

Preliminary
Drainage Report
For
Tentative Tract Map No. 20486
Adelanto, CA

Prepared
May 2022

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Project # 30203

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 employees that have provided data and calculations upon which the recommendations, conclusions, and decisions are based.



Christopher F. Lenz, PE 63001

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APPENDICES

APPENDIX A: SITE PLANS - PRE AND POST CONDITIONS

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APPENDIX C: PROJECT RATIONAL HYDROLOGY STUDY INFORMATION

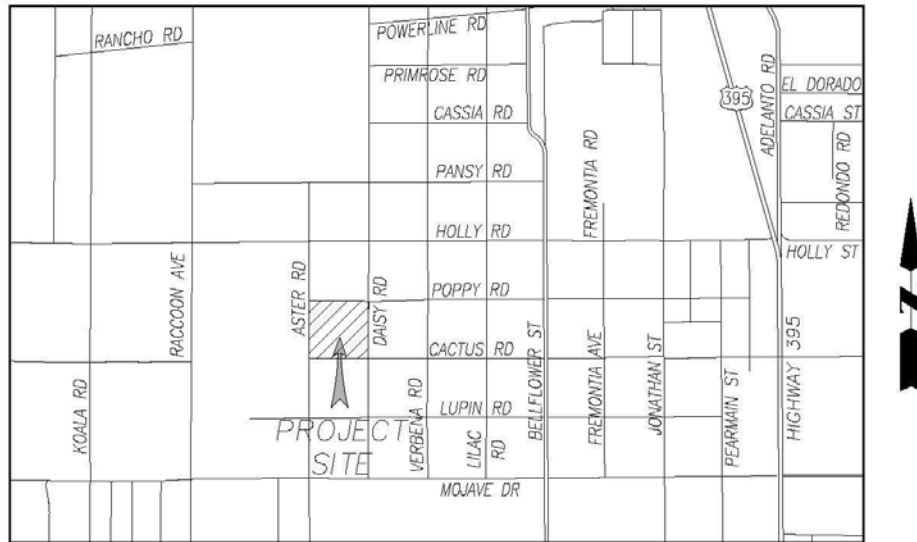
APPENDIX D: SCS UNIT HYDROGRAPH METHOD STUDY INFORMATION

APPENDIX E: BASIN ROUTING STUDY INFORMATION

APPENDIX F: PROJECT HYDRAULIC CALCULATIONS

I. INTRODUCTION

TTM 20486 is a residential subdivision of approximately 40 acres into 166 single family residential lots, located at the northeast intersection of Aster and Cactus Roads in the City of Adelanto. The property is square shaped and is bordered by dirt roads, with no directly bordering development. The minimum lot size is 5,000 sf. For the purposes of this report, WQMP calculations are provided, but a WQMP should be prepared with the final drainage report and project design.



VICINITY MAP

The purpose of this study is to determine the 10-year and 100-year storm runoff emanating from on-site and off-site areas for the Project. The study will determine the peak flow rates for the existing conditions, the peak flow rate and volumes for the proposed conditions, and proposed conditions flow rate and stored volume after routing through four (4) detention basins. Additional analysis will confirm hydraulic capacity of proposed street sections compared to rational expected runoff.

The scope of the study includes the following:

- Determination of points of flow concentration and watershed areas
- Determination of the 100-year storm runoff based upon the on-site drainage conditions utilizing the San Bernardino County Flood Control District (SBCFCD) SCS Unit Hydrograph Method
- Determination of the 10-year and 100-year peak flow rates for the off-site area utilizing the San Bernardino County Flood Control District (SBCFCD) Rational Method.

II. SITE DISCUSSION

The current property is vacant, undeveloped, and undisturbed land with varying slopes. The topography indicates that the runoff drains in a primarily northern direction in the form of sheet flow. There is a defined wash running through the center of the property. The on-site sheet flows are identified on the existing and proposed condition exhibits. On-site runoff outlets the property at the northwestern and northeastern corners of the site (see Existing Condition Exhibit).

III. RAINFALL DATA

The San Bernardino County Flood Control District (SBCFCD) hydrology Manual, (Reference 1) was used to develop the hydrological parameters for the 10-year and 100-year storm events. The Rational Method was used to determine the peak flow rates associated with the existing project conditions as well as the time of concentration used in the Unit Hydrograph method. In addition, the Unit Hydrograph Method was utilized to determine the runoff volume. Computations were performed using the CivilCADD drainage software for San Bernardino County Developed by CivilDesign Corporation. Rainfall data was taken from NOAA Atlas 14.

Return Period - Duration	Isohyetal (in)
10 year - 1 hour	0.61
2 year - 6 hour	0.79
2 year - 24 hour	1.41
100 year - 1 hour	1.03
100 year - 6 hour	2.16
100 year - 24 hour	4.21

Hydrologic Soil Groups “C” and “A” an Antecedent Moisture Conditions (AMC) 2 (10yr) and 3 (100yr) are used for the study area. The percentage impervious is 50, and the SCS runoff is 32 and 69. Refer to Appendix C for additional detail.

The project’s post developed runoff is designed to be contained in four (4) basins that will act as both water quality infiltration, and flood storage for peak runoff mitigation.

IV. ONSITE RUNOFF

Existing Condition/Pre-Development

The runoff from the subject site in the existing condition is primarily sheet

flow with two concentrations of flow as runoff exits the site. The site drains northerly. They are shown as Areas A and B on the Existing Conditions Drainage Exhibit in Appendix A. The peak flow rates are 27.8 cfs and 26.7 cfs respectively. Therefore, peak flows of 24.4 cfs and 24.0 will be the limiting factors of design outflow (90% of existing).

Proposed Condition/Post Development

The proposed condition is to utilize four basins for water quality and flood routing for the site. The design will incorporate controlled basin outlets at various locations of the site, discharging to the regional channels. This approach will maintain the existing drainage patterns. The site run-off has been routed to the basins using the streets and typical surface collection facilities for water quality and flood control. The Rationale method was prepared for the determination of time of concentrations for use in the development of the Unit Hydrographs. The post development 100-year runoff is shown on the Proposed Conditions Exhibit in Appendix A.

The post development runoff is then routed through the proposed basins to confirm post development runoff can be mitigated to less than pre-development runoff. The basins are proposed as dual-purpose retention and detention basins. The bottom 1-2 feet for the basins act as water quality retention only, with no outfall, relying solely on infiltration. The volume above serves as detention volume for flood storage and needed for peak flow mitigation. To drain the top flood storage, pipes connected to the regional channels have been used for preliminary calculations. The following tables detail the proposed basins shown on the TTM;

Basin Stage-Storage-Outfall Chart					
Depth		Vol Total		Q out	
[ft]	Area [sf]	Vol [acft]	[acft]	[cfs]*	
Basin A1					
0	9491	0.00	0.00	0.0	
1	10695	0.23	0.23	0.0	
2	11955	0.26	0.49	5.0	
3	13272	0.29	0.78	5.0	

DEPTH 1.66'
 STORED 0.4 AC-FT
 Qout 3.3 CFS

Basin Stage-Storage-Outfall Chart					
	Depth			Vol Total	Q out
	[ft]	Area [sf]	Vol [acft]	[acft]	[cfs]*
Basin A2					
	0	19545	0.00	0.00	0.0
	1	21849	0.48	0.48	0.0
	2	24202	0.53	1.00	5.0
	3	26605	0.58	1.59	5.0

DEPTH 1.97'

STORED 0.99 AC-FT

Qout 4.9 CFS

Basin Stage-Storage-Outfall Chart					
	Depth			Vol Total	Q out
	[ft]	Area [sf]	Vol [acft]	[acft]	[cfs]*
Basin A3					
	0	13307	0.00	0.00	0.0
	1	15371	0.33	0.33	0.0
	2	17489	0.38	0.71	5.0
	3	19659	0.43	1.13	5.0

DEPTH 1.88'

STORED 0.67 AC-FT

Qout 4.4 CFS

Basin Stage-Storage-Outfall Chart					
	Depth			Vol Total	Q out
	[ft]	Area [sf]	Vol [acft]	[acft]	[cfs]*
Basin B					
	0	16058			
	1	18550	0.32	0.32	0.0
	2	21094	0.38	0.70	0.0
	3	23691	0.43	1.13	0.0
	4	26341	0.46	1.59	24.0

DEPTH 3.93'

STORED 1.56 AC-FT

Qout 22.3 cfs

After routing through the proposed basins, the post development 100-year runoff for Area A (combined) is 12.6 cfs with 2.1 ac-ft stored, and for Area B is 22.3 cfs with 1.56 ac-ft stored. Note that the basins have been preliminarily oversized at 3.5 ac-ft versus 2.1 ac-ft required for A, and 1.59 versus 1.56 for Area B. The basins have been designed at 3'-4' deep. Preliminary pipes connected to the regional channels were used for calculations. At time of final design, the final outlet structure shall be specified and designed per this report. Refer to Appendices D and E for detailed output files and the TTM for grading detail.

The primary hydraulic design element studied for the onsite flows are the proposed roads within the project that will be used to carry runoff. At the minimum design slope of 0.4% the roads yield a capacity of 33 cfs within the curbs and 47 cfs within the right-of-way. At time of final design, curb inlets will be designed to convey runoff to the basin, or to dewater intersections at the builder's discretion. The post development sub areas were analyzed using the Rationale Method to determine peak runoff and confirm containment in the curb and right of way. The 100 yr peak site runoff of is contained within the right of way capacity of 47 cfs. Therefore, storm drain inlets may be used at key locations to de-water the street, but likely will only be required to route flows into the basins. At time of final design those facilities will be designed. Refer to the Proposed Conditions Drainage Exhibit in Appendix A and Appendix F for additional detail.

V. OFFSITE RUNOFF

The offsite contributing areas to the subject site are from the south. There is an existing channel running down the middle of the site that routes runoff to the northwest. The existing channel is the Master Plan Line 2B. Although the Master Plan shows Line 2B along the west side of Aster Road, the project will need to collect and route the existing flows through the site and protect the development. The TTM is designed to collect and route the design storm through the site in a trapezoidal channel. The project is proposing a temporary dip section for the outlet of the channel to mimic existing drainage patterns. See Appendix A and F for additional detail.

VI. STORMWATER TREATMENT

Stormwater treatment will be provided by the bottom 1-2 feet of the basins, where the required volume will infiltrate into the ground. As shown on the TTM, the basins exceed the required water quality volume of 0.61 ac-ft. Infiltration testing will be required at the time of final design to ensure sufficient rates to de-water the basin in 30 hours (with a safety factor of 2). Water quality calculations were prepared based on the San Bernardino County

Model Water Quality Management Plan Guidance document. The following calculations were used in the preliminary sizing of the proposed facilities.

- WQ Contributing area - 39.5 ac
- 2 yr 1 hour rainfall - 0.35"
- Impervious ratio - 50% (from SBCFCD hydrology Manual)
- $C_{BMP} = 0.34$
- Drainage Area Region - Desert - Regression Coefficient $P_6 = 1.2371$
- $P_6 = 1.2371 \times 0.35" = 0.43"$
- Regression Constant $a = 1.963$ for 48 hours
- $P_0 = a * C_{BMP} * P_6 = 1.963 \times 0.34 \times 0.43 = 0.29$
- $V_0 = (P_0 * A)/12 = (0.29 \times 39.5)/12 = 0.94$ ac-ft

VII. CONCLUSION

The proposed development of tract 20486, a 40-acre, 166 lot single family detached subdivision can be mitigated as designed and analyzed in this report to be compatible with the City of Adelanto Master Plan of Drainage. The development of the subject site will not significantly change area drainage patterns, impact any of the surrounding properties, or change any of the regional master plan facilities. The project will construct combination retention and detention basins of sufficient size to handle water quality through infiltration, and flood mitigation through detention. As designed, the basins exceed the required storage volume. The streets have been analyzed and are confirmed to contain the 10-year runoff within the curb, and the 100-year runoff within the right of way with the proposed addition of storm drain inlets at locations shown. At time of final design, the basins, outlet structures, street grades, and curb inlets will be designed and analyzed in conjunction with final grading and paving plans to confirm capacity.

REFERENCES

1. San Bernardino County Flood Control and Water Conservation District Hydrology Manual, August 1986.
2. City of Adelanto Drainage Master Plan Update, Figure 3-1 Proposed Systems Map, So and Associates Engineers, March 1992.

APPENDIX A: SITE PLANS - PRE AND POST CONDITIONS

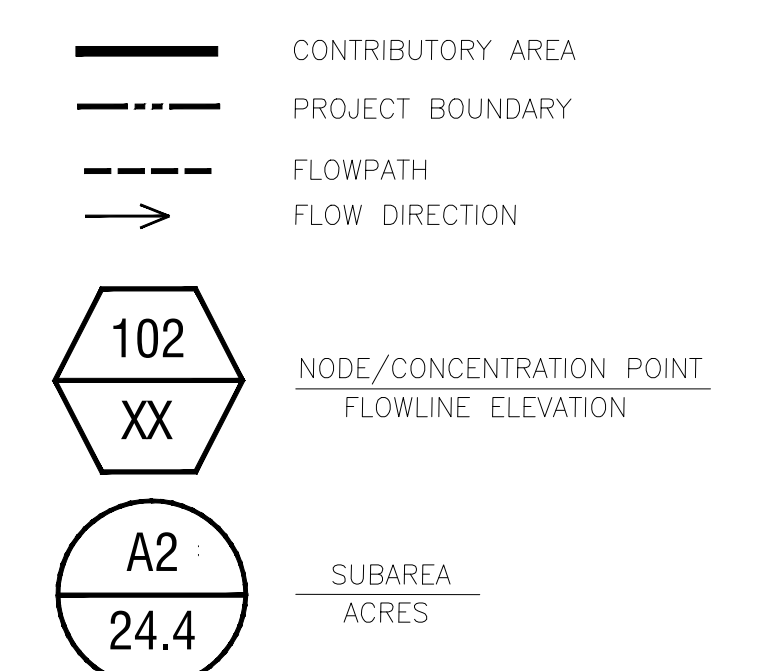
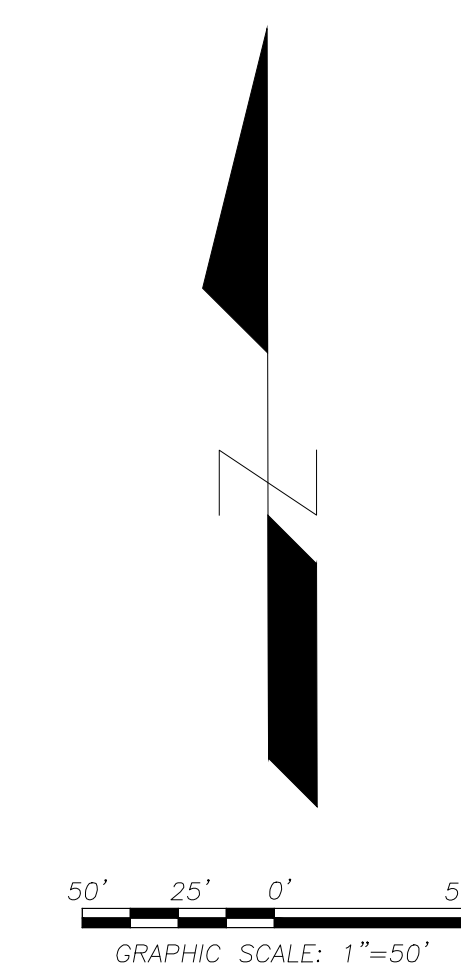
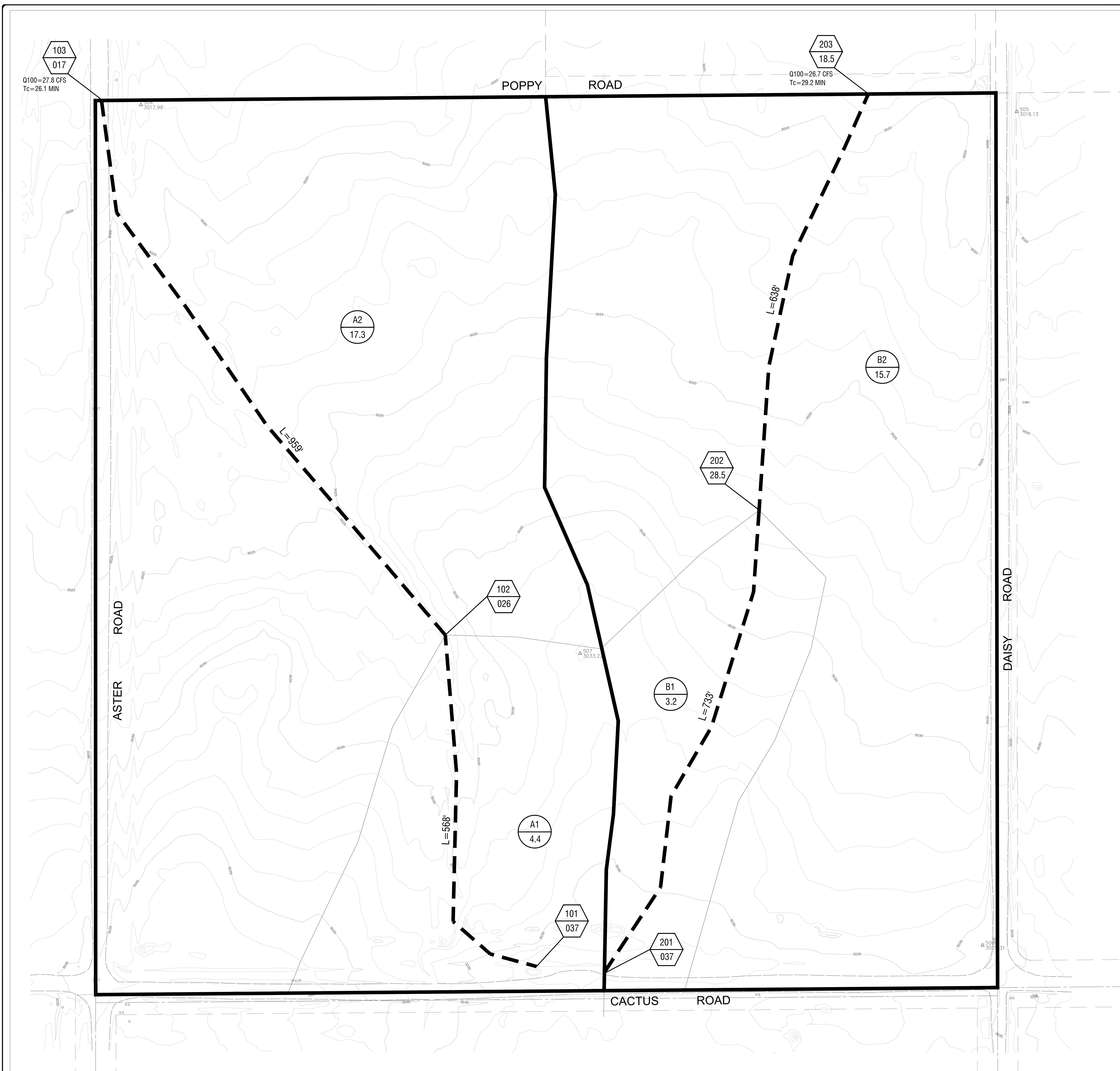
CHANNEL #3
Q = 1925 CFS (2345 CFS)
RW = 103-FT
ND = 7.5-FT (6-FT)
BASE = 25-FT
TOP = 49-FT

CHANNEL #3
Q = 850 CFS (2091 CFS)
RW = 90-FT
ND = 5.5-FT (6-FT)
BASE = 20-FT
TOP = 44-FT

CHANNEL #2B1
Q = 725 CFS (946 CFS)
RW = 86-FT
ND = 6.5-FT (5-FT)
BASE = 12-FT
TOP = 32-FT

CHANNEL #2B
Q = 450 CFS (1354 CFS)
RW = 82-FT
ND = 5.5-FT (6-FT)
BASE = 12-FT
TOP = 36-FT

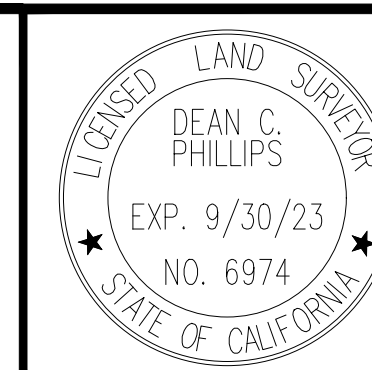
IN THE CITY OF ADELANTO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA.
EXISTING CONDITIONS EXHIBIT
TENTATIVE MAP - TRACT NO. 20486
 UNITED ENGINEERING GROUP CA., INC MAY 2022



SUBMITTALS:	REVISIONS		
	NO.	DESCRIPTION	DATE
DESIGNED BY:			
DRAWN BY:			
CHECKED BY:			



CHRISTOPHER F. LENZ DATE
R.C.E. No. 63001



DEAN C. PHILLIPS DATE
L.S. No. 6974
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ASTER & CACTUS

EXISTING CONDITIONS EXHIBIT
TRACT 20486

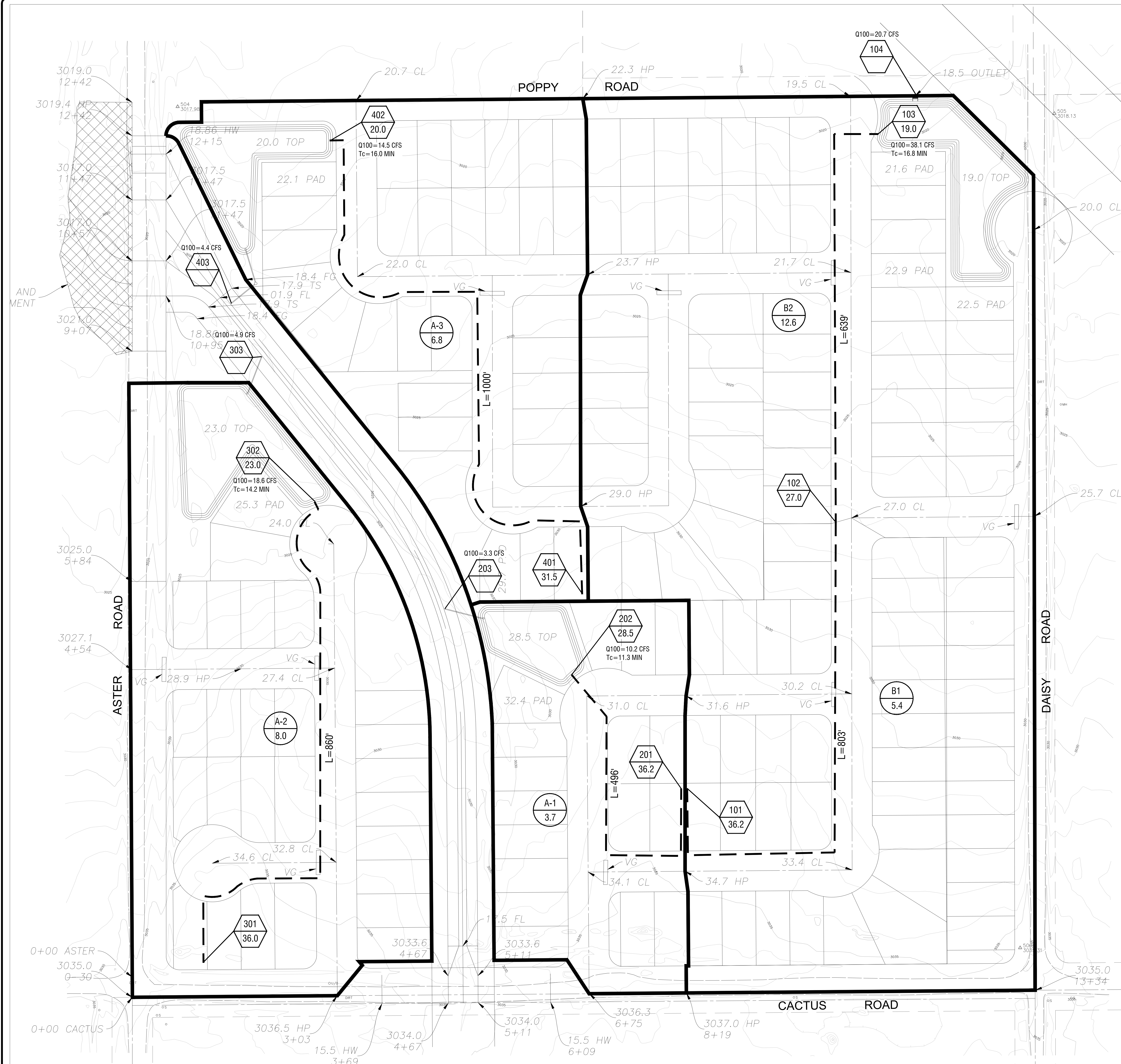
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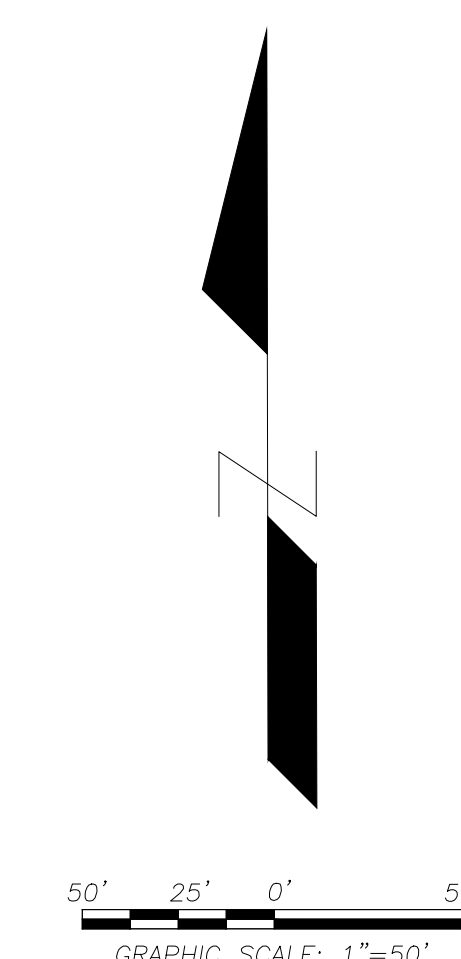
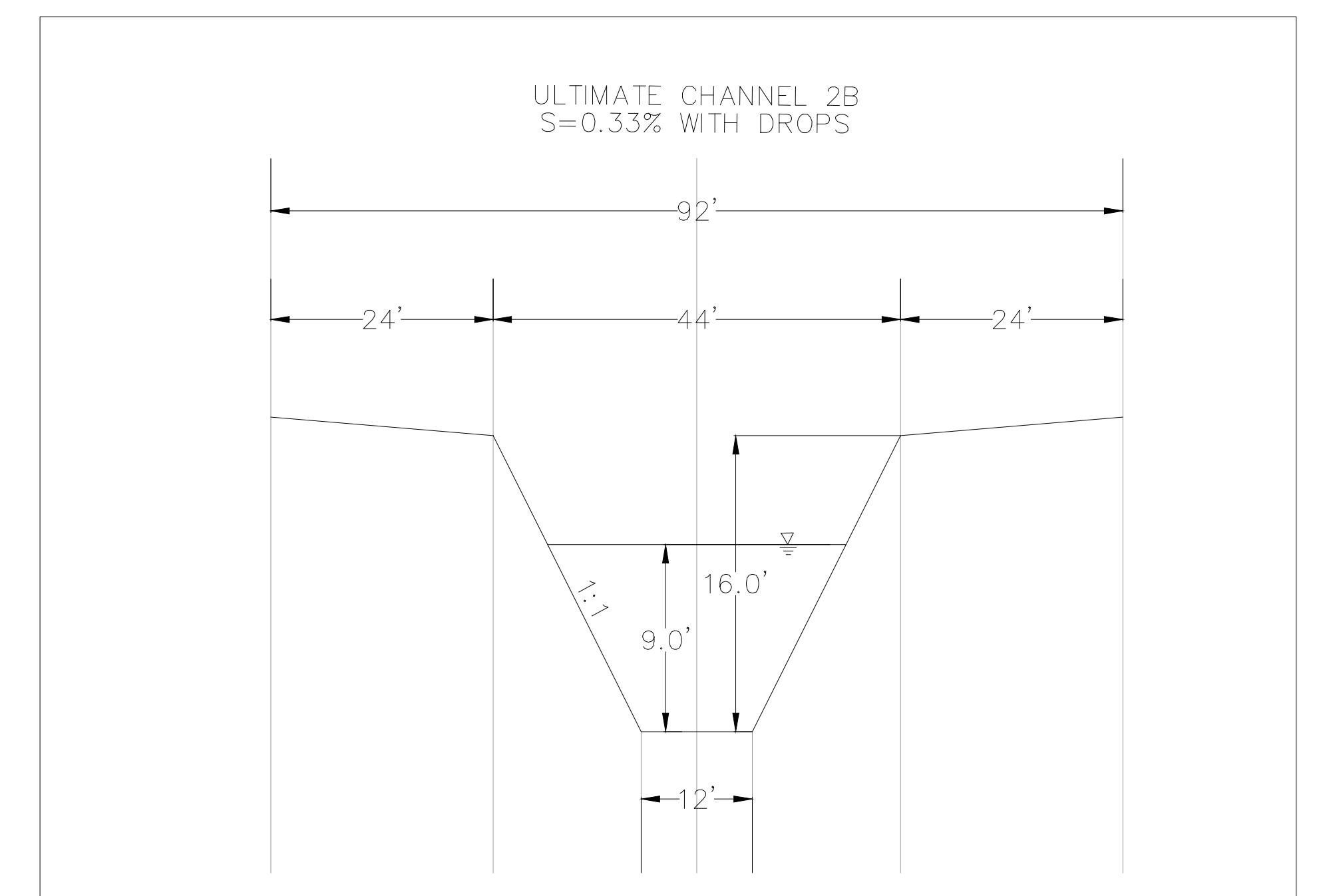
PROJECT NUMBER

CA-30200

IN THE CITY OF ADELANTO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA.
PROPOSED CONDITIONS EXHIBIT
TENTATIVE MAP - TRACT NO. 20486
 UNITED ENGINEERING GROUP CA., INC MAY 2022



CHANNEL 2B DESIGN SECTION



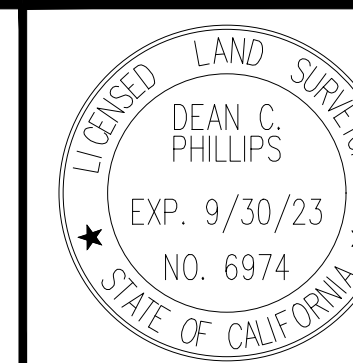
-
- CONTRIBUTORY AREA
 - - - PROJECT BOUNDARY
 - - - FLOWPATH
 → FLOW DIRECTION
 102
 XX
 NODE/CONCENTRATION POINT
 FLOWLINE ELEVATION
 A2
 24.4
 SUBAREA
 ACRES

NOTE: CHANNEL AND SPILLWAY ACREAGE IS 4.1 ACRES AND IS ACCOUNTED FOR IN PRE-POST ANALYSIS. REFER TO DRAINAGE REPORT.

SUBMITTALS:	REVISIONS		
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CHRISTOPHER F. LENZ DATE
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ASTER & CACTUS
PROPOSED CONDITIONS EXHIBIT TRACT 20486

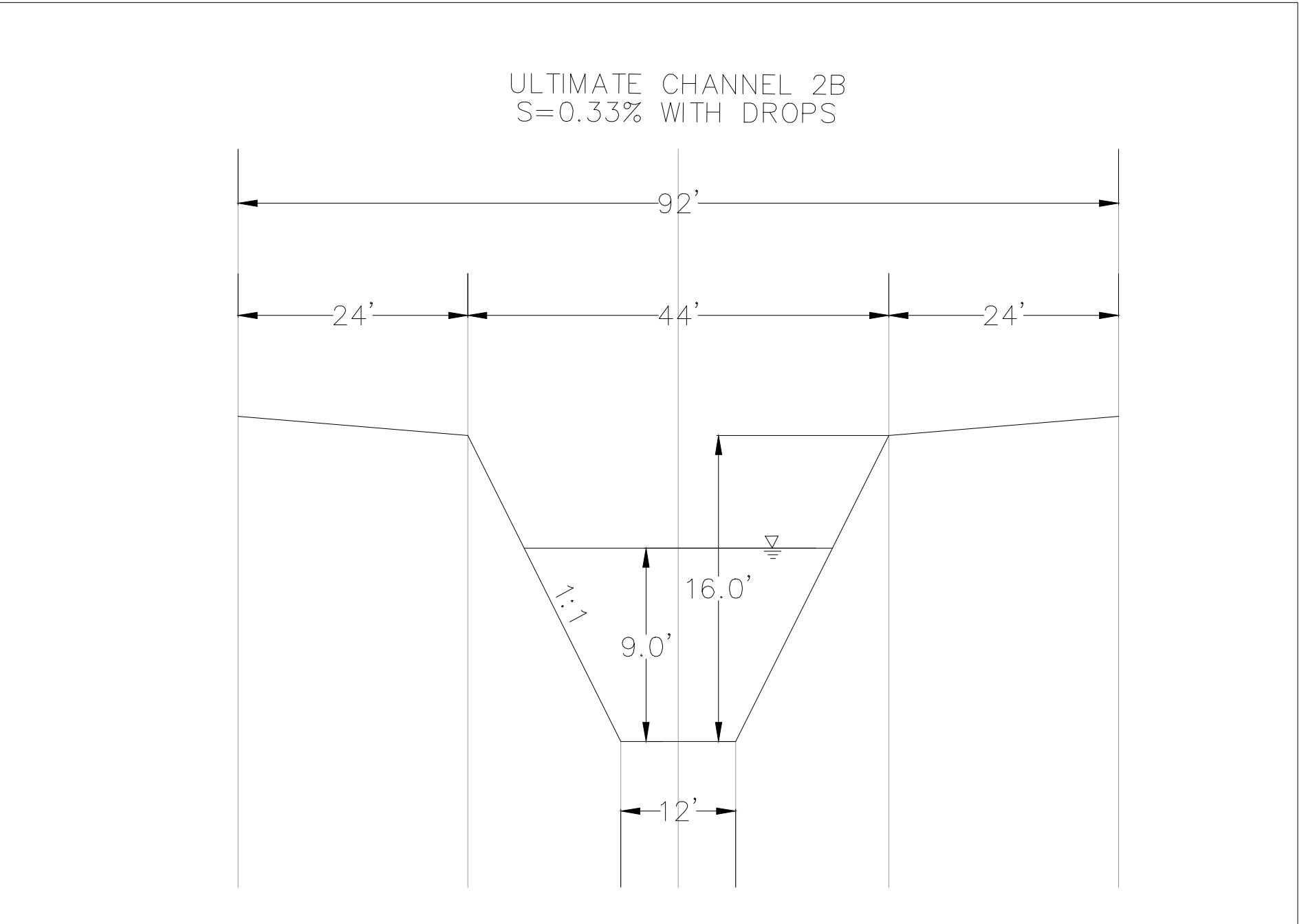
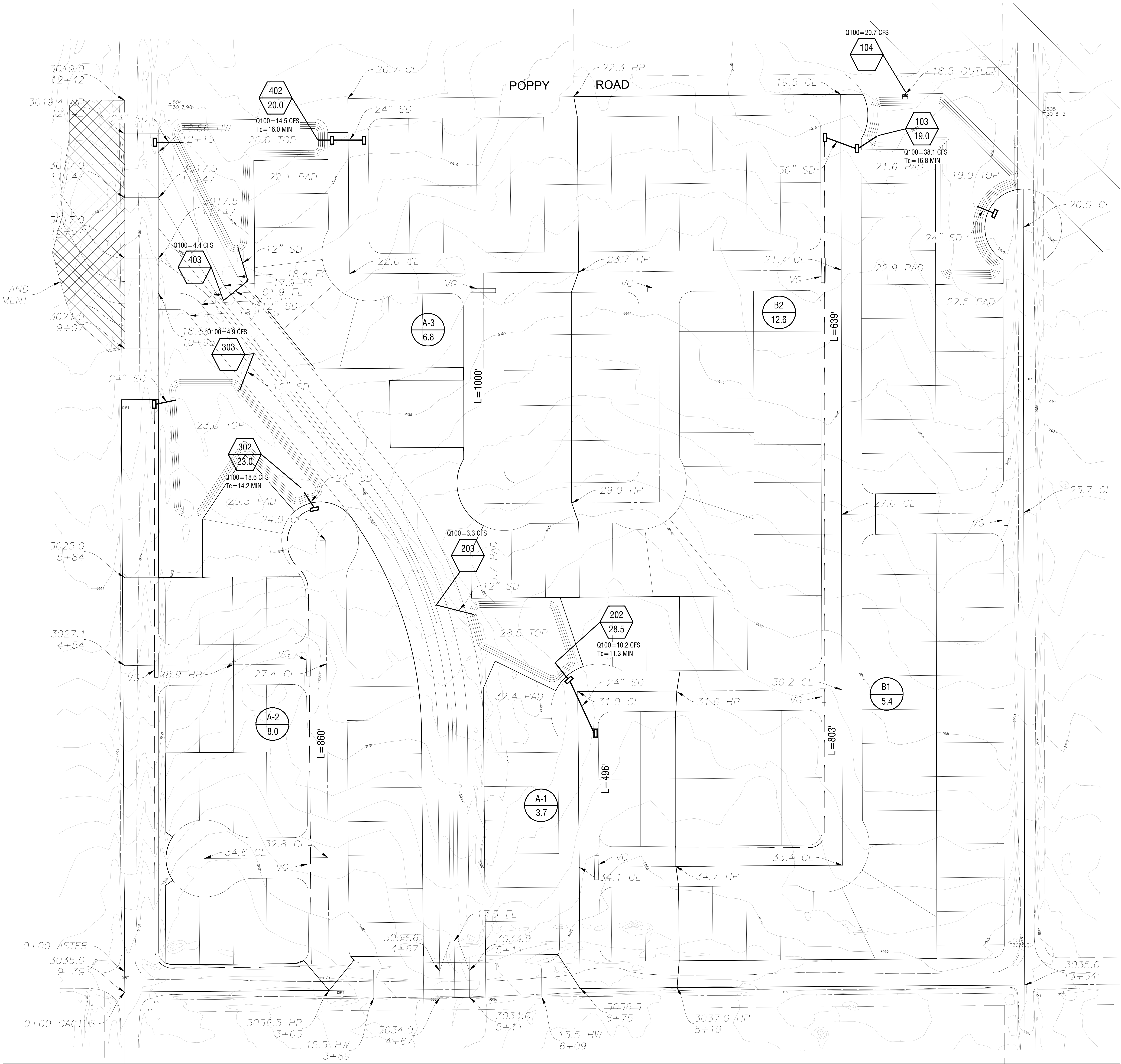
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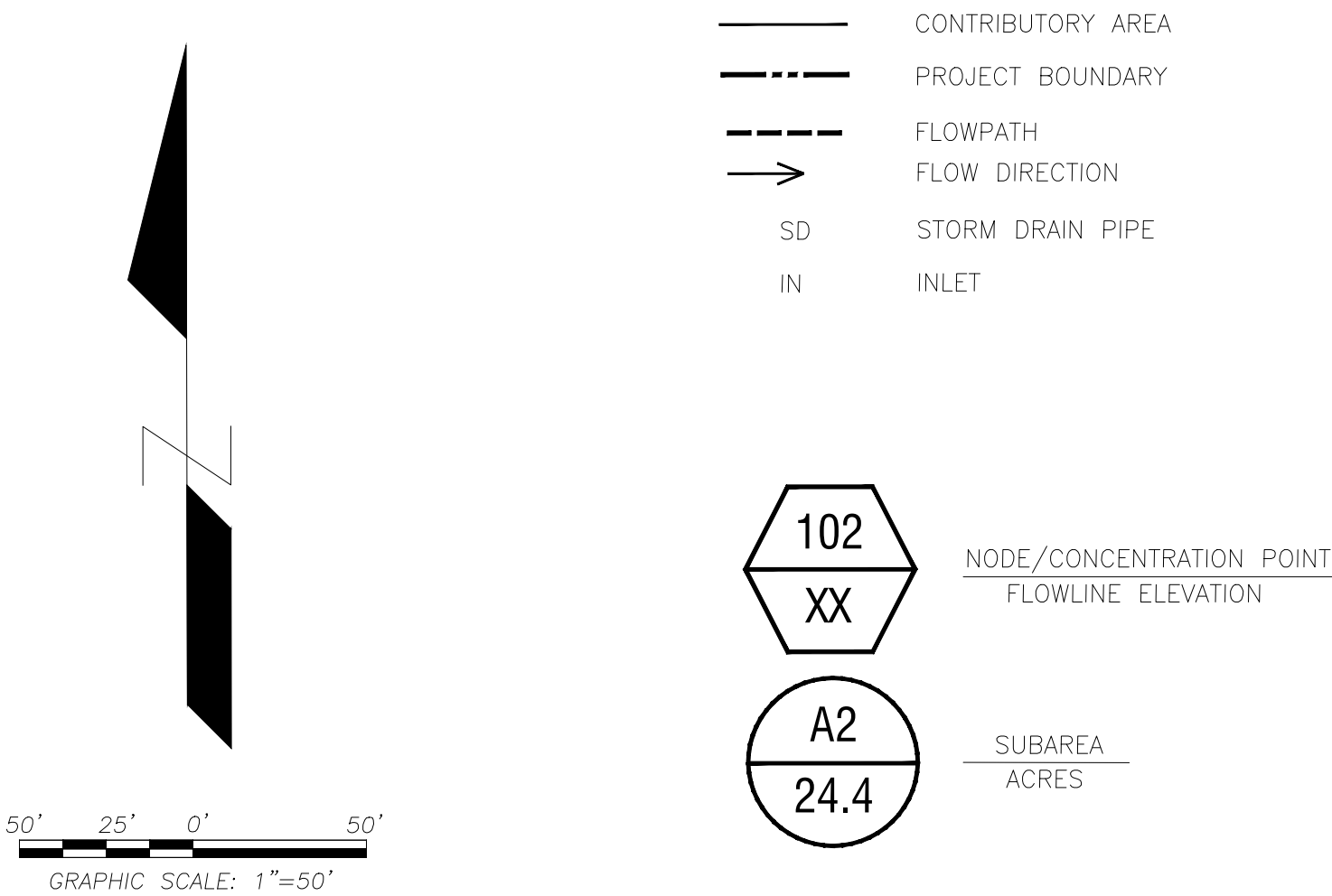
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STORM DRAIN EXHIBIT
TENTATIVE MAP - TRACT NO. 20486
UNITED ENGINEERING GROUP CA., INC MAY 2022



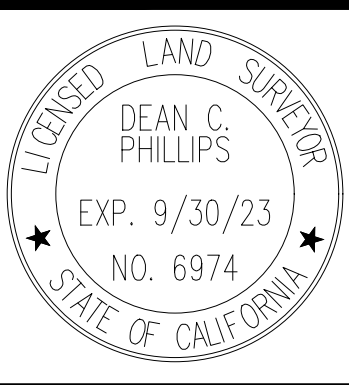
CHANNEL 2B DESIGN SECTION



SUBMITTALS:		REVISIONS		DATE
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CHRISTOPHER F. LENZ DATE
R.C.E. No. 63001



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ASTER & CACTUS
STORM DRAIN EXHIBIT
TRACT 20486

MAY 2022

SHEET 1 OF 1

PROJECT NUMBER
CA-30200

**APPENDIX B:
TENTATIVE TRACT MAP 20486**

LOT #	SO. FT.	ACRES
1	5,001.13	0.1148
2	5,001.13	0.1148
3	5,001.13	0.1148
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164	5,885.85	0.1352
165	5,885.85	0.1352
166	5,885.85	0.1352

TOTAL:	941,659.49 SO. FT., 21.6184 AC.
AVERAGE:	5,672.65 SO. FT., 0.1302 AC.

LETTERED LOTS	SO. FT.	ACRES
A	25,860.92	0.5937
B	32,297.88	0.7415
C	7,021.65	0.1612
D	119,086.24	2.7338
E	49,375.84	1.1335
F	1,800.45	0.0413
G	1,581.34	0.0363
H	4,287.27	0.0984
I	14,904.14	0.3422
J	41,543.23	0.9537

TOTAL:	297,759.07 SO. FT., 6.8356 AC.
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BENCHMARK:

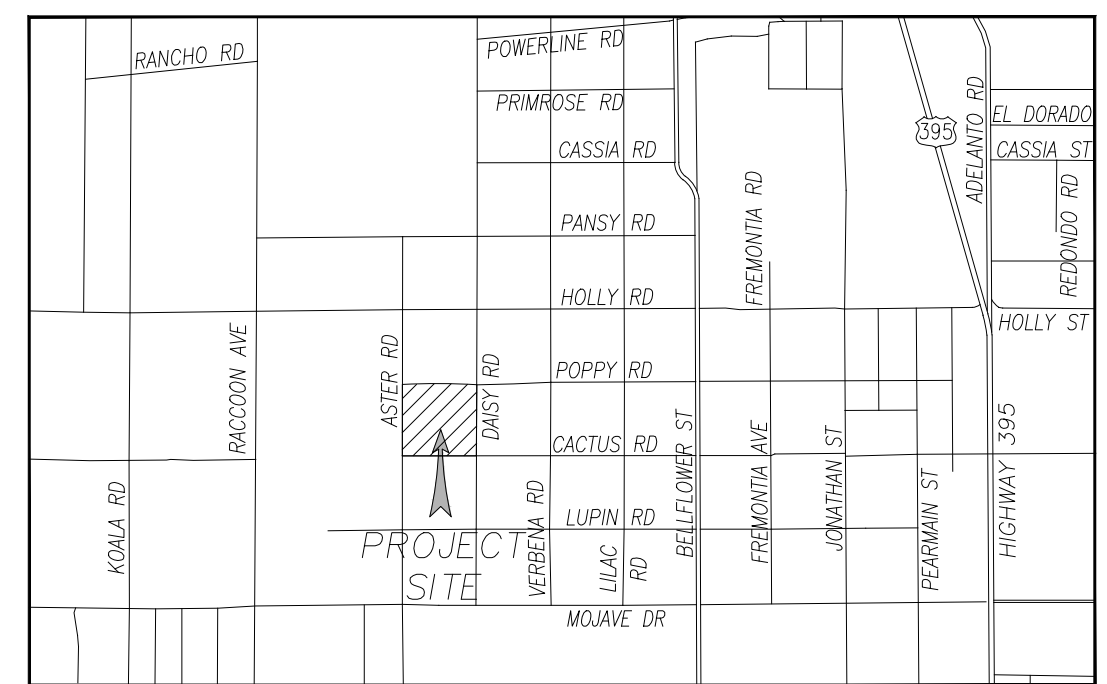
CITY OF ADELANTO BM NO. 5518, 4" BRASS DISC 54" EAST OF AND 54" SOUTH OF THE CENTERLINE INTERSECTION OF MOJAVE DRIVE & KAGLA RD
ELEV = 3083.746

BASIS OF BEARINGS

THE BEARING NORTH 88°35'18" EAST, BEING A LINE IN THE CALIFORNIA STATE COORDINATE SYSTEM BETWEEN CONTROL STATIONS "AD08E"-PID-EV2892 AND "GRAHAM"-PID-EV2893, EPOCH 1991.35, NAD 83

TENTATIVE MAP - TRACT NO. 20486

SOUTHWEST 1/4 OF THE NORTHWEST 1/4 OF SECTION 8, TOWNSHIP 5 NORTH, RANGE 5 WEST
SAN BERNARDINO BASE AND MERIDIAN, IN THE CITY OF ADELANTO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA
UNITED ENGINEERING GROUP CA., INC JANUARY 2022



VICINITY MAP

GENERAL NOTES:

- ASSESSOR'S PARCEL NUMBER: 0459-132-34-0-000
- THE PROPERTY SHOWN HEREIN CONTAINS THE ENTIRE CONTIGUOUS OWNERSHIP.
- TOTAL GROSS AREA = 39.53 AC.
TOTAL NET AREA = 21.62 AC.
TOTAL AREA TO BE DEDICATED FOR R/W = 11.08 AC.
- STREETS "A", "B", "C", "D", "E", "F", "G", "H", "I", "J", "K", "L", "M", "N", "O", "P", "Q", "R", "S", "T", "U", "V", "W", "X", "Y", "Z", "AA", "AB", "AC", "AD", "AE", "AF", "AG", "AH", "AI", "AJ", "AK", "AL", "AM", "AN", "AO", "AP", "AQ", "AR", "AS", "AT", "AU", "AV", "AW", "AX", "AY", "AZ", "BA", "BB", "BC", "BD", "BE", "BF", "BG", "BH", "BI", "BJ", "BK", "BL", "BM", "BN", "BO", "BP", "BQ", "BR", "BS", "BT", "BU", "BV", "BW", "BX", "BY", "BZ", "CA", "CB", "CC", "CD", "CE", "CF", "CG", "CH", "CI", "CJ", "CK", "CL", "CM", "CN", "CO", "CP", "CQ", "CR", "CS", "CT", "CU", "CV", "CW", "CX", "CY", "CZ", "DA", "DB", "DC", "DD", "DE", "DF", "DG", "DH", "DI", "DJ", "DK", "DL", "DM", "DN", "DO", "DP", "DQ", "DR", "DS", "DT", "DU", "DV", "DW", "DX", "DY", "DZ", "EA", "EB", "EC", "ED", "EE", "EF", "EG", "EH", "EI", "EJ", "EK", "EL", "EM", "EN", "EO", "EP", "EQ", "ER", "ES", "ET", "EU", "EV", "EW", "EX", "EY", "EZ", "FA", "FB", "FC", "FD", "FE", "FF", "FG", "FH", "FI", "FJ", "FK", "FL", "FM", "FN", "FO", "FP", "FQ", "FR", "FS", "FT", "FU", "FV", "FW", "FX", "FY", "FZ", "GA", "GB", "GC", "GD", "GE", "GF", "GG", "GH", "GI", "GJ", "GK", "GL", "GM", "GN", "GO", "GP", "GQ", "GR", "GS", "GT", "GU", "GV", "GW", "GX", "GY", "GZ", "HA", "HB", "HC", "HD", "HE", "HF", "HG", "HH", "HI", "HJ", "HK", "HL", "HM", "HN", "HO", "HP", "HQ", "HR", "HS", "HT", "HU", "HV", "HW", "HX", "HY", "HZ", "IA", "IB", "IC", "ID", "IE", "IF", "IG", "IH", "II", "IJ", "IK", "IL", "IM", "IN", "IO", "IP", "IQ", "IR", "IS", "IT", "IU", "IV", "IW", "IX", "IY", "IZ", "JA", "JB", "JC", "JD", "JE", "JF", "JG", "JH", "JI", "JJ", "JK", "JL", "JM", "JN", "JO", "JP", "JQ", "JR", "JS", "JT", "JU", "JV", "JW", "JX", "JY", "JZ", "KA", "KB", "KC", "KD", "KE", "KF", "KG", "KH", "KI", "KJ", "KK", "KL", "KM", "KN", "KO", "KP", "KQ", "KR", "KS", "KT", "KU", "KV", "KW", "KX", "KY", "KZ", "LA", "LB", "LC", "LD", "LE", "LF", "LG", "LH", "LI", "LJ", "LK", "LL", "LM", "LN", "LO", "LP", "LQ", "LR", "LS", "LT", "LU", "LV", "LW", "LX", "LY", "LZ", "MA", "MB", "MC", "MD", "ME", "MF", "MG", "MH", "MI", "MJ", "MK", "ML", "MM", "MN", "MO", "MP", "MQ", "MR", "MS", "MT", "MU", "MV", "MW", "MX", "MY", "MZ", "NA", "NB", "NC", "ND", "NE", "NF", "NG", "NH", "NI", "NJ", "NK", "NL", "NM", "NN", "NO", "NP", "NQ", "NR", "NS", "NT", "NU", "NV", "NW", "NX", "NY", "NZ", "OA", "OB", "OC", "OD", "OE", "OF", "OG", "OH", "OI", "OJ", "OK", "OL", "OM", "ON", "OO", "OP", "OQ", "OR", "OS", "OT", "OU", "OV", "OW", "OX", "OY", "OZ", "PA", "PB", "PC", "PD", "PE", "PF", "PG", "PH", "PI", "PJ", "PK", "PL", "PM", "PN", "PO", "PP", "PQ", "PR", "PS", "PT", "PU", "PV", "PW", "PX", "PY", "PZ", "QA", "QB", "QC", "QD", "QE", "QF", "QG", "QH", "QI", "QJ", "QK", "QL", "QM", "QN", "QO", "QP", "QQ", "QR", "QS", "QT", "QU", "QV", "QW", "QX", "QY", "QZ", "RA", "RB", "RC", "RD", "RE", "RF", "RG", "RH", "RI", "RJ", "RK", "RL", "RM", "RN", "RO", "RP", "RQ", "RR", "RS", "RT", "RU", "RV", "RW", "RX", "RY", "RZ", "SA", "SB", "SC", "SD", "SE", "SF", "SG", "SH", "SI", "SJ", "SK", "SL", "SM", "SN", "SO", "SP", "SQ", "SR", "SS", "ST", "SU", "SV", "SW", "SX", "SY", "SZ", "TA", "TB", "TC", "TD", "TE", "TF", "TG", "TH", "TI", "TJ", "TK", "TL", "TM", "TN", "TO", "TP", "TQ", "TR", "TS", "TT", "TU", "TV", "TW", "TX", "TY", "TZ", "UA", "UB", "UC", "UD", "UE", "UF", "UG", "UH", "UI", "UJ", "UK", "UL", "UM", "UN", "UO", "UP", "UQ", "UR", "US", "UT", "UU", "UV", "UW", "UX", "UY", "UZ", "VA", "VB", "VC", "VD", "VE", "VF", "VG", "VH", "VI", "VJ", "VK", "VL", "VM", "VN", "VO", "VP", "VQ", "VR", "VS", "VT", "VU", "VV", "VW", "VX", "VY", "VZ", "WA", "WB", "WC", "WD", "WE", "WF", "WG", "WH", "WI", "WJ", "WK", "WL", "WM", "WN", "WO", "WP", "WQ", "WR", "WS", "WT", "WU", "WV", "WW", "WX", "WY", "WZ", "XA", "XB", "XC", "XD", "XE", "XF", "XG", "XH", "XI", "XJ", "XK", "XL", "XM", "XN", "XO", "XP", "XQ", "XR", "XS", "XT", "XU", "XV", "XW", "XX", "XY", "XZ", "YA", "YB", "YC", "YD", "YE", "YF", "YG", "YH", "YI", "YJ", "YK", "YL", "YM", "YN", "YO", "YP", "YQ", "YR", "YS", "YT", "YU", "YV", "YW", "YX", "YY", "YZ", "ZA", "ZB", "ZC", "ZD", "ZE", "ZF", "ZG", "ZH", "ZI", "ZJ", "ZK", "ZL", "ZM", "ZN", "ZO", "ZP", "ZQ", "ZR", "ZS", "ZT", "ZU", "ZV", "ZW", "ZX", "ZY", "ZZ".

LAND USE INFORMATION:

EXISTING LAND USE: R-1 - SINGLE FAMILY RESIDENTIAL (7,200 SF)
PROPOSED LAND USE: R-S - SINGLE FAMILY RESIDENTIAL (5,000 SF)

LEGAL DESCRIPTION:

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

PARCEL 1:

THE NORTH 1/4 OF THE SOUTHWEST 1/4 OF THE NORTHWEST 1/4 OF SECTION 8, TOWNSHIP 5 NORTH, RANGE 5 WEST, SAN BERNARDINO BASE AND MERIDIAN, IN THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT OF SAID LAND ON FILE IN THE DISTRICT LAND OFFICE.

APN 3128-421-01-0-000

PARCEL 2:

THE SOUTH 1/4 OF THE SOUTHWEST 1/4 OF THE NORTHWEST 1/4 OF SECTION 8, TOWNSHIP 5 NORTH, RANGE 5 WEST, SAN BERNARDINO BASE AND MERIDIAN, IN THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT OF SAID LAND ON FILE IN THE DISTRICT LAND OFFICE.

EXCEPT THE SOUTH 30.00 FEET THEREOF AS GRANTED TO THE COUNTY OF SAN BERNARDINO BY DEED RECORDED OCTOBER 30, 1952 IN BOOK 3046, PAGE 582 OF OFFICIAL RECORDS.

APN 3128-421-05-0-000

LEGEND

EP	EDGE OF PAVEMENT
FG	FINISH GRADE
FL	FLOW LINE
FS	FINISH SURFACE
TC	TOP OF CURB
LP	LOW POINT
HP	HIGH POINT
GB	GRADE BREAK
BVC	BEGIN VERTICAL CURVE
MVC	MID POINT VERTICAL CURVE
ENC	END VERTICAL CURVE
EV	EXISTING ELEVATION
40	LOT NUMBER
PE=2997.64	2:1 SLOPE, UNLESS OTHERWISE SPECIFIED
---	TRACT BOUNDARY
(S)	EXIST. SEWER
(W)	EXIST. WATER

UTILITY PURVEYORS

WATER	ADELANTO PUBLIC UTILITY AUTHORITY 11600 AIR EXPRESSWAY ADELANTO, CA 92301 (760) 246-4755
SEWER	ADELANTO PUBLIC UTILITY AUTHORITY 11600 AIR EXPRESSWAY ADELANTO, CA 92301 (760) 246-4755
ELECTRIC	SOUTHERN CALIFORNIA EDISON 12353 HESPERIA ROAD VICTORVILLE, CA 92392 (800) 442-4650
GAS	SOUTHWEST GAS CORP. 13471 MARIPOSA ROAD VICTORVILLE, CA 92392 (877) 860-6020
TELEPHONE	VERIZON 16071 MOJAVE DRIVE VICTORVILLE, CA 92395 (760) 243-0774
CABLE	CHARTER COMMUNICATIONS 12490 BUSINESS CENTER DRIVE VICTORVILLE, CA 92392 (760) 843-9555

PREPARED BY:

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APPLICANT/OWNER:

HIGHER AMBITIONS HOLDINGS, LLC
16 VIA CORALLE
NEWPORT COAST, CA 92657

CACTUS & ASTER

VESTING TENTATIVE MAP TRACT NO. 20486

JANUARY 2022

SHEET 1 OF 1

PROJECT NUMBER

CA-30203

SUBMITTALS:

DESIGNED BY:

DRAWN BY:

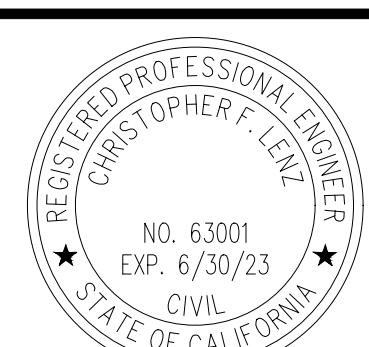
CHECKED BY:

REVISIONS

NO.

DESCRIPTION

DATE



CHRISTOPHER F. LENZ
R.C.E. No. 63001

DATE

**APPENDIX C:
PROJECT RATIONAL
HYDROLOGY STUDY INFORMATION**

Soil Map—San Bernardino County, California, Mojave River Area
(ASTER CACTUS SOILS MAP - AREA A)



Soil Map—San Bernardino County, California, Mojave River Area
(ASTER CACTUS SOILS MAP - AREA A)

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: San Bernardino County, California, Mojave River Area

Survey Area Data: Version 12, May 27, 2020

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

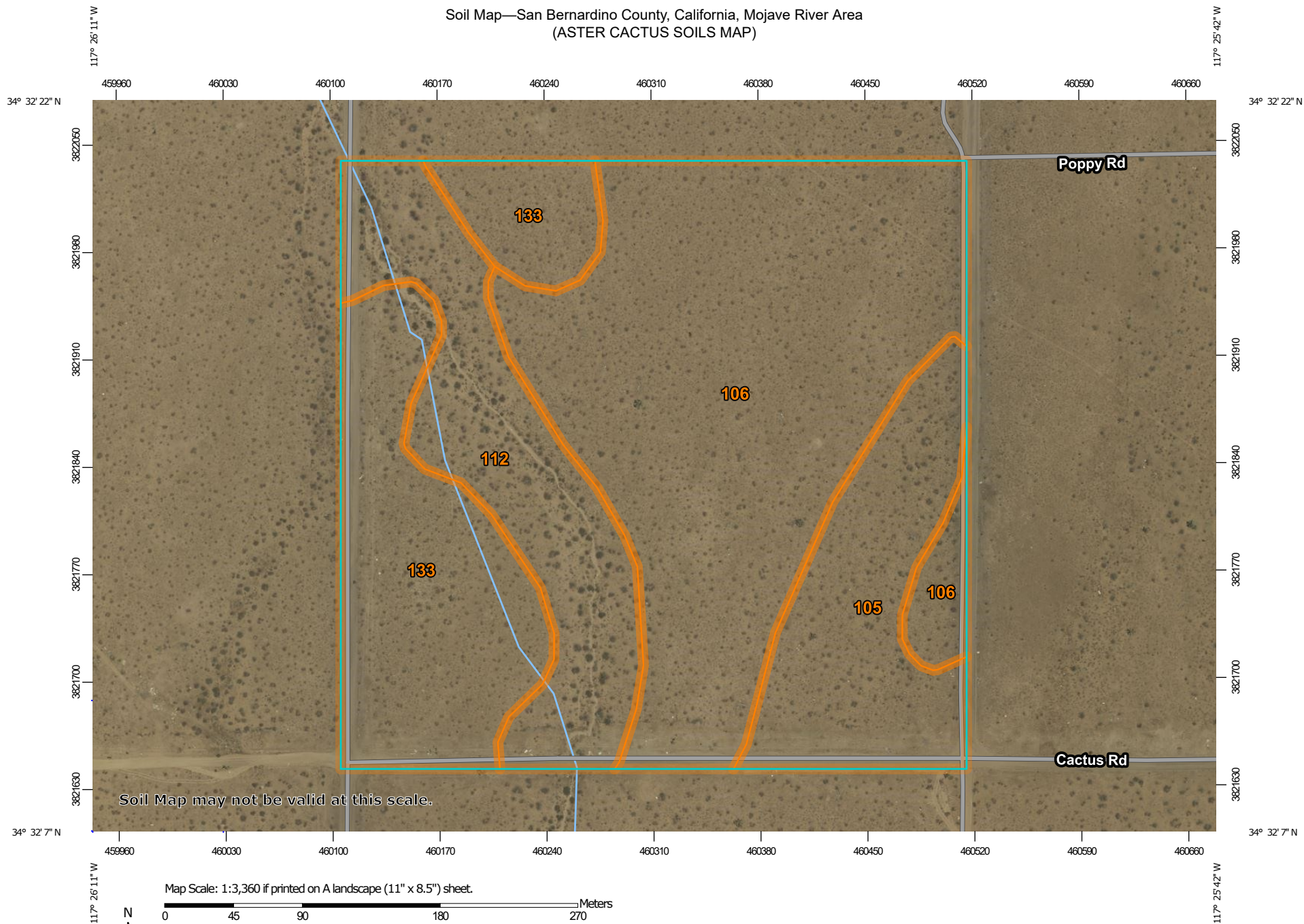
Date(s) aerial images were photographed: Jun 26, 2019—Jul 8, 2019

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
106	BRYMAN LOAMY FINE SAND, 2 TO 5 PERCENT SLOPES	5.5	26.1%
112	CAJON SAND, 0 TO 2 PERCENT SLOPES	7.0	33.1%
133	HELENDAL-BRYMAN LOAMY SANDS, 2 TO 5 PERCENT SLOPES*	8.6	40.8%
Totals for Area of Interest		21.1	100.0%

Soil Map—San Bernardino County, California, Mojave River Area
(ASTER CACTUS SOILS MAP)



Soil Map—San Bernardino County, California, Mojave River Area
(ASTER CACTUS SOILS MAP)

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

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Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: San Bernardino County, California, Mojave River Area

Survey Area Data: Version 12, May 27, 2020

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

Date(s) aerial images were photographed: Jun 26, 2019—Jul 8, 2019

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
105	BRYMAN LOAMY FINE SAND, 0 TO 2 PERCENT SLOPES	5.8	14.4%
106	BRYMAN LOAMY FINE SAND, 2 TO 5 PERCENT SLOPES	18.4	45.7%
112	CAJON SAND, 0 TO 2 PERCENT SLOPES	7.2	17.8%
133	HELENDALE-BRYMAN LOAMY SANDS, 2 TO 5 PERCENT SLOPES*	8.9	22.1%
Totals for Area of Interest		40.3	100.0%

San Bernardino County, California, Mojave River Area

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

Map Unit Setting

National map unit symbol: hkr9
Elevation: 2,800 to 3,200 feet
Mean annual precipitation: 3 to 6 inches
Mean annual air temperature: 59 to 63 degrees F
Frost-free period: 180 to 280 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Bryman and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bryman

Setting

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

Typical profile

H1 - 0 to 9 inches: loamy fine sand
H2 - 9 to 12 inches: sandy loam
H3 - 12 to 32 inches: sandy clay loam
H4 - 32 to 46 inches: sandy loam
H5 - 46 to 99 inches: loamy sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): 2e

Land capability classification (nonirrigated): 7e

Hydrologic Soil Group: C

Ecological site: R030XF012CA - Sandy

Hydric soil rating: No

Minor Components

Bryman, gravelly surface

Percent of map unit: 5 percent

Hydric soil rating: No

Helendale

Percent of map unit: 5 percent

Hydric soil rating: No

Cajon

Percent of map unit: 5 percent

Hydric soil rating: No

Mohave variant

Percent of map unit: 5 percent

Hydric soil rating: No

Data Source Information

Soil Survey Area: San Bernardino County, California, Mojave River Area

Survey Area Data: Version 12, May 27, 2020

San Bernardino County, California, Mojave River Area

112—CAJON SAND, 0 TO 2 PERCENT SLOPES

Map Unit Setting

National map unit symbol: hkrj

Elevation: 1,800 to 3,200 feet

Mean annual precipitation: 3 to 6 inches

Mean annual air temperature: 59 to 66 degrees F

Frost-free period: 180 to 290 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Cajon and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cajon

Setting

Landform: Alluvial fans

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium derived from granite sources

Typical profile

H1 - 0 to 7 inches: sand

H2 - 7 to 25 inches: sand

H3 - 25 to 45 inches: gravelly sand

H4 - 45 to 60 inches: stratified sand to loamy fine sand

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat excessively drained

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: None

Frequency of ponding: None

Calcium carbonate, maximum content: 1 percent

Available water supply, 0 to 60 inches: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): 3e

Land capability classification (nonirrigated): 7e

Hydrologic Soil Group: A

Ecological site: R030XF012CA - Sandy

Hydric soil rating: No

Minor Components

Helendale

Percent of map unit: 5 percent

Manet

Percent of map unit: 5 percent

Landform: Playas

Hydric soil rating: Yes

Kimberlina

Percent of map unit: 5 percent

Data Source Information

Soil Survey Area: San Bernardino County, California, Mojave River Area

Survey Area Data: Version 12, May 27, 2020

San Bernardino County, California, Mojave River Area

133—HELENDALE-BRYMAN LOAMY SANDS, 2 TO 5 PERCENT SLOPES*

Map Unit Setting

National map unit symbol: hks6

Elevation: 2,500 to 4,000 feet

Mean annual precipitation: 3 to 6 inches

Mean annual air temperature: 59 to 63 degrees F

Frost-free period: 180 to 280 days

Farmland classification: Prime farmland if irrigated

Map Unit Composition

Helendale and similar soils: 50 percent

Bryman and similar soils: 35 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Helendale

Setting

Landform: Fan remnants

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium derived from granite sources

Typical profile

H1 - 0 to 6 inches: loamy sand

H2 - 6 to 30 inches: sandy loam

H3 - 30 to 66 inches: sandy loam

H4 - 66 to 99 inches: loamy sand, sandy loam

H4 - 66 to 99 inches:

Properties and qualities

Slope: 2 to 5 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

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: None

Frequency of ponding: None

Calcium carbonate, maximum content: 5 percent

Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water supply, 0 to 60 inches: Low (about 5.8 inches)

Interpretive groups

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

Description of Bryman

Setting

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

Typical profile

H1 - 0 to 8 inches: loamy sand
H2 - 8 to 12 inches: sandy loam
H3 - 12 to 44 inches: sandy clay loam
H4 - 44 to 60 inches: loamy sand, coarse sandy loam
H4 - 44 to 60 inches:

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water
(Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.2 inches)

Interpretive groups

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

Minor Components

Cajon

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

Unnamed soils

Percent of map unit: 5 percent

Hydric soil rating: No

Mohave variant

Percent of map unit: 5 percent

Hydric soil rating: No

Data Source Information

Soil Survey Area: San Bernardino County, California, Mojave River Area

Survey Area Data: Version 12, May 27, 2020

Curve (I) Numbers of Hydrologic Soil-Cover Complexes For Pervious Areas-AMC II					
Cover Type (3)	Quality of Cover (2)	Soil Group			
		A	B	C	D
<u>NATURAL COVERS -</u>					
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
<u>URBAN COVERS -</u>					
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
<u>AGRICULTURAL COVERS -</u>					
Fallow (Land plowed but not tilled or seeded)		77	86	91	94

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

CURVE NUMBERS

FOR

PERVIOUS AREAS

ACTUAL IMPERVIOUS COVER

Land Use (1)	Range-Percent	Recommended Value For Average Conditions-Percent (2)
Natural or Agriculture	0 - 0	0
Public Park	10 - 25	15
School	30 - 50	40
Single Family Residential: (3)		
2.5 acre lots	5 - 15	10
1 acre lots	10 - 25	20
2 dwellings/acre	20 - 40	30
3-4 dwellings/acre	30 - 50	40
5-7 dwellings/acre	35 - 55	50
8-10 dwellings/acre	50 - 70	60
More than 10 dwellings/acre	65 - 90	80
Multiple Family Residential:		
Condominiums	45 - 70	65
Apartments	65 - 90	80
Mobile Home Park	60 - 85	75
Commercial, Downtown Business or Industrial	80 - 100	90

Notes:

1. Land use should be based on ultimate development of the watershed. Long range master plans for the County and incorporated cities should be reviewed to insure reasonable land use assumptions.
2. Recommended values are based on average conditions which may not apply to a particular study area. The percentage impervious may vary greatly even on comparable sized lots due to differences in dwelling size, improvements, etc. Landscape practices should also be considered as it is common in some areas to use ornamental gravels underlain by impervious plastic materials in place of lawns and shrubs. A field investigation of a study area shall always be made, and a review of aerial photos, where available, may assist in estimating the percentage of impervious cover in developed areas.
3. For typical equestrian subdivisions increase impervious area 5 percent over the values recommended in the table above.

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

**ACTUAL IMPERVIOUS COVER
FOR
DEVELOPED AREAS**



NOAA Atlas 14, Volume 6, Version 2
Location name: Adelanto, California, USA*
Latitude: 34.5371°, Longitude: -117.433°
Elevation: 3033.3 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	0.078 (0.064-0.095)	0.110 (0.091-0.134)	0.153 (0.126-0.188)	0.189 (0.154-0.234)	0.239 (0.189-0.306)	0.280 (0.216-0.365)	0.321 (0.243-0.430)	0.365 (0.268-0.503)	0.427 (0.300-0.612)	0.475 (0.323-0.706)
10-min	0.112 (0.092-0.137)	0.157 (0.130-0.193)	0.219 (0.180-0.269)	0.271 (0.221-0.335)	0.343 (0.271-0.439)	0.401 (0.310-0.523)	0.461 (0.348-0.617)	0.524 (0.384-0.721)	0.612 (0.431-0.878)	0.681 (0.464-1.01)
15-min	0.135 (0.112-0.165)	0.190 (0.157-0.233)	0.265 (0.218-0.325)	0.327 (0.267-0.405)	0.415 (0.328-0.531)	0.485 (0.375-0.633)	0.557 (0.420-0.746)	0.633 (0.465-0.872)	0.740 (0.521-1.06)	0.824 (0.561-1.22)
30-min	0.193 (0.159-0.236)	0.271 (0.224-0.332)	0.378 (0.311-0.464)	0.467 (0.381-0.578)	0.592 (0.468-0.758)	0.691 (0.535-0.903)	0.795 (0.600-1.06)	0.904 (0.663-1.24)	1.06 (0.743-1.52)	1.18 (0.800-1.75)
60-min	0.250 (0.206-0.306)	0.352 (0.290-0.431)	0.490 (0.403-0.602)	0.605 (0.494-0.749)	0.768 (0.606-0.982)	0.896 (0.693-1.17)	1.03 (0.778-1.38)	1.17 (0.860-1.61)	1.37 (0.964-1.96)	1.52 (1.04-2.26)
2-hr	0.351 (0.290-0.429)	0.475 (0.392-0.582)	0.646 (0.532-0.793)	0.791 (0.645-0.979)	0.996 (0.786-1.27)	1.16 (0.898-1.52)	1.33 (1.01-1.79)	1.52 (1.11-2.09)	1.77 (1.25-2.55)	1.98 (1.35-2.94)
3-hr	0.433 (0.358-0.529)	0.579 (0.478-0.709)	0.781 (0.642-0.959)	0.953 (0.778-1.18)	1.20 (0.946-1.53)	1.40 (1.08-1.82)	1.61 (1.21-2.15)	1.83 (1.34-2.52)	2.14 (1.51-3.07)	2.39 (1.63-3.55)
6-hr	0.591 (0.488-0.723)	0.785 (0.648-0.961)	1.05 (0.867-1.29)	1.28 (1.05-1.59)	1.61 (1.27-2.06)	1.88 (1.45-2.46)	2.16 (1.63-2.90)	2.47 (1.81-3.40)	2.90 (2.04-4.16)	3.25 (2.21-4.83)
12-hr	0.746 (0.616-0.912)	1.02 (0.838-1.24)	1.39 (1.14-1.71)	1.71 (1.39-2.11)	2.16 (1.71-2.76)	2.53 (1.95-3.30)	2.91 (2.20-3.90)	3.33 (2.44-4.58)	3.91 (2.76-5.62)	4.39 (2.99-6.52)
24-hr	1.00 (0.888-1.15)	1.41 (1.25-1.62)	1.97 (1.74-2.27)	2.44 (2.13-2.84)	3.10 (2.63-3.74)	3.64 (3.02-4.48)	4.21 (3.41-5.30)	4.81 (3.79-6.24)	5.67 (4.29-7.66)	6.37 (4.65-8.89)
2-day	1.10 (0.979-1.27)	1.56 (1.38-1.80)	2.20 (1.94-2.54)	2.73 (2.39-3.18)	3.49 (2.96-4.21)	4.11 (3.41-5.05)	4.76 (3.85-5.99)	5.45 (4.29-7.06)	6.44 (4.86-8.69)	7.23 (5.28-10.1)
3-day	1.18 (1.05-1.36)	1.68 (1.48-1.93)	2.36 (2.09-2.73)	2.94 (2.58-3.43)	3.77 (3.19-4.54)	4.43 (3.68-5.45)	5.14 (4.16-6.47)	5.89 (4.64-7.63)	6.96 (5.26-9.40)	7.84 (5.73-11.0)
4-day	1.26 (1.12-1.45)	1.79 (1.58-2.06)	2.52 (2.23-2.92)	3.15 (2.76-3.67)	4.03 (3.42-4.85)	4.74 (3.93-5.83)	5.49 (4.45-6.92)	6.30 (4.96-8.16)	7.45 (5.63-10.1)	8.38 (6.12-11.7)
7-day	1.35 (1.20-1.55)	1.91 (1.69-2.20)	2.70 (2.38-3.12)	3.36 (2.95-3.92)	4.31 (3.65-5.19)	5.06 (4.20-6.23)	5.86 (4.74-7.38)	6.70 (5.28-8.68)	7.89 (5.96-10.7)	8.85 (6.46-12.4)
10-day	1.43 (1.26-1.64)	2.02 (1.79-2.33)	2.85 (2.52-3.29)	3.56 (3.11-4.14)	4.56 (3.87-5.49)	5.36 (4.45-6.59)	6.20 (5.02-7.81)	7.09 (5.59-9.19)	8.35 (6.31-11.3)	9.36 (6.83-13.1)
20-day	1.67 (1.48-1.92)	2.38 (2.11-2.74)	3.38 (2.99-3.91)	4.24 (3.72-4.94)	5.49 (4.65-6.60)	6.48 (5.38-7.97)	7.54 (6.10-9.49)	8.65 (6.82-11.2)	10.2 (7.72-13.8)	11.5 (8.36-16.0)
30-day	1.89 (1.68-2.18)	2.71 (2.40-3.12)	3.87 (3.42-4.47)	4.88 (4.28-5.69)	6.36 (5.39-7.65)	7.55 (6.26-9.28)	8.80 (7.12-11.1)	10.1 (7.98-13.1)	12.0 (9.06-16.2)	13.5 (9.83-18.8)
45-day	2.20 (1.95-2.54)	3.15 (2.79-3.62)	4.51 (3.98-5.21)	5.71 (5.00-6.65)	7.48 (6.34-9.00)	8.93 (7.41-11.0)	10.5 (8.47-13.2)	12.1 (9.53-15.7)	14.4 (10.9-19.4)	16.2 (11.8-22.6)
60-day	2.46 (2.18-2.83)	3.48 (3.08-4.01)	4.99 (4.41-5.76)	6.33 (5.54-7.37)	8.31 (7.04-10.0)	9.96 (8.27-12.2)	11.7 (9.49-14.8)	13.6 (10.7-17.6)	16.2 (12.3-21.9)	18.4 (13.4-25.7)

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

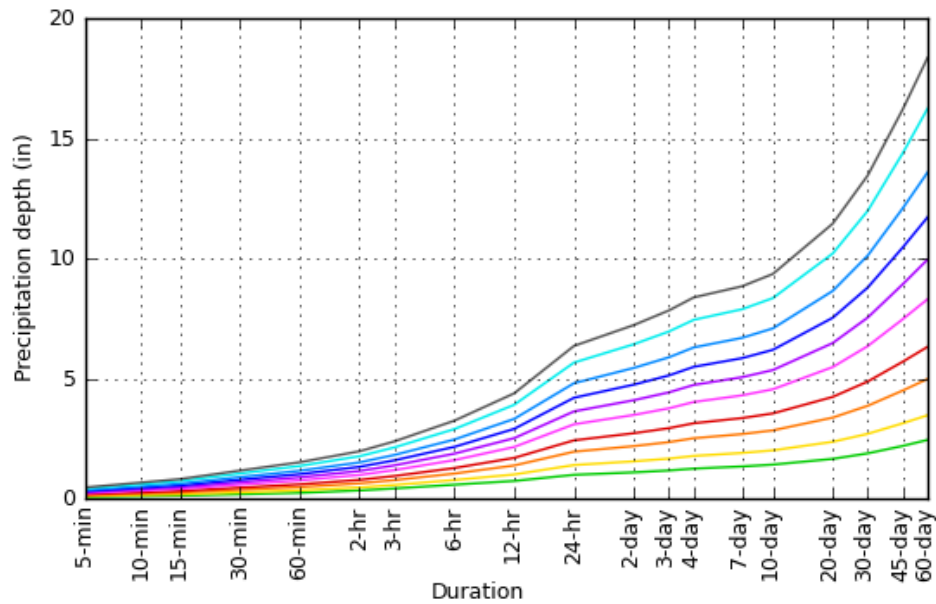
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper 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.

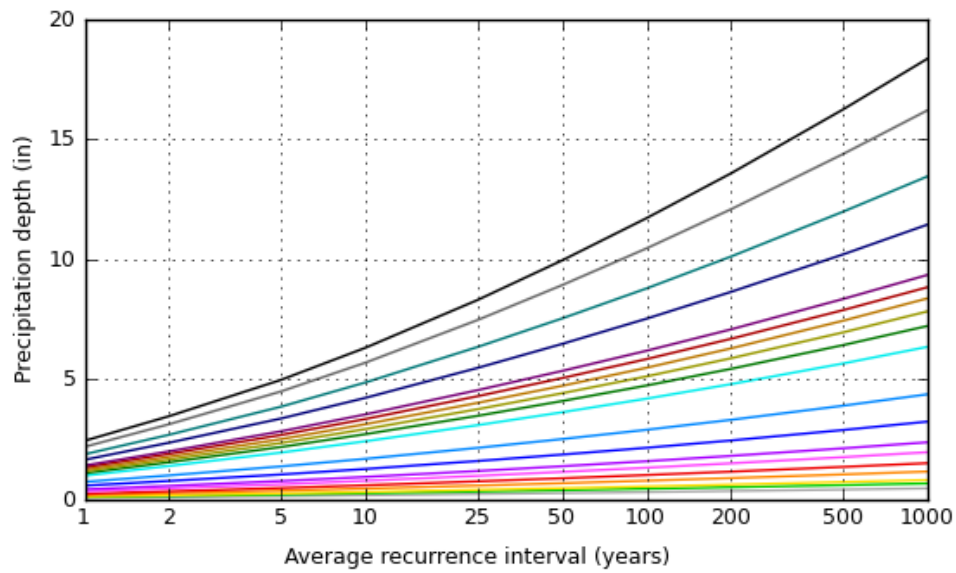
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PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 34.5371°, Longitude: -117.4330°



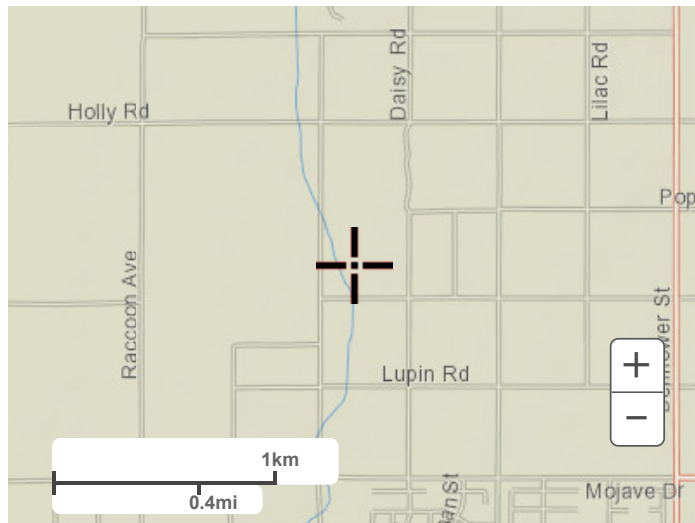
Average recurrence interval (years)
1
2
5
10
25
50
100
200
500
1000



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

Maps & aerials

Small scale terrain



Large scale terrain



Large scale map



Large scale aerial



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1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

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San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005
Version 7.1

Rational Hydrology Study Date: 08/24/21

ASTER & CACTUS
EXISTING CONDITION
100 YEAR PEAK RUNOFF
AREA A

Program License Serial Number 6232

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.030 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

++++
++++
Process from Point/Station 101.000 to Point/Station
102.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.740
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.260
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 57.54
Adjusted SCS curve number for AMC 3 = 77.03
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.420
(In/Hr)
Initial subarea data:
Initial area flow distance = 568.000(Ft.)
Top (of initial area) elevation = 37.000(Ft.)
Bottom (of initial area) elevation = 26.000(Ft.)
Difference in elevation = 11.000(Ft.)
Slope = 0.01937 s(%)= 1.94
 $TC = k(0.706)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 19.640 min.
Rainfall intensity = 2.251(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.732
Subarea runoff = 7.202(CFS)

Total initial stream area = 4.370(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.420(In/Hr)

++++
++++
Process from Point/Station 102.000 to Point/Station
103.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel = 0.000(CFS)
Depth of flow = 0.750(Ft.), Average velocity = 2.491(Ft/s)
***** Irregular Channel Data *****

Information entered for subchannel number 1 :
Point number 'X' coordinate 'Y' coordinate
1 0.00 2.00
2 25.00 0.00
3 50.00 2.00

Manning's 'N' friction factor = 0.030

Sub-Channel flow = 17.531(CFS)
' ' flow top width = 18.759(Ft.)
' ' velocity = 2.491(Ft/s)
' ' area = 7.038(Sq.Ft)
' ' Froude number = 0.717

Upstream point elevation = 26.000(Ft.)
Downstream point elevation = 17.000(Ft.)
Flow length = 959.000(Ft.)
Travel time = 6.42 min.
Time of concentration = 26.06 min.
Depth of flow = 0.750(Ft.)
Average velocity = 2.491(Ft/s)
Total irregular channel flow = 17.531(CFS)
Irregular channel normal depth above invert elev. = 0.750(Ft.)
Average velocity of channel(s) = 2.491(Ft/s)
Adding area flow to channel

UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.740
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.260
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 57.54
Adjusted SCS curve number for AMC 3 = 77.03
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.420

(In/Hr)
Rainfall intensity = 1.847(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area, (total area with
modified

rational method)(Q=KCIA) is C = 0.695
Subarea runoff = 20.579(CFS) for 17.260(Ac.)
Total runoff = 27.781(CFS)
Effective area this stream = 21.63(Ac.)
Total Study Area (Main Stream No. 1) = 21.63(Ac.)
Area averaged Fm value = 0.420(In/Hr)
Depth of flow = 0.892(Ft.), Average velocity = 2.795(Ft/s)
End of computations, Total Study Area = 21.63 (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(A_p) = 1.000

Area averaged SCS curve number = 57.5

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005
Version 7.1

Rational Hydrology Study Date: 08/24/21

ASTER & CACTUS
EXISTING CONDITION
100 YEAR PEAK RUNOFF
AREA B

Program License Serial Number 6232

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.030 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

++++
++++
Process from Point/Station 201.000 to Point/Station
202.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 79.00
Adjusted SCS curve number for AMC 3 = 93.40
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.129
(In/Hr)
Initial subarea data:
Initial area flow distance = 733.000(Ft.)
Top (of initial area) elevation = 37.000(Ft.)
Bottom (of initial area) elevation = 28.500(Ft.)
Difference in elevation = 8.500(Ft.)
Slope = 0.01160 s(%)= 1.16
TC = $k(0.706)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 24.098 min.
Rainfall intensity = 1.951(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.841
Subarea runoff = 5.165(CFS)

Total initial stream area = 3.150(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.129(In/Hr)

++++
++++
Process from Point/Station 202.000 to Point/Station
203.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel = 0.000(CFS)
Depth of flow = 0.391(Ft.), Average velocity = 2.089(Ft/s)
***** Irregular Channel Data *****

Information entered for subchannel number 1 :

Point number	'X' coordinate	'Y' coordinate
1	0.00	1.00
2	50.00	0.00
3	100.00	1.00

Manning's 'N' friction factor = 0.030

Sub-Channel flow = 15.975(CFS)
' ' flow top width = 39.109(Ft.)
' ' velocity = 2.089(Ft/s)
' ' area = 7.648(Sq.Ft)
' ' Froude number = 0.832

Upstream point elevation = 28.500(Ft.)
Downstream point elevation = 18.500(Ft.)
Flow length = 638.000(Ft.)
Travel time = 5.09 min.
Time of concentration = 29.19 min.
Depth of flow = 0.391(Ft.)
Average velocity = 2.089(Ft/s)
Total irregular channel flow = 15.975(CFS)
Irregular channel normal depth above invert elev. = 0.391(Ft.)
Average velocity of channel(s) = 2.089(Ft/s)
Adding area flow to channel

UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 79.00
Adjusted SCS curve number for AMC 3 = 93.40
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.129

(In/Hr)
Rainfall intensity = 1.706(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area, (total area with
modified

rational method)(Q=KCIA) is C = 0.832
Subarea runoff = 21.547(CFS) for 15.670(Ac.)
Total runoff = 26.712(CFS)
Effective area this stream = 18.82(Ac.)
Total Study Area (Main Stream No. 1) = 18.82(Ac.)
Area averaged Fm value = 0.129(In/Hr)
Depth of flow = 0.474(Ft.), Average velocity = 2.375(Ft/s)
End of computations, Total Study Area = 18.82 (Ac.)

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

Area averaged pervious area fraction(A_p) = 1.000

Area averaged SCS curve number = 79.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005
Version 7.1

Rational Hydrology Study Date: 10/15/21

ASTER & CACTUS
Proposed Condition
100 YEAR PEAK RUNOFF
AREA A-1

Program License Serial Number 6232

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.030 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

++++
++++
Process from Point/Station 201.000 to Point/Station
202.000
**** INITIAL AREA EVALUATION ****

RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 0.260
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.740
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 59.38
Adjusted SCS curve number for AMC 3 = 78.50
Pervious ratio(Ap) = 0.6000 Max loss rate(Fm)= 0.237
(In/Hr)
Initial subarea data:
Initial area flow distance = 496.000(Ft.)
Top (of initial area) elevation = 36.200(Ft.)
Bottom (of initial area) elevation = 28.500(Ft.)
Difference in elevation = 7.700(Ft.)
Slope = 0.01552 s(%)= 1.55
TC = $k(0.412)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 11.347 min.
Rainfall intensity = 3.305(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.835
Subarea runoff = 10.215(CFS)

Total initial stream area = 3.700(Ac.)
Pervious area fraction = 0.600
Initial area Fm value = 0.237(In/Hr)
End of computations, Total Study Area = 3.70 (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(A_p) = 0.600
Area averaged SCS curve number = 59.4

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

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Version 7.1

Rational Hydrology Study Date: 10/15/21

ASTER & CACTUS
Proposed Condition
100 YEAR PEAK RUNOFF
AREA A-2

Program License Serial Number 6232

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.030 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

++++
++++
Process from Point/Station 301.000 to Point/Station
302.000
**** INITIAL AREA EVALUATION ****

RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 0.260
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.740
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 59.38
Adjusted SCS curve number for AMC 3 = 78.50
Pervious ratio(Ap) = 0.6000 Max loss rate(Fm)= 0.237
(In/Hr)
Initial subarea data:
Initial area flow distance = 860.000(Ft.)
Top (of initial area) elevation = 36.000(Ft.)
Bottom (of initial area) elevation = 23.000(Ft.)
Difference in elevation = 13.000(Ft.)
Slope = 0.01512 s(%)= 1.51
 $TC = k(0.412)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 14.217 min.
Rainfall intensity = 2.822(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.824
Subarea runoff = 18.613(CFS)

Total initial stream area = 8.000(Ac.)
Pervious area fraction = 0.600
Initial area Fm value = 0.237(In/Hr)
End of computations, Total Study Area = 8.00 (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(A_p) = 0.600
Area averaged SCS curve number = 59.4

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005
Version 7.1

Rational Hydrology Study Date: 10/15/21

ASTER & CACTUS
Proposed Condition
100 YEAR PEAK RUNOFF
AREA A-3

Program License Serial Number 6232

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.030 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

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Process from Point/Station 401.000 to Point/Station
402.000
**** INITIAL AREA EVALUATION ****

RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 0.260
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.740
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 59.38
Adjusted SCS curve number for AMC 3 = 78.50
Pervious ratio(Ap) = 0.6000 Max loss rate(Fm)= 0.237
(In/Hr)
Initial subarea data:
Initial area flow distance = 1000.000(Ft.)
Top (of initial area) elevation = 31.500(Ft.)
Bottom (of initial area) elevation = 20.000(Ft.)
Difference in elevation = 11.500(Ft.)
Slope = 0.01150 s(%)= 1.15
 $TC = k(0.412)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 15.950 min.
Rainfall intensity = 2.604(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.818
Subarea runoff = 14.485(CFS)

Total initial stream area = 6.800(Ac.)
Pervious area fraction = 0.600
Initial area Fm value = 0.237(In/Hr)
End of computations, Total Study Area = 6.80 (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(A_p) = 0.600
Area averaged SCS curve number = 59.4

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005
Version 7.1

Rational Hydrology Study Date: 10/15/21

ASTER & CACTUS
Proposed Condition
100 YEAR PEAK RUNOFF
AREA B

Program License Serial Number 6232

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.030 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

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++++
Process from Point/Station 101.000 to Point/Station
102.000
**** INITIAL AREA EVALUATION ****

RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 69.00
Adjusted SCS curve number for AMC 3 = 86.20
Pervious ratio(Ap) = 0.6000 Max loss rate(Fm)= 0.157
(In/Hr)
Initial subarea data:
Initial area flow distance = 803.000(Ft.)
Top (of initial area) elevation = 36.200(Ft.)
Bottom (of initial area) elevation = 27.000(Ft.)
Difference in elevation = 9.200(Ft.)
Slope = 0.01146 s(%)= 1.15
 $TC = k(0.412)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 14.621 min.
Rainfall intensity = 2.767(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.849
Subarea runoff = 12.687(CFS)

Total initial stream area = 5.400(Ac.)
Pervious area fraction = 0.600
Initial area Fm value = 0.157(In/Hr)

++++
++++
Process from Point/Station 102.000 to Point/Station
103.000
***** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION *****

Top of street segment elevation = 27.000(Ft.)
End of street segment elevation = 19.000(Ft.)
Length of street segment = 639.000(Ft.)
Height of curb above gutter flowline = 6.0(In.)
Width of half street (curb to crown) = 18.000(Ft.)
Distance from crown to crossfall grade break = 16.000(Ft.)
Slope from gutter to grade break (v/hz) = 0.020
Slope from grade break to crown (v/hz) = 0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line = 12.000(Ft.)
Slope from curb to property line (v/hz) = 0.020
Gutter width = 2.000(Ft.)
Gutter hike from flowline = 0.100(In.)
Manning's N in gutter = 0.0120
Manning's N from gutter to grade break = 0.0120
Manning's N from grade break to crown = 0.0150
Estimated mean flow rate at midpoint of street = 25.448(CFS)
Depth of flow = 0.439(Ft.), Average velocity = 4.888(Ft/s)
Note: depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width = 18.000(Ft.)
Flow velocity = 4.89(Ft/s)
Travel time = 2.18 min. TC = 16.80 min.
Adding area flow to street
RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 69.00
Adjusted SCS curve number for AMC 3 = 86.20
Pervious ratio(Ap) = 0.6000 Max loss rate(Fm) = 0.157
(In/Hr)
Rainfall intensity = 2.511(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area, (total area with
modified
rational method)(Q=KCIA) is C = 0.844
Subarea runoff = 25.448(CFS) for 12.600(Ac.)
Total runoff = 38.135(CFS)
Effective area this stream = 18.00(Ac.)
Total Study Area (Main Stream No. 1) = 18.00(Ac.)
Area averaged Fm value = 0.157(In/Hr)
Street flow at end of street = 38.135(CFS)
Half street flow at end of street = 38.135(CFS)
Depth of flow = 0.526(Ft.), Average velocity = 5.624(Ft/s)
Warning: depth of flow exceeds top of curb
Note: depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property = 1.29(Ft.)

Flow width (from curb towards crown)= 18.000(Ft.)
End of computations, Total Study Area = 18.00 (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(A_p) = 0.600
Area averaged SCS curve number = 69.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005
Version 7.1

Rational Hydrology Study Date: 12/09/21

Aster Cactus
SD Check
IN 1

Program License Serial Number 6232

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.030 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

++++
++++
Process from Point/Station 101.000 to Point/Station
102.000
**** INITIAL AREA EVALUATION ****

RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 69.00
Adjusted SCS curve number for AMC 3 = 86.20
Pervious ratio(Ap) = 0.6000 Max loss rate(Fm)= 0.157
(In/Hr)
Initial subarea data:
Initial area flow distance = 672.000(Ft.)
Top (of initial area) elevation = 34.700(Ft.)
Bottom (of initial area) elevation = 27.000(Ft.)
Difference in elevation = 7.700(Ft.)
Slope = 0.01146 s(%)= 1.15
 $TC = k(0.412)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 13.615 min.
Rainfall intensity = 2.909(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.851
Subarea runoff = 6.242(CFS)

Total initial stream area = 2.520(Ac.)
Pervious area fraction = 0.600
Initial area Fm value = 0.157(In/Hr)

++++
++++
Process from Point/Station 102.000 to Point/Station
103.000
***** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION *****

Top of street segment elevation = 27.000(Ft.)
End of street segment elevation = 19.000(Ft.)
Length of street segment = 582.000(Ft.)
Height of curb above gutter flowline = 6.0(In.)
Width of half street (curb to crown) = 18.000(Ft.)
Distance from crown to crossfall grade break = 16.000(Ft.)
Slope from gutter to grade break (v/hz) = 0.020
Slope from grade break to crown (v/hz) = 0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line = 12.000(Ft.)
Slope from curb to property line (v/hz) = 0.030
Gutter width = 2.000(Ft.)
Gutter hike from flowline = 2.000(In.)
Manning's N in gutter = 0.0150
Manning's N from gutter to grade break = 0.0150
Manning's N from grade break to crown = 0.0150
Estimated mean flow rate at midpoint of street = 12.727(CFS)
Depth of flow = 0.401(Ft.), Average velocity = 3.165(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width = 13.726(Ft.)
Flow velocity = 3.16(Ft/s)
Travel time = 3.06 min. TC = 16.68 min.
Adding area flow to street
RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 69.00
Adjusted SCS curve number for AMC 3 = 86.20
Pervious ratio(Ap) = 0.6000 Max loss rate(Fm)= 0.157
(In/Hr)
Rainfall intensity = 2.524(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area,(total area with
modified
rational method)(Q=KCIA) is C = 0.844
Subarea runoff = 12.864(CFS) for 6.450(Ac.)
Total runoff = 19.106(CFS)
Effective area this stream = 8.97(Ac.)
Total Study Area (Main Stream No. 1) = 8.97(Ac.)
Area averaged Fm value = 0.157(In/Hr)
Street flow at end of street = 19.106(CFS)
Half street flow at end of street = 9.553(CFS)
Depth of flow = 0.450(Ft.), Average velocity = 3.490(Ft/s)
Flow width (from curb towards crown)= 16.157(Ft.)
End of computations, Total Study Area = 8.97 (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(A_p) = 0.600

Area averaged SCS curve number = 69.0

**APPENDIX D:
PROJECT SCS UNIT HYDROGRAPH
HYDROLOGY STUDY INFORMATION**

Unit Hydrograph Analysis

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7.0

Study date 10/15/21

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

Program License Serial Number 6232

ASTER CACTUS
SCS UNIT HYDROGRAPH
100YR 24HR
AREA A1

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Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
3.70	1	1.03

--
Rainfall data for year 100
3.70 6 2.16

--
Rainfall data for year 100
3.70 24 4.21

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

Fm	SCS curve No.(AMCII) (In/Hr)	SCS curve NO.(AMC 3) (In/Hr)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)
	69.0	86.2	3.70	1.000	0.262	0.500
0.131						

Area-averaged adjusted loss rate Fm (In/Hr) = 0.131

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
1.85	0.500	69.0	86.2	1.60	0.655
1.85	0.500	98.0	98.0	0.20	0.944

Area-averaged catchment yield fraction, Y = 0.799

Area-averaged low loss fraction, Yb = 0.201

User entry of time of concentration = 0.165 (hours)

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Watershed area = 3.70(Ac.)
 Catchment Lag time = 0.132 hours
 Unit interval = 5.000 minutes
 Unit interval percentage of lag time = 63.1313
 Hydrograph baseflow = 0.00(CFS)
 Average maximum watershed loss rate(Fm) = 0.131(In/Hr)
 Average low loss rate fraction (Yb) = 0.201 (decimal)
 DESERT S-Graph Selected
 Computed peak 5-minute rainfall = 0.489(In)
 Computed peak 30-minute rainfall = 0.837(In)
 Specified peak 1-hour rainfall = 1.030(In)
 Computed peak 3-hour rainfall = 1.622(In)
 Specified peak 6-hour rainfall = 2.160(In)
 Specified peak 24-hour rainfall = 4.210(In)

Rainfall depth area reduction factors:

Using a total area of 3.70(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000	Adjusted rainfall = 0.489(In)
30-minute factor = 1.000	Adjusted rainfall = 0.836(In)
1-hour factor = 1.000	Adjusted rainfall = 1.030(In)
3-hour factor = 1.000	Adjusted rainfall = 1.622(In)
6-hour factor = 1.000	Adjusted rainfall = 2.160(In)
24-hour factor = 1.000	Adjusted rainfall = 4.210(In)

Unit Hydrograph

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Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
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(K = 44.75 (CFS))

1	6.198	2.773
2	44.542	17.158
3	69.955	11.371
4	80.890	4.893
5	87.324	2.879
6	91.389	1.819
7	94.216	1.265
8	96.205	0.890
9	97.538	0.597
10	98.313	0.347
11	99.055	0.332
12	99.661	0.271
13	100.000	0.152

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.4887	0.4887
2	0.6016	0.1130
3	0.6794	0.0778
4	0.7407	0.0612
5	0.7920	0.0513
6	0.8365	0.0445
7	0.8761	0.0396
8	0.9119	0.0358
9	0.9447	0.0328
10	0.9750	0.0303
11	1.0033	0.0283
12	1.0298	0.0265
13	1.0645	0.0347
14	1.0976	0.0331
15	1.1294	0.0318
16	1.1599	0.0305
17	1.1893	0.0294
18	1.2178	0.0284
19	1.2453	0.0275
20	1.2720	0.0267
21	1.2979	0.0259
22	1.3231	0.0252
23	1.3477	0.0245
24	1.3716	0.0239
25	1.3949	0.0233
26	1.4177	0.0228
27	1.4400	0.0223
28	1.4618	0.0218
29	1.4832	0.0214
30	1.5041	0.0209
31	1.5247	0.0205
32	1.5448	0.0201
33	1.5646	0.0198
34	1.5840	0.0194
35	1.6031	0.0191
36	1.6219	0.0188
37	1.6404	0.0185
38	1.6586	0.0182
39	1.6765	0.0179
40	1.6941	0.0176
41	1.7115	0.0174
42	1.7286	0.0171

43	1.7455	0.0169
44	1.7622	0.0167
45	1.7786	0.0164
46	1.7948	0.0162
47	1.8109	0.0160
48	1.8267	0.0158
49	1.8423	0.0156
50	1.8578	0.0154
51	1.8730	0.0153
52	1.8881	0.0151
53	1.9031	0.0149
54	1.9178	0.0148
55	1.9324	0.0146
56	1.9469	0.0144
57	1.9612	0.0143
58	1.9753	0.0141
59	1.9893	0.0140
60	2.0032	0.0139
61	2.0169	0.0137
62	2.0305	0.0136
63	2.0440	0.0135
64	2.0573	0.0133
65	2.0706	0.0132
66	2.0837	0.0131
67	2.0967	0.0130
68	2.1095	0.0129
69	2.1223	0.0128
70	2.1350	0.0127
71	2.1475	0.0126
72	2.1600	0.0125
73	2.1744	0.0144
74	2.1887	0.0143
75	2.2028	0.0142
76	2.2169	0.0141
77	2.2309	0.0140
78	2.2448	0.0139
79	2.2586	0.0138
80	2.2724	0.0137
81	2.2860	0.0136
82	2.2995	0.0135
83	2.3130	0.0135
84	2.3264	0.0134
85	2.3397	0.0133
86	2.3529	0.0132
87	2.3660	0.0131
88	2.3790	0.0131
89	2.3920	0.0130
90	2.4049	0.0129
91	2.4177	0.0128
92	2.4305	0.0128
93	2.4432	0.0127
94	2.4558	0.0126
95	2.4683	0.0125
96	2.4808	0.0125
97	2.4932	0.0124
98	2.5056	0.0123
99	2.5178	0.0123
100	2.5300	0.0122
101	2.5422	0.0121
102	2.5543	0.0121

103	2.5663	0.0120
104	2.5783	0.0120
105	2.5902	0.0119
106	2.6020	0.0118
107	2.6138	0.0118
108	2.6255	0.0117
109	2.6372	0.0117
110	2.6488	0.0116
111	2.6604	0.0116
112	2.6719	0.0115
113	2.6834	0.0115
114	2.6948	0.0114
115	2.7061	0.0114
116	2.7174	0.0113
117	2.7287	0.0113
118	2.7399	0.0112
119	2.7510	0.0112
120	2.7621	0.0111
121	2.7732	0.0111
122	2.7842	0.0110
123	2.7952	0.0110
124	2.8061	0.0109
125	2.8170	0.0109
126	2.8278	0.0108
127	2.8386	0.0108
128	2.8493	0.0107
129	2.8600	0.0107
130	2.8707	0.0107
131	2.8813	0.0106
132	2.8918	0.0106
133	2.9024	0.0105
134	2.9128	0.0105
135	2.9233	0.0104
136	2.9337	0.0104
137	2.9441	0.0104
138	2.9544	0.0103
139	2.9647	0.0103
140	2.9749	0.0102
141	2.9851	0.0102
142	2.9953	0.0102
143	3.0054	0.0101
144	3.0155	0.0101
145	3.0256	0.0101
146	3.0356	0.0100
147	3.0456	0.0100
148	3.0556	0.0100
149	3.0655	0.0099
150	3.0754	0.0099
151	3.0852	0.0099
152	3.0951	0.0098
153	3.1048	0.0098
154	3.1146	0.0098
155	3.1243	0.0097
156	3.1340	0.0097
157	3.1437	0.0097
158	3.1533	0.0096
159	3.1629	0.0096
160	3.1724	0.0096
161	3.1820	0.0095
162	3.1915	0.0095

163	3.2009	0.0095
164	3.2104	0.0094
165	3.2198	0.0094
166	3.2292	0.0094
167	3.2385	0.0093
168	3.2478	0.0093
169	3.2571	0.0093
170	3.2664	0.0093
171	3.2756	0.0092
172	3.2848	0.0092
173	3.2940	0.0092
174	3.3032	0.0092
175	3.3123	0.0091
176	3.3214	0.0091
177	3.3305	0.0091
178	3.3395	0.0090
179	3.3485	0.0090
180	3.3575	0.0090
181	3.3665	0.0090
182	3.3754	0.0089
183	3.3843	0.0089
184	3.3932	0.0089
185	3.4021	0.0089
186	3.4109	0.0088
187	3.4197	0.0088
188	3.4285	0.0088
189	3.4373	0.0088
190	3.4460	0.0087
191	3.4548	0.0087
192	3.4635	0.0087
193	3.4721	0.0087
194	3.4808	0.0086
195	3.4894	0.0086
196	3.4980	0.0086
197	3.5066	0.0086
198	3.5151	0.0086
199	3.5237	0.0085
200	3.5322	0.0085
201	3.5407	0.0085
202	3.5492	0.0085
203	3.5576	0.0084
204	3.5660	0.0084
205	3.5744	0.0084
206	3.5828	0.0084
207	3.5912	0.0084
208	3.5995	0.0083
209	3.6078	0.0083
210	3.6161	0.0083
211	3.6244	0.0083
212	3.6327	0.0083
213	3.6409	0.0082
214	3.6491	0.0082
215	3.6573	0.0082
216	3.6655	0.0082
217	3.6737	0.0082
218	3.6818	0.0081
219	3.6899	0.0081
220	3.6980	0.0081
221	3.7061	0.0081
222	3.7142	0.0081

223	3.7222	0.0080
224	3.7303	0.0080
225	3.7383	0.0080
226	3.7462	0.0080
227	3.7542	0.0080
228	3.7622	0.0080
229	3.7701	0.0079
230	3.7780	0.0079
231	3.7859	0.0079
232	3.7938	0.0079
233	3.8017	0.0079
234	3.8095	0.0078
235	3.8173	0.0078
236	3.8251	0.0078
237	3.8329	0.0078
238	3.8407	0.0078
239	3.8485	0.0078
240	3.8562	0.0077
241	3.8640	0.0077
242	3.8717	0.0077
243	3.8794	0.0077
244	3.8870	0.0077
245	3.8947	0.0077
246	3.9023	0.0076
247	3.9100	0.0076
248	3.9176	0.0076
249	3.9252	0.0076
250	3.9328	0.0076
251	3.9403	0.0076
252	3.9479	0.0075
253	3.9554	0.0075
254	3.9629	0.0075
255	3.9704	0.0075
256	3.9779	0.0075
257	3.9854	0.0075
258	3.9928	0.0075
259	4.0003	0.0074
260	4.0077	0.0074
261	4.0151	0.0074
262	4.0225	0.0074
263	4.0299	0.0074
264	4.0373	0.0074
265	4.0446	0.0074
266	4.0520	0.0073
267	4.0593	0.0073
268	4.0666	0.0073
269	4.0739	0.0073
270	4.0812	0.0073
271	4.0885	0.0073
272	4.0957	0.0073
273	4.1030	0.0072
274	4.1102	0.0072
275	4.1174	0.0072
276	4.1246	0.0072
277	4.1318	0.0072
278	4.1390	0.0072
279	4.1461	0.0072
280	4.1533	0.0071
281	4.1604	0.0071
282	4.1675	0.0071

283	4.1746	0.0071
284	4.1817	0.0071
285	4.1888	0.0071
286	4.1959	0.0071
287	4.2029	0.0071
288	4.2100	0.0070

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0070	0.0014	0.0056
2	0.0071	0.0014	0.0056
3	0.0071	0.0014	0.0057
4	0.0071	0.0014	0.0057
5	0.0071	0.0014	0.0057
6	0.0071	0.0014	0.0057
7	0.0072	0.0014	0.0057
8	0.0072	0.0014	0.0057
9	0.0072	0.0014	0.0058
10	0.0072	0.0014	0.0058
11	0.0072	0.0015	0.0058
12	0.0073	0.0015	0.0058
13	0.0073	0.0015	0.0058
14	0.0073	0.0015	0.0058
15	0.0073	0.0015	0.0059
16	0.0073	0.0015	0.0059
17	0.0074	0.0015	0.0059
18	0.0074	0.0015	0.0059
19	0.0074	0.0015	0.0059
20	0.0074	0.0015	0.0059
21	0.0075	0.0015	0.0060
22	0.0075	0.0015	0.0060
23	0.0075	0.0015	0.0060
24	0.0075	0.0015	0.0060
25	0.0075	0.0015	0.0060
26	0.0076	0.0015	0.0060
27	0.0076	0.0015	0.0061
28	0.0076	0.0015	0.0061
29	0.0076	0.0015	0.0061
30	0.0077	0.0015	0.0061
31	0.0077	0.0015	0.0061
32	0.0077	0.0015	0.0062
33	0.0077	0.0016	0.0062
34	0.0078	0.0016	0.0062
35	0.0078	0.0016	0.0062
36	0.0078	0.0016	0.0062
37	0.0078	0.0016	0.0063
38	0.0079	0.0016	0.0063
39	0.0079	0.0016	0.0063
40	0.0079	0.0016	0.0063
41	0.0080	0.0016	0.0064
42	0.0080	0.0016	0.0064
43	0.0080	0.0016	0.0064
44	0.0080	0.0016	0.0064
45	0.0081	0.0016	0.0064
46	0.0081	0.0016	0.0065
47	0.0081	0.0016	0.0065

48	0.0081	0.0016	0.0065
49	0.0082	0.0016	0.0065
50	0.0082	0.0016	0.0066
51	0.0082	0.0017	0.0066
52	0.0083	0.0017	0.0066
53	0.0083	0.0017	0.0066
54	0.0083	0.0017	0.0067
55	0.0084	0.0017	0.0067
56	0.0084	0.0017	0.0067
57	0.0084	0.0017	0.0067
58	0.0084	0.0017	0.0068
59	0.0085	0.0017	0.0068
60	0.0085	0.0017	0.0068
61	0.0086	0.0017	0.0068
62	0.0086	0.0017	0.0069
63	0.0086	0.0017	0.0069
64	0.0086	0.0017	0.0069
65	0.0087	0.0017	0.0070
66	0.0087	0.0017	0.0070
67	0.0088	0.0018	0.0070
68	0.0088	0.0018	0.0070
69	0.0088	0.0018	0.0071
70	0.0089	0.0018	0.0071
71	0.0089	0.0018	0.0071
72	0.0089	0.0018	0.0071
73	0.0090	0.0018	0.0072
74	0.0090	0.0018	0.0072
75	0.0091	0.0018	0.0073
76	0.0091	0.0018	0.0073
77	0.0092	0.0018	0.0073
78	0.0092	0.0018	0.0073
79	0.0092	0.0019	0.0074
80	0.0093	0.0019	0.0074
81	0.0093	0.0019	0.0075
82	0.0093	0.0019	0.0075
83	0.0094	0.0019	0.0075
84	0.0094	0.0019	0.0075
85	0.0095	0.0019	0.0076
86	0.0095	0.0019	0.0076
87	0.0096	0.0019	0.0077
88	0.0096	0.0019	0.0077
89	0.0097	0.0019	0.0077
90	0.0097	0.0020	0.0078
91	0.0098	0.0020	0.0078
92	0.0098	0.0020	0.0078
93	0.0099	0.0020	0.0079
94	0.0099	0.0020	0.0079
95	0.0100	0.0020	0.0080
96	0.0100	0.0020	0.0080
97	0.0101	0.0020	0.0081
98	0.0101	0.0020	0.0081
99	0.0102	0.0020	0.0082
100	0.0102	0.0021	0.0082
101	0.0103	0.0021	0.0083
102	0.0104	0.0021	0.0083
103	0.0104	0.0021	0.0083
104	0.0105	0.0021	0.0084
105	0.0106	0.0021	0.0084
106	0.0106	0.0021	0.0085
107	0.0107	0.0021	0.0085

108	0.0107	0.0022	0.0086
109	0.0108	0.0022	0.0087
110	0.0109	0.0022	0.0087
111	0.0110	0.0022	0.0088
112	0.0110	0.0022	0.0088
113	0.0111	0.0022	0.0089
114	0.0112	0.0022	0.0089
115	0.0113	0.0023	0.0090
116	0.0113	0.0023	0.0090
117	0.0114	0.0023	0.0091
118	0.0115	0.0023	0.0092
119	0.0116	0.0023	0.0092
120	0.0116	0.0023	0.0093
121	0.0117	0.0024	0.0094
122	0.0118	0.0024	0.0094
123	0.0119	0.0024	0.0095
124	0.0120	0.0024	0.0096
125	0.0121	0.0024	0.0097
126	0.0121	0.0024	0.0097
127	0.0123	0.0025	0.0098
128	0.0123	0.0025	0.0099
129	0.0125	0.0025	0.0100
130	0.0125	0.0025	0.0100
131	0.0127	0.0025	0.0101
132	0.0128	0.0026	0.0102
133	0.0129	0.0026	0.0103
134	0.0130	0.0026	0.0104
135	0.0131	0.0026	0.0105
136	0.0132	0.0027	0.0106
137	0.0134	0.0027	0.0107
138	0.0135	0.0027	0.0108
139	0.0136	0.0027	0.0109
140	0.0137	0.0028	0.0110
141	0.0139	0.0028	0.0111
142	0.0140	0.0028	0.0112
143	0.0142	0.0028	0.0113
144	0.0143	0.0029	0.0114
145	0.0125	0.0025	0.0100
146	0.0126	0.0025	0.0100
147	0.0128	0.0026	0.0102
148	0.0129	0.0026	0.0103
149	0.0131	0.0026	0.0105
150	0.0132	0.0027	0.0106
151	0.0135	0.0027	0.0108
152	0.0136	0.0027	0.0109
153	0.0139	0.0028	0.0111
154	0.0140	0.0028	0.0112
155	0.0143	0.0029	0.0114
156	0.0144	0.0029	0.0115
157	0.0148	0.0030	0.0118
158	0.0149	0.0030	0.0119
159	0.0153	0.0031	0.0122
160	0.0154	0.0031	0.0123
161	0.0158	0.0032	0.0127
162	0.0160	0.0032	0.0128
163	0.0164	0.0033	0.0131
164	0.0167	0.0033	0.0133
165	0.0171	0.0034	0.0137
166	0.0174	0.0035	0.0139
167	0.0179	0.0036	0.0143

168	0.0182	0.0036	0.0145
169	0.0188	0.0038	0.0150
170	0.0191	0.0038	0.0153
171	0.0198	0.0040	0.0158
172	0.0201	0.0040	0.0161
173	0.0209	0.0042	0.0167
174	0.0214	0.0043	0.0171
175	0.0223	0.0045	0.0178
176	0.0228	0.0046	0.0182
177	0.0239	0.0048	0.0191
178	0.0245	0.0049	0.0196
179	0.0259	0.0052	0.0207
180	0.0267	0.0054	0.0213
181	0.0284	0.0057	0.0227
182	0.0294	0.0059	0.0235
183	0.0318	0.0064	0.0254
184	0.0331	0.0066	0.0265
185	0.0265	0.0053	0.0212
186	0.0283	0.0057	0.0226
187	0.0328	0.0066	0.0262
188	0.0358	0.0072	0.0286
189	0.0445	0.0089	0.0356
190	0.0513	0.0103	0.0410
191	0.0778	0.0109	0.0669
192	0.1130	0.0109	0.1021
193	0.4887	0.0109	0.4778
194	0.0612	0.0109	0.0503
195	0.0396	0.0079	0.0316
196	0.0303	0.0061	0.0242
197	0.0347	0.0070	0.0277
198	0.0305	0.0061	0.0244
199	0.0275	0.0055	0.0220
200	0.0252	0.0051	0.0201
201	0.0233	0.0047	0.0187
202	0.0218	0.0044	0.0174
203	0.0205	0.0041	0.0164
204	0.0194	0.0039	0.0155
205	0.0185	0.0037	0.0148
206	0.0176	0.0035	0.0141
207	0.0169	0.0034	0.0135
208	0.0162	0.0033	0.0130
209	0.0156	0.0031	0.0125
210	0.0151	0.0030	0.0121
211	0.0146	0.0029	0.0117
212	0.0141	0.0028	0.0113
213	0.0137	0.0028	0.0110
214	0.0133	0.0027	0.0107
215	0.0130	0.0026	0.0104
216	0.0127	0.0025	0.0101
217	0.0144	0.0029	0.0115
218	0.0141	0.0028	0.0113
219	0.0138	0.0028	0.0110
220	0.0135	0.0027	0.0108
221	0.0133	0.0027	0.0106
222	0.0131	0.0026	0.0104
223	0.0128	0.0026	0.0103
224	0.0126	0.0025	0.0101
225	0.0124	0.0025	0.0099
226	0.0122	0.0025	0.0098
227	0.0120	0.0024	0.0096

228	0.0118	0.0024	0.0095
229	0.0117	0.0023	0.0093
230	0.0115	0.0023	0.0092
231	0.0114	0.0023	0.0091
232	0.0112	0.0022	0.0090
233	0.0111	0.0022	0.0088
234	0.0109	0.0022	0.0087
235	0.0108	0.0022	0.0086
236	0.0107	0.0021	0.0085
237	0.0105	0.0021	0.0084
238	0.0104	0.0021	0.0083
239	0.0103	0.0021	0.0082
240	0.0102	0.0020	0.0081
241	0.0101	0.0020	0.0080
242	0.0100	0.0020	0.0080
243	0.0099	0.0020	0.0079
244	0.0098	0.0020	0.0078
245	0.0097	0.0019	0.0077
246	0.0096	0.0019	0.0076
247	0.0095	0.0019	0.0076
248	0.0094	0.0019	0.0075
249	0.0093	0.0019	0.0074
250	0.0092	0.0018	0.0074
251	0.0091	0.0018	0.0073
252	0.0090	0.0018	0.0072
253	0.0090	0.0018	0.0072
254	0.0089	0.0018	0.0071
255	0.0088	0.0018	0.0070
256	0.0087	0.0018	0.0070
257	0.0087	0.0017	0.0069
258	0.0086	0.0017	0.0069
259	0.0085	0.0017	0.0068
260	0.0085	0.0017	0.0068
261	0.0084	0.0017	0.0067
262	0.0083	0.0017	0.0067
263	0.0083	0.0017	0.0066
264	0.0082	0.0016	0.0066
265	0.0082	0.0016	0.0065
266	0.0081	0.0016	0.0065
267	0.0080	0.0016	0.0064
268	0.0080	0.0016	0.0064
269	0.0079	0.0016	0.0063
270	0.0079	0.0016	0.0063
271	0.0078	0.0016	0.0063
272	0.0078	0.0016	0.0062
273	0.0077	0.0016	0.0062
274	0.0077	0.0015	0.0061
275	0.0076	0.0015	0.0061
276	0.0076	0.0015	0.0061
277	0.0075	0.0015	0.0060
278	0.0075	0.0015	0.0060
279	0.0074	0.0015	0.0059
280	0.0074	0.0015	0.0059
281	0.0074	0.0015	0.0059
282	0.0073	0.0015	0.0058
283	0.0073	0.0015	0.0058
284	0.0072	0.0015	0.0058
285	0.0072	0.0014	0.0057
286	0.0071	0.0014	0.0057
287	0.0071	0.0014	0.0057

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288          0.0071          0.0014          0.0057
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Total soil rain loss =      0.74(In)
Total effective rainfall =      3.47(In)
Peak flow rate in flood hydrograph =      10.11(CFS)
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          24 - H O U R      S T O R M
      R u n o f f      H y d r o g r a p h
-----
--
          Hydrograph in   5   Minute intervals ((CFS))
-----
--
Time(h+m) Volume Ac.Ft   Q(CFS)  0          5.0          10.0          15.0
20.0
-----
|  0+ 5      0.0001      0.02  Q          |          |          |
|  0+10      0.0009      0.11  Q          |          |          |
|  0+15      0.0021      0.18  Q          |          |          |
|  0+20      0.0035      0.20  Q          |          |          |
|  0+25      0.0050      0.22  Q          |          |          |
|  0+30      0.0066      0.23  Q          |          |          |
|  0+35      0.0083      0.24  Q          |          |          |
|  0+40      0.0100      0.25  Q          |          |          |
|  0+45      0.0117      0.25  Q          |          |          |
|  0+50      0.0134      0.25  Q          |          |          |
|  0+55      0.0152      0.25  Q          |          |          |
|  1+ 0      0.0170      0.26  Q          |          |          |
|  1+ 5      0.0187      0.26  Q          |          |          |
|  1+10      0.0205      0.26  Q          |          |          |
|  1+15      0.0223      0.26  Q          |          |          |
|  1+20      0.0241      0.26  Q          |          |          |
|  1+25      0.0259      0.26  Q          |          |          |
|  1+30      0.0277      0.26  QV         |          |          |
|

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1+35	0.0295	0.26	QV			
1+40	0.0313	0.26	QV			
1+45	0.0332	0.26	QV			
1+50	0.0350	0.27	QV			
1+55	0.0368	0.27	QV			
2+ 0	0.0387	0.27	QV			
2+ 5	0.0405	0.27	QV			
2+10	0.0424	0.27	QV			
2+15	0.0442	0.27	QV			
2+20	0.0461	0.27	QV			
2+25	0.0480	0.27	QV			
2+30	0.0498	0.27	QV			
2+35	0.0517	0.27	QV			
2+40	0.0536	0.27	Q V			
2+45	0.0555	0.27	Q V			
2+50	0.0574	0.28	Q V			
2+55	0.0593	0.28	Q V			
3+ 0	0.0612	0.28	Q V			
3+ 5	0.0631	0.28	Q V			
3+10	0.0650	0.28	Q V			
3+15	0.0670	0.28	Q V			
3+20	0.0689	0.28	Q V			
3+25	0.0709	0.28	Q V			
3+30	0.0728	0.28	Q V			
3+35	0.0748	0.28	Q V			
3+40	0.0767	0.28	Q V			
3+45	0.0787	0.29	Q V			
3+50	0.0807	0.29	Q V			
3+55	0.0826	0.29	Q V			
4+ 0	0.0846	0.29	Q V			

4+ 5	0.0866	0.29	Q	V			
4+10	0.0886	0.29	Q	V			
4+15	0.0906	0.29	Q	V			
4+20	0.0927	0.29	Q	V			
4+25	0.0947	0.29	Q	V			
4+30	0.0967	0.30	Q	V			
4+35	0.0988	0.30	Q	V			
4+40	0.1008	0.30	Q	V			
4+45	0.1029	0.30	Q	V			
4+50	0.1049	0.30	Q	V			
4+55	0.1070	0.30	Q	V			
5+ 0	0.1091	0.30	Q	V			
5+ 5	0.1112	0.30	Q	V			
5+10	0.1133	0.30	Q	V			
5+15	0.1154	0.31	Q	V			
5+20	0.1175	0.31	Q	V			
5+25	0.1196	0.31	Q	V			
5+30	0.1217	0.31	Q	V			
5+35	0.1239	0.31	Q	V			
5+40	0.1260	0.31	Q	V			
5+45	0.1282	0.31	Q	V			
5+50	0.1303	0.31	Q	V			
5+55	0.1325	0.32	Q	V			
6+ 0	0.1347	0.32	Q	V			
6+ 5	0.1369	0.32	Q	V			
6+10	0.1391	0.32	Q	V			
6+15	0.1413	0.32	Q	V			
6+20	0.1435	0.32	Q	V			
6+25	0.1457	0.32	Q	V			
6+30	0.1480	0.33	Q	V			

	6+35	0.1502	0.33	Q	V			
	6+40	0.1525	0.33	Q	V			
	6+45	0.1548	0.33	Q	V			
	6+50	0.1570	0.33	Q	V			
	6+55	0.1593	0.33	Q	V			
	7+ 0	0.1616	0.33	Q	V			
	7+ 5	0.1640	0.34	Q	V			
	7+10	0.1663	0.34	Q	V			
	7+15	0.1686	0.34	Q	V			
	7+20	0.1710	0.34	Q	V			
	7+25	0.1733	0.34	Q	V			
	7+30	0.1757	0.34	Q	V			
	7+35	0.1781	0.35	Q	V			
	7+40	0.1805	0.35	Q	V			
	7+45	0.1829	0.35	Q	V			
	7+50	0.1853	0.35	Q	V			
	7+55	0.1877	0.35	Q	V			
	8+ 0	0.1901	0.35	Q	V			
	8+ 5	0.1926	0.36	Q	V			
	8+10	0.1951	0.36	Q	V			
	8+15	0.1976	0.36	Q	V			
	8+20	0.2000	0.36	Q	V			
	8+25	0.2026	0.36	Q	V			
	8+30	0.2051	0.37	Q	V			
	8+35	0.2076	0.37	Q	V			
	8+40	0.2102	0.37	Q	V			
	8+45	0.2127	0.37	Q	V			
	8+50	0.2153	0.37	Q	V			
	8+55	0.2179	0.38	Q	V			
	9+ 0	0.2205	0.38	Q	V			

	9+ 5	0.2231	0.38	Q	V		
	9+10	0.2258	0.38	Q	V		
	9+15	0.2284	0.39	Q	V		
	9+20	0.2311	0.39	Q	V		
	9+25	0.2338	0.39	Q	V		
	9+30	0.2365	0.39	Q	V		
	9+35	0.2393	0.40	Q	V		
	9+40	0.2420	0.40	Q	V		
	9+45	0.2448	0.40	Q	V		
	9+50	0.2475	0.40	Q	V		
	9+55	0.2503	0.41	Q	V		
	10+ 0	0.2532	0.41	Q	V		
	10+ 5	0.2560	0.41	Q	V		
	10+10	0.2589	0.42	Q	V		
	10+15	0.2617	0.42	Q	V		
	10+20	0.2646	0.42	Q	V		
	10+25	0.2676	0.42	Q	V		
	10+30	0.2705	0.43	Q	V		
	10+35	0.2735	0.43	Q	V		
	10+40	0.2765	0.43	Q	V		
	10+45	0.2795	0.44	Q	V		
	10+50	0.2825	0.44	Q	V		
	10+55	0.2856	0.44	Q	V		
	11+ 0	0.2887	0.45	Q	V		
	11+ 5	0.2918	0.45	Q	V		
	11+10	0.2949	0.46	Q	V		
	11+15	0.2981	0.46	Q	V		
	11+20	0.3013	0.46	Q	V		
	11+25	0.3045	0.47	Q	V		
	11+30	0.3077	0.47	Q	V		

	11+35	0.3110	0.48	Q	V		
	11+40	0.3143	0.48	Q	V		
	11+45	0.3177	0.49	Q	V		
	11+50	0.3211	0.49	Q	V		
	11+55	0.3245	0.49	Q	V		
	12+ 0	0.3279	0.50	Q	V		
	12+ 5	0.3313	0.50	Q	V		
	12+10	0.3346	0.48	Q	V		
	12+15	0.3378	0.46	Q	V		
	12+20	0.3410	0.46	Q	V		
	12+25	0.3442	0.46	Q	V		
	12+30	0.3474	0.47	Q	V		
	12+35	0.3507	0.47	Q	V		
	12+40	0.3539	0.48	Q	V		
	12+45	0.3572	0.48	Q	V		
	12+50	0.3606	0.49	Q	V		
	12+55	0.3640	0.49	Q	V		
	13+ 0	0.3674	0.50	Q	V		
	13+ 5	0.3709	0.51	Q	V		
	13+10	0.3745	0.52	Q	V		
	13+15	0.3781	0.52	Q	V		
	13+20	0.3818	0.53	Q	V		
	13+25	0.3855	0.54	Q	V		
	13+30	0.3893	0.55	Q	V		
	13+35	0.3932	0.56	Q	V		
	13+40	0.3971	0.57	Q	V		
	13+45	0.4011	0.58	Q	V		
	13+50	0.4052	0.60	Q	V		
	13+55	0.4094	0.61	Q	V		
	14+ 0	0.4137	0.62	Q	V		

14+ 5	0.4181	0.63	Q		V		
14+10	0.4225	0.65	Q		V		
14+15	0.4271	0.66	Q		V		
14+20	0.4318	0.68	Q		V		
14+25	0.4366	0.70	Q		V		
14+30	0.4416	0.72	Q		V		
14+35	0.4467	0.74	Q		V		
14+40	0.4520	0.76	Q		V		
14+45	0.4574	0.79	Q		V		
14+50	0.4630	0.82	Q		V		
14+55	0.4688	0.84	Q		V		
15+ 0	0.4749	0.88	Q		V		
15+ 5	0.4812	0.91	Q		V		
15+10	0.4878	0.96	Q		V		
15+15	0.4947	1.00	Q		V		
15+20	0.5020	1.06	Q		V		
15+25	0.5095	1.10	Q		V		
15+30	0.5167	1.04	Q		V		
15+35	0.5237	1.03	Q		V		
15+40	0.5313	1.10	Q		V		
15+45	0.5395	1.20	Q		V		
15+50	0.5490	1.38	Q		V		
15+55	0.5603	1.64	Q		V		
16+ 0	0.5761	2.29	Q		V		
16+ 5	0.6056	4.29	Q		V		
16+10	0.6752	10.11			Q	V	
16+15	0.7252	7.26			Q		V
16+20	0.7532	4.06	Q			V	
16+25	0.7727	2.83	Q			V	
16+30	0.7881	2.23	Q			V	

	16+35	0.8010	1.87	Q			V
	16+40	0.8118	1.57	Q			V
	16+45	0.8210	1.33	Q			V
	16+50	0.8288	1.14	Q			V
	16+55	0.8361	1.05	Q			V
	17+ 0	0.8427	0.96	Q			V
	17+ 5	0.8484	0.84	Q			V
	17+10	0.8535	0.73	Q			V
	17+15	0.8582	0.69	Q			V
	17+20	0.8627	0.65	Q			V
	17+25	0.8670	0.62	Q			V
	17+30	0.8711	0.60	Q			V
	17+35	0.8750	0.57	Q			V
	17+40	0.8788	0.55	Q			V
	17+45	0.8825	0.53	Q			V
	17+50	0.8860	0.52	Q			V
	17+55	0.8895	0.50	Q			V
	18+ 0	0.8928	0.48	Q			V
	18+ 5	0.8961	0.48	Q			V
	18+10	0.8995	0.49	Q			V
	18+15	0.9029	0.50	Q			V
	18+20	0.9063	0.50	Q			V
	18+25	0.9097	0.49	Q			V
	18+30	0.9130	0.48	Q			V
	18+35	0.9163	0.48	Q			V
	18+40	0.9195	0.47	Q			V
	18+45	0.9227	0.46	Q			V
	18+50	0.9258	0.45	Q			V
	18+55	0.9289	0.45	Q			V
	19+ 0	0.9319	0.44	Q			V

19+ 5	0.9349	0.43	Q				V
19+10	0.9378	0.43	Q				V
19+15	0.9407	0.42	Q				V
19+20	0.9436	0.41	Q				V
19+25	0.9464	0.41	Q				V
19+30	0.9492	0.40	Q				V
19+35	0.9519	0.40	Q				V
19+40	0.9546	0.39	Q				V
19+45	0.9573	0.39	Q				V
19+50	0.9599	0.38	Q				V
19+55	0.9625	0.38	Q				V
20+ 0	0.9651	0.37	Q				V
20+ 5	0.9676	0.37	Q				V
20+10	0.9702	0.37	Q				V
20+15	0.9727	0.36	Q				V
20+20	0.9751	0.36	Q				V
20+25	0.9776	0.35	Q				V
20+30	0.9800	0.35	Q				V
20+35	0.9824	0.35	Q				V
20+40	0.9847	0.34	Q				V
20+45	0.9871	0.34	Q				V
20+50	0.9894	0.34	Q				V
20+55	0.9917	0.33	Q				V
21+ 0	0.9940	0.33	Q				V
21+ 5	0.9962	0.33	Q				V
21+10	0.9984	0.32	Q				V
21+15	1.0007	0.32	Q				V
21+20	1.0029	0.32	Q				V
21+25	1.0050	0.32	Q				V
21+30	1.0072	0.31	Q				V

	21+35	1.0093	0.31	Q				V
	21+40	1.0115	0.31	Q				V
	21+45	1.0136	0.31	Q				V
	21+50	1.0157	0.30	Q				V
	21+55	1.0177	0.30	Q				V
	22+ 0	1.0198	0.30	Q				V
	22+ 5	1.0219	0.30	Q				V
	22+10	1.0239	0.29	Q				V
	22+15	1.0259	0.29	Q				V
	22+20	1.0279	0.29	Q				V
	22+25	1.0299	0.29	Q				V
	22+30	1.0319	0.29	Q				V
	22+35	1.0338	0.28	Q				V
	22+40	1.0358	0.28	Q				V
	22+45	1.0377	0.28	Q				V
	22+50	1.0396	0.28	Q				V
	22+55	1.0415	0.28	Q				V
	23+ 0	1.0434	0.28	Q				
V	23+ 5	1.0453	0.27	Q				
V	23+10	1.0472	0.27	Q				
V	23+15	1.0490	0.27	Q				
V	23+20	1.0509	0.27	Q				
V	23+25	1.0527	0.27	Q				
V	23+30	1.0546	0.27	Q				
V	23+35	1.0564	0.26	Q				
V	23+40	1.0582	0.26	Q				
V	23+45	1.0600	0.26	Q				
V	23+50	1.0618	0.26	Q				
V	23+55	1.0635	0.26	Q				
V	24+ 0	1.0653	0.26	Q				
V								

V	24+ 5	1.0669	0.24	Q			
V	24+10	1.0679	0.14	Q			
V	24+15	1.0684	0.08	Q			
V	24+20	1.0688	0.05	Q			
V	24+25	1.0690	0.03	Q			
V	24+30	1.0692	0.02	Q			
V	24+35	1.0693	0.01	Q			
V	24+40	1.0693	0.01	Q			
V	24+45	1.0694	0.01	Q			
V	24+50	1.0694	0.00	Q			
V	24+55	1.0694	0.00	Q			
V	25+ 0	1.0694	0.00	Q			

Unit Hydrograph Analysis

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7.0

Study date 10/15/21

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

Program License Serial Number 6232

ASTER CACTUS
BASIN ROUTING
100YR 24HR
AREA/BASIN A2

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Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
8.00	1	1.03

--
Rainfall data for year 100
8.00 6 2.16

--
Rainfall data for year 100
8.00 24 4.21

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

Fm	SCS curve No.(AMCII) (In/Hr)	SCS curve NO.(AMC 3) (In/Hr)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)
	69.0	86.2	8.00	1.000	0.262	0.500
0.131						

Area-averaged adjusted loss rate Fm (In/Hr) = 0.131

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
4.00	0.500	69.0	86.2	1.60	0.655
4.00	0.500	98.0	98.0	0.20	0.944

Area-averaged catchment yield fraction, Y = 0.799

Area-averaged low loss fraction, Yb = 0.201

User entry of time of concentration = 0.195 (hours)

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Watershed area = 8.00(Ac.)
 Catchment Lag time = 0.156 hours
 Unit interval = 5.000 minutes
 Unit interval percentage of lag time = 53.4188
 Hydrograph baseflow = 0.00(CFS)
 Average maximum watershed loss rate(Fm) = 0.131(In/Hr)
 Average low loss rate fraction (Yb) = 0.201 (decimal)
 DESERT S-Graph Selected
 Computed peak 5-minute rainfall = 0.489(In)
 Computed peak 30-minute rainfall = 0.837(In)
 Specified peak 1-hour rainfall = 1.030(In)
 Computed peak 3-hour rainfall = 1.622(In)
 Specified peak 6-hour rainfall = 2.160(In)
 Specified peak 24-hour rainfall = 4.210(In)

Rainfall depth area reduction factors:

Using a total area of 8.00(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000	Adjusted rainfall = 0.489(In)
30-minute factor = 1.000	Adjusted rainfall = 0.836(In)
1-hour factor = 1.000	Adjusted rainfall = 1.030(In)
3-hour factor = 1.000	Adjusted rainfall = 1.622(In)
6-hour factor = 1.000	Adjusted rainfall = 2.160(In)
24-hour factor = 1.000	Adjusted rainfall = 4.210(In)

Unit Hydrograph

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Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
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(K = 96.75 (CFS))

1	4.451	4.306
2	34.445	29.020
3	63.447	28.059
4	75.941	12.088
5	83.200	7.023
6	88.116	4.756
7	91.401	3.178
8	93.858	2.377
9	95.667	1.750
10	97.007	1.296
11	97.890	0.855
12	98.475	0.565
13	99.113	0.617
14	99.631	0.501
15	100.000	0.357

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.4886	0.4886
2	0.6015	0.1129
3	0.6793	0.0778
4	0.7405	0.0612
5	0.7918	0.0513
6	0.8363	0.0445
7	0.8759	0.0396
8	0.9117	0.0358
9	0.9445	0.0328
10	0.9748	0.0303
11	1.0031	0.0283
12	1.0296	0.0265
13	1.0643	0.0347
14	1.0974	0.0331
15	1.1292	0.0318
16	1.1597	0.0305
17	1.1892	0.0294
18	1.2176	0.0284
19	1.2451	0.0275
20	1.2718	0.0267
21	1.2978	0.0259
22	1.3230	0.0252
23	1.3475	0.0245
24	1.3715	0.0239
25	1.3948	0.0234
26	1.4176	0.0228
27	1.4399	0.0223
28	1.4617	0.0218
29	1.4831	0.0214
30	1.5041	0.0209
31	1.5246	0.0205
32	1.5447	0.0202
33	1.5645	0.0198
34	1.5840	0.0194
35	1.6031	0.0191
36	1.6219	0.0188
37	1.6403	0.0185
38	1.6585	0.0182
39	1.6764	0.0179
40	1.6941	0.0176

41	1.7114	0.0174
42	1.7286	0.0171
43	1.7455	0.0169
44	1.7621	0.0167
45	1.7786	0.0164
46	1.7948	0.0162
47	1.8108	0.0160
48	1.8267	0.0158
49	1.8423	0.0156
50	1.8577	0.0154
51	1.8730	0.0153
52	1.8881	0.0151
53	1.9030	0.0149
54	1.9178	0.0148
55	1.9324	0.0146
56	1.9468	0.0144
57	1.9611	0.0143
58	1.9753	0.0141
59	1.9893	0.0140
60	2.0032	0.0139
61	2.0169	0.0137
62	2.0305	0.0136
63	2.0440	0.0135
64	2.0573	0.0133
65	2.0705	0.0132
66	2.0836	0.0131
67	2.0966	0.0130
68	2.1095	0.0129
69	2.1223	0.0128
70	2.1349	0.0127
71	2.1475	0.0126
72	2.1599	0.0125
73	2.1743	0.0144
74	2.1886	0.0143
75	2.2028	0.0142
76	2.2169	0.0141
77	2.2309	0.0140
78	2.2448	0.0139
79	2.2586	0.0138
80	2.2723	0.0137
81	2.2860	0.0136
82	2.2995	0.0135
83	2.3130	0.0135
84	2.3263	0.0134
85	2.3396	0.0133
86	2.3528	0.0132
87	2.3660	0.0131
88	2.3790	0.0131
89	2.3920	0.0130
90	2.4049	0.0129
91	2.4177	0.0128
92	2.4305	0.0128
93	2.4432	0.0127
94	2.4558	0.0126
95	2.4683	0.0125
96	2.4808	0.0125
97	2.4932	0.0124
98	2.5055	0.0123
99	2.5178	0.0123
100	2.5300	0.0122

101	2.5422	0.0121
102	2.5543	0.0121
103	2.5663	0.0120
104	2.5782	0.0120
105	2.5901	0.0119
106	2.6020	0.0118
107	2.6138	0.0118
108	2.6255	0.0117
109	2.6372	0.0117
110	2.6488	0.0116
111	2.6604	0.0116
112	2.6719	0.0115
113	2.6833	0.0115
114	2.6947	0.0114
115	2.7061	0.0114
116	2.7174	0.0113
117	2.7287	0.0113
118	2.7399	0.0112
119	2.7510	0.0112
120	2.7621	0.0111
121	2.7732	0.0111
122	2.7842	0.0110
123	2.7951	0.0110
124	2.8061	0.0109
125	2.8169	0.0109
126	2.8278	0.0108
127	2.8385	0.0108
128	2.8493	0.0107
129	2.8600	0.0107
130	2.8706	0.0107
131	2.8812	0.0106
132	2.8918	0.0106
133	2.9023	0.0105
134	2.9128	0.0105
135	2.9233	0.0104
136	2.9337	0.0104
137	2.9440	0.0104
138	2.9544	0.0103
139	2.9646	0.0103
140	2.9749	0.0102
141	2.9851	0.0102
142	2.9953	0.0102
143	3.0054	0.0101
144	3.0155	0.0101
145	3.0256	0.0101
146	3.0356	0.0100
147	3.0456	0.0100
148	3.0555	0.0100
149	3.0655	0.0099
150	3.0754	0.0099
151	3.0852	0.0099
152	3.0950	0.0098
153	3.1048	0.0098
154	3.1146	0.0098
155	3.1243	0.0097
156	3.1340	0.0097
157	3.1436	0.0097
158	3.1532	0.0096
159	3.1628	0.0096
160	3.1724	0.0096

161	3.1819	0.0095
162	3.1914	0.0095
163	3.2009	0.0095
164	3.2103	0.0094
165	3.2197	0.0094
166	3.2291	0.0094
167	3.2385	0.0093
168	3.2478	0.0093
169	3.2571	0.0093
170	3.2664	0.0093
171	3.2756	0.0092
172	3.2848	0.0092
173	3.2940	0.0092
174	3.3031	0.0092
175	3.3123	0.0091
176	3.3214	0.0091
177	3.3304	0.0091
178	3.3395	0.0090
179	3.3485	0.0090
180	3.3575	0.0090
181	3.3664	0.0090
182	3.3754	0.0089
183	3.3843	0.0089
184	3.3932	0.0089
185	3.4021	0.0089
186	3.4109	0.0088
187	3.4197	0.0088
188	3.4285	0.0088
189	3.4373	0.0088
190	3.4460	0.0087
191	3.4547	0.0087
192	3.4634	0.0087
193	3.4721	0.0087
194	3.4808	0.0086
195	3.4894	0.0086
196	3.4980	0.0086
197	3.5066	0.0086
198	3.5151	0.0086
199	3.5237	0.0085
200	3.5322	0.0085
201	3.5407	0.0085
202	3.5491	0.0085
203	3.5576	0.0084
204	3.5660	0.0084
205	3.5744	0.0084
206	3.5828	0.0084
207	3.5912	0.0084
208	3.5995	0.0083
209	3.6078	0.0083
210	3.6161	0.0083
211	3.6244	0.0083
212	3.6327	0.0083
213	3.6409	0.0082
214	3.6491	0.0082
215	3.6573	0.0082
216	3.6655	0.0082
217	3.6736	0.0082
218	3.6818	0.0081
219	3.6899	0.0081
220	3.6980	0.0081

221	3.7061	0.0081
222	3.7142	0.0081
223	3.7222	0.0080
224	3.7302	0.0080
225	3.7382	0.0080
226	3.7462	0.0080
227	3.7542	0.0080
228	3.7621	0.0080
229	3.7701	0.0079
230	3.7780	0.0079
231	3.7859	0.0079
232	3.7938	0.0079
233	3.8016	0.0079
234	3.8095	0.0078
235	3.8173	0.0078
236	3.8251	0.0078
237	3.8329	0.0078
238	3.8407	0.0078
239	3.8485	0.0078
240	3.8562	0.0077
241	3.8639	0.0077
242	3.8716	0.0077
243	3.8793	0.0077
244	3.8870	0.0077
245	3.8947	0.0077
246	3.9023	0.0076
247	3.9099	0.0076
248	3.9176	0.0076
249	3.9251	0.0076
250	3.9327	0.0076
251	3.9403	0.0076
252	3.9478	0.0075
253	3.9554	0.0075
254	3.9629	0.0075
255	3.9704	0.0075
256	3.9779	0.0075
257	3.9854	0.0075
258	3.9928	0.0075
259	4.0003	0.0074
260	4.0077	0.0074
261	4.0151	0.0074
262	4.0225	0.0074
263	4.0299	0.0074
264	4.0373	0.0074
265	4.0446	0.0074
266	4.0519	0.0073
267	4.0593	0.0073
268	4.0666	0.0073
269	4.0739	0.0073
270	4.0812	0.0073
271	4.0884	0.0073
272	4.0957	0.0073
273	4.1029	0.0072
274	4.1102	0.0072
275	4.1174	0.0072
276	4.1246	0.0072
277	4.1318	0.0072
278	4.1389	0.0072
279	4.1461	0.0072
280	4.1532	0.0071

281	4.1604	0.0071
282	4.1675	0.0071
283	4.1746	0.0071
284	4.1817	0.0071
285	4.1888	0.0071
286	4.1959	0.0071
287	4.2029	0.0071
288	4.2100	0.0070

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0070	0.0014	0.0056
2	0.0071	0.0014	0.0056
3	0.0071	0.0014	0.0057
4	0.0071	0.0014	0.0057
5	0.0071	0.0014	0.0057
6	0.0071	0.0014	0.0057
7	0.0072	0.0014	0.0057
8	0.0072	0.0014	0.0057
9	0.0072	0.0014	0.0058
10	0.0072	0.0014	0.0058
11	0.0072	0.0015	0.0058
12	0.0073	0.0015	0.0058
13	0.0073	0.0015	0.0058
14	0.0073	0.0015	0.0058
15	0.0073	0.0015	0.0059
16	0.0073	0.0015	0.0059
17	0.0074	0.0015	0.0059
18	0.0074	0.0015	0.0059
19	0.0074	0.0015	0.0059
20	0.0074	0.0015	0.0059
21	0.0075	0.0015	0.0060
22	0.0075	0.0015	0.0060
23	0.0075	0.0015	0.0060
24	0.0075	0.0015	0.0060
25	0.0075	0.0015	0.0060
26	0.0076	0.0015	0.0060
27	0.0076	0.0015	0.0061
28	0.0076	0.0015	0.0061
29	0.0076	0.0015	0.0061
30	0.0077	0.0015	0.0061
31	0.0077	0.0015	0.0061
32	0.0077	0.0015	0.0062
33	0.0077	0.0016	0.0062
34	0.0078	0.0016	0.0062
35	0.0078	0.0016	0.0062
36	0.0078	0.0016	0.0062
37	0.0078	0.0016	0.0063
38	0.0079	0.0016	0.0063
39	0.0079	0.0016	0.0063
40	0.0079	0.0016	0.0063
41	0.0080	0.0016	0.0064
42	0.0080	0.0016	0.0064
43	0.0080	0.0016	0.0064
44	0.0080	0.0016	0.0064
45	0.0081	0.0016	0.0064

46	0.0081	0.0016	0.0065
47	0.0081	0.0016	0.0065
48	0.0081	0.0016	0.0065
49	0.0082	0.0016	0.0065
50	0.0082	0.0016	0.0066
51	0.0082	0.0017	0.0066
52	0.0083	0.0017	0.0066
53	0.0083	0.0017	0.0066
54	0.0083	0.0017	0.0067
55	0.0084	0.0017	0.0067
56	0.0084	0.0017	0.0067
57	0.0084	0.0017	0.0067
58	0.0084	0.0017	0.0068
59	0.0085	0.0017	0.0068
60	0.0085	0.0017	0.0068
61	0.0086	0.0017	0.0068
62	0.0086	0.0017	0.0069
63	0.0086	0.0017	0.0069
64	0.0086	0.0017	0.0069
65	0.0087	0.0017	0.0070
66	0.0087	0.0017	0.0070
67	0.0088	0.0018	0.0070
68	0.0088	0.0018	0.0070
69	0.0088	0.0018	0.0071
70	0.0089	0.0018	0.0071
71	0.0089	0.0018	0.0071
72	0.0089	0.0018	0.0071
73	0.0090	0.0018	0.0072
74	0.0090	0.0018	0.0072
75	0.0091	0.0018	0.0073
76	0.0091	0.0018	0.0073
77	0.0092	0.0018	0.0073
78	0.0092	0.0018	0.0073
79	0.0092	0.0019	0.0074
80	0.0093	0.0019	0.0074
81	0.0093	0.0019	0.0075
82	0.0093	0.0019	0.0075
83	0.0094	0.0019	0.0075
84	0.0094	0.0019	0.0075
85	0.0095	0.0019	0.0076
86	0.0095	0.0019	0.0076
87	0.0096	0.0019	0.0077
88	0.0096	0.0019	0.0077
89	0.0097	0.0019	0.0077
90	0.0097	0.0020	0.0078
91	0.0098	0.0020	0.0078
92	0.0098	0.0020	0.0078
93	0.0099	0.0020	0.0079
94	0.0099	0.0020	0.0079
95	0.0100	0.0020	0.0080
96	0.0100	0.0020	0.0080
97	0.0101	0.0020	0.0081
98	0.0101	0.0020	0.0081
99	0.0102	0.0020	0.0082
100	0.0102	0.0021	0.0082
101	0.0103	0.0021	0.0083
102	0.0104	0.0021	0.0083
103	0.0104	0.0021	0.0083
104	0.0105	0.0021	0.0084
105	0.0106	0.0021	0.0084

106	0.0106	0.0021	0.0085
107	0.0107	0.0021	0.0085
108	0.0107	0.0022	0.0086
109	0.0108	0.0022	0.0087
110	0.0109	0.0022	0.0087
111	0.0110	0.0022	0.0088
112	0.0110	0.0022	0.0088
113	0.0111	0.0022	0.0089
114	0.0112	0.0022	0.0089
115	0.0113	0.0023	0.0090
116	0.0113	0.0023	0.0090
117	0.0114	0.0023	0.0091
118	0.0115	0.0023	0.0092
119	0.0116	0.0023	0.0092
120	0.0116	0.0023	0.0093
121	0.0117	0.0024	0.0094
122	0.0118	0.0024	0.0094
123	0.0119	0.0024	0.0095
124	0.0120	0.0024	0.0096
125	0.0121	0.0024	0.0097
126	0.0121	0.0024	0.0097
127	0.0123	0.0025	0.0098
128	0.0123	0.0025	0.0099
129	0.0125	0.0025	0.0100
130	0.0125	0.0025	0.0100
131	0.0127	0.0025	0.0101
132	0.0128	0.0026	0.0102
133	0.0129	0.0026	0.0103
134	0.0130	0.0026	0.0104
135	0.0131	0.0026	0.0105
136	0.0132	0.0027	0.0106
137	0.0134	0.0027	0.0107
138	0.0135	0.0027	0.0108
139	0.0136	0.0027	0.0109
140	0.0137	0.0028	0.0110
141	0.0139	0.0028	0.0111
142	0.0140	0.0028	0.0112
143	0.0142	0.0028	0.0113
144	0.0143	0.0029	0.0114
145	0.0125	0.0025	0.0100
146	0.0126	0.0025	0.0100
147	0.0128	0.0026	0.0102
148	0.0129	0.0026	0.0103
149	0.0131	0.0026	0.0105
150	0.0132	0.0027	0.0106
151	0.0135	0.0027	0.0108
152	0.0136	0.0027	0.0109
153	0.0139	0.0028	0.0111
154	0.0140	0.0028	0.0112
155	0.0143	0.0029	0.0114
156	0.0144	0.0029	0.0115
157	0.0148	0.0030	0.0118
158	0.0149	0.0030	0.0119
159	0.0153	0.0031	0.0122
160	0.0154	0.0031	0.0123
161	0.0158	0.0032	0.0127
162	0.0160	0.0032	0.0128
163	0.0164	0.0033	0.0131
164	0.0167	0.0033	0.0133
165	0.0171	0.0034	0.0137

166	0.0174	0.0035	0.0139
167	0.0179	0.0036	0.0143
168	0.0182	0.0036	0.0145
169	0.0188	0.0038	0.0150
170	0.0191	0.0038	0.0153
171	0.0198	0.0040	0.0158
172	0.0202	0.0040	0.0161
173	0.0209	0.0042	0.0167
174	0.0214	0.0043	0.0171
175	0.0223	0.0045	0.0178
176	0.0228	0.0046	0.0182
177	0.0239	0.0048	0.0191
178	0.0245	0.0049	0.0196
179	0.0259	0.0052	0.0207
180	0.0267	0.0054	0.0213
181	0.0284	0.0057	0.0227
182	0.0294	0.0059	0.0235
183	0.0318	0.0064	0.0254
184	0.0331	0.0066	0.0265
185	0.0265	0.0053	0.0212
186	0.0283	0.0057	0.0226
187	0.0328	0.0066	0.0262
188	0.0358	0.0072	0.0286
189	0.0445	0.0089	0.0356
190	0.0513	0.0103	0.0410
191	0.0778	0.0109	0.0669
192	0.1129	0.0109	0.1020
193	0.4886	0.0109	0.4777
194	0.0612	0.0109	0.0503
195	0.0396	0.0079	0.0316
196	0.0303	0.0061	0.0242
197	0.0347	0.0070	0.0277
198	0.0305	0.0061	0.0244
199	0.0275	0.0055	0.0220
200	0.0252	0.0051	0.0202
201	0.0234	0.0047	0.0187
202	0.0218	0.0044	0.0174
203	0.0205	0.0041	0.0164
204	0.0194	0.0039	0.0155
205	0.0185	0.0037	0.0148
206	0.0176	0.0035	0.0141
207	0.0169	0.0034	0.0135
208	0.0162	0.0033	0.0130
209	0.0156	0.0031	0.0125
210	0.0151	0.0030	0.0121
211	0.0146	0.0029	0.0117
212	0.0141	0.0028	0.0113
213	0.0137	0.0028	0.0110
214	0.0133	0.0027	0.0107
215	0.0130	0.0026	0.0104
216	0.0127	0.0025	0.0101
217	0.0144	0.0029	0.0115
218	0.0141	0.0028	0.0113
219	0.0138	0.0028	0.0110
220	0.0135	0.0027	0.0108
221	0.0133	0.0027	0.0106
222	0.0131	0.0026	0.0104
223	0.0128	0.0026	0.0103
224	0.0126	0.0025	0.0101
225	0.0124	0.0025	0.0099

226	0.0122	0.0025	0.0098
227	0.0120	0.0024	0.0096
228	0.0118	0.0024	0.0095
229	0.0117	0.0023	0.0093
230	0.0115	0.0023	0.0092
231	0.0114	0.0023	0.0091
232	0.0112	0.0022	0.0090
233	0.0111	0.0022	0.0088
234	0.0109	0.0022	0.0087
235	0.0108	0.0022	0.0086
236	0.0107	0.0021	0.0085
237	0.0105	0.0021	0.0084
238	0.0104	0.0021	0.0083
239	0.0103	0.0021	0.0082
240	0.0102	0.0020	0.0081
241	0.0101	0.0020	0.0080
242	0.0100	0.0020	0.0080
243	0.0099	0.0020	0.0079
244	0.0098	0.0020	0.0078
245	0.0097	0.0019	0.0077
246	0.0096	0.0019	0.0076
247	0.0095	0.0019	0.0076
248	0.0094	0.0019	0.0075
249	0.0093	0.0019	0.0074
250	0.0092	0.0018	0.0074
251	0.0091	0.0018	0.0073
252	0.0090	0.0018	0.0072
253	0.0090	0.0018	0.0072
254	0.0089	0.0018	0.0071
255	0.0088	0.0018	0.0070
256	0.0087	0.0018	0.0070
257	0.0087	0.0017	0.0069
258	0.0086	0.0017	0.0069
259	0.0085	0.0017	0.0068
260	0.0085	0.0017	0.0068
261	0.0084	0.0017	0.0067
262	0.0083	0.0017	0.0067
263	0.0083	0.0017	0.0066
264	0.0082	0.0016	0.0066
265	0.0082	0.0016	0.0065
266	0.0081	0.0016	0.0065
267	0.0080	0.0016	0.0064
268	0.0080	0.0016	0.0064
269	0.0079	0.0016	0.0063
270	0.0079	0.0016	0.0063
271	0.0078	0.0016	0.0063
272	0.0078	0.0016	0.0062
273	0.0077	0.0016	0.0062
274	0.0077	0.0015	0.0061
275	0.0076	0.0015	0.0061
276	0.0076	0.0015	0.0061
277	0.0075	0.0015	0.0060
278	0.0075	0.0015	0.0060
279	0.0074	0.0015	0.0059
280	0.0074	0.0015	0.0059
281	0.0074	0.0015	0.0059
282	0.0073	0.0015	0.0058
283	0.0073	0.0015	0.0058
284	0.0072	0.0015	0.0058
285	0.0072	0.0014	0.0057

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286          0.0071          0.0014          0.0057
287          0.0071          0.0014          0.0057
288          0.0071          0.0014          0.0057
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Total soil rain loss =      0.74(In)
Total effective rainfall =      3.47(In)
Peak flow rate in flood hydrograph =      18.50(CFS)
-----
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                24 - H O U R      S T O R M
              R u n o f f      H y d r o g r a p h
-----
--
                Hydrograph in    5    Minute intervals ((CFS))
-----
--
Time(h+m) Volume Ac.Ft    Q(CFS)  0          5.0          10.0          15.0
20.0
-----
|  0+ 5          0.0002          0.02  Q          |          |          |
|  0+10          0.0015          0.19  Q          |          |          |
|  0+15          0.0038          0.35  Q          |          |          |
|  0+20          0.0067          0.42  Q          |          |          |
|  0+25          0.0098          0.46  Q          |          |          |
|  0+30          0.0132          0.48  Q          |          |          |
|  0+35          0.0166          0.50  VQ         |          |          |
|  0+40          0.0202          0.52  VQ         |          |          |
|  0+45          0.0238          0.53  VQ         |          |          |
|  0+50          0.0275          0.54  VQ         |          |          |
|  0+55          0.0313          0.54  VQ         |          |          |
|  1+ 0          0.0351          0.55  VQ         |          |          |
|  1+ 5          0.0389          0.55  VQ         |          |          |
|  1+10          0.0427          0.56  VQ         |          |          |
|  1+15          0.0466          0.56  VQ         |          |          |
|  1+20          0.0505          0.56  VQ         |          |          |
|  1+25          0.0544          0.57  VQ         |          |          |
|

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	1+30	0.0583	0.57	Q			
	1+35	0.0622	0.57	Q			
	1+40	0.0661	0.57	Q			
	1+45	0.0700	0.57	Q			
	1+50	0.0740	0.57	Q			
	1+55	0.0780	0.58	Q			
	2+ 0	0.0819	0.58	Q			
	2+ 5	0.0859	0.58	Q			
	2+10	0.0899	0.58	Q			
	2+15	0.0939	0.58	Q			
	2+20	0.0979	0.58	Q			
	2+25	0.1020	0.59	Q			
	2+30	0.1060	0.59	Q			
	2+35	0.1101	0.59	Q			
	2+40	0.1142	0.59	Q			
	2+45	0.1182	0.59	QV			
	2+50	0.1223	0.60	QV			
	2+55	0.1265	0.60	QV			
	3+ 0	0.1306	0.60	QV			
	3+ 5	0.1347	0.60	QV			
	3+10	0.1389	0.60	QV			
	3+15	0.1430	0.60	QV			
	3+20	0.1472	0.61	QV			
	3+25	0.1514	0.61	QV			
	3+30	0.1556	0.61	QV			
	3+35	0.1598	0.61	QV			
	3+40	0.1641	0.62	QV			
	3+45	0.1683	0.62	QV			
	3+50	0.1726	0.62	QV			
	3+55	0.1769	0.62	Q V			

4+ 0	0.1812	0.62	Q V			
4+ 5	0.1855	0.63	Q V			
4+10	0.1898	0.63	Q V			
4+15	0.1942	0.63	Q V			
4+20	0.1985	0.63	Q V			
4+25	0.2029	0.64	Q V			
4+30	0.2073	0.64	Q V			
4+35	0.2117	0.64	Q V			
4+40	0.2161	0.64	Q V			
4+45	0.2205	0.64	Q V			
4+50	0.2250	0.65	Q V			
4+55	0.2295	0.65	Q V			
5+ 0	0.2340	0.65	Q V			
5+ 5	0.2385	0.65	Q V			
5+10	0.2430	0.66	Q V			
5+15	0.2475	0.66	Q V			
5+20	0.2521	0.66	Q V			
5+25	0.2567	0.66	Q V			
5+30	0.2613	0.67	Q V			
5+35	0.2659	0.67	Q V			
5+40	0.2705	0.67	Q V			
5+45	0.2752	0.68	Q V			
5+50	0.2798	0.68	Q V			
5+55	0.2845	0.68	Q V			
6+ 0	0.2892	0.68	Q V			
6+ 5	0.2940	0.69	Q V			
6+10	0.2987	0.69	Q V			
6+15	0.3035	0.69	Q V			
6+20	0.3083	0.70	Q V			
6+25	0.3131	0.70	Q V			

6+30	0.3179	0.70	Q	V			
6+35	0.3228	0.70	Q	V			
6+40	0.3277	0.71	Q	V			
6+45	0.3326	0.71	Q	V			
6+50	0.3375	0.71	Q	V			
6+55	0.3424	0.72	Q	V			
7+ 0	0.3474	0.72	Q	V			
7+ 5	0.3524	0.72	Q	V			
7+10	0.3574	0.73	Q	V			
7+15	0.3624	0.73	Q	V			
7+20	0.3675	0.73	Q	V			
7+25	0.3726	0.74	Q	V			
7+30	0.3777	0.74	Q	V			
7+35	0.3828	0.75	Q	V			
7+40	0.3880	0.75	Q	V			
7+45	0.3932	0.75	Q	V			
7+50	0.3984	0.76	Q	V			
7+55	0.4036	0.76	Q	V			
8+ 0	0.4089	0.77	Q	V			
8+ 5	0.4142	0.77	Q	V			
8+10	0.4195	0.77	Q	V			
8+15	0.4249	0.78	Q	V			
8+20	0.4303	0.78	Q	V			
8+25	0.4357	0.79	Q	V			
8+30	0.4411	0.79	Q	V			
8+35	0.4466	0.79	Q	V			
8+40	0.4521	0.80	Q	V			
8+45	0.4576	0.80	Q	V			
8+50	0.4632	0.81	Q	V			
8+55	0.4688	0.81	Q	V			

9+ 0	0.4744	0.82	Q	V		
9+ 5	0.4801	0.82	Q	V		
9+10	0.4858	0.83	Q	V		
9+15	0.4915	0.83	Q	V		
9+20	0.4973	0.84	Q	V		
9+25	0.5031	0.84	Q	V		
9+30	0.5089	0.85	Q	V		
9+35	0.5148	0.85	Q	V		
9+40	0.5207	0.86	Q	V		
9+45	0.5267	0.87	Q	V		
9+50	0.5327	0.87	Q	V		
9+55	0.5387	0.88	Q	V		
10+ 0	0.5448	0.88	Q	V		
10+ 5	0.5509	0.89	Q	V		
10+10	0.5571	0.90	Q	V		
10+15	0.5633	0.90	Q	V		
10+20	0.5696	0.91	Q	V		
10+25	0.5759	0.91	Q	V		
10+30	0.5822	0.92	Q	V		
10+35	0.5886	0.93	Q	V		
10+40	0.5950	0.94	Q	V		
10+45	0.6015	0.94	Q	V		
10+50	0.6081	0.95	Q	V		
10+55	0.6147	0.96	Q	V		
11+ 0	0.6213	0.97	Q	V		
11+ 5	0.6280	0.97	Q	V		
11+10	0.6348	0.98	Q	V		
11+15	0.6416	0.99	Q	V		
11+20	0.6485	1.00	Q	V		
11+25	0.6554	1.01	Q	V		

	11+30	0.6624	1.02	Q	V		
	11+35	0.6695	1.03	Q	V		
	11+40	0.6766	1.04	Q	V		
	11+45	0.6838	1.05	Q	V		
	11+50	0.6911	1.06	Q	V		
	11+55	0.6984	1.07	Q	V		
	12+ 0	0.7059	1.08	Q	V		
	12+ 5	0.7133	1.08	Q	V		
	12+10	0.7205	1.04	Q	V		
	12+15	0.7274	1.01	Q	V		
	12+20	0.7344	1.00	Q	V		
	12+25	0.7413	1.00	Q	V		
	12+30	0.7482	1.01	Q	V		
	12+35	0.7552	1.02	Q	V		
	12+40	0.7623	1.03	Q	V		
	12+45	0.7694	1.04	Q	V		
	12+50	0.7766	1.05	Q	V		
	12+55	0.7839	1.06	Q	V		
	13+ 0	0.7914	1.08	Q	V		
	13+ 5	0.7989	1.09	Q	V		
	13+10	0.8065	1.11	Q	V		
	13+15	0.8143	1.13	Q	V		
	13+20	0.8222	1.15	Q	V		
	13+25	0.8302	1.16	Q	V		
	13+30	0.8384	1.18	Q	V		
	13+35	0.8467	1.21	Q	V		
	13+40	0.8551	1.23	Q	V		
	13+45	0.8637	1.25	Q	V		
	13+50	0.8725	1.28	Q	V		
	13+55	0.8815	1.30	Q	V		

14+ 0	0.8907	1.33	Q		V		
14+ 5	0.9000	1.36	Q		V		
14+10	0.9096	1.39	Q		V		
14+15	0.9195	1.43	Q		V		
14+20	0.9295	1.46	Q		V		
14+25	0.9398	1.50	Q		V		
14+30	0.9505	1.54	Q		V		
14+35	0.9614	1.58	Q		V		
14+40	0.9726	1.63	Q		V		
14+45	0.9842	1.68	Q		V		
14+50	0.9962	1.74	Q		V		
14+55	1.0086	1.80	Q		V		
15+ 0	1.0215	1.87	Q		V		
15+ 5	1.0349	1.95	Q		V		
15+10	1.0490	2.04	Q		V		
15+15	1.0636	2.13	Q		V		
15+20	1.0791	2.24	Q		V		
15+25	1.0952	2.34	Q		V		
15+30	1.1108	2.26	Q		V		
15+35	1.1260	2.21	Q		V		
15+40	1.1420	2.33	Q		V		
15+45	1.1594	2.53	Q		V		
15+50	1.1792	2.86	Q		V		
15+55	1.2024	3.38	Q		V		
16+ 0	1.2338	4.55	Q		V		
16+ 5	1.2892	8.05			Q	V	
16+10	1.4166	18.50				V	Q
16+15	1.5352	17.22				V	Q
16+20	1.6014	9.61			Q	V	
16+25	1.6472	6.64		Q		V	

16+30	1.6835	5.27		Q		V
16+35	1.7134	4.35		Q		V
16+40	1.7390	3.72		Q		V
16+45	1.7611	3.20		Q		V
16+50	1.7803	2.79		Q		V
16+55	1.7970	2.42		Q		V
17+ 0	1.8118	2.16		Q		V
17+ 5	1.8259	2.05		Q		V
17+10	1.8388	1.88		Q		V
17+15	1.8505	1.70		Q		V
17+20	1.8606	1.46		Q		V
17+25	1.8701	1.38		Q		V
17+30	1.8792	1.32		Q		V
17+35	1.8879	1.27		Q		V
17+40	1.8963	1.22		Q		V
17+45	1.9044	1.17		Q		V
17+50	1.9122	1.13		Q		V
17+55	1.9198	1.10		Q		V
18+ 0	1.9271	1.06		Q		V
18+ 5	1.9343	1.04		Q		V
18+10	1.9416	1.06		Q		V
18+15	1.9490	1.08		Q		V
18+20	1.9564	1.07		Q		V
18+25	1.9637	1.06		Q		V
18+30	1.9710	1.05		Q		V
18+35	1.9781	1.03		Q		V
18+40	1.9851	1.02		Q		V
18+45	1.9920	1.00		Q		V
18+50	1.9988	0.99		Q		V
18+55	2.0055	0.97		Q		V

19+ 0	2.0120	0.96	Q				V
19+ 5	2.0185	0.94	Q				V
19+10	2.0249	0.93	Q				V
19+15	2.0312	0.92	Q				V
19+20	2.0374	0.90	Q				V
19+25	2.0436	0.89	Q				V
19+30	2.0496	0.88	Q				V
19+35	2.0556	0.87	Q				V
19+40	2.0614	0.85	Q				V
19+45	2.0672	0.84	Q				V
19+50	2.0730	0.83	Q				V
19+55	2.0786	0.82	Q				V
20+ 0	2.0842	0.81	Q				V
20+ 5	2.0898	0.80	Q				V
20+10	2.0953	0.79	Q				V
20+15	2.1007	0.79	Q				V
20+20	2.1060	0.78	Q				V
20+25	2.1113	0.77	Q				V
20+30	2.1166	0.76	Q				V
20+35	2.1217	0.75	Q				V
20+40	2.1269	0.75	Q				V
20+45	2.1320	0.74	Q				V
20+50	2.1370	0.73	Q				V
20+55	2.1420	0.72	Q				V
21+ 0	2.1469	0.72	Q				V
21+ 5	2.1518	0.71	Q				V
21+10	2.1567	0.70	Q				V
21+15	2.1615	0.70	Q				V
21+20	2.1663	0.69	Q				V
21+25	2.1710	0.69	Q				V

	21+30	2.1757	0.68	Q				V
	21+35	2.1803	0.68	Q				V
	21+40	2.1849	0.67	Q				V
	21+45	2.1895	0.66	Q				V
	21+50	2.1941	0.66	Q				V
	21+55	2.1986	0.65	Q				V
	22+ 0	2.2030	0.65	Q				V
	22+ 5	2.2075	0.64	Q				V
	22+10	2.2119	0.64	Q				V
	22+15	2.2163	0.63	Q				V
	22+20	2.2206	0.63	Q				V
	22+25	2.2249	0.63	Q				V
	22+30	2.2292	0.62	Q				V
	22+35	2.2334	0.62	Q				V
	22+40	2.2377	0.61	Q				V
	22+45	2.2418	0.61	Q				V
	22+50	2.2460	0.60	Q				V
	22+55	2.2501	0.60	Q				V
	23+ 0	2.2543	0.60	Q				V
	23+ 5	2.2583	0.59	Q				
V	23+10	2.2624	0.59	Q				
V	23+15	2.2664	0.59	Q				
V	23+20	2.2704	0.58	Q				
V	23+25	2.2744	0.58	Q				
V	23+30	2.2784	0.57	Q				
V	23+35	2.2823	0.57	Q				
V	23+40	2.2862	0.57	Q				
V	23+45	2.2901	0.56	Q				
V	23+50	2.2940	0.56	Q				
V	23+55	2.2978	0.56	Q				
V								

V	24+ 0	2.3017	0.56	Q			
V	24+ 5	2.3053	0.53	Q			
V	24+10	2.3078	0.36	Q			
V	24+15	2.3092	0.20	Q			
V	24+20	2.3101	0.13	Q			
V	24+25	2.3107	0.09	Q			
V	24+30	2.3112	0.07	Q			
V	24+35	2.3115	0.05	Q			
V	24+40	2.3118	0.03	Q			
V	24+45	2.3119	0.02	Q			
V	24+50	2.3120	0.02	Q			
V	24+55	2.3121	0.01	Q			
V	25+ 0	2.3122	0.01	Q			
V	25+ 5	2.3122	0.00	Q			
V	25+10	2.3122	0.00	Q			
V							

Unit Hydrograph Analysis

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7.0

Study date 10/15/21

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

Program License Serial Number 6232

ASTER CACTUS
SCS UNIT HYDROGRAPH
100YR 24 HR
AREA A3

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Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
6.80	1	1.03

--		
Rainfall data for year 100		
6.80	6	2.16

--		
Rainfall data for year 100		
6.80	24	4.21

--		
++++++		
++		

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

Fm	SCS curve No.(AMCII) (In/Hr)	SCS curve NO.(AMC 3) (In/Hr)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)
	60.0	79.0	6.80	1.000	0.387	0.500
0.193						

Area-averaged adjusted loss rate Fm (In/Hr) = 0.193

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
3.40	0.500	60.0	79.0	2.66	0.507
3.40	0.500	98.0	98.0	0.20	0.944

Area-averaged catchment yield fraction, Y = 0.726

Area-averaged low loss fraction, Yb = 0.274

User entry of time of concentration = 0.270 (hours)

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Watershed area = 6.80(Ac.)
 Catchment Lag time = 0.216 hours
 Unit interval = 5.000 minutes
 Unit interval percentage of lag time = 38.5802
 Hydrograph baseflow = 0.00(CFS)
 Average maximum watershed loss rate(Fm) = 0.193(In/Hr)
 Average low loss rate fraction (Yb) = 0.274 (decimal)
 DESERT S-Graph Selected
 Computed peak 5-minute rainfall = 0.489(In)
 Computed peak 30-minute rainfall = 0.837(In)
 Specified peak 1-hour rainfall = 1.030(In)
 Computed peak 3-hour rainfall = 1.622(In)
 Specified peak 6-hour rainfall = 2.160(In)
 Specified peak 24-hour rainfall = 4.210(In)

Rainfall depth area reduction factors:

Using a total area of 6.80(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000	Adjusted rainfall = 0.489(In)
30-minute factor = 1.000	Adjusted rainfall = 0.836(In)
1-hour factor = 1.000	Adjusted rainfall = 1.030(In)
3-hour factor = 1.000	Adjusted rainfall = 1.622(In)
6-hour factor = 1.000	Adjusted rainfall = 2.160(In)
24-hour factor = 1.000	Adjusted rainfall = 4.210(In)

Unit Hydrograph

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Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
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(K = 82.24 (CFS))

1	2.595	2.134
2	17.110	11.937
3	47.025	24.601
4	64.168	14.098
5	73.585	7.744
6	79.873	5.171
7	84.321	3.658
8	87.824	2.881
9	90.350	2.078
10	92.386	1.674
11	94.047	1.366
12	95.367	1.086
13	96.438	0.881
14	97.275	0.688
15	97.884	0.501
16	98.288	0.332
17	98.739	0.371
18	99.202	0.381
19	99.584	0.314
20	99.827	0.200
21	100.000	0.142

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.4886	0.4886
2	0.6015	0.1129
3	0.6793	0.0778
4	0.7406	0.0612
5	0.7918	0.0513
6	0.8364	0.0445
7	0.8759	0.0396
8	0.9117	0.0358
9	0.9445	0.0328
10	0.9749	0.0303
11	1.0031	0.0283
12	1.0297	0.0265
13	1.0643	0.0347
14	1.0975	0.0331
15	1.1292	0.0318
16	1.1598	0.0305
17	1.1892	0.0294
18	1.2177	0.0284
19	1.2452	0.0275
20	1.2719	0.0267
21	1.2978	0.0259
22	1.3230	0.0252
23	1.3476	0.0245
24	1.3715	0.0239
25	1.3948	0.0234
26	1.4177	0.0228
27	1.4400	0.0223
28	1.4618	0.0218
29	1.4831	0.0214
30	1.5041	0.0209
31	1.5246	0.0205
32	1.5448	0.0202
33	1.5646	0.0198
34	1.5840	0.0194

35	1.6031	0.0191
36	1.6219	0.0188
37	1.6403	0.0185
38	1.6585	0.0182
39	1.6764	0.0179
40	1.6941	0.0176
41	1.7114	0.0174
42	1.7286	0.0171
43	1.7455	0.0169
44	1.7621	0.0167
45	1.7786	0.0164
46	1.7948	0.0162
47	1.8108	0.0160
48	1.8267	0.0158
49	1.8423	0.0156
50	1.8578	0.0154
51	1.8730	0.0153
52	1.8881	0.0151
53	1.9030	0.0149
54	1.9178	0.0148
55	1.9324	0.0146
56	1.9468	0.0144
57	1.9611	0.0143
58	1.9753	0.0141
59	1.9893	0.0140
60	2.0032	0.0139
61	2.0169	0.0137
62	2.0305	0.0136
63	2.0440	0.0135
64	2.0573	0.0133
65	2.0705	0.0132
66	2.0837	0.0131
67	2.0966	0.0130
68	2.1095	0.0129
69	2.1223	0.0128
70	2.1349	0.0127
71	2.1475	0.0126
72	2.1600	0.0125
73	2.1743	0.0144
74	2.1886	0.0143
75	2.2028	0.0142
76	2.2169	0.0141
77	2.2309	0.0140
78	2.2448	0.0139
79	2.2586	0.0138
80	2.2723	0.0137
81	2.2860	0.0136
82	2.2995	0.0135
83	2.3130	0.0135
84	2.3263	0.0134
85	2.3396	0.0133
86	2.3528	0.0132
87	2.3660	0.0131
88	2.3790	0.0131
89	2.3920	0.0130
90	2.4049	0.0129
91	2.4177	0.0128
92	2.4305	0.0128
93	2.4432	0.0127
94	2.4558	0.0126

95	2.4683	0.0125
96	2.4808	0.0125
97	2.4932	0.0124
98	2.5055	0.0123
99	2.5178	0.0123
100	2.5300	0.0122
101	2.5422	0.0121
102	2.5543	0.0121
103	2.5663	0.0120
104	2.5783	0.0120
105	2.5902	0.0119
106	2.6020	0.0118
107	2.6138	0.0118
108	2.6255	0.0117
109	2.6372	0.0117
110	2.6488	0.0116
111	2.6604	0.0116
112	2.6719	0.0115
113	2.6834	0.0115
114	2.6948	0.0114
115	2.7061	0.0114
116	2.7174	0.0113
117	2.7287	0.0113
118	2.7399	0.0112
119	2.7510	0.0112
120	2.7621	0.0111
121	2.7732	0.0111
122	2.7842	0.0110
123	2.7952	0.0110
124	2.8061	0.0109
125	2.8169	0.0109
126	2.8278	0.0108
127	2.8386	0.0108
128	2.8493	0.0107
129	2.8600	0.0107
130	2.8706	0.0107
131	2.8812	0.0106
132	2.8918	0.0106
133	2.9023	0.0105
134	2.9128	0.0105
135	2.9233	0.0104
136	2.9337	0.0104
137	2.9440	0.0104
138	2.9544	0.0103
139	2.9646	0.0103
140	2.9749	0.0102
141	2.9851	0.0102
142	2.9953	0.0102
143	3.0054	0.0101
144	3.0155	0.0101
145	3.0256	0.0101
146	3.0356	0.0100
147	3.0456	0.0100
148	3.0556	0.0100
149	3.0655	0.0099
150	3.0754	0.0099
151	3.0852	0.0099
152	3.0950	0.0098
153	3.1048	0.0098
154	3.1146	0.0098

155	3.1243	0.0097
156	3.1340	0.0097
157	3.1436	0.0097
158	3.1533	0.0096
159	3.1628	0.0096
160	3.1724	0.0096
161	3.1819	0.0095
162	3.1914	0.0095
163	3.2009	0.0095
164	3.2103	0.0094
165	3.2198	0.0094
166	3.2291	0.0094
167	3.2385	0.0093
168	3.2478	0.0093
169	3.2571	0.0093
170	3.2664	0.0093
171	3.2756	0.0092
172	3.2848	0.0092
173	3.2940	0.0092
174	3.3031	0.0092
175	3.3123	0.0091
176	3.3214	0.0091
177	3.3304	0.0091
178	3.3395	0.0090
179	3.3485	0.0090
180	3.3575	0.0090
181	3.3665	0.0090
182	3.3754	0.0089
183	3.3843	0.0089
184	3.3932	0.0089
185	3.4021	0.0089
186	3.4109	0.0088
187	3.4197	0.0088
188	3.4285	0.0088
189	3.4373	0.0088
190	3.4460	0.0087
191	3.4547	0.0087
192	3.4634	0.0087
193	3.4721	0.0087
194	3.4808	0.0086
195	3.4894	0.0086
196	3.4980	0.0086
197	3.5066	0.0086
198	3.5151	0.0086
199	3.5237	0.0085
200	3.5322	0.0085
201	3.5407	0.0085
202	3.5491	0.0085
203	3.5576	0.0084
204	3.5660	0.0084
205	3.5744	0.0084
206	3.5828	0.0084
207	3.5912	0.0084
208	3.5995	0.0083
209	3.6078	0.0083
210	3.6161	0.0083
211	3.6244	0.0083
212	3.6327	0.0083
213	3.6409	0.0082
214	3.6491	0.0082

215	3.6573	0.0082
216	3.6655	0.0082
217	3.6737	0.0082
218	3.6818	0.0081
219	3.6899	0.0081
220	3.6980	0.0081
221	3.7061	0.0081
222	3.7142	0.0081
223	3.7222	0.0080
224	3.7302	0.0080
225	3.7382	0.0080
226	3.7462	0.0080
227	3.7542	0.0080
228	3.7622	0.0080
229	3.7701	0.0079
230	3.7780	0.0079
231	3.7859	0.0079
232	3.7938	0.0079
233	3.8016	0.0079
234	3.8095	0.0078
235	3.8173	0.0078
236	3.8251	0.0078
237	3.8329	0.0078
238	3.8407	0.0078
239	3.8485	0.0078
240	3.8562	0.0077
241	3.8639	0.0077
242	3.8716	0.0077
243	3.8793	0.0077
244	3.8870	0.0077
245	3.8947	0.0077
246	3.9023	0.0076
247	3.9099	0.0076
248	3.9176	0.0076
249	3.9252	0.0076
250	3.9327	0.0076
251	3.9403	0.0076
252	3.9479	0.0075
253	3.9554	0.0075
254	3.9629	0.0075
255	3.9704	0.0075
256	3.9779	0.0075
257	3.9854	0.0075
258	3.9928	0.0075
259	4.0003	0.0074
260	4.0077	0.0074
261	4.0151	0.0074
262	4.0225	0.0074
263	4.0299	0.0074
264	4.0373	0.0074
265	4.0446	0.0074
266	4.0520	0.0073
267	4.0593	0.0073
268	4.0666	0.0073
269	4.0739	0.0073
270	4.0812	0.0073
271	4.0884	0.0073
272	4.0957	0.0073
273	4.1029	0.0072
274	4.1102	0.0072

275	4.1174	0.0072
276	4.1246	0.0072
277	4.1318	0.0072
278	4.1389	0.0072
279	4.1461	0.0072
280	4.1533	0.0071
281	4.1604	0.0071
282	4.1675	0.0071
283	4.1746	0.0071
284	4.1817	0.0071
285	4.1888	0.0071
286	4.1959	0.0071
287	4.2029	0.0071
288	4.2100	0.0070

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0070	0.0019	0.0051
2	0.0071	0.0019	0.0051
3	0.0071	0.0019	0.0051
4	0.0071	0.0019	0.0051
5	0.0071	0.0020	0.0052
6	0.0071	0.0020	0.0052
7	0.0072	0.0020	0.0052
8	0.0072	0.0020	0.0052
9	0.0072	0.0020	0.0052
10	0.0072	0.0020	0.0052
11	0.0072	0.0020	0.0053
12	0.0073	0.0020	0.0053
13	0.0073	0.0020	0.0053
14	0.0073	0.0020	0.0053
15	0.0073	0.0020	0.0053
16	0.0073	0.0020	0.0053
17	0.0074	0.0020	0.0053
18	0.0074	0.0020	0.0054
19	0.0074	0.0020	0.0054
20	0.0074	0.0020	0.0054
21	0.0075	0.0020	0.0054
22	0.0075	0.0021	0.0054
23	0.0075	0.0021	0.0054
24	0.0075	0.0021	0.0055
25	0.0075	0.0021	0.0055
26	0.0076	0.0021	0.0055
27	0.0076	0.0021	0.0055
28	0.0076	0.0021	0.0055
29	0.0076	0.0021	0.0055
30	0.0077	0.0021	0.0056
31	0.0077	0.0021	0.0056
32	0.0077	0.0021	0.0056
33	0.0077	0.0021	0.0056
34	0.0078	0.0021	0.0056
35	0.0078	0.0021	0.0057
36	0.0078	0.0021	0.0057
37	0.0078	0.0022	0.0057
38	0.0079	0.0022	0.0057
39	0.0079	0.0022	0.0057

40	0.0079	0.0022	0.0057
41	0.0080	0.0022	0.0058
42	0.0080	0.0022	0.0058
43	0.0080	0.0022	0.0058
44	0.0080	0.0022	0.0058
45	0.0081	0.0022	0.0059
46	0.0081	0.0022	0.0059
47	0.0081	0.0022	0.0059
48	0.0081	0.0022	0.0059
49	0.0082	0.0022	0.0059
50	0.0082	0.0022	0.0059
51	0.0082	0.0023	0.0060
52	0.0083	0.0023	0.0060
53	0.0083	0.0023	0.0060
54	0.0083	0.0023	0.0060
55	0.0084	0.0023	0.0061
56	0.0084	0.0023	0.0061
57	0.0084	0.0023	0.0061
58	0.0084	0.0023	0.0061
59	0.0085	0.0023	0.0062
60	0.0085	0.0023	0.0062
61	0.0086	0.0023	0.0062
62	0.0086	0.0024	0.0062
63	0.0086	0.0024	0.0063
64	0.0086	0.0024	0.0063
65	0.0087	0.0024	0.0063
66	0.0087	0.0024	0.0063
67	0.0088	0.0024	0.0064
68	0.0088	0.0024	0.0064
69	0.0088	0.0024	0.0064
70	0.0089	0.0024	0.0064
71	0.0089	0.0024	0.0065
72	0.0089	0.0025	0.0065
73	0.0090	0.0025	0.0065
74	0.0090	0.0025	0.0065
75	0.0091	0.0025	0.0066
76	0.0091	0.0025	0.0066
77	0.0092	0.0025	0.0066
78	0.0092	0.0025	0.0067
79	0.0092	0.0025	0.0067
80	0.0093	0.0025	0.0067
81	0.0093	0.0026	0.0068
82	0.0093	0.0026	0.0068
83	0.0094	0.0026	0.0068
84	0.0094	0.0026	0.0068
85	0.0095	0.0026	0.0069
86	0.0095	0.0026	0.0069
87	0.0096	0.0026	0.0070
88	0.0096	0.0026	0.0070
89	0.0097	0.0027	0.0070
90	0.0097	0.0027	0.0071
91	0.0098	0.0027	0.0071
92	0.0098	0.0027	0.0071
93	0.0099	0.0027	0.0072
94	0.0099	0.0027	0.0072
95	0.0100	0.0027	0.0073
96	0.0100	0.0028	0.0073
97	0.0101	0.0028	0.0073
98	0.0101	0.0028	0.0074
99	0.0102	0.0028	0.0074

100	0.0102	0.0028	0.0074
101	0.0103	0.0028	0.0075
102	0.0104	0.0028	0.0075
103	0.0104	0.0029	0.0076
104	0.0105	0.0029	0.0076
105	0.0106	0.0029	0.0077
106	0.0106	0.0029	0.0077
107	0.0107	0.0029	0.0078
108	0.0107	0.0029	0.0078
109	0.0108	0.0030	0.0079
110	0.0109	0.0030	0.0079
111	0.0110	0.0030	0.0080
112	0.0110	0.0030	0.0080
113	0.0111	0.0030	0.0081
114	0.0112	0.0031	0.0081
115	0.0113	0.0031	0.0082
116	0.0113	0.0031	0.0082
117	0.0114	0.0031	0.0083
118	0.0115	0.0031	0.0083
119	0.0116	0.0032	0.0084
120	0.0116	0.0032	0.0084
121	0.0117	0.0032	0.0085
122	0.0118	0.0032	0.0086
123	0.0119	0.0033	0.0086
124	0.0120	0.0033	0.0087
125	0.0121	0.0033	0.0088
126	0.0121	0.0033	0.0088
127	0.0123	0.0034	0.0089
128	0.0123	0.0034	0.0090
129	0.0125	0.0034	0.0091
130	0.0125	0.0034	0.0091
131	0.0127	0.0035	0.0092
132	0.0128	0.0035	0.0093
133	0.0129	0.0035	0.0094
134	0.0130	0.0036	0.0094
135	0.0131	0.0036	0.0095
136	0.0132	0.0036	0.0096
137	0.0134	0.0037	0.0097
138	0.0135	0.0037	0.0098
139	0.0136	0.0037	0.0099
140	0.0137	0.0038	0.0100
141	0.0139	0.0038	0.0101
142	0.0140	0.0038	0.0102
143	0.0142	0.0039	0.0103
144	0.0143	0.0039	0.0104
145	0.0125	0.0034	0.0090
146	0.0126	0.0034	0.0091
147	0.0128	0.0035	0.0093
148	0.0129	0.0035	0.0093
149	0.0131	0.0036	0.0095
150	0.0132	0.0036	0.0096
151	0.0135	0.0037	0.0098
152	0.0136	0.0037	0.0099
153	0.0139	0.0038	0.0101
154	0.0140	0.0038	0.0102
155	0.0143	0.0039	0.0104
156	0.0144	0.0040	0.0105
157	0.0148	0.0040	0.0107
158	0.0149	0.0041	0.0108
159	0.0153	0.0042	0.0111

160	0.0154	0.0042	0.0112
161	0.0158	0.0043	0.0115
162	0.0160	0.0044	0.0116
163	0.0164	0.0045	0.0119
164	0.0167	0.0046	0.0121
165	0.0171	0.0047	0.0124
166	0.0174	0.0048	0.0126
167	0.0179	0.0049	0.0130
168	0.0182	0.0050	0.0132
169	0.0188	0.0052	0.0136
170	0.0191	0.0052	0.0139
171	0.0198	0.0054	0.0144
172	0.0202	0.0055	0.0146
173	0.0209	0.0057	0.0152
174	0.0214	0.0059	0.0155
175	0.0223	0.0061	0.0162
176	0.0228	0.0063	0.0166
177	0.0239	0.0066	0.0174
178	0.0245	0.0067	0.0178
179	0.0259	0.0071	0.0188
180	0.0267	0.0073	0.0194
181	0.0284	0.0078	0.0206
182	0.0294	0.0081	0.0214
183	0.0318	0.0087	0.0230
184	0.0331	0.0091	0.0240
185	0.0265	0.0073	0.0193
186	0.0283	0.0078	0.0205
187	0.0328	0.0090	0.0238
188	0.0358	0.0098	0.0260
189	0.0445	0.0122	0.0323
190	0.0513	0.0141	0.0372
191	0.0778	0.0161	0.0617
192	0.1129	0.0161	0.0968
193	0.4886	0.0161	0.4725
194	0.0612	0.0161	0.0451
195	0.0396	0.0109	0.0287
196	0.0303	0.0083	0.0220
197	0.0347	0.0095	0.0251
198	0.0305	0.0084	0.0222
199	0.0275	0.0076	0.0200
200	0.0252	0.0069	0.0183
201	0.0234	0.0064	0.0169
202	0.0218	0.0060	0.0158
203	0.0205	0.0056	0.0149
204	0.0194	0.0053	0.0141
205	0.0185	0.0051	0.0134
206	0.0176	0.0048	0.0128
207	0.0169	0.0046	0.0123
208	0.0162	0.0045	0.0118
209	0.0156	0.0043	0.0113
210	0.0151	0.0041	0.0110
211	0.0146	0.0040	0.0106
212	0.0141	0.0039	0.0103
213	0.0137	0.0038	0.0100
214	0.0133	0.0037	0.0097
215	0.0130	0.0036	0.0094
216	0.0127	0.0035	0.0092
217	0.0144	0.0039	0.0104
218	0.0141	0.0039	0.0102
219	0.0138	0.0038	0.0100

220	0.0135	0.0037	0.0098
221	0.0133	0.0036	0.0096
222	0.0131	0.0036	0.0095
223	0.0128	0.0035	0.0093
224	0.0126	0.0035	0.0092
225	0.0124	0.0034	0.0090
226	0.0122	0.0034	0.0089
227	0.0120	0.0033	0.0087
228	0.0118	0.0033	0.0086
229	0.0117	0.0032	0.0085
230	0.0115	0.0032	0.0084
231	0.0114	0.0031	0.0082
232	0.0112	0.0031	0.0081
233	0.0111	0.0030	0.0080
234	0.0109	0.0030	0.0079
235	0.0108	0.0030	0.0078
236	0.0107	0.0029	0.0077
237	0.0105	0.0029	0.0076
238	0.0104	0.0029	0.0075
239	0.0103	0.0028	0.0075
240	0.0102	0.0028	0.0074
241	0.0101	0.0028	0.0073
242	0.0100	0.0027	0.0072
243	0.0099	0.0027	0.0071
244	0.0098	0.0027	0.0071
245	0.0097	0.0026	0.0070
246	0.0096	0.0026	0.0069
247	0.0095	0.0026	0.0069
248	0.0094	0.0026	0.0068
249	0.0093	0.0025	0.0067
250	0.0092	0.0025	0.0067
251	0.0091	0.0025	0.0066
252	0.0090	0.0025	0.0066
253	0.0090	0.0025	0.0065
254	0.0089	0.0024	0.0065
255	0.0088	0.0024	0.0064
256	0.0087	0.0024	0.0063
257	0.0087	0.0024	0.0063
258	0.0086	0.0024	0.0062
259	0.0085	0.0023	0.0062
260	0.0085	0.0023	0.0061
261	0.0084	0.0023	0.0061
262	0.0083	0.0023	0.0061
263	0.0083	0.0023	0.0060
264	0.0082	0.0023	0.0060
265	0.0082	0.0022	0.0059
266	0.0081	0.0022	0.0059
267	0.0080	0.0022	0.0058
268	0.0080	0.0022	0.0058
269	0.0079	0.0022	0.0058
270	0.0079	0.0022	0.0057
271	0.0078	0.0021	0.0057
272	0.0078	0.0021	0.0056
273	0.0077	0.0021	0.0056
274	0.0077	0.0021	0.0056
275	0.0076	0.0021	0.0055
276	0.0076	0.0021	0.0055
277	0.0075	0.0021	0.0055
278	0.0075	0.0021	0.0054
279	0.0074	0.0020	0.0054

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280          0.0074          0.0020          0.0054
281          0.0074          0.0020          0.0053
282          0.0073          0.0020          0.0053
283          0.0073          0.0020          0.0053
284          0.0072          0.0020          0.0052
285          0.0072          0.0020          0.0052
286          0.0071          0.0020          0.0052
287          0.0071          0.0020          0.0052
288          0.0071          0.0019          0.0051
-----
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--
Total soil rain loss =      1.02(In)
Total effective rainfall =      3.19(In)
Peak flow rate in flood hydrograph =      14.66(CFS)
-----
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++++
++
                24 - H O U R      S T O R M
                R u n o f f      H y d r o g r a p h
-----
--
                Hydrograph in    5    Minute intervals ((CFS))
-----
--
Time(h+m) Volume Ac.Ft    Q(CFS)  0          5.0          10.0          15.0
20.0
-----
|  0+ 5          0.0001          0.01  Q          |          |          |
|  0+10          0.0006          0.07  Q          |          |          |
|  0+15          0.0019          0.20  Q          |          |          |
|  0+20          0.0038          0.27  Q          |          |          |
|  0+25          0.0059          0.31  Q          |          |          |
|  0+30          0.0083          0.34  Q          |          |          |
|  0+35          0.0107          0.36  Q          |          |          |
|  0+40          0.0133          0.37  Q          |          |          |
|  0+45          0.0159          0.38  Q          |          |          |
|  0+50          0.0187          0.39  Q          |          |          |
|  0+55          0.0214          0.40  Q          |          |          |
|  1+ 0          0.0243          0.41  Q          |          |          |
|  1+ 5          0.0271          0.41  Q          |          |          |
|  1+10          0.0300          0.42  Q          |          |          |
|

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1+15	0.0329	0.42	Q			
1+20	0.0359	0.43	Q			
1+25	0.0388	0.43	Q			
1+30	0.0418	0.43	Q			
1+35	0.0448	0.44	Q			
1+40	0.0478	0.44	QV			
1+45	0.0508	0.44	QV			
1+50	0.0539	0.44	QV			
1+55	0.0569	0.44	QV			
2+ 0	0.0600	0.44	QV			
2+ 5	0.0630	0.45	QV			
2+10	0.0661	0.45	QV			
2+15	0.0692	0.45	QV			
2+20	0.0723	0.45	QV			
2+25	0.0754	0.45	QV			
2+30	0.0785	0.45	QV			
2+35	0.0816	0.45	QV			
2+40	0.0848	0.45	QV			
2+45	0.0879	0.46	QV			
2+50	0.0911	0.46	Q V			
2+55	0.0942	0.46	Q V			
3+ 0	0.0974	0.46	Q V			
3+ 5	0.1006	0.46	Q V			
3+10	0.1038	0.46	Q V			
3+15	0.1070	0.47	Q V			
3+20	0.1102	0.47	Q V			
3+25	0.1134	0.47	Q V			
3+30	0.1166	0.47	Q V			
3+35	0.1199	0.47	Q V			
3+40	0.1232	0.47	Q V			

	3+45	0.1264	0.47	Q V			
	3+50	0.1297	0.48	Q V			
	3+55	0.1330	0.48	Q V			
	4+ 0	0.1363	0.48	Q V			
	4+ 5	0.1396	0.48	Q V			
	4+10	0.1429	0.48	Q V			
	4+15	0.1463	0.48	Q V			
	4+20	0.1496	0.49	Q V			
	4+25	0.1530	0.49	Q V			
	4+30	0.1564	0.49	Q V			
	4+35	0.1597	0.49	Q V			
	4+40	0.1631	0.49	Q V			
	4+45	0.1666	0.50	Q V			
	4+50	0.1700	0.50	Q V			
	4+55	0.1734	0.50	Q V			
	5+ 0	0.1769	0.50	Q V			
	5+ 5	0.1803	0.50	Q V			
	5+10	0.1838	0.50	Q V			
	5+15	0.1873	0.51	Q V			
	5+20	0.1908	0.51	Q V			
	5+25	0.1943	0.51	Q V			
	5+30	0.1979	0.51	Q V			
	5+35	0.2014	0.51	Q V			
	5+40	0.2050	0.52	Q V			
	5+45	0.2085	0.52	Q V			
	5+50	0.2121	0.52	Q V			
	5+55	0.2157	0.52	Q V			
	6+ 0	0.2193	0.53	Q V			
	6+ 5	0.2230	0.53	Q V			
	6+10	0.2266	0.53	Q V			

6+15	0.2303	0.53	Q	V			
6+20	0.2340	0.53	Q	V			
6+25	0.2377	0.54	Q	V			
6+30	0.2414	0.54	Q	V			
6+35	0.2451	0.54	Q	V			
6+40	0.2489	0.54	Q	V			
6+45	0.2526	0.55	Q	V			
6+50	0.2564	0.55	Q	V			
6+55	0.2602	0.55	Q	V			
7+ 0	0.2640	0.55	Q	V			
7+ 5	0.2678	0.56	Q	V			
7+10	0.2717	0.56	Q	V			
7+15	0.2756	0.56	Q	V			
7+20	0.2795	0.56	Q	V			
7+25	0.2834	0.57	Q	V			
7+30	0.2873	0.57	Q	V			
7+35	0.2912	0.57	Q	V			
7+40	0.2952	0.58	Q	V			
7+45	0.2992	0.58	Q	V			
7+50	0.3032	0.58	Q	V			
7+55	0.3072	0.58	Q	V			
8+ 0	0.3112	0.59	Q	V			
8+ 5	0.3153	0.59	Q	V			
8+10	0.3194	0.59	Q	V			
8+15	0.3235	0.60	Q	V			
8+20	0.3276	0.60	Q	V			
8+25	0.3318	0.60	Q	V			
8+30	0.3360	0.61	Q	V			
8+35	0.3402	0.61	Q	V			
8+40	0.3444	0.61	Q	V			

	8+45	0.3486	0.62	Q	V			
	8+50	0.3529	0.62	Q	V			
	8+55	0.3572	0.62	Q	V			
	9+ 0	0.3615	0.63	Q	V			
	9+ 5	0.3659	0.63	Q	V			
	9+10	0.3702	0.63	Q	V			
	9+15	0.3746	0.64	Q	V			
	9+20	0.3790	0.64	Q	V			
	9+25	0.3835	0.65	Q	V			
	9+30	0.3880	0.65	Q	V			
	9+35	0.3925	0.65	Q	V			
	9+40	0.3970	0.66	Q	V			
	9+45	0.4016	0.66	Q	V			
	9+50	0.4062	0.67	Q	V			
	9+55	0.4108	0.67	Q	V			
	10+ 0	0.4155	0.68	Q	V			
	10+ 5	0.4202	0.68	Q	V			
	10+10	0.4249	0.69	Q	V			
	10+15	0.4296	0.69	Q	V			
	10+20	0.4344	0.70	Q	V			
	10+25	0.4393	0.70	Q	V			
	10+30	0.4441	0.71	Q	V			
	10+35	0.4490	0.71	Q	V			
	10+40	0.4539	0.72	Q	V			
	10+45	0.4589	0.72	Q	V			
	10+50	0.4639	0.73	Q	V			
	10+55	0.4690	0.73	Q	V			
	11+ 0	0.4741	0.74	Q	V			
	11+ 5	0.4792	0.75	Q	V			
	11+10	0.4844	0.75	Q	V			

	11+15	0.4896	0.76	Q	V		
	11+20	0.4949	0.76	Q	V		
	11+25	0.5002	0.77	Q	V		
	11+30	0.5055	0.78	Q	V		
	11+35	0.5109	0.78	Q	V		
	11+40	0.5164	0.79	Q	V		
	11+45	0.5219	0.80	Q	V		
	11+50	0.5274	0.81	Q	V		
	11+55	0.5330	0.81	Q	V		
	12+ 0	0.5387	0.82	Q	V		
	12+ 5	0.5444	0.83	Q	V		
	12+10	0.5500	0.82	Q	V		
	12+15	0.5555	0.79	Q	V		
	12+20	0.5609	0.78	Q	V		
	12+25	0.5662	0.78	Q	V		
	12+30	0.5716	0.78	Q	V		
	12+35	0.5769	0.78	Q	V		
	12+40	0.5824	0.79	Q	V		
	12+45	0.5879	0.80	Q	V		
	12+50	0.5934	0.80	Q	V		
	12+55	0.5990	0.81	Q	V		
	13+ 0	0.6047	0.82	Q	V		
	13+ 5	0.6104	0.83	Q	V		
	13+10	0.6162	0.85	Q	V		
	13+15	0.6221	0.86	Q	V		
	13+20	0.6281	0.87	Q	V		
	13+25	0.6342	0.89	Q	V		
	13+30	0.6404	0.90	Q	V		
	13+35	0.6468	0.92	Q	V		
	13+40	0.6532	0.93	Q	V		

13+45	0.6597	0.95	Q		V		
13+50	0.6664	0.97	Q		V		
13+55	0.6732	0.99	Q		V		
14+ 0	0.6801	1.01	Q		V		
14+ 5	0.6872	1.03	Q		V		
14+10	0.6944	1.05	Q		V		
14+15	0.7018	1.08	Q		V		
14+20	0.7094	1.10	Q		V		
14+25	0.7172	1.13	Q		V		
14+30	0.7252	1.16	Q		V		
14+35	0.7334	1.19	Q		V		
14+40	0.7418	1.23	Q		V		
14+45	0.7505	1.26	Q		V		
14+50	0.7595	1.30	Q		V		
14+55	0.7688	1.35	Q		V		
15+ 0	0.7784	1.40	Q		V		
15+ 5	0.7884	1.45	Q		V		
15+10	0.7988	1.51	Q		V		
15+15	0.8097	1.58	Q		V		
15+20	0.8211	1.66	Q		V		
15+25	0.8331	1.73	Q		V		
15+30	0.8451	1.75	Q		V		
15+35	0.8568	1.70	Q		V		
15+40	0.8687	1.73	Q		V		
15+45	0.8815	1.85	Q		V		
15+50	0.8955	2.04	Q		V		
15+55	0.9118	2.36	Q		V		
16+ 0	0.9323	2.98	Q		V		
16+ 5	0.9663	4.94		Q		V	
16+10	1.0339	9.81			Q	V	

16+15	1.1349	14.66					V	Q
16+20	1.2016	9.68				Q	V	
16+25	1.2456	6.40			Q		V	
16+30	1.2793	4.89			Q		V	
16+35	1.3072	4.04			Q		V	
16+40	1.3313	3.50			Q		V	
16+45	1.3517	2.97		Q			V	
16+50	1.3698	2.62		Q			V	
16+55	1.3859	2.34		Q			V	
17+ 0	1.4003	2.09		Q			V	
17+ 5	1.4133	1.89		Q			V	
17+10	1.4251	1.70		Q			V	
17+15	1.4356	1.54		Q			V	
17+20	1.4453	1.40		Q			V	
17+25	1.4546	1.35		Q			V	
17+30	1.4635	1.29		Q			V	
17+35	1.4718	1.21		Q			V	
17+40	1.4794	1.10		Q			V	
17+45	1.4865	1.03		Q			V	
17+50	1.4928	0.93	Q				V	
17+55	1.4990	0.89	Q				V	
18+ 0	1.5049	0.86	Q				V	
18+ 5	1.5107	0.84	Q				V	
18+10	1.5164	0.83	Q				V	
18+15	1.5222	0.84	Q				V	
18+20	1.5280	0.84	Q				V	
18+25	1.5337	0.83	Q				V	
18+30	1.5394	0.82	Q				V	
18+35	1.5449	0.81	Q				V	
18+40	1.5504	0.80	Q				V	

	18+45	1.5558	0.78	Q				V
	18+50	1.5611	0.77	Q				V
	18+55	1.5664	0.76	Q				V
	19+ 0	1.5715	0.75	Q				V
	19+ 5	1.5766	0.74	Q				V
	19+10	1.5816	0.73	Q				V
	19+15	1.5866	0.72	Q				V
	19+20	1.5914	0.71	Q				V
	19+25	1.5962	0.70	Q				V
	19+30	1.6010	0.69	Q				V
	19+35	1.6056	0.68	Q				V
	19+40	1.6102	0.67	Q				V
	19+45	1.6148	0.66	Q				V
	19+50	1.6193	0.65	Q				V
	19+55	1.6237	0.64	Q				V
	20+ 0	1.6281	0.64	Q				V
	20+ 5	1.6324	0.63	Q				V
	20+10	1.6367	0.62	Q				V
	20+15	1.6409	0.61	Q				V
	20+20	1.6451	0.61	Q				V
	20+25	1.6493	0.60	Q				V
	20+30	1.6534	0.59	Q				V
	20+35	1.6574	0.59	Q				V
	20+40	1.6614	0.58	Q				V
	20+45	1.6654	0.58	Q				V
	20+50	1.6693	0.57	Q				V
	20+55	1.6732	0.57	Q				V
	21+ 0	1.6771	0.56	Q				V
	21+ 5	1.6809	0.55	Q				V
	21+10	1.6847	0.55	Q				V

	21+15	1.6884	0.54	Q				V
	21+20	1.6921	0.54	Q				V
	21+25	1.6958	0.54	Q				V
	21+30	1.6995	0.53	Q				V
	21+35	1.7031	0.53	Q				V
	21+40	1.7067	0.52	Q				V
	21+45	1.7103	0.52	Q				V
	21+50	1.7138	0.51	Q				V
	21+55	1.7173	0.51	Q				V
	22+ 0	1.7208	0.51	Q				V
	22+ 5	1.7242	0.50	Q				V
	22+10	1.7277	0.50	Q				V
	22+15	1.7311	0.49	Q				V
	22+20	1.7344	0.49	Q				V
	22+25	1.7378	0.49	Q				V
	22+30	1.7411	0.48	Q				V
	22+35	1.7444	0.48	Q				V
	22+40	1.7477	0.48	Q				V
	22+45	1.7510	0.47	Q				V
	22+50	1.7542	0.47	Q				V
	22+55	1.7574	0.47	Q				V
	23+ 0	1.7606	0.46	Q				V
	23+ 5	1.7638	0.46	Q				
V	23+10	1.7670	0.46	Q				
V	23+15	1.7701	0.46	Q				
V	23+20	1.7732	0.45	Q				
V	23+25	1.7763	0.45	Q				
V	23+30	1.7794	0.45	Q				
V	23+35	1.7824	0.44	Q				
V	23+40	1.7855	0.44	Q				
V								

V	23+45	1.7885	0.44	Q			
V	23+50	1.7915	0.44	Q			
V	23+55	1.7945	0.43	Q			
V	24+ 0	1.7975	0.43	Q			
V	24+ 5	1.8003	0.42	Q			
V	24+10	1.8028	0.35	Q			
V	24+15	1.8043	0.23	Q			
V	24+20	1.8054	0.15	Q			
V	24+25	1.8062	0.11	Q			
V	24+30	1.8068	0.09	Q			
V	24+35	1.8072	0.07	Q			
V	24+40	1.8076	0.05	Q			
V	24+45	1.8079	0.04	Q			
V	24+50	1.8081	0.03	Q			
V	24+55	1.8083	0.03	Q			
V	25+ 0	1.8084	0.02	Q			
V	25+ 5	1.8085	0.02	Q			
V	25+10	1.8086	0.01	Q			
V	25+15	1.8087	0.01	Q			
V	25+20	1.8087	0.01	Q			
V	25+25	1.8088	0.01	Q			
V	25+30	1.8088	0.00	Q			
V	25+35	1.8088	0.00	Q			
V	25+40	1.8088	0.00	Q			
V							

Unit Hydrograph Analysis

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7.0

Study date 10/15/21

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

Program License Serial Number 6232

ASTER CACTUS
SCS UNIT HYDROGRAPH
100 YR 24HR
AREA B

--

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 10		
18.00	1	0.60

--
Rainfall data for year 2
18.00 6 0.79

--
Rainfall data for year 2
18.00 24 1.41

--
Rainfall data for year 100
18.00 1 1.03

```

--
Rainfall data for year 100
      18.00      6      2.16
-----
--
Rainfall data for year 100
      18.00     24      4.21
-----
--
++++
++

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

Fm      SCS curve   SCS curve      Area      Area      Fp(Fig C6)   Ap
(In/Hr) No.(AMCII) NO.(AMC 3)   (Ac.)     Fraction   (In/Hr)   (dec.)
      69.0      86.2      18.00      1.000      0.262      0.500
0.131

Area-averaged adjusted loss rate Fm (In/Hr) =  0.131

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

Area      Area      SCS CN      SCS CN      S      Pervious
(Ac.)      Fract      (AMC2)      (AMC3)      S      Yield Fr
      9.00      0.500      69.0      86.2      1.60      0.655
      9.00      0.500      98.0      98.0      0.20      0.944

Area-averaged catchment yield fraction, Y =  0.799
Area-averaged low loss fraction, Yb =  0.201
User entry of time of concentration =  0.293 (hours)
++++
++

Watershed area =      18.00(Ac.)
Catchment Lag time =  0.234 hours
Unit interval =  5.000 minutes
Unit interval percentage of lag time = 35.5518
Hydrograph baseflow =  0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.131(In/Hr)
Average low loss rate fraction (Yb) = 0.201 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.489(In)
Computed peak 30-minute rainfall =  0.837(In)
Specified peak 1-hour rainfall =  1.030(In)
Computed peak 3-hour rainfall =  1.622(In)
Specified peak 6-hour rainfall =  2.160(In)
Specified peak 24-hour rainfall =  4.210(In)

Rainfall depth area reduction factors:
Using a total area of      18.00(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999      Adjusted rainfall =  0.488(In)
30-minute factor = 0.999     Adjusted rainfall =  0.836(In)
1-hour factor = 0.999        Adjusted rainfall =  1.029(In)
3-hour factor = 1.000        Adjusted rainfall =  1.622(In)
6-hour factor = 1.000        Adjusted rainfall =  2.160(In)

```

24-hour factor = 1.000 Adjusted rainfall = 4.210(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 = 217.69 (CFS))

1	2.287	4.979
2	13.927	25.337
3	41.955	61.015
4	60.701	40.808
5	70.742	21.857
6	77.449	14.602
7	82.211	10.366
8	85.877	7.980
9	88.763	6.282
10	90.909	4.671
11	92.704	3.907
12	94.190	3.235
13	95.393	2.619
14	96.379	2.146
15	97.178	1.741
16	97.779	1.307
17	98.167	0.844
18	98.566	0.869
19	98.992	0.929
20	99.409	0.907
21	99.680	0.590
22	100.000	0.295

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.4883	0.4883
2	0.6012	0.1129
3	0.6790	0.0778
4	0.7402	0.0612
5	0.7914	0.0512
6	0.8359	0.0445
7	0.8755	0.0396
8	0.9113	0.0358
9	0.9440	0.0328
10	0.9744	0.0303
11	1.0026	0.0283
12	1.0291	0.0265
13	1.0638	0.0347
14	1.0969	0.0331
15	1.1287	0.0318
16	1.1593	0.0306
17	1.1888	0.0295
18	1.2172	0.0285
19	1.2448	0.0276
20	1.2715	0.0267
21	1.2974	0.0259

22	1.3227	0.0252
23	1.3472	0.0246
24	1.3712	0.0239
25	1.3945	0.0234
26	1.4174	0.0228
27	1.4397	0.0223
28	1.4615	0.0218
29	1.4829	0.0214
30	1.5039	0.0210
31	1.5244	0.0206
32	1.5446	0.0202
33	1.5644	0.0198
34	1.5838	0.0195
35	1.6030	0.0191
36	1.6218	0.0188
37	1.6402	0.0185
38	1.6584	0.0182
39	1.6763	0.0179
40	1.6940	0.0176
41	1.7113	0.0174
42	1.7285	0.0171
43	1.7454	0.0169
44	1.7620	0.0167
45	1.7785	0.0164
46	1.7947	0.0162
47	1.8107	0.0160
48	1.8266	0.0158
49	1.8422	0.0156
50	1.8577	0.0154
51	1.8729	0.0153
52	1.8880	0.0151
53	1.9029	0.0149
54	1.9177	0.0148
55	1.9323	0.0146
56	1.9468	0.0144
57	1.9610	0.0143
58	1.9752	0.0141
59	1.9892	0.0140
60	2.0031	0.0139
61	2.0168	0.0137
62	2.0304	0.0136
63	2.0439	0.0135
64	2.0572	0.0133
65	2.0705	0.0132
66	2.0836	0.0131
67	2.0966	0.0130
68	2.1094	0.0129
69	2.1222	0.0128
70	2.1349	0.0127
71	2.1474	0.0126
72	2.1599	0.0125
73	2.1743	0.0144
74	2.1886	0.0143
75	2.2027	0.0142
76	2.2168	0.0141
77	2.2308	0.0140
78	2.2447	0.0139
79	2.2585	0.0138
80	2.2723	0.0137
81	2.2859	0.0136

82	2.2994	0.0135
83	2.3129	0.0135
84	2.3263	0.0134
85	2.3396	0.0133
86	2.3528	0.0132
87	2.3659	0.0131
88	2.3789	0.0131
89	2.3919	0.0130
90	2.4048	0.0129
91	2.4177	0.0128
92	2.4304	0.0128
93	2.4431	0.0127
94	2.4557	0.0126
95	2.4682	0.0125
96	2.4807	0.0125
97	2.4931	0.0124
98	2.5055	0.0123
99	2.5177	0.0123
100	2.5300	0.0122
101	2.5421	0.0121
102	2.5542	0.0121
103	2.5662	0.0120
104	2.5782	0.0120
105	2.5901	0.0119
106	2.6019	0.0118
107	2.6137	0.0118
108	2.6254	0.0117
109	2.6371	0.0117
110	2.6487	0.0116
111	2.6603	0.0116
112	2.6718	0.0115
113	2.6833	0.0115
114	2.6947	0.0114
115	2.7060	0.0114
116	2.7173	0.0113
117	2.7286	0.0113
118	2.7398	0.0112
119	2.7509	0.0112
120	2.7620	0.0111
121	2.7731	0.0111
122	2.7841	0.0110
123	2.7951	0.0110
124	2.8060	0.0109
125	2.8169	0.0109
126	2.8277	0.0108
127	2.8385	0.0108
128	2.8492	0.0107
129	2.8599	0.0107
130	2.8706	0.0107
131	2.8812	0.0106
132	2.8917	0.0106
133	2.9023	0.0105
134	2.9127	0.0105
135	2.9232	0.0104
136	2.9336	0.0104
137	2.9440	0.0104
138	2.9543	0.0103
139	2.9646	0.0103
140	2.9748	0.0102
141	2.9850	0.0102

142	2.9952	0.0102
143	3.0053	0.0101
144	3.0154	0.0101
145	3.0255	0.0101
146	3.0355	0.0100
147	3.0455	0.0100
148	3.0555	0.0100
149	3.0654	0.0099
150	3.0753	0.0099
151	3.0851	0.0099
152	3.0950	0.0098
153	3.1047	0.0098
154	3.1145	0.0098
155	3.1242	0.0097
156	3.1339	0.0097
157	3.1436	0.0097
158	3.1532	0.0096
159	3.1628	0.0096
160	3.1723	0.0096
161	3.1819	0.0095
162	3.1914	0.0095
163	3.2008	0.0095
164	3.2103	0.0094
165	3.2197	0.0094
166	3.2291	0.0094
167	3.2384	0.0094
168	3.2477	0.0093
169	3.2570	0.0093
170	3.2663	0.0093
171	3.2755	0.0092
172	3.2847	0.0092
173	3.2939	0.0092
174	3.3031	0.0092
175	3.3122	0.0091
176	3.3213	0.0091
177	3.3304	0.0091
178	3.3394	0.0090
179	3.3484	0.0090
180	3.3574	0.0090
181	3.3664	0.0090
182	3.3753	0.0089
183	3.3842	0.0089
184	3.3931	0.0089
185	3.4020	0.0089
186	3.4108	0.0088
187	3.4197	0.0088
188	3.4284	0.0088
189	3.4372	0.0088
190	3.4460	0.0087
191	3.4547	0.0087
192	3.4634	0.0087
193	3.4720	0.0087
194	3.4807	0.0086
195	3.4893	0.0086
196	3.4979	0.0086
197	3.5065	0.0086
198	3.5151	0.0086
199	3.5236	0.0085
200	3.5321	0.0085
201	3.5406	0.0085

202	3.5491	0.0085
203	3.5575	0.0084
204	3.5659	0.0084
205	3.5743	0.0084
206	3.5827	0.0084
207	3.5911	0.0084
208	3.5994	0.0083
209	3.6078	0.0083
210	3.6161	0.0083
211	3.6243	0.0083
212	3.6326	0.0083
213	3.6408	0.0082
214	3.6490	0.0082
215	3.6572	0.0082
216	3.6654	0.0082
217	3.6736	0.0082
218	3.6817	0.0081
219	3.6898	0.0081
220	3.6979	0.0081
221	3.7060	0.0081
222	3.7141	0.0081
223	3.7221	0.0080
224	3.7302	0.0080
225	3.7382	0.0080
226	3.7462	0.0080
227	3.7541	0.0080
228	3.7621	0.0080
229	3.7700	0.0079
230	3.7779	0.0079
231	3.7858	0.0079
232	3.7937	0.0079
233	3.8016	0.0079
234	3.8094	0.0078
235	3.8173	0.0078
236	3.8251	0.0078
237	3.8329	0.0078
238	3.8406	0.0078
239	3.8484	0.0078
240	3.8561	0.0077
241	3.8639	0.0077
242	3.8716	0.0077
243	3.8793	0.0077
244	3.8869	0.0077
245	3.8946	0.0077
246	3.9023	0.0076
247	3.9099	0.0076
248	3.9175	0.0076
249	3.9251	0.0076
250	3.9327	0.0076
251	3.9402	0.0076
252	3.9478	0.0075
253	3.9553	0.0075
254	3.9628	0.0075
255	3.9703	0.0075
256	3.9778	0.0075
257	3.9853	0.0075
258	3.9928	0.0075
259	4.0002	0.0074
260	4.0076	0.0074
261	4.0150	0.0074

262	4.0224	0.0074	
263	4.0298	0.0074	
264	4.0372	0.0074	
265	4.0446	0.0074	
266	4.0519	0.0073	
267	4.0592	0.0073	
268	4.0665	0.0073	
269	4.0738	0.0073	
270	4.0811	0.0073	
271	4.0884	0.0073	
272	4.0956	0.0073	
273	4.1029	0.0072	
274	4.1101	0.0072	
275	4.1173	0.0072	
276	4.1245	0.0072	
277	4.1317	0.0072	
278	4.1389	0.0072	
279	4.1460	0.0072	
280	4.1532	0.0071	
281	4.1603	0.0071	
282	4.1675	0.0071	
283	4.1746	0.0071	
284	4.1817	0.0071	
285	4.1887	0.0071	
286	4.1958	0.0071	
287	4.2029	0.0071	
288	4.2099	0.0070	

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

	1	0.0070	0.0014
	2	0.0071	0.0014
	3	0.0071	0.0014
	4	0.0071	0.0014
	5	0.0071	0.0014
	6	0.0071	0.0014
	7	0.0072	0.0014
	8	0.0072	0.0014
	9	0.0072	0.0014
	10	0.0072	0.0014
	11	0.0072	0.0015
	12	0.0073	0.0015
	13	0.0073	0.0015
	14	0.0073	0.0015
	15	0.0073	0.0015
	16	0.0073	0.0015
	17	0.0074	0.0015
	18	0.0074	0.0015
	19	0.0074	0.0015
	20	0.0074	0.0015
	21	0.0075	0.0015
	22	0.0075	0.0015
	23	0.0075	0.0015
	24	0.0075	0.0015
	25	0.0075	0.0015
	26	0.0076	0.0015

27	0.0076	0.0015	0.0061
28	0.0076	0.0015	0.0061
29	0.0076	0.0015	0.0061
30	0.0077	0.0015	0.0061
31	0.0077	0.0015	0.0061
32	0.0077	0.0015	0.0062
33	0.0077	0.0016	0.0062
34	0.0078	0.0016	0.0062
35	0.0078	0.0016	0.0062
36	0.0078	0.0016	0.0062
37	0.0078	0.0016	0.0063
38	0.0079	0.0016	0.0063
39	0.0079	0.0016	0.0063
40	0.0079	0.0016	0.0063
41	0.0080	0.0016	0.0064
42	0.0080	0.0016	0.0064
43	0.0080	0.0016	0.0064
44	0.0080	0.0016	0.0064
45	0.0081	0.0016	0.0064
46	0.0081	0.0016	0.0065
47	0.0081	0.0016	0.0065
48	0.0081	0.0016	0.0065
49	0.0082	0.0016	0.0065
50	0.0082	0.0016	0.0066
51	0.0082	0.0017	0.0066
52	0.0083	0.0017	0.0066
53	0.0083	0.0017	0.0066
54	0.0083	0.0017	0.0067
55	0.0084	0.0017	0.0067
56	0.0084	0.0017	0.0067
57	0.0084	0.0017	0.0067
58	0.0084	0.0017	0.0068
59	0.0085	0.0017	0.0068
60	0.0085	0.0017	0.0068
61	0.0086	0.0017	0.0068
62	0.0086	0.0017	0.0069
63	0.0086	0.0017	0.0069
64	0.0086	0.0017	0.0069
65	0.0087	0.0017	0.0070
66	0.0087	0.0017	0.0070
67	0.0088	0.0018	0.0070
68	0.0088	0.0018	0.0070
69	0.0088	0.0018	0.0071
70	0.0089	0.0018	0.0071
71	0.0089	0.0018	0.0071
72	0.0089	0.0018	0.0071
73	0.0090	0.0018	0.0072
74	0.0090	0.0018	0.0072
75	0.0091	0.0018	0.0073
76	0.0091	0.0018	0.0073
77	0.0092	0.0018	0.0073
78	0.0092	0.0018	0.0073
79	0.0092	0.0019	0.0074
80	0.0093	0.0019	0.0074
81	0.0093	0.0019	0.0075
82	0.0094	0.0019	0.0075
83	0.0094	0.0019	0.0075
84	0.0094	0.0019	0.0075
85	0.0095	0.0019	0.0076
86	0.0095	0.0019	0.0076

87	0.0096	0.0019	0.0077
88	0.0096	0.0019	0.0077
89	0.0097	0.0019	0.0077
90	0.0097	0.0020	0.0078
91	0.0098	0.0020	0.0078
92	0.0098	0.0020	0.0078
93	0.0099	0.0020	0.0079
94	0.0099	0.0020	0.0079
95	0.0100	0.0020	0.0080
96	0.0100	0.0020	0.0080
97	0.0101	0.0020	0.0081
98	0.0101	0.0020	0.0081
99	0.0102	0.0020	0.0082
100	0.0102	0.0021	0.0082
101	0.0103	0.0021	0.0083
102	0.0104	0.0021	0.0083
103	0.0104	0.0021	0.0083
104	0.0105	0.0021	0.0084
105	0.0106	0.0021	0.0084
106	0.0106	0.0021	0.0085
107	0.0107	0.0021	0.0085
108	0.0107	0.0022	0.0086
109	0.0108	0.0022	0.0087
110	0.0109	0.0022	0.0087
111	0.0110	0.0022	0.0088
112	0.0110	0.0022	0.0088
113	0.0111	0.0022	0.0089
114	0.0112	0.0022	0.0089
115	0.0113	0.0023	0.0090
116	0.0113	0.0023	0.0090
117	0.0114	0.0023	0.0091
118	0.0115	0.0023	0.0092
119	0.0116	0.0023	0.0092
120	0.0116	0.0023	0.0093
121	0.0117	0.0024	0.0094
122	0.0118	0.0024	0.0094
123	0.0119	0.0024	0.0095
124	0.0120	0.0024	0.0096
125	0.0121	0.0024	0.0097
126	0.0121	0.0024	0.0097
127	0.0123	0.0025	0.0098
128	0.0123	0.0025	0.0099
129	0.0125	0.0025	0.0100
130	0.0125	0.0025	0.0100
131	0.0127	0.0025	0.0101
132	0.0128	0.0026	0.0102
133	0.0129	0.0026	0.0103
134	0.0130	0.0026	0.0104
135	0.0131	0.0026	0.0105
136	0.0132	0.0027	0.0106
137	0.0134	0.0027	0.0107
138	0.0135	0.0027	0.0108
139	0.0136	0.0027	0.0109
140	0.0137	0.0028	0.0110
141	0.0139	0.0028	0.0111
142	0.0140	0.0028	0.0112
143	0.0142	0.0028	0.0113
144	0.0143	0.0029	0.0114
145	0.0125	0.0025	0.0100
146	0.0126	0.0025	0.0100

147	0.0128	0.0026	0.0102
148	0.0129	0.0026	0.0103
149	0.0131	0.0026	0.0105
150	0.0132	0.0027	0.0106
151	0.0135	0.0027	0.0108
152	0.0136	0.0027	0.0109
153	0.0139	0.0028	0.0111
154	0.0140	0.0028	0.0112
155	0.0143	0.0029	0.0114
156	0.0144	0.0029	0.0115
157	0.0148	0.0030	0.0118
158	0.0149	0.0030	0.0119
159	0.0153	0.0031	0.0122
160	0.0154	0.0031	0.0123
161	0.0158	0.0032	0.0127
162	0.0160	0.0032	0.0128
163	0.0164	0.0033	0.0131
164	0.0167	0.0033	0.0133
165	0.0171	0.0034	0.0137
166	0.0174	0.0035	0.0139
167	0.0179	0.0036	0.0143
168	0.0182	0.0036	0.0145
169	0.0188	0.0038	0.0150
170	0.0191	0.0038	0.0153
171	0.0198	0.0040	0.0158
172	0.0202	0.0040	0.0161
173	0.0210	0.0042	0.0168
174	0.0214	0.0043	0.0171
175	0.0223	0.0045	0.0178
176	0.0228	0.0046	0.0182
177	0.0239	0.0048	0.0191
178	0.0246	0.0049	0.0196
179	0.0259	0.0052	0.0207
180	0.0267	0.0054	0.0214
181	0.0285	0.0057	0.0228
182	0.0295	0.0059	0.0236
183	0.0318	0.0064	0.0254
184	0.0331	0.0067	0.0265
185	0.0265	0.0053	0.0212
186	0.0283	0.0057	0.0226
187	0.0328	0.0066	0.0262
188	0.0358	0.0072	0.0286
189	0.0445	0.0089	0.0356
190	0.0512	0.0103	0.0410
191	0.0778	0.0109	0.0669
192	0.1129	0.0109	0.1020
193	0.4883	0.0109	0.4774
194	0.0612	0.0109	0.0503
195	0.0396	0.0079	0.0316
196	0.0303	0.0061	0.0242
197	0.0347	0.0070	0.0277
198	0.0306	0.0061	0.0244
199	0.0276	0.0055	0.0220
200	0.0252	0.0051	0.0202
201	0.0234	0.0047	0.0187
202	0.0218	0.0044	0.0175
203	0.0206	0.0041	0.0164
204	0.0195	0.0039	0.0155
205	0.0185	0.0037	0.0148
206	0.0176	0.0035	0.0141

207	0.0169	0.0034	0.0135
208	0.0162	0.0033	0.0130
209	0.0156	0.0031	0.0125
210	0.0151	0.0030	0.0121
211	0.0146	0.0029	0.0117
212	0.0141	0.0028	0.0113
213	0.0137	0.0028	0.0110
214	0.0133	0.0027	0.0107
215	0.0130	0.0026	0.0104
216	0.0127	0.0025	0.0101
217	0.0144	0.0029	0.0115
218	0.0141	0.0028	0.0113
219	0.0138	0.0028	0.0110
220	0.0135	0.0027	0.0108
221	0.0133	0.0027	0.0106
222	0.0131	0.0026	0.0104
223	0.0128	0.0026	0.0103
224	0.0126	0.0025	0.0101
225	0.0124	0.0025	0.0099
226	0.0122	0.0025	0.0098
227	0.0120	0.0024	0.0096
228	0.0118	0.0024	0.0095
229	0.0117	0.0023	0.0093
230	0.0115	0.0023	0.0092
231	0.0114	0.0023	0.0091
232	0.0112	0.0022	0.0090
233	0.0111	0.0022	0.0088
234	0.0109	0.0022	0.0087
235	0.0108	0.0022	0.0086
236	0.0107	0.0021	0.0085
237	0.0105	0.0021	0.0084
238	0.0104	0.0021	0.0083
239	0.0103	0.0021	0.0082
240	0.0102	0.0020	0.0081
241	0.0101	0.0020	0.0080
242	0.0100	0.0020	0.0080
243	0.0099	0.0020	0.0079
244	0.0098	0.0020	0.0078
245	0.0097	0.0019	0.0077
246	0.0096	0.0019	0.0076
247	0.0095	0.0019	0.0076
248	0.0094	0.0019	0.0075
249	0.0093	0.0019	0.0074
250	0.0092	0.0018	0.0074
251	0.0091	0.0018	0.0073
252	0.0090	0.0018	0.0072
253	0.0090	0.0018	0.0072
254	0.0089	0.0018	0.0071
255	0.0088	0.0018	0.0070
256	0.0087	0.0018	0.0070
257	0.0087	0.0017	0.0069
258	0.0086	0.0017	0.0069
259	0.0085	0.0017	0.0068
260	0.0085	0.0017	0.0068
261	0.0084	0.0017	0.0067
262	0.0083	0.0017	0.0067
263	0.0083	0.0017	0.0066
264	0.0082	0.0016	0.0066
265	0.0082	0.0016	0.0065
266	0.0081	0.0016	0.0065

267	0.0080	0.0016	0.0064
268	0.0080	0.0016	0.0064
269	0.0079	0.0016	0.0063
270	0.0079	0.0016	0.0063
271	0.0078	0.0016	0.0063
272	0.0078	0.0016	0.0062
273	0.0077	0.0016	0.0062
274	0.0077	0.0015	0.0061
275	0.0076	0.0015	0.0061
276	0.0076	0.0015	0.0061
277	0.0075	0.0015	0.0060
278	0.0075	0.0015	0.0060
279	0.0074	0.0015	0.0059
280	0.0074	0.0015	0.0059
281	0.0074	0.0015	0.0059
282	0.0073	0.0015	0.0058
283	0.0073	0.0015	0.0058
284	0.0072	0.0015	0.0058
285	0.0072	0.0014	0.0057
286	0.0071	0.0014	0.0057
287	0.0071	0.0014	0.0057
288	0.0071	0.0014	0.0057

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Total soil rain loss = 0.74(In)
Total effective rainfall = 3.47(In)
Peak flow rate in flood hydrograph = 38.09(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

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Hydrograph in 5 Minute intervals ((CFS))

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Time(h+m)	Volume	Ac.Ft	Q(CFS)	0	10.0	20.0	30.0
40.0							
0+ 5	0.0002	0.03	Q				
0+10	0.0014	0.17	Q				
0+15	0.0049	0.51	Q				
0+20	0.0100	0.75	Q				
0+25	0.0160	0.87	Q				
0+30	0.0226	0.96	Q				
0+35	0.0296	1.02	VQ				
0+40	0.0369	1.06	VQ				

0+45	0.0445	1.10	VQ			
0+50	0.0523	1.13	VQ			
0+55	0.0603	1.16	VQ			
1+ 0	0.0684	1.18	VQ			
1+ 5	0.0766	1.20	VQ			
1+10	0.0850	1.21	VQ			
1+15	0.0934	1.22	VQ			
1+20	0.1019	1.24	VQ			
1+25	0.1105	1.24	VQ			
1+30	0.1191	1.25	VQ			
1+35	0.1278	1.26	VQ			
1+40	0.1366	1.27	Q			
1+45	0.1454	1.28	Q			
1+50	0.1542	1.28	Q			
1+55	0.1631	1.29	Q			
2+ 0	0.1719	1.29	Q			
2+ 5	0.1809	1.29	Q			
2+10	0.1898	1.30	Q			
2+15	0.1988	1.30	Q			
2+20	0.2078	1.31	Q			
2+25	0.2168	1.31	Q			
2+30	0.2258	1.31	Q			
2+35	0.2349	1.32	Q			
2+40	0.2440	1.32	Q			
2+45	0.2532	1.33	Q			
2+50	0.2623	1.33	QV			
2+55	0.2715	1.34	QV			
3+ 0	0.2808	1.34	QV			
3+ 5	0.2900	1.34	QV			
3+10	0.2993	1.35	QV			

3+15	0.3086	1.35	QV			
3+20	0.3180	1.36	QV			
3+25	0.3273	1.36	QV			
3+30	0.3367	1.37	QV			
3+35	0.3462	1.37	QV			
3+40	0.3557	1.38	QV			
3+45	0.3652	1.38	QV			
3+50	0.3747	1.38	QV			
3+55	0.3843	1.39	QV			
4+ 0	0.3939	1.39	Q V			
4+ 5	0.4035	1.40	Q V			
4+10	0.4132	1.40	Q V			
4+15	0.4229	1.41	Q V			
4+20	0.4326	1.41	Q V			
4+25	0.4424	1.42	Q V			
4+30	0.4522	1.42	Q V			
4+35	0.4621	1.43	Q V			
4+40	0.4719	1.43	Q V			
4+45	0.4819	1.44	Q V			
4+50	0.4918	1.45	Q V			
4+55	0.5018	1.45	Q V			
5+ 0	0.5118	1.46	Q V			
5+ 5	0.5219	1.46	Q V			
5+10	0.5320	1.47	Q V			
5+15	0.5422	1.47	Q V			
5+20	0.5524	1.48	Q V			
5+25	0.5626	1.49	Q V			
5+30	0.5729	1.49	Q V			
5+35	0.5832	1.50	Q V			
5+40	0.5935	1.50	Q V			

	5+45	0.6039	1.51	Q	V			
	5+50	0.6143	1.51	Q	V			
	5+55	0.6248	1.52	Q	V			
	6+ 0	0.6353	1.53	Q	V			
	6+ 5	0.6459	1.53	Q	V			
	6+10	0.6565	1.54	Q	V			
	6+15	0.6672	1.55	Q	V			
	6+20	0.6779	1.55	Q	V			
	6+25	0.6886	1.56	Q	V			
	6+30	0.6994	1.57	Q	V			
	6+35	0.7102	1.57	Q	V			
	6+40	0.7211	1.58	Q	V			
	6+45	0.7321	1.59	Q	V			
	6+50	0.7431	1.60	Q	V			
	6+55	0.7541	1.60	Q	V			
	7+ 0	0.7652	1.61	Q	V			
	7+ 5	0.7763	1.62	Q	V			
	7+10	0.7875	1.62	Q	V			
	7+15	0.7987	1.63	Q	V			
	7+20	0.8100	1.64	Q	V			
	7+25	0.8214	1.65	Q	V			
	7+30	0.8328	1.66	Q	V			
	7+35	0.8443	1.66	Q	V			
	7+40	0.8558	1.67	Q	V			
	7+45	0.8674	1.68	Q	V			
	7+50	0.8790	1.69	Q	V			
	7+55	0.8907	1.70	Q	V			
	8+ 0	0.9024	1.71	Q	V			
	8+ 5	0.9142	1.72	Q	V			
	8+10	0.9261	1.72	Q	V			

8+15	0.9381	1.73	Q	V		
8+20	0.9501	1.74	Q	V		
8+25	0.9621	1.75	Q	V		
8+30	0.9743	1.76	Q	V		
8+35	0.9865	1.77	Q	V		
8+40	0.9987	1.78	Q	V		
8+45	1.0111	1.79	Q	V		
8+50	1.0235	1.80	Q	V		
8+55	1.0359	1.81	Q	V		
9+ 0	1.0485	1.82	Q	V		
9+ 5	1.0611	1.83	Q	V		
9+10	1.0738	1.84	Q	V		
9+15	1.0866	1.86	Q	V		
9+20	1.0995	1.87	Q	V		
9+25	1.1124	1.88	Q	V		
9+30	1.1254	1.89	Q	V		
9+35	1.1385	1.90	Q	V		
9+40	1.1517	1.91	Q	V		
9+45	1.1650	1.93	Q	V		
9+50	1.1783	1.94	Q	V		
9+55	1.1918	1.95	Q	V		
10+ 0	1.2053	1.96	Q	V		
10+ 5	1.2189	1.98	Q	V		
10+10	1.2326	1.99	Q	V		
10+15	1.2464	2.01	Q	V		
10+20	1.2604	2.02	Q	V		
10+25	1.2744	2.04	Q	V		
10+30	1.2885	2.05	Q	V		
10+35	1.3027	2.07	Q	V		
10+40	1.3170	2.08	Q	V		

10+45	1.3315	2.10	Q	V		
10+50	1.3460	2.11	Q	V		
10+55	1.3607	2.13	Q	V		
11+ 0	1.3755	2.15	Q	V		
11+ 5	1.3904	2.16	Q	V		
11+10	1.4054	2.18	Q	V		
11+15	1.4206	2.20	Q	V		
11+20	1.4358	2.22	Q	V		
11+25	1.4512	2.24	Q	V		
11+30	1.4668	2.26	Q	V		
11+35	1.4825	2.28	Q	V		
11+40	1.4983	2.30	Q	V		
11+45	1.5143	2.32	Q	V		
11+50	1.5304	2.34	Q	V		
11+55	1.5467	2.36	Q	V		
12+ 0	1.5631	2.39	Q	V		
12+ 5	1.5797	2.40	Q	V		
12+10	1.5961	2.39	Q	V		
12+15	1.6120	2.31	Q	V		
12+20	1.6277	2.27	Q	V		
12+25	1.6433	2.26	Q	V		
12+30	1.6589	2.27	Q	V		
12+35	1.6745	2.28	Q	V		
12+40	1.6903	2.29	Q	V		
12+45	1.7062	2.31	Q	V		
12+50	1.7223	2.34	Q	V		
12+55	1.7386	2.36	Q	V		
13+ 0	1.7551	2.39	Q	V		
13+ 5	1.7718	2.42	Q	V		
13+10	1.7887	2.45	Q	V		

13+15	1.8058	2.49	Q	V		
13+20	1.8232	2.53	Q	V		
13+25	1.8409	2.57	Q	V		
13+30	1.8589	2.61	Q	V		
13+35	1.8771	2.65	Q	V		
13+40	1.8957	2.70	Q	V		
13+45	1.9146	2.75	Q	V		
13+50	1.9339	2.80	Q	V		
13+55	1.9536	2.86	Q	V		
14+ 0	1.9737	2.91	Q	V		
14+ 5	1.9942	2.98	Q	V		
14+10	2.0151	3.04	Q	V		
14+15	2.0366	3.11	Q	V		
14+20	2.0585	3.19	Q	V		
14+25	2.0810	3.27	Q	V		
14+30	2.1041	3.35	Q	V		
14+35	2.1278	3.45	Q	V		
14+40	2.1522	3.54	Q	V		
14+45	2.1774	3.65	Q	V		
14+50	2.2033	3.77	Q	V		
14+55	2.2302	3.90	Q	V		
15+ 0	2.2579	4.03	Q	V		
15+ 5	2.2868	4.19	Q	V		
15+10	2.3168	4.36	Q	V		
15+15	2.3482	4.56	Q	V		
15+20	2.3810	4.77	Q	V		
15+25	2.4154	4.99	Q	V		
15+30	2.4503	5.07	Q	V		
15+35	2.4843	4.94	Q	V		
15+40	2.5188	5.00	Q	V		

15+45	2.5554	5.32		Q		V		
15+50	2.5956	5.82		Q		V		
15+55	2.6417	6.70		Q		V		
16+ 0	2.6985	8.25		Q		V		
16+ 5	2.7883	13.04				Q	V	
16+10	2.9529	23.90					VQ	
16+15	3.2152	38.09					V	
16+20	3.4089	28.13					V Q	
16+25	3.5363	18.49				Q	V	
16+30	3.6338	14.15				Q	V	
16+35	3.7145	11.73			Q		V	
16+40	3.7843	10.13			Q		V	
16+45	3.8452	8.84		Q			V	
16+50	3.8980	7.67		Q			V	
16+55	3.9456	6.90		Q			V	
17+ 0	3.9885	6.24		Q			V	
17+ 5	4.0274	5.64		Q			V	
17+10	4.0628	5.14		Q			V	
17+15	4.0951	4.70		Q			V	
17+20	4.1245	4.28		Q			V	
17+25	4.1514	3.89		Q			V	
17+30	4.1771	3.74		Q			V	
17+35	4.2019	3.60		Q			V	
17+40	4.2256	3.43		Q			V	
17+45	4.2472	3.14		Q			V	
17+50	4.2670	2.87		Q			V	
17+55	4.2851	2.64		Q			V	
18+ 0	4.3026	2.54		Q			V	
18+ 5	4.3196	2.47		Q			V	
18+10	4.3364	2.43		Q			V	

18+15	4.3533	2.46	Q			V
18+20	4.3702	2.46	Q			V
18+25	4.3870	2.44	Q			V
18+30	4.4035	2.40	Q			V
18+35	4.4199	2.37	Q			V
18+40	4.4359	2.33	Q			V
18+45	4.4517	2.29	Q			V
18+50	4.4673	2.26	Q			V
18+55	4.4826	2.22	Q			V
19+ 0	4.4977	2.19	Q			V
19+ 5	4.5125	2.16	Q			V
19+10	4.5272	2.13	Q			V
19+15	4.5416	2.09	Q			V
19+20	4.5558	2.06	Q			V
19+25	4.5698	2.04	Q			V
19+30	4.5837	2.01	Q			V
19+35	4.5973	1.98	Q			V
19+40	4.6108	1.96	Q			V
19+45	4.6241	1.93	Q			V
19+50	4.6372	1.91	Q			V
19+55	4.6502	1.88	Q			V
20+ 0	4.6630	1.86	Q			V
20+ 5	4.6756	1.84	Q			V
20+10	4.6881	1.82	Q			V
20+15	4.7005	1.79	Q			V
20+20	4.7127	1.77	Q			V
20+25	4.7248	1.75	Q			V
20+30	4.7367	1.74	Q			V
20+35	4.7486	1.72	Q			V
20+40	4.7603	1.70	Q			V

	20+45	4.7719	1.68	Q				V
	20+50	4.7833	1.67	Q				V
	20+55	4.7947	1.65	Q				V
	21+ 0	4.8060	1.63	Q				V
	21+ 5	4.8171	1.62	Q				V
	21+10	4.8282	1.60	Q				V
	21+15	4.8391	1.59	Q				V
	21+20	4.8499	1.58	Q				V
	21+25	4.8607	1.56	Q				V
	21+30	4.8714	1.55	Q				V
	21+35	4.8819	1.54	Q				V
	21+40	4.8924	1.52	Q				V
	21+45	4.9028	1.51	Q				V
	21+50	4.9131	1.50	Q				V
	21+55	4.9234	1.49	Q				V
	22+ 0	4.9335	1.47	Q				V
	22+ 5	4.9436	1.46	Q				V
	22+10	4.9536	1.45	Q				V
	22+15	4.9635	1.44	Q				V
	22+20	4.9734	1.43	Q				V
	22+25	4.9832	1.42	Q				V
	22+30	4.9929	1.41	Q				V
	22+35	5.0025	1.40	Q				V
	22+40	5.0121	1.39	Q				V
	22+45	5.0216	1.38	Q				V
	22+50	5.0310	1.37	Q				V
	22+55	5.0404	1.36	Q				V
	23+ 0	5.0497	1.35	Q				V
	23+ 5	5.0590	1.34	Q				V
	23+10	5.0682	1.34	Q				

V	23+15	5.0773	1.33	Q			
V	23+20	5.0864	1.32	Q			
V	23+25	5.0954	1.31	Q			
V	23+30	5.1044	1.30	Q			
V	23+35	5.1133	1.29	Q			
V	23+40	5.1222	1.29	Q			
V	23+45	5.1310	1.28	Q			
V	23+50	5.1398	1.27	Q			
V	23+55	5.1485	1.26	Q			
V	24+ 0	5.1571	1.26	Q			
V	24+ 5	5.1656	1.22	Q			
V	24+10	5.1729	1.07	Q			
V	24+15	5.1779	0.72	Q			
V	24+20	5.1813	0.49	Q			
V	24+25	5.1838	0.37	Q			
V	24+30	5.1858	0.28	Q			
V	24+35	5.1873	0.22	Q			
V	24+40	5.1885	0.17	Q			
V	24+45	5.1894	0.14	Q			
V	24+50	5.1902	0.11	Q			
V	24+55	5.1908	0.09	Q			
V	25+ 0	5.1913	0.07	Q			
V	25+ 5	5.1917	0.06	Q			
V	25+10	5.1920	0.04	Q			
V	25+15	5.1922	0.03	Q			
V	25+20	5.1924	0.03	Q			
V	25+25	5.1925	0.02	Q			
V	25+30	5.1926	0.02	Q			
V	25+35	5.1927	0.01	Q			
V	25+40	5.1927	0.01	Q			

V	25+45	5.1927	0.00	Q			
V							

APPENDIX E: BASIN ROUTING STUDY INFORMATION

FLOOD HYDROGRAPH ROUTING PROGRAM
Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2012
Study date: 10/15/21

ASTER CACTUS
BASIN ROUTING
100YR 24HR
AREA/BASIN A1

--

Program License Serial Number 6232

--
***** HYDROGRAPH INFORMATION

From study/file name: ASTERCACTUSA1.rte
*****HYDROGRAPH
DATA*****
Number of intervals = 300
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 10.107 (CFS)
Total volume = 1.069 (Ac.Ft)
Status of hydrographs being held in storage
Stream 1 Stream 2 Stream 3 Stream 4 Stream 5
Peak (CFS) 0.000 0.000 0.000 0.000
0.000
Vol (Ac.Ft) 0.000 0.000 0.000 0.000
0.000

++++
++++
Process from Point/Station 202.000 to Point/Station
203.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data

--
Total number of inflow hydrograph intervals = 300
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

--

```

--
Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)
-----

---

--
Depth vs. Storage and Depth vs. Discharge data:
  Basin Depth   Storage   Outflow   (S-0*dt/2)   (S+0*dt/2)
    (Ft.)      (Ac.Ft)    (CFS)    (Ac.Ft)    (Ac.Ft)
-----
---
      0.000      0.000      0.000      0.000      0.000
      1.000      0.230      0.010      0.230      0.230
      2.000      0.490      5.000      0.473      0.507
      3.000      0.780      5.000      0.763      0.797
-----

--
Hydrograph Detention Basin Routing
-----

---
Graph values: 'I'= unit inflow; 'O'=outflow at time shown
-----

---
Time   Inflow   Outflow   Storage
Depth
(Hours) (CFS)    (CFS)    (Ac.Ft)
(Ft.)
0.083  0.02      0.00      0.000
0.00   0.167    0.11      0.000
0.00   0.250    0.18      0.001
0.01   0.333    0.20      0.003
0.01   0.417    0.22      0.004
0.02   0.500    0.23      0.006
0.03   0.583    0.24      0.007
0.03   0.667    0.25      0.009
0.04   0.750    0.25      0.011
0.05   0.833    0.25      0.013
0.05   0.917    0.25      0.014
0.06   1.000    0.26      0.016
0.07   1.083    0.26      0.018
0.08   1.167    0.26      0.020
0.09   1.250    0.26      0.021
0.09

```

0.10	1.333	0.26	0.00	0.023	0				
0.11	1.417	0.26	0.00	0.025	0				
0.12	1.500	0.26	0.00	0.027	0				
0.12	1.583	0.26	0.00	0.029	0				
0.13	1.667	0.26	0.00	0.030	0				
0.14	1.750	0.26	0.00	0.032	0				
0.15	1.833	0.27	0.00	0.034	0				
0.16	1.917	0.27	0.00	0.036	0				
0.16	2.000	0.27	0.00	0.038	0				
0.17	2.083	0.27	0.00	0.039	0				
0.18	2.167	0.27	0.00	0.041	0				
0.19	2.250	0.27	0.00	0.043	0				
0.20	2.333	0.27	0.00	0.045	0				
0.20	2.417	0.27	0.00	0.047	0				
0.21	2.500	0.27	0.00	0.049	0				
0.22	2.583	0.27	0.00	0.051	0				
0.23	2.667	0.27	0.00	0.052	0				
0.24	2.750	0.27	0.00	0.054	0				
0.24	2.833	0.28	0.00	0.056	0				
0.25	2.917	0.28	0.00	0.058	0				
0.26	3.000	0.28	0.00	0.060	0				
0.27	3.083	0.28	0.00	0.062	0				
0.28	3.167	0.28	0.00	0.064	0				
0.29	3.250	0.28	0.00	0.066	0				
0.29	3.333	0.28	0.00	0.068	0				
0.30	3.417	0.28	0.00	0.069	0				
0.31	3.500	0.28	0.00	0.071	0				
0.32	3.583	0.28	0.00	0.073	0				
0.33	3.667	0.28	0.00	0.075	0				
0.34	3.750	0.29	0.00	0.077	0				

0.34	3.833	0.29	0.00	0.079	0				
0.35	3.917	0.29	0.00	0.081	0				
0.36	4.000	0.29	0.00	0.083	0				
0.37	4.083	0.29	0.00	0.085	0				
0.38	4.167	0.29	0.00	0.087	0				
0.39	4.250	0.29	0.00	0.089	0				
0.40	4.333	0.29	0.00	0.091	0				
0.40	4.417	0.29	0.00	0.093	0				
0.41	4.500	0.30	0.00	0.095	0				
0.42	4.583	0.30	0.00	0.097	0				
0.43	4.667	0.30	0.00	0.099	0				
0.44	4.750	0.30	0.00	0.101	0				
0.45	4.833	0.30	0.00	0.103	0				
0.46	4.917	0.30	0.00	0.105	0				
0.47	5.000	0.30	0.00	0.107	0				
0.47	5.083	0.30	0.00	0.109	0				
0.48	5.167	0.30	0.00	0.111	0				
0.49	5.250	0.31	0.00	0.113	0				
0.50	5.333	0.31	0.01	0.115	0				
0.51	5.417	0.31	0.01	0.117	0				
0.52	5.500	0.31	0.01	0.120	0				
0.53	5.583	0.31	0.01	0.122	0				
0.54	5.667	0.31	0.01	0.124	0				
0.55	5.750	0.31	0.01	0.126	0				
0.56	5.833	0.31	0.01	0.128	0				
0.57	5.917	0.32	0.01	0.130	0				
0.58	6.000	0.32	0.01	0.132	0I				
0.58	6.083	0.32	0.01	0.134	0I				
0.59	6.167	0.32	0.01	0.137	0I				
0.60	6.250	0.32	0.01	0.139	0I				

6.333	0.32	0.01	0.141	OI				
0.61								
6.417	0.32	0.01	0.143	OI				
0.62								
6.500	0.33	0.01	0.145	OI				
0.63								
6.583	0.33	0.01	0.147	OI				
0.64								
6.667	0.33	0.01	0.150	OI				
0.65								
6.750	0.33	0.01	0.152	OI				
0.66								
6.833	0.33	0.01	0.154	OI				
0.67								
6.917	0.33	0.01	0.156	OI				
0.68								
7.000	0.33	0.01	0.159	OI				
0.69								
7.083	0.34	0.01	0.161	OI				
0.70								
7.167	0.34	0.01	0.163	OI				
0.71								
7.250	0.34	0.01	0.165	OI				
0.72								
7.333	0.34	0.01	0.168	OI				
0.73								
7.417	0.34	0.01	0.170	OI				
0.74								
7.500	0.34	0.01	0.172	OI				
0.75								
7.583	0.35	0.01	0.175	OI				
0.76								
7.667	0.35	0.01	0.177	OI				
0.77								
7.750	0.35	0.01	0.179	OI				
0.78								
7.833	0.35	0.01	0.182	OI				
0.79								
7.917	0.35	0.01	0.184	OI				
0.80								
8.000	0.35	0.01	0.186	OI				
0.81								
8.083	0.36	0.01	0.189	OI				
0.82								
8.167	0.36	0.01	0.191	OI				
0.83								
8.250	0.36	0.01	0.194	OI				
0.84								
8.333	0.36	0.01	0.196	OI				
0.85								
8.417	0.36	0.01	0.199	OI				
0.86								
8.500	0.37	0.01	0.201	OI				
0.87								
8.583	0.37	0.01	0.203	OI				
0.88								
8.667	0.37	0.01	0.206	OI				
0.90								
8.750	0.37	0.01	0.208	OI				
0.91								

11.333	0.46	0.42	0.251	0				
1.08								
11.417	0.47	0.42	0.252	0				
1.08								
11.500	0.47	0.43	0.252	0				
1.08								
11.583	0.48	0.44	0.252	0				
1.09								
11.667	0.48	0.44	0.252	0				
1.09								
11.750	0.49	0.45	0.253	0				
1.09								
11.833	0.49	0.45	0.253	0				
1.09								
11.917	0.49	0.46	0.253	0				
1.09								
12.000	0.50	0.46	0.254	0				
1.09								
12.083	0.50	0.47	0.254	0				
1.09								
12.167	0.48	0.47	0.254	0				
1.09								
12.250	0.46	0.47	0.254	0				
1.09								
12.333	0.46	0.47	0.254	0				
1.09								
12.417	0.46	0.47	0.254	0				
1.09								
12.500	0.47	0.47	0.254	0				
1.09								
12.583	0.47	0.47	0.254	0				
1.09								
12.667	0.48	0.47	0.254	0				
1.09								
12.750	0.48	0.47	0.254	0				
1.09								
12.833	0.49	0.47	0.254	0				
1.09								
12.917	0.49	0.47	0.254	0				
1.09								
13.000	0.50	0.48	0.254	0				
1.09								
13.083	0.51	0.48	0.254	0				
1.09								
13.167	0.52	0.48	0.255	0				
1.09								
13.250	0.52	0.49	0.255	0				
1.10								
13.333	0.53	0.49	0.255	0				
1.10								
13.417	0.54	0.50	0.255	0				
1.10								
13.500	0.55	0.50	0.256	0				
1.10								
13.583	0.56	0.51	0.256	0				
1.10								
13.667	0.57	0.52	0.256	0				
1.10								
13.750	0.58	0.53	0.257	0				
1.10								

16.333	4.06	3.29	0.401				0	I					
1.66													
16.417	2.83	3.31	0.402				I	0					
1.66													
16.500	2.23	3.21	0.397				I		0				
1.64													
16.583	1.87	3.07	0.389				I		0				
1.61													
16.667	1.57	2.90	0.381				I		0				
1.58													
16.750	1.33	2.72	0.371				I		0				
1.54													
16.833	1.14	2.54	0.362				I		0				
1.51													
16.917	1.05	2.36	0.352				I		0				
1.47													
17.000	0.96	2.19	0.344				I		0				
1.44													
17.083	0.84	2.03	0.335				I		0				
1.41													
17.167	0.73	1.88	0.327				I		0				
1.37													
17.250	0.69	1.73	0.320				I		0				
1.35													
17.333	0.65	1.60	0.313				I		0				
1.32													
17.417	0.62	1.48	0.307				I		0				
1.29													
17.500	0.60	1.37	0.301				I		0				
1.27													
17.583	0.57	1.27	0.296				I		0				
1.25													
17.667	0.55	1.19	0.291				I		0				
1.24													
17.750	0.53	1.11	0.287				I		0				
1.22													
17.833	0.52	1.03	0.283				I		0				
1.21													
17.917	0.50	0.97	0.280				I		0				
1.19													
18.000	0.48	0.91	0.277				I		0				
1.18													
18.083	0.48	0.86	0.274				I		0				
1.17													
18.167	0.49	0.81	0.272				I		0				
1.16													
18.250	0.50	0.77	0.270				I		0				
1.15													
18.333	0.50	0.74	0.268				I		0				
1.15													
18.417	0.49	0.71	0.266				I		0				
1.14													
18.500	0.48	0.68	0.265				I	</					

416.333	0.00	0.00	0.057	0				
0.25								
416.417	0.00	0.00	0.057	0				
0.25								
416.500	0.00	0.00	0.057	0				
0.25								
416.583	0.00	0.00	0.057	0				
0.25								
416.667	0.00	0.00	0.057	0				
0.25								

Remaining water in basin = 0.06 (Ac.Ft)

```

*****HYDROGRAPH
DATA*****
      Number of intervals = 5001
      Time interval = 5.0 (Min.)
      Maximum/Peak flow rate = 3.311 (CFS)
      Total volume = 1.013 (Ac.Ft)
      Status of hydrographs being held in storage
      Stream 1 Stream 2 Stream 3 Stream 4 Stream 5
Peak (CFS) 0.000 0.000 0.000 0.000
0.000
Vol (Ac.Ft) 0.000 0.000 0.000 0.000
0.000
*****
*****
-----
--

```

FLOOD HYDROGRAPH ROUTING PROGRAM
Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2012
Study date: 10/15/21

ASTER CACTUS
BASIN ROUTING
100YR 24HR
AREA/BASIN A2

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Program License Serial Number 6232

--
***** HYDROGRAPH INFORMATION

From study/file name: ASTERACTUSA2.rte
*****HYDROGRAPH
DATA*****
Number of intervals = 302
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 18.498 (CFS)
Total volume = 2.312 (Ac.Ft)
Status of hydrographs being held in storage
Stream 1 Stream 2 Stream 3 Stream 4 Stream 5
Peak (CFS) 0.000 0.000 0.000 0.000
0.000
Vol (Ac.Ft) 0.000 0.000 0.000 0.000
0.000

++++
++++
Process from Point/Station 302.000 to Point/Station
303.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data

--
Total number of inflow hydrograph intervals = 302
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

--

```

--
Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)
-----

---

--
Depth vs. Storage and Depth vs. Discharge data:
  Basin Depth   Storage   Outflow   (S-0*dt/2)   (S+0*dt/2)
    (Ft.)      (Ac.Ft)    (CFS)    (Ac.Ft)    (Ac.Ft)
-----
0.000         0.000         0.000         0.000         0.000
1.000         0.480         0.010         0.480         0.480
2.000         1.000         5.000         0.983         1.017
3.000         1.590         5.000         1.573         1.607
-----

--
Hydrograph Detention Basin Routing
-----

---
Graph values: 'I'= unit inflow; 'O'=outflow at time shown
-----

---
Time   Inflow   Outflow   Storage
Depth
(Hours) (CFS)    (CFS)    (Ac.Ft)
(Ft.)
0.083   0.02     0.00     0.000
0.00    0.167   0.19     0.001
0.00    0.250   0.35     0.003
0.01    0.333   0.42     0.005
0.01    0.417   0.46     0.008
0.02    0.500   0.48     0.012
0.02    0.583   0.50     0.015
0.03    0.667   0.52     0.018
0.04    0.750   0.53     0.022
0.05    0.833   0.54     0.026
0.05    0.917   0.54     0.029
0.06    1.000   0.55     0.033
0.07    1.083   0.55     0.037
0.08    1.167   0.56     0.041
0.08    1.250   0.56     0.045
0.09

```

0.10	1.333	0.56	0.00	0.048	0				
0.11	1.417	0.57	0.00	0.052	0				
0.12	1.500	0.57	0.00	0.056	0				
0.13	1.583	0.57	0.00	0.060	0				
0.13	1.667	0.57	0.00	0.064	0				
0.14	1.750	0.57	0.00	0.068	0				
0.15	1.833	0.57	0.00	0.072	0				
0.16	1.917	0.58	0.00	0.076	0				
0.17	2.000	0.58	0.00	0.080	0				
0.17	2.083	0.58	0.00	0.084	OI				
0.18	2.167	0.58	0.00	0.088	OI				
0.19	2.250	0.58	0.00	0.092	OI				
0.20	2.333	0.58	0.00	0.096	OI				
0.21	2.417	0.59	0.00	0.100	OI				
0.22	2.500	0.59	0.00	0.104	OI				
0.22	2.583	0.59	0.00	0.108	OI				
0.23	2.667	0.59	0.00	0.112	OI				
0.24	2.750	0.59	0.00	0.116	OI				
0.25	2.833	0.60	0.00	0.120	OI				
0.26	2.917	0.60	0.00	0.124	OI				
0.27	3.000	0.60	0.00	0.128	OI				
0.28	3.083	0.60	0.00	0.132	OI				
0.28	3.167	0.60	0.00	0.136	OI				
0.29	3.250	0.60	0.00	0.141	OI				
0.30	3.333	0.61	0.00	0.145	OI				
0.31	3.417	0.61	0.00	0.149	OI				
0.32	3.500	0.61	0.00	0.153	OI				
0.33	3.583	0.61	0.00	0.157	OI				
0.34	3.667	0.62	0.00	0.161	OI				
0.35	3.750	0.62	0.00	0.166	OI				

0.35	3.917	0.62	0.00	0.170	OI				
0.36	4.000	0.62	0.00	0.178	OI				
0.37	4.083	0.63	0.00	0.183	OI				
0.38	4.167	0.63	0.00	0.187	OI				
0.39	4.250	0.63	0.00	0.191	OI				
0.40	4.333	0.63	0.00	0.196	OI				
0.41	4.417	0.64	0.00	0.200	OI				
0.42	4.500	0.64	0.00	0.204	OI				
0.43	4.583	0.64	0.00	0.209	OI				
0.44	4.667	0.64	0.00	0.213	OI				
0.45	4.750	0.64	0.00	0.218	OI				
0.46	4.833	0.65	0.00	0.222	OI				
0.47	4.917	0.65	0.00	0.226	OI				
0.48	5.000	0.65	0.00	0.231	OI				
0.49	5.083	0.65	0.00	0.235	OI				
0.50	5.167	0.66	0.00	0.240	OI				
0.51	5.250	0.66	0.01	0.244	OI				
0.52	5.333	0.66	0.01	0.249	OI				
0.53	5.417	0.66	0.01	0.253	OI				
0.54	5.500	0.67	0.01	0.258	OI				
0.55	5.583	0.67	0.01	0.262	OI				
0.56	5.667	0.67	0.01	0.267	OI				
0.57	5.750	0.68	0.01	0.272	OI				
0.58	5.833	0.68	0.01	0.276	OI				
0.59	5.917	0.68	0.01	0.281	OI				
0.59	6.000	0.68	0.01	0.286	OI				
0.60	6.083	0.69	0.01	0.290	OI				
0.61	6.167	0.69	0.01	0.295	OI				
0.62	6.250	0.69	0.01	0.300	OI				

6.333	0.70	0.01	0.304	OI				
0.63								
6.417	0.70	0.01	0.309	OI				
0.64								
6.500	0.70	0.01	0.314	OI				
0.65								
6.583	0.70	0.01	0.319	OI				
0.66								
6.667	0.71	0.01	0.324	OI				
0.67								
6.750	0.71	0.01	0.328	OI				
0.68								
6.833	0.71	0.01	0.333	OI				
0.69								
6.917	0.72	0.01	0.338	OI				
0.70								
7.000	0.72	0.01	0.343	OI				
0.71								
7.083	0.72	0.01	0.348	OI				
0.72								
7.167	0.73	0.01	0.353	OI				
0.74								
7.250	0.73	0.01	0.358	OI				
0.75								
7.333	0.73	0.01	0.363	OI				
0.76								
7.417	0.74	0.01	0.368	OI				
0.77								
7.500	0.74	0.01	0.373	OI				
0.78								
7.583	0.75	0.01	0.378	OI				
0.79								
7.667	0.75	0.01	0.383	OI				
0.80								
7.750	0.75	0.01	0.388	OI				
0.81								
7.833	0.76	0.01	0.393	OI				
0.82								
7.917	0.76	0.01	0.399	OI				
0.83								
8.000	0.77	0.01	0.404	OI				
0.84								
8.083	0.77	0.01	0.409	OI				
0.85								
8.167	0.77	0.01	0.414	OI				
0.86								
8.250	0.78	0.01	0.419	OI				
0.87								
8.333	0.78	0.01	0.425	OI				
0.88								
8.417	0.79	0.01	0.430	OI				
0.90								
8.500	0.79	0.01	0.435	OI				
0.91								
8.583	0.79	0.01	0.441	OI				
0.92								
8.667	0.80	0.01	0.446	OI				
0.93								
8.750	0.80	0.01	0.452	OI				
0.94								

13.833	1.28	1.07	0.590	OI				
1.21								
13.917	1.30	1.08	0.592	OI				
1.21								
14.000	1.33	1.10	0.593	OI				
1.22								
14.083	1.36	1.11	0.595	OI				
1.22								
14.167	1.39	1.13	0.597	OI				
1.22								
14.250	1.43	1.15	0.599	OI				
1.23								
14.333	1.46	1.17	0.601	0				
1.23								
14.417	1.50	1.19	0.603	0				
1.24								
14.500	1.54	1.21	0.605	0				
1.24								
14.583	1.58	1.23	0.607	0				
1.24								
14.667	1.63	1.25	0.610	0				
1.25								
14.750	1.68	1.28	0.612	0				
1.25								
14.833	1.74	1.31	0.615	OI				
1.26								
14.917	1.80	1.34	0.618	OI				
1.27								
15.000	1.87	1.37	0.622	OI				
1.27								
15.083	1.95	1.40	0.625	OI				
1.28								
15.167	2.04	1.44	0.629	OI				
1.29								
15.250	2.13	1.48	0.634	OI				
1.30								
15.333	2.24	1.53	0.638	OI				
1.30								
15.417	2.34	1.58	0.643	0 I				
1.31								
15.500	2.26	1.62	0.648	OI				
1.32								
15.583	2.21	1.66	0.652	OI				
1.33								
15.667	2.33	1.70	0.656	0 I				
1.34								
15.750	2.53	1.75	0.661	OI				
1.35								
15.833	2.86	1.81	0.667	OI				
1.36								
15.917	3.38	1.89	0.676	0 I				
1.38								
16.000	4.55	2.03	0.690	0 I				
1.40								
16.083	8.05	2.30	0.718	0	I			
1.46								
16.167	18.50	3.00	0.792	0				I
1.60								
16.250	17.22	3.95	0.891	0				I
1.79								

18.833	0.99	1.90	0.677	I 0				
1.38								
18.917	0.97	1.85	0.671	I 0				
1.37								
19.000	0.96	1.79	0.665	I 0				
1.36								
19.083	0.94	1.74	0.660	I 0				
1.35								
19.167	0.93	1.68	0.654	IO				
1.34								
19.250	0.92	1.64	0.649	IO				
1.33								
19.333	0.90	1.59	0.645	IO				
1.32								
19.417	0.89	1.54	0.640	IO				
1.31								
19.500	0.88	1.50	0.636	IO				
1.30								
19.583	0.87	1.46	0.631	IO				
1.29								
19.667	0.85	1.42	0.627	IO				
1.28								
19.750	0.84	1.39	0.623	IO				
1.28								
19.833	0.83	1.35	0.620	IO				
1.27								
19.917	0.82	1.32	0.616	IO				
1.26								
20.000	0.81	1.29	0.613	IO				
1.26								
20.083	0.80	1.26	0.610	IO				
1.25								
20.167	0.79	1.23	0.607	IO				
1.24								
20.250	0.79	1.20	0.604	IO				
1.24								
20.333	0.78	1.17	0.601	IO				
1.23								
20.417	0.77	1.15	0.598	0				
1.23								
20.500	0.76	1.12	0.596	0				
1.22								
20.583	0.75	1.10	0.593	0				
1.22								
20.667	0.75	1.08	0.591	0				
1.21								
20.750	0.74	1.05	0.589	0				
1.21								
20.833	0.73	1.03	0.587	0				
1.21								
20.917	0.72	1.01	0.585	0				
1.20								
21.000	0.72	1.00	0.583	0				
1.20								
21.083	0.71	0.98	0.581	0				
1.19								
21.167	0.70	0.96	0.579	0				
1.19								
21.250	0.70	0.94	0.577	0				
1.19								

416.333	0.00	0.01	0.247	0				
0.51								
416.417	0.00	0.01	0.247	0				
0.51								
416.500	0.00	0.01	0.247	0				
0.51								
416.583	0.00	0.01	0.246	0				
0.51								
416.667	0.00	0.01	0.246	0				
0.51								

Remaining water in basin = 0.25 (Ac.Ft)

*****HYDROGRAPH

DATA*****

Number of intervals = 5001

Time interval = 5.0 (Min.)

Maximum/Peak flow rate = 4.860 (CFS)

Total volume = 2.066 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	

--

FLOOD HYDROGRAPH ROUTING PROGRAM
Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2012
Study date: 10/15/21

ASTER CACTUS
BASIN ROUTING
100YR 24HR
AREA/BASIN A3

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Program License Serial Number 6232

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***** HYDROGRAPH INFORMATION

From study/file name: ASTERCACTUSA3.rte
*****HYDROGRAPH
DATA*****
Number of intervals = 308
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 14.664 (CFS)
Total volume = 1.809 (Ac.Ft)
Status of hydrographs being held in storage
Stream 1 Stream 2 Stream 3 Stream 4 Stream 5
Peak (CFS) 0.000 0.000 0.000 0.000
0.000
Vol (Ac.Ft) 0.000 0.000 0.000 0.000
0.000

++++
++++
Process from Point/Station 402.000 to Point/Station
403.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data

--
Total number of inflow hydrograph intervals = 308
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

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Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)
-----

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Depth vs. Storage and Depth vs. Discharge data:
  Basin Depth   Storage   Outflow   (S-0*dt/2)   (S+0*dt/2)
    (Ft.)      (Ac.Ft)    (CFS)    (Ac.Ft)    (Ac.Ft)
-----
---
      0.000      0.000      0.000      0.000      0.000
      1.000      0.330      0.010      0.330      0.330
      2.000      0.710      5.000      0.693      0.727
      3.000      1.130      5.000      1.113      1.147
-----

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Hydrograph Detention Basin Routing
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Graph values: 'I'= unit inflow; 'O'=outflow at time shown
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Time   Inflow   Outflow   Storage
Depth
(Hours) (CFS)    (CFS)    (Ac.Ft)
(Ft.)
0.083  0.01      0.00      0.000
0.00   0.167  0.07      0.000
0.00   0.250  0.20      0.001
0.00   0.333  0.27      0.003
0.01   0.417  0.31      0.005
0.01   0.500  0.34      0.007
0.02   0.583  0.36      0.009
0.03   0.667  0.37      0.012
0.04   0.750  0.38      0.015
0.04   0.833  0.39      0.017
0.05   0.917  0.40      0.020
0.06   1.000  0.41      0.023
0.07   1.083  0.41      0.026
0.08   1.167  0.42      0.029
0.09   1.250  0.42      0.031
0.10

```

0.10	1.333	0.43	0.00	0.034	0				
0.11	1.417	0.43	0.00	0.037	0				
0.12	1.500	0.43	0.00	0.040	0				
0.13	1.583	0.44	0.00	0.043	0				
0.14	1.667	0.44	0.00	0.046	0				
0.15	1.750	0.44	0.00	0.049	0				
0.16	1.833	0.44	0.00	0.052	0				
0.17	1.917	0.44	0.00	0.055	0				
0.18	2.000	0.44	0.00	0.058	0				
0.19	2.083	0.45	0.00	0.061	0				
0.20	2.167	0.45	0.00	0.064	0				
0.20	2.250	0.45	0.00	0.067	0				
0.21	2.333	0.45	0.00	0.071	0				
0.22	2.417	0.45	0.00	0.074	0				
0.23	2.500	0.45	0.00	0.077	0				
0.24	2.583	0.45	0.00	0.080	0				
0.25	2.667	0.45	0.00	0.083	0				
0.26	2.750	0.46	0.00	0.086	0				
0.27	2.833	0.46	0.00	0.089	0				
0.28	2.917	0.46	0.00	0.092	0I				
0.29	3.000	0.46	0.00	0.095	0I				
0.30	3.083	0.46	0.00	0.099	0I				
0.31	3.167	0.46	0.00	0.102	0I				
0.32	3.250	0.47	0.00	0.105	0I				
0.33	3.333	0.47	0.00	0.108	0I				
0.34	3.417	0.47	0.00	0.111	0I				
0.35	3.500	0.47	0.00	0.115	0I				
0.36	3.583	0.47	0.00	0.118	0I				
0.37	3.667	0.47	0.00	0.121	0I				
0.38	3.750	0.47	0.00	0.124	0I				

3.833	0.48	0.00	0.128	OI				
0.39								
3.917	0.48	0.00	0.131	OI				
0.40								
4.000	0.48	0.00	0.134	OI				
0.41								
4.083	0.48	0.00	0.137	OI				
0.42								
4.167	0.48	0.00	0.141	OI				
0.43								
4.250	0.48	0.00	0.144	OI				
0.44								
4.333	0.49	0.00	0.147	OI				
0.45								
4.417	0.49	0.00	0.151	OI				
0.46								
4.500	0.49	0.00	0.154	OI				
0.47								
4.583	0.49	0.00	0.157	OI				
0.48								
4.667	0.49	0.00	0.161	OI				
0.49								
4.750	0.50	0.00	0.164	OI				
0.50								
4.833	0.50	0.01	0.167	OI				
0.51								
4.917	0.50	0.01	0.171	OI				
0.52								
5.000	0.50	0.01	0.174	OI				
0.53								
5.083	0.50	0.01	0.178	OI				
0.54								
5.167	0.50	0.01	0.181	OI				
0.55								
5.250	0.51	0.01	0.184	OI				
0.56								
5.333	0.51	0.01	0.188	OI				
0.57								
5.417	0.51	0.01	0.191	OI				
0.58								
5.500	0.51	0.01	0.195	OI				
0.59								
5.583	0.51	0.01	0.198	OI				
0.60								
5.667	0.52	0.01	0.202	OI				
0.61								
5.750	0.52	0.01	0.205	OI				
0.62								
5.833	0.52	0.01	0.209	OI				
0.63								
5.917	0.52	0.01	0.212	OI				
0.64								
6.000	0.53	0.01	0.216	OI				
0.65								
6.083	0.53	0.01	0.220	OI				
0.67								
6.167	0.53	0.01	0.223	OI				
0.68								
6.250	0.53	0.01	0.227	OI				
0.69								

0.70	6.333	0.53	0.01	0.230	OI				
0.71	6.417	0.54	0.01	0.234	OI				
0.72	6.500	0.54	0.01	0.238	OI				
0.73	6.583	0.54	0.01	0.241	OI				
0.74	6.667	0.54	0.01	0.245	OI				
0.75	6.750	0.55	0.01	0.249	OI				
0.77	6.833	0.55	0.01	0.253	OI				
0.78	6.917	0.55	0.01	0.256	OI				
0.79	7.000	0.55	0.01	0.260	OI				
0.80	7.083	0.56	0.01	0.264	OI				
0.81	7.167	0.56	0.01	0.268	OI				
0.82	7.250	0.56	0.01	0.271	OI				
0.83	7.333	0.56	0.01	0.275	OI				
0.85	7.417	0.57	0.01	0.279	OI				
0.86	7.500	0.57	0.01	0.283	OI				
0.87	7.583	0.57	0.01	0.287	OI				
0.88	7.667	0.58	0.01	0.291	OI				
0.89	7.750	0.58	0.01	0.295	OI				
0.90	7.833	0.58	0.01	0.299	OI				
0.92	7.917	0.58	0.01	0.302	OI				
0.93	8.000	0.59	0.01	0.306	OI				
0.94	8.083	0.59	0.01	0.310	OI				
0.95	8.167	0.59	0.01	0.314	OI				
0.97	8.250	0.60	0.01	0.318	OI				
0.98	8.333	0.60	0.01	0.323	OI				
0.99	8.417	0.60	0.01	0.327	OI				
1.00	8.500	0.61	0.02	0.331	OI				
1.01	8.583	0.61	0.07	0.335	OI				
1.02	8.667	0.61	0.12	0.338	OI				
1.03	8.750	0.62	0.16	0.341	OI				

1.04	8.833	0.62	0.20	0.344	OI				
1.05	8.917	0.62	0.24	0.347	OI				
1.05	9.000	0.63	0.27	0.350	OI				
1.06	9.083	0.63	0.30	0.352	OI				
1.06	9.167	0.63	0.33	0.354	OI				
1.07	9.250	0.64	0.36	0.356	OI				
1.07	9.333	0.64	0.38	0.358	OI				
1.08	9.417	0.65	0.40	0.360	OI				
1.08	9.500	0.65	0.42	0.362	OI				
1.09	9.583	0.65	0.44	0.363	OI				
1.09	9.667	0.66	0.46	0.364	O				
1.09	9.750	0.66	0.48	0.366	O				
1.10	9.833	0.67	0.50	0.367	O				
1.10	9.917	0.67	0.51	0.368	O				
1.10	10.000	0.68	0.53	0.369	O				
1.11	10.083	0.68	0.54	0.370	O				
1.11	10.167	0.69	0.55	0.371	O				
1.11	10.250	0.69	0.56	0.372	O				
1.11	10.333	0.70	0.57	0.373	O				
1.12	10.417	0.70	0.58	0.374	O				
1.12	10.500	0.71	0.60	0.375	O				
1.12	10.583	0.71	0.60	0.375	O				
1.12	10.667	0.72	0.61	0.376	O				
1.12	10.750	0.72	0.62	0.377	O				
1.12	10.833	0.73	0.63	0.377	O				
1.13	10.917	0.73	0.64	0.378	O				
1.13	11.000	0.74	0.65	0.379	O				
1.13	11.083	0.75	0.66	0.379	O				
1.13	11.167	0.75	0.66	0.380	O				
1.13	11.250	0.76	0.67	0.380	O				

13.833	0.97	0.85	0.394	OI				
1.17								
13.917	0.99	0.86	0.395	OI				
1.17								
14.000	1.01	0.87	0.396	OI				
1.17								
14.083	1.03	0.89	0.397	OI				
1.18								
14.167	1.05	0.90	0.398	OI				
1.18								
14.250	1.08	0.91	0.399	OI				
1.18								
14.333	1.10	0.93	0.400	0				
1.18								
14.417	1.13	0.94	0.401	0				
1.19								
14.500	1.16	0.96	0.402	0				
1.19								
14.583	1.19	0.98	0.404	0				
1.19								
14.667	1.23	1.00	0.405	0				
1.20								
14.750	1.26	1.02	0.407	0				
1.20								
14.833	1.30	1.04	0.409	0				
1.21								
14.917	1.35	1.07	0.411	0				
1.21								
15.000	1.40	1.09	0.413	OI				
1.22								
15.083	1.45	1.12	0.415	OI				
1.22								
15.167	1.51	1.15	0.417	OI				
1.23								
15.250	1.58	1.19	0.420	OI				
1.24								
15.333	1.66	1.23	0.423	OI				
1.24								
15.417	1.73	1.27	0.426	OI				
1.25								
15.500	1.75	1.31	0.429	OI				
1.26								
15.583	1.70	1.34	0.432	OI				
1.27								
15.667	1.73	1.38	0.434	0				
1.27								
15.750	1.85	1.41	0.437	OI				
1.28								
15.833	2.04	1.46	0.440	OI				
1.29								
15.917	2.36	1.52	0.445	0 I				
1.30								
16.000	2.98	1.62	0.453	0 I				
1.32								
16.083	4.94	1.82	0.468	0	I			
1.36								
16.167	9.81	2.30	0.505	0		I		
1.46								
16.250	14.66	3.16	0.570	0				I
1.63								

18.833	0.77	1.34	0.431	IO				
1.27								
18.917	0.76	1.29	0.427	IO				
1.26								
19.000	0.75	1.24	0.424	IO				
1.25								
19.083	0.74	1.20	0.420	IO				
1.24								
19.167	0.73	1.16	0.417	IO				
1.23								
19.250	0.72	1.12	0.415	IO				
1.22								
19.333	0.71	1.08	0.412	IO				
1.22								
19.417	0.70	1.05	0.409	IO				
1.21								
19.500	0.69	1.02	0.407	IO				
1.20								
19.583	0.68	0.99	0.405	IO				
1.20								
19.667	0.67	0.96	0.403	IO				
1.19								
19.750	0.66	0.94	0.401	IO				
1.19								
19.833	0.65	0.91	0.399	O				
1.18								
19.917	0.64	0.89	0.397	O				
1.18								
20.000	0.64	0.87	0.395	O				
1.17								
20.083	0.63	0.85	0.394	O				
1.17								
20.167	0.62	0.83	0.392	O				
1.16								
20.250	0.61	0.81	0.391	O				
1.16								
20.333	0.61	0.79	0.390	O				
1.16								
20.417	0.60	0.78	0.388	O				
1.15								
20.500	0.59	0.76	0.387	O				
1.15								
20.583	0.59	0.75	0.386	O				
1.15								
20.667	0.58	0.73	0.385	O				
1.14								
20.750	0.58	0.72	0.384	O				
1.14								
20.833	0.57	0.71	0.383	O				
1.14								
20.917	0.57	0.69	0.382	O				
1.14								
21.000	0.56	0.68	0.381	O				
1.13								
21.083	0.55	0.67	0.380	O				
1.13								
21.167	0.55	0.66	0.380	O				
1.13								
21.250	0.54	0.65	0.379	O				
1.13								

416.333	0.00	0.00	0.125	0				
0.38								
416.417	0.00	0.00	0.125	0				
0.38								
416.500	0.00	0.00	0.125	0				
0.38								
416.583	0.00	0.00	0.125	0				
0.38								
416.667	0.00	0.00	0.125	0				
0.38								

Remaining water in basin = 0.12 (Ac.Ft)

*****HYDROGRAPH
 DATA*****
 Number of intervals = 5001
 Time interval = 5.0 (Min.)
 Maximum/Peak flow rate = 4.419 (CFS)
 Total volume = 1.684 (Ac.Ft)
 Status of hydrographs being held in storage
 Stream 1 Stream 2 Stream 3 Stream 4 Stream 5
 Peak (CFS) 0.000 0.000 0.000 0.000
 0.000
 Vol (Ac.Ft) 0.000 0.000 0.000 0.000
 0.000

 --

FLOOD HYDROGRAPH ROUTING PROGRAM
Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2012
Study date: 10/15/21

ASTER CACTUS
BASIN ROUTING
100 YEAR 24 HR
AREA/BASIN B

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Program License Serial Number 6232

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***** HYDROGRAPH INFORMATION

From study/file name: ASTERCACTUSB.rte
*****HYDROGRAPH
DATA*****
Number of intervals = 309
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 38.089 (CFS)
Total volume = 5.193 (Ac.Ft)
Status of hydrographs being held in storage
Stream 1 Stream 2 Stream 3 Stream 4 Stream 5
Peak (CFS) 0.000 0.000 0.000 0.000
0.000
Vol (Ac.Ft) 0.000 0.000 0.000 0.000
0.000

++++
++++
Process from Point/Station 103.000 to Point/Station
104.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data

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Total number of inflow hydrograph intervals = 309
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

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Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)
-----

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Depth vs. Storage and Depth vs. Discharge data:
  Basin Depth   Storage   Outflow   (S-0*dt/2)   (S+0*dt/2)
    (Ft.)      (Ac.Ft)    (CFS)    (Ac.Ft)    (Ac.Ft)
-----
0.000         0.000         0.000         0.000         0.000
1.000         0.400         0.010         0.400         0.400
2.000         0.850         0.010         0.850         0.850
3.000         1.370         0.010         1.370         1.370
4.000         1.940        24.000         1.857         2.023
-----

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Hydrograph Detention Basin Routing
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Graph values: 'I'= unit inflow; 'O'=outflow at time shown
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Time    Inflow  Outflow  Storage
Depth
(Hours) (CFS)   (CFS)   (Ac.Ft)
(Ft.)
0.083   0.03    0.00    0.000
0.00    0.167   0.00    0.001
0.00    0.250   0.00    0.003
0.01    0.333   0.00    0.007
0.02    0.417   0.00    0.013
0.03    0.500   0.00    0.019
0.05    0.583   0.00    0.026
0.07    0.667   0.00    0.033
0.08    0.750   0.00    0.041
0.10    0.833   0.00    0.048
0.12    0.917   0.00    0.056
0.14    1.000   0.00    0.064
0.16    1.083   0.00    0.072
0.18    1.167   0.00    0.081
0.20    1.250   0.00    0.089

```

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)
0.083	0.03	0.00	0.000
0.167	0.17	0.00	0.001
0.250	0.51	0.00	0.003
0.333	0.75	0.00	0.007
0.417	0.87	0.00	0.013
0.500	0.96	0.00	0.019
0.583	1.02	0.00	0.026
0.667	1.06	0.00	0.033
0.750	1.10	0.00	0.041
0.833	1.13	0.00	0.048
0.917	1.16	0.00	0.056
1.000	1.18	0.00	0.064
1.083	1.20	0.00	0.072
1.167	1.21	0.00	0.081
1.250	1.22	0.00	0.089

0.22									
1.333	1.24	0.00	0.098	OI					
0.24									
1.417	1.24	0.00	0.106	OI					
0.27									
1.500	1.25	0.00	0.115	OI					
0.29									
1.583	1.26	0.00	0.123	OI					
0.31									
1.667	1.27	0.00	0.132	OI					
0.33									
1.750	1.28	0.00	0.141	OI					
0.35									
1.833	1.28	0.00	0.150	OI					
0.37									
1.917	1.29	0.00	0.158	OI					
0.40									
2.000	1.29	0.00	0.167	OI					
0.42									
2.083	1.29	0.00	0.176	OI					
0.44									
2.167	1.30	0.00	0.185	OI					
0.46									
2.250	1.30	0.00	0.194	OI					
0.48									
2.333	1.31	0.01	0.203	OI					
0.51									
2.417	1.31	0.01	0.212	OI					
0.53									
2.500	1.31	0.01	0.221	OI					
0.55									
2.583	1.32	0.01	0.230	OI					
0.57									
2.667	1.32	0.01	0.239	OI					
0.60									
2.750	1.33	0.01	0.248	OI					
0.62									
2.833	1.33	0.01	0.257	OI					
0.64									
2.917	1.34	0.01	0.266	OI					
0.67									
3.000	1.34	0.01	0.275	OI					
0.69									
3.083	1.34	0.01	0.285	OI					
0.71									
3.167	1.35	0.01	0.294	OI					
0.73									
3.250	1.35	0.01	0.303	OI					
0.76									
3.333	1.36	0.01	0.312	OI					
0.78									
3.417	1.36	0.01	0.322	OI					
0.80									
3.500	1.37	0.01	0.331	OI					
0.83									
3.583	1.37	0.01	0.340	OI					
0.85									
3.667	1.38	0.01	0.350	OI					
0.87									
3.750	1.38	0.01	0.359	OI					

0.90									
3.833	1.38	0.01	0.369	OI					
0.92									
3.917	1.39	0.01	0.378	OI					
0.95									
4.000	1.39	0.01	0.388	OI					
0.97									
4.083	1.40	0.01	0.397	OI					
0.99									
4.167	1.40	0.01	0.407	OI					
1.02									
4.250	1.41	0.01	0.416	OI					
1.04									
4.333	1.41	0.01	0.426	OI					
1.06									
4.417	1.42	0.01	0.436	OI					
1.08									
4.500	1.42	0.01	0.445	OI					
1.10									
4.583	1.43	0.01	0.455	OI					
1.12									
4.667	1.43	0.01	0.465	OI					
1.14									
4.750	1.44	0.01	0.475	OI					
1.17									
4.833	1.45	0.01	0.485	OI					
1.19									
4.917	1.45	0.01	0.495	OI					
1.21									
5.000	1.46	0.01	0.505	OI					
1.23									
5.083	1.46	0.01	0.515	OI					
1.25									
5.167	1.47	0.01	0.525	OI					
1.28									
5.250	1.47	0.01	0.535	OI					
1.30									
5.333	1.48	0.01	0.545	OI					
1.32									
5.417	1.49	0.01	0.555	OI					
1.34									
5.500	1.49	0.01	0.565	OI					
1.37									
5.583	1.50	0.01	0.575	OI					
1.39									
5.667	1.50	0.01	0.586	OI					
1.41									
5.750	1.51	0.01	0.596	OI					
1.44									
5.833	1.51	0.01	0.606	OI					
1.46									
5.917	1.52	0.01	0.617	OI					
1.48									
6.000	1.53	0.01	0.627	OI					
1.50									
6.083	1.53	0.01	0.637	OI					
1.53									
6.167	1.54	0.01	0.648	OI					
1.55									
6.250	1.55	0.01	0.659	OI					

1.57									
6.333	1.55	0.01	0.669	OI					
1.60									
6.417	1.56	0.01	0.680	OI					
1.62									
6.500	1.57	0.01	0.691	OI					
1.65									
6.583	1.57	0.01	0.701	OI					
1.67									
6.667	1.58	0.01	0.712	OI					
1.69									
6.750	1.59	0.01	0.723	OI					
1.72									
6.833	1.60	0.01	0.734	OI					
1.74									
6.917	1.60	0.01	0.745	OI					
1.77									
7.000	1.61	0.01	0.756	OI					
1.79									
7.083	1.62	0.01	0.767	OI					
1.82									
7.167	1.62	0.01	0.778	OI					
1.84									
7.250	1.63	0.01	0.789	OI					
1.86									
7.333	1.64	0.01	0.800	OI					
1.89									
7.417	1.65	0.01	0.811	OI					
1.91									
7.500	1.66	0.01	0.823	OI					
1.94									
7.583	1.66	0.01	0.834	OI					
1.96									
7.667	1.67	0.01	0.846	OI					
1.99									
7.750	1.68	0.01	0.857	OI					
2.01									
7.833	1.69	0.01	0.869	OI					
2.04									
7.917	1.70	0.01	0.880	OI					
2.06									
8.000	1.71	0.01	0.892	OI					
2.08									
8.083	1.72	0.01	0.904	OI					
2.10									
8.167	1.72	0.01	0.915	OI					
2.13									
8.250	1.73	0.01	0.927	OI					
2.15									
8.333	1.74	0.01	0.939	OI					
2.17									
8.417	1.75	0.01	0.951	OI					
2.19									
8.500	1.76	0.01	0.963	OI					
2.22									
8.583	1.77	0.01	0.975	OI					
2.24									
8.667	1.78	0.01	0.987	OI					
2.26									
8.750	1.79	0.01	1.000	OI					

2.29									
8.833	1.80	0.01	1.012	OI					
2.31									
8.917	1.81	0.01	1.024	OI					
2.34									
9.000	1.82	0.01	1.037	OI					
2.36									
9.083	1.83	0.01	1.049	OI					
2.38									
9.167	1.84	0.01	1.062	OI					
2.41									
9.250	1.86	0.01	1.074	OI					
2.43									
9.333	1.87	0.01	1.087	OI					
2.46									
9.417	1.88	0.01	1.100	OI					
2.48									
9.500	1.89	0.01	1.113	OI					
2.51									
9.583	1.90	0.01	1.126	OI					
2.53									
9.667	1.91	0.01	1.139	OI					
2.56									
9.750	1.93	0.01	1.152	OI					
2.58									
9.833	1.94	0.01	1.165	OI					
2.61									
9.917	1.95	0.01	1.179	OI					
2.63									
10.000	1.96	0.01	1.192	OI					
2.66									
10.083	1.98	0.01	1.206	OI					
2.68									
10.167	1.99	0.01	1.219	OI					
2.71									
10.250	2.01	0.01	1.233	OI					
2.74									
10.333	2.02	0.01	1.247	OI					
2.76									
10.417	2.04	0.01	1.261	OI					
2.79									
10.500	2.05	0.01	1.275	OI					
2.82									
10.583	2.07	0.01	1.289	OI					
2.84									
10.667	2.08	0.01	1.303	OI					
2.87									
10.750	2.10	0.01	1.317	OI					
2.90									
10.833	2.11	0.01	1.332	OI					
2.93									
10.917	2.13	0.01	1.346	OI					
2.95									
11.000	2.15	0.01	1.361	OI					
2.98									
11.083	2.16	0.22	1.375	OI					
3.01									
11.167	2.18	0.71	1.387	OI					
3.03									
11.250	2.20	1.09	1.396	OI					

3.04									
11.333	2.22	1.37	1.402	0					
3.06									
11.417	2.24	1.59	1.407	0					
3.07									
11.500	2.26	1.75	1.411	0					
3.07									
11.583	2.28	1.88	1.415	0					
3.08									
11.667	2.30	1.99	1.417	0					
3.08									
11.750	2.32	2.07	1.419	0					
3.09									
11.833	2.34	2.13	1.420	0					
3.09									
11.917	2.36	2.19	1.422	0					
3.09									
12.000	2.39	2.24	1.423	OI					
3.09									
12.083	2.40	2.28	1.424	OI					
3.09									
12.167	2.39	2.31	1.425	OI					
3.10									
12.250	2.31	2.32	1.425	0					
3.10									
12.333	2.27	2.31	1.425	0					
3.10									
12.417	2.26	2.30	1.424	0					
3.10									
12.500	2.27	2.29	1.424	0					
3.10									
12.583	2.28	2.29	1.424	0					
3.09									
12.667	2.29	2.29	1.424	0					
3.09									
12.750	2.31	2.29	1.424	0					
3.10									
12.833	2.34	2.30	1.424	0					
3.10									
12.917	2.36	2.31	1.425	0					
3.10									
13.000	2.39	2.33	1.425	OI					
3.10									
13.083	2.42	2.35	1.426	OI					
3.10									
13.167	2.45	2.37	1.426	OI					
3.10									
13.250	2.49	2.40	1.427	0					
3.10									
13.333	2.53	2.42	1.427	0					
3.10									
13.417	2.57	2.46	1.428	0					
3.10									
13.500	2.61	2.49	1.429	0					
3.10									
13.583	2.65	2.53	1.430	0					
3.10									
13.667	2.70	2.56	1.431	0					
3.11									
13.750	2.75	2.60	1.432	0					

3.11									
13.833	2.80	2.65	1.433	0					
3.11									
13.917	2.86	2.69	1.434	0					
3.11									
14.000	2.91	2.74	1.435	0					
3.11									
14.083	2.98	2.79	1.436	0					
3.12									
14.167	3.04	2.85	1.437	0					
3.12									
14.250	3.11	2.91	1.439	0					
3.12									
14.333	3.19	2.97	1.440	0					
3.12									
14.417	3.27	3.03	1.442	0					
3.13									
14.500	3.35	3.10	1.444	0					
3.13									
14.583	3.45	3.18	1.445	0					
3.13									
14.667	3.54	3.26	1.447	0					
3.14									
14.750	3.65	3.34	1.449	0I					
3.14									
14.833	3.77	3.44	1.451	0I					
3.14									
14.917	3.90	3.54	1.454	0I					
3.15									
15.000	4.03	3.64	1.456	0					
3.15									
15.083	4.19	3.76	1.459	0					
3.16									
15.167	4.36	3.89	1.462	0					
3.16									
15.250	4.56	4.04	1.466	0					
3.17									
15.333	4.77	4.19	1.469	0I					
3.17									
15.417	4.99	4.37	1.474	0I					
3.18									
15.500	5.07	4.54	1.478	0I					
3.19									
15.583	4.94	4.65	1.480	0I					
3.19									
15.667	5.00	4.73	1.482	0I					
3.20									
15.750	5.32	4.84	1.485	0					
3.20									
15.833	5.82	5.03	1.489	0					
3.21									
15.917	6.70	5.34	1.497	0I					
3.22									
16.000	8.25	5.88	1.509	0 I					
3.24									
16.083	13.04	7.09	1.538	0	I				
3.29									
16.167	23.90	9.97	1.607	0		I			
3.42									
16.250	38.09	15.29	1.733	0					I

3.64									
16.333	28.13	19.80	1.840				0	I	
3.83									
16.417	18.49	20.69	1.861				I 0		
3.86									
16.500	14.15	19.58	1.835				I 0		
3.82									
16.583	11.73	17.90	1.795			I	0		
3.75									
16.667	10.13	16.14	1.753			I	0		
3.67									
16.750	8.84	14.45	1.713			I	0		
3.60									
16.833	7.67	12.88	1.676			I	0		
3.54									
16.917	6.90	11.47	1.642			I	0		
3.48									
17.000	6.24	10.23	1.613			I 0			
3.43									
17.083	5.64	9.14	1.587			I 0			
3.38									
17.167	5.14	8.19	1.564			I 0			
3.34									
17.250	4.70	7.36	1.545			I 0			
3.31									
17.333	4.28	6.63	1.527			I 0			
3.28									
17.417	3.89	5.99	1.512			I 0			
3.25									
17.500	3.74	5.44	1.499			IO			
3.23									
17.583	3.60	4.99	1.488			IO			
3.21									
17.667	3.43	4.62	1.479			IO			
3.19									
17.750	3.14	4.28	1.471			IO			
3.18									
17.833	2.87	3.96	1.464			IO			
3.16									
17.917	2.64	3.65	1.457			IO			
3.15									
18.000	2.54	3.38	1.450			0			
3.14									
18.083	2.47	3.16	1.445			0			
3.13									
18.167	2.43	2.98	1.441			0			
3.12									
18.250	2.46	2.84	1.437			0			
3.12									
18.333	2.46	2.75	1.435			0			
3.11									
18.417	2.44	2.67	1.433			0			
3.11									
18.500	2.40	2.61	1.432			0			
3.11									
18.583	2.37	2.55	1.430			IO			
3.11									
18.667	2.33	2.50	1.429			IO			
3.10									
18.750	2.29	2.45	1.428			IO			

3.10									
18.833	2.26	2.41	1.427	IO					
3.10									
18.917	2.22	2.37	1.426	0					
3.10									
19.000	2.19	2.33	1.425	0					
3.10									
19.083	2.16	2.29	1.424	0					
3.09									
19.167	2.13	2.25	1.423	0					
3.09									
19.250	2.09	2.21	1.422	0					
3.09									
19.333	2.06	2.18	1.422	0					
3.09									
19.417	2.04	2.15	1.421	0					
3.09									
19.500	2.01	2.12	1.420	0					
3.09									
19.583	1.98	2.09	1.419	0					
3.09									
19.667	1.96	2.06	1.419	0					
3.09									
19.750	1.93	2.03	1.418	0					
3.08									
19.833	1.91	2.00	1.417	0					
3.08									
19.917	1.88	1.97	1.417	0					
3.08									
20.000	1.86	1.95	1.416	0					
3.08									
20.083	1.84	1.92	1.415	0					
3.08									
20.167	1.82	1.90	1.415	0					
3.08									
20.250	1.79	1.87	1.414	0					
3.08									
20.333	1.77	1.85	1.414	0					
3.08									
20.417	1.75	1.83	1.413	0					
3.08									
20.500	1.74	1.81	1.413	0					
3.07									
20.583	1.72	1.79	1.412	0					
3.07									
20.667	1.70	1.77	1.412	0					
3.07									
20.750	1.68	1.75	1.411	0					
3.07									
20.833	1.67	1.73	1.411	0					
3.07									
20.917	1.65	1.71	1.410	0					
3.07									
21.000	1.63	1.69	1.410	0					
3.07									
21.083	1.62	1.68	1.410	0					
3.07									
21.167	1.60	1.66	1.409	0					
3.07									
21.250	1.59	1.64	1.409	0					

2.38								
416.333	0.00	0.01	1.047	0				
2.38								
416.417	0.00	0.01	1.047	0				
2.38								
416.500	0.00	0.01	1.047	0				
2.38								
416.583	0.00	0.01	1.047	0				
2.38								
416.667	0.00	0.01	1.047	0				
2.38								

Remaining water in basin = 1.05 (Ac.Ft)

```

*****HYDROGRAPH
DATA*****
      Number of intervals = 5001
      Time interval = 5.0 (Min.)
      Maximum/Peak flow rate = 20.690 (CFS)
      Total volume = 4.146 (Ac.Ft)
      Status of hydrographs being held in storage
            Stream 1 Stream 2 Stream 3 Stream 4 Stream 5
Peak (CFS)      0.000      0.000      0.000      0.000
0.000
Vol (Ac.Ft)      0.000      0.000      0.000      0.000
0.000
*****
*****
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APPENDIX F: PROJECT HYDRAULIC CALCULATIONS

Channel Report

Aster Road Temp Crossing

User-defined

Invert Elev (ft) = 17.50
Slope (%) = 1.00
N-Value = 0.012

Calculations

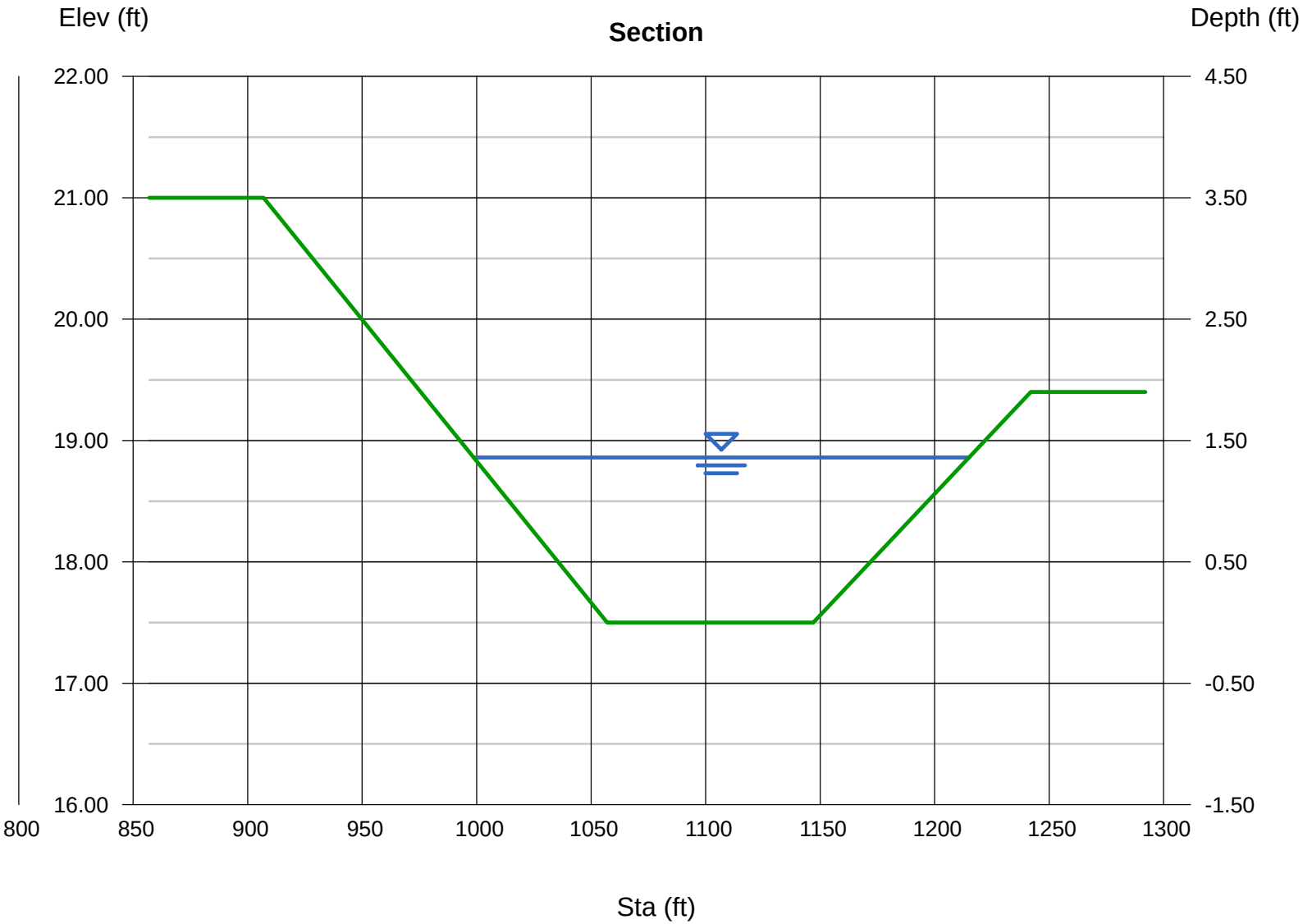
Compute by: Known Q
Known Q (cfs) = 2501.00

Highlighted

Depth (ft) = 1.36
Q (cfs) = 2,501
Area (sqft) = 208.27
Velocity (ft/s) = 12.01
Wetted Perim (ft) = 216.32
Crit Depth, Yc (ft) = 2.04
Top Width (ft) = 216.29
EGL (ft) = 3.60

(Sta, El, n)-(Sta, El, n)...

(907.00, 21.00)-(1057.00, 17.50, 0.012)-(1147.00, 17.50, 0.012)-(1242.00, 19.40, 0.012)



Channel Report

Basin A1 A2 and A3 Outlet Prelim Control Design

Circular

Diameter (ft) = 1.00

Invert Elev (ft) = 1.00

Slope (%) = 1.50

N-Value = 0.012

Calculations

Compute by: Known Q

Known Q (cfs) = 5.00

Highlighted

Depth (ft) = 0.89

Q (cfs) = 5.000

Area (sqft) = 0.74

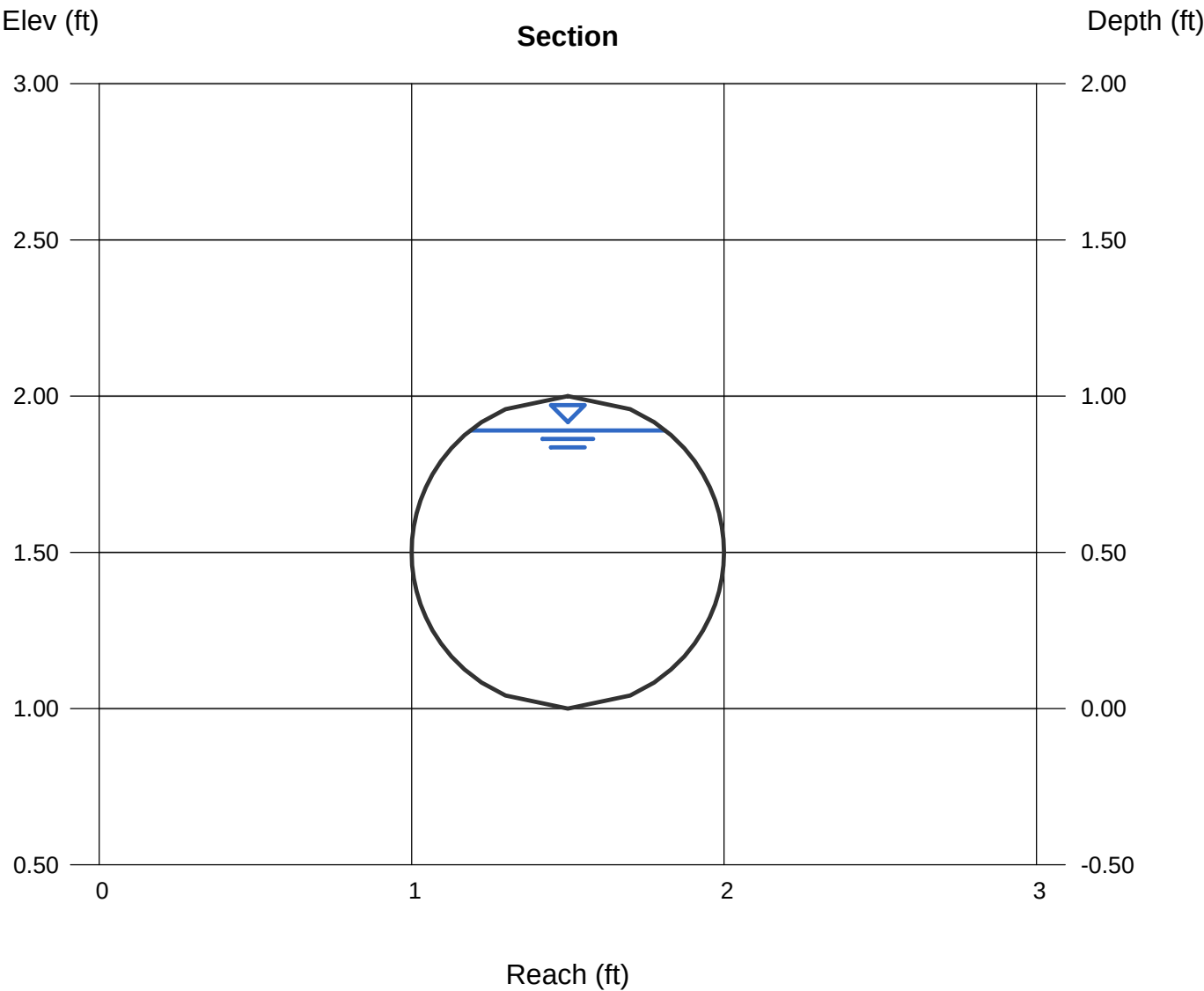
Velocity (ft/s) = 6.76

Wetted Perim (ft) = 2.47

Crit Depth, Yc (ft) = 0.92

Top Width (ft) = 0.62

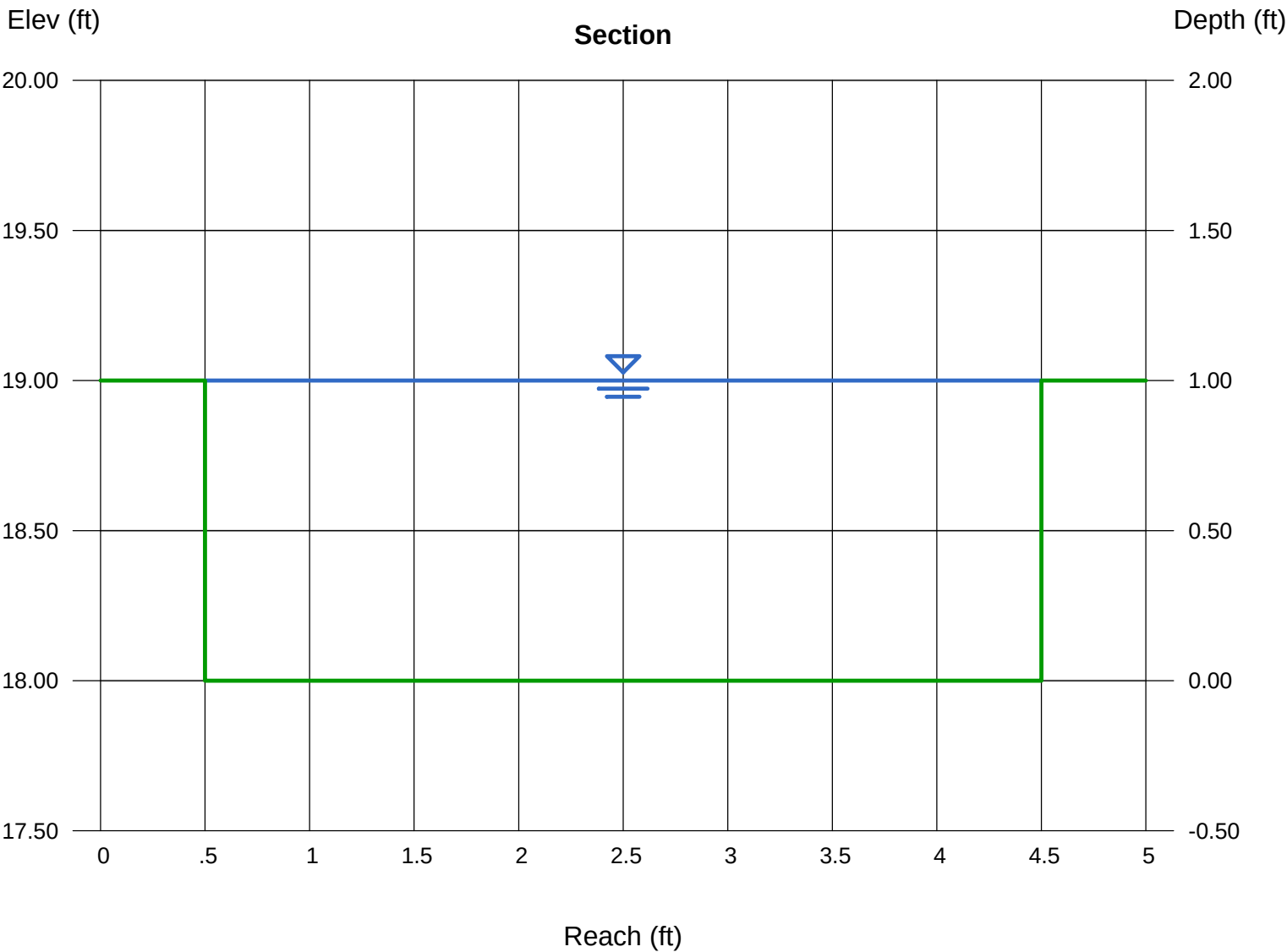
EGL (ft) = 1.60



Channel Report

Basin B Prelim Outlet Design

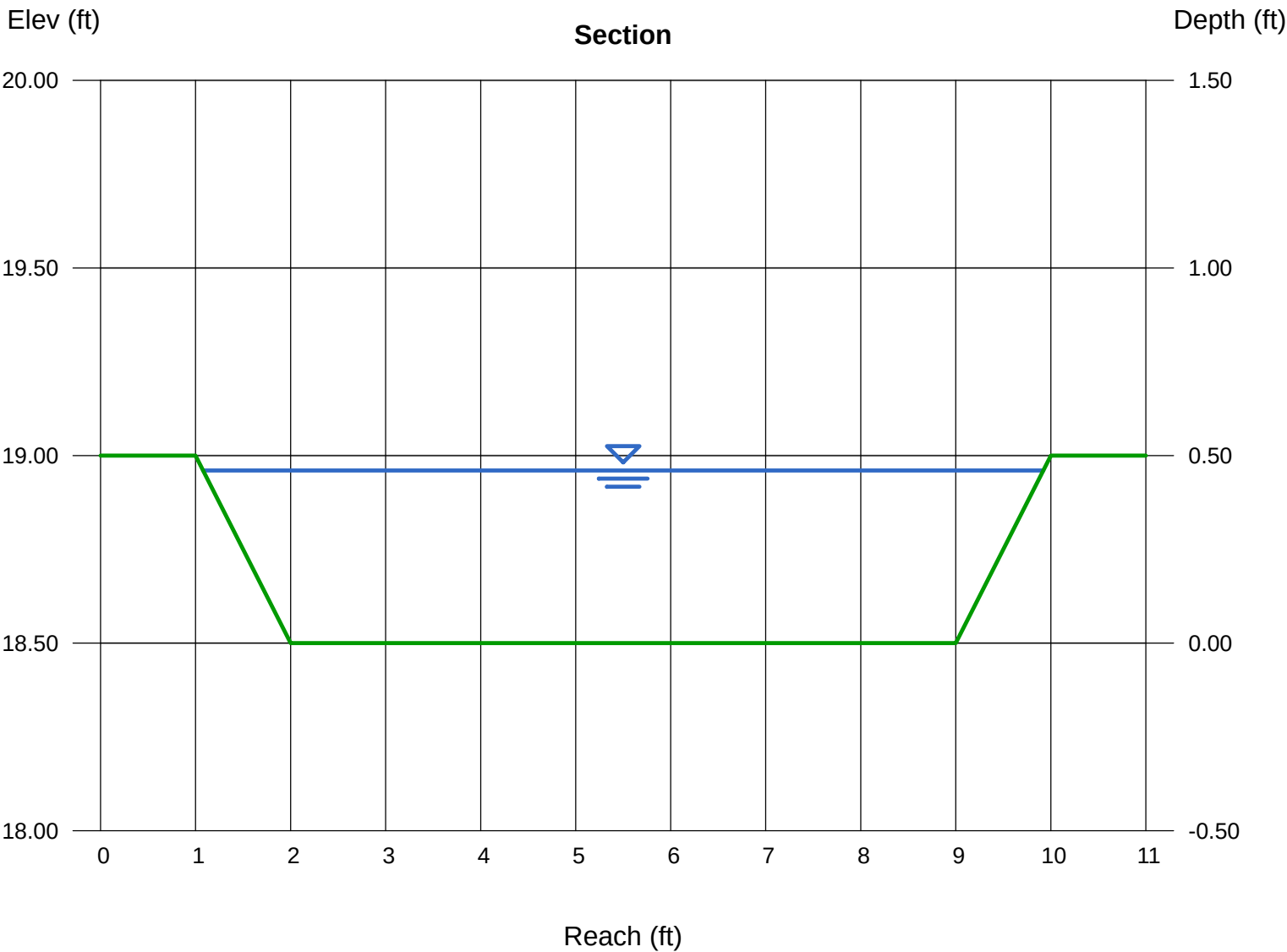
Rectangular		Highlighted	
Bottom Width (ft)	= 4.00	Depth (ft)	= 1.00
Total Depth (ft)	= 1.00	Q (cfs)	= 23.90
		Area (sqft)	= 4.00
Invert Elev (ft)	= 18.00	Velocity (ft/s)	= 5.98
Slope (%)	= 0.40	Wetted Perim (ft)	= 6.00
N-Value	= 0.012	Crit Depth, Yc (ft)	= 0.94
		Top Width (ft)	= 4.00
		EGL (ft)	= 1.56
Calculations			
Compute by:	Q vs Depth		
No. Increments	= 10		



Channel Report

Basin B Outlet Design

Trapezoidal		Highlighted	
Bottom Width (ft)	= 7.00	Depth (ft)	= 0.46
Side Slopes (z:1)	= 2.00, 2.00	Q (cfs)	= 24.00
Total Depth (ft)	= 0.50	Area (sqft)	= 3.64
Invert Elev (ft)	= 18.50	Velocity (ft/s)	= 6.59
Slope (%)	= 1.00	Wetted Perim (ft)	= 9.06
N-Value	= 0.012	Crit Depth, Yc (ft)	= 0.50
Calculations		Top Width (ft)	= 8.84
Compute by:	Known Q	EGL (ft)	= 1.13
Known Q (cfs)	= 24.00		



Channel Report

Temporary Cactus Rd Crossing

User-defined

Invert Elev (ft) = 34.00
Slope (%) = 1.00
N-Value = 0.012

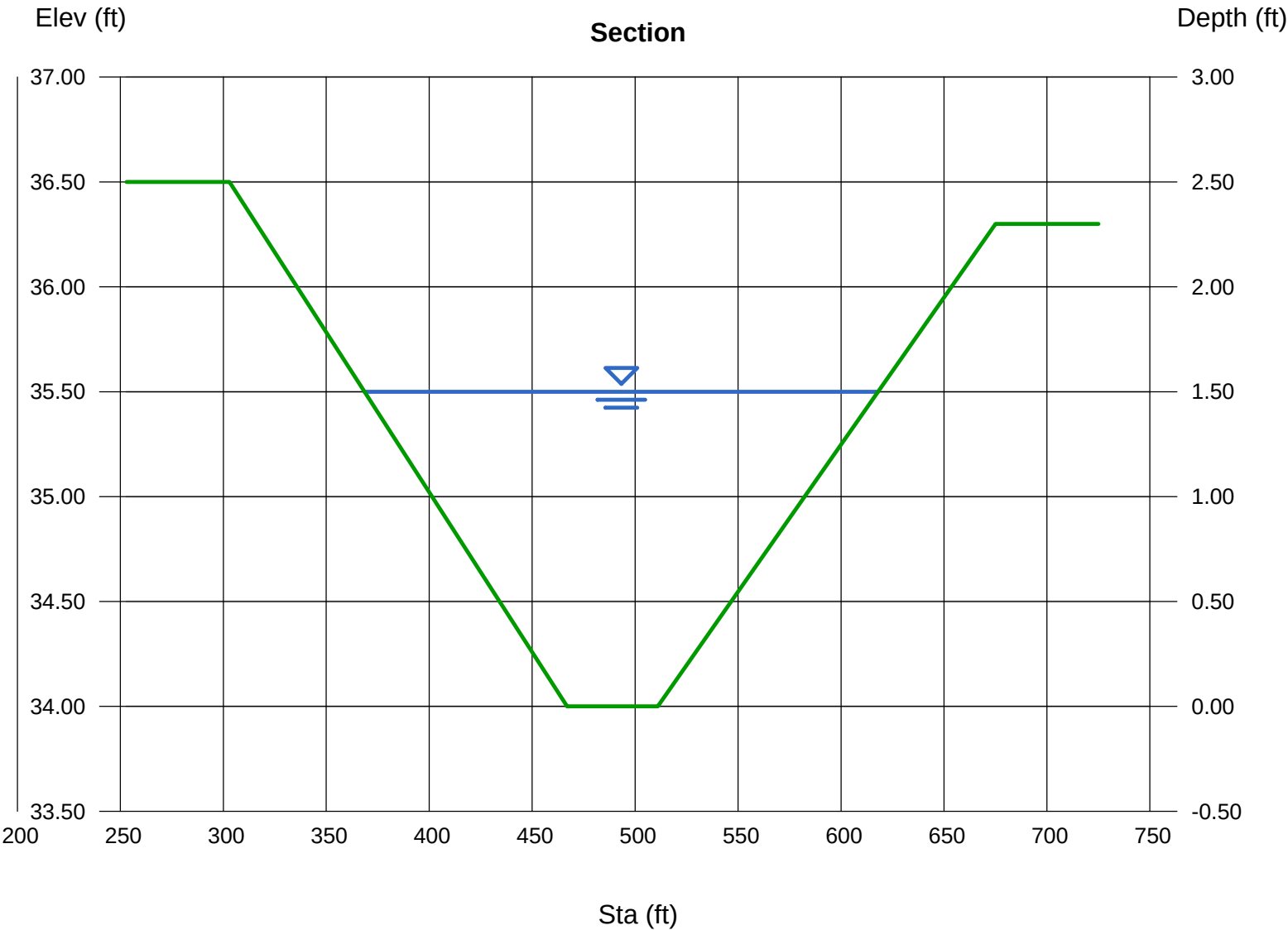
Calculations

Compute by: Known Q
Known Q (cfs) = 2501.00

Highlighted

Depth (ft) = 1.50
Q (cfs) = 2,501
Area (sqft) = 220.02
Velocity (ft/s) = 11.37
Wetted Perim (ft) = 249.38
Crit Depth, Yc (ft) = 2.13
Top Width (ft) = 249.36
EGL (ft) = 3.51

(Sta, El, n)-(Sta, El, n)..
(303.00, 36.50)-(467.00, 34.00, 0.012)-(511.00, 34.00, 0.012)-(675.00, 36.30, 0.012)



Culvert Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc.

Wednesday, Oct 13 2021

Full Flow Crossing - Three 12' h x 9' d RCB

Invert Elev Dn (ft) = 1.00
Pipe Length (ft) = 80.00
Slope (%) = 0.30
Invert Elev Up (ft) = 1.24
Rise (in) = 108.0
Shape = Box
Span (in) = 144.0
No. Barrels = 3
n-Value = 0.012
Inlet Edge = Mitered
Coeff. K,M,c,Y,k = 0.021, 1.33, 0.0463, 0.75, 0.7

Embankment

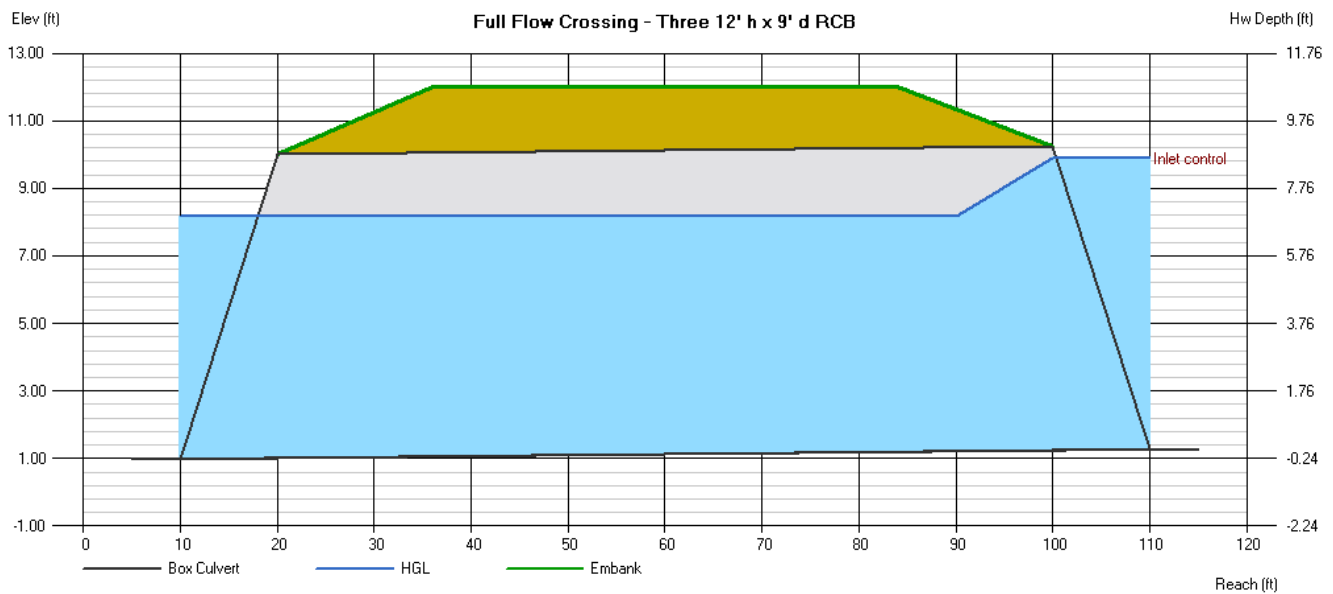
Top Elevation (ft) = 12.00
Top Width (ft) = 48.00
Crest Width (ft) = 100.00

Calculations

Qmin (cfs) = 2501.00
Qmax (cfs) = 2501.00
Tailwater Elev (ft) = (dc+D)/2

Highlighted

Qtotal (cfs) = 2501.00
Qpipe (cfs) = 2501.00
Qovertop (cfs) = 0.00
Veloc Dn (ft/s) = 9.71
Veloc Up (ft/s) = 10.05
HGL Dn (ft) = 8.15
HGL Up (ft) = 8.15
Hw Elev (ft) = 9.88
Hw/D (ft) = 0.96
Flow Regime = Inlet Control



Channel Report

Interim Channel

Trapezoidal

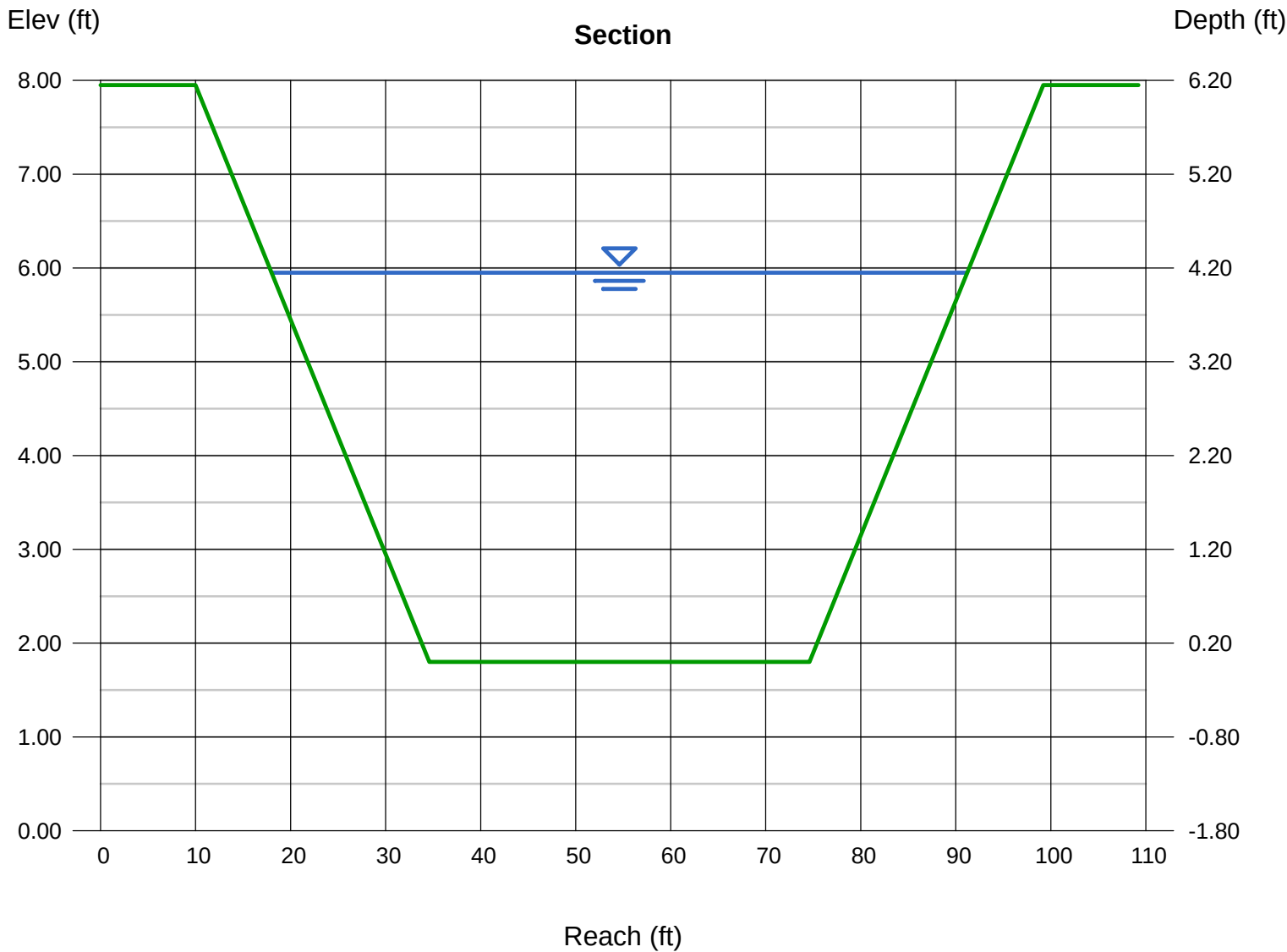
Bottom Width (ft) = 40.00
Side Slopes (z:1) = 4.00, 4.00
Total Depth (ft) = 6.15
Invert Elev (ft) = 1.80
Slope (%) = 1.00
N-Value = 0.030

Calculations

Compute by: Known Q
Known Q (cfs) = 2501.00

Highlighted

Depth (ft) = 4.15
Q (cfs) = 2,501
Area (sqft) = 234.89
Velocity (ft/s) = 10.65
Wetted Perim (ft) = 74.22
Crit Depth, Yc (ft) = 4.27
Top Width (ft) = 73.20
EGL (ft) = 5.91



Channel Report

Line 2B - Slope Check

User-defined

Invert Elev (ft) = 1.00
Slope (%) = 0.33
N-Value = 0.019

Calculations

Compute by: Known Q
Known Q (cfs) = 2501.00

Highlighted

Depth (ft) = 8.93
Q (cfs) = 2,501
Area (sqft) = 186.91
Velocity (ft/s) = 13.38
Wetted Perim (ft) = 37.26
Crit Depth, Yc (ft) = 8.65
Top Width (ft) = 29.86
EGL (ft) = 11.71

(Sta, El, n)-(Sta, El, n)...

(0.00, 17.00)-(16.00, 1.00, 0.012)-(28.00, 1.00, 0.030)-(44.00, 17.00, 0.012)

