PRELIMINARY DRAINAGE STUDY

PEPPER AVE
APN # 0264-201-26, 05, 06

San Bernardino County, California
August 13, 2021
REVISED: December 12, 2021

Prepared for:

Howard Industrial Partners, LLCs
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Report Prepared By:

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JN 17-006

This report has been prepared by or under the direction of the following registered civil engineer who attests to the technical information contained herein. The registered civil engineer has also judged the qualifications of any technical specialists providing engineering data upon which recommendations, conclusions, and decisions are based.

12/14/2021

Francisco Martinez RCE Registered Civil Engineer	Date	Seal

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APPENDICES

I. PURPOSE AND SCOPE

The purpose of this study is to determine the necessary drainage improvements and HCOC mitigation required for the Pepper Avenue project and proposed for industrial development.

The scope of this study includes the following:

1. Determination of points of flow concentration and watershed subareas for onsite and offsite areas.
2. Determination of the 100-year peak storm flows based upon the post-project onsite and existing condition offsite areas utilizing the Rational Method as outlined in the San Bernardino County Flood Control Hydrology Manual.
3. Determine the 100-year peak storm flows based upon the pre-project and post-project condition for the 24-hour storm duration utilizing the Unit Hydrograph Method as outlined in the San Bernardino County Flood Control Hydrology Manual.
4. Determine the required underground retention facilities and outlet control structure to mitigate the 100-year peak storm flows for the 24-hour storm duration in the post-project condition to flows less than or equal to the 100-year peak flow rate for existing conditions.
5. Determine the required storm drain infrastructure to flood protect the project site for the 100-year, 1-hour storm event.
6. Determine the required outlet control structure to safely by-pass the 100-year peak storm event.
7. Preparation of a hydrology report, which consist of hydrological and analytical results and exhibits.

II. PROJECT SITE AND DRAINAGE AREA OVERVIEW

The Pepper Avenue project is a proposed industrial building comprised of truck, trailer, car parking, landscape areas, an onsite storm drain system with a retention/infiltration subsurface system. The site is comprised of three parcels that are designated under the specific plan as community commercial with a total acreage of 23.70 acres; located in the City of Rialto, bounded by a vacant lot owned by State Sand & Gravel Company Inc to the north, a vacant lot owned West Valley Water District facility to the south, a Riverside Highland Water Company facility to the east and Pepper Avenue to the west (see Figure 1). Just east of the Riverside Highland Water Company property is a railroad owned by the Southern Pacific Company. This railroad runs along the westerly bank of the Lytle Creek which is also the westerly limits of the floodway, and drains to the Santa Ana River. See FEMA FIRM Map number 06071C7940J, revised September 2, 2016 (see Appendix F).

The project site is currently on undeveloped vacant land with sparse ornamentals, grasslands and shrubs. The site is considered relatively flat, and generally drains in a south east direction. There are no offsite flows entering the site, however, roughly 4.7 acres from the northerly property drains in a southeast direction towards the site, flows are intercepted by an existing earthen ditch that lays more or less along the northerly boundary and convey flows easterly towards the railroad tracks.

III. HYDROLOGY

The San Bernardino County Hydrology Manual (Reference 1) was used to develop the hydrological parameters for the hydrology analyses. The rational method and unit hydrograph method were used for the analyses and the computations were performed using the computer program developed by Civil CADD/Civil Design.

The rainfall depths used in the hydrology calculations for the rational method and the unit hydrograph method are as follows:

Storm Event & Duration	Rainfall (inches)
2-Year, 1-Hour	**0.637**
2-Year, 6-Hour	**1.61**
2-Year, 24-Hour	**2.94**
100-Year, 1-Hour	**1.64**
100-Year, 6-Hour	**3.74**
100-Year, 24-Hour	**6.86**

The rainfall depths were obtained from NOAA Atlas 14, which has been included in Appendix F.

The existing soil classification for the area consists of Hydrologic Soil Group "A", as shown in Appendix F; it is a Soils Map obtained from the USDA Websoil Survey. For 100-year storm events, Antecedent Moisture Condition (AMC) II was utilized.

The hydrology utilized the following land use covers:

Land Use Cover	Runoff Index Number (Soil "A")	Pervious Ratio
Urban Covers – Residential or Commercial landscaping	32	1.0
Commercial	98	0.1

The pre-developed rational method analysis was analyzed as "Urban Covers – Residential or Commercial Landscaping". In the post-development condition, the undisturbed area was analyzed as "Urban Covers – Residential or Commercial landscaping", while the proposed improvements were analyzed using "Commercial" covers.

Rational Method Analyses

The Rational Method analysis for both the existing and proposed conditions considered a single watershed area designated as "A", and on offsite watershed area designated as "X". Both watersheds are tributary to the Lytle Creek. Which ultimately discharges into the Santa Ana River.

The Rational Method Analysis results are shown in table on the following page:

TABLE 1. RATIONAL METHOD - ONSITE (Q_{100} YEAR, 1-HOUR)				
WATERSHED AREA	STORM EVENT (1-HOUR)	EXISTING CONDITIONS Q (CFS)	PROPOSED CONDITIONS Q (CFS)	DELTA Q(CFS)
A	100	21.40	75.50	54.10

Unit Hydrograph Analyses

To determine the increased runoff mitigation required for the project, a Unit Hydrograph calculation was performed for the existing and the proposed onsite conditions. For the existing and proposed conditions area "A" was analyzed.

The unit hydrographs were performed using a lag time that was calculated by the following formula:

Lag (hrs) = TC_{RM} (hrs) x 80%, where TC_{RM} is the corresponding rational method time of concentration.

The pre project unit hydrograph calculations utilized urban residential or commercial landscaping good cover, with a pervious ratio of 1.0 was used for conservative purposes. The post project condition perviousness was calculated using a unit area method to determine the average perviousness for each subarea.

The following tables summarize the unit hydrograph calculations:

TABLE 2. UNIT HYDROGRAPH VOLUME ANALYSIS					
WATERSHED AREA	STORM EVENT	EXISTING PEAK Q (CFS)	PROPOSED PEAK Q (CFS)	EXISTING TOTAL VOLUME (AF)	PROPOSED TOTAL VOLUME (AF)
A	100	26.33	76.78	1.95	12.05

IV. HYDRAULICS

The project will utilize a combination of surface improvements, subsurface storm drain, drainage inlets, swales, and gutters to collect and convey peak flows to an underground detention system. The mitigated storm volume is defined as 95% of the total proposed volume for the 2-year storm, minus the total volume of the existing 2-year storm. The outlet control structure will mitigate for both the water quality volume and the mitigated 2-year storm volume. Flows in excess of the mitigated 2-year storm will pass through the outlet control structure (weir) to control and mitigate storm flows not to exceed the HCOC

maximum allowable discharge (See Table 3). All storm flows in excess of the 100-year storm will be bypassed using a rectangular weir structure and convey the overflow into its natural drainage course, through the culvert system to the east of the project and ultimately into the Lytle Creek.

The offsite area "X" to the north of our project will not make it onsite and will instead bypass the onsite flows. During the existing condition an offsite earthen swale was picking up the flows to the north and conveying them to the east where the flows would exit the project limits and sheet flow to the Lytle Creek. In the proposed condition this earthen swale was regraded in order to improve channelization of flows but still maintained its natural drainage course and tributary area. The offsite bypass system is being proposed in order to maintain the original drainage patterns and to not comingle the offsite and onsite storm drain flows.

For preliminary purposes, two inlets will collect the 100-year peak flow for the developed condition and a storm drain system will convey these flows into a pair of underground detention basins. The proposed underground detention basins are set at the same invert elevation and connected via an equalization pipe. The equalization pipe will be designed to have a high point in order to ensure the water flows into the detention basin in cases of flows in excess of the 100-year storm. A 36" outlet pipe was sized in order to handle the 100-year peak flow in the event that it by-passes the underground chambers. A proposed outlet structure will mitigate and restrict flows in excess of the 2-year mitigated volume to the maximum mitigated storm drain flow rate to its natural drainage course, through a culvert system to the east of the project and ultimately into the Lytle Creek.

V. INCREASED RUNOFF MITIGATION

The project site will utilize an underground detention system to mitigate flows for increased runoff. This system will also serve as the water quality treatment facility for the project site. The water quality calculations and discussion have been provided in the Water Quality Management Plan. The required water quality volume for the project site is 112,165 ft^3 (5.54 acre-ft), and the calculation for the Design Capture Volume (DCV) has been included in Appendix E.

To store the required water quality volume, infiltrate the volume and mitigate for increased runoff, the underground infiltration and retention chambers are set at 7.0 feet deep with a bottom elevation of 1264.8.

Infiltration testing will be performed within the proposed basin location, and referenced as Detention System "A". The area in Detention System "A" provides a rate of approximately 3.9 in/hr, which is the recommendation from the geotechnical report, and after applying a safety factor in accordance with the technical guidance manual, the design infiltration rate is calculated to be 0.80 in/hr, this rate was utilized in the design of the chamber system. A worksheet has been included in Appendix F. To determine a flow rate through the soil that could be utilized in the basin routing calculations (to be performed in the final engineering phase), the infiltration rate was multiplied by the bottom surface area of the subsurface underground infiltration and retention system. The bottom surface area of the infiltration system is 31,784 ft^2, converting the calculated design infiltration rate to the appropriate units and multiplying by the surface area, the equivalent flow rate for the infiltration system is 1.32 ft^3/s. This flow rate will be utilized in the basin routing analyses during the final engineering phase.

Since the water quality volume (DCV) must infiltrate through the detention system bottom, the underground detention outlet structure did not include outlets below the DCV and the hydrologic conditions of concern (HCOC) retention required volume elevations. This would allow the water quality volume to pond and infiltrate through the soil. In addition, the proposed development must also

provide flow rate and volume reduction as mitigation to meet the HCOC requirements. Storm flows above the HCOC retention required volume will be released, and the discharge flow rates will be metered using an outlet control structure so they do not exceed the HCOC maximum allowable; except that the 100-year frequency storm event as previously noted will safely by-pass through the control structures and emergency spillway. The following section provides more detail on how the HCOC flow rate and volume are being estimated.

Stormwater mitigation information for watershed "A" can be seen in the table provided below:

TABLE 3. UNIT HYDROGRAPH VOLUME ANALYSIS

WATERSHED AREA	STORM EVENT	EXISTING PEAK Q (CFS)	EXISTING TOTAL STORM VOLUME (AF)	PROPOSED PEAK Q (CFS)	PROPOSED TOTAL STORM VOLUME (AF)	**HCOC MAXIMUM ALLOWABLE DISCHARGE (CFS)	*HCOC RETENTION REQUIRED VOLUME (AF)	PROPOSED MITIGATED DISCHARGE (CFS)	U/G RETENTION VOLUME (AF)	STORM CAPTURE
A	2	4.61	0.49	27.35	4.89	5.56	4.16	9.41	5.54	100%

*PER WQMP FORM 4.2-3. VOLUME REDUCTION REQUIRED TO MEET HCOCS = 180,880 FT^3

** PER WQMP FORM 4.2-5 (ITEM 14) - (ITEM 15) = MAXIMUM FLOW RATE DISCHARGE TO MEET HCOC'S

The total mitigation volume required for watershed area "A" was determined per the WQMP form 4.2-3, volume reduction required to meet HCOC's. The required retention volume for HCOC's was calculated by subtracting the 2-year, 24-Hour existing condition storm total volume from 95% of the total 2-year, 24-Hour proposed condition storm volume (see Table 4). The maximum discharge flow rate for HCOCs was determined per the WQMP form 4.2-5 by subtracting item 15 form item 14. We then selected the flow rates from the recess limb of the proposed unit hydrograph runs that are equal or less than the "HCOC Retention Required Volume"; and they were compiled and shown in Table 4 under the "Mitigated Discharge" column. The proposed underground detention system has been sized to accommodate this volume which corresponds to the "HCOC Retention Required Volume" column from Table 4 (e.g. underground retention system V= 5.54Acre-ft), thus a conservative approach.

VI. FINDINGS

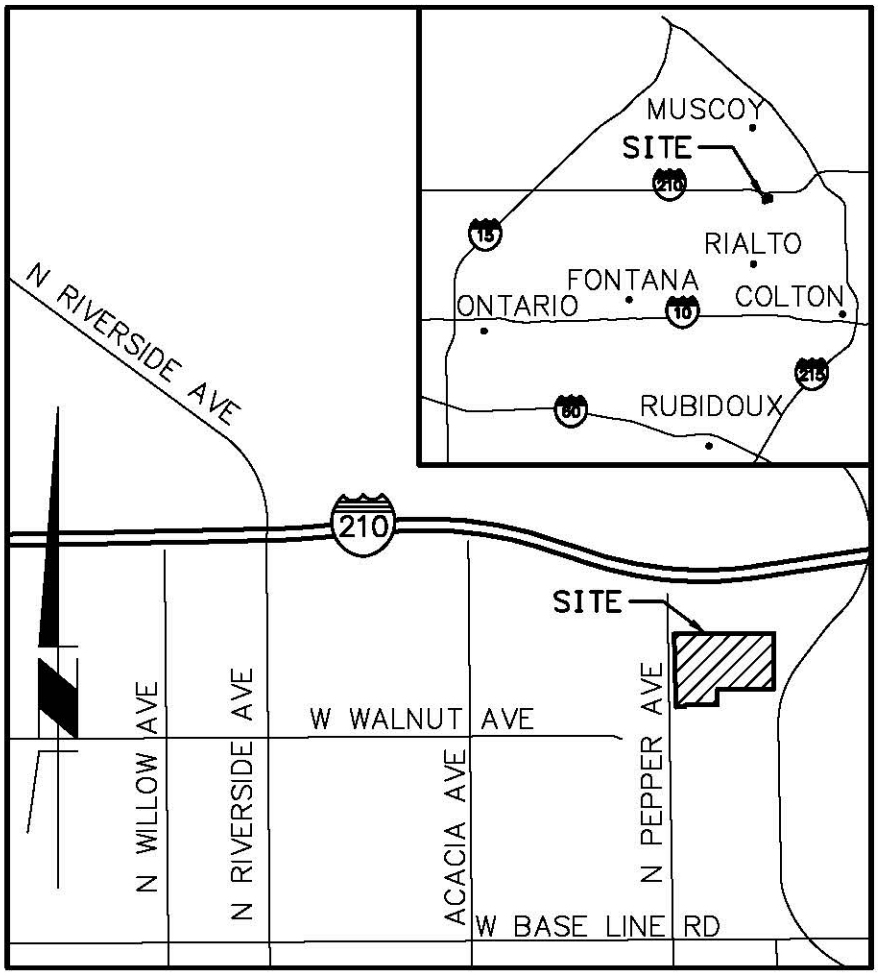
The hydrology analyses evaluated the proposed development to determine the necessary drainage improvements required to mitigate flows for increased runoff. It has been concluded that:

1. The proposed drainage facilities will adequately convey the 100-year flows and provide flood protection to the project site.
2. The proposed retention/infiltration subsurface system will adequately mitigate for water quality and increased runoff.

VII. REFERENCES

1. San Bernardino Flood Control Hydrology Manual, August 1986.
2. Brater, Ernest F., and Horace Williams King. 1976. *Handbook of Hydraulics for the Solution of Hydraulic Engineering Problems.* 6th ed. McGraw-Hill, Inc.
3. San Bernardino Rational Method and Unit Hydrograph modules, CivilDesign Engineering Software Version 9.0.

FIGURE 1:
VICINITY MAP



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PEPPER AVENUE

FIGURE 1
VICINITY MAP

H:\PDATA\19-006 HIP RIALTO PEPPER AVE\DOCS\HYDRO\1. PRELIMINARY\CAD\19-006-VIC-MAP-001.DWG DANIEL 5/27/2021 11:58 AM

FIGURE 2:

EXISTING CONDITION HYDROLOGY MAP

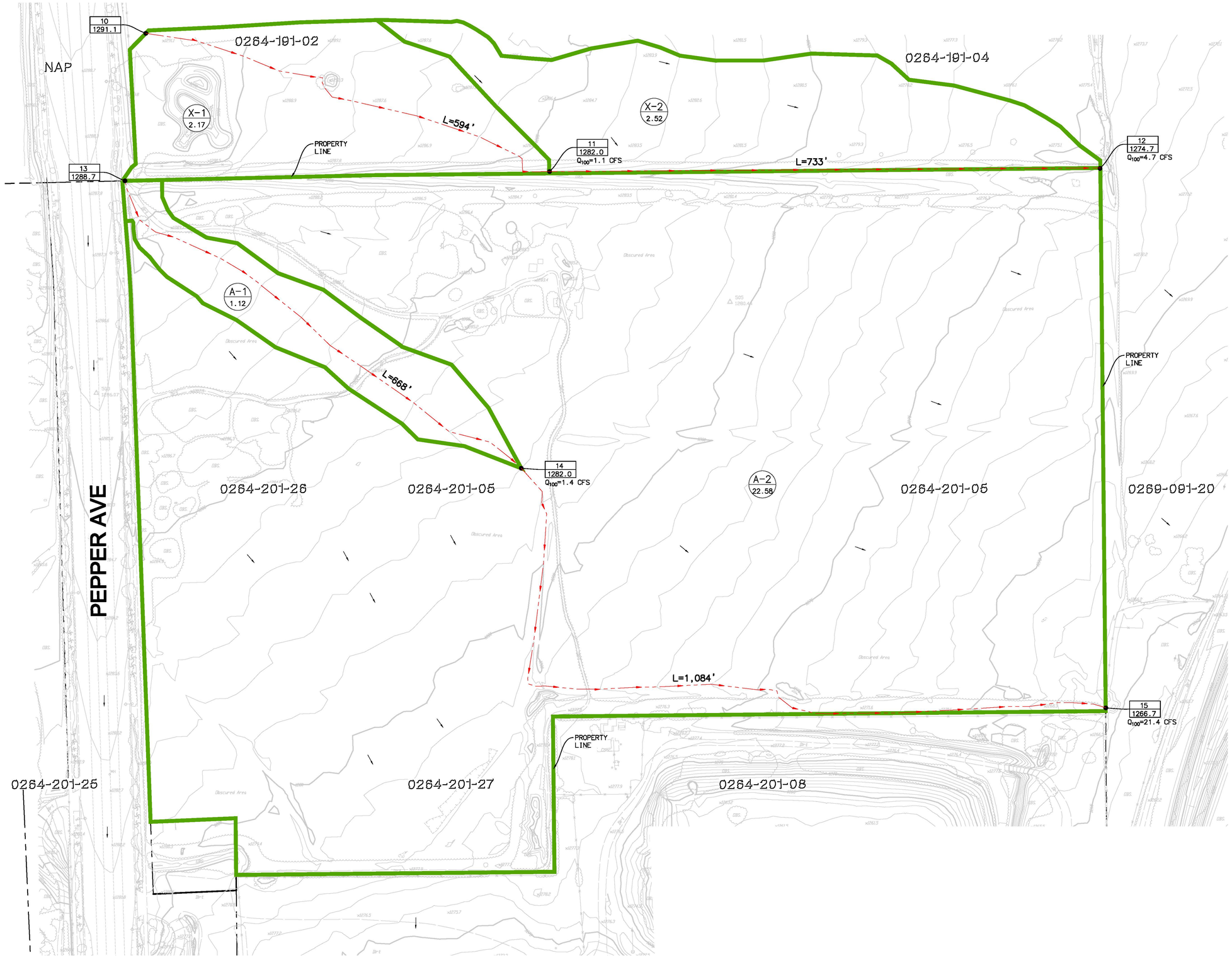

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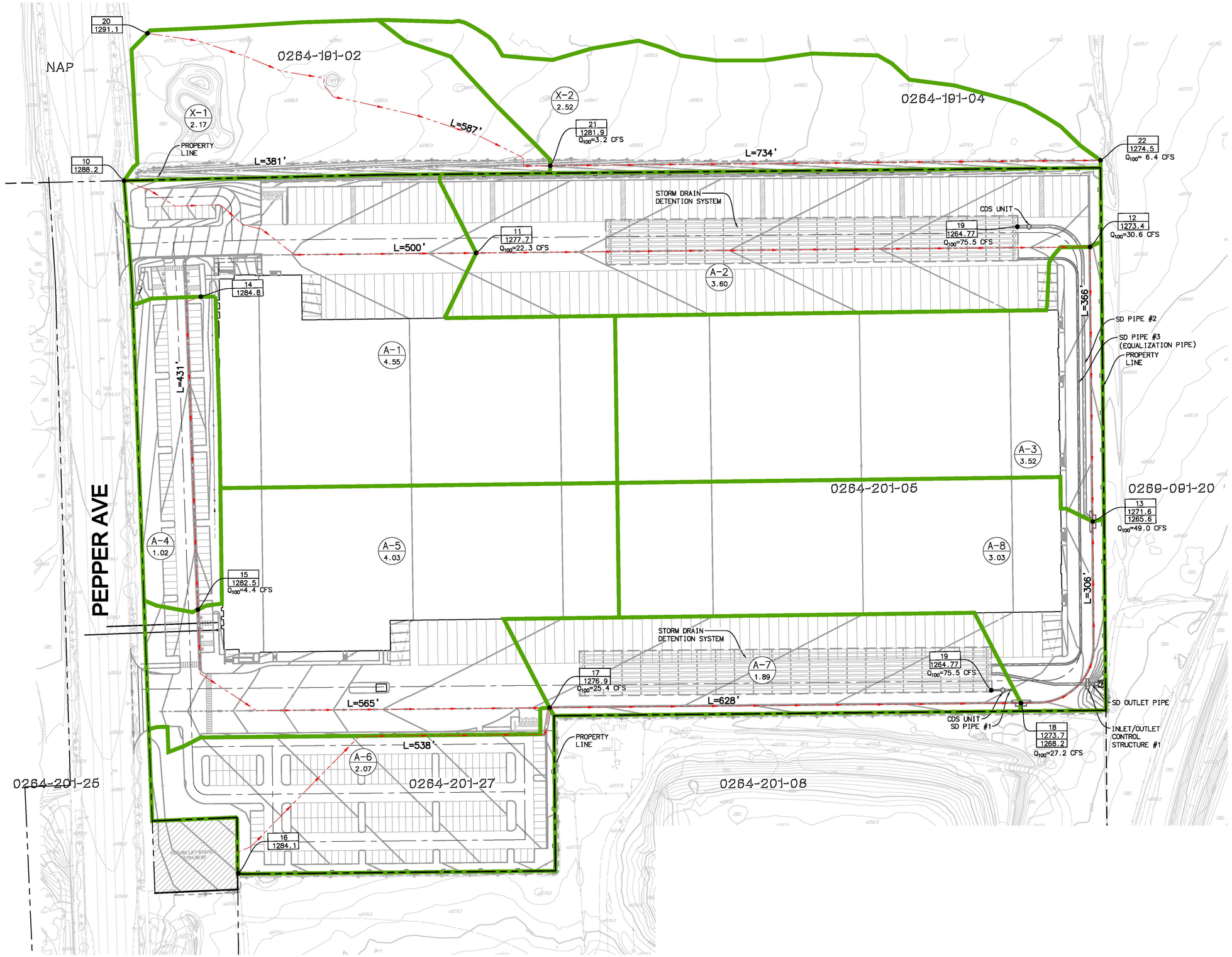
FIGURE 2 - EXISTING CONDITIONS

FIGURE 3:
PROPOSED CONDITION HYDROLOGY MAP



60 30 0 60 120 180

SCALE: 1"=60'

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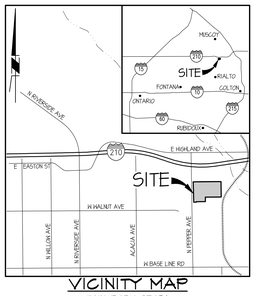
FIGURE 3 - PROPOSED CONDITIONS

FIGURE 4:
PROPOSED CONCEPTUAL GRADING PLANS

CITY OF RIALTO
COUNTY OF SAN BERNARDINO, CALIFORNIA

PEPPER AVENUE INDUSTRIAL BUILDING
CONCEPTUAL GRADING



VICINITY MAP
T01N, R05W, SEC36
NOT TO SCALE

APPLICANT/OWNER
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1144 NORTH TUSTIN STREET, SUITE 122
ORANGE, CA 92865
CONTACT: TIM HOWARD
(TEL)714-769-9155

ARCHITECT
AO ARCHITECTURE
1144 NORTH STREET
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(TEL)714-694-4860

ENGINEER
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PROJECT DESCRIPTION
AN INDUSTRIAL WAREHOUSE FACILITY CONSISTING OF A WAREHOUSE TOTALING 432,000 SQUARE FEET ON 23.82 ACRES.

SITE PLAN KEYNOTES

1. PAINTED CONCRETE TILT-UP WAREHOUSE / OFFICE / MANUFACTURING FACILITY. BUILDING TO BE DESIGNED PER ARCHITECT'S PLANS
2. ON SITE ACCESSIBLE SIDEWALK AND CURB RAMPS.
3. CONCRETE CURB
4. CONCRETE CURB & GUTTER
5. STANDARD PARKING STALL MIN. 9' X 18' - STRIPE PER STANDARDS SHOWN ON ARCHITECT'S PLANS
6. HANDICAP PARKING STALL MIN. 9' X 18' - STRIPE PER STANDARDS SHOWN ON ARCHITECT'S PLANS
7. TRAILER PARKING STALL MIN. 12' X 50' - STRIPE PER STANDARDS SHOWN ON ARCHITECT'S PLANS
8. ACCESSIBLE BUILDING ENTRY WITH ADJACENT BICYCLE RACKS PER ARCHITECT'S PLANS
9. PORTLAND CONC. CEMENT (PCC) PAVED TRUCK YARD ARCHITECT'S PLANS
10. POROUS ASPHALT PAVED PARKING PER ARCHITECT'S PLANS
11. DOCK HIGH TRUCK DOOR PER ARCHITECT'S PLANS
12. GRADE LEVEL RAMP DOOR PER ARCHITECT'S PLANS
13. EXTERIOR MAN DOOR AND STAIRS W/GUARD POST PER ARCHITECT'S PLANS
14. COMMERCIAL DRIVEWAY APPROACH PER SAN BERNARDINO COUNTY STD. 129B, LOCATED PER STD. 130, WITH DECORATIVE CONCRETE PAVING PER ARCHITECT'S PLANS
15. DETENTION BASIN
16. UNDERGROUND STORM WATER CHAMBER SYSTEM
17. LANDSCAPE AREA PER LANDSCAPE ARCHITECT'S PLANS
18. APPROXIMATE LOCATION OF TRASH ENCLOSURE PER ARCHITECT'S PLANS
19. METAL, MANUAL OPERATED SECURITY GATE WITH KNOX-PAD LOCK FOR FIRE DEPARTMENT ACCESS PER ARCHITECT'S PLANS
20. CONCRETE SCREEN WALL PER ARCHITECT'S PLANS
21. COMBINATION SCREEN & RETAINING WALL PER ARCHITECT'S PLANS
22. COMBINATION RETAINING WALL & TUBE STEEL FENCE PER ARCHITECT'S PLANS
23. TUBE STEEL FENCE PER ARCHITECT'S PLANS
24. RETAINING WALL
25. PROPOSED LOCATION OF FUTURE SEWER LIFT STATION (BY OTHERS)

LEGEND

- 1025 — INDEX CONTOUR
- RETAINING WALL
- FENCE
- EDGE OF PAVEMENT
- SIGN
- MH — MANHOLE
- RIGHT OF WAY
- EASEMENT
- PARCEL LINE
- PARCEL MAP BOUNDARY
- STREET CENTER LINE
- SCREEN WALL
- COMBINATION SCREEN/RETAINING WALL
- EXISTING LOT LINE
- RIDGE LINE
- RIBBON GUTTER
- FLOW ARROW
- PROPOSED EDGE OF PAVEMENT
- EX W — EXISTING WATER LINE
- EX SS — EXISTING SWR LINE
- SD — EXISTING STORM DRAIN PIPE
- SD — PROPOSED STORM DRAIN PIPE
- CUT/FILL LINE
- SLOPE SYMBOL
- PROPOSED STREET AC PAVEMENT
- GRIND AND OVERLAY
- POROUS PAVEMENT

SEWER

EXISTING SEWER:
PUBLIC SEWER

PROPOSED SEWER:
PRIVATE & PUBLIC SEWER

UTILITY COMPANIES:

WATER:	WEST VALLEY WATER DISTRICT PHONE: (909) 875-1322 RIALTO WATER SERVICES PHONE: (909) 820-2546
ELECTRIC:	SOUTHERN CALIFORNIA EDISON PHONE: (800) 655-4555
TELEPHONE:	AT&T PHONE: (800) 288-2020
CABLE:	SPECTRUM PHONE: (855) 243-8892
GAS:	SOUTHERN CALIFORNIA GAS COMPANY PHONE: (800) 427-2200
SCHOOL:	RIALTO UNIFIED SCHOOL DISTRICT PHONE: (909) 820-7700
SEWER:	RIALTO WATER SERVICES PHONE: (909) 820-2546

EARTHWORK ESTIMATE:

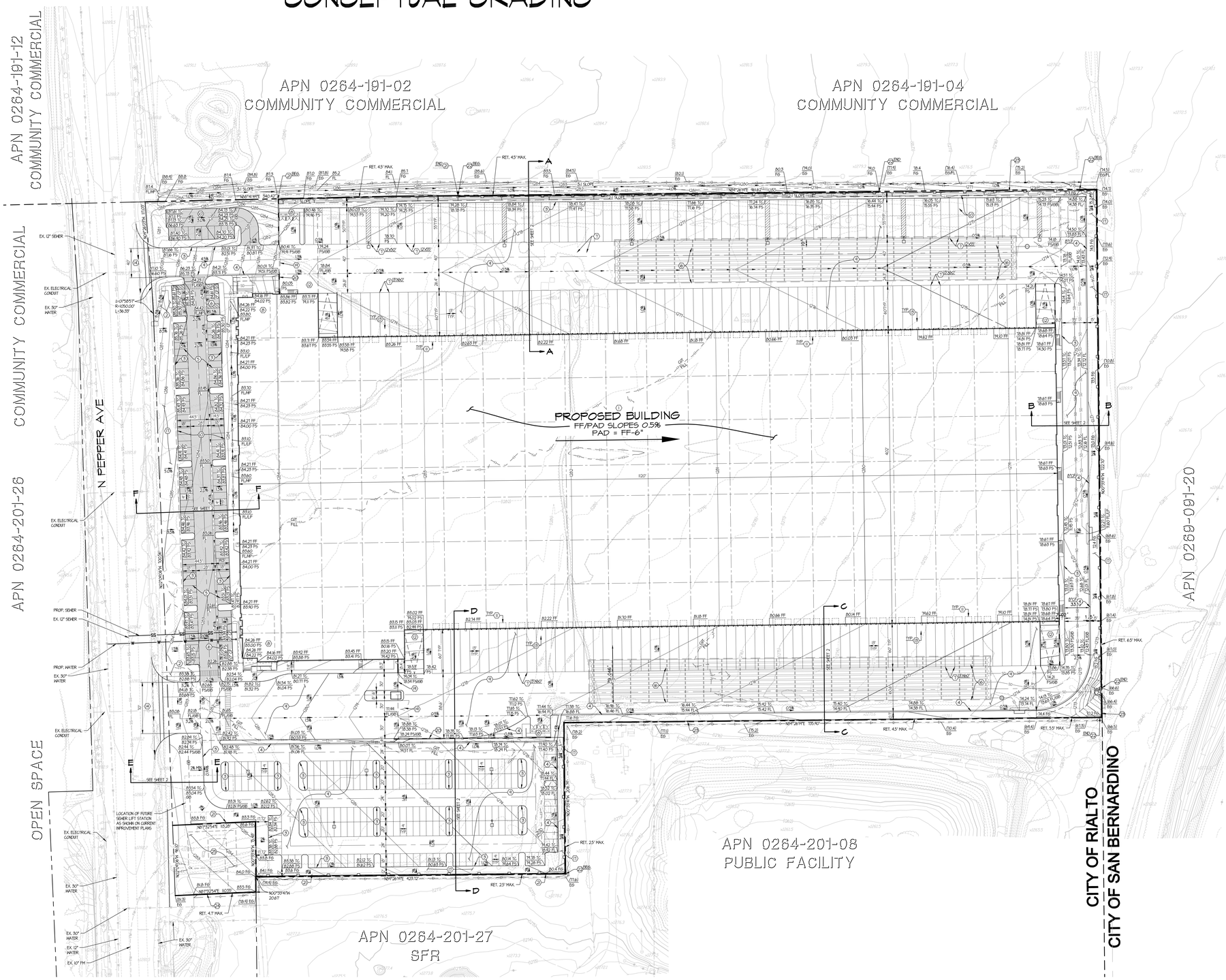
RAW CUT:	62,230 CY
RAW FILL:	49,740 CY
NET:	12,490 CY EXPORT

HAUL TRIPS:
ASSUMED (13 CY PER TRIP) = 961

ZONING ORDINANCE

EXISTING ZONING:
PEPPER AVENUE SPECIFIC PLAN COMMUNITY COMMERCIAL

PROPOSED ZONING:
PEPPER AVENUE SPECIFIC PLAN COMMUNITY COMMERCIAL (ALLOWING WAREHOUSE & LOGISTICS USES)



SAN BERNARDINO COUNTY		
PEPPER AVENUE INDUSTRIAL BUILDING CONCEPTUAL GRADING		
SCALE: AS SHOWN DATE: DEC. 2021 DESIGNED: AJ CHECKED: FM PLN CK REF:	FMCIVIL ENGINEERS INC. 29985 TECHNOLOGY DRIVE, SUITE 306 MURRIETA	CA 92563 951.973.0201 - FMCIVIL.COM	SHEET 1 OF 2 SHEETS

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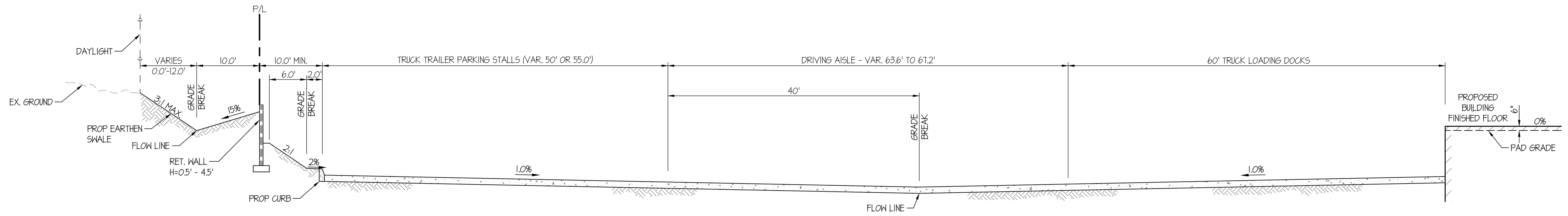
CITY OF RIALTO
COUNTY OF SAN BERNARDINO, CALIFORNIA

PEPPER AVENUE INDUSTRIAL BUILDING
CONCEPTUAL GRADING



SECTION A-A
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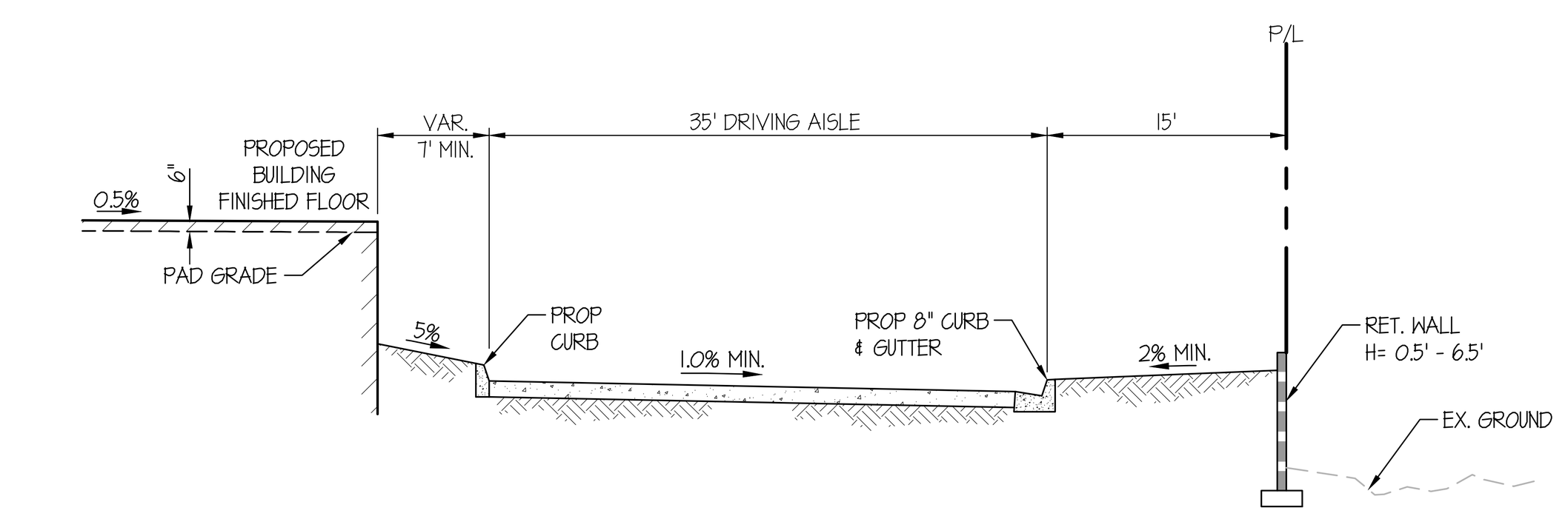
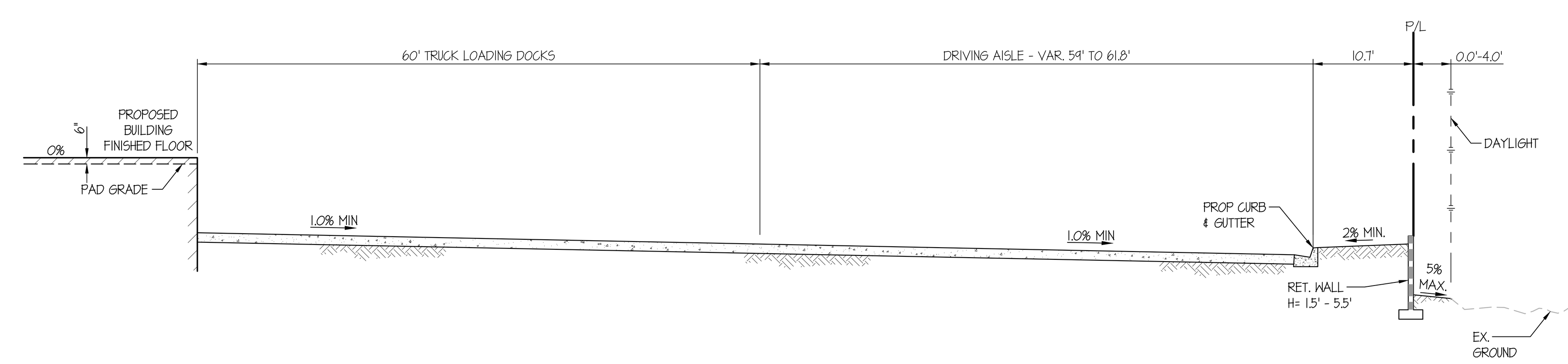


SECTION B-B
HOR. SCALE: 1"=10'



SECTION C-C
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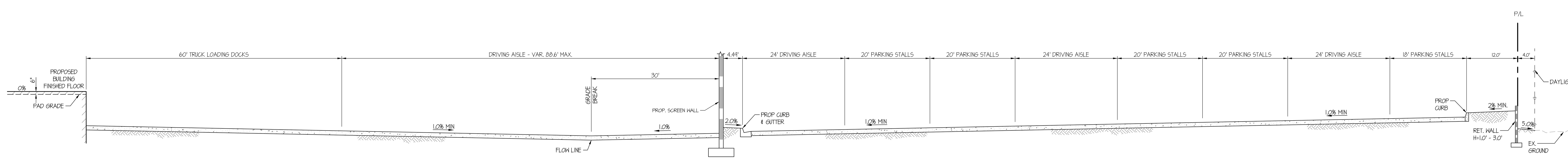

SECTION D-D
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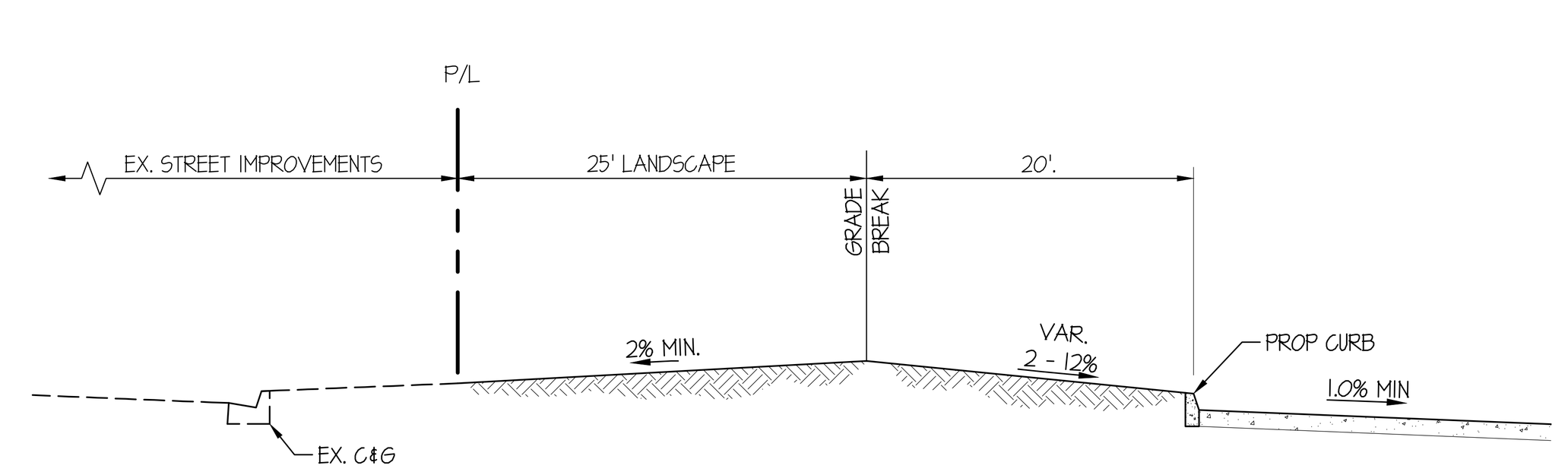

SECTION E-E
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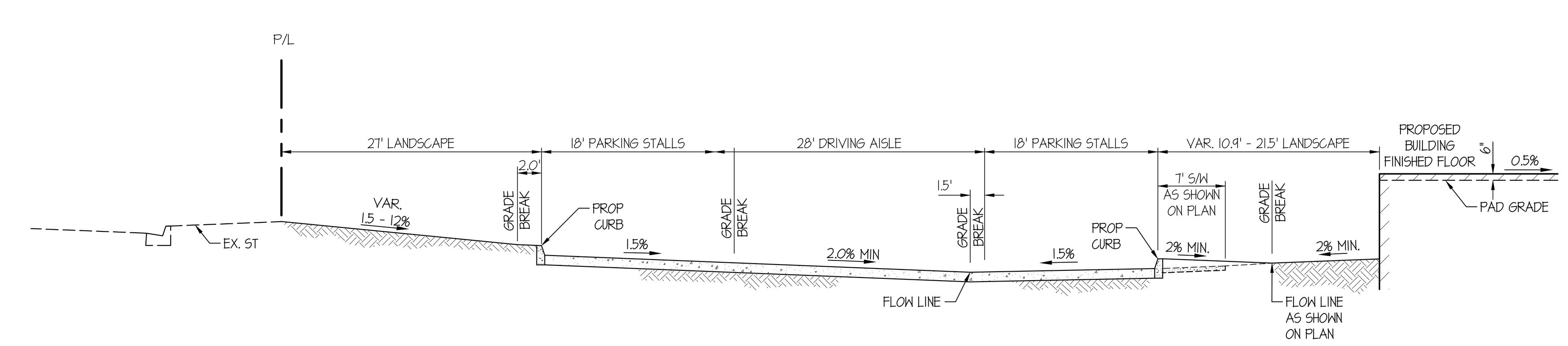

SECTION F-F
HOR. SCALE: 1"=10'

SAN BERNARDINO COUNTY

PEPPER AVENUE
INDUSTRIAL BUILDING
TYPICAL SECTIONS

SCALE:	AS SHOWN
DATE:	DEC. 2021
DESIGNED:	AJ
CHECKED:	FM
PLN CK REF:	

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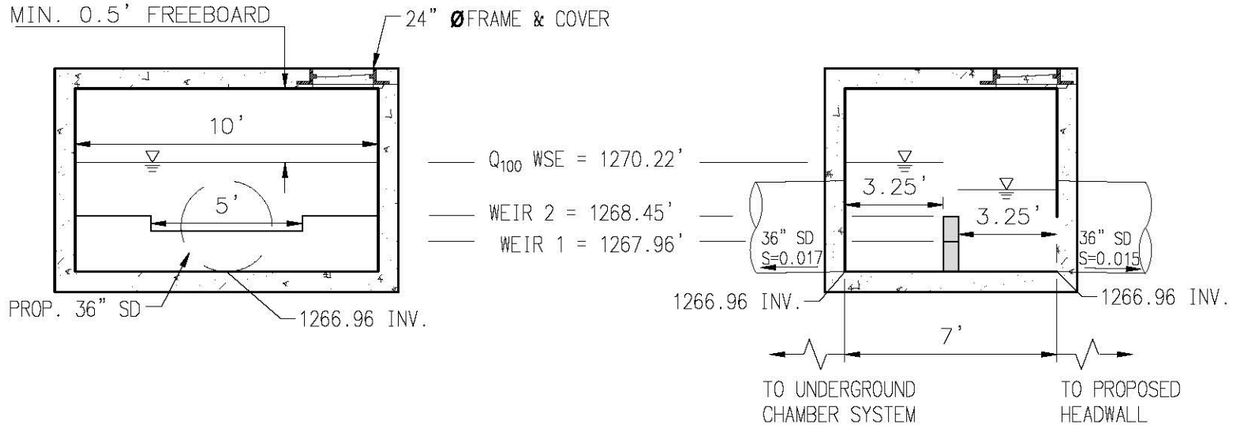
SHEET 2 OF 2 SHEETS

FIGURE 5:
OUTLET CONTROL STRUCTURE DETAIL



OUTLET CONTROL STRUCTURE

UNDERGROUND CHAMBER SYSTEM BOTTOM = 1264.77

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OUTLET CONTROL STRUCTURE DETAIL

1

OF 1 SHEETS

APPENDIX A

RATIONAL METHOD HYDROLOGY – EXISTING CONDITION

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 12/14/21

PEPPER INDUSTRIAL BUILDING
EXISTING CONDITION
100-YEAR STORM EVENT ANALYSIS - WATERSHED A

Program License Serial Number 6405

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.640 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++
Process from Point/Station 13.000 to Point/Station 14.000
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.978(In/Hr)
Initial subarea data:
Initial area flow distance = 668.000(Ft.)
Top (of initial area) elevation = 1288.700(Ft.)
Bottom (of initial area) elevation = 1282.000(Ft.)
Difference in elevation = 6.700(Ft.)
Slope = 0.01003 s(%)= 1.00
TC = k(0.950)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 32.164 min.
Rainfall intensity = 2.384(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.531
Subarea runoff = 1.417(CFS)
Total initial stream area = 1.120(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.978(In/Hr)

++
Process from Point/Station 14.000 to Point/Station 15.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

```
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.272(Ft.), Average velocity =   1.554(Ft/s)
      ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              1.00
      2            100.00              0.00
      3            200.00              1.00
Manning's 'N' friction factor =   0.030
------------------------------------------------------------------
Sub-Channel flow  =     11.460(CFS)
  '     '    flow top width =     54.305(Ft.)
  '     '    velocity=    1.554(Ft/s)
  '     '    area =      7.372(Sq.Ft)
  '     '    Froude number =     0.743

Upstream point elevation =  1282.000(Ft.)
Downstream point elevation =  1266.700(Ft.)
Flow length =  1084.000(Ft.)
Travel time  =   11.62 min.
Time of concentration =   43.79 min.
Depth of flow =   0.272(Ft.)
Average velocity =   1.554(Ft/s)
Total irregular channel flow =    11.460(CFS)
Irregular channel normal depth above invert elev. =   0.272(Ft.)
Average velocity of channel(s) =   1.554(Ft/s)
 Adding area flow to channel
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.978(In/Hr)
Rainfall intensity =      1.981(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.456
Subarea runoff =     19.985(CFS) for   22.580(Ac.)
Total runoff =     21.402(CFS)
Effective area this stream =       23.70(Ac.)
Total Study Area (Main Stream No. 1) =       23.70(Ac.)
Area averaged Fm value =    0.978(In/Hr)
Depth of flow =   0.343(Ft.), Average velocity =   1.817(Ft/s)
End of computations, Total Study Area =           23.70 (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 =  32.0
```

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 12/14/21

PEPPER INDUSTRIAL BUILDING
EXISTING CONDITION
100-YEAR STORM EVENT ANALYSIS - OFFSITE WATERSHED X

Program License Serial Number 6405

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.640 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

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

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.978(In/Hr)
Initial subarea data:
Initial area flow distance = 594.000(Ft.)
Top (of initial area) elevation = 1291.100(Ft.)
Bottom (of initial area) elevation = 1282.000(Ft.)
Difference in elevation = 9.100(Ft.)
Slope = 0.01532 s(%)= 1.53
TC = k(0.950)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 28.196 min.
Rainfall intensity = 2.580(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.559
Subarea runoff = 3.129(CFS)
Total initial stream area = 2.170(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.978(In/Hr)

++
Process from Point/Station 11.000 to Point/Station 12.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

```
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.195(Ft.), Average velocity =   1.046(Ft/s)
      ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              1.00
      2            100.00              0.00
      3            200.00              1.00
Manning's 'N' friction factor =   0.030
------------------------------------------------------------------
Sub-Channel flow  =      3.962(CFS)
  '     '    flow top width =     38.927(Ft.)
  '     '    velocity=    1.046(Ft/s)
  '     '    area =      3.788(Sq.Ft)
  '     '    Froude number =     0.591

Upstream point elevation =  1282.000(Ft.)
Downstream point elevation =  1274.700(Ft.)
Flow length =   733.000(Ft.)
Travel time  =   11.68 min.
Time of concentration =   39.88 min.
Depth of flow =   0.195(Ft.)
Average velocity =   1.046(Ft/s)
Total irregular channel flow =     3.962(CFS)
Irregular channel normal depth above invert elev. =   0.195(Ft.)
Average velocity of channel(s) =   1.046(Ft/s)
 Adding area flow to channel
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.978(In/Hr)
Rainfall intensity =      2.096(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.480
Subarea runoff =      1.589(CFS) for    2.520(Ac.)
Total runoff =      4.718(CFS)
Effective area this stream =        4.69(Ac.)
Total Study Area (Main Stream No. 1) =        4.69(Ac.)
Area averaged Fm value =    0.978(In/Hr)
Depth of flow =   0.208(Ft.), Average velocity =   1.092(Ft/s)
End of computations, Total Study Area =            4.69 (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 =  32.0
```

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 12/14/21

PEPPER INDUSTRIAL BUILDING
EXISTING CONDITION
2-YEAR STORM EVENT ANALYSIS - WATERSHED A

Program License Serial Number 6405

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

Rational hydrology study storm event year is 2.0
Computed rainfall intensity:
Storm year = 2.00 1 hour rainfall = 0.637 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++
Process from Point/Station 13.000 to Point/Station 14.000
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 50.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.810(In/Hr)
Initial subarea data:
Initial area flow distance = 668.000(Ft.)
Top (of initial area) elevation = 1288.700(Ft.)
Bottom (of initial area) elevation = 1282.000(Ft.)
Difference in elevation = 6.700(Ft.)
Slope = 0.01003 s(%)= 1.00
TC = k(0.950)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 32.164 min.
Rainfall intensity = 0.926(In/Hr) for a 2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.113
Subarea runoff = 0.117(CFS)
Total initial stream area = 1.120(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.810(In/Hr)

++
Process from Point/Station 14.000 to Point/Station 15.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

```
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.054(Ft.), Average velocity =   0.530(Ft/s)
      ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              1.00
      2            100.00              0.00
      3            200.00              1.00
Manning's 'N' friction factor =   0.030
------------------------------------------------------------------
Sub-Channel flow  =      0.154(CFS)
  '     '    flow top width =     10.799(Ft.)
  '     '    velocity=    0.530(Ft/s)
  '     '    area =      0.292(Sq.Ft)
  '     '    Froude number =     0.568

Upstream point elevation =  1282.000(Ft.)
Downstream point elevation =  1266.700(Ft.)
Flow length =  1084.000(Ft.)
Travel time  =   34.12 min.
Time of concentration =   66.28 min.
Depth of flow =   0.054(Ft.)
Average velocity =   0.530(Ft/s)
Total irregular channel flow =     0.154(CFS)
Irregular channel normal depth above invert elev. =   0.054(Ft.)
Average velocity of channel(s) =   0.530(Ft/s)
 Adding area flow to channel
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 50.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.810(In/Hr)
The area added to the existing stream causes a
a lower flow rate of Q =      0.000(CFS)
therefore the upstream flow rate of Q =      0.117(CFS) is being used
Rainfall intensity =      0.600(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.000
Subarea runoff =      0.000(CFS) for   22.580(Ac.)
Total runoff =      0.117(CFS)
Effective area this stream =       23.70(Ac.)
Total Study Area (Main Stream No. 1) =       23.70(Ac.)
Area averaged Fm value =    0.810(In/Hr)
Depth of flow =   0.049(Ft.), Average velocity =   0.495(Ft/s)
End of computations, Total Study Area =           23.70 (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 =  50.0
```

APPENDIX B

RATIONAL METHOD HYDROLOGY – PROPOSED CONDITION

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 12/14/21

PEPPER INDUSTRIAL BUILDING
PROPOSED CONDITION
100-YEAR STORM EVENT ANALYSIS - WATERSHED A

Program License Serial Number 6405

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.640 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++
Process from Point/Station 10.000 to Point/Station 11.000
**** 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 = 500.000(Ft.)
Top (of initial area) elevation = 1288.200(Ft.)
Bottom (of initial area) elevation = 1277.700(Ft.)
Difference in elevation = 10.500(Ft.)
Slope = 0.02100 s(%)= 2.10
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 7.907 min.
Rainfall intensity = 5.533(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.884
Subarea runoff = 22.255(CFS)
Total initial stream area = 4.550(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.098(In/Hr)

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station       12.000
**** IMPROVED CHANNEL TRAVEL TIME ****
_____________________________________________________________________________
Upstream point elevation =  1277.700(Ft.)
Downstream point elevation =  1273.400(Ft.)
Channel length thru subarea  =   818.000(Ft.)
Channel base width      =    0.000(Ft.)
Slope or 'Z' of left channel bank =  23.330
Slope or 'Z' of right channel bank =  23.330
Estimated mean flow rate at midpoint of channel =     26.480(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    4.500(Ft.)
Flow(q) thru subarea =     26.480(CFS)
Depth of flow =   0.595(Ft.), Average velocity =   3.201(Ft/s)
Channel flow top width =   27.786(Ft.)
Flow Velocity =    3.20(Ft/s)
Travel time  =    4.26 min.
Time of concentration =   12.17 min.
Critical depth =      0.602(Ft.)
 Adding area flow to channel
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)
Rainfall intensity =      4.272(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.879
Subarea runoff =      8.363(CFS) for    3.600(Ac.)
Total runoff =     30.618(CFS)
Effective area this stream =        8.15(Ac.)
Total Study Area (Main Stream No. 1) =        8.15(Ac.)
Area averaged Fm value =    0.098(In/Hr)
Depth of flow =   0.629(Ft.), Average velocity =   3.319(Ft/s)
Critical depth =      0.641(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       13.000
**** IMPROVED CHANNEL TRAVEL TIME ****
_____________________________________________________________________________
Upstream point elevation =  1273.400(Ft.)
Downstream point elevation =  1271.600(Ft.)
Channel length thru subarea  =   366.000(Ft.)
Channel base width      =    0.000(Ft.)
Slope or 'Z' of left channel bank = 100.000
Slope or 'Z' of right channel bank = 100.000
Estimated mean flow rate at midpoint of channel =     34.790(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    1.300(Ft.)
Flow(q) thru subarea =     34.790(CFS)
Depth of flow =   0.387(Ft.), Average velocity =   2.324(Ft/s)
Channel flow top width =   77.385(Ft.)
Flow Velocity =    2.32(Ft/s)
```

```
Travel time  =    2.62 min.
Time of concentration =   14.79 min.
Critical depth =      0.375(Ft.)
 Adding area flow to channel
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)
Rainfall intensity =      3.800(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.877
Subarea runoff =      8.261(CFS) for    3.520(Ac.)
Total runoff =     38.879(CFS)
Effective area this stream =       11.67(Ac.)
Total Study Area (Main Stream No. 1) =       11.67(Ac.)
Area averaged Fm value =    0.098(In/Hr)
Depth of flow =   0.403(Ft.), Average velocity =   2.389(Ft/s)
Critical depth =      0.395(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       13.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     11.670(Ac.)
Runoff from this stream =     38.879(CFS)
Time of concentration =   14.79 min.
Rainfall intensity =     3.800(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.000 to Point/Station       13.000
**** 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 =   306.000(Ft.)
Top (of initial area) elevation =  1273.700(Ft.)
Bottom (of initial area) elevation =  1271.600(Ft.)
Difference in elevation =     2.100(Ft.)
Slope =    0.00686  s(%)=       0.69
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.126 min.
Rainfall intensity =      5.443(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.884
```

```
Subarea runoff =     14.576(CFS)
Total initial stream area =        3.030(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.000 to Point/Station       13.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      3.030(Ac.)
Runoff from this stream =     14.576(CFS)
Time of concentration =    8.13 min.
Rainfall intensity =     5.443(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     38.88    11.670     14.79    0.098      3.800
2     14.58     3.030      8.13    0.098      5.443
Qmax(1) =
         1.000 *    1.000 *    38.879) +
         0.693 *    1.000 *    14.576) + =      48.974
Qmax(2) =
         1.444 *    0.549 *    38.879) +
         1.000 *    1.000 *    14.576) + =      45.415

Total of 2 streams to confluence:
Flow rates before confluence point:
      38.879      14.576
Maximum flow rates at confluence using above data:
       48.974       45.415
Area of streams before confluence:
       11.670        3.030
Effective area values after confluence:
       14.700        9.441
Results of confluence:
Total flow rate =     48.974(CFS)
Time of concentration =    14.792 min.
Effective stream area after confluence =     14.700(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) =      14.70(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       19.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1265.600(Ft.)
Downstream point/station elevation =  1264.770(Ft.)
Pipe length  =   465.00(Ft.)   Manning's N = 0.013
```

```
No. of pipes = 1  Required pipe flow  =    48.974(CFS)
Nearest computed pipe diameter  =     45.00(In.)
Calculated individual pipe flow  =    48.974(CFS)
Normal flow depth in pipe =   35.34(In.)
Flow top width inside pipe =   36.95(In.)
Critical Depth =   25.70(In.)
Pipe flow velocity =      5.27(Ft/s)
Travel time through pipe =    1.47 min.
Time of concentration (TC) =    16.26 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       19.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     14.700(Ac.)
Runoff from this stream =     48.974(CFS)
Time of concentration =   16.26 min.
Rainfall intensity =     3.589(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       15.000
**** 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 =   431.000(Ft.)
Top (of initial area) elevation =  1284.800(Ft.)
Bottom (of initial area) elevation =  1282.500(Ft.)
Difference in elevation =     2.300(Ft.)
Slope =    0.00534  s(%)=       0.53
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.800 min.
Rainfall intensity =      4.864(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.882
Subarea runoff =      4.376(CFS)
Total initial stream area =        1.020(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station       17.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________________
```

```
Upstream point elevation =  1282.500(Ft.)
Downstream point elevation =  1276.900(Ft.)
Channel length thru subarea  =   565.000(Ft.)
Channel base width      =    0.000(Ft.)
Slope or 'Z' of left channel bank =  48.300
Slope or 'Z' of right channel bank =  48.300
Estimated mean flow rate at midpoint of channel =     11.224(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    1.240(Ft.)
Flow(q) thru subarea =     11.224(CFS)
Depth of flow =   0.292(Ft.), Average velocity =   2.732(Ft/s)
Channel flow top width =   28.173(Ft.)
Flow Velocity =    2.73(Ft/s)
Travel time  =    3.45 min.
Time of concentration =   13.25 min.
Critical depth =      0.320(Ft.)
 Adding area flow to channel
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)
Rainfall intensity =      4.060(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.878
Subarea runoff =     13.631(CFS) for    4.030(Ac.)
Total runoff =     18.006(CFS)
Effective area this stream =        5.05(Ac.)
Total Study Area (Main Stream No. 2) =       19.75(Ac.)
Area averaged Fm value =    0.098(In/Hr)
Depth of flow =   0.348(Ft.), Average velocity =   3.075(Ft/s)
Critical depth =      0.387(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station       17.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      5.050(Ac.)
Runoff from this stream =     18.006(CFS)
Time of concentration =   13.25 min.
Rainfall intensity =     4.060(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.000 to Point/Station       17.000
**** 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 =   538.000(Ft.)
Top (of initial area) elevation =  1284.100(Ft.)
Bottom (of initial area) elevation =  1276.900(Ft.)
Difference in elevation =     7.200(Ft.)
Slope =    0.01338  s(%)=       1.34
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.910 min.
Rainfall intensity =      5.150(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.883
Subarea runoff =      9.412(CFS)
Total initial stream area =        2.070(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.000 to Point/Station       17.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      2.070(Ac.)
Runoff from this stream =      9.412(CFS)
Time of concentration =    8.91 min.
Rainfall intensity =     5.150(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     18.01     5.050     13.25    0.098      4.060
2      9.41     2.070      8.91    0.098      5.150
Qmax(1) =
         1.000 *    1.000 *    18.006) +
         0.784 *    1.000 *     9.412) + =      25.387
Qmax(2) =
         1.275 *    0.673 *    18.006) +
         1.000 *    1.000 *     9.412) + =      24.857

Total of 2 streams to confluence:
Flow rates before confluence point:
      18.006       9.412
Maximum flow rates at confluence using above data:
       25.387       24.857
Area of streams before confluence:
        5.050        2.070
Effective area values after confluence:
        7.120        5.467
Results of confluence:
Total flow rate =     25.387(CFS)
Time of concentration =    13.247 min.
```

```
Effective stream area after confluence =      7.120(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) =       7.12(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       17.000 to Point/Station       18.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =  1276.900(Ft.)
Downstream point elevation =  1273.700(Ft.)
Channel length thru subarea  =   628.000(Ft.)
Channel base width      =    0.000(Ft.)
Slope or 'Z' of left channel bank = 100.000
Slope or 'Z' of right channel bank =  12.500
Estimated mean flow rate at midpoint of channel =     26.326(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    1.240(Ft.)
Flow(q) thru subarea =     26.326(CFS)
Depth of flow =   0.430(Ft.), Average velocity =   2.536(Ft/s)
Channel flow top width =   48.332(Ft.)
Flow Velocity =    2.54(Ft/s)
Travel time  =    4.13 min.
Time of concentration =   17.37 min.
Critical depth =      0.422(Ft.)
 Adding area flow to channel
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)
Rainfall intensity =      3.450(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.874
Subarea runoff =      1.795(CFS) for    1.890(Ac.)
Total runoff =     27.181(CFS)
Effective area this stream =        9.01(Ac.)
Total Study Area (Main Stream No. 2) =       23.71(Ac.)
Area averaged Fm value =    0.098(In/Hr)
Depth of flow =   0.435(Ft.), Average velocity =   2.556(Ft/s)
Critical depth =      0.430(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.000 to Point/Station       19.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1268.200(Ft.)
Downstream point/station elevation =  1264.770(Ft.)
Pipe length  =    50.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    27.181(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    27.181(CFS)
Normal flow depth in pipe =   14.55(In.)
```

```
Flow top width inside pipe =   14.16(In.)
Critical depth could not be calculated.
Pipe flow velocity =     17.75(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =    17.42 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.000 to Point/Station       19.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      9.010(Ac.)
Runoff from this stream =     27.181(CFS)
Time of concentration =   17.42 min.
Rainfall intensity =     3.444(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     48.97    14.700     16.26    0.098      3.589
2     27.18     9.010     17.42    0.098      3.444
Qmax(1) =
         1.000 *    1.000 *    48.974) +
         1.043 *    0.934 *    27.181) + =      75.449
Qmax(2) =
         0.958 *    1.000 *    48.974) +
         1.000 *    1.000 *    27.181) + =      74.119

Total of 2 main streams to confluence:
Flow rates before confluence point:
      49.974      28.181
Maximum flow rates at confluence using above data:
       75.449       74.119
Area of streams before confluence:
       14.700        9.010
Effective area values after confluence:
       23.111       23.710


Results of confluence:
Total flow rate =     75.449(CFS)
Time of concentration =    16.263 min.
Effective stream area after confluence  =     23.111(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.098(In/Hr)
Study area total =      23.71(Ac.)
End of computations, Total Study Area =           23.71 (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

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 12/14/21

PEPPER INDUSTRIAL BUILDING
PROPOSED CONDITION
100-YEAR STORM EVENT ANALYSIS - OFFSITE WATERSHED X

Program License Serial Number 6405

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.640 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++
Process from Point/Station 20.000 to Point/Station 21.000
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.978(In/Hr)
Initial subarea data:
Initial area flow distance = 587.000(Ft.)
Top (of initial area) elevation = 1291.100(Ft.)
Bottom (of initial area) elevation = 1281.900(Ft.)
Difference in elevation = 9.200(Ft.)
Slope = 0.01567 s(%)= 1.57
TC = k(0.950)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 27.935 min.
Rainfall intensity = 2.594(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.561
Subarea runoff = 3.157(CFS)
Total initial stream area = 2.170(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.978(In/Hr)

++
Process from Point/Station 21.000 to Point/Station 22.000

**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1281.900(Ft.)
Downstream point elevation = 1274.500(Ft.)
Channel length thru subarea = 734.000(Ft.)
Channel base width = 5.000(Ft.)
Slope or 'Z' of left channel bank = 0.000
Slope or 'Z' of right channel bank = 0.000
Estimated mean flow rate at midpoint of channel = 4.853(CFS)
Manning's 'N' = 0.005
Maximum depth of channel = 2.500(Ft.)
Flow(q) thru subarea = 4.853(CFS)
Depth of flow = 0.131(Ft.), Average velocity = 7.427(Ft/s)
Channel flow top width = 5.000(Ft.)
Flow Velocity = 7.43(Ft/s)
Travel time = 1.65 min.
Time of concentration = 29.58 min.
Critical depth = 0.309(Ft.)
Adding area flow to channel
Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.978(In/Hr)
Rainfall intensity = 2.507(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area,(total area with modified rational method)(Q=KCIA) is C = 0.549
Subarea runoff = 3.297(CFS) for 2.520(Ac.)
Total runoff = 6.454(CFS)
Effective area this stream = 4.69(Ac.)
Total Study Area (Main Stream No. 1) = 4.69(Ac.)
Area averaged Fm value = 0.978(In/Hr)
Depth of flow = 0.156(Ft.), Average velocity = 8.293(Ft/s)
Critical depth = 0.375(Ft.)
End of computations, Total Study Area = 4.69 (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 = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 12/14/21

PEPPER INDUSTRIAL BUILDING
PROPOSED CONDITION
2-YEAR STORM EVENT ANALYSIS - WATERSHED A

Program License Serial Number 6405

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

Rational hydrology study storm event year is 2.0
Computed rainfall intensity:
Storm year = 2.00 1 hour rainfall = 0.637 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++
Process from Point/Station 10.000 to Point/Station 11.000
**** 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 = 500.000(Ft.)
Top (of initial area) elevation = 1288.200(Ft.)
Bottom (of initial area) elevation = 1277.700(Ft.)
Difference in elevation = 10.500(Ft.)
Slope = 0.02100 s(%)= 2.10
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 7.907 min.
Rainfall intensity = 2.149(In/Hr) for a 2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.859
Subarea runoff = 8.399(CFS)
Total initial stream area = 4.550(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.098(In/Hr)

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Process from Point/Station       11.000 to Point/Station       12.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________________
Upstream point elevation =  1277.700(Ft.)
Downstream point elevation =  1273.400(Ft.)
Channel length thru subarea  =   818.000(Ft.)
Channel base width      =    0.000(Ft.)
Slope or 'Z' of left channel bank =  23.330
Slope or 'Z' of right channel bank =  23.330
Estimated mean flow rate at midpoint of channel =      9.626(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    4.500(Ft.)
Flow(q) thru subarea =      9.626(CFS)
Depth of flow =   0.407(Ft.), Average velocity =   2.485(Ft/s)
Channel flow top width =   19.011(Ft.)
Flow Velocity =    2.49(Ft/s)
Travel time  =    5.49 min.
Time of concentration =   13.39 min.
Critical depth =      0.402(Ft.)
 Adding area flow to channel
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)
Rainfall intensity =      1.566(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.844
Subarea runoff =      2.373(CFS) for    3.600(Ac.)
Total runoff =     10.772(CFS)
Effective area this stream =        8.15(Ac.)
Total Study Area (Main Stream No. 1) =        8.15(Ac.)
Area averaged Fm value =    0.098(In/Hr)
Depth of flow =   0.425(Ft.), Average velocity =   2.556(Ft/s)
Critical depth =      0.422(Ft.)


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Process from Point/Station       12.000 to Point/Station       13.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________________
Upstream point elevation =  1273.400(Ft.)
Downstream point elevation =  1271.600(Ft.)
Channel length thru subarea  =   366.000(Ft.)
Channel base width      =    0.000(Ft.)
Slope or 'Z' of left channel bank = 100.000
Slope or 'Z' of right channel bank = 100.000
Estimated mean flow rate at midpoint of channel =     12.085(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    1.300(Ft.)
Flow(q) thru subarea =     12.085(CFS)
Depth of flow =   0.260(Ft.), Average velocity =   1.784(Ft/s)
Channel flow top width =   52.054(Ft.)
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Flow Velocity =    1.78(Ft/s)
Travel time  =    3.42 min.
Time of concentration =   16.81 min.
Critical depth =      0.246(Ft.)
 Adding area flow to channel
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)
Rainfall intensity =      1.367(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.836
Subarea runoff =      2.555(CFS) for    3.520(Ac.)
Total runoff =     13.327(CFS)
Effective area this stream =       11.67(Ac.)
Total Study Area (Main Stream No. 1) =       11.67(Ac.)
Area averaged Fm value =    0.098(In/Hr)
Depth of flow =   0.270(Ft.), Average velocity =   1.828(Ft/s)
Critical depth =      0.256(Ft.)


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Process from Point/Station       12.000 to Point/Station       13.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     11.670(Ac.)
Runoff from this stream =     13.327(CFS)
Time of concentration =   16.81 min.
Rainfall intensity =     1.367(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       18.000 to Point/Station       13.000
**** 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 =   306.000(Ft.)
Top (of initial area) elevation =  1273.700(Ft.)
Bottom (of initial area) elevation =  1271.600(Ft.)
Difference in elevation =     2.100(Ft.)
Slope =    0.00686  s(%)=       0.69
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.126 min.
Rainfall intensity =      2.114(In/Hr) for a     2.0 year storm
```

```
Effective runoff coefficient used for area (Q=KCIA) is C = 0.858
Subarea runoff =      5.498(CFS)
Total initial stream area =        3.030(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


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Process from Point/Station       18.000 to Point/Station       13.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      3.030(Ac.)
Runoff from this stream =      5.498(CFS)
Time of concentration =    8.13 min.
Rainfall intensity =     2.114(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     13.33    11.670     16.81    0.098      1.367
2      5.50     3.030      8.13    0.098      2.114
Qmax(1) =
         1.000 *    1.000 *    13.327) +
         0.629 *    1.000 *     5.498) + =      16.787
Qmax(2) =
         1.589 *    0.483 *    13.327) +
         1.000 *    1.000 *     5.498) + =      15.734

Total of 2 streams to confluence:
Flow rates before confluence point:
      13.327       5.498
Maximum flow rates at confluence using above data:
       16.787       15.734
Area of streams before confluence:
       11.670        3.030
Effective area values after confluence:
       14.700        8.670
Results of confluence:
Total flow rate =     16.787(CFS)
Time of concentration =    16.812 min.
Effective stream area after confluence =     14.700(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) =      14.70(Ac.)


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Process from Point/Station       13.000 to Point/Station       19.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1265.600(Ft.)
Downstream point/station elevation =  1264.770(Ft.)
```

```
Pipe length  =   465.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    16.787(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    16.787(CFS)
Normal flow depth in pipe =   23.77(In.)
Flow top width inside pipe =   24.34(In.)
Critical Depth =   16.62(In.)
Pipe flow velocity =      4.02(Ft/s)
Travel time through pipe =    1.93 min.
Time of concentration (TC) =    18.74 min.


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Process from Point/Station       13.000 to Point/Station       19.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     14.700(Ac.)
Runoff from this stream =     16.787(CFS)
Time of concentration =   18.74 min.
Rainfall intensity =     1.281(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Program is now starting with Main Stream No. 2


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Process from Point/Station       14.000 to Point/Station       15.000
**** 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 =   431.000(Ft.)
Top (of initial area) elevation =  1284.800(Ft.)
Bottom (of initial area) elevation =  1282.500(Ft.)
Difference in elevation =     2.300(Ft.)
Slope =    0.00534  s(%)=       0.53
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.800 min.
Rainfall intensity =      1.889(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.853
Subarea runoff =      1.645(CFS)
Total initial stream area =        1.020(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


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Process from Point/Station       15.000 to Point/Station       17.000
**** IMPROVED CHANNEL TRAVEL TIME ****
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```
Upstream point elevation =  1282.500(Ft.)
Downstream point elevation =  1276.900(Ft.)
Channel length thru subarea  =   565.000(Ft.)
Channel base width      =    0.000(Ft.)
Slope or 'Z' of left channel bank =  48.300
Slope or 'Z' of right channel bank =  48.300
Estimated mean flow rate at midpoint of channel =      4.062(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    1.240(Ft.)
Flow(q) thru subarea =      4.062(CFS)
Depth of flow =   0.199(Ft.), Average velocity =   2.119(Ft/s)
Channel flow top width =   19.244(Ft.)
Flow Velocity =    2.12(Ft/s)
Travel time  =    4.44 min.
Time of concentration =   14.24 min.
Critical depth =      0.213(Ft.)
 Adding area flow to channel
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)
Rainfall intensity =      1.510(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.842
Subarea runoff =      4.772(CFS) for    4.030(Ac.)
Total runoff =      6.417(CFS)
Effective area this stream =        5.05(Ac.)
Total Study Area (Main Stream No. 2) =       19.75(Ac.)
Area averaged Fm value =    0.098(In/Hr)
Depth of flow =   0.236(Ft.), Average velocity =   2.376(Ft/s)
Critical depth =      0.256(Ft.)


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Process from Point/Station       15.000 to Point/Station       17.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      5.050(Ac.)
Runoff from this stream =      6.417(CFS)
Time of concentration =   14.24 min.
Rainfall intensity =     1.510(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.000 to Point/Station       17.000
**** 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 =   538.000(Ft.)
Top (of initial area) elevation =  1284.100(Ft.)
Bottom (of initial area) elevation =  1276.900(Ft.)
Difference in elevation =     7.200(Ft.)
Slope =    0.01338  s(%)=       1.34
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.910 min.
Rainfall intensity =      2.000(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.856
Subarea runoff =      3.544(CFS)
Total initial stream area =        2.070(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


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Process from Point/Station       16.000 to Point/Station       17.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      2.070(Ac.)
Runoff from this stream =      3.544(CFS)
Time of concentration =    8.91 min.
Rainfall intensity =     2.000(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      6.42     5.050     14.24    0.098      1.510
2      3.54     2.070      8.91    0.098      2.000
Qmax(1) =
         1.000 *    1.000 *     6.417) +
         0.742 *    1.000 *     3.544) + =       9.047
Qmax(2) =
         1.348 *    0.626 *     6.417) +
         1.000 *    1.000 *     3.544) + =       8.954

Total of 2 streams to confluence:
Flow rates before confluence point:
       6.417       3.544
Maximum flow rates at confluence using above data:
        9.047        8.954
Area of streams before confluence:
        5.050        2.070
Effective area values after confluence:
        7.120        5.229
Results of confluence:
Total flow rate =      9.047(CFS)
```

```
Time of concentration =    14.244 min.
Effective stream area after confluence =      7.120(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) =       7.12(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       17.000 to Point/Station       18.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =  1276.900(Ft.)
Downstream point elevation =  1273.700(Ft.)
Channel length thru subarea  =   628.000(Ft.)
Channel base width      =    0.000(Ft.)
Slope or 'Z' of left channel bank = 100.000
Slope or 'Z' of right channel bank =  12.500
Estimated mean flow rate at midpoint of channel =      9.216(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    1.240(Ft.)
Flow(q) thru subarea =      9.216(CFS)
Depth of flow =   0.290(Ft.), Average velocity =   1.950(Ft/s)
Channel flow top width =   32.605(Ft.)
Flow Velocity =    1.95(Ft/s)
Travel time  =    5.37 min.
Time of concentration =   19.61 min.
Critical depth =      0.277(Ft.)
 Adding area flow to channel
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)
Rainfall intensity =      1.246(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.829
Subarea runoff =      0.265(CFS) for    1.890(Ac.)
Total runoff =      9.312(CFS)
Effective area this stream =        9.01(Ac.)
Total Study Area (Main Stream No. 2) =       23.71(Ac.)
Area averaged Fm value =    0.098(In/Hr)
Depth of flow =   0.291(Ft.), Average velocity =   1.956(Ft/s)
Critical depth =      0.279(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.000 to Point/Station       19.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1268.200(Ft.)
Downstream point/station elevation =  1264.770(Ft.)
Pipe length  =    50.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.312(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     9.312(CFS)
```

```
Normal flow depth in pipe =    9.82(In.)
Flow top width inside pipe =    9.25(In.)
Critical depth could not be calculated.
Pipe flow velocity =     13.54(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =    19.67 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.000 to Point/Station       19.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      9.010(Ac.)
Runoff from this stream =      9.312(CFS)
Time of concentration =   19.67 min.
Rainfall intensity =     1.244(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     16.79    14.700     18.74    0.098      1.281
2      9.31     9.010     19.67    0.098      1.244
Qmax(1) =
         1.000 *    1.000 *    16.787) +
         1.032 *    0.953 *     9.312) + =      25.942
Qmax(2) =
         0.969 *    1.000 *    16.787) +
         1.000 *    1.000 *     9.312) + =      25.577

Total of 2 main streams to confluence:
Flow rates before confluence point:
      17.787      10.312
Maximum flow rates at confluence using above data:
       25.942       25.577
Area of streams before confluence:
       14.700        9.010
Effective area values after confluence:
       23.283       23.710


Results of confluence:
Total flow rate =     25.942(CFS)
Time of concentration =    18.739 min.
Effective stream area after confluence  =     23.283(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.098(In/Hr)
Study area total =      23.71(Ac.)
End of computations, Total Study Area =           23.71 (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 C

PRE – PROJECT CONDITION UNIT HYDROGRAPH HYDROLOGY

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

Study date 12/14/21

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+

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

Program License Serial Number 6405

PEPPER INDUSTRIAL BUILDING
ONSITE EXISTING CONDITION
100-YEAR, 24-HOUR STORM EVENT ANALYSIS

Storm Event Year = 100

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 100		
23.70	1	1.64
Rainfall data for year 100		
23.70	6	3.74
Rainfall data for year 100		
23.70	24	6.86

++

******** 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	23.70	1.000	0.978	1.000	0.978

Area-averaged adjusted loss rate Fm (In/Hr) = 0.978

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
23.70	1.000	32.0	32.0	21.25	0.042

Area-averaged catchment yield fraction, Y = 0.042
Area-averaged low loss fraction, Yb = 0.958
User entry of time of concentration = 0.730 (hours)
++
Watershed area = 23.70(Ac.)
Catchment Lag time = 0.584 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 14.2733
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.978(In/Hr)
Average low loss rate fraction (Yb) = 0.958 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.607(In)
Computed peak 30-minute rainfall = 1.243(In)
Specified peak 1-hour rainfall = 1.640(In)
Computed peak 3-hour rainfall = 2.719(In)
Specified peak 6-hour rainfall = 3.740(In)
Specified peak 24-hour rainfall = 6.860(In)

Rainfall depth area reduction factors:
Using a total area of 23.70(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999 Adjusted rainfall = 0.606(In)
30-minute factor = 0.999 Adjusted rainfall = 1.242(In)
1-hour factor = 0.999 Adjusted rainfall = 1.638(In)
3-hour factor = 1.000 Adjusted rainfall = 2.718(In)
6-hour factor = 1.000 Adjusted rainfall = 3.740(In)
24-hour factor = 1.000 Adjusted rainfall = 6.860(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 = 286.62 (CFS))		
1	0.818	2.345
2	2.823	5.746
3	6.629	10.910
4	13.405	19.419
5	21.858	24.228
6	31.546	27.770
7	43.048	32.967

8	55.777	36.485
9	68.287	35.855
10	76.124	22.461
11	82.388	17.955
12	88.038	16.195
13	90.934	8.299
14	93.639	7.754
15	95.598	5.614
16	96.922	3.797
17	97.865	2.701
18	98.296	1.236
19	98.553	0.736
20	98.810	0.736
21	99.067	0.736
22	99.324	0.736
23	99.581	0.736
24	99.833	0.724
25	100.000	0.478

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.6063	0.6063
2	0.8000	0.1937
3	0.9409	0.1409
4	1.0556	0.1147
5	1.1542	0.0986
6	1.2415	0.0873
7	1.3205	0.0790
8	1.3929	0.0724
9	1.4601	0.0672
10	1.5230	0.0629
11	1.5821	0.0592
12	1.6382	0.0560
13	1.6998	0.0616
14	1.7588	0.0591
15	1.8157	0.0568
16	1.8705	0.0548
17	1.9235	0.0530
18	1.9749	0.0514
19	2.0247	0.0498
20	2.0731	0.0484
21	2.1203	0.0472
22	2.1663	0.0460
23	2.2111	0.0448
24	2.2549	0.0438
25	2.2978	0.0428
26	2.3397	0.0419
27	2.3807	0.0411
28	2.4210	0.0402
29	2.4605	0.0395
30	2.4992	0.0388
31	2.5373	0.0381
32	2.5747	0.0374
33	2.6115	0.0368
34	2.6477	0.0362
35	2.6833	0.0356
36	2.7184	0.0351

37	2.7528	0.0345
38	2.7868	0.0340
39	2.8204	0.0335
40	2.8534	0.0331
41	2.8860	0.0326
42	2.9182	0.0322
43	2.9500	0.0318
44	2.9813	0.0314
45	3.0123	0.0310
46	3.0430	0.0306
47	3.0732	0.0303
48	3.1032	0.0299
49	3.1327	0.0296
50	3.1620	0.0293
51	3.1909	0.0289
52	3.2196	0.0286
53	3.2479	0.0283
54	3.2760	0.0281
55	3.3038	0.0278
56	3.3313	0.0275
57	3.3585	0.0272
58	3.3855	0.0270
59	3.4123	0.0267
60	3.4387	0.0265
61	3.4650	0.0263
62	3.4910	0.0260
63	3.5168	0.0258
64	3.5424	0.0256
65	3.5678	0.0254
66	3.5929	0.0252
67	3.6179	0.0250
68	3.6426	0.0248
69	3.6672	0.0246
70	3.6916	0.0244
71	3.7157	0.0242
72	3.7397	0.0240
73	3.7624	0.0226
74	3.7848	0.0225
75	3.8071	0.0223
76	3.8293	0.0221
77	3.8512	0.0220
78	3.8730	0.0218
79	3.8947	0.0217
80	3.9162	0.0215
81	3.9375	0.0213
82	3.9587	0.0212
83	3.9798	0.0211
84	4.0007	0.0209
85	4.0215	0.0208
86	4.0421	0.0206
87	4.0626	0.0205
88	4.0830	0.0204
89	4.1032	0.0202
90	4.1233	0.0201
91	4.1433	0.0200
92	4.1632	0.0199
93	4.1829	0.0197

94	4.2026	0.0196
95	4.2221	0.0195
96	4.2415	0.0194
97	4.2607	0.0193
98	4.2799	0.0192
99	4.2990	0.0191
100	4.3179	0.0189
101	4.3367	0.0188
102	4.3555	0.0187
103	4.3741	0.0186
104	4.3927	0.0185
105	4.4111	0.0184
106	4.4294	0.0183
107	4.4477	0.0182
108	4.4658	0.0181
109	4.4839	0.0180
110	4.5018	0.0180
111	4.5197	0.0179
112	4.5374	0.0178
113	4.5551	0.0177
114	4.5727	0.0176
115	4.5902	0.0175
116	4.6077	0.0174
117	4.6250	0.0173
118	4.6423	0.0173
119	4.6594	0.0172
120	4.6765	0.0171
121	4.6936	0.0170
122	4.7105	0.0169
123	4.7273	0.0169
124	4.7441	0.0168
125	4.7608	0.0167
126	4.7775	0.0166
127	4.7940	0.0166
128	4.8105	0.0165
129	4.8269	0.0164
130	4.8432	0.0163
131	4.8595	0.0163
132	4.8757	0.0162
133	4.8918	0.0161
134	4.9079	0.0161
135	4.9239	0.0160
136	4.9398	0.0159
137	4.9557	0.0159
138	4.9715	0.0158
139	4.9872	0.0157
140	5.0029	0.0157
141	5.0185	0.0156
142	5.0340	0.0155
143	5.0495	0.0155
144	5.0650	0.0154
145	5.0803	0.0154
146	5.0956	0.0153
147	5.1109	0.0152
148	5.1260	0.0152
149	5.1412	0.0151
150	5.1562	0.0151

151	5.1713	0.0150
152	5.1862	0.0150
153	5.2011	0.0149
154	5.2160	0.0148
155	5.2308	0.0148
156	5.2455	0.0147
157	5.2602	0.0147
158	5.2748	0.0146
159	5.2894	0.0146
160	5.3040	0.0145
161	5.3184	0.0145
162	5.3329	0.0144
163	5.3472	0.0144
164	5.3616	0.0143
165	5.3759	0.0143
166	5.3901	0.0142
167	5.4043	0.0142
168	5.4184	0.0141
169	5.4325	0.0141
170	5.4466	0.0140
171	5.4605	0.0140
172	5.4745	0.0140
173	5.4884	0.0139
174	5.5023	0.0139
175	5.5161	0.0138
176	5.5299	0.0138
177	5.5436	0.0137
178	5.5573	0.0137
179	5.5709	0.0136
180	5.5845	0.0136
181	5.5981	0.0136
182	5.6116	0.0135
183	5.6250	0.0135
184	5.6385	0.0134
185	5.6519	0.0134
186	5.6652	0.0133
187	5.6785	0.0133
188	5.6918	0.0133
189	5.7050	0.0132
190	5.7182	0.0132
191	5.7314	0.0132
192	5.7445	0.0131
193	5.7576	0.0131
194	5.7706	0.0130
195	5.7836	0.0130
196	5.7965	0.0130
197	5.8095	0.0129
198	5.8224	0.0129
199	5.8352	0.0129
200	5.8480	0.0128
201	5.8608	0.0128
202	5.8735	0.0127
203	5.8863	0.0127
204	5.8989	0.0127
205	5.9116	0.0126
206	5.9242	0.0126
207	5.9367	0.0126

208	5.9493	0.0125
209	5.9618	0.0125
210	5.9742	0.0125
211	5.9867	0.0124
212	5.9991	0.0124
213	6.0114	0.0124
214	6.0238	0.0123
215	6.0361	0.0123
216	6.0483	0.0123
217	6.0606	0.0122
218	6.0728	0.0122
219	6.0850	0.0122
220	6.0971	0.0121
221	6.1092	0.0121
222	6.1213	0.0121
223	6.1333	0.0121
224	6.1454	0.0120
225	6.1574	0.0120
226	6.1693	0.0120
227	6.1812	0.0119
228	6.1932	0.0119
229	6.2050	0.0119
230	6.2169	0.0118
231	6.2287	0.0118
232	6.2405	0.0118
233	6.2522	0.0118
234	6.2640	0.0117
235	6.2757	0.0117
236	6.2873	0.0117
237	6.2990	0.0116
238	6.3106	0.0116
239	6.3222	0.0116
240	6.3337	0.0116
241	6.3453	0.0115
242	6.3568	0.0115
243	6.3683	0.0115
244	6.3797	0.0115
245	6.3911	0.0114
246	6.4026	0.0114
247	6.4139	0.0114
248	6.4253	0.0114
249	6.4366	0.0113
250	6.4479	0.0113
251	6.4592	0.0113
252	6.4704	0.0112
253	6.4817	0.0112
254	6.4929	0.0112
255	6.5040	0.0112
256	6.5152	0.0111
257	6.5263	0.0111
258	6.5374	0.0111
259	6.5485	0.0111
260	6.5595	0.0111
261	6.5706	0.0110
262	6.5816	0.0110
263	6.5925	0.0110
264	6.6035	0.0110

265	6.6144	0.0109
266	6.6253	0.0109
267	6.6362	0.0109
268	6.6471	0.0109
269	6.6579	0.0108
270	6.6688	0.0108
271	6.6796	0.0108
272	6.6903	0.0108
273	6.7011	0.0108
274	6.7118	0.0107
275	6.7225	0.0107
276	6.7332	0.0107
277	6.7439	0.0107
278	6.7545	0.0106
279	6.7651	0.0106
280	6.7757	0.0106
281	6.7863	0.0106
282	6.7969	0.0106
283	6.8074	0.0105
284	6.8179	0.0105
285	6.8284	0.0105
286	6.8389	0.0105
287	6.8494	0.0105
288	6.8598	0.0104

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0104	0.0100	0.0004
2	0.0105	0.0100	0.0004
3	0.0105	0.0101	0.0004
4	0.0105	0.0101	0.0004
5	0.0106	0.0101	0.0004
6	0.0106	0.0101	0.0004
7	0.0106	0.0102	0.0004
8	0.0106	0.0102	0.0004
9	0.0107	0.0102	0.0004
10	0.0107	0.0103	0.0004
11	0.0108	0.0103	0.0004
12	0.0108	0.0103	0.0004
13	0.0108	0.0104	0.0005
14	0.0108	0.0104	0.0005
15	0.0109	0.0104	0.0005
16	0.0109	0.0105	0.0005
17	0.0110	0.0105	0.0005
18	0.0110	0.0105	0.0005
19	0.0110	0.0106	0.0005
20	0.0111	0.0106	0.0005
21	0.0111	0.0106	0.0005
22	0.0111	0.0107	0.0005
23	0.0112	0.0107	0.0005
24	0.0112	0.0107	0.0005
25	0.0112	0.0108	0.0005
26	0.0113	0.0108	0.0005
27	0.0113	0.0109	0.0005
28	0.0114	0.0109	0.0005

29	0.0114	0.0109	0.0005
30	0.0114	0.0110	0.0005
31	0.0115	0.0110	0.0005
32	0.0115	0.0110	0.0005
33	0.0116	0.0111	0.0005
34	0.0116	0.0111	0.0005
35	0.0116	0.0112	0.0005
36	0.0117	0.0112	0.0005
37	0.0117	0.0112	0.0005
38	0.0118	0.0113	0.0005
39	0.0118	0.0113	0.0005
40	0.0118	0.0114	0.0005
41	0.0119	0.0114	0.0005
42	0.0119	0.0114	0.0005
43	0.0120	0.0115	0.0005
44	0.0120	0.0115	0.0005
45	0.0121	0.0116	0.0005
46	0.0121	0.0116	0.0005
47	0.0122	0.0117	0.0005
48	0.0122	0.0117	0.0005
49	0.0123	0.0118	0.0005
50	0.0123	0.0118	0.0005
51	0.0124	0.0119	0.0005
52	0.0124	0.0119	0.0005
53	0.0125	0.0119	0.0005
54	0.0125	0.0120	0.0005
55	0.0126	0.0120	0.0005
56	0.0126	0.0121	0.0005
57	0.0127	0.0121	0.0005
58	0.0127	0.0122	0.0005
59	0.0128	0.0122	0.0005
60	0.0128	0.0123	0.0005
61	0.0129	0.0124	0.0005
62	0.0129	0.0124	0.0005
63	0.0130	0.0125	0.0005
64	0.0130	0.0125	0.0005
65	0.0131	0.0126	0.0005
66	0.0132	0.0126	0.0005
67	0.0132	0.0127	0.0006
68	0.0133	0.0127	0.0006
69	0.0133	0.0128	0.0006
70	0.0134	0.0128	0.0006
71	0.0135	0.0129	0.0006
72	0.0135	0.0130	0.0006
73	0.0136	0.0130	0.0006
74	0.0136	0.0131	0.0006
75	0.0137	0.0132	0.0006
76	0.0138	0.0132	0.0006
77	0.0139	0.0133	0.0006
78	0.0139	0.0133	0.0006
79	0.0140	0.0134	0.0006
80	0.0140	0.0135	0.0006
81	0.0141	0.0135	0.0006
82	0.0142	0.0136	0.0006
83	0.0143	0.0137	0.0006
84	0.0143	0.0137	0.0006
85	0.0144	0.0138	0.0006

86	0.0145	0.0139	0.0006
87	0.0146	0.0140	0.0006
88	0.0146	0.0140	0.0006
89	0.0147	0.0141	0.0006
90	0.0148	0.0142	0.0006
91	0.0149	0.0143	0.0006
92	0.0150	0.0143	0.0006
93	0.0151	0.0144	0.0006
94	0.0151	0.0145	0.0006
95	0.0152	0.0146	0.0006
96	0.0153	0.0147	0.0006
97	0.0154	0.0148	0.0006
98	0.0155	0.0148	0.0006
99	0.0156	0.0150	0.0006
100	0.0157	0.0150	0.0007
101	0.0158	0.0151	0.0007
102	0.0159	0.0152	0.0007
103	0.0160	0.0153	0.0007
104	0.0161	0.0154	0.0007
105	0.0162	0.0155	0.0007
106	0.0163	0.0156	0.0007
107	0.0164	0.0157	0.0007
108	0.0165	0.0158	0.0007
109	0.0166	0.0159	0.0007
110	0.0167	0.0160	0.0007
111	0.0169	0.0162	0.0007
112	0.0169	0.0162	0.0007
113	0.0171	0.0164	0.0007
114	0.0172	0.0165	0.0007
115	0.0173	0.0166	0.0007
116	0.0174	0.0167	0.0007
117	0.0176	0.0169	0.0007
118	0.0177	0.0169	0.0007
119	0.0179	0.0171	0.0007
120	0.0180	0.0172	0.0007
121	0.0181	0.0174	0.0008
122	0.0182	0.0175	0.0008
123	0.0184	0.0177	0.0008
124	0.0185	0.0178	0.0008
125	0.0187	0.0180	0.0008
126	0.0188	0.0181	0.0008
127	0.0191	0.0183	0.0008
128	0.0192	0.0184	0.0008
129	0.0194	0.0186	0.0008
130	0.0195	0.0187	0.0008
131	0.0197	0.0189	0.0008
132	0.0199	0.0190	0.0008
133	0.0201	0.0193	0.0008
134	0.0202	0.0194	0.0008
135	0.0205	0.0196	0.0009
136	0.0206	0.0198	0.0009
137	0.0209	0.0200	0.0009
138	0.0211	0.0202	0.0009
139	0.0213	0.0205	0.0009
140	0.0215	0.0206	0.0009
141	0.0218	0.0209	0.0009
142	0.0220	0.0211	0.0009

143	0.0223	0.0214	0.0009
144	0.0225	0.0215	0.0009
145	0.0240	0.0230	0.0010
146	0.0242	0.0232	0.0010
147	0.0246	0.0235	0.0010
148	0.0248	0.0237	0.0010
149	0.0252	0.0241	0.0010
150	0.0254	0.0243	0.0011
151	0.0258	0.0247	0.0011
152	0.0260	0.0249	0.0011
153	0.0265	0.0254	0.0011
154	0.0267	0.0256	0.0011
155	0.0272	0.0261	0.0011
156	0.0275	0.0264	0.0011
157	0.0281	0.0269	0.0012
158	0.0283	0.0272	0.0012
159	0.0289	0.0277	0.0012
160	0.0293	0.0280	0.0012
161	0.0299	0.0287	0.0012
162	0.0303	0.0290	0.0013
163	0.0310	0.0297	0.0013
164	0.0314	0.0301	0.0013
165	0.0322	0.0308	0.0013
166	0.0326	0.0313	0.0014
167	0.0335	0.0321	0.0014
168	0.0340	0.0326	0.0014
169	0.0351	0.0336	0.0015
170	0.0356	0.0341	0.0015
171	0.0368	0.0353	0.0015
172	0.0374	0.0359	0.0016
173	0.0388	0.0371	0.0016
174	0.0395	0.0378	0.0016
175	0.0411	0.0394	0.0017
176	0.0419	0.0402	0.0017
177	0.0438	0.0420	0.0018
178	0.0448	0.0430	0.0019
179	0.0472	0.0452	0.0020
180	0.0484	0.0464	0.0020
181	0.0514	0.0492	0.0021
182	0.0530	0.0508	0.0022
183	0.0568	0.0545	0.0024
184	0.0591	0.0566	0.0025
185	0.0560	0.0537	0.0023
186	0.0592	0.0567	0.0025
187	0.0672	0.0644	0.0028
188	0.0724	0.0694	0.0030
189	0.0873	0.0815	0.0058
190	0.0986	0.0815	0.0171
191	0.1409	0.0815	0.0594
192	0.1937	0.0815	0.1122
193	0.6063	0.0815	0.5248
194	0.1147	0.0815	0.0333
195	0.0790	0.0757	0.0033
196	0.0629	0.0602	0.0026
197	0.0616	0.0590	0.0026
198	0.0548	0.0525	0.0023
199	0.0498	0.0478	0.0021

200	0.0460	0.0440	0.0019
201	0.0428	0.0411	0.0018
202	0.0402	0.0386	0.0017
203	0.0381	0.0365	0.0016
204	0.0362	0.0347	0.0015
205	0.0345	0.0331	0.0014
206	0.0331	0.0317	0.0014
207	0.0318	0.0304	0.0013
208	0.0306	0.0293	0.0013
209	0.0296	0.0284	0.0012
210	0.0286	0.0275	0.0012
211	0.0278	0.0266	0.0012
212	0.0270	0.0259	0.0011
213	0.0263	0.0252	0.0011
214	0.0256	0.0245	0.0011
215	0.0250	0.0239	0.0010
216	0.0244	0.0233	0.0010
217	0.0226	0.0217	0.0009
218	0.0221	0.0212	0.0009
219	0.0217	0.0208	0.0009
220	0.0212	0.0203	0.0009
221	0.0208	0.0199	0.0009
222	0.0204	0.0195	0.0008
223	0.0200	0.0192	0.0008
224	0.0196	0.0188	0.0008
225	0.0193	0.0185	0.0008
226	0.0189	0.0182	0.0008
227	0.0186	0.0179	0.0008
228	0.0183	0.0176	0.0008
229	0.0180	0.0173	0.0008
230	0.0178	0.0170	0.0007
231	0.0175	0.0168	0.0007
232	0.0173	0.0165	0.0007
233	0.0170	0.0163	0.0007
234	0.0168	0.0161	0.0007
235	0.0166	0.0159	0.0007
236	0.0163	0.0157	0.0007
237	0.0161	0.0155	0.0007
238	0.0159	0.0153	0.0007
239	0.0157	0.0151	0.0007
240	0.0155	0.0149	0.0006
241	0.0154	0.0147	0.0006
242	0.0152	0.0146	0.0006
243	0.0150	0.0144	0.0006
244	0.0148	0.0142	0.0006
245	0.0147	0.0141	0.0006
246	0.0145	0.0139	0.0006
247	0.0144	0.0138	0.0006
248	0.0142	0.0136	0.0006
249	0.0141	0.0135	0.0006
250	0.0140	0.0134	0.0006
251	0.0138	0.0132	0.0006
252	0.0137	0.0131	0.0006
253	0.0136	0.0130	0.0006
254	0.0134	0.0129	0.0006
255	0.0133	0.0128	0.0006
256	0.0132	0.0126	0.0005

257	0.0131	0.0125	0.0005
258	0.0130	0.0124	0.0005
259	0.0129	0.0123	0.0005
260	0.0127	0.0122	0.0005
261	0.0126	0.0121	0.0005
262	0.0125	0.0120	0.0005
263	0.0124	0.0119	0.0005
264	0.0123	0.0118	0.0005
265	0.0122	0.0117	0.0005
266	0.0121	0.0116	0.0005
267	0.0121	0.0115	0.0005
268	0.0120	0.0115	0.0005
269	0.0119	0.0114	0.0005
270	0.0118	0.0113	0.0005
271	0.0117	0.0112	0.0005
272	0.0116	0.0111	0.0005
273	0.0115	0.0111	0.0005
274	0.0115	0.0110	0.0005
275	0.0114	0.0109	0.0005
276	0.0113	0.0108	0.0005
277	0.0112	0.0108	0.0005
278	0.0111	0.0107	0.0005
279	0.0111	0.0106	0.0005
280	0.0110	0.0105	0.0005
281	0.0109	0.0105	0.0005
282	0.0109	0.0104	0.0005
283	0.0108	0.0103	0.0004
284	0.0107	0.0103	0.0004
285	0.0107	0.0102	0.0004
286	0.0106	0.0102	0.0004
287	0.0105	0.0101	0.0004
288	0.0105	0.0100	0.0004

Total soil rain loss = 5.87(In)
Total effective rainfall = 0.99(In)
Peak flow rate in flood hydrograph = 26.34(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

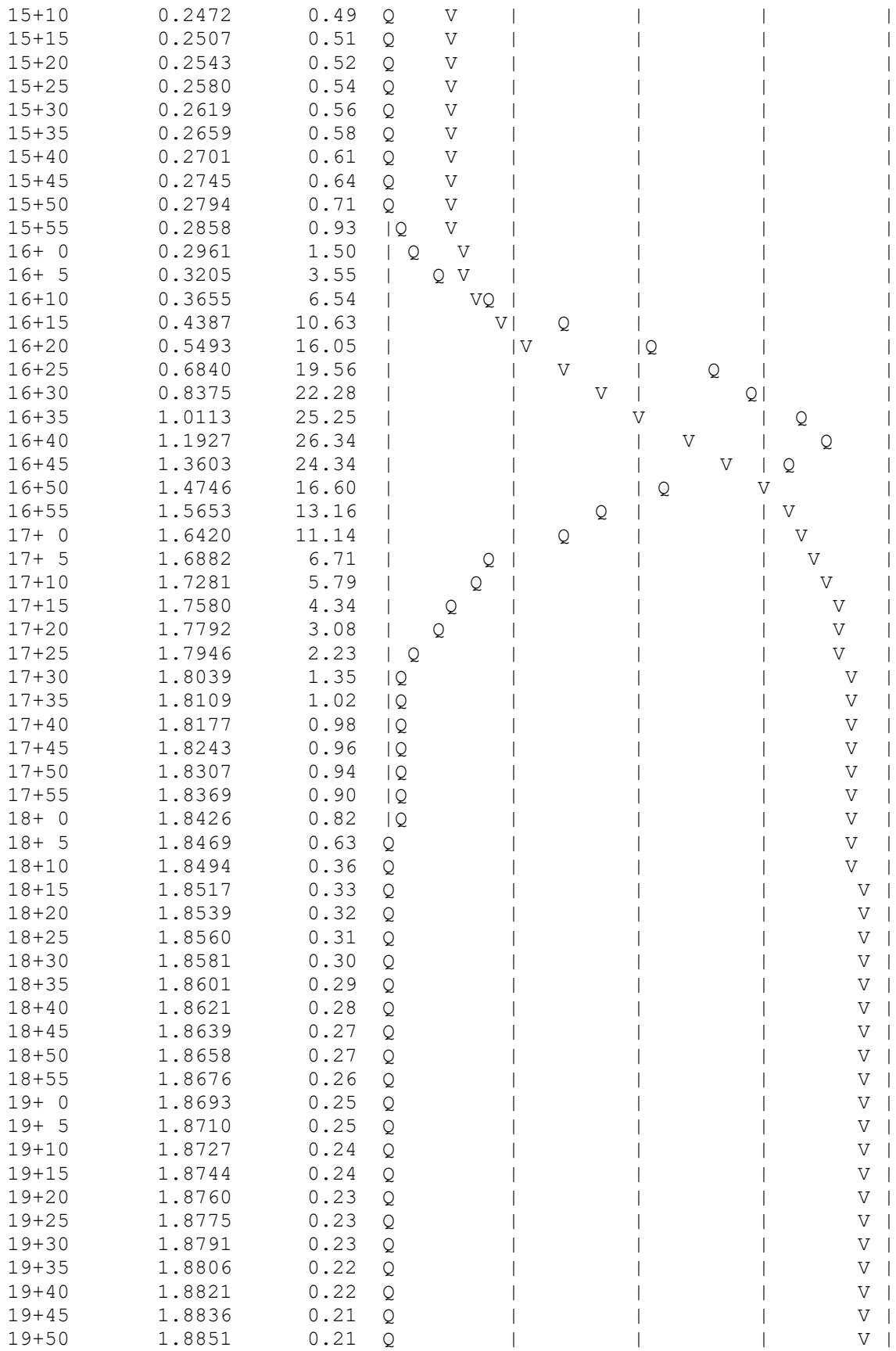
Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	7.5	15.0	22.5	30.0
0+ 5	0.0000	0.00	Q	|	|	|	|
0+10	0.0000	0.00	Q	|	|	|	|
0+15	0.0001	0.01	Q	|	|	|	|
0+20	0.0002	0.02	Q	|	|	|	|
0+25	0.0004	0.03	Q	|	|	|	|
0+30	0.0007	0.04	Q	|	|	|	|
0+35	0.0010	0.05	Q	|	|	|	|
0+40	0.0015	0.07	Q	|	|	|	|
0+45	0.0021	0.09	Q	|	|	|	|
0+50	0.0028	0.10	Q	|	|	|	|

0+55	0.0035	0.10	Q				
1+ 0	0.0042	0.11	Q				
1+ 5	0.0050	0.11	Q				
1+10	0.0059	0.12	Q				
1+15	0.0067	0.12	Q				
1+20	0.0075	0.12	Q				
1+25	0.0084	0.13	Q				
1+30	0.0093	0.13	Q				
1+35	0.0101	0.13	Q				
1+40	0.0110	0.13	Q				
1+45	0.0119	0.13	Q				
1+50	0.0128	0.13	Q				
1+55	0.0137	0.13	Q				
2+ 0	0.0146	0.13	Q				
2+ 5	0.0155	0.13	Q				
2+10	0.0164	0.13	Q				
2+15	0.0173	0.13	Q				
2+20	0.0182	0.13	Q				
2+25	0.0191	0.13	Q				
2+30	0.0200	0.13	Q				
2+35	0.0209	0.13	Q				
2+40	0.0219	0.13	Q				
2+45	0.0228	0.13	Q				
2+50	0.0237	0.13	Q				
2+55	0.0247	0.14	Q				
3+ 0	0.0256	0.14	Q				
3+ 5	0.0265	0.14	Q				
3+10	0.0275	0.14	Q				
3+15	0.0284	0.14	Q				
3+20	0.0294	0.14	Q				
3+25	0.0303	0.14	Q				
3+30	0.0313	0.14	Q				
3+35	0.0322	0.14	Q				
3+40	0.0332	0.14	Q				
3+45	0.0342	0.14	Q				
3+50	0.0351	0.14	Q				
3+55	0.0361	0.14	Q				
4+ 0	0.0371	0.14	Q				
4+ 5	0.0381	0.14	Q				
4+10	0.0390	0.14	Q				
4+15	0.0400	0.14	Q				
4+20	0.0410	0.14	Q				
4+25	0.0420	0.14	Q				
4+30	0.0430	0.14	Q				
4+35	0.0440	0.15	Q				
4+40	0.0450	0.15	Q				
4+45	0.0460	0.15	Q				
4+50	0.0470	0.15	Q				
4+55	0.0481	0.15	Q				
5+ 0	0.0491	0.15	QV				
5+ 5	0.0501	0.15	QV				
5+10	0.0511	0.15	QV				
5+15	0.0522	0.15	QV				
5+20	0.0532	0.15	QV				
5+25	0.0543	0.15	QV				
5+30	0.0553	0.15	QV				
5+35	0.0564	0.15	QV				

5+40	0.0574	0.15	QV				
5+45	0.0585	0.15	QV				
5+50	0.0595	0.15	QV				
5+55	0.0606	0.16	QV				
6+ 0	0.0617	0.16	QV				
6+ 5	0.0628	0.16	QV				
6+10	0.0638	0.16	QV				
6+15	0.0649	0.16	QV				
6+20	0.0660	0.16	QV				
6+25	0.0671	0.16	QV				
6+30	0.0682	0.16	QV				
6+35	0.0693	0.16	QV				
6+40	0.0705	0.16	QV				
6+45	0.0716	0.16	QV				
6+50	0.0727	0.16	QV				
6+55	0.0738	0.16	QV				
7+ 0	0.0750	0.16	QV				
7+ 5	0.0761	0.17	QV				
7+10	0.0773	0.17	QV				
7+15	0.0784	0.17	QV				
7+20	0.0796	0.17	QV				
7+25	0.0807	0.17	QV				
7+30	0.0819	0.17	QV				
7+35	0.0831	0.17	QV				
7+40	0.0843	0.17	QV				
7+45	0.0855	0.17	QV				
7+50	0.0866	0.17	QV				
7+55	0.0878	0.17	QV				
8+ 0	0.0891	0.18	QV				
8+ 5	0.0903	0.18	QV				
8+10	0.0915	0.18	QV				
8+15	0.0927	0.18	QV				
8+20	0.0940	0.18	QV				
8+25	0.0952	0.18	QV				
8+30	0.0964	0.18	QV				
8+35	0.0977	0.18	Q V				
8+40	0.0990	0.18	Q V				
8+45	0.1002	0.18	Q V				
8+50	0.1015	0.19	Q V				
8+55	0.1028	0.19	Q V				
9+ 0	0.1041	0.19	Q V				
9+ 5	0.1054	0.19	Q V				
9+10	0.1067	0.19	Q V				
9+15	0.1080	0.19	Q V				
9+20	0.1094	0.19	Q V				
9+25	0.1107	0.19	Q V				
9+30	0.1120	0.20	Q V				
9+35	0.1134	0.20	Q V				
9+40	0.1147	0.20	Q V				
9+45	0.1161	0.20	Q V				
9+50	0.1175	0.20	Q V				
9+55	0.1189	0.20	Q V				
10+ 0	0.1203	0.20	Q V				
10+ 5	0.1217	0.20	Q V				
10+10	0.1231	0.21	Q V				
10+15	0.1246	0.21	Q V				
10+20	0.1260	0.21	Q V				

10+25	0.1274	0.21	Q	V			
10+30	0.1289	0.21	Q	V			
10+35	0.1304	0.21	Q	V			
10+40	0.1319	0.22	Q	V			
10+45	0.1334	0.22	Q	V			
10+50	0.1349	0.22	Q	V			
10+55	0.1364	0.22	Q	V			
11+ 0	0.1379	0.22	Q	V			
11+ 5	0.1395	0.22	Q	V			
11+10	0.1410	0.23	Q	V			
11+15	0.1426	0.23	Q	V			
11+20	0.1442	0.23	Q	V			
11+25	0.1458	0.23	Q	V			
11+30	0.1474	0.23	Q	V			
11+35	0.1490	0.24	Q	V			
11+40	0.1507	0.24	Q	V			
11+45	0.1524	0.24	Q	V			
11+50	0.1540	0.24	Q	V			
11+55	0.1557	0.25	Q	V			
12+ 0	0.1574	0.25	Q	V			
12+ 5	0.1592	0.25	Q	V			
12+10	0.1609	0.25	Q	V			
12+15	0.1627	0.26	Q	V			
12+20	0.1645	0.26	Q	V			
12+25	0.1663	0.27	Q	V			
12+30	0.1682	0.27	Q	V			
12+35	0.1701	0.27	Q	V			
12+40	0.1720	0.28	Q	V			
12+45	0.1739	0.28	Q	V			
12+50	0.1759	0.29	Q	V			
12+55	0.1779	0.29	Q	V			
13+ 0	0.1800	0.30	Q	V			
13+ 5	0.1821	0.30	Q	V			
13+10	0.1842	0.31	Q	V			
13+15	0.1863	0.31	Q	V			
13+20	0.1885	0.31	Q	V			
13+25	0.1907	0.32	Q	V			
13+30	0.1929	0.32	Q	V			
13+35	0.1951	0.33	Q	V			
13+40	0.1974	0.33	Q	V			
13+45	0.1998	0.34	Q	V			
13+50	0.2021	0.34	Q	V			
13+55	0.2045	0.35	Q	V			
14+ 0	0.2070	0.36	Q	V			
14+ 5	0.2095	0.36	Q	V			
14+10	0.2120	0.37	Q	V			
14+15	0.2146	0.38	Q	V			
14+20	0.2172	0.38	Q	V			
14+25	0.2199	0.39	Q	V			
14+30	0.2227	0.40	Q	V			
14+35	0.2255	0.41	Q	V			
14+40	0.2283	0.42	Q	V			
14+45	0.2313	0.43	Q	V			
14+50	0.2343	0.44	Q	V			
14+55	0.2374	0.45	Q	V			
15+ 0	0.2405	0.46	Q	V			
15+ 5	0.2438	0.47	Q	V			



19+55	1.8865	0.21	Q	|	|	|	V |
20+ 0	1.8879	0.21	Q	|	|	|	V |
20+ 5	1.8893	0.20	Q	|	|	|	V |
20+10	1.8907	0.20	Q	|	|	|	V |
20+15	1.8920	0.20	Q	|	|	|	V |
20+20	1.8934	0.19	Q	|	|	|	V |
20+25	1.8947	0.19	Q	|	|	|	V |
20+30	1.8960	0.19	Q	|	|	|	V |
20+35	1.8973	0.19	Q	|	|	|	V |
20+40	1.8985	0.18	Q	|	|	|	V|
20+45	1.8998	0.18	Q	|	|	|	V|
20+50	1.9010	0.18	Q	|	|	|	V|
20+55	1.9023	0.18	Q	|	|	|	V|
21+ 0	1.9035	0.18	Q	|	|	|	V|
21+ 5	1.9047	0.17	Q	|	|	|	V|
21+10	1.9059	0.17	Q	|	|	|	V|
21+15	1.9071	0.17	Q	|	|	|	V|
21+20	1.9082	0.17	Q	|	|	|	V|
21+25	1.9094	0.17	Q	|	|	|	V|
21+30	1.9105	0.17	Q	|	|	|	V|
21+35	1.9116	0.16	Q	|	|	|	V|
21+40	1.9128	0.16	Q	|	|	|	V|
21+45	1.9139	0.16	Q	|	|	|	V|
21+50	1.9150	0.16	Q	|	|	|	V|
21+55	1.9161	0.16	Q	|	|	|	V|
22+ 0	1.9171	0.16	Q	|	|	|	V|
22+ 5	1.9182	0.16	Q	|	|	|	V|
22+10	1.9193	0.15	Q	|	|	|	V|
22+15	1.9203	0.15	Q	|	|	|	V|
22+20	1.9214	0.15	Q	|	|	|	V|
22+25	1.9224	0.15	Q	|	|	|	V|
22+30	1.9234	0.15	Q	|	|	|	V|
22+35	1.9244	0.15	Q	|	|	|	V|
22+40	1.9255	0.15	Q	|	|	|	V|
22+45	1.9265	0.15	Q	|	|	|	V|
22+50	1.9275	0.14	Q	|	|	|	V|
22+55	1.9284	0.14	Q	|	|	|	V|
23+ 0	1.9294	0.14	Q	|	|	|	V|
23+ 5	1.9304	0.14	Q	|	|	|	V|
23+10	1.9314	0.14	Q	|	|	|	V|
23+15	1.9323	0.14	Q	|	|	|	V|
23+20	1.9333	0.14	Q	|	|	|	V|
23+25	1.9342	0.14	Q	|	|	|	V|
23+30	1.9351	0.14	Q	|	|	|	V|
23+35	1.9361	0.14	Q	|	|	|	V|
23+40	1.9370	0.13	Q	|	|	|	V|
23+45	1.9379	0.13	Q	|	|	|	V|
23+50	1.9388	0.13	Q	|	|	|	V|
23+55	1.9397	0.13	Q	|	|	|	V|
24+ 0	1.9406	0.13	Q	|	|	|	V|
24+ 5	1.9415	0.13	Q	|	|	|	V|
24+10	1.9424	0.13	Q	|	|	|	V|
24+15	1.9432	0.12	Q	|	|	|	V|
24+20	1.9440	0.11	Q	|	|	|	V|
24+25	1.9447	0.10	Q	|	|	|	V|
24+30	1.9453	0.09	Q	|	|	|	V|
24+35	1.9458	0.07	Q	|	|	|	V|

24+40	1.9462	0.06	Q	|	|	|	V|
24+45	1.9464	0.04	Q	|	|	|	V|
24+50	1.9467	0.03	Q	|	|	|	V|
24+55	1.9468	0.02	Q	|	|	|	V|
25+ 0	1.9469	0.02	Q	|	|	|	V|
25+ 5	1.9470	0.01	Q	|	|	|	V|
25+10	1.9470	0.01	Q	|	|	|	V|
25+15	1.9471	0.01	Q	|	|	|	V|
25+20	1.9471	0.00	Q	|	|	|	V|
25+25	1.9471	0.00	Q	|	|	|	V|
25+30	1.9471	0.00	Q	|	|	|	V|
25+35	1.9472	0.00	Q	|	|	|	V|
25+40	1.9472	0.00	Q	|	|	|	V|
25+45	1.9472	0.00	Q	|	|	|	V|
25+50	1.9472	0.00	Q	|	|	|	V|
25+55	1.9472	0.00	Q	|	|	|	V|
26+ 0	1.9472	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 12/14/21

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

Program License Serial Number 6405

PEPPER INDUSTRIAL BUILDING
ONSITE EXISTING CONDITION
2-YEAR, 24-HOUR STORM EVENT ANALYSIS

Storm Event Year = 2

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 2		
23.70	1	0.64
Rainfall data for year 2		
23.70	6	1.61
Rainfall data for year 2		
23.70	24	2.94

++

******** 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)
50.0	50.0	23.70	1.000	0.810	1.000	0.810

Area-averaged adjusted loss rate Fm (In/Hr) = 0.810

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
23.70	1.000	50.0	50.0	10.00	0.027

Area-averaged catchment yield fraction, Y = 0.027
Area-averaged low loss fraction, Yb = 0.973
User entry of time of concentration = 1.105 (hours)
++
Watershed area = 23.70(Ac.)
Catchment Lag time = 0.884 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 9.4294
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.810(In/Hr)
Average low loss rate fraction (Yb) = 0.973 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.237(In)
Computed peak 30-minute rainfall = 0.485(In)
Specified peak 1-hour rainfall = 0.640(In)
Computed peak 3-hour rainfall = 1.127(In)
Specified peak 6-hour rainfall = 1.610(In)
Specified peak 24-hour rainfall = 2.940(In)

Rainfall depth area reduction factors:
Using a total area of 23.70(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999 Adjusted rainfall = 0.237(In)
30-minute factor = 0.999 Adjusted rainfall = 0.484(In)
1-hour factor = 0.999 Adjusted rainfall = 0.639(In)
3-hour factor = 1.000 Adjusted rainfall = 1.127(In)
6-hour factor = 1.000 Adjusted rainfall = 1.610(In)
24-hour factor = 1.000 Adjusted rainfall = 2.940(In)

U n i t H y d r o g r a p h
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Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
(K = 286.62 (CFS))		
1	0.523	1.499
2	1.693	3.353
3	3.183	4.270
4	5.639	7.041
5	9.431	10.866
6	14.420	14.302
7	19.986	15.953

8	26.068	17.431
9	32.724	19.077
10	40.175	21.357
11	48.728	24.515
12	56.898	23.417
13	65.685	25.186
14	72.345	19.087
15	76.562	12.088
16	80.671	11.778
17	85.064	12.592
18	88.357	9.438
19	90.095	4.982
20	92.065	5.645
21	93.765	4.873
22	95.112	3.861
23	96.154	2.986
24	96.954	2.295
25	97.603	1.860
26	98.104	1.437
27	98.298	0.555
28	98.468	0.487
29	98.637	0.487
30	98.807	0.487
31	98.977	0.487
32	99.147	0.486
33	99.316	0.486
34	99.486	0.486
35	99.656	0.487
36	99.825	0.486
37	99.948	0.351
38	100.000	0.150

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.2366	0.2366
2	0.3122	0.0756
3	0.3672	0.0550
4	0.4120	0.0448
5	0.4504	0.0385
6	0.4845	0.0341
7	0.5153	0.0308
8	0.5436	0.0283
9	0.5698	0.0262
10	0.5943	0.0245
11	0.6174	0.0231
12	0.6393	0.0219
13	0.6662	0.0269
14	0.6922	0.0260
15	0.7173	0.0251
16	0.7415	0.0243
17	0.7651	0.0236
18	0.7880	0.0229
19	0.8103	0.0223
20	0.8320	0.0217
21	0.8532	0.0212
22	0.8739	0.0207
23	0.8942	0.0203

24	0.9140	0.0198
25	0.9335	0.0194
26	0.9525	0.0191
27	0.9713	0.0187
28	0.9897	0.0184
29	1.0077	0.0181
30	1.0255	0.0178
31	1.0430	0.0175
32	1.0602	0.0172
33	1.0772	0.0170
34	1.0939	0.0167
35	1.1104	0.0165
36	1.1266	0.0163
37	1.1426	0.0160
38	1.1584	0.0158
39	1.1740	0.0156
40	1.1894	0.0154
41	1.2046	0.0152
42	1.2197	0.0150
43	1.2346	0.0149
44	1.2493	0.0147
45	1.2638	0.0145
46	1.2782	0.0144
47	1.2924	0.0142
48	1.3065	0.0141
49	1.3205	0.0139
50	1.3343	0.0138
51	1.3479	0.0137
52	1.3615	0.0135
53	1.3749	0.0134
54	1.3882	0.0133
55	1.4014	0.0132
56	1.4145	0.0131
57	1.4274	0.0130
58	1.4402	0.0128
59	1.4530	0.0127
60	1.4656	0.0126
61	1.4781	0.0125
62	1.4906	0.0124
63	1.5029	0.0123
64	1.5151	0.0122
65	1.5273	0.0121
66	1.5393	0.0121
67	1.5513	0.0120
68	1.5632	0.0119
69	1.5750	0.0118
70	1.5867	0.0117
71	1.5983	0.0116
72	1.6099	0.0116
73	1.6196	0.0097
74	1.6292	0.0096
75	1.6387	0.0095
76	1.6481	0.0095
77	1.6575	0.0094
78	1.6668	0.0093
79	1.6761	0.0092
80	1.6853	0.0092

81	1.6944	0.0091
82	1.7035	0.0091
83	1.7124	0.0090
84	1.7214	0.0089
85	1.7302	0.0089
86	1.7391	0.0088
87	1.7478	0.0088
88	1.7565	0.0087
89	1.7652	0.0086
90	1.7737	0.0086
91	1.7823	0.0085
92	1.7908	0.0085
93	1.7992	0.0084
94	1.8076	0.0084
95	1.8159	0.0083
96	1.8242	0.0083
97	1.8324	0.0082
98	1.8406	0.0082
99	1.8487	0.0081
100	1.8568	0.0081
101	1.8649	0.0080
102	1.8729	0.0080
103	1.8808	0.0080
104	1.8887	0.0079
105	1.8966	0.0079
106	1.9044	0.0078
107	1.9122	0.0078
108	1.9199	0.0077
109	1.9277	0.0077
110	1.9353	0.0077
111	1.9429	0.0076
112	1.9505	0.0076
113	1.9581	0.0075
114	1.9656	0.0075
115	1.9730	0.0075
116	1.9805	0.0074
117	1.9879	0.0074
118	1.9952	0.0074
119	2.0026	0.0073
120	2.0099	0.0073
121	2.0171	0.0073
122	2.0243	0.0072
123	2.0315	0.0072
124	2.0387	0.0072
125	2.0458	0.0071
126	2.0529	0.0071
127	2.0600	0.0071
128	2.0670	0.0070
129	2.0740	0.0070
130	2.0810	0.0070
131	2.0879	0.0069
132	2.0948	0.0069
133	2.1017	0.0069
134	2.1086	0.0069
135	2.1154	0.0068
136	2.1222	0.0068
137	2.1289	0.0068

138	2.1357	0.0067
139	2.1424	0.0067
140	2.1491	0.0067
141	2.1557	0.0067
142	2.1623	0.0066
143	2.1689	0.0066
144	2.1755	0.0066
145	2.1821	0.0066
146	2.1886	0.0065
147	2.1951	0.0065
148	2.2016	0.0065
149	2.2080	0.0064
150	2.2144	0.0064
151	2.2208	0.0064
152	2.2272	0.0064
153	2.2336	0.0064
154	2.2399	0.0063
155	2.2462	0.0063
156	2.2525	0.0063
157	2.2588	0.0063
158	2.2650	0.0062
159	2.2712	0.0062
160	2.2774	0.0062
161	2.2836	0.0062
162	2.2897	0.0062
163	2.2959	0.0061
164	2.3020	0.0061
165	2.3081	0.0061
166	2.3141	0.0061
167	2.3202	0.0060
168	2.3262	0.0060
169	2.3322	0.0060
170	2.3382	0.0060
171	2.3442	0.0060
172	2.3501	0.0059
173	2.3560	0.0059
174	2.3619	0.0059
175	2.3678	0.0059
176	2.3737	0.0059
177	2.3795	0.0058
178	2.3854	0.0058
179	2.3912	0.0058
180	2.3970	0.0058
181	2.4027	0.0058
182	2.4085	0.0058
183	2.4142	0.0057
184	2.4200	0.0057
185	2.4257	0.0057
186	2.4314	0.0057
187	2.4370	0.0057
188	2.4427	0.0057
189	2.4483	0.0056
190	2.4539	0.0056
191	2.4595	0.0056
192	2.4651	0.0056
193	2.4707	0.0056
194	2.4762	0.0056

195	2.4818	0.0055
196	2.4873	0.0055
197	2.4928	0.0055
198	2.4983	0.0055
199	2.5038	0.0055
200	2.5092	0.0055
201	2.5147	0.0054
202	2.5201	0.0054
203	2.5255	0.0054
204	2.5309	0.0054
205	2.5363	0.0054
206	2.5417	0.0054
207	2.5470	0.0054
208	2.5523	0.0053
209	2.5577	0.0053
210	2.5630	0.0053
211	2.5683	0.0053
212	2.5736	0.0053
213	2.5788	0.0053
214	2.5841	0.0053
215	2.5893	0.0052
216	2.5945	0.0052
217	2.5997	0.0052
218	2.6049	0.0052
219	2.6101	0.0052
220	2.6153	0.0052
221	2.6205	0.0052
222	2.6256	0.0051
223	2.6307	0.0051
224	2.6359	0.0051
225	2.6410	0.0051
226	2.6460	0.0051
227	2.6511	0.0051
228	2.6562	0.0051
229	2.6613	0.0051
230	2.6663	0.0050
231	2.6713	0.0050
232	2.6763	0.0050
233	2.6813	0.0050
234	2.6863	0.0050
235	2.6913	0.0050
236	2.6963	0.0050
237	2.7012	0.0050
238	2.7062	0.0049
239	2.7111	0.0049
240	2.7160	0.0049
241	2.7210	0.0049
242	2.7259	0.0049
243	2.7307	0.0049
244	2.7356	0.0049
245	2.7405	0.0049
246	2.7453	0.0049
247	2.7502	0.0048
248	2.7550	0.0048
249	2.7598	0.0048
250	2.7646	0.0048
251	2.7694	0.0048

252	2.7742	0.0048
253	2.7790	0.0048
254	2.7838	0.0048
255	2.7885	0.0048
256	2.7933	0.0047
257	2.7980	0.0047
258	2.8027	0.0047
259	2.8074	0.0047
260	2.8121	0.0047
261	2.8168	0.0047
262	2.8215	0.0047
263	2.8262	0.0047
264	2.8309	0.0047
265	2.8355	0.0047
266	2.8402	0.0046
267	2.8448	0.0046
268	2.8494	0.0046
269	2.8540	0.0046
270	2.8586	0.0046
271	2.8632	0.0046
272	2.8678	0.0046
273	2.8724	0.0046
274	2.8770	0.0046
275	2.8815	0.0046
276	2.8861	0.0045
277	2.8906	0.0045
278	2.8951	0.0045
279	2.8996	0.0045
280	2.9042	0.0045
281	2.9087	0.0045
282	2.9131	0.0045
283	2.9176	0.0045
284	2.9221	0.0045
285	2.9266	0.0045
286	2.9310	0.0045
287	2.9355	0.0044
288	2.9399	0.0044

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0044	0.0043	0.0001
2	0.0044	0.0043	0.0001
3	0.0045	0.0043	0.0001
4	0.0045	0.0044	0.0001
5	0.0045	0.0044	0.0001
6	0.0045	0.0044	0.0001
7	0.0045	0.0044	0.0001
8	0.0045	0.0044	0.0001
9	0.0045	0.0044	0.0001
10	0.0046	0.0044	0.0001
11	0.0046	0.0044	0.0001
12	0.0046	0.0045	0.0001
13	0.0046	0.0045	0.0001
14	0.0046	0.0045	0.0001
15	0.0046	0.0045	0.0001

16	0.0046	0.0045	0.0001
17	0.0047	0.0045	0.0001
18	0.0047	0.0045	0.0001
19	0.0047	0.0046	0.0001
20	0.0047	0.0046	0.0001
21	0.0047	0.0046	0.0001
22	0.0047	0.0046	0.0001
23	0.0048	0.0046	0.0001
24	0.0048	0.0046	0.0001
25	0.0048	0.0047	0.0001
26	0.0048	0.0047	0.0001
27	0.0048	0.0047	0.0001
28	0.0048	0.0047	0.0001
29	0.0049	0.0047	0.0001
30	0.0049	0.0047	0.0001
31	0.0049	0.0048	0.0001
32	0.0049	0.0048	0.0001
33	0.0049	0.0048	0.0001
34	0.0049	0.0048	0.0001
35	0.0050	0.0048	0.0001
36	0.0050	0.0048	0.0001
37	0.0050	0.0049	0.0001
38	0.0050	0.0049	0.0001
39	0.0050	0.0049	0.0001
40	0.0050	0.0049	0.0001
41	0.0051	0.0049	0.0001
42	0.0051	0.0049	0.0001
43	0.0051	0.0050	0.0001
44	0.0051	0.0050	0.0001
45	0.0051	0.0050	0.0001
46	0.0052	0.0050	0.0001
47	0.0052	0.0050	0.0001
48	0.0052	0.0051	0.0001
49	0.0052	0.0051	0.0001
50	0.0052	0.0051	0.0001
51	0.0053	0.0051	0.0001
52	0.0053	0.0051	0.0001
53	0.0053	0.0052	0.0001
54	0.0053	0.0052	0.0001
55	0.0054	0.0052	0.0001
56	0.0054	0.0052	0.0001
57	0.0054	0.0052	0.0001
58	0.0054	0.0053	0.0001
59	0.0054	0.0053	0.0001
60	0.0055	0.0053	0.0001
61	0.0055	0.0053	0.0002
62	0.0055	0.0054	0.0002
63	0.0055	0.0054	0.0002
64	0.0056	0.0054	0.0002
65	0.0056	0.0054	0.0002
66	0.0056	0.0054	0.0002
67	0.0056	0.0055	0.0002
68	0.0057	0.0055	0.0002
69	0.0057	0.0055	0.0002
70	0.0057	0.0055	0.0002
71	0.0057	0.0056	0.0002
72	0.0058	0.0056	0.0002

73	0.0058	0.0056	0.0002
74	0.0058	0.0057	0.0002
75	0.0058	0.0057	0.0002
76	0.0059	0.0057	0.0002
77	0.0059	0.0057	0.0002
78	0.0059	0.0058	0.0002
79	0.0060	0.0058	0.0002
80	0.0060	0.0058	0.0002
81	0.0060	0.0059	0.0002
82	0.0060	0.0059	0.0002
83	0.0061	0.0059	0.0002
84	0.0061	0.0059	0.0002
85	0.0062	0.0060	0.0002
86	0.0062	0.0060	0.0002
87	0.0062	0.0060	0.0002
88	0.0062	0.0061	0.0002
89	0.0063	0.0061	0.0002
90	0.0063	0.0061	0.0002
91	0.0064	0.0062	0.0002
92	0.0064	0.0062	0.0002
93	0.0064	0.0062	0.0002
94	0.0064	0.0063	0.0002
95	0.0065	0.0063	0.0002
96	0.0065	0.0063	0.0002
97	0.0066	0.0064	0.0002
98	0.0066	0.0064	0.0002
99	0.0067	0.0065	0.0002
100	0.0067	0.0065	0.0002
101	0.0067	0.0066	0.0002
102	0.0068	0.0066	0.0002
103	0.0068	0.0066	0.0002
104	0.0069	0.0067	0.0002
105	0.0069	0.0067	0.0002
106	0.0069	0.0067	0.0002
107	0.0070	0.0068	0.0002
108	0.0070	0.0068	0.0002
109	0.0071	0.0069	0.0002
110	0.0071	0.0069	0.0002
111	0.0072	0.0070	0.0002
112	0.0072	0.0070	0.0002
113	0.0073	0.0071	0.0002
114	0.0073	0.0071	0.0002
115	0.0074	0.0072	0.0002
116	0.0074	0.0072	0.0002
117	0.0075	0.0073	0.0002
118	0.0075	0.0073	0.0002
119	0.0076	0.0074	0.0002
120	0.0077	0.0075	0.0002
121	0.0077	0.0075	0.0002
122	0.0078	0.0076	0.0002
123	0.0079	0.0077	0.0002
124	0.0079	0.0077	0.0002
125	0.0080	0.0078	0.0002
126	0.0080	0.0078	0.0002
127	0.0081	0.0079	0.0002
128	0.0082	0.0080	0.0002

129	0.0083	0.0081	0.0002
130	0.0083	0.0081	0.0002
131	0.0084	0.0082	0.0002
132	0.0085	0.0082	0.0002
133	0.0086	0.0084	0.0002
134	0.0086	0.0084	0.0002
135	0.0088	0.0085	0.0002
136	0.0088	0.0086	0.0002
137	0.0089	0.0087	0.0002
138	0.0090	0.0087	0.0002
139	0.0091	0.0089	0.0003
140	0.0092	0.0089	0.0003
141	0.0093	0.0091	0.0003
142	0.0094	0.0091	0.0003
143	0.0095	0.0093	0.0003
144	0.0096	0.0093	0.0003
145	0.0116	0.0112	0.0003
146	0.0116	0.0113	0.0003
147	0.0118	0.0115	0.0003
148	0.0119	0.0116	0.0003
149	0.0121	0.0117	0.0003
150	0.0121	0.0118	0.0003
151	0.0123	0.0120	0.0003
152	0.0124	0.0121	0.0003
153	0.0126	0.0123	0.0003
154	0.0127	0.0124	0.0003
155	0.0130	0.0126	0.0004
156	0.0131	0.0127	0.0004
157	0.0133	0.0129	0.0004
158	0.0134	0.0131	0.0004
159	0.0137	0.0133	0.0004
160	0.0138	0.0134	0.0004
161	0.0141	0.0137	0.0004
162	0.0142	0.0138	0.0004
163	0.0145	0.0141	0.0004
164	0.0147	0.0143	0.0004
165	0.0150	0.0146	0.0004
166	0.0152	0.0148	0.0004
167	0.0156	0.0152	0.0004
168	0.0158	0.0154	0.0004
169	0.0163	0.0158	0.0004
170	0.0165	0.0160	0.0005
171	0.0170	0.0165	0.0005
172	0.0172	0.0167	0.0005
173	0.0178	0.0173	0.0005
174	0.0181	0.0176	0.0005
175	0.0187	0.0182	0.0005
176	0.0191	0.0186	0.0005
177	0.0198	0.0193	0.0005
178	0.0203	0.0197	0.0006
179	0.0212	0.0206	0.0006
180	0.0217	0.0211	0.0006
181	0.0229	0.0223	0.0006
182	0.0236	0.0229	0.0006
183	0.0251	0.0244	0.0007
184	0.0260	0.0252	0.0007
185	0.0219	0.0213	0.0006

186	0.0231	0.0225	0.0006
187	0.0262	0.0255	0.0007
188	0.0283	0.0275	0.0008
189	0.0341	0.0331	0.0009
190	0.0385	0.0374	0.0011
191	0.0550	0.0535	0.0015
192	0.0756	0.0675	0.0081
193	0.2366	0.0675	0.1691
194	0.0448	0.0435	0.0012
195	0.0308	0.0300	0.0008
196	0.0245	0.0239	0.0007
197	0.0269	0.0262	0.0007
198	0.0243	0.0236	0.0007
199	0.0223	0.0217	0.0006
200	0.0207	0.0201	0.0006
201	0.0194	0.0189	0.0005
202	0.0184	0.0179	0.0005
203	0.0175	0.0170	0.0005
204	0.0167	0.0163	0.0005
205	0.0160	0.0156	0.0004
206	0.0154	0.0150	0.0004
207	0.0149	0.0145	0.0004
208	0.0144	0.0140	0.0004
209	0.0139	0.0136	0.0004
210	0.0135	0.0132	0.0004
211	0.0132	0.0128	0.0004
212	0.0128	0.0125	0.0004
213	0.0125	0.0122	0.0003
214	0.0122	0.0119	0.0003
215	0.0120	0.0116	0.0003
216	0.0117	0.0114	0.0003
217	0.0097	0.0094	0.0003
218	0.0095	0.0092	0.0003
219	0.0092	0.0090	0.0003
220	0.0091	0.0088	0.0002
221	0.0089	0.0086	0.0002
222	0.0087	0.0085	0.0002
223	0.0085	0.0083	0.0002
224	0.0084	0.0081	0.0002
225	0.0082	0.0080	0.0002
226	0.0081	0.0079	0.0002
227	0.0080	0.0077	0.0002
228	0.0078	0.0076	0.0002
229	0.0077	0.0075	0.0002
230	0.0076	0.0074	0.0002
231	0.0075	0.0073	0.0002
232	0.0074	0.0072	0.0002
233	0.0073	0.0071	0.0002
234	0.0072	0.0070	0.0002
235	0.0071	0.0069	0.0002
236	0.0070	0.0068	0.0002
237	0.0069	0.0067	0.0002
238	0.0068	0.0066	0.0002
239	0.0067	0.0065	0.0002
240	0.0066	0.0064	0.0002
241	0.0066	0.0064	0.0002
242	0.0065	0.0063	0.0002

243	0.0064	0.0062	0.0002
244	0.0063	0.0062	0.0002
245	0.0063	0.0061	0.0002
246	0.0062	0.0060	0.0002
247	0.0061	0.0060	0.0002
248	0.0061	0.0059	0.0002
249	0.0060	0.0058	0.0002
250	0.0059	0.0058	0.0002
251	0.0059	0.0057	0.0002
252	0.0058	0.0057	0.0002
253	0.0058	0.0056	0.0002
254	0.0057	0.0056	0.0002
255	0.0057	0.0055	0.0002
256	0.0056	0.0055	0.0002
257	0.0056	0.0054	0.0002
258	0.0055	0.0054	0.0002
259	0.0055	0.0053	0.0002
260	0.0054	0.0053	0.0001
261	0.0054	0.0052	0.0001
262	0.0053	0.0052	0.0001
263	0.0053	0.0051	0.0001
264	0.0053	0.0051	0.0001
265	0.0052	0.0051	0.0001
266	0.0052	0.0050	0.0001
267	0.0051	0.0050	0.0001
268	0.0051	0.0050	0.0001
269	0.0051	0.0049	0.0001
270	0.0050	0.0049	0.0001
271	0.0050	0.0048	0.0001
272	0.0049	0.0048	0.0001
273	0.0049	0.0048	0.0001
274	0.0049	0.0047	0.0001
275	0.0048	0.0047	0.0001
276	0.0048	0.0047	0.0001
277	0.0048	0.0046	0.0001
278	0.0047	0.0046	0.0001
279	0.0047	0.0046	0.0001
280	0.0047	0.0046	0.0001
281	0.0047	0.0045	0.0001
282	0.0046	0.0045	0.0001
283	0.0046	0.0045	0.0001
284	0.0046	0.0044	0.0001
285	0.0045	0.0044	0.0001
286	0.0045	0.0044	0.0001
287	0.0045	0.0044	0.0001
288	0.0045	0.0043	0.0001

Total soil rain loss = 2.69(In)
Total effective rainfall = 0.25(In)
Peak flow rate in flood hydrograph = 4.61(CFS)

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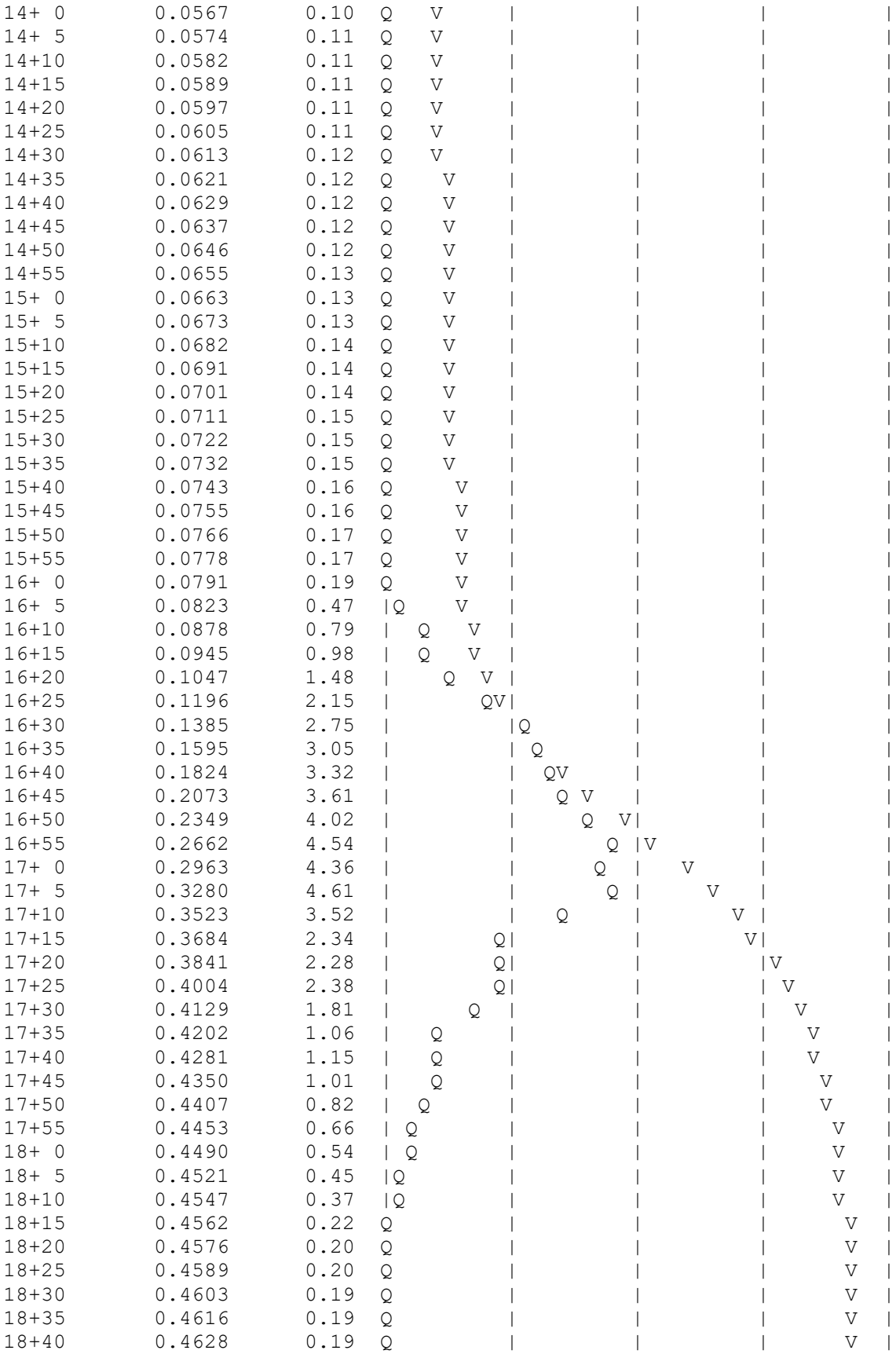
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

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	0.0001	0.01	Q	|	|	|	|
0+35	0.0001	0.01	Q	|	|	|	|
0+40	0.0002	0.01	Q	|	|	|	|
0+45	0.0003	0.01	Q	|	|	|	|
0+50	0.0004	0.01	Q	|	|	|	|
0+55	0.0005	0.02	Q	|	|	|	|
1+ 0	0.0006	0.02	Q	|	|	|	|
1+ 5	0.0008	0.02	Q	|	|	|	|
1+10	0.0010	0.03	Q	|	|	|	|
1+15	0.0012	0.03	Q	|	|	|	|
1+20	0.0014	0.03	Q	|	|	|	|
1+25	0.0016	0.03	Q	|	|	|	|
1+30	0.0018	0.03	Q	|	|	|	|
1+35	0.0020	0.03	Q	|	|	|	|
1+40	0.0022	0.03	Q	|	|	|	|
1+45	0.0025	0.03	Q	|	|	|	|
1+50	0.0027	0.03	Q	|	|	|	|
1+55	0.0029	0.03	Q	|	|	|	|
2+ 0	0.0032	0.04	Q	|	|	|	|
2+ 5	0.0034	0.04	Q	|	|	|	|
2+10	0.0037	0.04	Q	|	|	|	|
2+15	0.0039	0.04	Q	|	|	|	|
2+20	0.0042	0.04	Q	|	|	|	|
2+25	0.0044	0.04	Q	|	|	|	|
2+30	0.0047	0.04	Q	|	|	|	|
2+35	0.0049	0.04	Q	|	|	|	|
2+40	0.0052	0.04	Q	|	|	|	|
2+45	0.0054	0.04	Q	|	|	|	|
2+50	0.0057	0.04	Q	|	|	|	|
2+55	0.0059	0.04	Q	|	|	|	|
3+ 0	0.0062	0.04	Q	|	|	|	|
3+ 5	0.0065	0.04	Q	|	|	|	|
3+10	0.0067	0.04	Q	|	|	|	|
3+15	0.0070	0.04	Q	|	|	|	|
3+20	0.0072	0.04	Q	|	|	|	|
3+25	0.0075	0.04	Q	|	|	|	|
3+30	0.0078	0.04	Q	|	|	|	|
3+35	0.0080	0.04	Q	|	|	|	|
3+40	0.0083	0.04	Q	|	|	|	|
3+45	0.0086	0.04	Q	|	|	|	|
3+50	0.0088	0.04	Q	|	|	|	|
3+55	0.0091	0.04	Q	|	|	|	|
4+ 0	0.0094	0.04	Q	|	|	|	|
4+ 5	0.0097	0.04	Q	|	|	|	|
4+10	0.0099	0.04	Q	|	|	|	|
4+15	0.0102	0.04	Q	|	|	|	|
4+20	0.0105	0.04	Q	|	|	|	|
4+25	0.0108	0.04	Q	|	|	|	|

4+30	0.0110	0.04	Q				
4+35	0.0113	0.04	Q				
4+40	0.0116	0.04	Q				
4+45	0.0119	0.04	Q				
4+50	0.0121	0.04	Q				
4+55	0.0124	0.04	QV				
5+ 0	0.0127	0.04	QV				
5+ 5	0.0130	0.04	QV				
5+10	0.0133	0.04	QV				
5+15	0.0136	0.04	QV				
5+20	0.0139	0.04	QV				
5+25	0.0141	0.04	QV				
5+30	0.0144	0.04	QV				
5+35	0.0147	0.04	QV				
5+40	0.0150	0.04	QV				
5+45	0.0153	0.04	QV				
5+50	0.0156	0.04	QV				
5+55	0.0159	0.04	QV				
6+ 0	0.0162	0.04	QV				
6+ 5	0.0165	0.04	QV				
6+10	0.0168	0.04	QV				
6+15	0.0171	0.04	QV				
6+20	0.0174	0.04	QV				
6+25	0.0177	0.04	QV				
6+30	0.0180	0.04	QV				
6+35	0.0183	0.04	QV				
6+40	0.0186	0.04	QV				
6+45	0.0189	0.04	QV				
6+50	0.0192	0.05	QV				
6+55	0.0196	0.05	QV				
7+ 0	0.0199	0.05	QV				
7+ 5	0.0202	0.05	QV				
7+10	0.0205	0.05	QV				
7+15	0.0208	0.05	QV				
7+20	0.0211	0.05	QV				
7+25	0.0215	0.05	QV				
7+30	0.0218	0.05	QV				
7+35	0.0221	0.05	QV				
7+40	0.0224	0.05	QV				
7+45	0.0228	0.05	QV				
7+50	0.0231	0.05	QV				
7+55	0.0234	0.05	QV				
8+ 0	0.0238	0.05	QV				
8+ 5	0.0241	0.05	QV				
8+10	0.0244	0.05	QV				
8+15	0.0248	0.05	Q V				
8+20	0.0251	0.05	Q V				
8+25	0.0255	0.05	Q V				
8+30	0.0258	0.05	Q V				
8+35	0.0261	0.05	Q V				
8+40	0.0265	0.05	Q V				
8+45	0.0268	0.05	Q V				
8+50	0.0272	0.05	Q V				
8+55	0.0276	0.05	Q V				
9+ 0	0.0279	0.05	Q V				
9+ 5	0.0283	0.05	Q V				
9+10	0.0286	0.05	Q V				

9+15	0.0290	0.05	Q	V			
9+20	0.0294	0.05	Q	V			
9+25	0.0297	0.05	Q	V			
9+30	0.0301	0.05	Q	V			
9+35	0.0305	0.05	Q	V			
9+40	0.0308	0.05	Q	V			
9+45	0.0312	0.05	Q	V			
9+50	0.0316	0.06	Q	V			
9+55	0.0320	0.06	Q	V			
10+ 0	0.0324	0.06	Q	V			
10+ 5	0.0327	0.06	Q	V			
10+10	0.0331	0.06	Q	V			
10+15	0.0335	0.06	Q	V			
10+20	0.0339	0.06	Q	V			
10+25	0.0343	0.06	Q	V			
10+30	0.0347	0.06	Q	V			
10+35	0.0351	0.06	Q	V			
10+40	0.0355	0.06	Q	V			
10+45	0.0359	0.06	Q	V			
10+50	0.0364	0.06	Q	V			
10+55	0.0368	0.06	Q	V			
11+ 0	0.0372	0.06	Q	V			
11+ 5	0.0376	0.06	Q	V			
11+10	0.0380	0.06	Q	V			
11+15	0.0385	0.06	Q	V			
11+20	0.0389	0.06	Q	V			
11+25	0.0393	0.06	Q	V			
11+30	0.0398	0.06	Q	V			
11+35	0.0402	0.06	Q	V			
11+40	0.0407	0.07	Q	V			
11+45	0.0411	0.07	Q	V			
11+50	0.0416	0.07	Q	V			
11+55	0.0421	0.07	Q	V			
12+ 0	0.0425	0.07	Q	V			
12+ 5	0.0430	0.07	Q	V			
12+10	0.0435	0.07	Q	V			
12+15	0.0440	0.07	Q	V			
12+20	0.0444	0.07	Q	V			
12+25	0.0449	0.07	Q	V			
12+30	0.0454	0.07	Q	V			
12+35	0.0460	0.08	Q	V			
12+40	0.0465	0.08	Q	V			
12+45	0.0470	0.08	Q	V			
12+50	0.0476	0.08	Q	V			
12+55	0.0482	0.08	Q	V			
13+ 0	0.0488	0.08	Q	V			
13+ 5	0.0494	0.09	Q	V			
13+10	0.0500	0.09	Q	V			
13+15	0.0506	0.09	Q	V			
13+20	0.0512	0.09	Q	V			
13+25	0.0519	0.09	Q	V			
13+30	0.0525	0.10	Q	V			
13+35	0.0532	0.10	Q	V			
13+40	0.0539	0.10	Q	V			
13+45	0.0546	0.10	Q	V			
13+50	0.0553	0.10	Q	V			
13+55	0.0560	0.10	Q	V			



18+45	0.4641	0.18	Q	|	|	|	V |
18+50	0.4653	0.18	Q	|	|	|	V |
18+55	0.4665	0.17	Q	|	|	|	V |
19+ 0	0.4677	0.17	Q	|	|	|	V |
19+ 5	0.4687	0.14	Q	|	|	|	V |
19+10	0.4694	0.11	Q	|	|	|	V |
19+15	0.4699	0.08	Q	|	|	|	V |
19+20	0.4705	0.07	Q	|	|	|	V |
19+25	0.4710	0.07	Q	|	|	|	V |
19+30	0.4714	0.07	Q	|	|	|	V |
19+35	0.4719	0.07	Q	|	|	|	V |
19+40	0.4724	0.07	Q	|	|	|	V |
19+45	0.4728	0.07	Q	|	|	|	V |
19+50	0.4733	0.06	Q	|	|	|	V |
19+55	0.4737	0.06	Q	|	|	|	V |
20+ 0	0.4741	0.06	Q	|	|	|	V |
20+ 5	0.4746	0.06	Q	|	|	|	V |
20+10	0.4750	0.06	Q	|	|	|	V |
20+15	0.4754	0.06	Q	|	|	|	V |
20+20	0.4758	0.06	Q	|	|	|	V |
20+25	0.4762	0.06	Q	|	|	|	V |
20+30	0.4766	0.06	Q	|	|	|	V |
20+35	0.4770	0.06	Q	|	|	|	V |
20+40	0.4773	0.05	Q	|	|	|	V |
20+45	0.4777	0.05	Q	|	|	|	V |
20+50	0.4781	0.05	Q	|	|	|	V |
20+55	0.4784	0.05	Q	|	|	|	V |
21+ 0	0.4788	0.05	Q	|	|	|	V |
21+ 5	0.4792	0.05	Q	|	|	|	V |
21+10	0.4795	0.05	Q	|	|	|	V |
21+15	0.4799	0.05	Q	|	|	|	V |
21+20	0.4802	0.05	Q	|	|	|	V|
21+25	0.4805	0.05	Q	|	|	|	V|
21+30	0.4809	0.05	Q	|	|	|	V|
21+35	0.4812	0.05	Q	|	|	|	V|
21+40	0.4815	0.05	Q	|	|	|	V|
21+45	0.4819	0.05	Q	|	|	|	V|
21+50	0.4822	0.05	Q	|	|	|	V|
21+55	0.4825	0.05	Q	|	|	|	V|
22+ 0	0.4828	0.05	Q	|	|	|	V|
22+ 5	0.4831	0.05	Q	|	|	|	V|
22+10	0.4834	0.04	Q	|	|	|	V|
22+15	0.4837	0.04	Q	|	|	|	V|
22+20	0.4840	0.04	Q	|	|	|	V|
22+25	0.4843	0.04	Q	|	|	|	V|
22+30	0.4846	0.04	Q	|	|	|	V|
22+35	0.4849	0.04	Q	|	|	|	V|
22+40	0.4852	0.04	Q	|	|	|	V|
22+45	0.4855	0.04	Q	|	|	|	V|
22+50	0.4858	0.04	Q	|	|	|	V|
22+55	0.4861	0.04	Q	|	|	|	V|
23+ 0	0.4864	0.04	Q	|	|	|	V|
23+ 5	0.4867	0.04	Q	|	|	|	V|
23+10	0.4869	0.04	Q	|	|	|	V|
23+15	0.4872	0.04	Q	|	|	|	V|
23+20	0.4875	0.04	Q	|	|	|	V|
23+25	0.4878	0.04	Q	|	|	|	V|

23+30	0.4880	0.04	Q	|	|	|	V|
23+35	0.4883	0.04	Q	|	|	|	V|
23+40	0.4886	0.04	Q	|	|	|	V|
23+45	0.4888	0.04	Q	|	|	|	V|
23+50	0.4891	0.04	Q	|	|	|	V|
23+55	0.4894	0.04	Q	|	|	|	V|
24+ 0	0.4896	0.04	Q	|	|	|	V|
24+ 5	0.4899	0.04	Q	|	|	|	V|
24+10	0.4901	0.04	Q	|	|	|	V|
24+15	0.4904	0.04	Q	|	|	|	V|
24+20	0.4906	0.03	Q	|	|	|	V|
24+25	0.4908	0.03	Q	|	|	|	V|
24+30	0.4911	0.03	Q	|	|	|	V|
24+35	0.4913	0.03	Q	|	|	|	V|
24+40	0.4915	0.03	Q	|	|	|	V|
24+45	0.4916	0.02	Q	|	|	|	V|
24+50	0.4918	0.02	Q	|	|	|	V|
24+55	0.4919	0.02	Q	|	|	|	V|
25+ 0	0.4920	0.02	Q	|	|	|	V|
25+ 5	0.4921	0.01	Q	|	|	|	V|
25+10	0.4922	0.01	Q	|	|	|	V|
25+15	0.4922	0.01	Q	|	|	|	V|
25+20	0.4923	0.01	Q	|	|	|	V|
25+25	0.4923	0.01	Q	|	|	|	V|
25+30	0.4923	0.00	Q	|	|	|	V|
25+35	0.4924	0.00	Q	|	|	|	V|
25+40	0.4924	0.00	Q	|	|	|	V|
25+45	0.4924	0.00	Q	|	|	|	V|
25+50	0.4924	0.00	Q	|	|	|	V|
25+55	0.4924	0.00	Q	|	|	|	V|
26+ 0	0.4924	0.00	Q	|	|	|	V|
26+ 5	0.4924	0.00	Q	|	|	|	V|
26+10	0.4924	0.00	Q	|	|	|	V|
26+15	0.4924	0.00	Q	|	|	|	V|
26+20	0.4924	0.00	Q	|	|	|	V|
26+25	0.4924	0.00	Q	|	|	|	V|
26+30	0.4924	0.00	Q	|	|	|	V|
26+35	0.4924	0.00	Q	|	|	|	V|
26+40	0.4924	0.00	Q	|	|	|	V|
26+45	0.4924	0.00	Q	|	|	|	V|
26+50	0.4924	0.00	Q	|	|	|	V|
26+55	0.4924	0.00	Q	|	|	|	V|
27+ 0	0.4925	0.00	Q	|	|	|	V|
27+ 5	0.4925	0.00	Q	|	|	|	V|

APPENDIX D

POST – PROJECT CONDITION UNIT HYDROGRAPH HYDROLOGY

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

Study date 12/14/21

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

Program License Serial Number 6405

PEPPER INDUSTRIAL BUILDING
ONSITE PROPOSED CONDITION
100-YEAR, 24-HOUR STORM EVENT ANALYSIS

Storm Event Year = 100

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 100		
23.71	1	1.64
Rainfall data for year 100		
23.71	6	3.74
Rainfall data for year 100		
23.71	24	6.86

++

******** 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	23.71	1.000	0.978	0.100	0.098

Area-averaged adjusted loss rate Fm (In/Hr) = 0.098

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
2.37	0.100	32.0	32.0	21.25	0.042
21.34	0.900	98.0	98.0	0.20	0.965

Area-averaged catchment yield fraction, Y = 0.873
Area-averaged low loss fraction, Yb = 0.127
User entry of time of concentration = 0.271 (hours)
++
Watershed area = 23.71(Ac.)
Catchment Lag time = 0.217 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 38.4379
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.098(In/Hr)
Average low loss rate fraction (Yb) = 0.127 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.607(In)
Computed peak 30-minute rainfall = 1.243(In)
Specified peak 1-hour rainfall = 1.640(In)
Computed peak 3-hour rainfall = 2.719(In)
Specified peak 6-hour rainfall = 3.740(In)
Specified peak 24-hour rainfall = 6.860(In)

Rainfall depth area reduction factors:
Using a total area of 23.71(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999 Adjusted rainfall = 0.606(In)
30-minute factor = 0.999 Adjusted rainfall = 1.242(In)
1-hour factor = 0.999 Adjusted rainfall = 1.638(In)
3-hour factor = 1.000 Adjusted rainfall = 2.718(In)
6-hour factor = 1.000 Adjusted rainfall = 3.740(In)
24-hour factor = 1.000 Adjusted rainfall = 6.860(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 = 286.74 (CFS))	
1	2.845	8.159
2	18.129	43.826
3	46.195	80.477
4	75.173	83.091
5	89.709	41.683
6	95.923	17.818

7	98.257	6.693
8	98.989	2.099
9	99.675	1.967
10	100.000	0.932

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.6063	0.6063
2	0.8000	0.1937
3	0.9409	0.1409
4	1.0556	0.1147
5	1.1542	0.0986
6	1.2415	0.0873
7	1.3205	0.0790
8	1.3929	0.0724
9	1.4601	0.0672
10	1.5230	0.0629
11	1.5821	0.0592
12	1.6382	0.0560
13	1.6998	0.0616
14	1.7588	0.0591
15	1.8157	0.0568
16	1.8705	0.0548
17	1.9235	0.0530
18	1.9749	0.0514
19	2.0247	0.0498
20	2.0731	0.0484
21	2.1203	0.0472
22	2.1663	0.0460
23	2.2111	0.0448
24	2.2549	0.0438
25	2.2978	0.0428
26	2.3397	0.0419
27	2.3807	0.0411
28	2.4210	0.0402
29	2.4605	0.0395
30	2.4992	0.0388
31	2.5373	0.0381
32	2.5747	0.0374
33	2.6115	0.0368
34	2.6477	0.0362
35	2.6833	0.0356
36	2.7184	0.0351
37	2.7528	0.0345
38	2.7868	0.0340
39	2.8204	0.0335
40	2.8534	0.0331
41	2.8860	0.0326
42	2.9182	0.0322
43	2.9500	0.0318
44	2.9813	0.0314
45	3.0123	0.0310
46	3.0430	0.0306
47	3.0732	0.0303
48	3.1032	0.0299
49	3.1327	0.0296
50	3.1620	0.0293

51	3.1909	0.0289
52	3.2196	0.0286
53	3.2479	0.0283
54	3.2760	0.0281
55	3.3038	0.0278
56	3.3313	0.0275
57	3.3585	0.0272
58	3.3855	0.0270
59	3.4123	0.0267
60	3.4387	0.0265
61	3.4650	0.0263
62	3.4910	0.0260
63	3.5168	0.0258
64	3.5424	0.0256
65	3.5678	0.0254
66	3.5929	0.0252
67	3.6179	0.0250
68	3.6426	0.0248
69	3.6672	0.0246
70	3.6916	0.0244
71	3.7157	0.0242
72	3.7397	0.0240
73	3.7624	0.0226
74	3.7848	0.0225
75	3.8071	0.0223
76	3.8293	0.0221
77	3.8512	0.0220
78	3.8730	0.0218
79	3.8947	0.0217
80	3.9162	0.0215
81	3.9375	0.0213
82	3.9587	0.0212
83	3.9798	0.0211
84	4.0007	0.0209
85	4.0215	0.0208
86	4.0421	0.0206
87	4.0626	0.0205
88	4.0830	0.0204
89	4.1032	0.0202
90	4.1233	0.0201
91	4.1433	0.0200
92	4.1632	0.0199
93	4.1829	0.0197
94	4.2026	0.0196
95	4.2221	0.0195
96	4.2415	0.0194
97	4.2607	0.0193
98	4.2799	0.0192
99	4.2990	0.0191
100	4.3179	0.0189
101	4.3367	0.0188
102	4.3555	0.0187
103	4.3741	0.0186
104	4.3927	0.0185
105	4.4111	0.0184
106	4.4294	0.0183
107	4.4477	0.0182

108	4.4658	0.0181
109	4.4839	0.0180
110	4.5018	0.0180
111	4.5197	0.0179
112	4.5374	0.0178
113	4.5551	0.0177
114	4.5727	0.0176
115	4.5902	0.0175
116	4.6077	0.0174
117	4.6250	0.0173
118	4.6423	0.0173
119	4.6594	0.0172
120	4.6765	0.0171
121	4.6936	0.0170
122	4.7105	0.0169
123	4.7273	0.0169
124	4.7441	0.0168
125	4.7608	0.0167
126	4.7775	0.0166
127	4.7940	0.0166
128	4.8105	0.0165
129	4.8269	0.0164
130	4.8432	0.0163
131	4.8595	0.0163
132	4.8757	0.0162
133	4.8918	0.0161
134	4.9079	0.0161
135	4.9239	0.0160
136	4.9398	0.0159
137	4.9557	0.0159
138	4.9715	0.0158
139	4.9872	0.0157
140	5.0029	0.0157
141	5.0185	0.0156
142	5.0340	0.0155
143	5.0495	0.0155
144	5.0650	0.0154
145	5.0803	0.0154
146	5.0956	0.0153
147	5.1109	0.0152
148	5.1260	0.0152
149	5.1412	0.0151
150	5.1562	0.0151
151	5.1713	0.0150
152	5.1862	0.0150
153	5.2011	0.0149
154	5.2160	0.0148
155	5.2308	0.0148
156	5.2455	0.0147
157	5.2602	0.0147
158	5.2748	0.0146
159	5.2894	0.0146
160	5.3040	0.0145
161	5.3184	0.0145
162	5.3329	0.0144
163	5.3472	0.0144
164	5.3616	0.0143

165	5.3759	0.0143
166	5.3901	0.0142
167	5.4043	0.0142
168	5.4184	0.0141
169	5.4325	0.0141
170	5.4466	0.0140
171	5.4605	0.0140
172	5.4745	0.0140
173	5.4884	0.0139
174	5.5023	0.0139
175	5.5161	0.0138
176	5.5299	0.0138
177	5.5436	0.0137
178	5.5573	0.0137
179	5.5709	0.0136
180	5.5845	0.0136
181	5.5981	0.0136
182	5.6116	0.0135
183	5.6250	0.0135
184	5.6385	0.0134
185	5.6519	0.0134
186	5.6652	0.0133
187	5.6785	0.0133
188	5.6918	0.0133
189	5.7050	0.0132
190	5.7182	0.0132
191	5.7314	0.0132
192	5.7445	0.0131
193	5.7576	0.0131
194	5.7706	0.0130
195	5.7836	0.0130
196	5.7965	0.0130
197	5.8095	0.0129
198	5.8224	0.0129
199	5.8352	0.0129
200	5.8480	0.0128
201	5.8608	0.0128
202	5.8735	0.0127
203	5.8863	0.0127
204	5.8989	0.0127
205	5.9116	0.0126
206	5.9242	0.0126
207	5.9367	0.0126
208	5.9493	0.0125
209	5.9618	0.0125
210	5.9742	0.0125
211	5.9867	0.0124
212	5.9991	0.0124
213	6.0114	0.0124
214	6.0238	0.0123
215	6.0361	0.0123
216	6.0483	0.0123
217	6.0606	0.0122
218	6.0728	0.0122
219	6.0850	0.0122
220	6.0971	0.0121
221	6.1092	0.0121

222	6.1213	0.0121
223	6.1333	0.0121
224	6.1454	0.0120
225	6.1574	0.0120
226	6.1693	0.0120
227	6.1812	0.0119
228	6.1932	0.0119
229	6.2050	0.0119
230	6.2169	0.0118
231	6.2287	0.0118
232	6.2405	0.0118
233	6.2522	0.0118
234	6.2640	0.0117
235	6.2757	0.0117
236	6.2873	0.0117
237	6.2990	0.0116
238	6.3106	0.0116
239	6.3222	0.0116
240	6.3337	0.0116
241	6.3453	0.0115
242	6.3568	0.0115
243	6.3683	0.0115
244	6.3797	0.0115
245	6.3911	0.0114
246	6.4026	0.0114
247	6.4139	0.0114
248	6.4253	0.0114
249	6.4366	0.0113
250	6.4479	0.0113
251	6.4592	0.0113
252	6.4704	0.0112
253	6.4817	0.0112
254	6.4929	0.0112
255	6.5040	0.0112
256	6.5152	0.0111
257	6.5263	0.0111
258	6.5374	0.0111
259	6.5485	0.0111
260	6.5595	0.0111
261	6.5706	0.0110
262	6.5816	0.0110
263	6.5925	0.0110
264	6.6035	0.0110
265	6.6144	0.0109
266	6.6253	0.0109
267	6.6362	0.0109
268	6.6471	0.0109
269	6.6579	0.0108
270	6.6688	0.0108
271	6.6796	0.0108
272	6.6903	0.0108
273	6.7011	0.0108
274	6.7118	0.0107
275	6.7225	0.0107
276	6.7332	0.0107
277	6.7439	0.0107
278	6.7545	0.0106

279	6.7651	0.0106
280	6.7757	0.0106
281	6.7863	0.0106
282	6.7969	0.0106
283	6.8074	0.0105
284	6.8179	0.0105
285	6.8284	0.0105
286	6.8389	0.0105
287	6.8494	0.0105
288	6.8598	0.0104

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0104	0.0013	0.0091
2	0.0105	0.0013	0.0091
3	0.0105	0.0013	0.0092
4	0.0105	0.0013	0.0092
5	0.0106	0.0013	0.0092
6	0.0106	0.0013	0.0092
7	0.0106	0.0014	0.0093
8	0.0106	0.0014	0.0093
9	0.0107	0.0014	0.0093
10	0.0107	0.0014	0.0093
11	0.0108	0.0014	0.0094
12	0.0108	0.0014	0.0094
13	0.0108	0.0014	0.0094
14	0.0108	0.0014	0.0095
15	0.0109	0.0014	0.0095
16	0.0109	0.0014	0.0095
17	0.0110	0.0014	0.0096
18	0.0110	0.0014	0.0096
19	0.0110	0.0014	0.0096
20	0.0111	0.0014	0.0096
21	0.0111	0.0014	0.0097
22	0.0111	0.0014	0.0097
23	0.0112	0.0014	0.0098
24	0.0112	0.0014	0.0098
25	0.0112	0.0014	0.0098
26	0.0113	0.0014	0.0098
27	0.0113	0.0014	0.0099
28	0.0114	0.0014	0.0099
29	0.0114	0.0015	0.0100
30	0.0114	0.0015	0.0100
31	0.0115	0.0015	0.0100
32	0.0115	0.0015	0.0100
33	0.0116	0.0015	0.0101
34	0.0116	0.0015	0.0101
35	0.0116	0.0015	0.0102
36	0.0117	0.0015	0.0102
37	0.0117	0.0015	0.0102
38	0.0118	0.0015	0.0103
39	0.0118	0.0015	0.0103
40	0.0118	0.0015	0.0103
41	0.0119	0.0015	0.0104
42	0.0119	0.0015	0.0104

43	0.0120	0.0015	0.0105
44	0.0120	0.0015	0.0105
45	0.0121	0.0015	0.0105
46	0.0121	0.0015	0.0106
47	0.0122	0.0015	0.0106
48	0.0122	0.0016	0.0107
49	0.0123	0.0016	0.0107
50	0.0123	0.0016	0.0107
51	0.0124	0.0016	0.0108
52	0.0124	0.0016	0.0108
53	0.0125	0.0016	0.0109
54	0.0125	0.0016	0.0109
55	0.0126	0.0016	0.0110
56	0.0126	0.0016	0.0110
57	0.0127	0.0016	0.0111
58	0.0127	0.0016	0.0111
59	0.0128	0.0016	0.0112
60	0.0128	0.0016	0.0112
61	0.0129	0.0016	0.0112
62	0.0129	0.0016	0.0113
63	0.0130	0.0017	0.0113
64	0.0130	0.0017	0.0114
65	0.0131	0.0017	0.0114
66	0.0132	0.0017	0.0115
67	0.0132	0.0017	0.0115
68	0.0133	0.0017	0.0116
69	0.0133	0.0017	0.0117
70	0.0134	0.0017	0.0117
71	0.0135	0.0017	0.0118
72	0.0135	0.0017	0.0118
73	0.0136	0.0017	0.0119
74	0.0136	0.0017	0.0119
75	0.0137	0.0017	0.0120
76	0.0138	0.0018	0.0120
77	0.0139	0.0018	0.0121
78	0.0139	0.0018	0.0121
79	0.0140	0.0018	0.0122
80	0.0140	0.0018	0.0123
81	0.0141	0.0018	0.0123
82	0.0142	0.0018	0.0124
83	0.0143	0.0018	0.0125
84	0.0143	0.0018	0.0125
85	0.0144	0.0018	0.0126
86	0.0145	0.0018	0.0126
87	0.0146	0.0019	0.0127
88	0.0146	0.0019	0.0128
89	0.0147	0.0019	0.0129
90	0.0148	0.0019	0.0129
91	0.0149	0.0019	0.0130
92	0.0150	0.0019	0.0131
93	0.0151	0.0019	0.0132
94	0.0151	0.0019	0.0132
95	0.0152	0.0019	0.0133
96	0.0153	0.0019	0.0134
97	0.0154	0.0020	0.0135
98	0.0155	0.0020	0.0135
99	0.0156	0.0020	0.0136

100	0.0157	0.0020	0.0137
101	0.0158	0.0020	0.0138
102	0.0159	0.0020	0.0138
103	0.0160	0.0020	0.0140
104	0.0161	0.0020	0.0140
105	0.0162	0.0021	0.0141
106	0.0163	0.0021	0.0142
107	0.0164	0.0021	0.0143
108	0.0165	0.0021	0.0144
109	0.0166	0.0021	0.0145
110	0.0167	0.0021	0.0146
111	0.0169	0.0021	0.0147
112	0.0169	0.0022	0.0148
113	0.0171	0.0022	0.0149
114	0.0172	0.0022	0.0150
115	0.0173	0.0022	0.0151
116	0.0174	0.0022	0.0152
117	0.0176	0.0022	0.0154
118	0.0177	0.0022	0.0154
119	0.0179	0.0023	0.0156
120	0.0180	0.0023	0.0157
121	0.0181	0.0023	0.0158
122	0.0182	0.0023	0.0159
123	0.0184	0.0023	0.0161
124	0.0185	0.0024	0.0162
125	0.0187	0.0024	0.0164
126	0.0188	0.0024	0.0164
127	0.0191	0.0024	0.0166
128	0.0192	0.0024	0.0167
129	0.0194	0.0025	0.0169
130	0.0195	0.0025	0.0170
131	0.0197	0.0025	0.0172
132	0.0199	0.0025	0.0173
133	0.0201	0.0026	0.0176
134	0.0202	0.0026	0.0177
135	0.0205	0.0026	0.0179
136	0.0206	0.0026	0.0180
137	0.0209	0.0027	0.0183
138	0.0211	0.0027	0.0184
139	0.0213	0.0027	0.0186
140	0.0215	0.0027	0.0188
141	0.0218	0.0028	0.0190
142	0.0220	0.0028	0.0192
143	0.0223	0.0028	0.0195
144	0.0225	0.0029	0.0196
145	0.0240	0.0031	0.0209
146	0.0242	0.0031	0.0211
147	0.0246	0.0031	0.0214
148	0.0248	0.0031	0.0216
149	0.0252	0.0032	0.0220
150	0.0254	0.0032	0.0221
151	0.0258	0.0033	0.0225
152	0.0260	0.0033	0.0227
153	0.0265	0.0034	0.0231
154	0.0267	0.0034	0.0233
155	0.0272	0.0035	0.0238
156	0.0275	0.0035	0.0240

157	0.0281	0.0036	0.0245
158	0.0283	0.0036	0.0247
159	0.0289	0.0037	0.0253
160	0.0293	0.0037	0.0255
161	0.0299	0.0038	0.0261
162	0.0303	0.0038	0.0264
163	0.0310	0.0039	0.0271
164	0.0314	0.0040	0.0274
165	0.0322	0.0041	0.0281
166	0.0326	0.0041	0.0285
167	0.0335	0.0043	0.0293
168	0.0340	0.0043	0.0297
169	0.0351	0.0045	0.0306
170	0.0356	0.0045	0.0311
171	0.0368	0.0047	0.0321
172	0.0374	0.0048	0.0327
173	0.0388	0.0049	0.0338
174	0.0395	0.0050	0.0345
175	0.0411	0.0052	0.0358
176	0.0419	0.0053	0.0366
177	0.0438	0.0056	0.0382
178	0.0448	0.0057	0.0391
179	0.0472	0.0060	0.0412
180	0.0484	0.0062	0.0423
181	0.0514	0.0065	0.0448
182	0.0530	0.0067	0.0463
183	0.0568	0.0072	0.0496
184	0.0591	0.0075	0.0516
185	0.0560	0.0071	0.0489
186	0.0592	0.0075	0.0517
187	0.0672	0.0081	0.0590
188	0.0724	0.0081	0.0643
189	0.0873	0.0081	0.0792
190	0.0986	0.0081	0.0904
191	0.1409	0.0081	0.1327
192	0.1937	0.0081	0.1856
193	0.6063	0.0081	0.5982
194	0.1147	0.0081	0.1066
195	0.0790	0.0081	0.0708
196	0.0629	0.0080	0.0549
197	0.0616	0.0078	0.0537
198	0.0548	0.0070	0.0479
199	0.0498	0.0063	0.0435
200	0.0460	0.0058	0.0401
201	0.0428	0.0054	0.0374
202	0.0402	0.0051	0.0351
203	0.0381	0.0048	0.0332
204	0.0362	0.0046	0.0316
205	0.0345	0.0044	0.0301
206	0.0331	0.0042	0.0288
207	0.0318	0.0040	0.0277
208	0.0306	0.0039	0.0267
209	0.0296	0.0038	0.0258
210	0.0286	0.0036	0.0250
211	0.0278	0.0035	0.0242
212	0.0270	0.0034	0.0236
213	0.0263	0.0033	0.0229

214	0.0256	0.0033	0.0223
215	0.0250	0.0032	0.0218
216	0.0244	0.0031	0.0213
217	0.0226	0.0029	0.0198
218	0.0221	0.0028	0.0193
219	0.0217	0.0028	0.0189
220	0.0212	0.0027	0.0185
221	0.0208	0.0026	0.0181
222	0.0204	0.0026	0.0178
223	0.0200	0.0025	0.0174
224	0.0196	0.0025	0.0171
225	0.0193	0.0025	0.0168
226	0.0189	0.0024	0.0165
227	0.0186	0.0024	0.0163
228	0.0183	0.0023	0.0160
229	0.0180	0.0023	0.0158
230	0.0178	0.0023	0.0155
231	0.0175	0.0022	0.0153
232	0.0173	0.0022	0.0151
233	0.0170	0.0022	0.0149
234	0.0168	0.0021	0.0146
235	0.0166	0.0021	0.0145
236	0.0163	0.0021	0.0143
237	0.0161	0.0021	0.0141
238	0.0159	0.0020	0.0139
239	0.0157	0.0020	0.0137
240	0.0155	0.0020	0.0136
241	0.0154	0.0020	0.0134
242	0.0152	0.0019	0.0133
243	0.0150	0.0019	0.0131
244	0.0148	0.0019	0.0130
245	0.0147	0.0019	0.0128
246	0.0145	0.0018	0.0127
247	0.0144	0.0018	0.0126
248	0.0142	0.0018	0.0124
249	0.0141	0.0018	0.0123
250	0.0140	0.0018	0.0122
251	0.0138	0.0018	0.0121
252	0.0137	0.0017	0.0119
253	0.0136	0.0017	0.0118
254	0.0134	0.0017	0.0117
255	0.0133	0.0017	0.0116
256	0.0132	0.0017	0.0115
257	0.0131	0.0017	0.0114
258	0.0130	0.0016	0.0113
259	0.0129	0.0016	0.0112
260	0.0127	0.0016	0.0111
261	0.0126	0.0016	0.0110
262	0.0125	0.0016	0.0109
263	0.0124	0.0016	0.0109
264	0.0123	0.0016	0.0108
265	0.0122	0.0016	0.0107
266	0.0121	0.0015	0.0106
267	0.0121	0.0015	0.0105
268	0.0120	0.0015	0.0104
269	0.0119	0.0015	0.0104
270	0.0118	0.0015	0.0103

271	0.0117	0.0015	0.0102
272	0.0116	0.0015	0.0101
273	0.0115	0.0015	0.0101
274	0.0115	0.0015	0.0100
275	0.0114	0.0014	0.0099
276	0.0113	0.0014	0.0099
277	0.0112	0.0014	0.0098
278	0.0111	0.0014	0.0097
279	0.0111	0.0014	0.0097
280	0.0110	0.0014	0.0096
281	0.0109	0.0014	0.0095
282	0.0109	0.0014	0.0095
283	0.0108	0.0014	0.0094
284	0.0107	0.0014	0.0094
285	0.0107	0.0014	0.0093
286	0.0106	0.0013	0.0093
287	0.0105	0.0013	0.0092
288	0.0105	0.0013	0.0091

Total soil rain loss = 0.76(In)
Total effective rainfall = 6.10(In)
Peak flow rate in flood hydrograph = 76.78(CFS)

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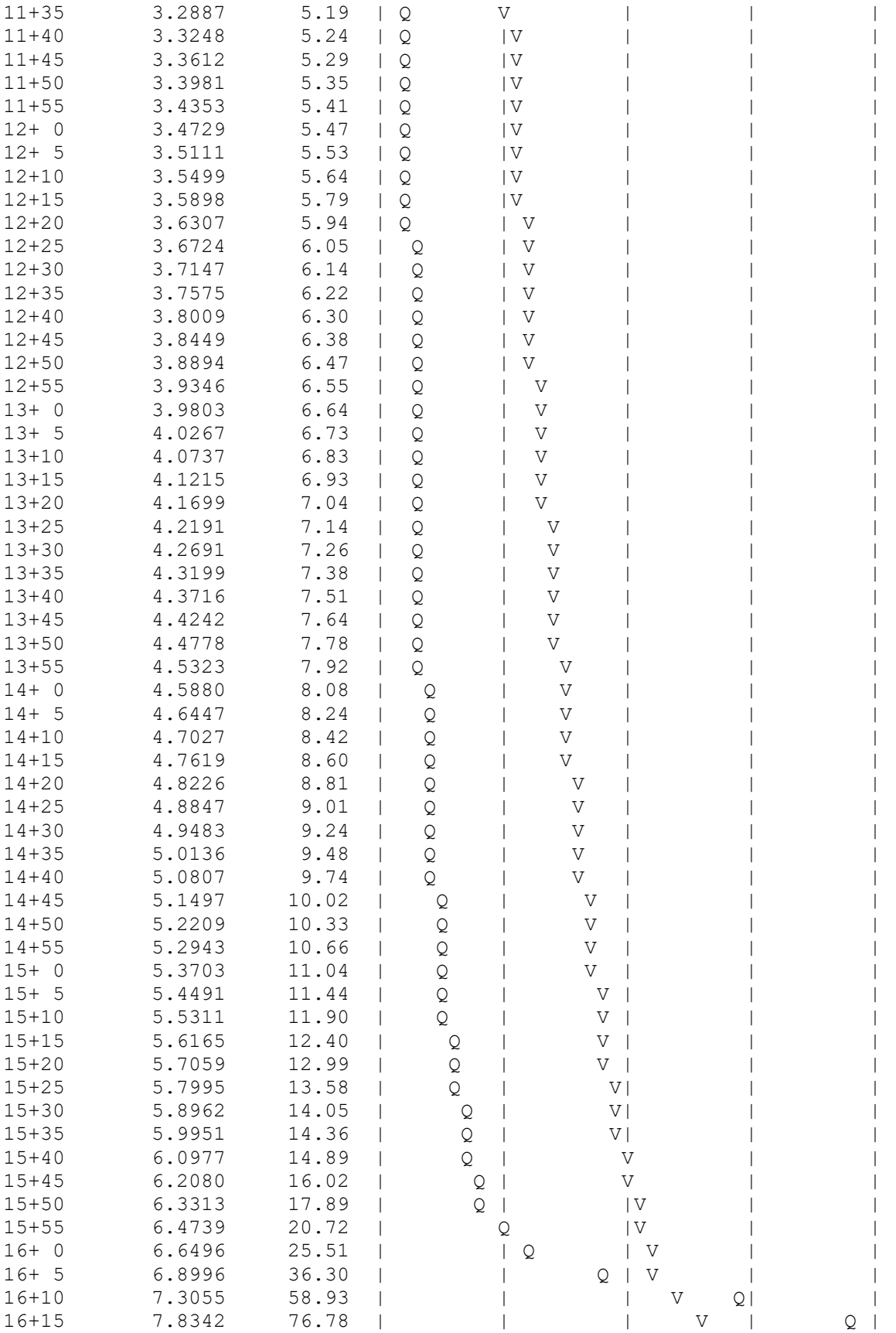
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

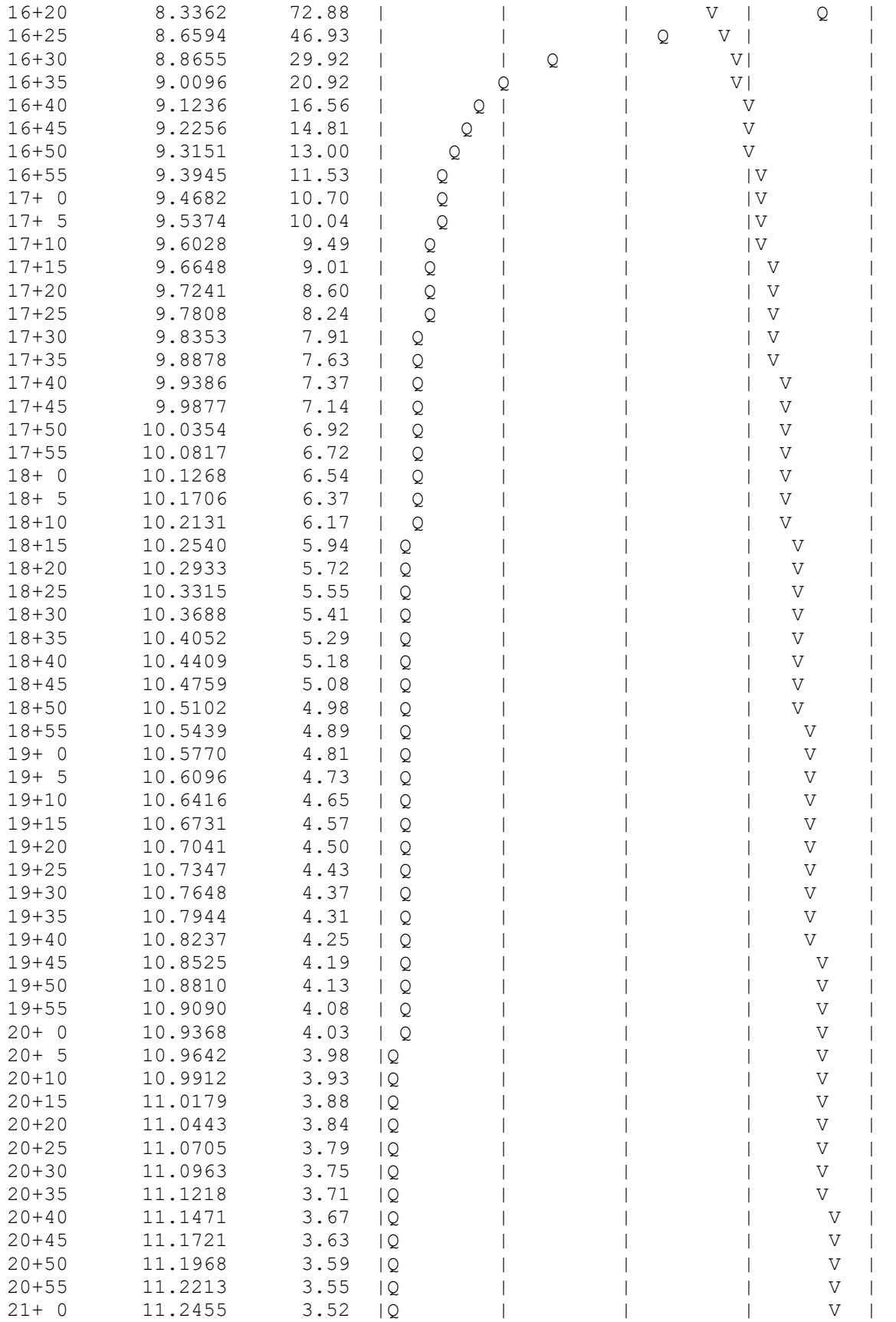
Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	20.0	40.0	60.0	80.0
0+ 5	0.0005	0.07	Q				
0+10	0.0038	0.47	Q				
0+15	0.0121	1.21	Q				
0+20	0.0256	1.97	Q				
0+25	0.0418	2.35	VQ				
0+30	0.0592	2.52	VQ				
0+35	0.0770	2.59	VQ				
0+40	0.0951	2.62	VQ				
0+45	0.1133	2.64	VQ				
0+50	0.1316	2.66	VQ				
0+55	0.1499	2.67	VQ				
1+ 0	0.1684	2.68	VQ				
1+ 5	0.1869	2.68	VQ				
1+10	0.2054	2.69	VQ				
1+15	0.2240	2.70	VQ				
1+20	0.2426	2.71	VQ				
1+25	0.2614	2.72	VQ				
1+30	0.2801	2.73	VQ				
1+35	0.2990	2.73	VQ				
1+40	0.3179	2.74	|Q				
1+45	0.3368	2.75	|Q				
1+50	0.3558	2.76	|Q				
1+55	0.3749	2.77	|Q				
2+ 0	0.3940	2.78	|Q				

2+ 5	0.4132	2.79	|Q	|	|	|	|
2+10	0.4325	2.80	|Q	|	|	|	|
2+15	0.4518	2.81	|Q	|	|	|	|
2+20	0.4712	2.82	|Q	|	|	|	|
2+25	0.4907	2.83	|Q	|	|	|	|
2+30	0.5102	2.84	|Q	|	|	|	|
2+35	0.5298	2.84	|Q	|	|	|	|
2+40	0.5495	2.85	|Q	|	|	|	|
2+45	0.5692	2.86	|Q	|	|	|	|
2+50	0.5890	2.87	|Q	|	|	|	|
2+55	0.6089	2.88	|QV	|	|	|	|
3+ 0	0.6288	2.89	|QV	|	|	|	|
3+ 5	0.6488	2.90	|QV	|	|	|	|
3+10	0.6689	2.92	|QV	|	|	|	|
3+15	0.6890	2.93	|QV	|	|	|	|
3+20	0.7093	2.94	|QV	|	|	|	|
3+25	0.7296	2.95	|QV	|	|	|	|
3+30	0.7499	2.96	|QV	|	|	|	|
3+35	0.7704	2.97	|QV	|	|	|	|
3+40	0.7909	2.98	|QV	|	|	|	|
3+45	0.8115	2.99	|QV	|	|	|	|
3+50	0.8322	3.00	|QV	|	|	|	|
3+55	0.8529	3.01	|QV	|	|	|	|
4+ 0	0.8738	3.02	|QV	|	|	|	|
4+ 5	0.8947	3.04	|QV	|	|	|	|
4+10	0.9157	3.05	|Q V	|	|	|	|
4+15	0.9367	3.06	|Q V	|	|	|	|
4+20	0.9579	3.07	|Q V	|	|	|	|
4+25	0.9791	3.08	|Q V	|	|	|	|
4+30	1.0005	3.10	|Q V	|	|	|	|
4+35	1.0219	3.11	|Q V	|	|	|	|
4+40	1.0434	3.12	|Q V	|	|	|	|
4+45	1.0649	3.13	|Q V	|	|	|	|
4+50	1.0866	3.15	|Q V	|	|	|	|
4+55	1.1084	3.16	|Q V	|	|	|	|
5+ 0	1.1302	3.17	|Q V	|	|	|	|
5+ 5	1.1522	3.19	|Q V	|	|	|	|
5+10	1.1742	3.20	|Q V	|	|	|	|
5+15	1.1963	3.21	|Q V	|	|	|	|
5+20	1.2185	3.23	|Q V	|	|	|	|
5+25	1.2409	3.24	|Q V	|	|	|	|
5+30	1.2633	3.25	|Q V	|	|	|	|
5+35	1.2858	3.27	|Q V	|	|	|	|
5+40	1.3084	3.28	|Q V	|	|	|	|
5+45	1.3311	3.30	|Q V	|	|	|	|
5+50	1.3539	3.31	|Q V	|	|	|	|
5+55	1.3768	3.33	|Q V	|	|	|	|
6+ 0	1.3999	3.34	|Q V	|	|	|	|
6+ 5	1.4230	3.36	|Q V	|	|	|	|
6+10	1.4462	3.37	|Q V	|	|	|	|
6+15	1.4696	3.39	|Q V	|	|	|	|
6+20	1.4930	3.40	|Q V	|	|	|	|
6+25	1.5166	3.42	|Q V	|	|	|	|
6+30	1.5402	3.44	|Q V	|	|	|	|
6+35	1.5640	3.45	|Q V	|	|	|	|
6+40	1.5879	3.47	|Q V	|	|	|	|
6+45	1.6119	3.49	|Q V	|	|	|	|

6+50	1.6361	3.50	Q V			
6+55	1.6603	3.52	Q V			
7+ 0	1.6847	3.54	Q V			
7+ 5	1.7092	3.56	Q V			
7+10	1.7339	3.58	Q V			
7+15	1.7586	3.59	Q V			
7+20	1.7835	3.61	Q V			
7+25	1.8085	3.63	Q V			
7+30	1.8337	3.65	Q V			
7+35	1.8590	3.67	Q V			
7+40	1.8844	3.69	Q V			
7+45	1.9099	3.71	Q V			
7+50	1.9356	3.73	Q V			
7+55	1.9615	3.75	Q V			
8+ 0	1.9875	3.77	Q V			
8+ 5	2.0136	3.80	Q V			
8+10	2.0399	3.82	Q V			
8+15	2.0664	3.84	Q V			
8+20	2.0930	3.86	Q V			
8+25	2.1197	3.88	Q V			
8+30	2.1466	3.91	Q V			
8+35	2.1737	3.93	Q V			
8+40	2.2010	3.96	Q V			
8+45	2.2284	3.98	Q V			
8+50	2.2560	4.01	Q V			
8+55	2.2837	4.03	Q V			
9+ 0	2.3117	4.06	Q V			
9+ 5	2.3398	4.08	Q V			
9+10	2.3681	4.11	Q V			
9+15	2.3966	4.14	Q V			
9+20	2.4253	4.17	Q V			
9+25	2.4541	4.19	Q V			
9+30	2.4832	4.22	Q V			
9+35	2.5125	4.25	Q V			
9+40	2.5420	4.28	Q V			
9+45	2.5717	4.31	Q V			
9+50	2.6016	4.34	Q V			
9+55	2.6317	4.37	Q V			
10+ 0	2.6621	4.41	Q V			
10+ 5	2.6927	4.44	Q V			
10+10	2.7235	4.47	Q V			
10+15	2.7545	4.51	Q V			
10+20	2.7858	4.54	Q V			
10+25	2.8174	4.58	Q V			
10+30	2.8492	4.62	Q V			
10+35	2.8812	4.66	Q V			
10+40	2.9136	4.69	Q V			
10+45	2.9462	4.73	Q V			
10+50	2.9790	4.77	Q V			
10+55	3.0122	4.82	Q V			
11+ 0	3.0457	4.86	Q V			
11+ 5	3.0794	4.90	Q V			
11+10	3.1135	4.95	Q V			
11+15	3.1478	4.99	Q V			
11+20	3.1826	5.04	Q V			
11+25	3.2176	5.09	Q V			
11+30	3.2530	5.14	Q V			





21+ 5	11.2695	3.48	|Q	|	|	|	V |
21+10	11.2933	3.45	|Q	|	|	|	V |
21+15	11.3168	3.42	|Q	|	|	|	V |
21+20	11.3401	3.39	|Q	|	|	|	V |
21+25	11.3632	3.35	|Q	|	|	|	V |
21+30	11.3861	3.32	|Q	|	|	|	V |
21+35	11.4088	3.29	|Q	|	|	|	V |
21+40	11.4313	3.27	|Q	|	|	|	V |
21+45	11.4536	3.24	|Q	|	|	|	V |
21+50	11.4757	3.21	|Q	|	|	|	V |
21+55	11.4976	3.18	|Q	|	|	|	V |
22+ 0	11.5194	3.16	|Q	|	|	|	V |
22+ 5	11.5409	3.13	|Q	|	|	|	V |
22+10	11.5623	3.11	|Q	|	|	|	V |
22+15	11.5835	3.08	|Q	|	|	|	V |
22+20	11.6046	3.06	|Q	|	|	|	V |
22+25	11.6255	3.03	|Q	|	|	|	V |
22+30	11.6462	3.01	|Q	|	|	|	V |
22+35	11.6668	2.99	|Q	|	|	|	V |
22+40	11.6872	2.97	|Q	|	|	|	V |
22+45	11.7075	2.94	|Q	|	|	|	V |
22+50	11.7277	2.92	|Q	|	|	|	V |
22+55	11.7476	2.90	|Q	|	|	|	V|
23+ 0	11.7675	2.88	|Q	|	|	|	V|
23+ 5	11.7872	2.86	|Q	|	|	|	V|
23+10	11.8068	2.84	|Q	|	|	|	V|
23+15	11.8262	2.82	|Q	|	|	|	V|
23+20	11.8455	2.80	|Q	|	|	|	V|
23+25	11.8647	2.79	|Q	|	|	|	V|
23+30	11.8838	2.77	|Q	|	|	|	V|
23+35	11.9027	2.75	|Q	|	|	|	V|
23+40	11.9216	2.73	|Q	|	|	|	V|
23+45	11.9403	2.72	|Q	|	|	|	V|
23+50	11.9588	2.70	|Q	|	|	|	V|
23+55	11.9773	2.68	|Q	|	|	|	V|
24+ 0	11.9957	2.67	|Q	|	|	|	V|
24+ 5	12.0134	2.58	|Q	|	|	|	V|
24+10	12.0283	2.16	|Q	|	|	|	V|
24+15	12.0381	1.42	Q	|	|	|	V|
24+20	12.0426	0.65	Q	|	|	|	V|
24+25	12.0444	0.27	Q	|	|	|	V|
24+30	12.0452	0.11	Q	|	|	|	V|
24+35	12.0455	0.05	Q	|	|	|	V|
24+40	12.0457	0.03	Q	|	|	|	V|
24+45	12.0457	0.01	Q	|	|	|	V

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

Study date 12/14/21

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

Program License Serial Number 6405

PEPPER INDUSTRIAL BUILDING
ONSITE PROPOSED CONDITION
2-YEAR, 24-HOUR STORM EVENT ANALYSIS

Storm Event Year = 2

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 2		
23.71	1	0.64
Rainfall data for year 2		
23.71	6	1.61
Rainfall data for year 2		
23.71	24	2.94

++

******** 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	23.71	1.000	0.978	0.100	0.098

Area-averaged adjusted loss rate Fm (In/Hr) = 0.098

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
2.37	0.100	32.0	32.0	14.70	0.000
21.34	0.900	98.0	98.0	0.20	0.921

Area-averaged catchment yield fraction, Y = 0.829
Area-averaged low loss fraction, Yb = 0.171
User entry of time of concentration = 0.312 (hours)
++
Watershed area = 23.71(Ac.)
Catchment Lag time = 0.250 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 33.3547
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.098(In/Hr)
Average low loss rate fraction (Yb) = 0.171 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.237(In)
Computed peak 30-minute rainfall = 0.485(In)
Specified peak 1-hour rainfall = 0.640(In)
Computed peak 3-hour rainfall = 1.127(In)
Specified peak 6-hour rainfall = 1.610(In)
Specified peak 24-hour rainfall = 2.940(In)

Rainfall depth area reduction factors:
Using a total area of 23.71(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999 Adjusted rainfall = 0.237(In)
30-minute factor = 0.999 Adjusted rainfall = 0.484(In)
1-hour factor = 0.999 Adjusted rainfall = 0.639(In)
3-hour factor = 1.000 Adjusted rainfall = 1.127(In)
6-hour factor = 1.000 Adjusted rainfall = 1.610(In)
24-hour factor = 1.000 Adjusted rainfall = 2.940(In)

U n i t H y d r o g r a p h
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Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 286.74 (CFS))	
1	2.273	6.516
2	13.730	32.854
3	35.629	62.793
4	63.903	81.075
5	82.434	53.136
6	91.872	27.062

7	96.479	13.210
8	98.283	5.174
9	98.903	1.778
10	99.504	1.721
11	100.000	1.423

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.2366	0.2366
2	0.3122	0.0756
3	0.3672	0.0550
4	0.4120	0.0448
5	0.4504	0.0385
6	0.4845	0.0341
7	0.5153	0.0308
8	0.5436	0.0283
9	0.5698	0.0262
10	0.5943	0.0245
11	0.6174	0.0231
12	0.6393	0.0219
13	0.6662	0.0269
14	0.6922	0.0260
15	0.7173	0.0251
16	0.7415	0.0243
17	0.7651	0.0236
18	0.7880	0.0229
19	0.8103	0.0223
20	0.8320	0.0217
21	0.8532	0.0212
22	0.8739	0.0207
23	0.8942	0.0203
24	0.9140	0.0198
25	0.9335	0.0194
26	0.9525	0.0191
27	0.9713	0.0187
28	0.9897	0.0184
29	1.0077	0.0181
30	1.0255	0.0178
31	1.0430	0.0175
32	1.0602	0.0172
33	1.0772	0.0170
34	1.0939	0.0167
35	1.1104	0.0165
36	1.1266	0.0163
37	1.1426	0.0160
38	1.1584	0.0158
39	1.1740	0.0156
40	1.1894	0.0154
41	1.2046	0.0152
42	1.2197	0.0150
43	1.2346	0.0149
44	1.2493	0.0147
45	1.2638	0.0145
46	1.2782	0.0144
47	1.2924	0.0142
48	1.3065	0.0141
49	1.3205	0.0139

50	1.3343	0.0138
51	1.3479	0.0137
52	1.3615	0.0135
53	1.3749	0.0134
54	1.3882	0.0133
55	1.4014	0.0132
56	1.4145	0.0131
57	1.4274	0.0130
58	1.4402	0.0128
59	1.4530	0.0127
60	1.4656	0.0126
61	1.4781	0.0125
62	1.4906	0.0124
63	1.5029	0.0123
64	1.5151	0.0122
65	1.5273	0.0121
66	1.5393	0.0121
67	1.5513	0.0120
68	1.5632	0.0119
69	1.5750	0.0118
70	1.5867	0.0117
71	1.5983	0.0116
72	1.6099	0.0116
73	1.6196	0.0097
74	1.6292	0.0096
75	1.6387	0.0095
76	1.6481	0.0095
77	1.6575	0.0094
78	1.6668	0.0093
79	1.6761	0.0092
80	1.6853	0.0092
81	1.6944	0.0091
82	1.7035	0.0091
83	1.7124	0.0090
84	1.7214	0.0089
85	1.7302	0.0089
86	1.7391	0.0088
87	1.7478	0.0088
88	1.7565	0.0087
89	1.7652	0.0086
90	1.7737	0.0086
91	1.7823	0.0085
92	1.7908	0.0085
93	1.7992	0.0084
94	1.8076	0.0084
95	1.8159	0.0083
96	1.8242	0.0083
97	1.8324	0.0082
98	1.8406	0.0082
99	1.8487	0.0081
100	1.8568	0.0081
101	1.8649	0.0080
102	1.8729	0.0080
103	1.8808	0.0080
104	1.8887	0.0079
105	1.8966	0.0079
106	1.9044	0.0078

107	1.9122	0.0078
108	1.9199	0.0077
109	1.9277	0.0077
110	1.9353	0.0077
111	1.9429	0.0076
112	1.9505	0.0076
113	1.9581	0.0075
114	1.9656	0.0075
115	1.9730	0.0075
116	1.9805	0.0074
117	1.9879	0.0074
118	1.9952	0.0074
119	2.0026	0.0073
120	2.0099	0.0073
121	2.0171	0.0073
122	2.0243	0.0072
123	2.0315	0.0072
124	2.0387	0.0072
125	2.0458	0.0071
126	2.0529	0.0071
127	2.0600	0.0071
128	2.0670	0.0070
129	2.0740	0.0070
130	2.0810	0.0070
131	2.0879	0.0069
132	2.0948	0.0069
133	2.1017	0.0069
134	2.1086	0.0069
135	2.1154	0.0068
136	2.1222	0.0068
137	2.1289	0.0068
138	2.1357	0.0067
139	2.1424	0.0067
140	2.1491	0.0067
141	2.1557	0.0067
142	2.1623	0.0066
143	2.1689	0.0066
144	2.1755	0.0066
145	2.1821	0.0066
146	2.1886	0.0065
147	2.1951	0.0065
148	2.2016	0.0065
149	2.2080	0.0064
150	2.2144	0.0064
151	2.2208	0.0064
152	2.2272	0.0064
153	2.2336	0.0064
154	2.2399	0.0063
155	2.2462	0.0063
156	2.2525	0.0063
157	2.2588	0.0063
158	2.2650	0.0062
159	2.2712	0.0062
160	2.2774	0.0062
161	2.2836	0.0062
162	2.2897	0.0062
163	2.2959	0.0061

164	2.3020	0.0061
165	2.3081	0.0061
166	2.3141	0.0061
167	2.3202	0.0060
168	2.3262	0.0060
169	2.3322	0.0060
170	2.3382	0.0060
171	2.3442	0.0060
172	2.3501	0.0059
173	2.3560	0.0059
174	2.3619	0.0059
175	2.3678	0.0059
176	2.3737	0.0059
177	2.3795	0.0058
178	2.3854	0.0058
179	2.3912	0.0058
180	2.3970	0.0058
181	2.4027	0.0058
182	2.4085	0.0058
183	2.4142	0.0057
184	2.4200	0.0057
185	2.4257	0.0057
186	2.4314	0.0057
187	2.4370	0.0057
188	2.4427	0.0057
189	2.4483	0.0056
190	2.4539	0.0056
191	2.4595	0.0056
192	2.4651	0.0056
193	2.4707	0.0056
194	2.4762	0.0056
195	2.4818	0.0055
196	2.4873	0.0055
197	2.4928	0.0055
198	2.4983	0.0055
199	2.5038	0.0055
200	2.5092	0.0055
201	2.5147	0.0054
202	2.5201	0.0054
203	2.5255	0.0054
204	2.5309	0.0054
205	2.5363	0.0054
206	2.5417	0.0054
207	2.5470	0.0054
208	2.5523	0.0053
209	2.5577	0.0053
210	2.5630	0.0053
211	2.5683	0.0053
212	2.5736	0.0053
213	2.5788	0.0053
214	2.5841	0.0053
215	2.5893	0.0052
216	2.5945	0.0052
217	2.5997	0.0052
218	2.6049	0.0052
219	2.6101	0.0052
220	2.6153	0.0052

221	2.6205	0.0052
222	2.6256	0.0051
223	2.6307	0.0051
224	2.6359	0.0051
225	2.6410	0.0051
226	2.6460	0.0051
227	2.6511	0.0051
228	2.6562	0.0051
229	2.6613	0.0051
230	2.6663	0.0050
231	2.6713	0.0050
232	2.6763	0.0050
233	2.6813	0.0050
234	2.6863	0.0050
235	2.6913	0.0050
236	2.6963	0.0050
237	2.7012	0.0050
238	2.7062	0.0049
239	2.7111	0.0049
240	2.7160	0.0049
241	2.7210	0.0049
242	2.7259	0.0049
243	2.7307	0.0049
244	2.7356	0.0049
245	2.7405	0.0049
246	2.7453	0.0049
247	2.7502	0.0048
248	2.7550	0.0048
249	2.7598	0.0048
250	2.7646	0.0048
251	2.7694	0.0048
252	2.7742	0.0048
253	2.7790	0.0048
254	2.7838	0.0048
255	2.7885	0.0048
256	2.7933	0.0047
257	2.7980	0.0047
258	2.8027	0.0047
259	2.8074	0.0047
260	2.8121	0.0047
261	2.8168	0.0047
262	2.8215	0.0047
263	2.8262	0.0047
264	2.8309	0.0047
265	2.8355	0.0047
266	2.8402	0.0046
267	2.8448	0.0046
268	2.8494	0.0046
269	2.8540	0.0046
270	2.8586	0.0046
271	2.8632	0.0046
272	2.8678	0.0046
273	2.8724	0.0046
274	2.8770	0.0046
275	2.8815	0.0046
276	2.8861	0.0045
277	2.8906	0.0045

278	2.8951	0.0045
279	2.8996	0.0045
280	2.9042	0.0045
281	2.9087	0.0045
282	2.9131	0.0045
283	2.9176	0.0045
284	2.9221	0.0045
285	2.9266	0.0045
286	2.9310	0.0045
287	2.9355	0.0044
288	2.9399	0.0044

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0044	0.0008	0.0037
2	0.0044	0.0008	0.0037
3	0.0045	0.0008	0.0037
4	0.0045	0.0008	0.0037
5	0.0045	0.0008	0.0037
6	0.0045	0.0008	0.0037
7	0.0045	0.0008	0.0037
8	0.0045	0.0008	0.0038
9	0.0045	0.0008	0.0038
10	0.0046	0.0008	0.0038
11	0.0046	0.0008	0.0038
12	0.0046	0.0008	0.0038
13	0.0046	0.0008	0.0038
14	0.0046	0.0008	0.0038
15	0.0046	0.0008	0.0038
16	0.0046	0.0008	0.0038
17	0.0047	0.0008	0.0039
18	0.0047	0.0008	0.0039
19	0.0047	0.0008	0.0039
20	0.0047	0.0008	0.0039
21	0.0047	0.0008	0.0039
22	0.0047	0.0008	0.0039
23	0.0048	0.0008	0.0039
24	0.0048	0.0008	0.0040
25	0.0048	0.0008	0.0040
26	0.0048	0.0008	0.0040
27	0.0048	0.0008	0.0040
28	0.0048	0.0008	0.0040
29	0.0049	0.0008	0.0040
30	0.0049	0.0008	0.0040
31	0.0049	0.0008	0.0041
32	0.0049	0.0008	0.0041
33	0.0049	0.0008	0.0041
34	0.0049	0.0008	0.0041
35	0.0050	0.0008	0.0041
36	0.0050	0.0008	0.0041
37	0.0050	0.0009	0.0041
38	0.0050	0.0009	0.0042
39	0.0050	0.0009	0.0042
40	0.0050	0.0009	0.0042
41	0.0051	0.0009	0.0042

42	0.0051	0.0009	0.0042
43	0.0051	0.0009	0.0042
44	0.0051	0.0009	0.0042
45	0.0051	0.0009	0.0043
46	0.0052	0.0009	0.0043
47	0.0052	0.0009	0.0043
48	0.0052	0.0009	0.0043
49	0.0052	0.0009	0.0043
50	0.0052	0.0009	0.0043
51	0.0053	0.0009	0.0044
52	0.0053	0.0009	0.0044
53	0.0053	0.0009	0.0044
54	0.0053	0.0009	0.0044
55	0.0054	0.0009	0.0044
56	0.0054	0.0009	0.0045
57	0.0054	0.0009	0.0045
58	0.0054	0.0009	0.0045
59	0.0054	0.0009	0.0045
60	0.0055	0.0009	0.0045
61	0.0055	0.0009	0.0046
62	0.0055	0.0009	0.0046
63	0.0055	0.0009	0.0046
64	0.0056	0.0009	0.0046
65	0.0056	0.0010	0.0046
66	0.0056	0.0010	0.0046
67	0.0056	0.0010	0.0047
68	0.0057	0.0010	0.0047
69	0.0057	0.0010	0.0047
70	0.0057	0.0010	0.0047
71	0.0057	0.0010	0.0048
72	0.0058	0.0010	0.0048
73	0.0058	0.0010	0.0048
74	0.0058	0.0010	0.0048
75	0.0058	0.0010	0.0048
76	0.0059	0.0010	0.0049
77	0.0059	0.0010	0.0049
78	0.0059	0.0010	0.0049
79	0.0060	0.0010	0.0049
80	0.0060	0.0010	0.0050
81	0.0060	0.0010	0.0050
82	0.0060	0.0010	0.0050
83	0.0061	0.0010	0.0050
84	0.0061	0.0010	0.0051
85	0.0062	0.0011	0.0051
86	0.0062	0.0011	0.0051
87	0.0062	0.0011	0.0052
88	0.0062	0.0011	0.0052
89	0.0063	0.0011	0.0052
90	0.0063	0.0011	0.0052
91	0.0064	0.0011	0.0053
92	0.0064	0.0011	0.0053
93	0.0064	0.0011	0.0053
94	0.0064	0.0011	0.0053
95	0.0065	0.0011	0.0054
96	0.0065	0.0011	0.0054
97	0.0066	0.0011	0.0055
98	0.0066	0.0011	0.0055

99	0.0067	0.0011	0.0055
100	0.0067	0.0011	0.0055
101	0.0067	0.0012	0.0056
102	0.0068	0.0012	0.0056
103	0.0068	0.0012	0.0057
104	0.0069	0.0012	0.0057
105	0.0069	0.0012	0.0057
106	0.0069	0.0012	0.0058
107	0.0070	0.0012	0.0058
108	0.0070	0.0012	0.0058
109	0.0071	0.0012	0.0059
110	0.0071	0.0012	0.0059
111	0.0072	0.0012	0.0060
112	0.0072	0.0012	0.0060
113	0.0073	0.0012	0.0060
114	0.0073	0.0013	0.0061
115	0.0074	0.0013	0.0061
116	0.0074	0.0013	0.0062
117	0.0075	0.0013	0.0062
118	0.0075	0.0013	0.0063
119	0.0076	0.0013	0.0063
120	0.0077	0.0013	0.0064
121	0.0077	0.0013	0.0064
122	0.0078	0.0013	0.0065
123	0.0079	0.0013	0.0065
124	0.0079	0.0014	0.0066
125	0.0080	0.0014	0.0066
126	0.0080	0.0014	0.0067
127	0.0081	0.0014	0.0067
128	0.0082	0.0014	0.0068
129	0.0083	0.0014	0.0069
130	0.0083	0.0014	0.0069
131	0.0084	0.0014	0.0070
132	0.0085	0.0014	0.0070
133	0.0086	0.0015	0.0071
134	0.0086	0.0015	0.0072
135	0.0088	0.0015	0.0073
136	0.0088	0.0015	0.0073
137	0.0089	0.0015	0.0074
138	0.0090	0.0015	0.0075
139	0.0091	0.0016	0.0076
140	0.0092	0.0016	0.0076
141	0.0093	0.0016	0.0077
142	0.0094	0.0016	0.0078
143	0.0095	0.0016	0.0079
144	0.0096	0.0016	0.0080
145	0.0116	0.0020	0.0096
146	0.0116	0.0020	0.0096
147	0.0118	0.0020	0.0098
148	0.0119	0.0020	0.0099
149	0.0121	0.0021	0.0100
150	0.0121	0.0021	0.0101
151	0.0123	0.0021	0.0102
152	0.0124	0.0021	0.0103
153	0.0126	0.0022	0.0105
154	0.0127	0.0022	0.0106
155	0.0130	0.0022	0.0107

156	0.0131	0.0022	0.0108
157	0.0133	0.0023	0.0110
158	0.0134	0.0023	0.0111
159	0.0137	0.0023	0.0113
160	0.0138	0.0024	0.0114
161	0.0141	0.0024	0.0117
162	0.0142	0.0024	0.0118
163	0.0145	0.0025	0.0121
164	0.0147	0.0025	0.0122
165	0.0150	0.0026	0.0125
166	0.0152	0.0026	0.0126
167	0.0156	0.0027	0.0129
168	0.0158	0.0027	0.0131
169	0.0163	0.0028	0.0135
170	0.0165	0.0028	0.0137
171	0.0170	0.0029	0.0141
172	0.0172	0.0029	0.0143
173	0.0178	0.0030	0.0147
174	0.0181	0.0031	0.0150
175	0.0187	0.0032	0.0155
176	0.0191	0.0033	0.0158
177	0.0198	0.0034	0.0165
178	0.0203	0.0035	0.0168
179	0.0212	0.0036	0.0176
180	0.0217	0.0037	0.0180
181	0.0229	0.0039	0.0190
182	0.0236	0.0040	0.0195
183	0.0251	0.0043	0.0208
184	0.0260	0.0044	0.0215
185	0.0219	0.0037	0.0181
186	0.0231	0.0039	0.0191
187	0.0262	0.0045	0.0217
188	0.0283	0.0048	0.0234
189	0.0341	0.0058	0.0283
190	0.0385	0.0066	0.0319
191	0.0550	0.0081	0.0468
192	0.0756	0.0081	0.0674
193	0.2366	0.0081	0.2285
194	0.0448	0.0077	0.0371
195	0.0308	0.0053	0.0255
196	0.0245	0.0042	0.0203
197	0.0269	0.0046	0.0223
198	0.0243	0.0041	0.0201
199	0.0223	0.0038	0.0185
200	0.0207	0.0035	0.0172
201	0.0194	0.0033	0.0161
202	0.0184	0.0031	0.0152
203	0.0175	0.0030	0.0145
204	0.0167	0.0029	0.0139
205	0.0160	0.0027	0.0133
206	0.0154	0.0026	0.0128
207	0.0149	0.0025	0.0123
208	0.0144	0.0025	0.0119
209	0.0139	0.0024	0.0116
210	0.0135	0.0023	0.0112
211	0.0132	0.0023	0.0109
212	0.0128	0.0022	0.0106

213	0.0125	0.0021	0.0104
214	0.0122	0.0021	0.0101
215	0.0120	0.0020	0.0099
216	0.0117	0.0020	0.0097
217	0.0097	0.0017	0.0080
218	0.0095	0.0016	0.0078
219	0.0092	0.0016	0.0077
220	0.0091	0.0015	0.0075
221	0.0089	0.0015	0.0074
222	0.0087	0.0015	0.0072
223	0.0085	0.0015	0.0071
224	0.0084	0.0014	0.0069
225	0.0082	0.0014	0.0068
226	0.0081	0.0014	0.0067
227	0.0080	0.0014	0.0066
228	0.0078	0.0013	0.0065
229	0.0077	0.0013	0.0064
230	0.0076	0.0013	0.0063
231	0.0075	0.0013	0.0062
232	0.0074	0.0013	0.0061
233	0.0073	0.0012	0.0060
234	0.0072	0.0012	0.0059
235	0.0071	0.0012	0.0059
236	0.0070	0.0012	0.0058
237	0.0069	0.0012	0.0057
238	0.0068	0.0012	0.0056
239	0.0067	0.0011	0.0056
240	0.0066	0.0011	0.0055
241	0.0066	0.0011	0.0054
242	0.0065	0.0011	0.0054
243	0.0064	0.0011	0.0053
244	0.0063	0.0011	0.0052
245	0.0063	0.0011	0.0052
246	0.0062	0.0011	0.0051
247	0.0061	0.0010	0.0051
248	0.0061	0.0010	0.0050
249	0.0060	0.0010	0.0050
250	0.0059	0.0010	0.0049
251	0.0059	0.0010	0.0049
252	0.0058	0.0010	0.0048
253	0.0058	0.0010	0.0048
254	0.0057	0.0010	0.0047
255	0.0057	0.0010	0.0047
256	0.0056	0.0010	0.0047
257	0.0056	0.0010	0.0046
258	0.0055	0.0009	0.0046
259	0.0055	0.0009	0.0045
260	0.0054	0.0009	0.0045
261	0.0054	0.0009	0.0045
262	0.0053	0.0009	0.0044
263	0.0053	0.0009	0.0044
264	0.0053	0.0009	0.0044
265	0.0052	0.0009	0.0043
266	0.0052	0.0009	0.0043
267	0.0051	0.0009	0.0043
268	0.0051	0.0009	0.0042
269	0.0051	0.0009	0.0042

270	0.0050	0.0009	0.0042
271	0.0050	0.0009	0.0041
272	0.0049	0.0008	0.0041
273	0.0049	0.0008	0.0041
274	0.0049	0.0008	0.0040
275	0.0048	0.0008	0.0040
276	0.0048	0.0008	0.0040
277	0.0048	0.0008	0.0040
278	0.0047	0.0008	0.0039
279	0.0047	0.0008	0.0039
280	0.0047	0.0008	0.0039
281	0.0047	0.0008	0.0039
282	0.0046	0.0008	0.0038
283	0.0046	0.0008	0.0038
284	0.0046	0.0008	0.0038
285	0.0045	0.0008	0.0038
286	0.0045	0.0008	0.0037
287	0.0045	0.0008	0.0037
288	0.0045	0.0008	0.0037

Total soil rain loss = 0.46(In)
Total effective rainfall = 2.48(In)
Peak flow rate in flood hydrograph = 27.35(CFS)

++

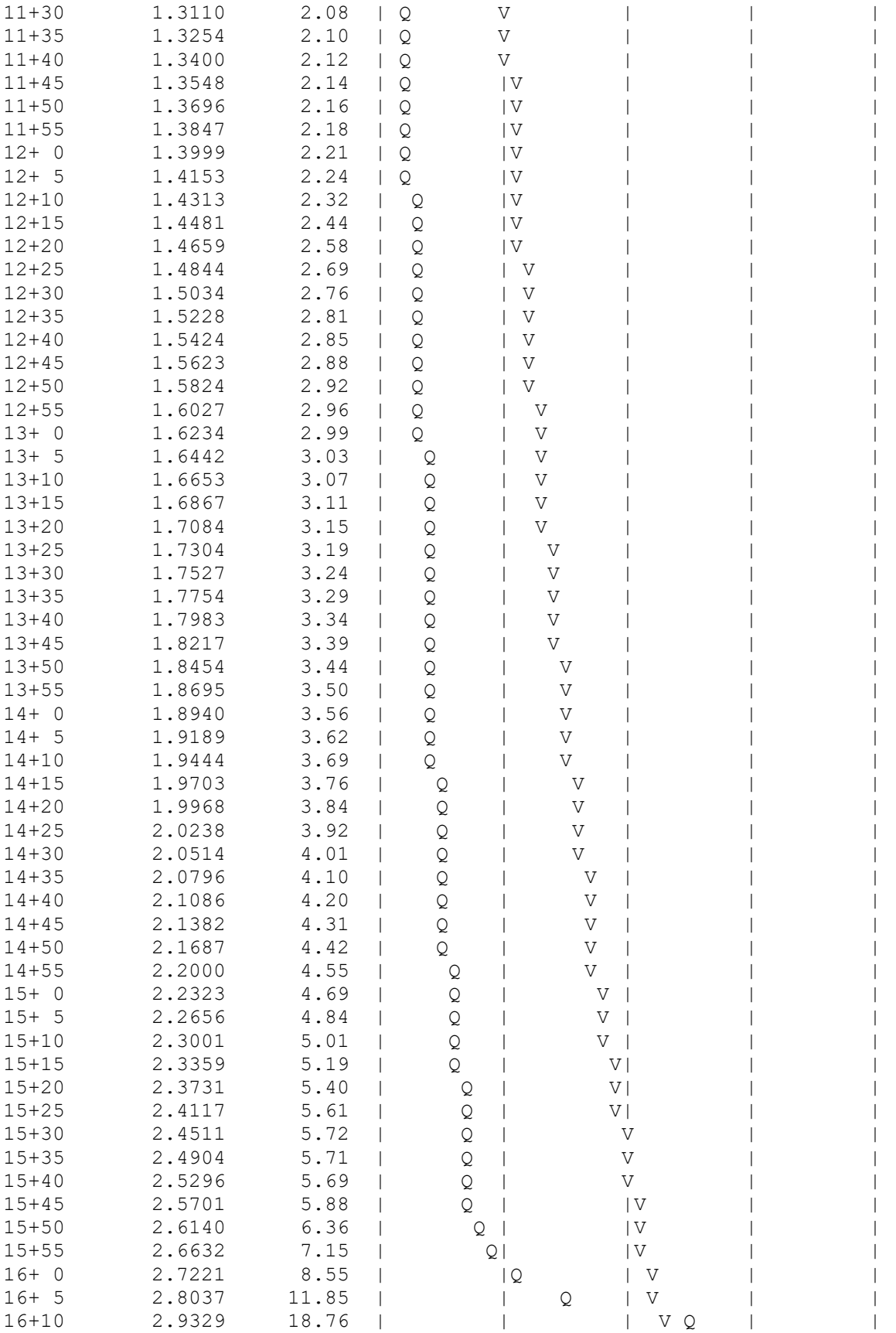
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

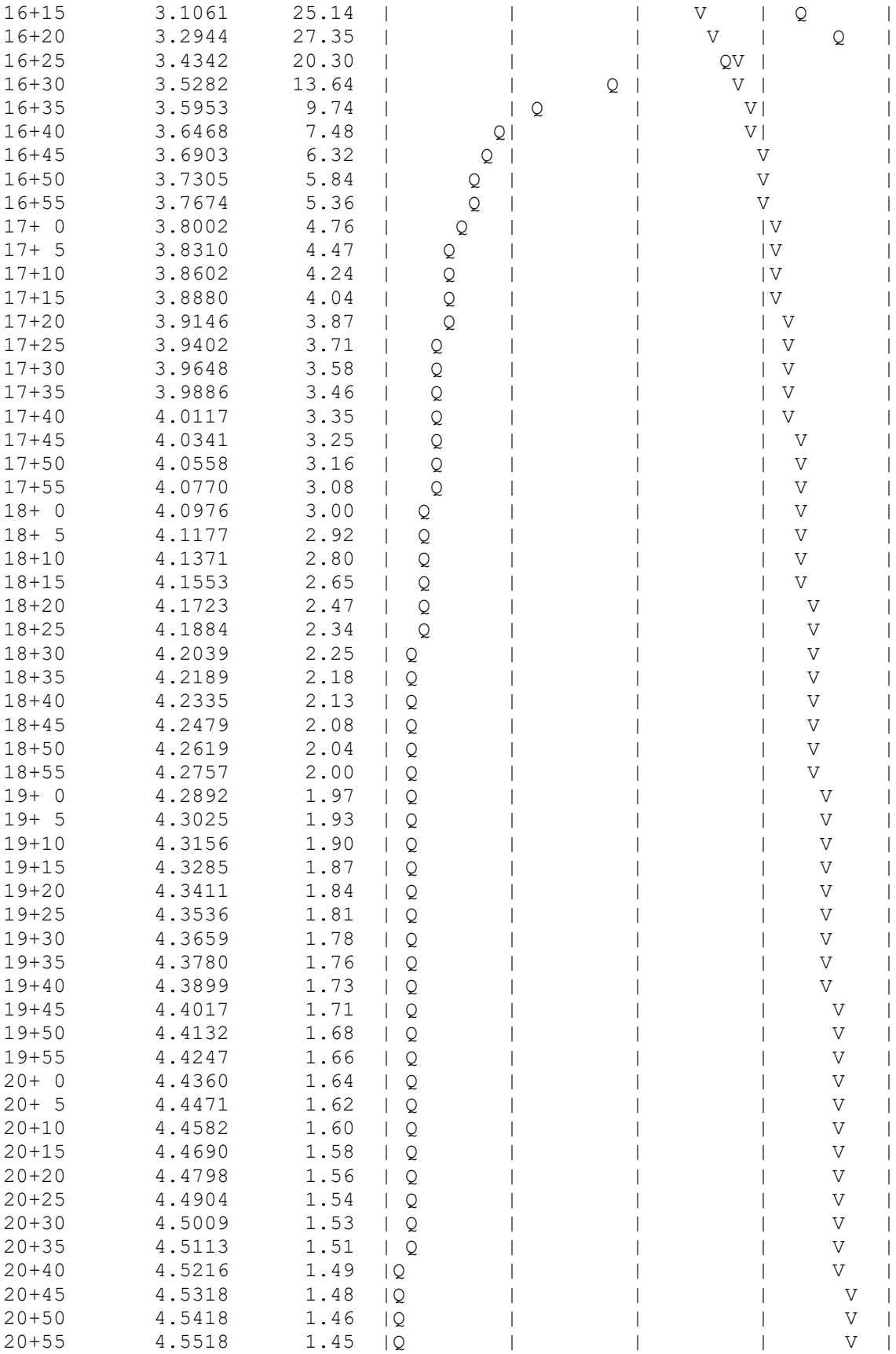
Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	7.5	15.0	22.5	30.0
0+ 5	0.0002	0.02	Q				
0+10	0.0012	0.14	Q				
0+15	0.0038	0.38	Q				
0+20	0.0084	0.68	Q				
0+25	0.0144	0.87	VQ				
0+30	0.0211	0.98	VQ				
0+35	0.0282	1.03	VQ				
0+40	0.0354	1.05	VQ				
0+45	0.0427	1.06	VQ				
0+50	0.0501	1.07	VQ				
0+55	0.0575	1.08	VQ				
1+ 0	0.0649	1.08	VQ				
1+ 5	0.0724	1.08	VQ				
1+10	0.0799	1.09	VQ				
1+15	0.0874	1.09	VQ				
1+20	0.0949	1.09	VQ				
1+25	0.1025	1.10	VQ				
1+30	0.1101	1.10	VQ				
1+35	0.1177	1.10	VQ				
1+40	0.1253	1.11	|Q				
1+45	0.1329	1.11	|Q				
1+50	0.1406	1.11	|Q				
1+55	0.1483	1.12	|Q				

2+ 0	0.1560	1.12	|Q	|	|	|	|
2+ 5	0.1638	1.13	|Q	|	|	|	|
2+10	0.1716	1.13	|Q	|	|	|	|
2+15	0.1794	1.13	|Q	|	|	|	|
2+20	0.1872	1.14	|Q	|	|	|	|
2+25	0.1951	1.14	|Q	|	|	|	|
2+30	0.2030	1.14	|Q	|	|	|	|
2+35	0.2109	1.15	|Q	|	|	|	|
2+40	0.2188	1.15	|Q	|	|	|	|
2+45	0.2268	1.16	|Q	|	|	|	|
2+50	0.2348	1.16	|Q	|	|	|	|
2+55	0.2428	1.16	|Q	|	|	|	|
3+ 0	0.2508	1.17	|QV	|	|	|	|
3+ 5	0.2589	1.17	|QV	|	|	|	|
3+10	0.2670	1.18	|QV	|	|	|	|
3+15	0.2752	1.18	|QV	|	|	|	|
3+20	0.2833	1.19	|QV	|	|	|	|
3+25	0.2915	1.19	|QV	|	|	|	|
3+30	0.2997	1.19	|QV	|	|	|	|
3+35	0.3080	1.20	|QV	|	|	|	|
3+40	0.3163	1.20	|QV	|	|	|	|
3+45	0.3246	1.21	|QV	|	|	|	|
3+50	0.3330	1.21	|QV	|	|	|	|
3+55	0.3413	1.22	|QV	|	|	|	|
4+ 0	0.3497	1.22	|QV	|	|	|	|
4+ 5	0.3582	1.23	|QV	|	|	|	|
4+10	0.3667	1.23	|QV	|	|	|	|
4+15	0.3752	1.24	|Q V	|	|	|	|
4+20	0.3837	1.24	|Q V	|	|	|	|
4+25	0.3923	1.25	|Q V	|	|	|	|
4+30	0.4009	1.25	|Q V	|	|	|	|
4+35	0.4096	1.26	|Q V	|	|	|	|
4+40	0.4182	1.26	|Q V	|	|	|	|
4+45	0.4270	1.27	|Q V	|	|	|	|
4+50	0.4357	1.27	|Q V	|	|	|	|
4+55	0.4445	1.28	|Q V	|	|	|	|
5+ 0	0.4533	1.28	|Q V	|	|	|	|
5+ 5	0.4622	1.29	|Q V	|	|	|	|
5+10	0.4711	1.29	|Q V	|	|	|	|
5+15	0.4800	1.30	|Q V	|	|	|	|
5+20	0.4890	1.30	|Q V	|	|	|	|
5+25	0.4980	1.31	|Q V	|	|	|	|
5+30	0.5071	1.31	|Q V	|	|	|	|
5+35	0.5162	1.32	|Q V	|	|	|	|
5+40	0.5253	1.33	|Q V	|	|	|	|
5+45	0.5345	1.33	|Q V	|	|	|	|
5+50	0.5437	1.34	|Q V	|	|	|	|
5+55	0.5529	1.34	|Q V	|	|	|	|
6+ 0	0.5622	1.35	|Q V	|	|	|	|
6+ 5	0.5716	1.36	|Q V	|	|	|	|
6+10	0.5810	1.36	|Q V	|	|	|	|
6+15	0.5904	1.37	|Q V	|	|	|	|
6+20	0.5999	1.38	|Q V	|	|	|	|
6+25	0.6094	1.38	|Q V	|	|	|	|
6+30	0.6189	1.39	|Q V	|	|	|	|
6+35	0.6286	1.40	|Q V	|	|	|	|
6+40	0.6382	1.40	|Q V	|	|	|	|

6+45	0.6479	1.41	|Q V |	|	|	|
6+50	0.6577	1.42	|Q V |	|	|	|
6+55	0.6675	1.42	|Q V |	|	|	|
7+ 0	0.6773	1.43	|Q V |	|	|	|
7+ 5	0.6872	1.44	|Q V |	|	|	|
7+10	0.6972	1.44	|Q V |	|	|	|
7+15	0.7072	1.45	|Q V |	|	|	|
7+20	0.7172	1.46	|Q V |	|	|	|
7+25	0.7273	1.47	|Q V |	|	|	|
7+30	0.7375	1.48	|Q V |	|	|	|
7+35	0.7477	1.48	|Q V |	|	|	|
7+40	0.7580	1.49	|Q V |	|	|	|
7+45	0.7683	1.50	|Q V |	|	|	|
7+50	0.7787	1.51	| Q V |	|	|	|
7+55	0.7891	1.52	| Q V |	|	|	|
8+ 0	0.7996	1.52	| Q V |	|	|	|
8+ 5	0.8102	1.53	| Q V |	|	|	|
8+10	0.8208	1.54	| Q V |	|	|	|
8+15	0.8315	1.55	| Q V |	|	|	|
8+20	0.8423	1.56	| Q V |	|	|	|
8+25	0.8531	1.57	| Q V |	|	|	|
8+30	0.8639	1.58	| Q V |	|	|	|
8+35	0.8749	1.59	| Q V |	|	|	|
8+40	0.8859	1.60	| Q V |	|	|	|
8+45	0.8970	1.61	| Q V |	|	|	|
8+50	0.9081	1.62	| Q V |	|	|	|
8+55	0.9193	1.63	| Q V |	|	|	|
9+ 0	0.9306	1.64	| Q V |	|	|	|
9+ 5	0.9420	1.65	| Q V |	|	|	|
9+10	0.9534	1.66	| Q V |	|	|	|
9+15	0.9649	1.67	| Q V |	|	|	|
9+20	0.9765	1.68	| Q V |	|	|	|
9+25	0.9882	1.69	| Q V |	|	|	|
9+30	1.0000	1.71	| Q V |	|	|	|
9+35	1.0118	1.72	| Q V |	|	|	|
9+40	1.0237	1.73	| Q V |	|	|	|
9+45	1.0357	1.74	| Q V |	|	|	|
9+50	1.0478	1.76	| Q V |	|	|	|
9+55	1.0600	1.77	| Q V |	|	|	|
10+ 0	1.0722	1.78	| Q V |	|	|	|
10+ 5	1.0846	1.79	| Q V |	|	|	|
10+10	1.0970	1.81	| Q V |	|	|	|
10+15	1.1096	1.82	| Q V|	|	|	|
10+20	1.1222	1.84	| Q V|	|	|	|
10+25	1.1350	1.85	| Q V|	|	|	|
10+30	1.1478	1.87	| Q V|	|	|	|
10+35	1.1608	1.88	| Q V|	|	|	|
10+40	1.1739	1.90	| Q V|	|	|	|
10+45	1.1870	1.91	| Q V|	|	|	|
10+50	1.2003	1.93	| Q V|	|	|	|
10+55	1.2137	1.95	| Q V|	|	|	|
11+ 0	1.2272	1.96	| Q V |	|	|	|
11+ 5	1.2409	1.98	| Q V |	|	|	|
11+10	1.2546	2.00	| Q V |	|	|	|
11+15	1.2685	2.02	| Q V |	|	|	|
11+20	1.2826	2.04	| Q V |	|	|	|
11+25	1.2967	2.06	| Q V |	|	|	|





21+ 0	4.5616	1.43	|Q	|	|	|	V |
21+ 5	4.5714	1.42	|Q	|	|	|	V |
21+10	4.5810	1.40	|Q	|	|	|	V |
21+15	4.5906	1.39	|Q	|	|	|	V |
21+20	4.6001	1.38	|Q	|	|	|	V |
21+25	4.6095	1.36	|Q	|	|	|	V |
21+30	4.6188	1.35	|Q	|	|	|	V |
21+35	4.6280	1.34	|Q	|	|	|	V |
21+40	4.6371	1.33	|Q	|	|	|	V |
21+45	4.6462	1.31	|Q	|	|	|	V |
21+50	4.6552	1.30	|Q	|	|	|	V |
21+55	4.6641	1.29	|Q	|	|	|	V |
22+ 0	4.6729	1.28	|Q	|	|	|	V |
22+ 5	4.6816	1.27	|Q	|	|	|	V |
22+10	4.6903	1.26	|Q	|	|	|	V |
22+15	4.6989	1.25	|Q	|	|	|	V |
22+20	4.7075	1.24	|Q	|	|	|	V |
22+25	4.7160	1.23	|Q	|	|	|	V |
22+30	4.7244	1.22	|Q	|	|	|	V |
22+35	4.7327	1.21	|Q	|	|	|	V |
22+40	4.7410	1.20	|Q	|	|	|	V |
22+45	4.7492	1.19	|Q	|	|	|	V |
22+50	4.7574	1.19	|Q	|	|	|	V |
22+55	4.7655	1.18	|Q	|	|	|	V |
23+ 0	4.7736	1.17	|Q	|	|	|	V|
23+ 5	4.7816	1.16	|Q	|	|	|	V|
23+10	4.7895	1.15	|Q	|	|	|	V|
23+15	4.7974	1.14	|Q	|	|	|	V|
23+20	4.8052	1.14	|Q	|	|	|	V|
23+25	4.8130	1.13	|Q	|	|	|	V|
23+30	4.8207	1.12	|Q	|	|	|	V|
23+35	4.8284	1.11	|Q	|	|	|	V|
23+40	4.8360	1.11	|Q	|	|	|	V|
23+45	4.8436	1.10	|Q	|	|	|	V|
23+50	4.8511	1.09	|Q	|	|	|	V|
23+55	4.8586	1.09	|Q	|	|	|	V|
24+ 0	4.8661	1.08	|Q	|	|	|	V|
24+ 5	4.8733	1.05	|Q	|	|	|	V|
24+10	4.8797	0.92	|Q	|	|	|	V|
24+15	4.8844	0.69	Q	|	|	|	V|
24+20	4.8870	0.38	Q	|	|	|	V|
24+25	4.8883	0.19	Q	|	|	|	V|
24+30	4.8889	0.09	Q	|	|	|	V|
24+35	4.8892	0.04	Q	|	|	|	V|
24+40	4.8893	0.02	Q	|	|	|	V|
24+45	4.8894	0.01	Q	|	|	|	V|
24+50	4.8894	0.01	Q	|	|	|	V

APPENDIX E

HYDRAULIC CALCULATIONS

Hydraulic Analysis Report

Project Data

Project Title:

Designer:

Project Date: Friday, July 2, 2021

Project Units: U.S. Customary Units

Notes:

Channel Analysis: Channel Analysis-A3

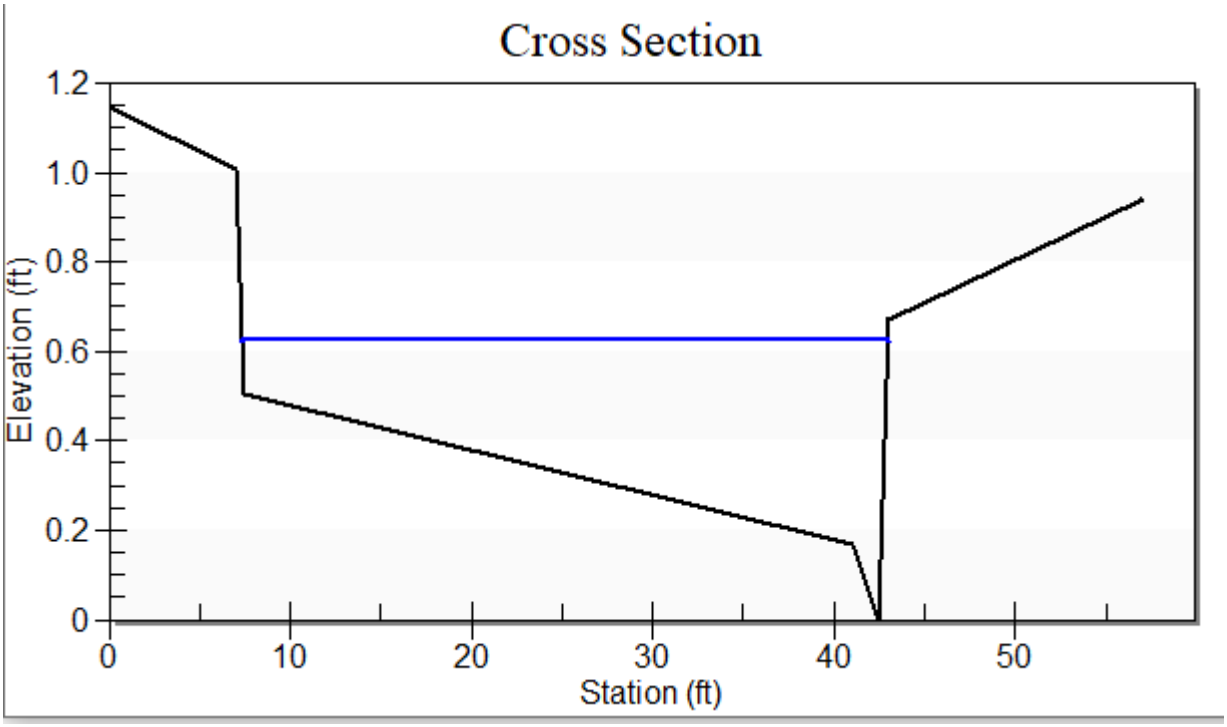
Notes:

Input Parameters

Channel Type: Custom Cross Section

Cross Section Data

Elevation (ft)	Elevation (ft)	Manning's n
0.00	1.15	0.0100
7.00	1.00	0.0100
7.50	0.51	0.0100
41.00	0.17	0.0120
42.50	0.00	0.0120
43.00	0.67	0.0100
57.00	0.94	-----



Longitudinal Slope: 0.0050 ft/ft

Flow: 49.0000 cfs

Result Parameters

Depth: 0.6263 ft

Area of Flow: 10.6387 ft^2

Wetted Perimeter: 35.9642 ft

Hydraulic Radius: 0.2958 ft

Average Velocity: 4.6058 ft/s

Top Width: 35.5886 ft

Froude Number: 1.4845

Critical Depth: 0.7244 ft

Critical Velocity: 3.4464 ft/s

Critical Slope: 0.0019 ft/ft

Critical Top Width: 38.54 ft

Calculated Max Shear Stress: 0.1954 lb/ft^2

Calculated Avg Shear Stress: 0.0923 lb/ft^2

Composite Manning's n Equation: Lotter method

Manning's n: 0.0101

Hydraulic Analysis Report

Project Data

Project Title:

Designer:

Project Date: Friday, July 2, 2021

Project Units: U.S. Customary Units

Notes:

Channel Analysis: Channel Analysis-A7

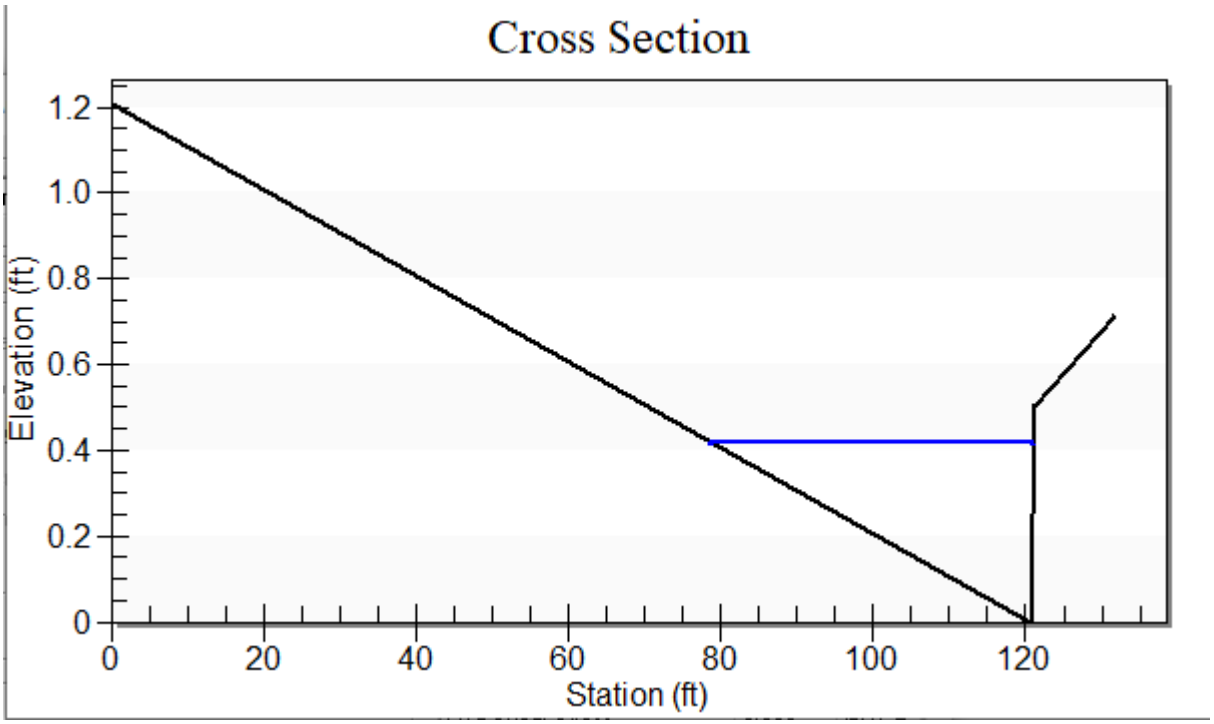
Notes:

Input Parameters

Channel Type: Custom Cross Section

Cross Section Data

Elevation (ft)	Elevation (ft)	Manning's n
0.00	1.21	0.0120
120.60	0.00	0.0120
121.10	0.50	0.0100
131.80	0.71	-----



Longitudinal Slope: 0.0050 ft/ft

Flow: 27.2000 cfs

Result Parameters

Depth: 0.4184 ft

Area of Flow: 8.8394 ft^2

Wetted Perimeter: 42.4312 ft

Hydraulic Radius: 0.2083 ft

Average Velocity: 3.0771 ft/s

Top Width: 42.2558 ft

Froude Number: 1.1856

Critical Depth: 0.4479 ft

Critical Velocity: 2.6853 ft/s

Critical Slope: 0.0035 ft/ft

Critical Top Width: 45.23 ft

Calculated Max Shear Stress: 0.1305 lb/ft^2

Calculated Avg Shear Stress: 0.0650 lb/ft^2

Composite Manning's n Equation: Lotter method

Manning's n: 0.0120

Hydraulic Analysis Report

Project Data

Project Title:

Designer:

Project Date: Friday, July 2, 2021

Project Units: U.S. Customary Units

Notes:

Channel Analysis: SD PIPE #1

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 2.0000 ft

Longitudinal Slope: 0.0686 ft/ft

Manning's n: 0.0150

Flow: 27.2000 cfs

Result Parameters

Depth: 1.0349 ft

Area of Flow: 1.6405 ft^2

Wetted Perimeter: 3.2113 ft

Hydraulic Radius: 0.5108 ft

Average Velocity: 16.5805 ft/s

Top Width: 1.9988 ft

Froude Number: 3.2253

Critical Depth: 1.8125 ft

Critical Velocity: 9.0882 ft/s

Critical Slope: 0.0169 ft/ft

Critical Top Width: 1.17 ft

Calculated Max Shear Stress: 4.4298 lb/ft^2

Calculated Avg Shear Stress: 2.1867 lb/ft^2

Hydraulic Analysis Report

Project Data

Project Title:

Designer:

Project Date: Friday, July 2, 2021

Project Units: U.S. Customary Units

Notes:

Channel Analysis: SD PIPE #2

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 3.5000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0150

Flow: 49.0000 cfs

Result Parameters

Depth: 2.3567 ft

Area of Flow: 6.8907 ft^2

Wetted Perimeter: 6.7369 ft

Hydraulic Radius: 1.0228 ft

Average Velocity: 7.1111 ft/s

Top Width: 3.2829 ft

Froude Number: 0.8650

Critical Depth: 2.1875 ft

Critical Velocity: 7.7462 ft/s

Critical Slope: 0.0062 ft/ft

Critical Top Width: 3.39 ft

Calculated Max Shear Stress: 0.7353 lb/ft^2

Calculated Avg Shear Stress: 0.3191 lb/ft^2

Hydraulic Analysis Report

Project Data

Project Title:

Designer:

Project Date: Friday, July 2, 2021

Project Units: U.S. Customary Units

Notes:

Channel Analysis: OUTLET SD PIPE

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 3.0000 ft

Longitudinal Slope: 0.0150 ft/ft

Manning's n: 0.0150

Flow: 75.5000 cfs

Result Parameters

Depth: 2.7040 ft

Area of Flow: 6.7079 ft^2

Wetted Perimeter: 7.5076 ft

Hydraulic Radius: 0.8935 ft

Average Velocity: 11.2554 ft/s

Top Width: 1.7893 ft

Froude Number: 1.0244

Critical Depth: 2.7246 ft

Critical Velocity: 11.1948 ft/s

Critical Slope: 0.0149 ft/ft

Critical Top Width: 1.73 ft

Calculated Max Shear Stress: 2.5309 lb/ft^2

Calculated Avg Shear Stress: 0.8363 lb/ft^2

Hydraulic Analysis Report

Project Data

Project Title:

Designer:

Project Date: Friday, July 2, 2021

Project Units: U.S. Customary Units

Notes:

Weir Analysis: OUTLET CONTROL STRUCTURE-HCOC

Notes:

Input Parameters

Weir Type: Rectangular

Coefficient: 3.2000

Length: 5.0000 ft

Flow: 5.5600 cfs

Result Parameters

Head: 0.4943 ft

Weir Analysis: OUTLET CONTROL STRUCTURE-100yr-Bypass

Notes:

Input Parameters

Weir Type: Rectangular

Coefficient: 3.2000

Length: 10.0000 ft

Flow: 75.5000 cfs

Result Parameters

Head: 1.7723 ft

Hydraulic Analysis Report

Project Data

Project Title:

Designer:

Project Date: Friday, July 2, 2021

Project Units: U.S. Customary Units

Notes:

Curb and Gutter Analysis: INLET #1

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0100 ft/ft

Cross-Slope of Pavement: 0.0500 ft/ft

Uniform Gutter Geometry

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 14.2256 ft

Gutter Result Parameters

Design Flow: 30.1000 cfs

Gutter Depression: 0.0000 in

Area of Flow: 5.0592 ft^2

Eo (Gutter Flow to Total Flow): 0.3327

Gutter Depth at Curb: 8.5353 in

Inlet Input Parameters

Inlet Location: Inlet in Sag

Percent Clogging: 0.0000 %

Inlet Type: Curb Opening

Length of Inlet: 14.0000 ft

Curb opening height: 6.0000 in

Local Depression: 4.0000 in

Inlet Result Parameters

Perimeter: 14.0000 ft

Effective Perimeter: 14.0000 ft

Area: 11.6667 ft^2

Effective Area: 11.6667 ft^2

Depth at curb face (upstream of local depression): 0.8008 ft

Computed Width of Spread at Sag: 16.0168 ft

Flow type: Weir Flow

Efficiency: 1.0000

Hydraulic Analysis Report

Project Data

Project Title:

Designer:

Project Date: Friday, July 2, 2021

Project Units: U.S. Customary Units

Notes:

Curb and Gutter Analysis: INLET #2

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0080 ft/ft

Cross-Slope of Pavement: 0.0050 ft/ft

Uniform Gutter Geometry

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 64.5997 ft

Gutter Result Parameters

Design Flow: 32.8000 cfs

Gutter Depression: 0.0000 in

Area of Flow: 10.4328 ft^2

Eo (Gutter Flow to Total Flow): 0.0805

Gutter Depth at Curb: 3.8760 in

Inlet Input Parameters

Inlet Location: Inlet in Sag

Percent Clogging: 0.0000 %

Inlet Type: Curb Opening

Length of Inlet: 14.0000 ft

Curb opening height: 8.0000 in

Local Depression: 4.0000 in

Inlet Result Parameters

Perimeter: 14.0000 ft

Effective Perimeter: 14.0000 ft

Area: 14.0000 ft^2

Effective Area: 14.0000 ft^2

Depth at curb face (upstream of local depression): 0.8480 ft

Computed Width of Spread at Sag: 169.6080 ft

Flow type: Weir Flow

Efficiency: 1.0000

APPENDIX F

REFERENCE DATA

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)

R1W R2W R7W

T4N T3N T2N T1N T1S

SOURCE: 1970 SCS SURVEY

SOURCE: GEOLOGY MAP

SOURCE: 1970 SCS SURVEY

SOURCE: GEOLOGY MAP

SOURCE: 1970 SCS SURVEY

SOURCE: GEOLOGY MAP

SOURCE: 1970 SCS SURVEY

SOURCE: GEOLOGY MAP

SOURCE: 1970 SCS SURVEY

SOURCE: GEOLOGY MAP

SOURCE: 1970 SCS SURVEY

SOURCE: GEOLOGY MAP

SOURCE: 1970 SCS SURVEY

PROJECT SITE

LEGEND

SOIL GROUP BOUNDARY

A SOIL GROUP DESIGNATION

BOUNDARY OF INDICATED SOURCE

INDEX MAP

Scale 1:250,000

CONTOUR INTERVAL 200 FEET

WITH SUPPLEMENTARY CONTOURS AT 100 FOOT INTERVALS

TRANSVERSE MERCATOR PROJECTION

BLACK NUMBERED LINES INDICATE THE 10,000 METER UNIVERSAL TRANSVERSE MERCATOR GRID, ZONE 11

1985 MAGNETIC DECLINATION FROM TRUE NORTH VARIES FROM 1 5/6° (280 MILS) EASTERLY FOR THE CENTER OF THE WEST EDGE TO 15° (270 MILS) EASTERLY FOR THE CENTER OF THE EAST EDGE

BASE MAP REPRODUCED FROM U.S.G.S. "SAN BERNARDINO" TOPOGRAPHIC MAP

SCALE REDUCED BY 1/2

LOCATION DIAGRAM

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

HYDROLOGIC SOILS GROUP MAP FOR SOUTHCENTRAL AREA

FIGURE C-11

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for San Bernardino County Southwestern Part, California

Pepper Avenue Industrial Building

May 31, 2021

Preface

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

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

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

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

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

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

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

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

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

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

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

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

Soil Map

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

Custom Soil Resource Report
Soil Map

Map Scale: 1:2,460 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 Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: San Bernardino County Southwestern Part, California
Survey Area Data: Version 12, May 27, 2020

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

Date(s) aerial images were photographed: Apr 1, 2018—Jun 30, 2018

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

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Gr	Grangeville fine sandy loam, warm MAAT, MLRA 19	15.8	65.7%
TuB	Tujunga loamy sand, 0 to 5 percent slopes	8.3	34.3%
Totals for Area of Interest		**24.1**	**100.0%**

Map Unit Descriptions

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

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

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

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

onsite investigation is needed to define and locate the soils and miscellaneous areas.

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

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

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

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

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

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

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

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

San Bernardino County Southwestern Part, California

Gr—Grangeville fine sandy loam, warm MAAT, MLRA 19

Map Unit Setting

National map unit symbol: 2vncy
Elevation: 490 to 1,430 feet
Mean annual precipitation: 11 to 17 inches
Mean annual air temperature: 64 to 66 degrees F
Frost-free period: 271 to 365 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Grangeville

Setting

Landform: Alluvial fans, flood plains
Landform position (two-dimensional): Toeslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

A - 0 to 12 inches: fine sandy loam
C - 12 to 79 inches: fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Very slightly saline to slightly saline (2.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 3.0
Available water capacity: Moderate (about 7.9 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 3c
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

San emigdio, fine sandy loam

Percent of map unit: 5 percent
Landform: Alluvial fans, flood plains

Landform position (two-dimensional): Toeslope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Unnamed, hydric

Percent of map unit: 5 percent
Landform: Alluvial fans, depressions, flood plains
Landform position (two-dimensional): Toeslope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Chino

Percent of map unit: 5 percent
Landform: Alluvial fans, flood plains
Landform position (two-dimensional): Toeslope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

TuB—Tujunga loamy sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2sx6y
Elevation: 650 to 3,110 feet
Mean annual precipitation: 10 to 25 inches
Mean annual air temperature: 62 to 65 degrees F
Frost-free period: 325 to 365 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Tujunga, Loamy Sand

Setting

Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

A - 0 to 6 inches: loamy sand
C1 - 6 to 18 inches: loamy sand
C2 - 18 to 60 inches: loamy sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Available water capacity: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Tujunga, gravelly loamy sand

Percent of map unit: 10 percent
Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Hanford, sandy loam

Percent of map unit: 5 percent
Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

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.

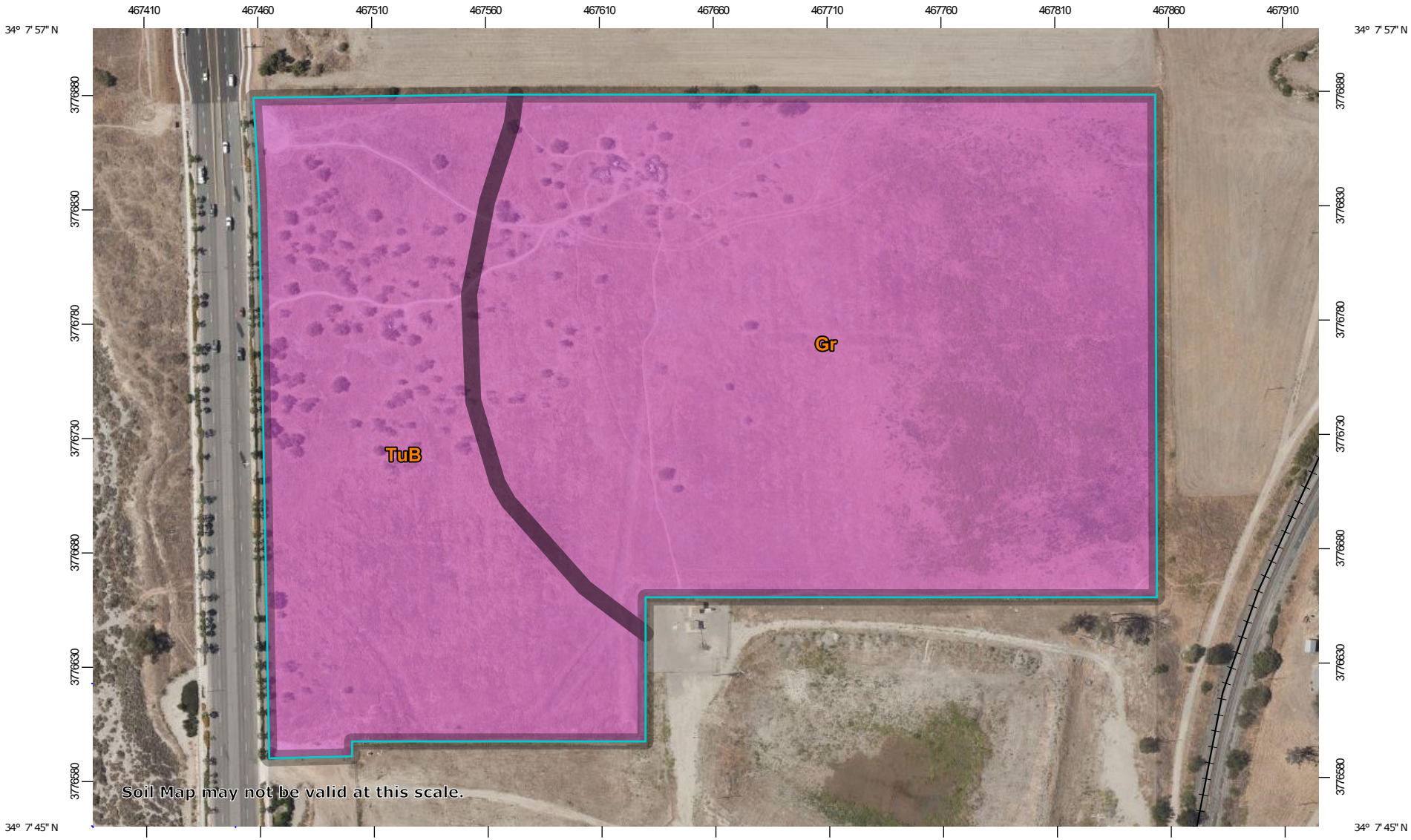
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

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.

Custom Soil Resource Report
Map—Hydrologic Soil Group



Map Scale: 1:2,460 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.

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Survey Area Data: Version 12, May 27, 2020

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

Date(s) aerial images were photographed: Apr 1, 2018—Jun 30, 2018

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

MAP LEGEND	MAP INFORMATION
	imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Gr	Grangeville fine sandy loam, warm MAAT, MLRA 19	A	15.8	65.7%
TuB	Tujunga loamy sand, 0 to 5 percent slopes	A	8.3	34.3%
Totals for Area of Interest			**24.1**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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NOAA Atlas 14, Volume 6, Version 2
Location name: Rialto, California, USA*
Latitude: 34.1311°, Longitude: -117.3509°
Elevation: 1275.95 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	0.129 (0.107-0.156)	0.169 (0.141-0.206)	0.224 (0.186-0.273)	0.269 (0.221-0.331)	0.332 (0.264-0.423)	0.382 (0.297-0.497)	0.435 (0.329-0.579)	0.490 (0.361-0.672)	0.567 (0.400-0.812)	0.630 (0.429-0.934)
10-min	0.184 (0.153-0.224)	0.243 (0.202-0.295)	0.321 (0.266-0.391)	0.386 (0.317-0.474)	0.477 (0.378-0.606)	0.548 (0.426-0.713)	0.623 (0.472-0.830)	0.702 (0.517-0.963)	0.813 (0.574-1.16)	0.903 (0.615-1.34)
15-min	0.223 (0.186-0.271)	0.294 (0.244-0.357)	0.388 (0.322-0.473)	0.467 (0.384-0.574)	0.576 (0.458-0.733)	0.663 (0.515-0.862)	0.753 (0.571-1.00)	0.849 (0.625-1.17)	0.984 (0.694-1.41)	1.09 (0.744-1.62)
30-min	0.330 (0.275-0.401)	0.435 (0.361-0.529)	0.575 (0.476-0.701)	0.691 (0.568-0.850)	0.854 (0.678-1.09)	0.982 (0.763-1.28)	1.12 (0.846-1.49)	1.26 (0.926-1.73)	1.46 (1.03-2.09)	1.62 (1.10-2.40)
60-min	0.484 (0.403-0.588)	0.637 (0.530-0.775)	0.842 (0.698-1.03)	1.01 (0.832-1.25)	1.25 (0.993-1.59)	1.44 (1.12-1.87)	1.64 (1.24-2.18)	1.84 (1.36-2.53)	2.13 (1.51-3.06)	2.37 (1.61-3.51)
2-hr	0.710 (0.590-0.862)	0.917 (0.762-1.11)	1.19 (0.987-1.45)	1.42 (1.17-1.74)	1.73 (1.37-2.20)	1.97 (1.53-2.57)	2.23 (1.69-2.97)	2.49 (1.83-3.41)	2.85 (2.01-4.08)	3.14 (2.14-4.66)
3-hr	0.884 (0.735-1.07)	1.13 (0.942-1.38)	1.46 (1.21-1.78)	1.73 (1.42-2.13)	2.11 (1.67-2.68)	2.39 (1.86-3.11)	2.69 (2.04-3.59)	3.00 (2.21-4.11)	3.42 (2.42-4.90)	3.76 (2.56-5.57)
6-hr	1.26 (1.05-1.54)	1.61 (1.34-1.96)	2.07 (1.72-2.52)	2.44 (2.01-3.00)	2.95 (2.34-3.75)	3.34 (2.60-4.34)	3.74 (2.83-4.98)	4.15 (3.06-5.69)	4.71 (3.32-6.74)	5.14 (3.50-7.63)
12-hr	1.69 (1.41-2.05)	2.17 (1.80-2.63)	2.79 (2.31-3.40)	3.29 (2.70-4.04)	3.96 (3.14-5.04)	4.47 (3.48-5.81)	4.99 (3.78-6.65)	5.52 (4.07-7.57)	6.23 (4.40-8.92)	6.79 (4.62-10.1)
24-hr	2.26 (2.01-2.61)	2.94 (2.60-3.39)	3.81 (3.36-4.40)	4.50 (3.94-5.25)	5.44 (4.61-6.55)	6.15 (5.10-7.56)	6.86 (5.56-8.64)	7.58 (5.98-9.82)	8.55 (6.47-11.5)	9.30 (6.80-13.0)
2-day	2.77 (2.45-3.19)	3.65 (3.23-4.22)	4.81 (4.24-5.56)	5.75 (5.03-6.70)	7.02 (5.94-8.46)	7.99 (6.63-9.83)	8.97 (7.27-11.3)	9.99 (7.87-12.9)	11.4 (8.59-15.3)	12.4 (9.08-17.3)
3-day	2.94 (2.61-3.39)	3.95 (3.50-4.56)	5.29 (4.66-6.12)	6.39 (5.59-7.45)	7.89 (6.68-9.51)	9.06 (7.52-11.1)	10.3 (8.31-12.9)	11.5 (9.07-14.9)	13.2 (10.0-17.8)	14.6 (10.7-20.3)
4-day	3.14 (2.78-3.61)	4.26 (3.76-4.91)	5.75 (5.07-6.65)	6.98 (6.11-8.14)	8.69 (7.36-10.5)	10.0 (8.32-12.3)	11.4 (9.25-14.4)	12.9 (10.1-16.7)	14.9 (11.3-20.1)	16.5 (12.0-23.0)
7-day	3.55 (3.14-4.09)	4.87 (4.30-5.61)	6.63 (5.85-7.67)	8.10 (7.09-9.44)	10.1 (8.59-12.2)	11.8 (9.76-14.5)	13.4 (10.9-16.9)	15.2 (12.0-19.7)	17.7 (13.4-23.8)	19.6 (14.3-27.4)
10-day	3.86 (3.42-4.45)	5.33 (4.71-6.14)	7.30 (6.44-8.44)	8.95 (7.83-10.4)	11.2 (9.53-13.6)	13.1 (10.8-16.1)	15.0 (12.1-18.9)	17.0 (13.4-22.0)	19.8 (15.0-26.7)	22.0 (16.1-30.8)
20-day	4.71 (4.18-5.43)	6.58 (5.82-7.59)	9.10 (8.03-10.5)	11.2 (9.82-13.1)	14.2 (12.0-17.1)	16.6 (13.8-20.4)	19.1 (15.5-24.0)	21.7 (17.1-28.2)	25.5 (19.3-34.4)	28.5 (20.8-39.8)
30-day	5.56 (4.92-6.41)	7.77 (6.87-8.97)	10.8 (9.51-12.5)	13.3 (11.7-15.5)	16.9 (14.3-20.4)	19.8 (16.4-24.3)	22.8 (18.5-28.7)	26.0 (20.5-33.7)	30.6 (23.1-41.3)	34.3 (25.1-47.8)
45-day	6.66 (5.90-7.67)	9.27 (8.20-10.7)	12.8 (11.3-14.8)	15.9 (13.9-18.5)	20.1 (17.0-24.2)	23.6 (19.5-29.0)	27.2 (22.0-34.2)	31.1 (24.5-40.2)	36.5 (27.7-49.3)	41.0 (30.0-57.2)
60-day	7.78 (6.89-8.96)	10.7 (9.51-12.4)	14.8 (13.1-17.1)	18.2 (16.0-21.3)	23.1 (19.6-27.8)	27.0 (22.4-33.2)	31.2 (25.2-39.3)	35.6 (28.1-46.1)	41.9 (31.7-56.5)	47.1 (34.4-65.7)

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

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

Please refer to NOAA Atlas 14 document for more information.

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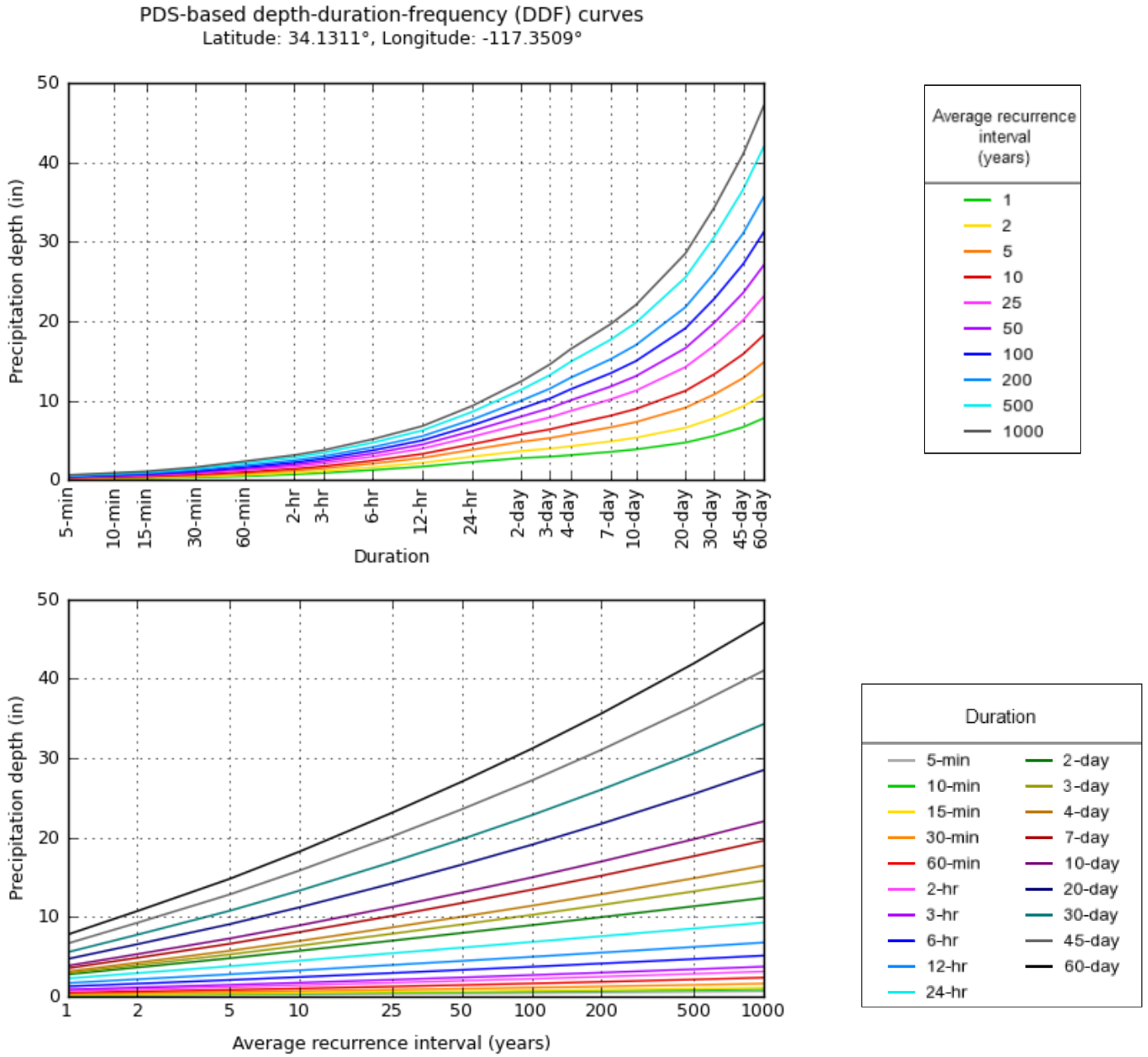
PF graphical



NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Mon May 31 18:18:56 2021

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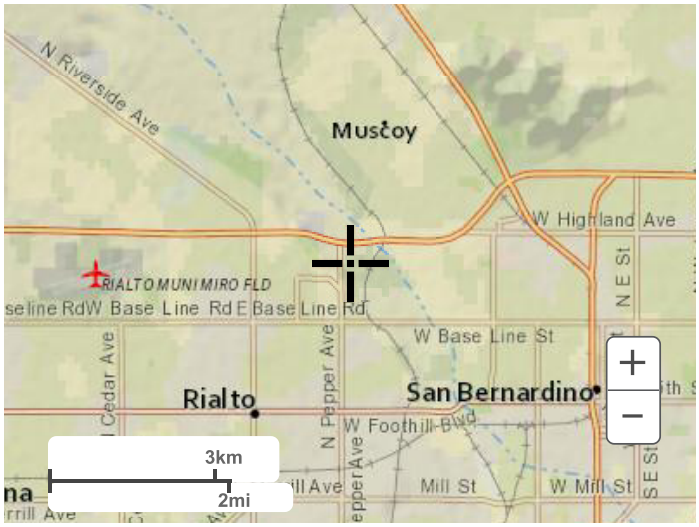
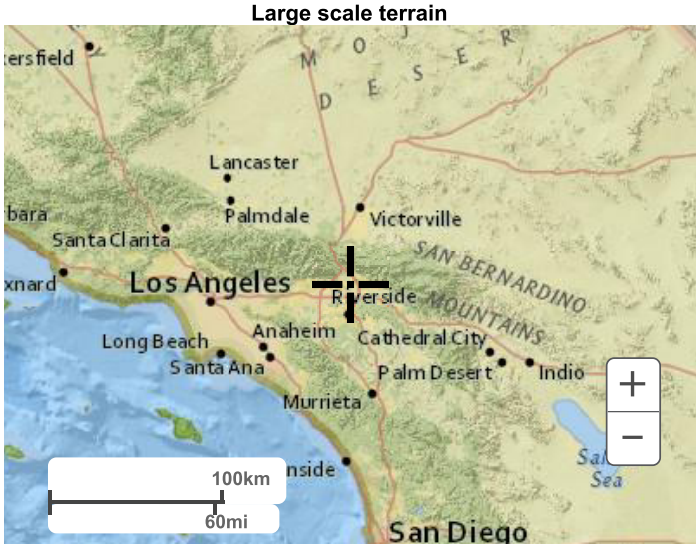
Maps & aerials

Small scale terrain

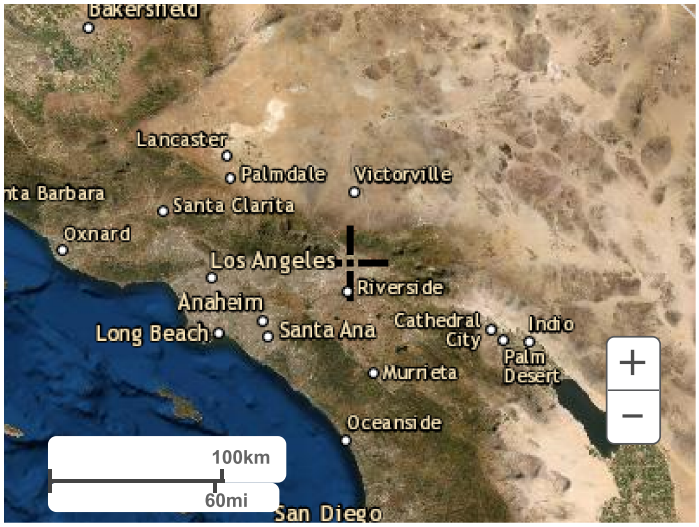


Large scale terrain



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

Pepper Industrial Building **DMA 1**

Infiltration Test No.	Infiltration Rate (in/hr)	
I-3	0.8	
I-4	4.2	
Infiltration Rate (lowest) =	**2.5**	Used
Geotechnical Report recommendation =	3.9 (N/A)	

Worksheet H: Factor of Safety and Design Infiltration Rate and Worksheet

Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
A	Suitability Assessment	Soil assessment methods	0.25	2	0.5
		Predominant soil texture	0.25	1	0.25
		Site soil variability	0.25	1	0.25
		Depth to groundwater / impervious layer	0.25	1	0.25
		Suitability Assessment Safety Factor, $S_A = \sum p$			1.25
B	Design	Tributary area size	0.25	2	0.5
		Level of pretreatment/ expected sediment loads	0.25	3	0.75
		Redundancy	0.25	3	0.75
		Compaction during construction	0.25	2	0.5
		Design Safety Factor, $S_B = \sum p$			2.5
Combined Safety Factor, $S_{total} = S_A x S_B$					3.13
Observed Infiltration Rate, inch/hr, $K_{observed}$ (corrected for test-specific bias)					2.50
Design Infiltration Rate, in/hr, Kdesign = $K_{0bserved} / S_{total}$					**0.80**

Infiltration values I-3 and I-4 obtained from Southern California Geotechnical's Report #20G234-3 dated August 31, 2021. Other infiltration values were omitted as those infiltration tests do not fall within the proposed chamber footprint.

Note: The minimum combined adjustment factor shall not be less than 2.0 and the maximum combined adjustment factor shall not exceed 9.0.

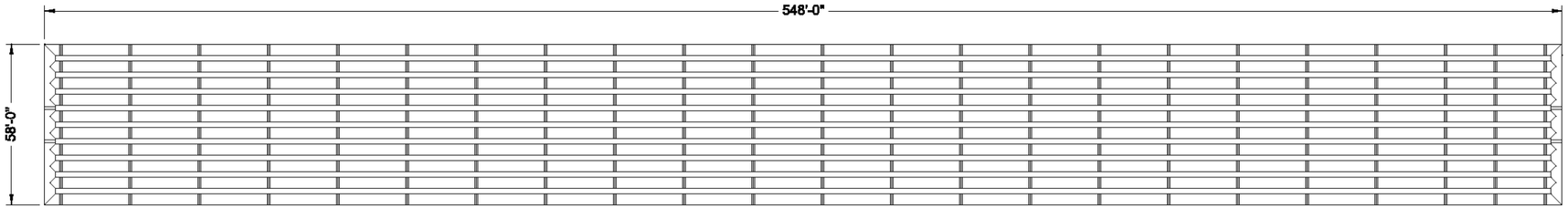
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20 & HS25
- APPROX. LINEAR FOOTAGE = 5,516 lf.

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = N/A
- PIPE STORAGE VOLUME = 69,316 cf.
- BACKFILL STORAGE VOLUME = 58,073 cf.
- TOTAL STORAGE PROVIDED = 127,390 cf.

PIPE DETAILS
- DIAMETER = 48 IN.
- CORRUGATION = 2 2/3x1/2
- GAGE = 12
- COATING = ALT2
- WALL TYPE = Perforated
- BARRELL SPACING = 24 IN.

BACKFILL DETAILS
- WIDTH AT ENDS = 12 IN.
- ABOVE PIPE = 18 IN.
- WIDTH AT SIDES = 12 IN.
- BELOW PIPE = 12 IN.



NOTES

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE $2\frac{2}{3}$" x $\frac{1}{2}$" CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
- BAND TYPE TO BE DETERMINED UPON FINAL DESIGN.
- THE PROJECT SUMMARY IS REFLECTIVE OF THE DYODS DESIGN, QUANTITIES ARE APPROX. AND SHOULD BE VERIFIED UPON FINAL DESIGN AND APPROVAL. FOR EXAMPLE, TOTAL EXCAVATION DOES NOT CONSIDER ALL VARIABLES SUCH AS SHORING AND ONLY ACCOUNTS FOR MATERIAL WITHIN THE ESTIMATED EXCAVATION FOOTPRINT.
- THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

ASSEMBLY

SCALE: 1" = 50'

DATE	REVISION DESCRIPTION	BY

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO12190 Pepper Avenue - Rialto
Chamber 1 - Revised
Rialto, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
5126	12190	12/15/2021
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D1		

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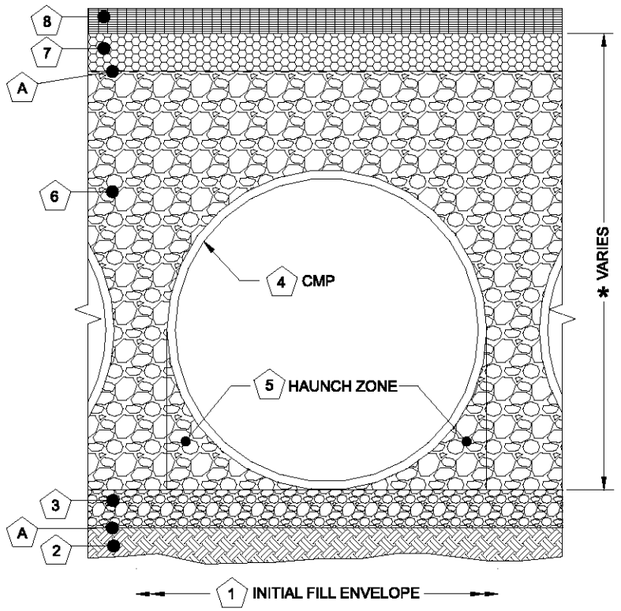


Infiltration Systems - CMP Infiltration & CMP Perforated Drainage Pipe			
Material Location	Description	Material Designation	Designation
8 Rigid or Flexible Pavement (If applicable)			
7 Road Base (If applicable			
A Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decision for consideration to prevent soil migration into varying soil types. Wrap the trench only.
6 Backfill	Infiltration pipe systems have a pipe perforation sized of 3/8" diameter. An open graded, free draining stone, with a particle size of ¼" – 2 ½" diameter is recommended.	AASHTO M 145-A-1 or AASHTO M 43 - 3, 4	Material shall be worked into the pipe haunches by means of shovel-slicing, rodding, air-tamper, vibratory rod, or other effective methods. Compaction of all placed fill material is necessary and shall be considered adequate when no further yielding of the material is observed under the compactor, or under foot, and the Project Engineer or his representative is satisfied with the level of compaction"
3 Bedding Stone	Well graded granular bedding material w/maximum particle size of 3"	AASHTO M43 - 3,357,4,467, 5, 56, 57	For soil aggregates larger than 3/8" a dedicated bedding layer is not required for CMP. Pipe may be placed on the trench bottom comprised of native suitable well graded & granular material. For Arch pipes it is recommended to be shaped to a relatively flat bottom or fine-grade the foundation to a slight v-shape. Soil aggregates less than 3/8" and unsuitable material should be over-excavated and re-placed with a 4"-6" layer of well graded & granular stone per the material designation.
A Geotextile Layer	None	None	Contech does not recommend geotextiles be placed under the invert of infiltration systems due to the propensity for geotextiles to clog over time.
* Note: The listed AASHTO designations are for gradation only. The stone must also be angular and clean.			

1 MINIMUM WIDTH DEPENDS ON SITE CONDITIONS AND ENGINEERING JUDGEMENT.

FOUNDATION/BEDDING PREPARATION

2 PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER.

5 HAUNCH ZONE MATERIAL SHALL BE PLACED AND UNIFORMLY COMPACTED WITHOUT SOFT SPOTS.

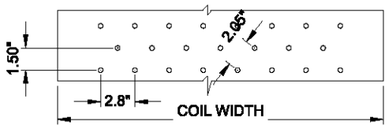
BACKFILL

MATERIAL SHALL BE PLACED IN 8"-10" MAXIMUM LIFTS. INADEQUATE COMPACTION CAN LEAD TO EXCESSIVE DEFLECTIONS WITHIN THE SYSTEM AND SETTLEMENT OF THE SOILS OVER THE SYSTEM. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO-LIFT DIFFERENTIAL BETWEEN THE SIDES OF ANY PIPE IN THE SYSTEM AT ALL TIMES DURING THE BACKFILL PROCESS. BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE SYSTEM AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON ANY PIPES IN THE SYSTEM.

EQUIPMENT USED TO PLACE AND COMPACT THE BACKFILL SHALL BE OF A SIZE AND TYPE SO AS NOT TO DISTORT, DAMAGE, OR DISPLACE THE PIPE. ATTENTION MUST BE GIVEN TO PROVIDING ADEQUATE MINIMUM COVER FOR SUCH EQUIPMENT. MAINTAIN BALANCED LOADING ON ALL PIPES IN THE SYSTEM DURING ALL SUCH OPERATIONS.

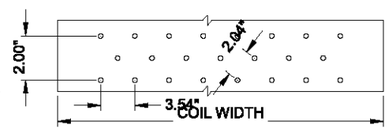
OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS. REFER TO TYPICAL BACKFILL DETAIL FOR MATERIAL REQUIRED.

2 2/3" x 1/2" CORRUGATION - STEEL AND ALUMINUM CMP EDGE SPACING EQUAL ON BOTH SIDES



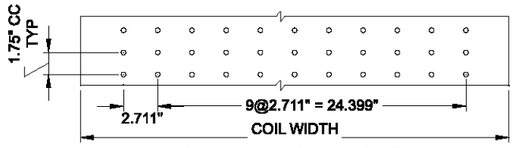
OPEN AREA = 3.76 SQ IN/SQ FT

3" x 1" CORRUGATION - STEEL AND ALUMINUM CMP (COIL PROVIDED FROM CONTECH LANTANA, FL PLANT)



OPEN AREA = 4.16 SQ IN/SQ FT

5" x 1" CORRUGATION - STEEL ONLY
EDGE SPACING EQUAL ON BOTH SIDES



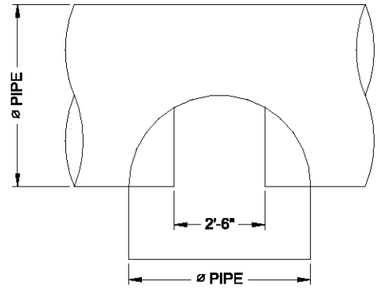
OPEN AREA = 3.33 SQ IN/SQ FT

NOTES:

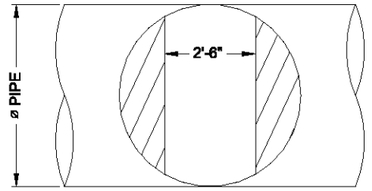
1. PERFORATIONS MEET AASHTO AND ASTM SPECIFICATIONS.
2. PERFORATION OPEN AREA PER SQUARE FOOT OF PIPE IS BASED ON THE NOMINAL DIAMETER AND LENGTH OF PIPE.
3. ALL DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
4. ALL HOLES ⌀3/8".

TYPICAL PERFORATION DETAIL

SCALE: N.T.S.



PLAN

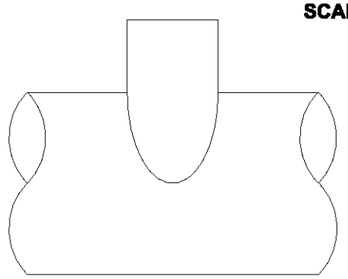


FRONT

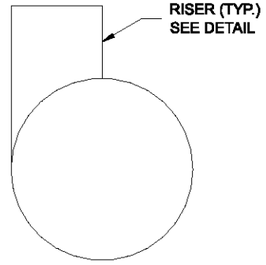
TYPICAL MANWAY DETAIL

SCALE: N.T.S.

NOTE:
MANWAY DETAIL APPLICABLE FOR CMP SYSTEMS WITH DIAMETERS 48" AND LARGER. MANWAYS MAY BE REQUIRED ON SMALLER SYSTEMS DEPENDING ON ACTUAL SITE SPECIFIC CONDITIONS.



ELEVATION

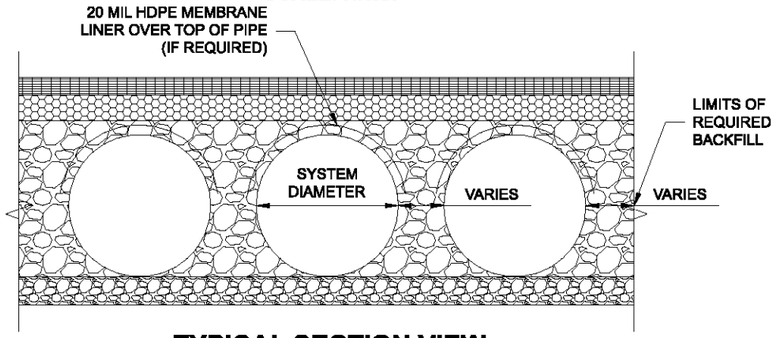


END

TYPICAL RISER DETAIL

SCALE: N.T.S.

NOTE:
LADDERS ARE OPTIONAL AND ARE NOT REQUIRED FOR ALL SYSTEMS.



TYPICAL SECTION VIEW

LINER OVER ROWS
SCALE: N.T.S.

NOTE: IF SALTING AGENTS FOR SNOW AND ICE REMOVAL ARE USED ON OR NEAR THE PROJECT, AN HDPE MEMBRANE LINER IS RECOMMENDED WITH THE SYSTEM. THE IMPERMEABLE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM A CHANGE IN THE SURROUNDING ENVIRONMENT OVER A PERIOD OF TIME. PLEASE REFER TO THE CORRUGATED METAL PIPE DETENTION DESIGN GUIDE FOR ADDITIONAL INFORMATION.

DATE	REVISION DESCRIPTION	BY

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CONTECH CMP DETENTION SYSTEMS

CONTECH DYODS DRAWING

DYO12190 Pepper Avenue - Rialto
Chamber 1 - Revised
Rialto, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
5126	12190	12/15/2021
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D2		

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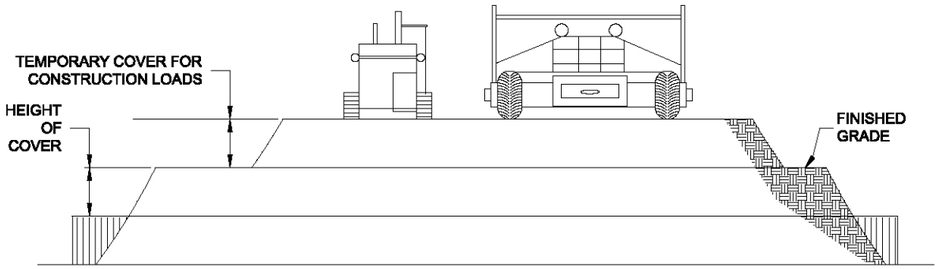


CONSTRUCTION LOADS

FOR TEMPORARY CONSTRUCTION VEHICLE LOADS, AN EXTRA AMOUNT OF COMPACTED COVER MAY BE REQUIRED OVER THE TOP OF THE PIPE. THE HEIGHT-OF-COVER SHALL MEET THE MINIMUM REQUIREMENTS SHOWN IN THE TABLE BELOW. THE USE OF HEAVY CONSTRUCTION EQUIPMENT NECESSITATES GREATER PROTECTION FOR THE PIPE THAN FINISHED GRADE COVER MINIMUMS FOR NORMAL HIGHWAY TRAFFIC.

PIPE SPAN, INCHES	AXLE LOADS (kips)			
	18-50	50-75	75-110	110-150
	MINIMUM COVER (FT)			
12-42	2.0	2.5	3.0	3.0
48-72	3.0	3.0	3.5	4.0
78-120	3.0	3.5	4.0	4.0
126-144	3.5	4.0	4.5	4.5

*MINIMUM COVER MAY VARY, DEPENDING ON LOCAL CONDITIONS. THE CONTRACTOR MUST PROVIDE THE ADDITIONAL COVER REQUIRED TO AVOID DAMAGE TO THE PIPE. MINIMUM COVER IS MEASURED FROM THE TOP OF THE PIPE TO THE TOP OF THE MAINTAINED CONSTRUCTION ROADWAY SURFACE.

CONSTRUCTION LOADING DIAGRAM

SCALE: N.T.S.

SPECIFICATION FOR DESIGNED DETENTION SYSTEM:

SCOPE
THIS SPECIFICATION COVERS THE MANUFACTURE AND INSTALLATION OF THE DESIGNED DETENTION SYSTEM DETAILED IN THE PROJECT PLANS.

MATERIAL
THE MATERIAL SHALL CONFORM TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2 STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-274 OR ASTM A-92.

THE GALVANIZED STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-218 OR ASTM A-929.

THE POLYMER COATED STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-246 OR ASTM A-742.

THE ALUMINUM COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-197 OR ASTM B-744.

CONSTRUCTION LOADS
CONSTRUCTION LOADS MAY BE HIGHER THAN FINAL LOADS. FOLLOW THE MANUFACTURER'S OR NCSPA GUIDELINES.

PIPE
THE PIPE SHALL BE MANUFACTURED IN ACCORDANCE TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2: AASHTO M-36 OR ASTM A-760

GALVANIZED: AASHTO M-36 OR ASTM A-760

POLYMER COATED: AASHTO M-245 OR ASTM A-762

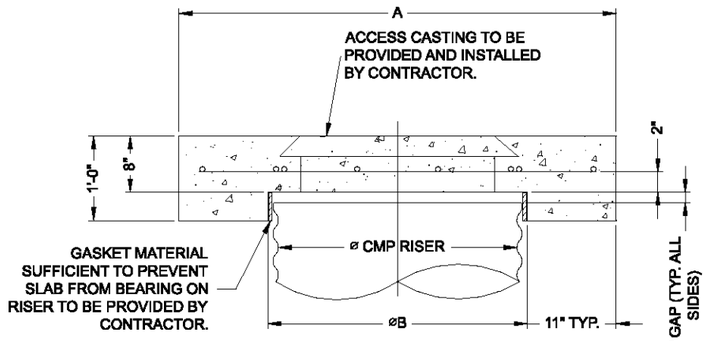
ALUMINUM: AASHTO M-196 OR ASTM B-745

HANDLING AND ASSEMBLY
SHALL BE IN ACCORDANCE WITH NCSP'S (NATIONAL CORRUGATED STEEL PIPE ASSOCIATION) FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL. SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR ALUMINUM PIPE.

INSTALLATION
SHALL BE IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SECTION 26, DIVISION II DIVISION II OR ASTM A-798 (FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL) OR ASTM B-788 (FOR ALUMINUM PIPE) AND IN CONFORMANCE WITH THE PROJECT PLANS AND SPECIFICATIONS. IF THERE ARE ANY INCONSISTENCIES OR CONFLICTS THE CONTRACTOR SHOULD DISCUSS AND RESOLVE WITH THE SITE ENGINEER.

IT IS ALWAYS THE RESPONSIBILITY OF THE CONTRACTOR TO FOLLOW OSHA GUIDELINES FOR SAFE PRACTICES.

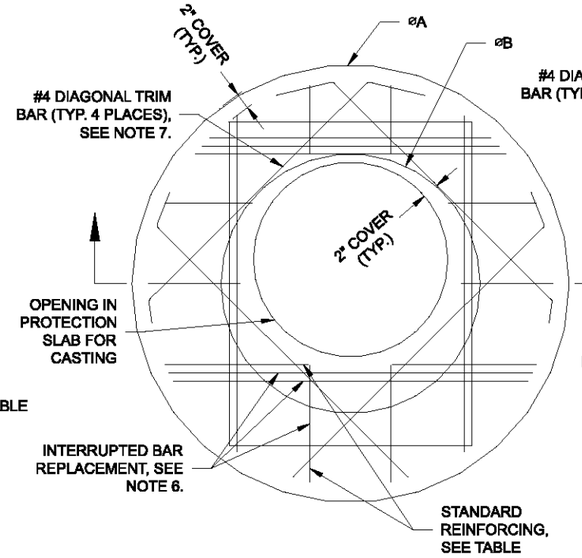
NOTE:
THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.



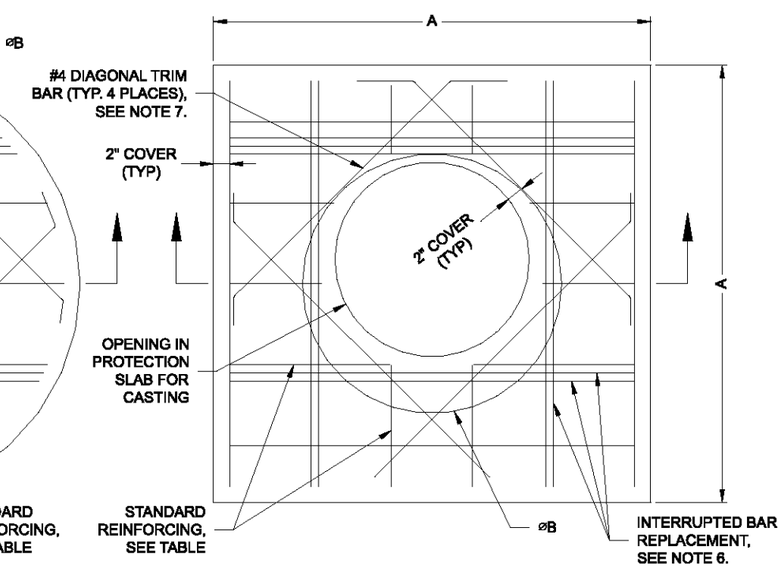
SECTION VIEW

REINFORCING TABLE				
ø CMP RISER	A	ø B	REINFORCING	**BEARING PRESSURE (PSF)
24"	ø 4' 4'X4'	26"	#5 @ 12" OCEW #5 @ 12" OCEW	2,410 1,780
30"	ø 4'-6" 4'-6" X 4'-6"	32"	#5 @ 12" OCEW #5 @ 12" OCEW	2,120 1,530
36"	ø 5' 5' X 5'	38"	#5 @ 10" OCEW #5 @ 10" OCEW	1,890 1,350
42"	ø 5'-6" 5'-6" X 5'-6"	44"	#5 @ 10" OCEW #5 @ 9" OCEW	1,720 1,210
48"	ø 6' 6' X 6'	50"	#5 @ 9" OCEW #5 @ 8" OCEW	1,600 1,100

** ASSUMED SOIL BEARING CAPACITY



ROUND OPTION PLAN VIEW



SQUARE OPTION PLAN VIEW

NOTES:

1. DESIGN IN ACCORDANCE WITH AASHTO, 17th EDITION.
2. DESIGN LOAD HS25.
3. EARTH COVER = 1' MAX.
4. CONCRETE STRENGTH = 3,500 psi
5. REINFORCING STEEL = ASTM A615, GRADE 60.
6. PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS EQUAL TO THE BARS INTERRUPTED, HALF EACH SIDE. ADDITIONAL BARS TO BE IN THE SAME PLANE.
7. TRIM OPENING WITH DIAGONAL #4 BARS, EXTEND BARS A MINIMUM OF 12" BEYOND OPENING, BEND BARS AS REQUIRED TO MAINTAIN BAR COVER.
8. PROTECTION SLAB AND ALL MATERIALS TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
9. DETAIL DESIGN BY DELTA ENGINEERING, BINGHAMTON, NY.

MANHOLE CAP DETAIL

SCALE: N.T.S.

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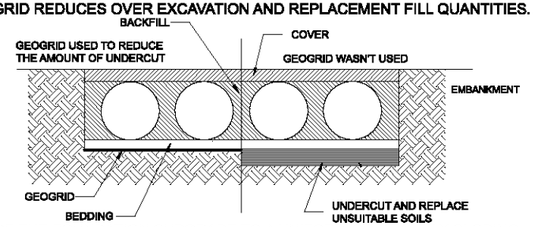
CMP DETENTION INSTALLATION GUIDE

PROPER INSTALLATION OF A FLEXIBLE UNDERGROUND DETENTION SYSTEM WILL ENSURE LONG-TERM PERFORMANCE. THE CONFIGURATION OF THESE SYSTEMS OFTEN REQUIRES SPECIAL CONSTRUCTION PRACTICES THAT DIFFER FROM CONVENTIONAL FLEXIBLE PIPE CONSTRUCTION. CONTECH ENGINEERED SOLUTIONS STRONGLY SUGGESTS SCHEDULING A PRE-CONSTRUCTION MEETING WITH YOUR LOCAL SALES ENGINEER TO DETERMINE IF ADDITIONAL MEASURES, NOT COVERED IN THIS GUIDE, ARE APPROPRIATE FOR YOUR SITE.

FOUNDATION

CONSTRUCT A FOUNDATION THAT CAN SUPPORT THE DESIGN LOADING APPLIED BY THE PIPE AND ADJACENT BACKFILL WEIGHT AS WELL AS MAINTAIN ITS INTEGRITY DURING CONSTRUCTION.

IF SOFT OR UNSUITABLE SOILS ARE ENCOUNTERED, REMOVE THE POOR SOILS DOWN TO A SUITABLE DEPTH AND THEN BUILD UP TO THE APPROPRIATE ELEVATION WITH A COMPETENT BACKFILL MATERIAL. THE STRUCTURAL FILL MATERIAL GRADATION SHOULD NOT ALLOW THE MIGRATION OF FINES, WHICH CAN CAUSE SETTLEMENT OF THE DETENTION SYSTEM OR PAVEMENT ABOVE. IF THE STRUCTURAL FILL MATERIAL IS NOT COMPATIBLE WITH THE UNDERLYING SOILS AN ENGINEERING FABRIC SHOULD BE USED AS A SEPARATOR. IN SOME CASES, USING A STIFF REINFORCING GEOGRID REDUCES OVER EXCAVATION AND REPLACEMENT FILL QUANTITIES.

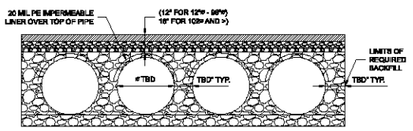


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING SATURATION OF THE SUBGRADE.

GEOMEMBRANE BARRIER

A SITE'S RESISTIVITY MAY CHANGE OVER TIME WHEN VARIOUS TYPES OF SALTING AGENTS ARE USED, SUCH AS ROAD SALTS FOR DEICING AGENTS. IF SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE, A GEOMEMBRANE BARRIER IS RECOMMENDED WITH THE SYSTEM. THE GEOMEMBRANE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM THE USE OF SUCH AGENTS INCLUDING PREMATURE CORROSION AND REDUCED ACTUAL SERVICE LIFE.

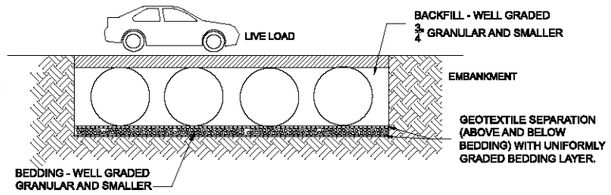
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE.



IN-SITU TRENCH WALL

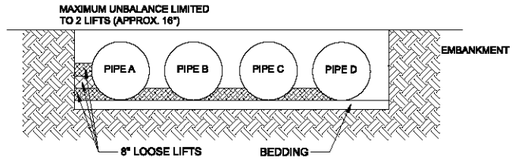
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION BEYOND THE SPRING LINE OF THE OUTER MOST PIPES.

IN MOST CASES THE REQUIREMENTS FOR A SAFE WORK ENVIRONMENT AND PROPER BACKFILL PLACEMENT AND COMPACTION TAKE CARE OF THIS CONCERN.



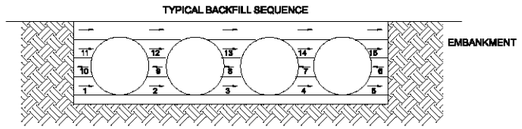
BACKFILL PLACEMENT

MATERIAL SHALL BE WORKED INTO THE PIPE HAUNCHES BY MEANS OF SHOVEL-SLICING, RODDING, AIR TAMPER, VIBRATORY ROD, OR OTHER EFFECTIVE METHODS.

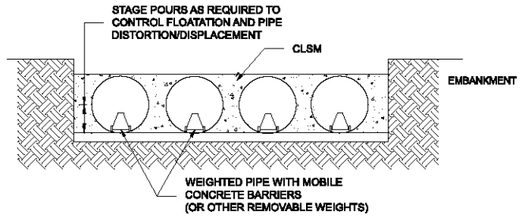


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE LEVEL OF COMPACTION.

FOR LARGE SYSTEMS, CONVEYOR SYSTEMS, BACKHOES WITH LONG REACHES OR DRAGLINES WITH STONE BUCKETS MAY BE USED TO PLACE BACKFILL. ONCE MINIMUM COVER FOR CONSTRUCTION LOADING ACROSS THE ENTIRE WIDTH OF THE SYSTEM IS REACHED, ADVANCE THE EQUIPMENT TO THE END OF THE RECENTLY PLACED FILL, AND BEGIN THE SEQUENCE AGAIN UNTIL THE SYSTEM IS COMPLETELY BACKFILLED. THIS TYPE OF CONSTRUCTION SEQUENCE PROVIDES ROOM FOR STOCKPILED BACKFILL DIRECTLY BEHIND THE BACKHOE, AS WELL AS THE MOVEMENT OF CONSTRUCTION TRAFFIC. MATERIAL STOCKPILES ON TOP OF THE BACKFILLED DETENTION SYSTEM SHOULD BE LIMITED TO 8- TO 10-FEET HIGH AND MUST PROVIDE BALANCED LOADING ACROSS ALL BARRELS. TO DETERMINE THE PROPER COVER OVER THE PIPES TO ALLOW THE MOVEMENT OF CONSTRUCTION EQUIPMENT SEE TABLE 1, OR CONTACT YOUR LOCAL CONTECH SALES ENGINEER.



WHEN FLOWABLE FILL IS USED, YOU MUST PREVENT PIPE FLOATATION. TYPICALLY, SMALL LIFTS ARE PLACED BETWEEN THE PIPES AND THEN ALLOWED TO SET-UP PRIOR TO THE PLACEMENT OF THE NEXT LIFT. THE ALLOWABLE THICKNESS OF THE CLSM LIFT IS A FUNCTION OF A PROPER BALANCE BETWEEN THE UPLIFT FORCE OF THE CLSM, THE OPPOSING WEIGHT OF THE PIPE, AND THE EFFECT OF OTHER RESTRAINING MEASURES. THE PIPE CAN CARRY LIMITED FLUID PRESSURE WITHOUT PIPE DISTORTION OR DISPLACEMENT, WHICH ALSO AFFECTS THE CLSM LIFT THICKNESS. YOUR LOCAL CONTECH SALES ENGINEER CAN HELP DETERMINE THE PROPER LIFT THICKNESS.

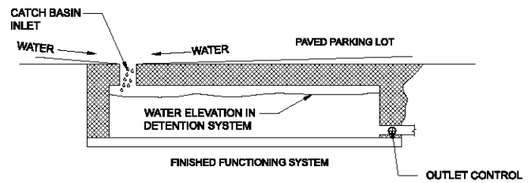


CONSTRUCTION LOADING

TYPICALLY, THE MINIMUM COVER SPECIFIED FOR A PROJECT ASSUMES H-20 LIVE LOAD. BECAUSE CONSTRUCTION LOADS OFTEN EXCEED DESIGN LIVE LOADS, INCREASED TEMPORARY MINIMUM COVER REQUIREMENTS ARE NECESSARY. SINCE CONSTRUCTION EQUIPMENT VARIES FROM JOB TO JOB, IT IS BEST TO ADDRESS EQUIPMENT SPECIFIC MINIMUM COVER REQUIREMENTS WITH YOUR LOCAL CONTECH SALES ENGINEER DURING YOUR PRE-CONSTRUCTION MEETING.

ADDITIONAL CONSIDERATIONS

BECAUSE MOST SYSTEMS ARE CONSTRUCTED BELOW-GRADE, RAINFALL CAN RAPIDLY FILL THE EXCAVATION; POTENTIALLY CAUSING FLOATATION AND MOVEMENT OF THE PREVIOUSLY PLACED PIPES. TO HELP MITIGATE POTENTIAL PROBLEMS, IT IS BEST TO START THE INSTALLATION AT THE DOWNSTREAM END WITH THE OUTLET ALREADY CONSTRUCTED TO ALLOW A ROUTE FOR THE WATER TO ESCAPE. TEMPORARY DIVERSION MEASURES MAY BE REQUIRED FOR HIGH FLOWS DUE TO THE RESTRICTED NATURE OF THE OUTLET PIPE.



CMP DETENTION SYSTEM INSPECTION AND MAINTENANCE

UNDERGROUND STORMWATER DETENTION AND INFILTRATION SYSTEMS MUST BE INSPECTED AND MAINTAINED AT REGULAR INTERVALS FOR PURPOSES OF PERFORMANCE AND LONGEVITY.

INSPECTION

INSPECTION IS THE KEY TO EFFECTIVE MAINTENANCE OF CMP DETENTION SYSTEMS AND IS EASILY PERFORMED. CONTECH RECOMMENDS ONGOING, ANNUAL INSPECTIONS. SITES WITH HIGH TRASH LOAD OR SMALL OUTLET CONTROL ORIFICES MAY NEED MORE FREQUENT INSPECTIONS. THE RATE AT WHICH THE SYSTEM COLLECTS POLLUTANTS WILL DEPEND MORE ON SITE SPECIFIC ACTIVITIES RATHER THAN THE SIZE OR CONFIGURATION OF THE SYSTEM.

INSPECTIONS SHOULD BE PERFORMED MORE OFTEN IN EQUIPMENT WASHDOWN AREAS, IN CLIMATES WHERE SANDING AND/OR SALTING OPERATIONS TAKE PLACE, AND IN OTHER VARIOUS INSTANCES IN WHICH ONE WOULD EXPECT HIGHER ACCUMULATIONS OF SEDIMENT OR ABRASIVE/ CORROSIVE CONDITIONS. A RECORD OF EACH INSPECTION IS TO BE MAINTAINED FOR THE LIFE OF THE SYSTEM

MAINTENANCE

CMP DETENTION SYSTEMS SHOULD BE CLEANED WHEN AN INSPECTION REVEALS ACCUMULATED SEDIMENT OR TRASH IS CLOGGING THE DISCHARGE ORIFICE.

ACCUMULATED SEDIMENT AND TRASH CAN TYPICALLY BE EVACUATED THROUGH THE MANHOLE OVER THE OUTLET ORIFICE. IF MAINTENANCE IS NOT PERFORMED AS RECOMMENDED, SEDIMENT AND TRASH MAY ACCUMULATE IN FRONT OF THE OUTLET ORIFICE. MANHOLE COVERS SHOULD BE SECURELY SEATED FOLLOWING CLEANING ACTIVITIES. CONTECH SUGGESTS THAT ALL SYSTEMS BE DESIGNED WITH AN ACCESS/INSPECTION MANHOLE SITUATED AT OR NEAR THE INLET AND THE OUTLET ORIFICE. SHOULD IT BE NECESSARY TO GET INSIDE THE SYSTEM TO PERFORM MAINTENANCE ACTIVITIES, ALL APPROPRIATE PRECAUTIONS REGARDING CONFINED SPACE ENTRY AND OSHA REGULATIONS SHOULD BE FOLLOWED.

ANNUAL INSPECTIONS ARE BEST PRACTICE FOR ALL UNDERGROUND SYSTEMS. DURING THIS INSPECTION, IF EVIDENCE OF SALTING/DE-ICING AGENTS IS OBSERVED WITHIN THE SYSTEM, IT IS BEST PRACTICE FOR THE SYSTEM TO BE RINSED, INCLUDING ABOVE THE SPRING LINE SOON AFTER THE SPRING THAW AS PART OF THE MAINTENANCE PROGRAM FOR THE SYSTEM.

MAINTAINING AN UNDERGROUND DETENTION OR INFILTRATION SYSTEM IS EASIEST WHEN THERE IS NO FLOW ENTERING THE SYSTEM. FOR THIS REASON, IT IS A GOOD IDEA TO SCHEDULE THE CLEANOUT DURING DRY WEATHER.

THE FOREGOING INSPECTION AND MAINTENANCE EFFORTS HELP ENSURE UNDERGROUND PIPE SYSTEMS USED FOR STORMWATER STORAGE CONTINUE TO FUNCTION AS INTENDED BY IDENTIFYING RECOMMENDED REGULAR INSPECTION AND MAINTENANCE PRACTICES. INSPECTION AND MAINTENANCE RELATED TO THE STRUCTURAL INTEGRITY OF THE PIPE OR THE SOUNDNESS OF PIPE JOINT CONNECTIONS IS BEYOND THE SCOPE OF THIS GUIDE.

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DATE	REVISION DESCRIPTION	BY

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CONTECH CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO12190 Pepper Avenue - Rialto
Chamber 1 - Revised
Rialto, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
5126	12190	12/15/2021
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D4		

Santa Ana Watershed

BMP Design Volume, V_{BMP}

Company Name	FMCIVIL Engineers Inc.
Designed by	Francisco Martinez, PE
Project	Pepper Industrial Building (DA 1)
Date	12/14/2021

DA 1

Surface Type	**Area (SF)**
Roof	465,518.26
Concrete or Asphalt	444,750.92
Future Impervious Area	-
Restore to Natural	
Ornamental Landscaping, Basin, and Pervious Concrete	122,175.82
Total Area (SF)	1,032,445.00
Total Area (Acres)	23.7

Impervious Ratio =	**(i)**	88.2%
C_{BMP} = Runoff Coefficient	**$0.858i^3-0.78i^2+0.774i+0.04$**	0.7041
$P_{2yr,1hr}$	**NOAA - 2-yr 1-hr rainfall depth**	0.637
a_1 = San Bernardino Climate Region	**Valley = 1.4807 Mountain = 1.909 Desert = 1.2371**	1.4807
P_6 - Mean Storm Rainfall Depth	**$P_6 = a_1 * P_{2yr,1hr}$**	0.9432
a_2 = Drawdown rate of Basin	**1.582 for 24-hr 1.963 for 48-hr**	1.9630
Project Area (SF)	**(DA)**	1,032,445.00
Design Capture Volume (cu.ft.)	**$DCV = DA * C_{BMP} * a_2 * P_6/12$**	112,164.67
Volume Provided, cu. Ft.	**ConTech Chamber Capacity**	241,579.30

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations (BFEs) shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 11 North. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242** or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was provided in digital format by the San Bernardino County ISD.GIS Department, United States Geological Survey, the Bureau of Land Management, the United States Department of Agriculture, and the National Geodetic Survey. The imagery was flown by U.S. Department of Agriculture Farm Sevice Agency in 2012 and was produced with a 1-meter ground sampling distance.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

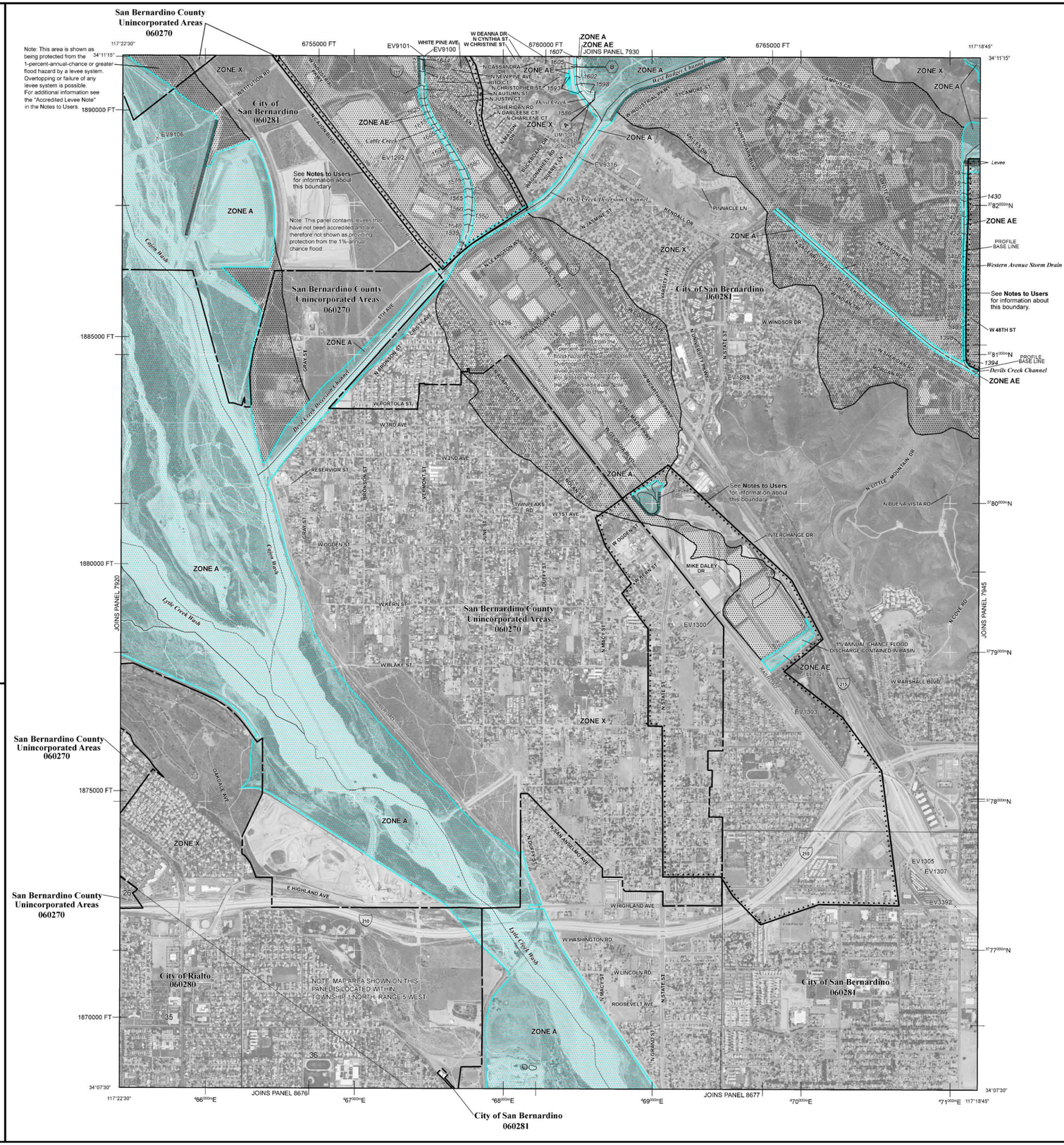
Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products, or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information eXchange.

ATTENTION: The levee, dike, or other structure that impacts flood hazards inside this boundary has not been shown to comply with Section 65.10 of the NFIP Regulations. As such, this FIRM panel will be revised at a later date to update the flood hazard information associated with this structure.

The flood hazard data inside this boundary on the FIRM panel has been republished from the previous effective (historic) FIRM for this area, after being converted from NGVD29 to NAVD88.

ACCREDITED LEVEE NOTES TO USERS: Check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent-annual-chance level) and Emergency Action Plan, on the levee system(s) shown as providing protection for areas on this panel. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures. For more information on flood insurance, interested parties should visit the FEMA website at http://www.fema.gov/business/nfip/index.shtm.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Areas to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities
- 513 (EL 987) — Base Flood Elevation line and value; elevation in feet*
- Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

- A–A — Cross section line
- 23–23 — Transect line
- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 4275000mE — 1000-meter Universal Transverse Mercator grid values, zone 11
- 6000000 FT — 5000-foot grid ticks: California State Plane coordinate system, Zone V (FIPSZONE = 405), Lambert projection
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories List on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
August 28, 2008

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
September 2, 2016 – to change Base Flood Elevations, to add Base Flood Elevations, to change Special Flood Hazard Areas, to add Special Flood Hazard Areas, to change zone designations, to incorporate previously issued Letters of Map Revision, and to reflect updated topographic information.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

500 0 500 1,000 1,500 2,000 FEET
300 0 300 600 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 7940J

FIRM

FLOOD INSURANCE RATE MAP

SAN BERNARDINO COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 7940 OF 9400

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
RIALTO, CITY OF	060280	7940	J
SAN BERNARDINO COUNTY	060270	7940	J
SAN BERNARDINO, CITY OF	060281	7940	J

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER 06071C7940J

MAP REVISED SEPTEMBER 2, 2016

Federal Emergency Management Agency