	0.2965	0.49	Q V			
10+15	0.2999	0.49	Q V			
10+20	0.3033	0.50	Q V			
10+25	0.3067	0.50	Q V			
10+30	0.3102	0.50	Q V			
10+35	0.3137	0.51	Q V			
10+40	0.3172	0.51	Q V			
10+45	0.3208	0.52	Q V			
10+50	0.3244	0.52	Q V			
10+55	0.3280	0.53	Q V			
11+ 0	0.3316	0.53	Q V			
11+ 5	0.3353	0.54	Q V			
11+10	0.3390	0.54	Q V			
11+15	0.3428	0.55	Q V			
11+20	0.3466	0.55	Q V			
11+25	0.3504	0.56	Q V			
11+30	0.3543	0.56	Q V			
11+35	0.3582	0.57	Q V			
11+40	0.3621	0.57	Q V			
11+45	0.3661	0.58	Q V			
11+50	0.3701	0.58	Q V			
11+55	0.3742	0.59	Q V			
12+ 0	0.3783	0.60	Q V			
12+ 5	0.3825	0.61	Q V			
12+10	0.3868	0.63	Q V			
12+15	0.3914	0.66	Q V			
12+20	0.3960	0.67	Q V			
12+25	0.4007	0.69	Q V			
12+30	0.4055	0.70	Q V			
12+35	0.4104	0.71	Q V			
12+40	0.4153	0.72	Q V			
12+45	0.4203	0.73	Q V			
12+50	0.4254	0.74	Q V			
12+55	0.4306	0.75	Q V			
13+ 0	0.4358	0.76	Q V			
13+ 5	0.4411	0.77	Q V			
13+10	0.4464	0.78	Q V			
13+15	0.4519	0.79	Q V			
13+20	0.4574	0.80	Q V			
13+25	0.4630	0.81	Q V			
13+30	0.4687	0.83	Q V			
13+35	0.4745	0.84	Q V			
13+40	0.4804	0.85	Q V			
13+45	0.4864	0.87	Q V			
13+50	0.4925	0.88	Q V			
13+55	0.4987	0.90	Q V			
14+ 0	0.5050	0.92	Q V			



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  19+50       1.2265      0.45  |Q        |         |         |     V   |
  19+55       1.2296      0.45  |Q        |         |         |     V   |
  20+ 0       1.2327      0.44  |Q        |         |         |     V   |
  20+ 5       1.2357      0.44  |Q        |         |         |     V   |
  20+10       1.2386      0.43  |Q        |         |         |     V   |
  20+15       1.2416      0.43  |Q        |         |         |     V   |
  20+20       1.2445      0.42  |Q        |         |         |     V   |
  20+25       1.2473      0.42  |Q        |         |         |     V   |
  20+30       1.2502      0.41  |Q        |         |         |     V   |
  20+35       1.2530      0.41  |Q        |         |         |     V   |
  20+40       1.2558      0.40  |Q        |         |         |      V  |
  20+45       1.2585      0.40  |Q        |         |         |      V  |
  20+50       1.2612      0.39  |Q        |         |         |      V  |
  20+55       1.2639      0.39  |Q        |         |         |      V  |
  21+ 0       1.2666      0.39  |Q        |         |         |      V  |
  21+ 5       1.2692      0.38  |Q        |         |         |      V  |
  21+10       1.2718      0.38  |Q        |         |         |      V  |
  21+15       1.2744      0.37  |Q        |         |         |      V  |
  21+20       1.2769      0.37  |Q        |         |         |      V  |
  21+25       1.2795      0.37  |Q        |         |         |      V  |
  21+30       1.2820      0.36  |Q        |         |         |      V  |
  21+35       1.2845      0.36  |Q        |         |         |      V  |
  21+40       1.2869      0.36  |Q        |         |         |      V  |
  21+45       1.2894      0.35  |Q        |         |         |       V |
  21+50       1.2918      0.35  |Q        |         |         |       V |
  21+55       1.2942      0.35  |Q        |         |         |       V |
  22+ 0       1.2966      0.35  |Q        |         |         |       V |
  22+ 5       1.2989      0.34  |Q        |         |         |       V |
  22+10       1.3013      0.34  |Q        |         |         |       V |
  22+15       1.3036      0.34  |Q        |         |         |       V |
  22+20       1.3059      0.33  |Q        |         |         |       V |
  22+25       1.3082      0.33  |Q        |         |         |       V |
  22+30       1.3104      0.33  |Q        |         |         |       V |
  22+35       1.3127      0.33  |Q        |         |         |       V |
  22+40       1.3149      0.32  |Q        |         |         |       V |
  22+45       1.3172      0.32  |Q        |         |         |       V |
  22+50       1.3194      0.32  |Q        |         |         |       V |
  22+55       1.3215      0.32  |Q        |         |         |        V|
  23+ 0       1.3237      0.32  |Q        |         |         |        V|
  23+ 5       1.3259      0.31  |Q        |         |         |        V|
  23+10       1.3280      0.31  |Q        |         |         |        V|
  23+15       1.3301      0.31  |Q        |         |         |        V|
  23+20       1.3323      0.31  |Q        |         |         |        V|
  23+25       1.3344      0.30  |Q        |         |         |        V|
  23+30       1.3364      0.30  |Q        |         |         |        V|
  23+35       1.3385      0.30  |Q        |         |         |        V|
  23+40       1.3406      0.30  |Q        |         |         |        V|
  23+45       1.3426      0.30  |Q        |         |         |        V|
  23+50       1.3446      0.29  |Q        |         |         |        V|
  23+55       1.3467      0.29  |Q        |         |         |        V|
  24+ 0       1.3487      0.29  |Q        |         |         |        V|
-------------------------------------------------------------------------
```

Appendix I.IV

Synthetic Unit Hydrograph Method Analysis
Post-Development Conditions
2-Year Storm

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

Study date 03/30/23

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

Program License Serial Number 6443

JURUPA AND WILLOW
UNIT HYDROGRAPH
2-YEAR STORM
POST DEVELOPMENT - DA A

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 10		
6.57	1	0.79
Rainfall data for year 2		
6.57	6	1.26
Rainfall data for year 2		
6.57	24	2.27
Rainfall data for year 100		
6.57	1	1.24
Rainfall data for year 100		
6.57	6	2.93
Rainfall data for year 100		
6.57	24	5.35

++

******** 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)
32.0	16.6	6.57	1.000	1.000	0.160	0.160

Area-averaged adjusted loss rate Fm (In/Hr) = 0.160

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC1)	S	Pervious Yield Fr
1.05	0.160	32.0	16.6	11.35	0.000
5.52	0.840	98.0	98.0	0.20	0.900

Area-averaged catchment yield fraction, Y = 0.756
Area-averaged low loss fraction, Yb = 0.244
User entry of time of concentration = 0.129 (hours)
++
Watershed area = 6.57(Ac.)
Catchment Lag time = 0.103 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 80.7494
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.160(In/Hr)
Average low loss rate fraction (Yb) = 0.244 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.174(In)
Computed peak 30-minute rainfall = 0.356(In)
Specified peak 1-hour rainfall = 0.470(In)
Computed peak 3-hour rainfall = 0.861(In)
Specified peak 6-hour rainfall = 1.260(In)
Specified peak 24-hour rainfall = 2.270(In)

Rainfall depth area reduction factors:
Using a total area of 6.57(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.174(In)
30-minute factor = 1.000 Adjusted rainfall = 0.356(In)
1-hour factor = 1.000 Adjusted rainfall = 0.470(In)
3-hour factor = 1.000 Adjusted rainfall = 0.861(In)
6-hour factor = 1.000 Adjusted rainfall = 1.260(In)
24-hour factor = 1.000 Adjusted rainfall = 2.270(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 = 79.46 (CFS))	
1	11.507	9.143
2	64.504	42.109
3	94.202	23.597
4	98.887	3.723
5	100.000	0.884

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.1740	0.1740
2	0.2296	0.0556
3	0.2701	0.0404
4	0.3030	0.0329
5	0.3313	0.0283
6	0.3564	0.0251
7	0.3790	0.0227
8	0.3998	0.0208
9	0.4191	0.0193
10	0.4371	0.0180
11	0.4541	0.0170
12	0.4702	0.0161
13	0.4914	0.0212
14	0.5118	0.0204
15	0.5316	0.0198
16	0.5509	0.0192

17	0.5695	0.0187
18	0.5877	0.0182
19	0.6055	0.0177
20	0.6228	0.0173
21	0.6398	0.0169
22	0.6563	0.0166
23	0.6726	0.0162
24	0.6885	0.0159
25	0.7042	0.0156
26	0.7195	0.0154
27	0.7346	0.0151
28	0.7495	0.0148
29	0.7641	0.0146
30	0.7785	0.0144
31	0.7926	0.0142
32	0.8066	0.0140
33	0.8204	0.0138
34	0.8340	0.0136
35	0.8474	0.0134
36	0.8606	0.0132
37	0.8737	0.0131
38	0.8866	0.0129
39	0.8993	0.0128
40	0.9120	0.0126
41	0.9244	0.0125
42	0.9368	0.0123
43	0.9490	0.0122
44	0.9610	0.0121
45	0.9730	0.0120
46	0.9848	0.0118
47	0.9965	0.0117
48	1.0081	0.0116
49	1.0196	0.0115
50	1.0310	0.0114
51	1.0423	0.0113
52	1.0535	0.0112
53	1.0646	0.0111
54	1.0756	0.0110
55	1.0865	0.0109
56	1.0973	0.0108
57	1.1081	0.0107
58	1.1187	0.0106
59	1.1293	0.0106
60	1.1398	0.0105
61	1.1502	0.0104
62	1.1605	0.0103
63	1.1708	0.0103
64	1.1809	0.0102
65	1.1911	0.0101
66	1.2011	0.0100
67	1.2111	0.0100
68	1.2210	0.0099
69	1.2308	0.0098
70	1.2406	0.0098
71	1.2503	0.0097
72	1.2600	0.0097
73	1.2674	0.0074
74	1.2747	0.0073
75	1.2820	0.0073
76	1.2892	0.0072
77	1.2964	0.0072
78	1.3035	0.0071
79	1.3106	0.0071
80	1.3176	0.0070
81	1.3246	0.0070
82	1.3315	0.0069
83	1.3384	0.0069
84	1.3452	0.0068
85	1.3520	0.0068

86	1.3587	0.0067
87	1.3654	0.0067
88	1.3720	0.0066
89	1.3786	0.0066
90	1.3852	0.0066
91	1.3917	0.0065
92	1.3982	0.0065
93	1.4046	0.0064
94	1.4110	0.0064
95	1.4174	0.0064
96	1.4237	0.0063
97	1.4300	0.0063
98	1.4362	0.0062
99	1.4424	0.0062
100	1.4486	0.0062
101	1.4547	0.0061
102	1.4608	0.0061
103	1.4669	0.0061
104	1.4729	0.0060
105	1.4789	0.0060
106	1.4849	0.0060
107	1.4908	0.0059
108	1.4967	0.0059
109	1.5026	0.0059
110	1.5084	0.0058
111	1.5142	0.0058
112	1.5200	0.0058
113	1.5258	0.0057
114	1.5315	0.0057
115	1.5372	0.0057
116	1.5428	0.0057
117	1.5485	0.0056
118	1.5541	0.0056
119	1.5596	0.0056
120	1.5652	0.0056
121	1.5707	0.0055
122	1.5762	0.0055
123	1.5817	0.0055
124	1.5871	0.0054
125	1.5926	0.0054
126	1.5980	0.0054
127	1.6033	0.0054
128	1.6087	0.0053
129	1.6140	0.0053
130	1.6193	0.0053
131	1.6246	0.0053
132	1.6298	0.0053
133	1.6351	0.0052
134	1.6403	0.0052
135	1.6455	0.0052
136	1.6506	0.0052
137	1.6558	0.0051
138	1.6609	0.0051
139	1.6660	0.0051
140	1.6711	0.0051
141	1.6761	0.0051
142	1.6812	0.0050
143	1.6862	0.0050
144	1.6912	0.0050
145	1.6962	0.0050
146	1.7011	0.0050
147	1.7061	0.0049
148	1.7110	0.0049
149	1.7159	0.0049
150	1.7208	0.0049
151	1.7256	0.0049
152	1.7305	0.0048
153	1.7353	0.0048
154	1.7401	0.0048

155	1.7449	0.0048
156	1.7497	0.0048
157	1.7544	0.0048
158	1.7591	0.0047
159	1.7639	0.0047
160	1.7686	0.0047
161	1.7733	0.0047
162	1.7779	0.0047
163	1.7826	0.0047
164	1.7872	0.0046
165	1.7918	0.0046
166	1.7964	0.0046
167	1.8010	0.0046
168	1.8056	0.0046
169	1.8102	0.0046
170	1.8147	0.0045
171	1.8192	0.0045
172	1.8237	0.0045
173	1.8282	0.0045
174	1.8327	0.0045
175	1.8372	0.0045
176	1.8416	0.0045
177	1.8461	0.0044
178	1.8505	0.0044
179	1.8549	0.0044
180	1.8593	0.0044
181	1.8637	0.0044
182	1.8680	0.0044
183	1.8724	0.0044
184	1.8767	0.0043
185	1.8810	0.0043
186	1.8853	0.0043
187	1.8896	0.0043
188	1.8939	0.0043
189	1.8982	0.0043
190	1.9025	0.0043
191	1.9067	0.0042
192	1.9109	0.0042
193	1.9152	0.0042
194	1.9194	0.0042
195	1.9236	0.0042
196	1.9277	0.0042
197	1.9319	0.0042
198	1.9361	0.0042
199	1.9402	0.0041
200	1.9444	0.0041
201	1.9485	0.0041
202	1.9526	0.0041
203	1.9567	0.0041
204	1.9608	0.0041
205	1.9648	0.0041
206	1.9689	0.0041
207	1.9730	0.0041
208	1.9770	0.0040
209	1.9810	0.0040
210	1.9851	0.0040
211	1.9891	0.0040
212	1.9931	0.0040
213	1.9970	0.0040
214	2.0010	0.0040
215	2.0050	0.0040
216	2.0089	0.0040
217	2.0129	0.0039
218	2.0168	0.0039
219	2.0207	0.0039
220	2.0247	0.0039
221	2.0286	0.0039
222	2.0325	0.0039
223	2.0363	0.0039

224	2.0402	0.0039	
225	2.0441	0.0039	
226	2.0479	0.0039	
227	2.0518	0.0038	
228	2.0556	0.0038	
229	2.0594	0.0038	
230	2.0632	0.0038	
231	2.0670	0.0038	
232	2.0708	0.0038	
233	2.0746	0.0038	
234	2.0784	0.0038	
235	2.0822	0.0038	
236	2.0859	0.0038	
237	2.0897	0.0037	
238	2.0934	0.0037	
239	2.0971	0.0037	
240	2.1009	0.0037	
241	2.1046	0.0037	
242	2.1083	0.0037	
243	2.1120	0.0037	
244	2.1157	0.0037	
245	2.1193	0.0037	
246	2.1230	0.0037	
247	2.1267	0.0037	
248	2.1303	0.0037	
249	2.1340	0.0036	
250	2.1376	0.0036	
251	2.1412	0.0036	
252	2.1448	0.0036	
253	2.1485	0.0036	
254	2.1521	0.0036	
255	2.1557	0.0036	
256	2.1592	0.0036	
257	2.1628	0.0036	
258	2.1664	0.0036	
259	2.1699	0.0036	
260	2.1735	0.0036	
261	2.1770	0.0035	
262	2.1806	0.0035	
263	2.1841	0.0035	
264	2.1876	0.0035	
265	2.1912	0.0035	
266	2.1947	0.0035	
267	2.1982	0.0035	
268	2.2017	0.0035	
269	2.2051	0.0035	
270	2.2086	0.0035	
271	2.2121	0.0035	
272	2.2155	0.0035	
273	2.2190	0.0035	
274	2.2225	0.0034	
275	2.2259	0.0034	
276	2.2293	0.0034	
277	2.2328	0.0034	
278	2.2362	0.0034	
279	2.2396	0.0034	
280	2.2430	0.0034	
281	2.2464	0.0034	
282	2.2498	0.0034	
283	2.2532	0.0034	
284	2.2565	0.0034	
285	2.2599	0.0034	
286	2.2633	0.0034	
287	2.2666	0.0034	
288	2.2700	0.0034	

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)

1	0.0034	0.0008	0.0025
2	0.0034	0.0008	0.0025
3	0.0034	0.0008	0.0025
4	0.0034	0.0008	0.0026
5	0.0034	0.0008	0.0026
6	0.0034	0.0008	0.0026
7	0.0034	0.0008	0.0026
8	0.0034	0.0008	0.0026
9	0.0034	0.0008	0.0026
10	0.0034	0.0008	0.0026
11	0.0035	0.0008	0.0026
12	0.0035	0.0008	0.0026
13	0.0035	0.0008	0.0026
14	0.0035	0.0009	0.0026
15	0.0035	0.0009	0.0026
16	0.0035	0.0009	0.0027
17	0.0035	0.0009	0.0027
18	0.0035	0.0009	0.0027
19	0.0035	0.0009	0.0027
20	0.0036	0.0009	0.0027
21	0.0036	0.0009	0.0027
22	0.0036	0.0009	0.0027
23	0.0036	0.0009	0.0027
24	0.0036	0.0009	0.0027
25	0.0036	0.0009	0.0027
26	0.0036	0.0009	0.0027
27	0.0036	0.0009	0.0028
28	0.0037	0.0009	0.0028
29	0.0037	0.0009	0.0028
30	0.0037	0.0009	0.0028
31	0.0037	0.0009	0.0028
32	0.0037	0.0009	0.0028
33	0.0037	0.0009	0.0028
34	0.0037	0.0009	0.0028
35	0.0037	0.0009	0.0028
36	0.0038	0.0009	0.0028
37	0.0038	0.0009	0.0029
38	0.0038	0.0009	0.0029
39	0.0038	0.0009	0.0029
40	0.0038	0.0009	0.0029
41	0.0038	0.0009	0.0029
42	0.0038	0.0009	0.0029
43	0.0039	0.0009	0.0029
44	0.0039	0.0009	0.0029
45	0.0039	0.0010	0.0029
46	0.0039	0.0010	0.0029
47	0.0039	0.0010	0.0030
48	0.0039	0.0010	0.0030
49	0.0040	0.0010	0.0030
50	0.0040	0.0010	0.0030
51	0.0040	0.0010	0.0030
52	0.0040	0.0010	0.0030
53	0.0040	0.0010	0.0030
54	0.0040	0.0010	0.0030
55	0.0041	0.0010	0.0031
56	0.0041	0.0010	0.0031
57	0.0041	0.0010	0.0031
58	0.0041	0.0010	0.0031
59	0.0041	0.0010	0.0031
60	0.0041	0.0010	0.0031
61	0.0042	0.0010	0.0031
62	0.0042	0.0010	0.0032
63	0.0042	0.0010	0.0032
64	0.0042	0.0010	0.0032
65	0.0042	0.0010	0.0032
66	0.0042	0.0010	0.0032
67	0.0043	0.0010	0.0032
68	0.0043	0.0010	0.0032

69	0.0043	0.0011	0.0033
70	0.0043	0.0011	0.0033
71	0.0044	0.0011	0.0033
72	0.0044	0.0011	0.0033
73	0.0044	0.0011	0.0033
74	0.0044	0.0011	0.0033
75	0.0044	0.0011	0.0034
76	0.0045	0.0011	0.0034
77	0.0045	0.0011	0.0034
78	0.0045	0.0011	0.0034
79	0.0045	0.0011	0.0034
80	0.0045	0.0011	0.0034
81	0.0046	0.0011	0.0035
82	0.0046	0.0011	0.0035
83	0.0046	0.0011	0.0035
84	0.0046	0.0011	0.0035
85	0.0047	0.0011	0.0035
86	0.0047	0.0011	0.0035
87	0.0047	0.0012	0.0036
88	0.0047	0.0012	0.0036
89	0.0048	0.0012	0.0036
90	0.0048	0.0012	0.0036
91	0.0048	0.0012	0.0036
92	0.0048	0.0012	0.0037
93	0.0049	0.0012	0.0037
94	0.0049	0.0012	0.0037
95	0.0049	0.0012	0.0037
96	0.0050	0.0012	0.0037
97	0.0050	0.0012	0.0038
98	0.0050	0.0012	0.0038
99	0.0051	0.0012	0.0038
100	0.0051	0.0012	0.0038
101	0.0051	0.0013	0.0039
102	0.0051	0.0013	0.0039
103	0.0052	0.0013	0.0039
104	0.0052	0.0013	0.0039
105	0.0053	0.0013	0.0040
106	0.0053	0.0013	0.0040
107	0.0053	0.0013	0.0040
108	0.0053	0.0013	0.0040
109	0.0054	0.0013	0.0041
110	0.0054	0.0013	0.0041
111	0.0055	0.0013	0.0041
112	0.0055	0.0013	0.0042
113	0.0056	0.0014	0.0042
114	0.0056	0.0014	0.0042
115	0.0056	0.0014	0.0043
116	0.0057	0.0014	0.0043
117	0.0057	0.0014	0.0043
118	0.0057	0.0014	0.0043
119	0.0058	0.0014	0.0044
120	0.0058	0.0014	0.0044
121	0.0059	0.0014	0.0045
122	0.0059	0.0014	0.0045
123	0.0060	0.0015	0.0045
124	0.0060	0.0015	0.0046
125	0.0061	0.0015	0.0046
126	0.0061	0.0015	0.0046
127	0.0062	0.0015	0.0047
128	0.0062	0.0015	0.0047
129	0.0063	0.0015	0.0048
130	0.0064	0.0016	0.0048
131	0.0064	0.0016	0.0049
132	0.0065	0.0016	0.0049
133	0.0066	0.0016	0.0050
134	0.0066	0.0016	0.0050
135	0.0067	0.0016	0.0051
136	0.0067	0.0016	0.0051
137	0.0068	0.0017	0.0052

138	0.0069	0.0017	0.0052
139	0.0070	0.0017	0.0053
140	0.0070	0.0017	0.0053
141	0.0071	0.0017	0.0054
142	0.0072	0.0018	0.0054
143	0.0073	0.0018	0.0055
144	0.0073	0.0018	0.0055
145	0.0097	0.0024	0.0073
146	0.0097	0.0024	0.0073
147	0.0098	0.0024	0.0074
148	0.0099	0.0024	0.0075
149	0.0100	0.0025	0.0076
150	0.0101	0.0025	0.0076
151	0.0103	0.0025	0.0078
152	0.0103	0.0025	0.0078
153	0.0105	0.0026	0.0079
154	0.0106	0.0026	0.0080
155	0.0107	0.0026	0.0081
156	0.0108	0.0026	0.0082
157	0.0110	0.0027	0.0083
158	0.0111	0.0027	0.0084
159	0.0113	0.0028	0.0085
160	0.0114	0.0028	0.0086
161	0.0116	0.0028	0.0088
162	0.0117	0.0029	0.0089
163	0.0120	0.0029	0.0090
164	0.0121	0.0029	0.0091
165	0.0123	0.0030	0.0093
166	0.0125	0.0030	0.0094
167	0.0128	0.0031	0.0096
168	0.0129	0.0032	0.0098
169	0.0132	0.0032	0.0100
170	0.0134	0.0033	0.0101
171	0.0138	0.0034	0.0104
172	0.0140	0.0034	0.0106
173	0.0144	0.0035	0.0109
174	0.0146	0.0036	0.0110
175	0.0151	0.0037	0.0114
176	0.0154	0.0038	0.0116
177	0.0159	0.0039	0.0120
178	0.0162	0.0040	0.0123
179	0.0169	0.0041	0.0128
180	0.0173	0.0042	0.0131
181	0.0182	0.0044	0.0138
182	0.0187	0.0046	0.0141
183	0.0198	0.0048	0.0150
184	0.0204	0.0050	0.0155
185	0.0161	0.0039	0.0122
186	0.0170	0.0041	0.0128
187	0.0193	0.0047	0.0146
188	0.0208	0.0051	0.0157
189	0.0251	0.0061	0.0189
190	0.0283	0.0069	0.0214
191	0.0404	0.0099	0.0306
192	0.0556	0.0133	0.0423
193	0.1740	0.0133	0.1607
194	0.0329	0.0080	0.0249
195	0.0227	0.0055	0.0171
196	0.0180	0.0044	0.0136
197	0.0212	0.0052	0.0160
198	0.0192	0.0047	0.0145
199	0.0177	0.0043	0.0134
200	0.0166	0.0041	0.0125
201	0.0156	0.0038	0.0118
202	0.0148	0.0036	0.0112
203	0.0142	0.0035	0.0107
204	0.0136	0.0033	0.0103
205	0.0131	0.0032	0.0099
206	0.0126	0.0031	0.0095

207	0.0122	0.0030	0.0092
208	0.0118	0.0029	0.0089
209	0.0115	0.0028	0.0087
210	0.0112	0.0027	0.0085
211	0.0109	0.0027	0.0082
212	0.0106	0.0026	0.0080
213	0.0104	0.0025	0.0079
214	0.0102	0.0025	0.0077
215	0.0100	0.0024	0.0075
216	0.0098	0.0024	0.0074
217	0.0074	0.0018	0.0056
218	0.0072	0.0018	0.0055
219	0.0071	0.0017	0.0053
220	0.0069	0.0017	0.0052
221	0.0068	0.0017	0.0051
222	0.0066	0.0016	0.0050
223	0.0065	0.0016	0.0049
224	0.0064	0.0016	0.0048
225	0.0063	0.0015	0.0047
226	0.0062	0.0015	0.0047
227	0.0061	0.0015	0.0046
228	0.0060	0.0015	0.0045
229	0.0059	0.0014	0.0044
230	0.0058	0.0014	0.0044
231	0.0057	0.0014	0.0043
232	0.0056	0.0014	0.0042
233	0.0055	0.0013	0.0042
234	0.0054	0.0013	0.0041
235	0.0054	0.0013	0.0041
236	0.0053	0.0013	0.0040
237	0.0052	0.0013	0.0040
238	0.0052	0.0013	0.0039
239	0.0051	0.0012	0.0039
240	0.0050	0.0012	0.0038
241	0.0050	0.0012	0.0038
242	0.0049	0.0012	0.0037
243	0.0049	0.0012	0.0037
244	0.0048	0.0012	0.0036
245	0.0048	0.0012	0.0036
246	0.0047	0.0011	0.0036
247	0.0047	0.0011	0.0035
248	0.0046	0.0011	0.0035
249	0.0046	0.0011	0.0034
250	0.0045	0.0011	0.0034
251	0.0045	0.0011	0.0034
252	0.0044	0.0011	0.0033
253	0.0044	0.0011	0.0033
254	0.0043	0.0011	0.0033
255	0.0043	0.0010	0.0032
256	0.0043	0.0010	0.0032
257	0.0042	0.0010	0.0032
258	0.0042	0.0010	0.0032
259	0.0041	0.0010	0.0031
260	0.0041	0.0010	0.0031
261	0.0041	0.0010	0.0031
262	0.0040	0.0010	0.0031
263	0.0040	0.0010	0.0030
264	0.0040	0.0010	0.0030
265	0.0039	0.0010	0.0030
266	0.0039	0.0010	0.0030
267	0.0039	0.0009	0.0029
268	0.0039	0.0009	0.0029
269	0.0038	0.0009	0.0029
270	0.0038	0.0009	0.0029
271	0.0038	0.0009	0.0028
272	0.0037	0.0009	0.0028
273	0.0037	0.0009	0.0028
274	0.0037	0.0009	0.0028
275	0.0037	0.0009	0.0028

276	0.0036	0.0009	0.0027
277	0.0036	0.0009	0.0027
278	0.0036	0.0009	0.0027
279	0.0036	0.0009	0.0027
280	0.0035	0.0009	0.0027
281	0.0035	0.0009	0.0027
282	0.0035	0.0009	0.0026
283	0.0035	0.0008	0.0026
284	0.0034	0.0008	0.0026
285	0.0034	0.0008	0.0026
286	0.0034	0.0008	0.0026
287	0.0034	0.0008	0.0026
288	0.0034	0.0008	0.0025

Total soil rain loss = 0.53(In)
Total effective rainfall = 1.74(In)
Peak flow rate in flood hydrograph = 8.12(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	2.5	5.0	7.5	10.0
0+ 5	0.0002	0.02	Q				
0+10	0.0011	0.13	Q				
0+15	0.0024	0.19	Q				
0+20	0.0037	0.20	Q				
0+25	0.0051	0.20	Q				
0+30	0.0065	0.20	Q				
0+35	0.0079	0.20	Q				
0+40	0.0093	0.20	Q				
0+45	0.0108	0.21	Q				
0+50	0.0122	0.21	Q				
0+55	0.0136	0.21	Q				
1+ 0	0.0150	0.21	Q				
1+ 5	0.0165	0.21	Q				
1+10	0.0179	0.21	Q				
1+15	0.0193	0.21	Q				
1+20	0.0208	0.21	Q				
1+25	0.0222	0.21	Q				
1+30	0.0237	0.21	Q				
1+35	0.0251	0.21	QV				
1+40	0.0266	0.21	QV				
1+45	0.0281	0.21	QV				
1+50	0.0296	0.21	QV				
1+55	0.0310	0.21	QV				
2+ 0	0.0325	0.22	QV				
2+ 5	0.0340	0.22	QV				
2+10	0.0355	0.22	QV				
2+15	0.0370	0.22	QV				
2+20	0.0385	0.22	QV				
2+25	0.0400	0.22	QV				
2+30	0.0415	0.22	QV				
2+35	0.0430	0.22	QV				
2+40	0.0446	0.22	QV				
2+45	0.0461	0.22	QV				
2+50	0.0476	0.22	QV				
2+55	0.0492	0.22	Q V				
3+ 0	0.0507	0.22	Q V				
3+ 5	0.0523	0.23	Q V				
3+10	0.0538	0.23	Q V				
3+15	0.0554	0.23	Q V				
3+20	0.0570	0.23	Q V				
3+25	0.0586	0.23	Q V				

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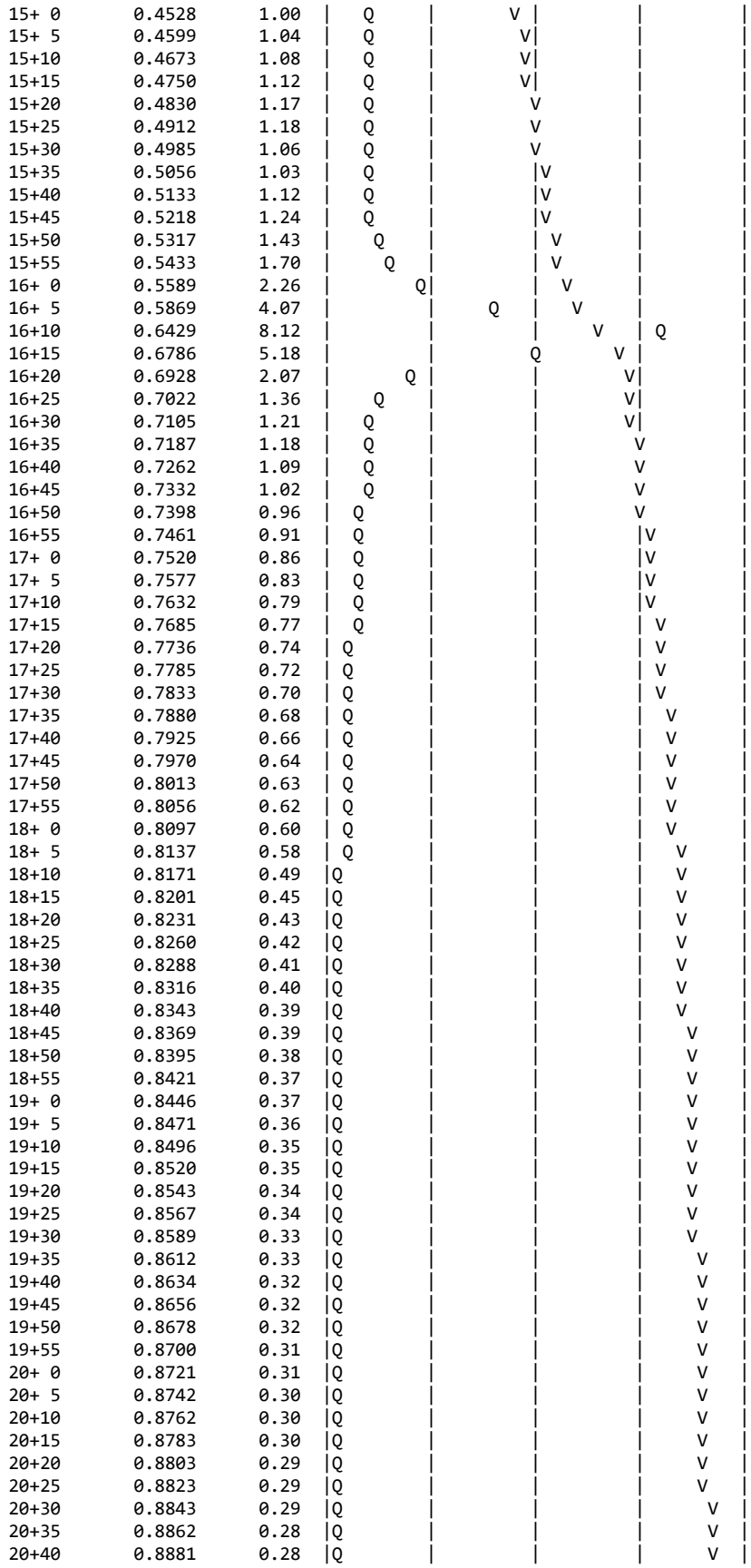
3+30      0.0601     0.23  Q V      |        |        |        |
3+35      0.0617     0.23  Q V      |        |        |        |
3+40      0.0633     0.23  Q V      |        |        |        |
3+45      0.0649     0.23  Q V      |        |        |        |
3+50      0.0665     0.23  Q V      |        |        |        |
3+55      0.0681     0.23  Q V      |        |        |        |
4+ 0      0.0698     0.24  Q V      |        |        |        |
4+ 5      0.0714     0.24  Q V      |        |        |        |
4+10      0.0730     0.24  Q  V     |        |        |        |
4+15      0.0747     0.24  Q  V     |        |        |        |
4+20      0.0763     0.24  Q  V     |        |        |        |
4+25      0.0780     0.24  Q  V     |        |        |        |
4+30      0.0796     0.24  Q  V     |        |        |        |
4+35      0.0813     0.24  Q  V     |        |        |        |
4+40      0.0829     0.24  Q  V     |        |        |        |
4+45      0.0846     0.24  Q  V     |        |        |        |
4+50      0.0863     0.24  Q  V     |        |        |        |
4+55      0.0880     0.25  Q  V     |        |        |        |
5+ 0      0.0897     0.25  Q  V     |        |        |        |
5+ 5      0.0914     0.25  Q  V     |        |        |        |
5+10      0.0931     0.25  Q  V     |        |        |        |
5+15      0.0949     0.25  |Q V     |        |        |        |
5+20      0.0966     0.25  |Q  V    |        |        |        |
5+25      0.0983     0.25  |Q  V    |        |        |        |
5+30      0.1001     0.25  |Q  V    |        |        |        |
5+35      0.1018     0.25  |Q  V    |        |        |        |
5+40      0.1036     0.26  |Q  V    |        |        |        |
5+45      0.1054     0.26  |Q  V    |        |        |        |
5+50      0.1071     0.26  |Q  V    |        |        |        |
5+55      0.1089     0.26  |Q  V    |        |        |        |
6+ 0      0.1107     0.26  |Q  V    |        |        |        |
6+ 5      0.1125     0.26  |Q  V    |        |        |        |
6+10      0.1143     0.26  |Q  V    |        |        |        |
6+15      0.1162     0.26  |Q  V    |        |        |        |
6+20      0.1180     0.27  |Q  V    |        |        |        |
6+25      0.1198     0.27  |Q   V   |        |        |        |
6+30      0.1217     0.27  |Q   V   |        |        |        |
6+35      0.1235     0.27  |Q   V   |        |        |        |
6+40      0.1254     0.27  |Q   V   |        |        |        |
6+45      0.1273     0.27  |Q   V   |        |        |        |
6+50      0.1292     0.27  |Q   V   |        |        |        |
6+55      0.1311     0.28  |Q   V   |        |        |        |
7+ 0      0.1330     0.28  |Q   V   |        |        |        |
7+ 5      0.1349     0.28  |Q   V   |        |        |        |
7+10      0.1368     0.28  |Q   V   |        |        |        |
7+15      0.1387     0.28  |Q   V   |        |        |        |
7+20      0.1407     0.28  |Q   V   |        |        |        |
7+25      0.1427     0.28  |Q   V   |        |        |        |
7+30      0.1446     0.29  |Q    V  |        |        |        |
7+35      0.1466     0.29  |Q    V  |        |        |        |
7+40      0.1486     0.29  |Q    V  |        |        |        |
7+45      0.1506     0.29  |Q    V  |        |        |        |
7+50      0.1526     0.29  |Q    V  |        |        |        |
7+55      0.1546     0.29  |Q    V  |        |        |        |
8+ 0      0.1567     0.30  |Q    V  |        |        |        |
8+ 5      0.1587     0.30  |Q    V  |        |        |        |
8+10      0.1608     0.30  |Q    V  |        |        |        |
8+15      0.1628     0.30  |Q    V  |        |        |        |
8+20      0.1649     0.30  |Q    V  |        |        |        |
8+25      0.1670     0.30  |Q    V  |        |        |        |
8+30      0.1691     0.31  |Q     V |        |        |        |
8+35      0.1713     0.31  |Q     V |        |        |        |
8+40      0.1734     0.31  |Q     V |        |        |        |
8+45      0.1756     0.31  |Q     V |        |        |        |
8+50      0.1777     0.31  |Q     V |        |        |        |
8+55      0.1799     0.32  |Q     V |        |        |        |
9+ 0      0.1821     0.32  |Q     V |        |        |        |
9+ 5      0.1843     0.32  |Q     V |        |        |        |
9+10      0.1865     0.32  |Q     V |        |        |        |
```

```
 9+15       0.1888      0.33  |Q     V  |         |         |         |
 9+20       0.1910      0.33  |Q      V |         |         |         |
 9+25       0.1933      0.33  |Q      V |         |         |         |
 9+30       0.1956      0.33  |Q      V |         |         |         |
 9+35       0.1979      0.33  |Q      V |         |         |         |
 9+40       0.2002      0.34  |Q      V |         |         |         |
 9+45       0.2026      0.34  |Q      V |         |         |         |
 9+50       0.2049      0.34  |Q      V |         |         |         |
 9+55       0.2073      0.34  |Q      V |         |         |         |
10+ 0       0.2097      0.35  |Q      V |         |         |         |
10+ 5       0.2121      0.35  |Q      V |         |         |         |
10+10       0.2145      0.35  |Q      V |         |         |         |
10+15       0.2170      0.36  |Q       V|         |         |         |
10+20       0.2194      0.36  |Q       V|         |         |         |
10+25       0.2219      0.36  |Q       V|         |         |         |
10+30       0.2244      0.36  |Q       V|         |         |         |
10+35       0.2270      0.37  |Q       V|         |         |         |
10+40       0.2295      0.37  |Q       V|         |         |         |
10+45       0.2321      0.37  |Q       V|         |         |         |
10+50       0.2347      0.38  |Q       V|         |         |         |
10+55       0.2373      0.38  |Q       V|         |         |         |
11+ 0       0.2400      0.38  |Q        V         |         |         |
11+ 5       0.2427      0.39  |Q        V         |         |         |
11+10       0.2454      0.39  |Q        V         |         |         |
11+15       0.2481      0.40  |Q        V         |         |         |
11+20       0.2508      0.40  |Q        V         |         |         |
11+25       0.2536      0.40  |Q        V         |         |         |
11+30       0.2564      0.41  |Q        V         |         |         |
11+35       0.2593      0.41  |Q        V         |         |         |
11+40       0.2621      0.42  |Q        V         |         |         |
11+45       0.2650      0.42  |Q        |V        |         |         |
11+50       0.2680      0.43  |Q        |V        |         |         |
11+55       0.2709      0.43  |Q        |V        |         |         |
12+ 0       0.2739      0.44  |Q        |V        |         |         |
12+ 5       0.2771      0.46  |Q        |V        |         |         |
12+10       0.2807      0.53  | Q       |V        |         |         |
12+15       0.2847      0.57  | Q       |V        |         |         |
12+20       0.2887      0.59  | Q       | V       |         |         |
12+25       0.2928      0.59  | Q       | V       |         |         |
12+30       0.2969      0.60  | Q       | V       |         |         |
12+35       0.3011      0.61  | Q       | V       |         |         |
12+40       0.3053      0.61  | Q       | V       |         |         |
12+45       0.3096      0.62  | Q       | V       |         |         |
12+50       0.3139      0.63  | Q       |  V      |         |         |
12+55       0.3183      0.63  | Q       |  V      |         |         |
13+ 0       0.3227      0.64  | Q       |  V      |         |         |
13+ 5       0.3272      0.65  | Q       |  V      |         |         |
13+10       0.3317      0.66  | Q       |  V      |         |         |
13+15       0.3363      0.66  | Q       |   V     |         |         |
13+20       0.3409      0.67  | Q       |   V     |         |         |
13+25       0.3456      0.68  | Q       |   V     |         |         |
13+30       0.3504      0.69  | Q       |   V     |         |         |
13+35       0.3552      0.70  | Q       |   V     |         |         |
13+40       0.3601      0.71  | Q       |    V    |         |         |
13+45       0.3651      0.72  | Q       |    V    |         |         |
13+50       0.3702      0.74  | Q       |    V    |         |         |
13+55       0.3753      0.75  | Q       |    V    |         |         |
14+ 0       0.3805      0.76  |  Q      |    V    |         |         |
14+ 5       0.3859      0.77  |  Q      |     V   |         |         |
14+10       0.3913      0.79  |  Q      |     V   |         |         |
14+15       0.3968      0.80  |  Q      |     V   |         |         |
14+20       0.4025      0.82  |  Q      |     V   |         |         |
14+25       0.4082      0.84  |  Q      |      V  |         |         |
14+30       0.4141      0.86  |  Q      |      V  |         |         |
14+35       0.4201      0.87  |  Q      |      V  |         |         |
14+40       0.4263      0.90  |  Q      |      V  |         |         |
14+45       0.4326      0.92  |  Q      |       V |         |         |
14+50       0.4392      0.95  |  Q      |       V |         |         |
14+55       0.4459      0.97  |  Q      |       V |         |         |
```



```
   20+45       0.8901      0.28  |Q        |         |         |      V  |
   20+50       0.8919      0.27  |Q        |         |         |      V  |
   20+55       0.8938      0.27  |Q        |         |         |      V  |
   21+ 0       0.8957      0.27  |Q        |         |         |      V  |
   21+ 5       0.8975      0.27  |Q        |         |         |      V  |
   21+10       0.8993      0.26  |Q        |         |         |      V  |
   21+15       0.9011      0.26  |Q        |         |         |      V  |
   21+20       0.9029      0.26  |Q        |         |         |      V  |
   21+25       0.9047      0.26  |Q        |         |         |      V  |
   21+30       0.9064      0.25  |Q        |         |         |      V  |
   21+35       0.9082      0.25  |Q        |         |         |       V |
   21+40       0.9099      0.25  Q         |         |         |       V |
   21+45       0.9116      0.25  Q         |         |         |       V |
   21+50       0.9133      0.25  Q         |         |         |       V |
   21+55       0.9149      0.24  Q         |         |         |       V |
   22+ 0       0.9166      0.24  Q         |         |         |       V |
   22+ 5       0.9183      0.24  Q         |         |         |       V |
   22+10       0.9199      0.24  Q         |         |         |       V |
   22+15       0.9215      0.24  Q         |         |         |       V |
   22+20       0.9231      0.23  Q         |         |         |       V |
   22+25       0.9247      0.23  Q         |         |         |       V |
   22+30       0.9263      0.23  Q         |         |         |       V |
   22+35       0.9279      0.23  Q         |         |         |       V |
   22+40       0.9294      0.23  Q         |         |         |       V |
   22+45       0.9310      0.23  Q         |         |         |        V|
   22+50       0.9325      0.22  Q         |         |         |        V|
   22+55       0.9341      0.22  Q         |         |         |        V|
   23+ 0       0.9356      0.22  Q         |         |         |        V|
   23+ 5       0.9371      0.22  Q         |         |         |        V|
   23+10       0.9386      0.22  Q         |         |         |        V|
   23+15       0.9401      0.22  Q         |         |         |        V|
   23+20       0.9415      0.21  Q         |         |         |        V|
   23+25       0.9430      0.21  Q         |         |         |        V|
   23+30       0.9445      0.21  Q         |         |         |        V|
   23+35       0.9459      0.21  Q         |         |         |        V|
   23+40       0.9473      0.21  Q         |         |         |        V|
   23+45       0.9488      0.21  Q         |         |         |        V|
   23+50       0.9502      0.21  Q         |         |         |        V|
   23+55       0.9516      0.20  Q         |         |         |        V|
   24+ 0       0.9530      0.20  Q         |         |         |        V|
-------------------------------------------------------------------------
```

Appendix I.V

Synthetic Unit Hydrograph Method Analysis
Post-Development Conditions
10-Year Storm

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

Study date 03/30/23

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

Program License Serial Number 6443

JURUPA AND WILLOW
UNIT HYDROGRAPH
10-YEAR STORM
POST DEVELOPMENT - DA A

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		
6.57	1	0.79
Rainfall data for year 2		
6.57	6	1.26
Rainfall data for year 2		
6.57	24	2.27
Rainfall data for year 100		
6.57	1	1.24
Rainfall data for year 100		
6.57	6	2.93
Rainfall data for year 100		
6.57	24	5.35

++

******** 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)
32.0	32.0	6.57	1.000	0.978	0.160	0.156

Area-averaged adjusted loss rate Fm (In/Hr) = 0.156

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
1.05	0.160	32.0	32.0	17.69	0.000
5.52	0.840	98.0	98.0	0.20	0.934

Area-averaged catchment yield fraction, Y = 0.785
Area-averaged low loss fraction, Yb = 0.215
User entry of time of concentration = 0.124 (hours)
++
Watershed area = 6.57(Ac.)
Catchment Lag time = 0.099 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 84.0054
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.156(In/Hr)
Average low loss rate fraction (Yb) = 0.215 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.291(In)
Computed peak 30-minute rainfall = 0.596(In)
Specified peak 1-hour rainfall = 0.787(In)
Computed peak 3-hour rainfall = 1.371(In)
Specified peak 6-hour rainfall = 1.947(In)
Specified peak 24-hour rainfall = 3.537(In)

Rainfall depth area reduction factors:
Using a total area of 6.57(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.291(In)
30-minute factor = 1.000 Adjusted rainfall = 0.596(In)
1-hour factor = 1.000 Adjusted rainfall = 0.787(In)
3-hour factor = 1.000 Adjusted rainfall = 1.371(In)
6-hour factor = 1.000 Adjusted rainfall = 1.947(In)
24-hour factor = 1.000 Adjusted rainfall = 3.537(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 = 79.46 (CFS))	
1	12.391	9.846
2	67.521	43.803
3	95.128	21.936
4	99.092	3.150
5	100.000	0.721

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.2912	0.2912
2	0.3842	0.0930
3	0.4519	0.0677
4	0.5070	0.0551
5	0.5543	0.0473
6	0.5963	0.0419
7	0.6342	0.0379
8	0.6690	0.0348
9	0.7012	0.0323
10	0.7314	0.0302
11	0.7598	0.0284
12	0.7868	0.0269
13	0.8193	0.0325
14	0.8506	0.0313
15	0.8808	0.0302
16	0.9100	0.0292

17	0.9383	0.0283
18	0.9658	0.0275
19	0.9926	0.0268
20	1.0187	0.0261
21	1.0442	0.0255
22	1.0690	0.0249
23	1.0933	0.0243
24	1.1171	0.0238
25	1.1404	0.0233
26	1.1633	0.0228
27	1.1857	0.0224
28	1.2077	0.0220
29	1.2293	0.0216
30	1.2506	0.0213
31	1.2715	0.0209
32	1.2921	0.0206
33	1.3124	0.0203
34	1.3323	0.0200
35	1.3520	0.0197
36	1.3714	0.0194
37	1.3906	0.0191
38	1.4094	0.0189
39	1.4281	0.0186
40	1.4465	0.0184
41	1.4646	0.0182
42	1.4826	0.0180
43	1.5003	0.0177
44	1.5179	0.0175
45	1.5352	0.0173
46	1.5524	0.0172
47	1.5693	0.0170
48	1.5861	0.0168
49	1.6028	0.0166
50	1.6192	0.0165
51	1.6355	0.0163
52	1.6516	0.0161
53	1.6676	0.0160
54	1.6835	0.0158
55	1.6991	0.0157
56	1.7147	0.0155
57	1.7301	0.0154
58	1.7454	0.0153
59	1.7605	0.0152
60	1.7756	0.0150
61	1.7905	0.0149
62	1.8052	0.0148
63	1.8199	0.0147
64	1.8345	0.0145
65	1.8489	0.0144
66	1.8632	0.0143
67	1.8774	0.0142
68	1.8916	0.0141
69	1.9056	0.0140
70	1.9195	0.0139
71	1.9333	0.0138
72	1.9470	0.0137
73	1.9586	0.0116
74	1.9701	0.0115
75	1.9815	0.0114
76	1.9929	0.0113
77	2.0041	0.0113
78	2.0153	0.0112
79	2.0264	0.0111
80	2.0374	0.0110
81	2.0483	0.0109
82	2.0592	0.0109
83	2.0699	0.0108
84	2.0807	0.0107
85	2.0913	0.0106

86	2.1018	0.0106
87	2.1123	0.0105
88	2.1228	0.0104
89	2.1331	0.0104
90	2.1434	0.0103
91	2.1536	0.0102
92	2.1638	0.0102
93	2.1739	0.0101
94	2.1839	0.0100
95	2.1939	0.0100
96	2.2038	0.0099
97	2.2137	0.0099
98	2.2235	0.0098
99	2.2332	0.0097
100	2.2429	0.0097
101	2.2525	0.0096
102	2.2621	0.0096
103	2.2716	0.0095
104	2.2811	0.0095
105	2.2905	0.0094
106	2.2999	0.0094
107	2.3092	0.0093
108	2.3185	0.0093
109	2.3277	0.0092
110	2.3369	0.0092
111	2.3460	0.0091
112	2.3551	0.0091
113	2.3641	0.0090
114	2.3731	0.0090
115	2.3820	0.0089
116	2.3909	0.0089
117	2.3998	0.0089
118	2.4086	0.0088
119	2.4174	0.0088
120	2.4261	0.0087
121	2.4348	0.0087
122	2.4434	0.0086
123	2.4520	0.0086
124	2.4606	0.0086
125	2.4691	0.0085
126	2.4776	0.0085
127	2.4861	0.0084
128	2.4945	0.0084
129	2.5029	0.0084
130	2.5112	0.0083
131	2.5195	0.0083
132	2.5278	0.0083
133	2.5360	0.0082
134	2.5442	0.0082
135	2.5523	0.0082
136	2.5605	0.0081
137	2.5686	0.0081
138	2.5766	0.0081
139	2.5846	0.0080
140	2.5926	0.0080
141	2.6006	0.0080
142	2.6085	0.0079
143	2.6164	0.0079
144	2.6243	0.0079
145	2.6321	0.0078
146	2.6399	0.0078
147	2.6477	0.0078
148	2.6554	0.0077
149	2.6631	0.0077
150	2.6708	0.0077
151	2.6785	0.0077
152	2.6861	0.0076
153	2.6937	0.0076
154	2.7013	0.0076

155	2.7088	0.0075
156	2.7163	0.0075
157	2.7238	0.0075
158	2.7313	0.0075
159	2.7387	0.0074
160	2.7461	0.0074
161	2.7535	0.0074
162	2.7608	0.0074
163	2.7681	0.0073
164	2.7754	0.0073
165	2.7827	0.0073
166	2.7900	0.0073
167	2.7972	0.0072
168	2.8044	0.0072
169	2.8116	0.0072
170	2.8187	0.0072
171	2.8259	0.0071
172	2.8330	0.0071
173	2.8400	0.0071
174	2.8471	0.0071
175	2.8541	0.0070
176	2.8611	0.0070
177	2.8681	0.0070
178	2.8751	0.0070
179	2.8820	0.0069
180	2.8890	0.0069
181	2.8959	0.0069
182	2.9028	0.0069
183	2.9096	0.0069
184	2.9164	0.0068
185	2.9233	0.0068
186	2.9301	0.0068
187	2.9368	0.0068
188	2.9436	0.0068
189	2.9503	0.0067
190	2.9570	0.0067
191	2.9637	0.0067
192	2.9704	0.0067
193	2.9770	0.0067
194	2.9837	0.0066
195	2.9903	0.0066
196	2.9969	0.0066
197	3.0035	0.0066
198	3.0100	0.0066
199	3.0166	0.0065
200	3.0231	0.0065
201	3.0296	0.0065
202	3.0361	0.0065
203	3.0425	0.0065
204	3.0490	0.0064
205	3.0554	0.0064
206	3.0618	0.0064
207	3.0682	0.0064
208	3.0746	0.0064
209	3.0809	0.0064
210	3.0873	0.0063
211	3.0936	0.0063
212	3.0999	0.0063
213	3.1062	0.0063
214	3.1125	0.0063
215	3.1187	0.0063
216	3.1249	0.0062
217	3.1312	0.0062
218	3.1374	0.0062
219	3.1436	0.0062
220	3.1497	0.0062
221	3.1559	0.0062
222	3.1620	0.0061
223	3.1682	0.0061

224	3.1743	0.0061	
225	3.1804	0.0061	
226	3.1865	0.0061	
227	3.1925	0.0061	
228	3.1986	0.0060	
229	3.2046	0.0060	
230	3.2106	0.0060	
231	3.2166	0.0060	
232	3.2226	0.0060	
233	3.2286	0.0060	
234	3.2345	0.0060	
235	3.2405	0.0059	
236	3.2464	0.0059	
237	3.2523	0.0059	
238	3.2582	0.0059	
239	3.2641	0.0059	
240	3.2700	0.0059	
241	3.2759	0.0059	
242	3.2817	0.0058	
243	3.2875	0.0058	
244	3.2934	0.0058	
245	3.2992	0.0058	
246	3.3050	0.0058	
247	3.3107	0.0058	
248	3.3165	0.0058	
249	3.3223	0.0058	
250	3.3280	0.0057	
251	3.3337	0.0057	
252	3.3394	0.0057	
253	3.3451	0.0057	
254	3.3508	0.0057	
255	3.3565	0.0057	
256	3.3622	0.0057	
257	3.3678	0.0056	
258	3.3735	0.0056	
259	3.3791	0.0056	
260	3.3847	0.0056	
261	3.3903	0.0056	
262	3.3959	0.0056	
263	3.4015	0.0056	
264	3.4070	0.0056	
265	3.4126	0.0056	
266	3.4181	0.0055	
267	3.4236	0.0055	
268	3.4292	0.0055	
269	3.4347	0.0055	
270	3.4402	0.0055	
271	3.4456	0.0055	
272	3.4511	0.0055	
273	3.4566	0.0055	
274	3.4620	0.0054	
275	3.4674	0.0054	
276	3.4729	0.0054	
277	3.4783	0.0054	
278	3.4837	0.0054	
279	3.4891	0.0054	
280	3.4945	0.0054	
281	3.4998	0.0054	
282	3.5052	0.0054	
283	3.5105	0.0053	
284	3.5159	0.0053	
285	3.5212	0.0053	
286	3.5265	0.0053	
287	3.5318	0.0053	
288	3.5371	0.0053	

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)

1	0.0053	0.0011	0.0042
2	0.0053	0.0011	0.0042
3	0.0053	0.0011	0.0042
4	0.0053	0.0011	0.0042
5	0.0054	0.0012	0.0042
6	0.0054	0.0012	0.0042
7	0.0054	0.0012	0.0042
8	0.0054	0.0012	0.0042
9	0.0054	0.0012	0.0043
10	0.0054	0.0012	0.0043
11	0.0055	0.0012	0.0043
12	0.0055	0.0012	0.0043
13	0.0055	0.0012	0.0043
14	0.0055	0.0012	0.0043
15	0.0055	0.0012	0.0043
16	0.0055	0.0012	0.0043
17	0.0056	0.0012	0.0044
18	0.0056	0.0012	0.0044
19	0.0056	0.0012	0.0044
20	0.0056	0.0012	0.0044
21	0.0056	0.0012	0.0044
22	0.0056	0.0012	0.0044
23	0.0057	0.0012	0.0045
24	0.0057	0.0012	0.0045
25	0.0057	0.0012	0.0045
26	0.0057	0.0012	0.0045
27	0.0058	0.0012	0.0045
28	0.0058	0.0012	0.0045
29	0.0058	0.0012	0.0045
30	0.0058	0.0013	0.0046
31	0.0058	0.0013	0.0046
32	0.0058	0.0013	0.0046
33	0.0059	0.0013	0.0046
34	0.0059	0.0013	0.0046
35	0.0059	0.0013	0.0046
36	0.0059	0.0013	0.0047
37	0.0060	0.0013	0.0047
38	0.0060	0.0013	0.0047
39	0.0060	0.0013	0.0047
40	0.0060	0.0013	0.0047
41	0.0060	0.0013	0.0047
42	0.0061	0.0013	0.0048
43	0.0061	0.0013	0.0048
44	0.0061	0.0013	0.0048
45	0.0061	0.0013	0.0048
46	0.0062	0.0013	0.0048
47	0.0062	0.0013	0.0049
48	0.0062	0.0013	0.0049
49	0.0062	0.0013	0.0049
50	0.0063	0.0013	0.0049
51	0.0063	0.0014	0.0049
52	0.0063	0.0014	0.0049
53	0.0063	0.0014	0.0050
54	0.0064	0.0014	0.0050
55	0.0064	0.0014	0.0050
56	0.0064	0.0014	0.0050
57	0.0064	0.0014	0.0051
58	0.0065	0.0014	0.0051
59	0.0065	0.0014	0.0051
60	0.0065	0.0014	0.0051
61	0.0066	0.0014	0.0051
62	0.0066	0.0014	0.0052
63	0.0066	0.0014	0.0052
64	0.0066	0.0014	0.0052
65	0.0067	0.0014	0.0052
66	0.0067	0.0014	0.0053
67	0.0067	0.0015	0.0053
68	0.0068	0.0015	0.0053

69	0.0068	0.0015	0.0053
70	0.0068	0.0015	0.0053
71	0.0069	0.0015	0.0054
72	0.0069	0.0015	0.0054
73	0.0069	0.0015	0.0054
74	0.0069	0.0015	0.0054
75	0.0070	0.0015	0.0055
76	0.0070	0.0015	0.0055
77	0.0071	0.0015	0.0055
78	0.0071	0.0015	0.0056
79	0.0071	0.0015	0.0056
80	0.0072	0.0015	0.0056
81	0.0072	0.0016	0.0056
82	0.0072	0.0016	0.0057
83	0.0073	0.0016	0.0057
84	0.0073	0.0016	0.0057
85	0.0074	0.0016	0.0058
86	0.0074	0.0016	0.0058
87	0.0074	0.0016	0.0058
88	0.0075	0.0016	0.0059
89	0.0075	0.0016	0.0059
90	0.0075	0.0016	0.0059
91	0.0076	0.0016	0.0060
92	0.0076	0.0016	0.0060
93	0.0077	0.0017	0.0060
94	0.0077	0.0017	0.0061
95	0.0078	0.0017	0.0061
96	0.0078	0.0017	0.0061
97	0.0079	0.0017	0.0062
98	0.0079	0.0017	0.0062
99	0.0080	0.0017	0.0062
100	0.0080	0.0017	0.0063
101	0.0081	0.0017	0.0063
102	0.0081	0.0017	0.0063
103	0.0082	0.0018	0.0064
104	0.0082	0.0018	0.0064
105	0.0083	0.0018	0.0065
106	0.0083	0.0018	0.0065
107	0.0084	0.0018	0.0066
108	0.0084	0.0018	0.0066
109	0.0085	0.0018	0.0067
110	0.0085	0.0018	0.0067
111	0.0086	0.0019	0.0068
112	0.0086	0.0019	0.0068
113	0.0087	0.0019	0.0068
114	0.0088	0.0019	0.0069
115	0.0089	0.0019	0.0069
116	0.0089	0.0019	0.0070
117	0.0090	0.0019	0.0071
118	0.0090	0.0019	0.0071
119	0.0091	0.0020	0.0072
120	0.0092	0.0020	0.0072
121	0.0093	0.0020	0.0073
122	0.0093	0.0020	0.0073
123	0.0094	0.0020	0.0074
124	0.0095	0.0020	0.0074
125	0.0096	0.0021	0.0075
126	0.0096	0.0021	0.0076
127	0.0097	0.0021	0.0076
128	0.0098	0.0021	0.0077
129	0.0099	0.0021	0.0078
130	0.0100	0.0021	0.0078
131	0.0101	0.0022	0.0079
132	0.0102	0.0022	0.0080
133	0.0103	0.0022	0.0081
134	0.0104	0.0022	0.0081
135	0.0105	0.0023	0.0082
136	0.0106	0.0023	0.0083
137	0.0107	0.0023	0.0084

138	0.0108	0.0023	0.0085
139	0.0109	0.0024	0.0086
140	0.0110	0.0024	0.0086
141	0.0112	0.0024	0.0088
142	0.0113	0.0024	0.0088
143	0.0114	0.0025	0.0090
144	0.0115	0.0025	0.0090
145	0.0137	0.0030	0.0108
146	0.0138	0.0030	0.0108
147	0.0140	0.0030	0.0110
148	0.0141	0.0030	0.0111
149	0.0143	0.0031	0.0112
150	0.0144	0.0031	0.0113
151	0.0147	0.0032	0.0115
152	0.0148	0.0032	0.0116
153	0.0150	0.0032	0.0118
154	0.0152	0.0033	0.0119
155	0.0154	0.0033	0.0121
156	0.0155	0.0034	0.0122
157	0.0158	0.0034	0.0124
158	0.0160	0.0034	0.0125
159	0.0163	0.0035	0.0128
160	0.0165	0.0035	0.0129
161	0.0168	0.0036	0.0132
162	0.0170	0.0037	0.0133
163	0.0173	0.0037	0.0136
164	0.0175	0.0038	0.0138
165	0.0180	0.0039	0.0141
166	0.0182	0.0039	0.0143
167	0.0186	0.0040	0.0146
168	0.0189	0.0041	0.0148
169	0.0194	0.0042	0.0152
170	0.0197	0.0042	0.0154
171	0.0203	0.0044	0.0159
172	0.0206	0.0044	0.0161
173	0.0213	0.0046	0.0167
174	0.0216	0.0047	0.0170
175	0.0224	0.0048	0.0176
176	0.0228	0.0049	0.0179
177	0.0238	0.0051	0.0187
178	0.0243	0.0052	0.0191
179	0.0255	0.0055	0.0200
180	0.0261	0.0056	0.0205
181	0.0275	0.0059	0.0216
182	0.0283	0.0061	0.0222
183	0.0302	0.0065	0.0237
184	0.0313	0.0067	0.0245
185	0.0269	0.0058	0.0211
186	0.0284	0.0061	0.0223
187	0.0323	0.0070	0.0253
188	0.0348	0.0075	0.0273
189	0.0419	0.0090	0.0329
190	0.0473	0.0102	0.0371
191	0.0677	0.0130	0.0546
192	0.0930	0.0130	0.0800
193	0.2912	0.0130	0.2781
194	0.0551	0.0119	0.0432
195	0.0379	0.0082	0.0298
196	0.0302	0.0065	0.0237
197	0.0325	0.0070	0.0255
198	0.0292	0.0063	0.0229
199	0.0268	0.0058	0.0210
200	0.0249	0.0054	0.0195
201	0.0233	0.0050	0.0183
202	0.0220	0.0047	0.0173
203	0.0209	0.0045	0.0164
204	0.0200	0.0043	0.0157
205	0.0191	0.0041	0.0150
206	0.0184	0.0040	0.0144

207	0.0177	0.0038	0.0139
208	0.0172	0.0037	0.0135
209	0.0166	0.0036	0.0130
210	0.0161	0.0035	0.0127
211	0.0157	0.0034	0.0123
212	0.0153	0.0033	0.0120
213	0.0149	0.0032	0.0117
214	0.0145	0.0031	0.0114
215	0.0142	0.0031	0.0112
216	0.0139	0.0030	0.0109
217	0.0116	0.0025	0.0091
218	0.0113	0.0024	0.0089
219	0.0111	0.0024	0.0087
220	0.0109	0.0023	0.0085
221	0.0106	0.0023	0.0083
222	0.0104	0.0022	0.0082
223	0.0102	0.0022	0.0080
224	0.0100	0.0022	0.0079
225	0.0099	0.0021	0.0077
226	0.0097	0.0021	0.0076
227	0.0095	0.0021	0.0075
228	0.0094	0.0020	0.0074
229	0.0092	0.0020	0.0072
230	0.0091	0.0020	0.0071
231	0.0089	0.0019	0.0070
232	0.0088	0.0019	0.0069
233	0.0087	0.0019	0.0068
234	0.0086	0.0018	0.0067
235	0.0084	0.0018	0.0066
236	0.0083	0.0018	0.0065
237	0.0082	0.0018	0.0065
238	0.0081	0.0018	0.0064
239	0.0080	0.0017	0.0063
240	0.0079	0.0017	0.0062
241	0.0078	0.0017	0.0061
242	0.0077	0.0017	0.0061
243	0.0077	0.0016	0.0060
244	0.0076	0.0016	0.0059
245	0.0075	0.0016	0.0059
246	0.0074	0.0016	0.0058
247	0.0073	0.0016	0.0057
248	0.0073	0.0016	0.0057
249	0.0072	0.0015	0.0056
250	0.0071	0.0015	0.0056
251	0.0070	0.0015	0.0055
252	0.0070	0.0015	0.0055
253	0.0069	0.0015	0.0054
254	0.0068	0.0015	0.0054
255	0.0068	0.0015	0.0053
256	0.0067	0.0014	0.0053
257	0.0067	0.0014	0.0052
258	0.0066	0.0014	0.0052
259	0.0065	0.0014	0.0051
260	0.0065	0.0014	0.0051
261	0.0064	0.0014	0.0050
262	0.0064	0.0014	0.0050
263	0.0063	0.0014	0.0050
264	0.0063	0.0014	0.0049
265	0.0062	0.0013	0.0049
266	0.0062	0.0013	0.0048
267	0.0061	0.0013	0.0048
268	0.0061	0.0013	0.0048
269	0.0060	0.0013	0.0047
270	0.0060	0.0013	0.0047
271	0.0059	0.0013	0.0047
272	0.0059	0.0013	0.0046
273	0.0059	0.0013	0.0046
274	0.0058	0.0013	0.0046
275	0.0058	0.0012	0.0045

276	0.0057	0.0012	0.0045
277	0.0057	0.0012	0.0045
278	0.0057	0.0012	0.0044
279	0.0056	0.0012	0.0044
280	0.0056	0.0012	0.0044
281	0.0056	0.0012	0.0044
282	0.0055	0.0012	0.0043
283	0.0055	0.0012	0.0043
284	0.0054	0.0012	0.0043
285	0.0054	0.0012	0.0042
286	0.0054	0.0012	0.0042
287	0.0053	0.0012	0.0042
288	0.0053	0.0011	0.0042

Total soil rain loss = 0.70(In)
Total effective rainfall = 2.83(In)
Peak flow rate in flood hydrograph = 14.56(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	0.0003	0.04	Q	|	|	|	|
0+10	0.0018	0.22	Q	|	|	|	|
0+15	0.0040	0.31	Q	|	|	|	|
0+20	0.0062	0.33	Q	|	|	|	|
0+25	0.0085	0.33	Q	|	|	|	|
0+30	0.0108	0.33	Q	|	|	|	|
0+35	0.0131	0.33	Q	|	|	|	|
0+40	0.0155	0.34	Q	|	|	|	|
0+45	0.0178	0.34	Q	|	|	|	|
0+50	0.0201	0.34	Q	|	|	|	|
0+55	0.0224	0.34	Q	|	|	|	|
1+ 0	0.0248	0.34	Q	|	|	|	|
1+ 5	0.0271	0.34	Q	|	|	|	|
1+10	0.0295	0.34	Q	|	|	|	|
1+15	0.0318	0.34	Q	|	|	|	|
1+20	0.0342	0.34	Q	|	|	|	|
1+25	0.0366	0.35	Q	|	|	|	|
1+30	0.0390	0.35	QV	|	|	|	|
1+35	0.0414	0.35	QV	|	|	|	|
1+40	0.0438	0.35	QV	|	|	|	|
1+45	0.0462	0.35	QV	|	|	|	|
1+50	0.0486	0.35	QV	|	|	|	|
1+55	0.0510	0.35	QV	|	|	|	|
2+ 0	0.0534	0.35	QV	|	|	|	|
2+ 5	0.0559	0.35	QV	|	|	|	|
2+10	0.0583	0.36	QV	|	|	|	|
2+15	0.0608	0.36	QV	|	|	|	|
2+20	0.0633	0.36	QV	|	|	|	|
2+25	0.0657	0.36	QV	|	|	|	|
2+30	0.0682	0.36	QV	|	|	|	|
2+35	0.0707	0.36	QV	|	|	|	|
2+40	0.0732	0.36	QV	|	|	|	|
2+45	0.0757	0.36	QV	|	|	|	|
2+50	0.0782	0.37	Q V	|	|	|	|
2+55	0.0808	0.37	Q V	|	|	|	|
3+ 0	0.0833	0.37	Q V	|	|	|	|
3+ 5	0.0858	0.37	Q V	|	|	|	|
3+10	0.0884	0.37	Q V	|	|	|	|
3+15	0.0910	0.37	Q V	|	|	|	|
3+20	0.0935	0.37	Q V	|	|	|	|
3+25	0.0961	0.38	Q V	|	|	|	|

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3+30      0.0987     0.38  Q V      |        |        |        |
3+35      0.1013     0.38  Q V      |        |        |        |
3+40      0.1039     0.38  Q V      |        |        |        |
3+45      0.1065     0.38  Q V      |        |        |        |
3+50      0.1092     0.38  Q V      |        |        |        |
3+55      0.1118     0.38  Q V      |        |        |        |
4+ 0      0.1145     0.39  Q V      |        |        |        |
4+ 5      0.1171     0.39  Q  V     |        |        |        |
4+10      0.1198     0.39  Q  V     |        |        |        |
4+15      0.1225     0.39  Q  V     |        |        |        |
4+20      0.1252     0.39  Q  V     |        |        |        |
4+25      0.1279     0.39  Q  V     |        |        |        |
4+30      0.1306     0.39  Q  V     |        |        |        |
4+35      0.1333     0.40  Q  V     |        |        |        |
4+40      0.1361     0.40  Q  V     |        |        |        |
4+45      0.1388     0.40  Q  V     |        |        |        |
4+50      0.1416     0.40  Q  V     |        |        |        |
4+55      0.1444     0.40  Q  V     |        |        |        |
5+ 0      0.1472     0.40  Q  V     |        |        |        |
5+ 5      0.1500     0.41  Q  V     |        |        |        |
5+10      0.1528     0.41  Q  V     |        |        |        |
5+15      0.1556     0.41  Q   V    |        |        |        |
5+20      0.1584     0.41  Q   V    |        |        |        |
5+25      0.1613     0.41  Q   V    |        |        |        |
5+30      0.1641     0.42  Q   V    |        |        |        |
5+35      0.1670     0.42  Q   V    |        |        |        |
5+40      0.1699     0.42  Q   V    |        |        |        |
5+45      0.1728     0.42  Q   V    |        |        |        |
5+50      0.1757     0.42  Q   V    |        |        |        |
5+55      0.1786     0.42  Q   V    |        |        |        |
6+ 0      0.1816     0.43  Q   V    |        |        |        |
6+ 5      0.1845     0.43  Q   V    |        |        |        |
6+10      0.1875     0.43  Q   V    |        |        |        |
6+15      0.1904     0.43  Q   V    |        |        |        |
6+20      0.1934     0.43  Q   V    |        |        |        |
6+25      0.1965     0.44  Q    V   |        |        |        |
6+30      0.1995     0.44  Q    V   |        |        |        |
6+35      0.2025     0.44  Q    V   |        |        |        |
6+40      0.2056     0.44  Q    V   |        |        |        |
6+45      0.2086     0.45  Q    V   |        |        |        |
6+50      0.2117     0.45  Q    V   |        |        |        |
6+55      0.2148     0.45  Q    V   |        |        |        |
7+ 0      0.2179     0.45  Q    V   |        |        |        |
7+ 5      0.2211     0.45  Q    V   |        |        |        |
7+10      0.2242     0.46  Q    V   |        |        |        |
7+15      0.2274     0.46  Q    V   |        |        |        |
7+20      0.2306     0.46  Q    V   |        |        |        |
7+25      0.2338     0.46  Q     V  |        |        |        |
7+30      0.2370     0.47  Q     V  |        |        |        |
7+35      0.2402     0.47  Q     V  |        |        |        |
7+40      0.2435     0.47  Q     V  |        |        |        |
7+45      0.2468     0.47  Q     V  |        |        |        |
7+50      0.2500     0.48  Q     V  |        |        |        |
7+55      0.2533     0.48  Q     V  |        |        |        |
8+ 0      0.2567     0.48  Q     V  |        |        |        |
8+ 5      0.2600     0.49  Q     V  |        |        |        |
8+10      0.2634     0.49  Q     V  |        |        |        |
8+15      0.2668     0.49  Q     V  |        |        |        |
8+20      0.2702     0.49  Q     V  |        |        |        |
8+25      0.2736     0.50  Q      V |        |        |        |
8+30      0.2771     0.50  |Q     V |        |        |        |
8+35      0.2805     0.50  |Q     V |        |        |        |
8+40      0.2840     0.51  |Q     V |        |        |        |
8+45      0.2875     0.51  |Q     V |        |        |        |
8+50      0.2911     0.51  |Q     V |        |        |        |
8+55      0.2946     0.52  |Q     V |        |        |        |
9+ 0      0.2982     0.52  |Q     V |        |        |        |
9+ 5      0.3018     0.52  |Q     V |        |        |        |
9+10      0.3055     0.53  |Q     V |        |        |        |
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 9+15      0.3091     0.53  |Q    V  |        |        |        |
 9+20      0.3128     0.53  |Q     V |        |        |        |
 9+25      0.3165     0.54  |Q     V |        |        |        |
 9+30      0.3203     0.54  |Q     V |        |        |        |
 9+35      0.3240     0.55  |Q     V |        |        |        |
 9+40      0.3278     0.55  |Q     V |        |        |        |
 9+45      0.3316     0.55  |Q     V |        |        |        |
 9+50      0.3355     0.56  |Q     V |        |        |        |
 9+55      0.3394     0.56  |Q     V |        |        |        |
10+ 0      0.3433     0.57  |Q     V |        |        |        |
10+ 5      0.3472     0.57  |Q     V |        |        |        |
10+10      0.3512     0.58  |Q      V|        |        |        |
10+15      0.3552     0.58  |Q      V|        |        |        |
10+20      0.3592     0.59  |Q      V|        |        |        |
10+25      0.3633     0.59  |Q      V|        |        |        |
10+30      0.3673     0.60  |Q      V|        |        |        |
10+35      0.3715     0.60  |Q      V|        |        |        |
10+40      0.3756     0.61  |Q      V|        |        |        |
10+45      0.3799     0.61  |Q      V|        |        |        |
10+50      0.3841     0.62  |Q      V|        |        |        |
10+55      0.3884     0.62  |Q       V        |        |        |
11+ 0      0.3927     0.63  |Q       V        |        |        |
11+ 5      0.3970     0.63  |Q       V        |        |        |
11+10      0.4014     0.64  |Q       V        |        |        |
11+15      0.4059     0.64  |Q       V        |        |        |
11+20      0.4104     0.65  |Q       V        |        |        |
11+25      0.4149     0.66  |Q       V        |        |        |
11+30      0.4195     0.66  |Q       V        |        |        |
11+35      0.4241     0.67  |Q       V        |        |        |
11+40      0.4288     0.68  |Q       |V        |        |        |
11+45      0.4335     0.69  |Q       |V        |        |        |
11+50      0.4383     0.69  |Q       |V        |        |        |
11+55      0.4431     0.70  |Q       |V        |        |        |
12+ 0      0.4480     0.71  |Q       |V        |        |        |
12+ 5      0.4530     0.73  |Q       |V        |        |        |
12+10      0.4586     0.81  |Q       |V        |        |        |
12+15      0.4645     0.85  |Q       |V        |        |        |
12+20      0.4705     0.87  |Q       | V       |        |        |
12+25      0.4765     0.88  |Q       | V       |        |        |
12+30      0.4826     0.89  |Q       | V       |        |        |
12+35      0.4888     0.90  |Q       | V       |        |        |
12+40      0.4951     0.91  |Q       | V       |        |        |
12+45      0.5014     0.92  |Q       | V       |        |        |
12+50      0.5079     0.93  |Q       |  V      |        |        |
12+55      0.5143     0.94  |Q       |  V      |        |        |
13+ 0      0.5209     0.96  |Q       |  V      |        |        |
13+ 5      0.5276     0.97  |Q       |  V      |        |        |
13+10      0.5344     0.98  |Q       |  V      |        |        |
13+15      0.5412     0.99  |Q       |  V      |        |        |
13+20      0.5482     1.01  | Q      |   V     |        |        |
13+25      0.5552     1.02  | Q      |   V     |        |        |
13+30      0.5624     1.04  | Q      |   V     |        |        |
13+35      0.5697     1.06  | Q      |   V     |        |        |
13+40      0.5771     1.07  | Q      |   V     |        |        |
13+45      0.5846     1.09  | Q      |    V    |        |        |
13+50      0.5922     1.11  | Q      |    V    |        |        |
13+55      0.6000     1.13  | Q      |    V    |        |        |
14+ 0      0.6080     1.15  | Q      |    V    |        |        |
14+ 5      0.6160     1.17  | Q      |    V    |        |        |
14+10      0.6243     1.20  | Q      |     V   |        |        |
14+15      0.6327     1.22  | Q      |     V   |        |        |
14+20      0.6414     1.25  | Q      |     V   |        |        |
14+25      0.6502     1.28  | Q      |     V   |        |        |
14+30      0.6592     1.31  | Q      |      V  |        |        |
14+35      0.6685     1.34  | Q      |      V  |        |        |
14+40      0.6780     1.38  | Q      |      V  |        |        |
14+45      0.6878     1.42  | Q      |      V  |        |        |
14+50      0.6979     1.47  | Q      |       V |        |        |
14+55      0.7083     1.51  |  Q     |       V |        |        |
```

15+ 0	0.7191	1.57	Q		V		
15+ 5	0.7302	1.62	Q		V		
15+10	0.7419	1.69	Q		V		
15+15	0.7540	1.76	Q		V		
15+20	0.7667	1.85	Q		V		
15+25	0.7798	1.89	Q		V		
15+30	0.7920	1.77	Q		V		
15+35	0.8042	1.78	Q		V		
15+40	0.8177	1.95	Q		V		
15+45	0.8326	2.16	Q		V		
15+50	0.8498	2.50	Q		V		
15+55	0.8704	2.99	Q		V		
16+ 0	0.8987	4.12	Q		V		
16+ 5	0.9510	7.58	Q	Q	V		
16+10	1.0513	14.56			V Q		
16+15	1.1103	8.58		Q	V		
16+20	1.1339	3.42	Q		V		
16+25	1.1496	2.28	Q		V		
16+30	1.1633	1.99	Q		V		
16+35	1.1761	1.87	Q		V		
16+40	1.1879	1.71	Q		V		
16+45	1.1988	1.59	Q		V		
16+50	1.2090	1.48	Q		V		
16+55	1.2186	1.40	Q		V		
17+ 0	1.2278	1.32	Q		V		
17+ 5	1.2364	1.26	Q		V		
17+10	1.2448	1.21	Q		V		
17+15	1.2527	1.16	Q		V		
17+20	1.2604	1.12	Q		V		
17+25	1.2679	1.08	Q		V		
17+30	1.2751	1.05	Q		V		
17+35	1.2821	1.01	Q		V		
17+40	1.2888	0.99	Q		V		
17+45	1.2955	0.96	Q		V		
17+50	1.3019	0.94	Q		V		
17+55	1.3082	0.91	Q		V		
18+ 0	1.3143	0.89	Q		V		
18+ 5	1.3202	0.86	Q		V		
18+10	1.3255	0.77	Q		V		
18+15	1.3305	0.72	Q		V		
18+20	1.3353	0.70	Q		V		
18+25	1.3399	0.68	Q		V		
18+30	1.3445	0.67	Q		V		
18+35	1.3490	0.65	Q		V		
18+40	1.3534	0.64	Q		V		
18+45	1.3578	0.63	Q		V		
18+50	1.3620	0.62	Q		V		
18+55	1.3662	0.61	Q		V		
19+ 0	1.3703	0.60	Q		V		
19+ 5	1.3744	0.59	Q		V		
19+10	1.3783	0.58	Q		V		
19+15	1.3822	0.57	Q		V		
19+20	1.3861	0.56	Q		V		
19+25	1.3899	0.55	Q		V		
19+30	1.3936	0.54	Q		V		
19+35	1.3973	0.54	Q		V		
19+40	1.4010	0.53	Q		V		
19+45	1.4046	0.52	Q		V		
19+50	1.4081	0.51	Q		V		
19+55	1.4116	0.51	Q		V		
20+ 0	1.4151	0.50	Q		V		
20+ 5	1.4185	0.50	Q		V		
20+10	1.4219	0.49	Q		V		
20+15	1.4252	0.48	Q		V		
20+20	1.4285	0.48	Q		V		
20+25	1.4317	0.47	Q		V		
20+30	1.4350	0.47	Q		V		
20+35	1.4382	0.46	Q		V		
20+40	1.4413	0.46	Q		V		

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   20+45       1.4444      0.45  Q        |         |         |      V  |
   20+50       1.4475      0.45  Q        |         |         |      V  |
   20+55       1.4506      0.44  Q        |         |         |      V  |
   21+ 0       1.4536      0.44  Q        |         |         |      V  |
   21+ 5       1.4566      0.44  Q        |         |         |      V  |
   21+10       1.4596      0.43  Q        |         |         |      V  |
   21+15       1.4625      0.43  Q        |         |         |      V  |
   21+20       1.4654      0.42  Q        |         |         |      V  |
   21+25       1.4683      0.42  Q        |         |         |      V  |
   21+30       1.4712      0.42  Q        |         |         |      V  |
   21+35       1.4740      0.41  Q        |         |         |       V |
   21+40       1.4768      0.41  Q        |         |         |       V |
   21+45       1.4796      0.40  Q        |         |         |       V |
   21+50       1.4824      0.40  Q        |         |         |       V |
   21+55       1.4851      0.40  Q        |         |         |       V |
   22+ 0       1.4878      0.39  Q        |         |         |       V |
   22+ 5       1.4905      0.39  Q        |         |         |       V |
   22+10       1.4932      0.39  Q        |         |         |       V |
   22+15       1.4959      0.39  Q        |         |         |       V |
   22+20       1.4985      0.38  Q        |         |         |       V |
   22+25       1.5011      0.38  Q        |         |         |       V |
   22+30       1.5037      0.38  Q        |         |         |       V |
   22+35       1.5063      0.37  Q        |         |         |       V |
   22+40       1.5089      0.37  Q        |         |         |       V |
   22+45       1.5114      0.37  Q        |         |         |       V |
   22+50       1.5139      0.37  Q        |         |         |        V|
   22+55       1.5164      0.36  Q        |         |         |        V|
   23+ 0       1.5189      0.36  Q        |         |         |        V|
   23+ 5       1.5214      0.36  Q        |         |         |        V|
   23+10       1.5238      0.36  Q        |         |         |        V|
   23+15       1.5263      0.35  Q        |         |         |        V|
   23+20       1.5287      0.35  Q        |         |         |        V|
   23+25       1.5311      0.35  Q        |         |         |        V|
   23+30       1.5335      0.35  Q        |         |         |        V|
   23+35       1.5358      0.34  Q        |         |         |        V|
   23+40       1.5382      0.34  Q        |         |         |        V|
   23+45       1.5405      0.34  Q        |         |         |        V|
   23+50       1.5429      0.34  Q        |         |         |        V|
   23+55       1.5452      0.34  Q        |         |         |        V|
   24+ 0       1.5475      0.33  Q        |         |         |        V|
-------------------------------------------------------------------------
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Appendix I.VI

Synthetic Unit Hydrograph Method Analysis
Post-Development Conditions
100-Year Storm

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

Study date 03/30/23

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

Program License Serial Number 6443

JURUPA AND WILLOW
UNIT HYDROGRAPH
100-YEAR STORM
POST DEVELOPMENT - DA A

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 10		
6.57	1	0.79
Rainfall data for year 2		
6.57	6	1.26
Rainfall data for year 2		
6.57	24	2.27
Rainfall data for year 100		
6.57	1	1.24
Rainfall data for year 100		
6.57	6	2.93
Rainfall data for year 100		
6.57	24	5.35

++

******** 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)
32.0	52.0	6.57	1.000	0.785	0.160	0.126

Area-averaged adjusted loss rate Fm (In/Hr) = 0.126

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
1.05	0.160	32.0	52.0	9.23	0.180
5.52	0.840	98.0	98.0	0.20	0.956

Area-averaged catchment yield fraction, Y = 0.832
Area-averaged low loss fraction, Yb = 0.168
User entry of time of concentration = 0.120 (hours)
++
Watershed area = 6.57(Ac.)
Catchment Lag time = 0.096 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 86.8056
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.126(In/Hr)
Average low loss rate fraction (Yb) = 0.168 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.459(In)
Computed peak 30-minute rainfall = 0.940(In)
Specified peak 1-hour rainfall = 1.240(In)
Computed peak 3-hour rainfall = 2.101(In)
Specified peak 6-hour rainfall = 2.930(In)
Specified peak 24-hour rainfall = 5.350(In)

Rainfall depth area reduction factors:
Using a total area of 6.57(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.459(In)
30-minute factor = 1.000 Adjusted rainfall = 0.939(In)
1-hour factor = 1.000 Adjusted rainfall = 1.240(In)
3-hour factor = 1.000 Adjusted rainfall = 2.101(In)
6-hour factor = 1.000 Adjusted rainfall = 2.930(In)
24-hour factor = 1.000 Adjusted rainfall = 5.350(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 = 79.46 (CFS))	
1	13.176	10.469
2	69.924	45.089
3	95.818	20.574
4	99.265	2.739
5	100.000	0.584

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.4588	0.4588
2	0.6054	0.1466
3	0.7120	0.1066
4	0.7988	0.0868
5	0.8734	0.0746
6	0.9395	0.0661
7	0.9992	0.0598
8	1.0540	0.0548
9	1.1049	0.0508
10	1.1524	0.0476
11	1.1972	0.0448
12	1.2396	0.0424
13	1.2882	0.0486
14	1.3349	0.0467
15	1.3798	0.0450
16	1.4232	0.0434

17	1.4653	0.0420
18	1.5061	0.0408
19	1.5457	0.0396
20	1.5842	0.0385
21	1.6218	0.0376
22	1.6584	0.0366
23	1.6942	0.0358
24	1.7291	0.0350
25	1.7634	0.0342
26	1.7969	0.0335
27	1.8297	0.0329
28	1.8620	0.0322
29	1.8936	0.0316
30	1.9247	0.0311
31	1.9552	0.0305
32	1.9853	0.0300
33	2.0148	0.0296
34	2.0439	0.0291
35	2.0726	0.0286
36	2.1008	0.0282
37	2.1286	0.0278
38	2.1560	0.0274
39	2.1831	0.0270
40	2.2097	0.0267
41	2.2361	0.0263
42	2.2621	0.0260
43	2.2878	0.0257
44	2.3132	0.0254
45	2.3383	0.0251
46	2.3631	0.0248
47	2.3876	0.0245
48	2.4118	0.0242
49	2.4358	0.0240
50	2.4595	0.0237
51	2.4830	0.0235
52	2.5063	0.0232
53	2.5293	0.0230
54	2.5521	0.0228
55	2.5747	0.0226
56	2.5970	0.0224
57	2.6192	0.0222
58	2.6411	0.0220
59	2.6629	0.0218
60	2.6845	0.0216
61	2.7058	0.0214
62	2.7270	0.0212
63	2.7481	0.0210
64	2.7689	0.0208
65	2.7896	0.0207
66	2.8101	0.0205
67	2.8305	0.0204
68	2.8507	0.0202
69	2.8707	0.0200
70	2.8906	0.0199
71	2.9103	0.0197
72	2.9299	0.0196
73	2.9475	0.0176
74	2.9650	0.0175
75	2.9824	0.0173
76	2.9996	0.0172
77	3.0166	0.0171
78	3.0336	0.0170
79	3.0504	0.0168
80	3.0671	0.0167
81	3.0837	0.0166
82	3.1002	0.0165
83	3.1166	0.0164
84	3.1328	0.0163
85	3.1490	0.0161

86	3.1650	0.0160
87	3.1809	0.0159
88	3.1968	0.0158
89	3.2125	0.0157
90	3.2281	0.0156
91	3.2436	0.0155
92	3.2591	0.0154
93	3.2744	0.0153
94	3.2897	0.0152
95	3.3048	0.0152
96	3.3199	0.0151
97	3.3349	0.0150
98	3.3498	0.0149
99	3.3646	0.0148
100	3.3793	0.0147
101	3.3939	0.0146
102	3.4085	0.0146
103	3.4229	0.0145
104	3.4373	0.0144
105	3.4516	0.0143
106	3.4659	0.0142
107	3.4800	0.0142
108	3.4941	0.0141
109	3.5082	0.0140
110	3.5221	0.0139
111	3.5360	0.0139
112	3.5498	0.0138
113	3.5635	0.0137
114	3.5772	0.0137
115	3.5908	0.0136
116	3.6043	0.0135
117	3.6177	0.0135
118	3.6311	0.0134
119	3.6445	0.0133
120	3.6577	0.0133
121	3.6710	0.0132
122	3.6841	0.0131
123	3.6972	0.0131
124	3.7102	0.0130
125	3.7232	0.0130
126	3.7361	0.0129
127	3.7489	0.0128
128	3.7617	0.0128
129	3.7745	0.0127
130	3.7871	0.0127
131	3.7998	0.0126
132	3.8123	0.0126
133	3.8249	0.0125
134	3.8373	0.0125
135	3.8497	0.0124
136	3.8621	0.0124
137	3.8744	0.0123
138	3.8867	0.0123
139	3.8989	0.0122
140	3.9110	0.0122
141	3.9231	0.0121
142	3.9352	0.0121
143	3.9472	0.0120
144	3.9592	0.0120
145	3.9711	0.0119
146	3.9830	0.0119
147	3.9948	0.0118
148	4.0066	0.0118
149	4.0183	0.0117
150	4.0300	0.0117
151	4.0416	0.0116
152	4.0532	0.0116
153	4.0648	0.0116
154	4.0763	0.0115

155	4.0878	0.0115
156	4.0992	0.0114
157	4.1106	0.0114
158	4.1220	0.0114
159	4.1333	0.0113
160	4.1446	0.0113
161	4.1558	0.0112
162	4.1670	0.0112
163	4.1781	0.0112
164	4.1892	0.0111
165	4.2003	0.0111
166	4.2114	0.0110
167	4.2224	0.0110
168	4.2333	0.0110
169	4.2442	0.0109
170	4.2551	0.0109
171	4.2660	0.0109
172	4.2768	0.0108
173	4.2876	0.0108
174	4.2983	0.0107
175	4.3090	0.0107
176	4.3197	0.0107
177	4.3304	0.0106
178	4.3410	0.0106
179	4.3516	0.0106
180	4.3621	0.0105
181	4.3726	0.0105
182	4.3831	0.0105
183	4.3935	0.0104
184	4.4039	0.0104
185	4.4143	0.0104
186	4.4247	0.0103
187	4.4350	0.0103
188	4.4453	0.0103
189	4.4555	0.0103
190	4.4657	0.0102
191	4.4759	0.0102
192	4.4861	0.0102
193	4.4962	0.0101
194	4.5063	0.0101
195	4.5164	0.0101
196	4.5265	0.0100
197	4.5365	0.0100
198	4.5465	0.0100
199	4.5564	0.0100
200	4.5663	0.0099
201	4.5762	0.0099
202	4.5861	0.0099
203	4.5960	0.0098
204	4.6058	0.0098
205	4.6156	0.0098
206	4.6253	0.0098
207	4.6351	0.0097
208	4.6448	0.0097
209	4.6545	0.0097
210	4.6641	0.0097
211	4.6738	0.0096
212	4.6834	0.0096
213	4.6930	0.0096
214	4.7025	0.0096
215	4.7121	0.0095
216	4.7216	0.0095
217	4.7310	0.0095
218	4.7405	0.0095
219	4.7499	0.0094
220	4.7593	0.0094
221	4.7687	0.0094
222	4.7781	0.0094
223	4.7874	0.0093

224	4.7967	0.0093	
225	4.8060	0.0093	
226	4.8153	0.0093	
227	4.8245	0.0092	
228	4.8338	0.0092	
229	4.8429	0.0092	
230	4.8521	0.0092	
231	4.8613	0.0092	
232	4.8704	0.0091	
233	4.8795	0.0091	
234	4.8886	0.0091	
235	4.8977	0.0091	
236	4.9067	0.0090	
237	4.9157	0.0090	
238	4.9247	0.0090	
239	4.9337	0.0090	
240	4.9426	0.0090	
241	4.9516	0.0089	
242	4.9605	0.0089	
243	4.9694	0.0089	
244	4.9783	0.0089	
245	4.9871	0.0089	
246	4.9959	0.0088	
247	5.0048	0.0088	
248	5.0135	0.0088	
249	5.0223	0.0088	
250	5.0311	0.0088	
251	5.0398	0.0087	
252	5.0485	0.0087	
253	5.0572	0.0087	
254	5.0659	0.0087	
255	5.0745	0.0087	
256	5.0832	0.0086	
257	5.0918	0.0086	
258	5.1004	0.0086	
259	5.1089	0.0086	
260	5.1175	0.0086	
261	5.1260	0.0085	
262	5.1346	0.0085	
263	5.1431	0.0085	
264	5.1515	0.0085	
265	5.1600	0.0085	
266	5.1685	0.0084	
267	5.1769	0.0084	
268	5.1853	0.0084	
269	5.1937	0.0084	
270	5.2021	0.0084	
271	5.2104	0.0084	
272	5.2188	0.0083	
273	5.2271	0.0083	
274	5.2354	0.0083	
275	5.2437	0.0083	
276	5.2520	0.0083	
277	5.2602	0.0083	
278	5.2685	0.0082	
279	5.2767	0.0082	
280	5.2849	0.0082	
281	5.2931	0.0082	
282	5.3013	0.0082	
283	5.3094	0.0082	
284	5.3176	0.0081	
285	5.3257	0.0081	
286	5.3338	0.0081	
287	5.3419	0.0081	
288	5.3500	0.0081	

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)

1	0.0081	0.0014	0.0067
2	0.0081	0.0014	0.0067
3	0.0081	0.0014	0.0068
4	0.0081	0.0014	0.0068
5	0.0082	0.0014	0.0068
6	0.0082	0.0014	0.0068
7	0.0082	0.0014	0.0068
8	0.0082	0.0014	0.0069
9	0.0083	0.0014	0.0069
10	0.0083	0.0014	0.0069
11	0.0083	0.0014	0.0069
12	0.0083	0.0014	0.0069
13	0.0084	0.0014	0.0070
14	0.0084	0.0014	0.0070
15	0.0084	0.0014	0.0070
16	0.0084	0.0014	0.0070
17	0.0085	0.0014	0.0071
18	0.0085	0.0014	0.0071
19	0.0085	0.0014	0.0071
20	0.0086	0.0014	0.0071
21	0.0086	0.0014	0.0071
22	0.0086	0.0015	0.0072
23	0.0087	0.0015	0.0072
24	0.0087	0.0015	0.0072
25	0.0087	0.0015	0.0072
26	0.0087	0.0015	0.0073
27	0.0088	0.0015	0.0073
28	0.0088	0.0015	0.0073
29	0.0088	0.0015	0.0073
30	0.0089	0.0015	0.0074
31	0.0089	0.0015	0.0074
32	0.0089	0.0015	0.0074
33	0.0090	0.0015	0.0074
34	0.0090	0.0015	0.0075
35	0.0090	0.0015	0.0075
36	0.0090	0.0015	0.0075
37	0.0091	0.0015	0.0076
38	0.0091	0.0015	0.0076
39	0.0092	0.0015	0.0076
40	0.0092	0.0015	0.0076
41	0.0092	0.0016	0.0077
42	0.0092	0.0016	0.0077
43	0.0093	0.0016	0.0077
44	0.0093	0.0016	0.0077
45	0.0094	0.0016	0.0078
46	0.0094	0.0016	0.0078
47	0.0094	0.0016	0.0078
48	0.0095	0.0016	0.0079
49	0.0095	0.0016	0.0079
50	0.0095	0.0016	0.0079
51	0.0096	0.0016	0.0080
52	0.0096	0.0016	0.0080
53	0.0097	0.0016	0.0080
54	0.0097	0.0016	0.0081
55	0.0097	0.0016	0.0081
56	0.0098	0.0016	0.0081
57	0.0098	0.0017	0.0082
58	0.0098	0.0017	0.0082
59	0.0099	0.0017	0.0082
60	0.0099	0.0017	0.0083
61	0.0100	0.0017	0.0083
62	0.0100	0.0017	0.0083
63	0.0101	0.0017	0.0084
64	0.0101	0.0017	0.0084
65	0.0102	0.0017	0.0085
66	0.0102	0.0017	0.0085
67	0.0103	0.0017	0.0085
68	0.0103	0.0017	0.0086

69	0.0103	0.0017	0.0086
70	0.0104	0.0017	0.0086
71	0.0104	0.0018	0.0087
72	0.0105	0.0018	0.0087
73	0.0105	0.0018	0.0088
74	0.0106	0.0018	0.0088
75	0.0106	0.0018	0.0089
76	0.0107	0.0018	0.0089
77	0.0107	0.0018	0.0089
78	0.0108	0.0018	0.0090
79	0.0109	0.0018	0.0090
80	0.0109	0.0018	0.0091
81	0.0110	0.0018	0.0091
82	0.0110	0.0019	0.0091
83	0.0111	0.0019	0.0092
84	0.0111	0.0019	0.0092
85	0.0112	0.0019	0.0093
86	0.0112	0.0019	0.0093
87	0.0113	0.0019	0.0094
88	0.0114	0.0019	0.0094
89	0.0114	0.0019	0.0095
90	0.0115	0.0019	0.0095
91	0.0116	0.0019	0.0096
92	0.0116	0.0020	0.0096
93	0.0117	0.0020	0.0097
94	0.0117	0.0020	0.0098
95	0.0118	0.0020	0.0098
96	0.0119	0.0020	0.0099
97	0.0120	0.0020	0.0099
98	0.0120	0.0020	0.0100
99	0.0121	0.0020	0.0101
100	0.0122	0.0020	0.0101
101	0.0123	0.0021	0.0102
102	0.0123	0.0021	0.0102
103	0.0124	0.0021	0.0103
104	0.0125	0.0021	0.0104
105	0.0126	0.0021	0.0105
106	0.0126	0.0021	0.0105
107	0.0127	0.0021	0.0106
108	0.0128	0.0022	0.0106
109	0.0129	0.0022	0.0107
110	0.0130	0.0022	0.0108
111	0.0131	0.0022	0.0109
112	0.0131	0.0022	0.0109
113	0.0133	0.0022	0.0110
114	0.0133	0.0022	0.0111
115	0.0135	0.0023	0.0112
116	0.0135	0.0023	0.0112
117	0.0137	0.0023	0.0114
118	0.0137	0.0023	0.0114
119	0.0139	0.0023	0.0115
120	0.0139	0.0023	0.0116
121	0.0141	0.0024	0.0117
122	0.0142	0.0024	0.0118
123	0.0143	0.0024	0.0119
124	0.0144	0.0024	0.0120
125	0.0146	0.0025	0.0121
126	0.0146	0.0025	0.0122
127	0.0148	0.0025	0.0123
128	0.0149	0.0025	0.0124
129	0.0151	0.0025	0.0125
130	0.0152	0.0026	0.0126
131	0.0153	0.0026	0.0128
132	0.0154	0.0026	0.0128
133	0.0156	0.0026	0.0130
134	0.0157	0.0026	0.0131
135	0.0159	0.0027	0.0132
136	0.0160	0.0027	0.0133
137	0.0163	0.0027	0.0135

138	0.0164	0.0028	0.0136
139	0.0166	0.0028	0.0138
140	0.0167	0.0028	0.0139
141	0.0170	0.0029	0.0141
142	0.0171	0.0029	0.0142
143	0.0173	0.0029	0.0144
144	0.0175	0.0029	0.0145
145	0.0196	0.0033	0.0163
146	0.0197	0.0033	0.0164
147	0.0200	0.0034	0.0167
148	0.0202	0.0034	0.0168
149	0.0205	0.0035	0.0171
150	0.0207	0.0035	0.0172
151	0.0210	0.0035	0.0175
152	0.0212	0.0036	0.0176
153	0.0216	0.0036	0.0179
154	0.0218	0.0037	0.0181
155	0.0222	0.0037	0.0184
156	0.0224	0.0038	0.0186
157	0.0228	0.0038	0.0190
158	0.0230	0.0039	0.0191
159	0.0235	0.0040	0.0195
160	0.0237	0.0040	0.0197
161	0.0242	0.0041	0.0202
162	0.0245	0.0041	0.0204
163	0.0251	0.0042	0.0209
164	0.0254	0.0043	0.0211
165	0.0260	0.0044	0.0216
166	0.0263	0.0044	0.0219
167	0.0270	0.0046	0.0225
168	0.0274	0.0046	0.0228
169	0.0282	0.0048	0.0235
170	0.0286	0.0048	0.0238
171	0.0296	0.0050	0.0246
172	0.0300	0.0051	0.0250
173	0.0311	0.0052	0.0258
174	0.0316	0.0053	0.0263
175	0.0329	0.0055	0.0273
176	0.0335	0.0056	0.0279
177	0.0350	0.0059	0.0291
178	0.0358	0.0060	0.0298
179	0.0376	0.0063	0.0312
180	0.0385	0.0065	0.0320
181	0.0408	0.0069	0.0339
182	0.0420	0.0071	0.0350
183	0.0450	0.0076	0.0374
184	0.0467	0.0079	0.0388
185	0.0424	0.0071	0.0353
186	0.0448	0.0075	0.0372
187	0.0508	0.0086	0.0423
188	0.0548	0.0092	0.0456
189	0.0661	0.0105	0.0556
190	0.0746	0.0105	0.0641
191	0.1066	0.0105	0.0961
192	0.1466	0.0105	0.1361
193	0.4588	0.0105	0.4483
194	0.0868	0.0105	0.0764
195	0.0598	0.0101	0.0497
196	0.0476	0.0080	0.0395
197	0.0486	0.0082	0.0404
198	0.0434	0.0073	0.0361
199	0.0396	0.0067	0.0329
200	0.0366	0.0062	0.0305
201	0.0342	0.0058	0.0285
202	0.0322	0.0054	0.0268
203	0.0305	0.0051	0.0254
204	0.0291	0.0049	0.0242
205	0.0278	0.0047	0.0231
206	0.0267	0.0045	0.0222

207	0.0257	0.0043	0.0214
208	0.0248	0.0042	0.0206
209	0.0240	0.0040	0.0199
210	0.0232	0.0039	0.0193
211	0.0226	0.0038	0.0188
212	0.0220	0.0037	0.0183
213	0.0214	0.0036	0.0178
214	0.0208	0.0035	0.0173
215	0.0204	0.0034	0.0169
216	0.0199	0.0034	0.0165
217	0.0176	0.0030	0.0146
218	0.0172	0.0029	0.0143
219	0.0168	0.0028	0.0140
220	0.0165	0.0028	0.0137
221	0.0161	0.0027	0.0134
222	0.0158	0.0027	0.0132
223	0.0155	0.0026	0.0129
224	0.0152	0.0026	0.0127
225	0.0150	0.0025	0.0125
226	0.0147	0.0025	0.0122
227	0.0145	0.0024	0.0120
228	0.0142	0.0024	0.0118
229	0.0140	0.0024	0.0117
230	0.0138	0.0023	0.0115
231	0.0136	0.0023	0.0113
232	0.0134	0.0023	0.0111
233	0.0132	0.0022	0.0110
234	0.0130	0.0022	0.0108
235	0.0128	0.0022	0.0107
236	0.0127	0.0021	0.0105
237	0.0125	0.0021	0.0104
238	0.0124	0.0021	0.0103
239	0.0122	0.0021	0.0102
240	0.0121	0.0020	0.0100
241	0.0119	0.0020	0.0099
242	0.0118	0.0020	0.0098
243	0.0116	0.0020	0.0097
244	0.0115	0.0019	0.0096
245	0.0114	0.0019	0.0095
246	0.0113	0.0019	0.0094
247	0.0112	0.0019	0.0093
248	0.0110	0.0019	0.0092
249	0.0109	0.0018	0.0091
250	0.0108	0.0018	0.0090
251	0.0107	0.0018	0.0089
252	0.0106	0.0018	0.0088
253	0.0105	0.0018	0.0087
254	0.0104	0.0018	0.0087
255	0.0103	0.0017	0.0086
256	0.0102	0.0017	0.0085
257	0.0101	0.0017	0.0084
258	0.0100	0.0017	0.0084
259	0.0100	0.0017	0.0083
260	0.0099	0.0017	0.0082
261	0.0098	0.0016	0.0081
262	0.0097	0.0016	0.0081
263	0.0096	0.0016	0.0080
264	0.0096	0.0016	0.0079
265	0.0095	0.0016	0.0079
266	0.0094	0.0016	0.0078
267	0.0093	0.0016	0.0078
268	0.0093	0.0016	0.0077
269	0.0092	0.0015	0.0076
270	0.0091	0.0015	0.0076
271	0.0091	0.0015	0.0075
272	0.0090	0.0015	0.0075
273	0.0089	0.0015	0.0074
274	0.0089	0.0015	0.0074
275	0.0088	0.0015	0.0073

276	0.0088	0.0015	0.0073
277	0.0087	0.0015	0.0072
278	0.0086	0.0015	0.0072
279	0.0086	0.0014	0.0071
280	0.0085	0.0014	0.0071
281	0.0085	0.0014	0.0070
282	0.0084	0.0014	0.0070
283	0.0084	0.0014	0.0070
284	0.0083	0.0014	0.0069
285	0.0083	0.0014	0.0069
286	0.0082	0.0014	0.0068
287	0.0082	0.0014	0.0068
288	0.0081	0.0014	0.0067

Total soil rain loss = 0.81(In)
Total effective rainfall = 4.54(In)
Peak flow rate in flood hydrograph = 24.12(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	7.5	15.0	22.5	30.0
0+ 5	0.0005	0.07	Q				
0+10	0.0031	0.37	Q				
0+15	0.0066	0.51	Q				
0+20	0.0102	0.53	Q				
0+25	0.0140	0.54	Q				
0+30	0.0177	0.54	Q				
0+35	0.0214	0.54	Q				
0+40	0.0251	0.54	Q				
0+45	0.0289	0.54	Q				
0+50	0.0326	0.55	Q				
0+55	0.0364	0.55	Q				
1+ 0	0.0402	0.55	Q				
1+ 5	0.0440	0.55	Q				
1+10	0.0478	0.55	Q				
1+15	0.0516	0.55	Q				
1+20	0.0554	0.56	Q				
1+25	0.0593	0.56	Q				
1+30	0.0631	0.56	QV				
1+35	0.0670	0.56	QV				
1+40	0.0709	0.56	QV				
1+45	0.0748	0.57	QV				
1+50	0.0787	0.57	QV				
1+55	0.0826	0.57	QV				
2+ 0	0.0866	0.57	QV				
2+ 5	0.0905	0.57	QV				
2+10	0.0945	0.57	QV				
2+15	0.0984	0.58	QV				
2+20	0.1024	0.58	QV				
2+25	0.1064	0.58	QV				
2+30	0.1104	0.58	QV				
2+35	0.1145	0.58	QV				
2+40	0.1185	0.59	QV				
2+45	0.1225	0.59	QV				
2+50	0.1266	0.59	Q V				
2+55	0.1307	0.59	Q V				
3+ 0	0.1348	0.60	Q V				
3+ 5	0.1389	0.60	Q V				
3+10	0.1430	0.60	Q V				
3+15	0.1472	0.60	Q V				
3+20	0.1513	0.60	Q V				
3+25	0.1555	0.61	Q V				

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3+30      0.1597     0.61  Q V      |        |        |        |
3+35      0.1639     0.61  Q V      |        |        |        |
3+40      0.1681     0.61  Q V      |        |        |        |
3+45      0.1724     0.62  Q V      |        |        |        |
3+50      0.1766     0.62  Q V      |        |        |        |
3+55      0.1809     0.62  Q V      |        |        |        |
4+ 0      0.1852     0.62  Q V      |        |        |        |
4+ 5      0.1895     0.62  Q  V     |        |        |        |
4+10      0.1938     0.63  Q  V     |        |        |        |
4+15      0.1981     0.63  Q  V     |        |        |        |
4+20      0.2025     0.63  Q  V     |        |        |        |
4+25      0.2069     0.63  Q  V     |        |        |        |
4+30      0.2113     0.64  Q  V     |        |        |        |
4+35      0.2157     0.64  Q  V     |        |        |        |
4+40      0.2201     0.64  Q  V     |        |        |        |
4+45      0.2245     0.65  Q  V     |        |        |        |
4+50      0.2290     0.65  Q  V     |        |        |        |
4+55      0.2335     0.65  Q  V     |        |        |        |
5+ 0      0.2380     0.65  Q  V     |        |        |        |
5+ 5      0.2425     0.66  Q  V     |        |        |        |
5+10      0.2470     0.66  Q  V     |        |        |        |
5+15      0.2516     0.66  Q   V    |        |        |        |
5+20      0.2562     0.66  Q   V    |        |        |        |
5+25      0.2607     0.67  Q   V    |        |        |        |
5+30      0.2654     0.67  Q   V    |        |        |        |
5+35      0.2700     0.67  Q   V    |        |        |        |
5+40      0.2747     0.68  Q   V    |        |        |        |
5+45      0.2793     0.68  Q   V    |        |        |        |
5+50      0.2840     0.68  Q   V    |        |        |        |
5+55      0.2888     0.69  Q   V    |        |        |        |
6+ 0      0.2935     0.69  Q   V    |        |        |        |
6+ 5      0.2983     0.69  Q   V    |        |        |        |
6+10      0.3031     0.70  Q   V    |        |        |        |
6+15      0.3079     0.70  Q   V    |        |        |        |
6+20      0.3127     0.70  Q    V   |        |        |        |
6+25      0.3176     0.71  Q    V   |        |        |        |
6+30      0.3224     0.71  Q    V   |        |        |        |
6+35      0.3274     0.71  Q    V   |        |        |        |
6+40      0.3323     0.72  Q    V   |        |        |        |
6+45      0.3372     0.72  Q    V   |        |        |        |
6+50      0.3422     0.72  Q    V   |        |        |        |
6+55      0.3472     0.73  Q    V   |        |        |        |
7+ 0      0.3522     0.73  Q    V   |        |        |        |
7+ 5      0.3573     0.73  Q    V   |        |        |        |
7+10      0.3624     0.74  Q    V   |        |        |        |
7+15      0.3675     0.74  Q    V   |        |        |        |
7+20      0.3726     0.75  Q    V   |        |        |        |
7+25      0.3778     0.75  Q     V  |        |        |        |
7+30      0.3830     0.75  |Q    V  |        |        |        |
7+35      0.3882     0.76  |Q    V  |        |        |        |
7+40      0.3935     0.76  |Q    V  |        |        |        |
7+45      0.3987     0.77  |Q    V  |        |        |        |
7+50      0.4040     0.77  |Q    V  |        |        |        |
7+55      0.4094     0.78  |Q    V  |        |        |        |
8+ 0      0.4148     0.78  |Q    V  |        |        |        |
8+ 5      0.4202     0.78  |Q    V  |        |        |        |
8+10      0.4256     0.79  |Q    V  |        |        |        |
8+15      0.4311     0.79  |Q    V  |        |        |        |
8+20      0.4366     0.80  |Q     V |        |        |        |
8+25      0.4421     0.80  |Q     V |        |        |        |
8+30      0.4476     0.81  |Q     V |        |        |        |
8+35      0.4532     0.81  |Q     V |        |        |        |
8+40      0.4589     0.82  |Q     V |        |        |        |
8+45      0.4645     0.82  |Q     V |        |        |        |
8+50      0.4703     0.83  |Q     V |        |        |        |
8+55      0.4760     0.83  |Q     V |        |        |        |
9+ 0      0.4818     0.84  |Q     V |        |        |        |
9+ 5      0.4876     0.84  |Q     V |        |        |        |
9+10      0.4935     0.85  |Q     V |        |        |        |
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 9+15       0.4994      0.86  |Q      V |         |         |         |
 9+20       0.5053      0.86  |Q      V |         |         |         |
 9+25       0.5113      0.87  |Q      V |         |         |         |
 9+30       0.5173      0.87  |Q      V |         |         |         |
 9+35       0.5234      0.88  |Q      V |         |         |         |
 9+40       0.5295      0.89  |Q      V |         |         |         |
 9+45       0.5356      0.89  |Q      V |         |         |         |
 9+50       0.5418      0.90  |Q      V |         |         |         |
 9+55       0.5481      0.91  |Q      V |         |         |         |
10+ 0       0.5544      0.91  |Q      V |         |         |         |
10+ 5       0.5607      0.92  |Q       V|         |         |         |
10+10       0.5671      0.93  |Q       V|         |         |         |
10+15       0.5735      0.94  |Q       V|         |         |         |
10+20       0.5800      0.94  |Q       V|         |         |         |
10+25       0.5866      0.95  |Q       V|         |         |         |
10+30       0.5932      0.96  |Q       V|         |         |         |
10+35       0.5998      0.97  |Q       V|         |         |         |
10+40       0.6066      0.98  |Q       V|         |         |         |
10+45       0.6133      0.98  |Q       V|         |         |         |
10+50       0.6202      0.99  |Q       V|         |         |         |
10+55       0.6271      1.00  |Q        V         |         |         |
11+ 0       0.6340      1.01  |Q        V         |         |         |
11+ 5       0.6410      1.02  |Q        V         |         |         |
11+10       0.6481      1.03  |Q        V         |         |         |
11+15       0.6553      1.04  |Q        V         |         |         |
11+20       0.6625      1.05  |Q        V         |         |         |
11+25       0.6698      1.06  |Q        V         |         |         |
11+30       0.6772      1.07  |Q        V         |         |         |
11+35       0.6846      1.08  |Q        |V        |         |         |
11+40       0.6921      1.09  |Q        |V        |         |         |
11+45       0.6997      1.10  |Q        |V        |         |         |
11+50       0.7074      1.12  |Q        |V        |         |         |
11+55       0.7152      1.13  |Q        |V        |         |         |
12+ 0       0.7230      1.14  |Q        |V        |         |         |
12+ 5       0.7311      1.17  |Q        |V        |         |         |
12+10       0.7397      1.25  |Q        |V        |         |         |
12+15       0.7487      1.30  |Q        | V       |         |         |
12+20       0.7577      1.32  |Q        | V       |         |         |
12+25       0.7669      1.33  |Q        | V       |         |         |
12+30       0.7762      1.35  |Q        | V       |         |         |
12+35       0.7856      1.37  |Q        | V       |         |         |
12+40       0.7951      1.38  |Q        | V       |         |         |
12+45       0.8048      1.40  |Q        | V       |         |         |
12+50       0.8146      1.42  |Q        |  V      |         |         |
12+55       0.8244      1.44  |Q        |  V      |         |         |
13+ 0       0.8345      1.46  |Q        |  V      |         |         |
13+ 5       0.8446      1.48  |Q        |  V      |         |         |
13+10       0.8550      1.50  |Q        |  V      |         |         |
13+15       0.8654      1.52  | Q       |  V      |         |         |
13+20       0.8761      1.54  | Q       |   V     |         |         |
13+25       0.8869      1.57  | Q       |   V     |         |         |
13+30       0.8978      1.59  | Q       |   V     |         |         |
13+35       0.9090      1.62  | Q       |   V     |         |         |
13+40       0.9203      1.65  | Q       |   V     |         |         |
13+45       0.9318      1.67  | Q       |   V     |         |         |
13+50       0.9436      1.71  | Q       |    V    |         |         |
13+55       0.9556      1.74  | Q       |    V    |         |         |
14+ 0       0.9678      1.78  | Q       |    V    |         |         |
14+ 5       0.9803      1.81  | Q       |    V    |         |         |
14+10       0.9930      1.85  | Q       |    V    |         |         |
14+15       1.0060      1.89  | Q       |     V   |         |         |
14+20       1.0194      1.94  | Q       |     V   |         |         |
14+25       1.0330      1.98  | Q       |     V   |         |         |
14+30       1.0470      2.04  | Q       |     V   |         |         |
14+35       1.0614      2.09  | Q       |      V  |         |         |
14+40       1.0762      2.15  | Q       |      V  |         |         |
14+45       1.0914      2.21  | Q       |      V  |         |         |
14+50       1.1072      2.29  |  Q      |      V  |         |         |
14+55       1.1234      2.36  |  Q      |       V |         |         |
```

15+ 0	1.1403	2.45	Q		V		
15+ 5	1.1578	2.54	Q		V		
15+10	1.1761	2.66	Q		V		
15+15	1.1952	2.77	Q		V		
15+20	1.2153	2.92	Q		V		
15+25	1.2360	3.00	Q		V		
15+30	1.2560	2.90	Q		V		
15+35	1.2765	2.98	Q		V		
15+40	1.2990	3.27	Q		V		
15+45	1.3240	3.63	Q		V		
15+50	1.3533	4.25	Q		V		
15+55	1.3891	5.19	Q		V		
16+ 0	1.4390	7.26	Q		V		
16+ 5	1.5287	13.02		Q	V		
16+10	1.6948	24.12			V	Q	
16+15	1.7885	13.62		Q	V		
16+20	1.8267	5.53	Q		V		
16+25	1.8521	3.70	Q		V		
16+30	1.8741	3.19	Q		V		
16+35	1.8944	2.94	Q		V		
16+40	1.9128	2.68	Q		V		
16+45	1.9299	2.47	Q		V		
16+50	1.9457	2.30	Q		V		
16+55	1.9606	2.16	Q		V		
17+ 0	1.9747	2.05	Q		V		
17+ 5	1.9881	1.95	Q		V		
17+10	2.0009	1.86	Q		V		
17+15	2.0132	1.78	Q		V		
17+20	2.0250	1.71	Q		V		
17+25	2.0363	1.65	Q		V		
17+30	2.0473	1.60	Q		V		
17+35	2.0580	1.55	Q		V		
17+40	2.0684	1.50	Q		V		
17+45	2.0784	1.46	Q		V		
17+50	2.0882	1.42	Q		V		
17+55	2.0977	1.39	Q		V		
18+ 0	2.1071	1.35	Q		V		
18+ 5	2.1160	1.31	Q		V		
18+10	2.1244	1.21	Q		V		
18+15	2.1323	1.15	Q		V		
18+20	2.1400	1.12	Q		V		
18+25	2.1475	1.09	Q		V		
18+30	2.1549	1.07	Q		V		
18+35	2.1621	1.05	Q		V		
18+40	2.1692	1.03	Q		V		
18+45	2.1762	1.01	Q		V		
18+50	2.1830	0.99	Q		V		
18+55	2.1897	0.98	Q		V		
19+ 0	2.1964	0.96	Q		V		
19+ 5	2.2029	0.94	Q		V		
19+10	2.2093	0.93	Q		V		
19+15	2.2156	0.92	Q		V		
19+20	2.2218	0.90	Q		V		
19+25	2.2279	0.89	Q		V		
19+30	2.2339	0.88	Q		V		
19+35	2.2399	0.86	Q		V		
19+40	2.2457	0.85	Q		V		
19+45	2.2515	0.84	Q		V		
19+50	2.2572	0.83	Q		V		
19+55	2.2629	0.82	Q		V		
20+ 0	2.2684	0.81	Q		V		
20+ 5	2.2739	0.80	Q		V		
20+10	2.2794	0.79	Q		V		
20+15	2.2848	0.78	Q		V		
20+20	2.2901	0.77	Q		V		
20+25	2.2953	0.76	Q		V		
20+30	2.3005	0.75	Q		V		
20+35	2.3057	0.75	Q		V		
20+40	2.3108	0.74	Q		V		

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   20+45       2.3158      0.73  Q        |         |         |      V  |
   20+50       2.3208      0.72  Q        |         |         |      V  |
   20+55       2.3257      0.72  Q        |         |         |      V  |
   21+ 0       2.3306      0.71  Q        |         |         |      V  |
   21+ 5       2.3354      0.70  Q        |         |         |      V  |
   21+10       2.3402      0.70  Q        |         |         |      V  |
   21+15       2.3450      0.69  Q        |         |         |      V  |
   21+20       2.3497      0.68  Q        |         |         |      V  |
   21+25       2.3543      0.68  Q        |         |         |      V  |
   21+30       2.3590      0.67  Q        |         |         |      V  |
   21+35       2.3635      0.66  Q        |         |         |       V |
   21+40       2.3681      0.66  Q        |         |         |       V |
   21+45       2.3726      0.65  Q        |         |         |       V |
   21+50       2.3770      0.65  Q        |         |         |       V |
   21+55       2.3815      0.64  Q        |         |         |       V |
   22+ 0       2.3859      0.64  Q        |         |         |       V |
   22+ 5       2.3902      0.63  Q        |         |         |       V |
   22+10       2.3945      0.63  Q        |         |         |       V |
   22+15       2.3988      0.62  Q        |         |         |       V |
   22+20       2.4031      0.62  Q        |         |         |       V |
   22+25       2.4073      0.61  Q        |         |         |       V |
   22+30       2.4115      0.61  Q        |         |         |       V |
   22+35       2.4157      0.60  Q        |         |         |       V |
   22+40       2.4198      0.60  Q        |         |         |       V |
   22+45       2.4239      0.60  Q        |         |         |       V |
   22+50       2.4280      0.59  Q        |         |         |        V|
   22+55       2.4320      0.59  Q        |         |         |        V|
   23+ 0       2.4360      0.58  Q        |         |         |        V|
   23+ 5       2.4400      0.58  Q        |         |         |        V|
   23+10       2.4440      0.58  Q        |         |         |        V|
   23+15       2.4479      0.57  Q        |         |         |        V|
   23+20       2.4518      0.57  Q        |         |         |        V|
   23+25       2.4557      0.56  Q        |         |         |        V|
   23+30       2.4596      0.56  Q        |         |         |        V|
   23+35       2.4634      0.56  Q        |         |         |        V|
   23+40       2.4672      0.55  Q        |         |         |        V|
   23+45       2.4710      0.55  Q        |         |         |        V|
   23+50       2.4747      0.55  Q        |         |         |        V|
   23+55       2.4785      0.54  Q        |         |         |        V|
   24+ 0       2.4822      0.54  Q        |         |         |        V|
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Appendix J

BMP Analysis

CONTECH ENGINEERED SOLUTIONS

Date: 7/18/2021
Project Name: Underground Infiltration CMP #1 - 7614 (7-18-2021 0-14-3

City / County:
State:

Designed By:
Company:
Telephone:

CMP: Underground Detention System
Storage Volume Estimation

=Adjustable Input Cells

Contech Engineered Solutions, LLC is pleased to offer the following estimate of storage volume for the above named project. The results are submitted as an estimate only, without liability on the part of Contech Engineered Solutions, LLC for accuracy or suitability to any particular applicaton and are subject to verification of the Engineer of Record. **This tool is only applicable for rectangular shaped systems.**

Summary of Inputs

System Information		Backfill Information		Pipe & Analysis Information	
Out-to-out length (ft):	90.0	Backfill Porosity (%):	40%	System Diameter (in):	96
Out-to-out width (ft):	63.0	Depth Above Pipe (in):	6.0	Pipe Spacing (in):	36
Number of Manifolds (ea):	1.0	Depth Below Pipe (in):	6.0	Incremental Analysis (in):	2
Number of Barrels (ea):	6.0	Width At Ends (ft):	3.0	System Invert (Elevation):	0
		Width At Sides (ft):	3.0		

Storage Volume Estimation

System		Pipe		Stone		Total System		Miscellaneous		
Depth (ft)	Elevation (ft)	Incremental Storage (cf)	Cumulative Storage (cf)	Incremental Storage (cf)	Cumulative Storage (cf)	Incremental Storage (cf)	Cumulative Storage (cf)	Open Storage (%)	Ave. Surface Area (sf)	
0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0%	2,649.6	
0.17	0.16	0.0	0.0	441.6	441.6	441.6	441.6	0.0%	2,649.6	
0.33	0.33	0.0	0.0	441.6	883.2	441.6	883.2	0.0%	2,649.6	
0.50	0.50	0.0	0.0	441.6	1,324.8	441.6	1,324.8	0.0%	2,649.6	
0.67	0.66	141.5	141.5	385.0	1,709.8	526.5	1,851.3	7.6%	3,410.6	
0.83	0.83	256.2	397.7	339.1	2,048.9	595.3	2,446.6	16.3%	3,714.3	
1.00	1.00	328.2	726.0	310.3	2,359.2	638.5	3,085.2	23.5%	3,939.3	
1.17	1.16	384.4	1,110.4	287.8	2,647.0	672.3	3,757.4	29.6%	4,122.2	
1.33	1.33	431.1	1,541.5	269.2	2,916.2	700.3	4,457.7	34.6%	4,277.2	
1.50	1.50	471.2	2,012.7	253.1	3,169.3	724.3	5,182.0	38.8%	4,411.7	
1.67	1.66	506.2	2,518.9	239.1	3,408.4	745.3	5,927.4	42.5%	4,530.1	
1.83	1.83	537.2	3,056.2	226.7	3,635.1	763.9	6,691.3	45.7%	4,635.2	
2.00	2.00	564.9	3,621.0	215.7	3,850.8	780.5	7,471.8	48.5%	4,729.2	
2.17	2.16	589.6	4,210.6	205.8	4,056.6	795.3	8,267.2	50.9%	4,813.4	
2.33	2.33	611.7	4,822.3	196.9	4,253.5	808.6	9,075.8	53.1%	4,888.9	
2.50	2.50	631.6	5,454.0	189.0	4,442.4	820.6	9,896.4	55.1%	4,956.7	
2.67	2.66	649.4	6,103.4	181.8	4,624.2	831.3	10,727.6	56.9%	5,017.3	
2.83	2.83	665.3	6,768.7	175.5	4,799.7	840.8	11,568.4	58.5%	5,071.3	
3.00	3.00	679.5	7,448.2	169.8	4,969.5	849.3	12,417.7	60.0%	5,119.2	
3.17	3.16	692.0	8,140.2	164.8	5,134.3	856.8	13,274.5	61.3%	5,161.2	
3.33	3.33	702.9	8,843.1	160.4	5,294.8	863.3	14,137.8	62.5%	5,197.8	
3.50	3.50	712.3	9,555.4	156.7	5,451.5	869.0	15,006.8	63.7%	5,229.0	
3.67	3.66	720.2	10,275.6	153.5	5,605.0	873.7	15,880.6	64.7%	5,255.1	
3.83	3.83	726.8	11,002.4	150.9	5,755.8	877.7	16,758.3	65.7%	5,276.3	
4.00	4.00	732.0	11,734.5	148.8	5,904.6	880.8	17,639.1	66.5%	5,292.7	
4.17	4.16	735.9	12,470.4	147.2	6,051.8	883.2	18,522.2	67.3%	5,304.3	
4.33	4.33	738.5	13,208.9	146.2	6,198.0	884.7	19,406.9	68.1%	5,311.3	
4.50	4.50	739.8	13,948.7	145.7	6,343.7	885.5	20,292.4	68.7%	5,313.6	
4.67	4.66	739.8	14,688.5	145.7	6,489.4	885.5	21,177.9	69.4%	5,311.3	
4.83	4.83	738.5	15,427.0	146.2	6,635.6	884.7	22,062.6	69.9%	5,304.3	
5.00	5.00	735.9	16,162.9	147.2	6,782.8	883.2	22,945.7	70.4%	5,292.7	Retention Volume
5.17	5.16	732.0	16,894.9	148.8	6,931.6	880.8	23,826.5	70.9%	5,276.3	
5.33	5.33	726.8	17,621.7	150.9	7,082.5	877.7	24,704.2	71.3%	5,255.1	
5.50	5.50	720.2	18,342.0	153.5	7,236.0	873.7	25,578.0	71.7%	5,229.0	
5.67	5.66	712.3	19,054.3	156.7	7,392.7	869.0	26,447.0	72.0%	5,197.8	
5.83	5.83	702.9	19,757.1	160.4	7,553.1	863.3	27,310.3	72.3%	5,161.2	
6.00	6.00	692.0	20,449.1	164.8	7,718.0	856.8	28,167.1	72.6%	5,119.2	
6.17	6.16	679.5	21,128.6	169.8	7,887.8	849.3	29,016.4	72.8%	5,071.3	

6.33	6.33	665.3	21,793.9	175.5	8,063.2	840.8	29,857.2	73.0%	5,017.3
6.50	6.50	649.4	22,443.4	181.8	8,245.0	831.3	30,688.4	73.1%	4,956.7
6.67	6.66	631.6	23,075.0	189.0	8,434.0	820.6	31,509.0	73.2%	4,888.9
6.83	6.83	611.7	23,686.7	196.9	8,630.9	808.6	32,317.6	73.3%	4,813.4
7.00	7.00	589.6	24,276.3	205.8	8,836.7	795.3	33,113.0	73.3%	4,729.2
7.17	7.16	564.9	24,841.2	215.7	9,052.3	780.5	33,893.5	73.3%	4,635.2
7.33	7.33	537.2	25,378.4	226.7	9,279.0	763.9	34,657.4	73.2%	4,530.1
7.50	7.50	506.2	25,884.6	239.1	9,518.1	745.3	35,402.8	73.1%	4,411.7
7.67	7.66	471.2	26,355.8	253.1	9,771.3	724.3	36,127.1	73.0%	4,277.2
7.83	7.83	431.1	26,787.0	269.2	10,040.4	700.3	36,827.4	72.7%	4,122.2
8.00	8.00	384.4	27,171.4	287.8	10,328.2	672.3	37,499.6	72.5%	3,939.3
8.17	8.16	328.2	27,499.6	310.3	10,638.6	638.5	38,138.2	72.1%	3,714.3
8.33	8.33	256.2	27,755.8	339.1	10,977.7	595.3	38,733.5	71.7%	3,410.6
8.50	8.50	141.5	27,897.3	385.0	11,362.7	526.5	39,260.0	71.1%	2,649.6
8.67	8.66	0.0	27,897.3	441.6	11,804.3	441.6	39,701.6	70.3%	2,649.6
8.83	8.83	0.0	27,897.3	441.6	12,245.9	441.6	40,143.2	69.5%	2,649.6
9.00	9.00	0.0	27,897.3	441.6	12,687.5	441.6	40,584.8	68.7%	2,649.6

Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Monday, 10 / 31 / 2022

Pond No. 1 - Underground Basin #1

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	n/a	0	0
0.50	100.50	n/a	1,325	1,325
1.00	101.00	n/a	1,760	3,085
1.50	101.50	n/a	2,097	5,182
2.00	102.00	n/a	2,290	7,472
2.50	102.50	n/a	2,425	9,896
3.00	103.00	n/a	2,521	12,418
3.50	103.50	n/a	2,589	15,007
4.00	104.00	n/a	2,632	17,639
4.50	104.50	n/a	2,653	20,292
5.00	105.00	n/a	2,653	22,946
5.50	105.50	n/a	2,632	25,578
6.00	106.00	n/a	2,589	28,167
6.50	106.50	n/a	2,521	30,688
7.00	107.00	n/a	2,425	33,113
7.50	107.50	n/a	2,290	35,403
8.00	108.00	n/a	2,097	37,500
8.50	108.50	n/a	1,760	39,260
9.00	109.00	n/a	1,325	40,585

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	0.00	0.00	0.00
Span (in)	= 15.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 105.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	0.00	---	---	---	---	---	---	---	---	---	0.000
0.50	1,325	100.50	0.00	---	---	---	---	---	---	---	---	---	0.000
1.00	3,085	101.00	0.00	---	---	---	---	---	---	---	---	---	0.000
1.50	5,182	101.50	0.00	---	---	---	---	---	---	---	---	---	0.000
2.00	7,472	102.00	0.00	---	---	---	---	---	---	---	---	---	0.000
2.50	9,896	102.50	0.00	---	---	---	---	---	---	---	---	---	0.000
3.00	12,418	103.00	0.00	---	---	---	---	---	---	---	---	---	0.000
3.50	15,007	103.50	0.00	---	---	---	---	---	---	---	---	---	0.000
4.00	17,639	104.00	0.00	---	---	---	---	---	---	---	---	---	0.000
4.50	20,292	104.50	0.00	---	---	---	---	---	---	---	---	---	0.000
5.00	22,946	105.00	0.00	---	---	---	---	---	---	---	---	---	0.000
5.50	25,578	105.50	1.10 ic	---	---	---	---	---	---	---	---	---	1.104
6.00	28,167	106.00	3.58 ic	---	---	---	---	---	---	---	---	---	3.584
6.50	30,688	106.50	5.53 ic	---	---	---	---	---	---	---	---	---	5.527
7.00	33,113	107.00	6.93 ic	---	---	---	---	---	---	---	---	---	6.928
7.50	35,403	107.50	8.09 ic	---	---	---	---	---	---	---	---	---	8.090
8.00	37,500	108.00	9.11 ic	---	---	---	---	---	---	---	---	---	9.105
8.50	39,260	108.50	10.02 ic	---	---	---	---	---	---	---	---	---	10.02
9.00	40,585	109.00	10.85 ic	---	---	---	---	---	---	---	---	---	10.85

Hydrograph Report

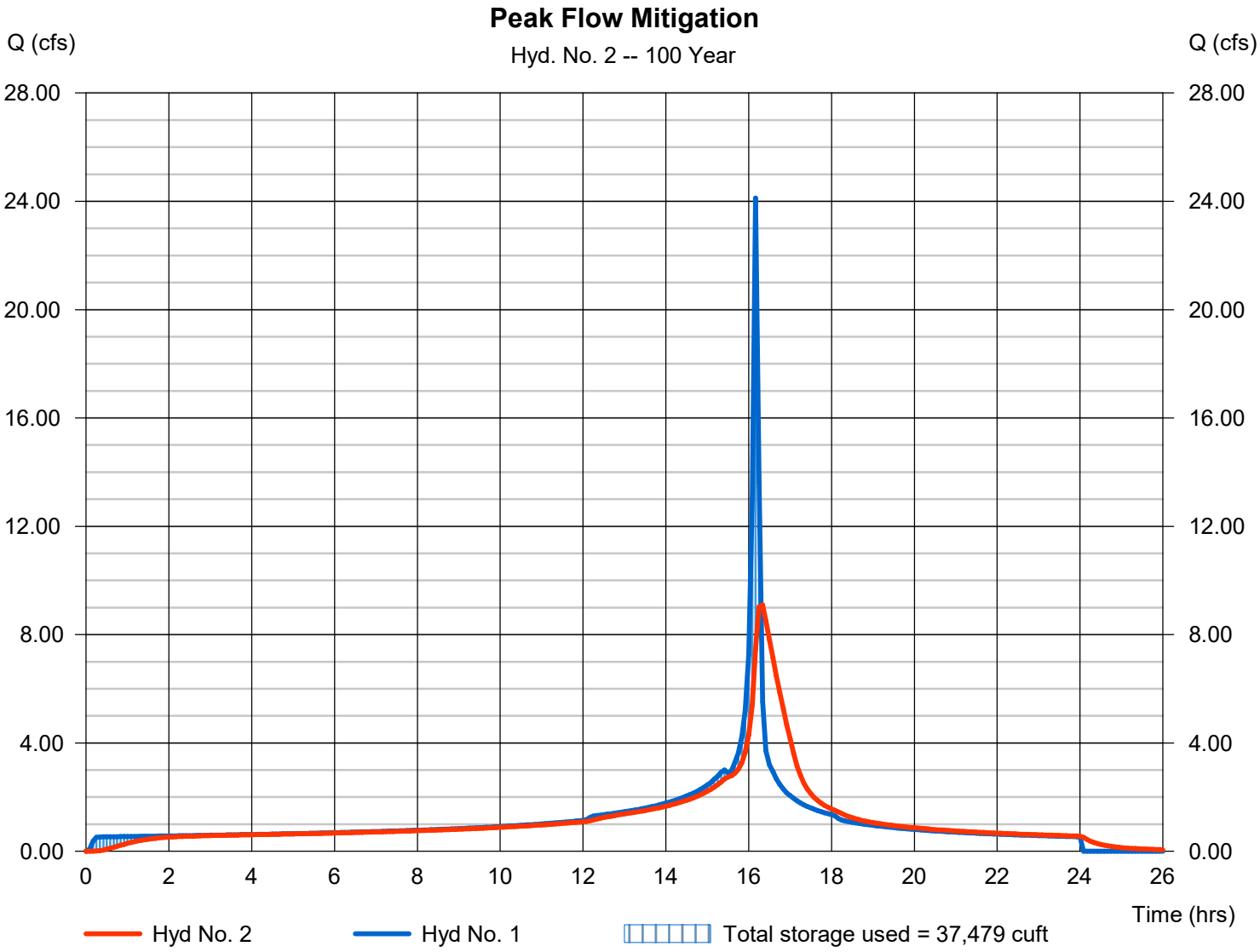
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Friday, 03 / 31 / 2023

Hyd. No. 2

Peak Flow Mitigation

Hydrograph type	=	Reservoir	Peak discharge	=	9.095 cfs
Storm frequency	=	100 yrs	Time to peak	=	16.33 hrs
Time interval	=	5 min	Hyd. volume	=	108,111 cuft
Inflow hyd. No.	=	1 - 100-Year, 24-Hour	Max. Elevation	=	107.99 ft
Reservoir name	=	Underground Basin #1	Max. Storage	=	37,479 cuft

Storage Indication method used. Wet pond routing start elevation = 105.00 ft.



```
                  FLOOD HYDROGRAPH ROUTING PROGRAM
            Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018
                        Study date: 03/30/23

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


JURUPA AND WILLOW
BASIN ROUTING
100-YEAR STORM
POST DEVELOPMENT - DA A
------------------------------------------------------------------------


Program License Serial Number 6443

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

               From study/file name: JurupaWillowPostUH100A.rte
****************************HYDROGRAPH DATA****************************
               Number of intervals =   292
               Time interval =    5.0 (Min.)
               Maximum/Peak flow rate =       24.115 (CFS)
               Total volume =       2.487 (Ac.Ft)
        Status of hydrographs being held in storage
                  Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)      0.000     0.000     0.000     0.000     0.000
        Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
************************************************************************



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        0.000 to Point/Station        0.000
**** RETARDING BASIN ROUTING ****
________________________________________________________________________

User entry of depth-outflow-storage data
------------------------------------------------------------------------
Total number of inflow hydrograph intervals = 292
Hydrograph time unit =  5.000 (Min.)
Initial depth in storage basin =   5.00(Ft.)
------------------------------------------------------------------------
------------------------------------------------------------------------
Initial basin depth =   5.00 (Ft.)
Initial basin storage =      0.53 (Ac.Ft)
Initial basin outflow =   0.00 (CFS)
------------------------------------------------------------------------
------------------------------------------------------------------------
Depth vs. Storage and Depth vs. Discharge data:
 Basin Depth  Storage    Outflow   (S-O*dt/2)   (S+O*dt/2)
     (Ft.)    (Ac.Ft)    (CFS)     (Ac.Ft)    (Ac.Ft)
------------------------------------------------------------------------
  0.000      0.000      0.000      0.000        0.000
  5.000      0.527      0.001      0.527        0.527
  5.500      0.587      1.100      0.583        0.591
  6.000      0.647      3.580      0.635        0.659
  6.500      0.705      5.530      0.686        0.724
  7.000      0.760      6.930      0.736        0.784
  7.500      0.813      8.090      0.785        0.841
  8.000      0.861      9.110      0.830        0.892
  8.500      0.901     10.020      0.866        0.936
  9.000      0.932     10.850      0.895        0.969
------------------------------------------------------------------------
               Hydrograph Detention Basin Routing
------------------------------------------------------------------------
```

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

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	6.0	12.06	18.09	24.12	Depth (Ft.)
0.083	0.07	0.00	0.527	O					5.00
0.167	0.37	0.03	0.529	O					5.01
0.250	0.51	0.08	0.531	O					5.04
0.333	0.53	0.13	0.534	O					5.06
0.417	0.54	0.18	0.537	O					5.08
0.500	0.54	0.22	0.539	O					5.10
0.583	0.54	0.26	0.541	O					5.12
0.667	0.54	0.29	0.543	O					5.13
0.750	0.54	0.32	0.545	O					5.15
0.833	0.55	0.35	0.546	O					5.16
0.917	0.55	0.37	0.547	O					5.17
1.000	0.55	0.39	0.548	O					5.18
1.083	0.55	0.41	0.549	O					5.19
1.167	0.55	0.43	0.550	O					5.19
1.250	0.55	0.44	0.551	O					5.20
1.333	0.56	0.46	0.552	O					5.21
1.417	0.56	0.47	0.553	O					5.21
1.500	0.56	0.48	0.553	O					5.22
1.583	0.56	0.49	0.554	O					5.22
1.667	0.56	0.50	0.554	O					5.23
1.750	0.57	0.51	0.555	O					5.23
1.833	0.57	0.51	0.555	O					5.23
1.917	0.57	0.52	0.555	O					5.24
2.000	0.57	0.53	0.556	O					5.24
2.083	0.57	0.53	0.556	O					5.24
2.167	0.57	0.54	0.556	O					5.24
2.250	0.58	0.54	0.556	O					5.25
2.333	0.58	0.55	0.557	O					5.25
2.417	0.58	0.55	0.557	O					5.25
2.500	0.58	0.55	0.557	O					5.25
2.583	0.58	0.56	0.557	O					5.25
2.667	0.59	0.56	0.558	O					5.25
2.750	0.59	0.56	0.558	O					5.26
2.833	0.59	0.57	0.558	O					5.26
2.917	0.59	0.57	0.558	O					5.26
3.000	0.60	0.57	0.558	O					5.26
3.083	0.60	0.58	0.558	O					5.26
3.167	0.60	0.58	0.559	O					5.26
3.250	0.60	0.58	0.559	O					5.26
3.333	0.60	0.58	0.559	O					5.26
3.417	0.61	0.59	0.559	O					5.27
3.500	0.61	0.59	0.559	O					5.27
3.583	0.61	0.59	0.559	O					5.27
3.667	0.61	0.59	0.559	O					5.27
3.750	0.62	0.60	0.559	O					5.27
3.833	0.62	0.60	0.560	O					5.27
3.917	0.62	0.60	0.560	O					5.27
4.000	0.62	0.60	0.560	O					5.27
4.083	0.62	0.61	0.560	O					5.28
4.167	0.63	0.61	0.560	O					5.28
4.250	0.63	0.61	0.560	O					5.28
4.333	0.63	0.61	0.560	O					5.28
4.417	0.63	0.62	0.561	O					5.28
4.500	0.64	0.62	0.561	O					5.28
4.583	0.64	0.62	0.561	O					5.28
4.667	0.64	0.62	0.561	O					5.28
4.750	0.65	0.63	0.561	O					5.28
4.833	0.65	0.63	0.561	O					5.29
4.917	0.65	0.63	0.561	O					5.29
5.000	0.65	0.63	0.561	O					5.29
5.083	0.66	0.64	0.562	O					5.29
5.167	0.66	0.64	0.562	O					5.29
5.250	0.66	0.64	0.562	O					5.29
5.333	0.66	0.64	0.562	O					5.29

5.417	0.67	0.65	0.562	O				5.29
5.500	0.67	0.65	0.562	O				5.29
5.583	0.67	0.65	0.563	O				5.30
5.667	0.68	0.65	0.563	O				5.30
5.750	0.68	0.66	0.563	O				5.30
5.833	0.68	0.66	0.563	O				5.30
5.917	0.69	0.66	0.563	O				5.30
6.000	0.69	0.67	0.563	O				5.30
6.083	0.69	0.67	0.563	O				5.30
6.167	0.70	0.67	0.564	O				5.31
6.250	0.70	0.67	0.564	O				5.31
6.333	0.70	0.68	0.564	O				5.31
6.417	0.71	0.68	0.564	O				5.31
6.500	0.71	0.68	0.564	O				5.31
6.583	0.71	0.69	0.564	O				5.31
6.667	0.72	0.69	0.565	O				5.31
6.750	0.72	0.69	0.565	O				5.32
6.833	0.72	0.70	0.565	O				5.32
6.917	0.73	0.70	0.565	O				5.32
7.000	0.73	0.70	0.565	O				5.32
7.083	0.73	0.71	0.566	O				5.32
7.167	0.74	0.71	0.566	O				5.32
7.250	0.74	0.71	0.566	O				5.32
7.333	0.75	0.72	0.566	O				5.33
7.417	0.75	0.72	0.566	O				5.33
7.500	0.75	0.72	0.567	OI				5.33
7.583	0.76	0.73	0.567	OI				5.33
7.667	0.76	0.73	0.567	OI				5.33
7.750	0.77	0.74	0.567	OI				5.33
7.833	0.77	0.74	0.567	OI				5.34
7.917	0.78	0.74	0.568	OI				5.34
8.000	0.78	0.75	0.568	OI				5.34
8.083	0.78	0.75	0.568	OI				5.34
8.167	0.79	0.76	0.568	|O				5.34
8.250	0.79	0.76	0.568	|O				5.35
8.333	0.80	0.76	0.569	|O				5.35
8.417	0.80	0.77	0.569	|O				5.35
8.500	0.81	0.77	0.569	|O				5.35
8.583	0.81	0.78	0.569	|O				5.35
8.667	0.82	0.78	0.570	|O				5.36
8.750	0.82	0.79	0.570	|O				5.36
8.833	0.83	0.79	0.570	|O				5.36
8.917	0.83	0.80	0.570	|O				5.36
9.000	0.84	0.80	0.571	|O				5.36
9.083	0.84	0.81	0.571	|O				5.37
9.167	0.85	0.81	0.571	|O				5.37
9.250	0.86	0.82	0.571	|O				5.37
9.333	0.86	0.82	0.572	|O				5.37
9.417	0.87	0.83	0.572	|O				5.38
9.500	0.87	0.83	0.572	|O				5.38
9.583	0.88	0.84	0.573	|O				5.38
9.667	0.89	0.84	0.573	|O				5.38
9.750	0.89	0.85	0.573	|O				5.39
9.833	0.90	0.85	0.574	|O				5.39
9.917	0.91	0.86	0.574	|O				5.39
10.000	0.91	0.87	0.574	|O				5.39
10.083	0.92	0.87	0.575	|O				5.40
10.167	0.93	0.88	0.575	|O				5.40
10.250	0.94	0.88	0.575	|O				5.40
10.333	0.94	0.89	0.576	|O				5.40
10.417	0.95	0.90	0.576	|O				5.41
10.500	0.96	0.90	0.576	|O				5.41
10.583	0.97	0.91	0.577	|O				5.41
10.667	0.98	0.92	0.577	|O				5.42
10.750	0.98	0.93	0.577	|O				5.42
10.833	0.99	0.93	0.578	|O				5.42
10.917	1.00	0.94	0.578	|O				5.43
11.000	1.01	0.95	0.579	|O				5.43
11.083	1.02	0.96	0.579	|O				5.43

```
11.167    1.03    0.96      0.580  |O      |       |       |       |     5.44
11.250    1.04    0.97      0.580  |O      |       |       |       |     5.44
11.333    1.05    0.98      0.580  |O      |       |       |       |     5.45
11.417    1.06    0.99      0.581  |O      |       |       |       |     5.45
11.500    1.07    1.00      0.581  |O      |       |       |       |     5.45
11.583    1.08    1.01      0.582  |O      |       |       |       |     5.46
11.667    1.09    1.02      0.582  |O      |       |       |       |     5.46
11.750    1.10    1.03      0.583  |O      |       |       |       |     5.47
11.833    1.12    1.04      0.584  |O      |       |       |       |     5.47
11.917    1.13    1.05      0.584  |O      |       |       |       |     5.48
12.000    1.14    1.06      0.585  |O      |       |       |       |     5.48
12.083    1.17    1.07      0.585  |O      |       |       |       |     5.49
12.167    1.25    1.09      0.586  |O      |       |       |       |     5.49
12.250    1.30    1.12      0.587  |O      |       |       |       |     5.50
12.333    1.32    1.16      0.589  |O      |       |       |       |     5.51
12.417    1.33    1.20      0.590  |O      |       |       |       |     5.52
12.500    1.35    1.24      0.590  |O      |       |       |       |     5.53
12.583    1.37    1.27      0.591  |O      |       |       |       |     5.53
12.667    1.38    1.29      0.592  |O      |       |       |       |     5.54
12.750    1.40    1.32      0.592  |O      |       |       |       |     5.54
12.833    1.42    1.34      0.593  |O      |       |       |       |     5.55
12.917    1.44    1.36      0.593  |O      |       |       |       |     5.55
13.000    1.46    1.38      0.594  |O      |       |       |       |     5.56
13.083    1.48    1.40      0.594  |O      |       |       |       |     5.56
13.167    1.50    1.42      0.595  |O      |       |       |       |     5.57
13.250    1.52    1.45      0.595  |OI     |       |       |       |     5.57
13.333    1.54    1.47      0.596  |OI     |       |       |       |     5.57
13.417    1.57    1.49      0.596  |OI     |       |       |       |     5.58
13.500    1.59    1.51      0.597  | O     |       |       |       |     5.58
13.583    1.62    1.54      0.598  | O     |       |       |       |     5.59
13.667    1.65    1.56      0.598  | O     |       |       |       |     5.59
13.750    1.67    1.58      0.599  | O     |       |       |       |     5.60
13.833    1.71    1.61      0.599  | O     |       |       |       |     5.60
13.917    1.74    1.64      0.600  | O     |       |       |       |     5.61
14.000    1.78    1.67      0.601  | O     |       |       |       |     5.61
14.083    1.81    1.70      0.601  | O     |       |       |       |     5.62
14.167    1.85    1.73      0.602  | O     |       |       |       |     5.63
14.250    1.89    1.77      0.603  | O     |       |       |       |     5.63
14.333    1.94    1.80      0.604  | O     |       |       |       |     5.64
14.417    1.98    1.84      0.605  | O     |       |       |       |     5.65
14.500    2.04    1.88      0.606  | O     |       |       |       |     5.66
14.583    2.09    1.93      0.607  | O     |       |       |       |     5.67
14.667    2.15    1.98      0.608  | O     |       |       |       |     5.68
14.750    2.21    2.03      0.609  | O     |       |       |       |     5.69
14.833    2.29    2.08      0.611  | OI    |       |       |       |     5.70
14.917    2.36    2.14      0.612  | OI    |       |       |       |     5.71
15.000    2.45    2.21      0.614  | OI    |       |       |       |     5.72
15.083    2.54    2.28      0.616  |  O    |       |       |       |     5.74
15.167    2.66    2.36      0.617  |  O    |       |       |       |     5.75
15.250    2.77    2.45      0.620  |  O    |       |       |       |     5.77
15.333    2.92    2.55      0.622  |  O    |       |       |       |     5.79
15.417    3.00    2.65      0.625  |  O    |       |       |       |     5.81
15.500    2.90    2.73      0.626  |  O    |       |       |       |     5.83
15.583    2.98    2.78      0.628  |  O    |       |       |       |     5.84
15.667    3.27    2.86      0.630  |  OI   |       |       |       |     5.86
15.750    3.63    3.01      0.633  |  OI   |       |       |       |     5.89
15.833    4.25    3.24      0.639  |   OI  |       |       |       |     5.93
15.917    5.19    3.61      0.648  |   O I |       |       |       |     6.01
16.000    7.26    4.15      0.664  |    O  |I      |       |       |     6.15
16.083   13.02    5.39      0.701  |      O|       |I      |       |     6.46
16.167   24.12    7.47      0.784  |       |O      |       |      I    7.23
16.250   13.62    9.04      0.858  |       |  O    | I     |       |     7.96
16.333    5.53    9.11      0.861  |      I|   O   |       |       |     8.00
16.417    3.70    8.50      0.832  |   I   |  O    |       |       |     7.70
16.500    3.19    7.80      0.800  |   I   | O     |       |       |     7.38
16.583    2.94    7.14      0.769  |  I    |O      |       |       |     7.09
16.667    2.68    6.47      0.742  |  I    O       |       |       |     6.84
16.750    2.47    5.84      0.717  |  I   O|       |       |       |     6.61
16.833    2.30    5.22      0.696  |  I  O |       |       |       |     6.42
```

16.917	2.16	4.60	0.677	I O				6.26
17.000	2.05	4.08	0.662	I O				6.13
17.083	1.95	3.65	0.649	I O				6.02
17.167	1.86	3.23	0.638	I O				5.93
17.250	1.78	2.88	0.630	IO				5.86
17.333	1.71	2.59	0.623	IO				5.80
17.417	1.65	2.37	0.618	IO				5.76
17.500	1.60	2.18	0.613	O				5.72
17.583	1.55	2.03	0.610	O				5.69
17.667	1.50	1.90	0.606	IO				5.66
17.750	1.46	1.80	0.604	IO				5.64
17.833	1.42	1.71	0.602	IO				5.62
17.917	1.39	1.63	0.600	IO				5.61
18.000	1.35	1.57	0.598	IO				5.59
18.083	1.31	1.51	0.597	IO				5.58
18.167	1.21	1.45	0.595	O				5.57
18.250	1.15	1.38	0.594	O				5.56
18.333	1.12	1.32	0.592	O				5.54
18.417	1.09	1.26	0.591	O				5.53
18.500	1.07	1.22	0.590	O				5.52
18.583	1.05	1.18	0.589	O				5.52
18.667	1.03	1.15	0.588	O				5.51
18.750	1.01	1.11	0.587	O				5.50
18.833	0.99	1.09	0.587	O				5.50
18.917	0.98	1.08	0.586	O				5.49
19.000	0.96	1.07	0.585	O				5.49
19.083	0.94	1.05	0.584	O				5.48
19.167	0.93	1.04	0.584	O				5.47
19.250	0.92	1.03	0.583	O				5.47
19.333	0.90	1.01	0.582	O				5.46
19.417	0.89	1.00	0.581	O				5.45
19.500	0.88	0.98	0.581	O				5.45
19.583	0.86	0.97	0.580	O				5.44
19.667	0.85	0.96	0.579	O				5.44
19.750	0.84	0.94	0.578	O				5.43
19.833	0.83	0.93	0.578	O				5.42
19.917	0.82	0.92	0.577	O				5.42
20.000	0.81	0.91	0.576	O				5.41
20.083	0.80	0.89	0.576	O				5.41
20.167	0.79	0.88	0.575	O				5.40
20.250	0.78	0.87	0.574	O				5.40
20.333	0.77	0.86	0.574	O				5.39
20.417	0.76	0.85	0.573	O				5.39
20.500	0.75	0.84	0.573	O				5.38
20.583	0.75	0.83	0.572	IO				5.38
20.667	0.74	0.82	0.572	IO				5.37
20.750	0.73	0.81	0.571	IO				5.37
20.833	0.72	0.80	0.571	IO				5.36
20.917	0.72	0.79	0.570	IO				5.36
21.000	0.71	0.78	0.570	IO				5.35
21.083	0.70	0.77	0.569	IO				5.35
21.167	0.70	0.76	0.569	IO				5.35
21.250	0.69	0.75	0.568	IO				5.34
21.333	0.68	0.75	0.568	O				5.34
21.417	0.68	0.74	0.567	O				5.34
21.500	0.67	0.73	0.567	O				5.33
21.583	0.66	0.72	0.566	O				5.33
21.667	0.66	0.72	0.566	O				5.33
21.750	0.65	0.71	0.566	O				5.32
21.833	0.65	0.70	0.565	O				5.32
21.917	0.64	0.70	0.565	O				5.32
22.000	0.64	0.69	0.565	O				5.31
22.083	0.63	0.68	0.564	O				5.31
22.167	0.63	0.68	0.564	O				5.31
22.250	0.62	0.67	0.564	O				5.30
22.333	0.62	0.66	0.563	O				5.30
22.417	0.61	0.66	0.563	O				5.30
22.500	0.61	0.65	0.563	O				5.30
22.583	0.60	0.65	0.562	O				5.29

22.667	0.60	0.64	0.562	O	|	|	|	5.29
22.750	0.60	0.64	0.562	O	|	|	|	5.29
22.833	0.59	0.63	0.561	O	|	|	|	5.29
22.917	0.59	0.63	0.561	O	|	|	|	5.28
23.000	0.58	0.62	0.561	O	|	|	|	5.28
23.083	0.58	0.62	0.561	O	|	|	|	5.28
23.167	0.58	0.61	0.560	O	|	|	|	5.28
23.250	0.57	0.61	0.560	O	|	|	|	5.28
23.333	0.57	0.60	0.560	O	|	|	|	5.27
23.417	0.56	0.60	0.560	O	|	|	|	5.27
23.500	0.56	0.59	0.559	O	|	|	|	5.27
23.583	0.56	0.59	0.559	O	|	|	|	5.27
23.667	0.55	0.59	0.559	O	|	|	|	5.27
23.750	0.55	0.58	0.559	O	|	|	|	5.26
23.833	0.55	0.58	0.558	O	|	|	|	5.26
23.917	0.54	0.57	0.558	O	|	|	|	5.26
24.000	0.54	0.57	0.558	O	|	|	|	5.26
24.083	0.47	0.56	0.558	O	|	|	|	5.26
24.167	0.16	0.53	0.556	O	|	|	|	5.24
24.250	0.02	0.48	0.553	O	|	|	|	5.22
24.333	0.00	0.42	0.550	O	|	|	|	5.19
24.417	0.00	0.37	0.547	O	|	|	|	5.17
24.500	0.00	0.33	0.545	O	|	|	|	5.15
24.583	0.00	0.29	0.543	O	|	|	|	5.13
24.667	0.00	0.26	0.541	O	|	|	|	5.12
24.750	0.00	0.23	0.539	O	|	|	|	5.10
24.833	0.00	0.20	0.538	O	|	|	|	5.09
24.917	0.00	0.18	0.537	O	|	|	|	5.08
25.000	0.00	0.15	0.535	O	|	|	|	5.07
25.083	0.00	0.14	0.534	O	|	|	|	5.06
25.167	0.00	0.12	0.534	O	|	|	|	5.05
25.250	0.00	0.11	0.533	O	|	|	|	5.05
25.333	0.00	0.09	0.532	O	|	|	|	5.04
25.417	0.00	0.08	0.531	O	|	|	|	5.04
25.500	0.00	0.07	0.531	O	|	|	|	5.03
25.583	0.00	0.06	0.530	O	|	|	|	5.03
25.667	0.00	0.06	0.530	O	|	|	|	5.03
25.750	0.00	0.05	0.530	O	|	|	|	5.02
25.833	0.00	0.04	0.529	O	|	|	|	5.02
25.917	0.00	0.04	0.529	O	|	|	|	5.02
26.000	0.00	0.03	0.529	O	|	|	|	5.02
26.083	0.00	0.03	0.529	O	|	|	|	5.01
26.167	0.00	0.03	0.528	O	|	|	|	5.01
26.250	0.00	0.02	0.528	O	|	|	|	5.01
26.333	0.00	0.02	0.528	O	|	|	|	5.01
26.417	0.00	0.02	0.528	O	|	|	|	5.01
26.500	0.00	0.02	0.528	O	|	|	|	5.01
26.583	0.00	0.01	0.528	O	|	|	|	5.01
26.667	0.00	0.01	0.528	O	|	|	|	5.01
26.750	0.00	0.01	0.528	O	|	|	|	5.00
26.833	0.00	0.01	0.527	O	|	|	|	5.00
26.917	0.00	0.01	0.527	O	|	|	|	5.00
27.000	0.00	0.01	0.527	O	|	|	|	5.00
27.083	0.00	0.01	0.527	O	|	|	|	5.00
27.167	0.00	0.01	0.527	O	|	|	|	5.00
27.250	0.00	0.01	0.527	O	|	|	|	5.00
27.333	0.00	0.00	0.527	O	|	|	|	5.00
27.417	0.00	0.00	0.527	O	|	|	|	5.00
27.500	0.00	0.00	0.527	O	|	|	|	5.00
27.583	0.00	0.00	0.527	O	|	|	|	5.00
27.667	0.00	0.00	0.527	O	|	|	|	5.00
27.750	0.00	0.00	0.527	O	|	|	|	5.00
27.833	0.00	0.00	0.527	O	|	|	|	5.00
27.917	0.00	0.00	0.527	O	|	|	|	5.00
28.000	0.00	0.00	0.527	O	|	|	|	5.00
28.083	0.00	0.00	0.527	O	|	|	|	5.00
28.167	0.00	0.00	0.527	O	|	|	|	5.00
28.250	0.00	0.00	0.527	O	|	|	|	5.00
28.333	0.00	0.00	0.527	O	|	|	|	5.00

```
**************************HYDROGRAPH DATA**************************
               Number of intervals =   340
               Time interval =    5.0 (Min.)
               Maximum/Peak flow rate =        9.111 (CFS)
               Total volume =       2.487 (Ac.Ft)
        Status of hydrographs being held in storage
                  Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)      0.000     0.000     0.000     0.000     0.000
        Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
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Appendix K

Hydraulic Analysis
(To be prepared in Final Engineering)