

**DRAINAGE REPORT
FOR
LKQ ADELANTO PROJECT
ADELANTO, CALIFORNIA**

Prepared for:

GYANT COMPLIANCE

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Prepared by:



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July 15, 2016

AMENDED: September 26, 2024

Land Development	THE PLANS AND DETAILS HAVE BEEN	B. HEMSLEY@LUS.SB.COUNTY.GOV (909) 387-4547
	REVIEWED	
	FOR CODE COMPLIANCE	
	THE REVIEW OF THESE PLANS SHALL NOT BE CONSTRUED TO BE A PERMIT FOR ANY VIOLATION OF ANY CODE OR ORDINANCE OF THIS COUNTY.	
	By: <u>William Hemsley</u> Date: <u>10/21/2024</u>	
	THESE PLANS SHALL BE ON THE JOB FOR ALL REQUIRED INSPECTIONS	

**DRAINAGE REPORT
LKQ ADELANTO PROJECT
ADELANTO, CALIFORNIA**

This report has been prepared by, or under the direction of, the following registered civil engineer who attests to the technical information contained herein.



Anthony M. Mistretta
Registered Civil Engineer

7/21/16

Date



Seal

AMENDEMENT DATED 9/26/2024:



Anthony M. Mistretta
Registered Civil Engineer

9/26/2024

Date



Seal

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I. PURPOSE AND SCOPE

The purpose of this drainage analysis is to determine the 100-year storm run-off emanating from the on-site drainage area for the proposed LKQ Adelanto Project (Project) in Adelanto, California. The study will compare the existing and proposed conditions to determine the increase in peak storm flows due to the proposed grading and site improvements.

The scope of the study includes the following:

1. Determination of points of flow concentration and drainage areas.
2. Determination of the 100-year storm flows based upon the proposed condition utilizing the Civil Design Engineering Software Program Package for San Bernardino County, Rational Method.
3. Design of proposed on-site underground storm drain system.
4. Determination of the 100-year storm volumes based upon the existing condition utilizing the Civil Design Engineering Software Program Package for San Bernardino County, Synthetic Unit Hydrograph.
5. Determination of the 100-year storm volumes based upon the proposed condition utilizing the Civil Design Engineering Software Program Package for San Bernardino County, Synthetic Unit Hydrograph.
6. Design of proposed on-site retention basin.
7. Preparation of hydrology maps.
8. Preparation of the hydrology report.

II. PROJECT DESCRIPTION

The proposed Project is located at 11200 Alden Road in the City of Adelanto, California. The site is approximately ¼ mile east of US Highway 395 and 10.4 miles west of Interstate 15 (See Figure 1). The Project proposes a building, concrete flatwork, and grading improvements on approximately 1.7 acres of the overall 30.7-acre project site, which is shown on Figure 2.

III. DRAINAGE AREA OVERVIEW

Existing Condition

The Project site is mostly undeveloped and surrounded by vacant desert land with natural vegetation. There is an existing 5,500-square-foot building with adjacent pavement located toward the southwest corner of the site. Topographically, the site is relatively flat and slopes to the north at an overall gradient of less than 2 percent. Site elevations range from 2,802 feet above MSL in the southwest, to 2,786 feet in the northwest. Runoff generated from the site drains northerly via overland sheet flow.

Proposed Condition

Upon development, approximately 1.7 acres of impervious surface will be added to the Project site. Runoff flows from these impervious areas will be conveyed northerly by overland sheet flow and a proposed underground storm drain system, and ultimately discharge into a proposed retention basin located along the north side of the lot.

IV. HYDROLOGY

Methodology

The San Bernardino County Hydrology Manual (Reference 1) was used to develop the hydrological parameters for the 100-year storm event. The Rational and Unit Hydrograph Methods were used for the analyses. The Rational Method was used to determine the peak flow rates for the proposed condition, while the Unit Hydrograph Method was used to determine the 100-year flood volumes for the existing and proposed conditions. Computations were performed using the San Bernardino County module for computer programs developed by Civil Cadd/Civil Design Engineering Software, RSBC for Rational Method and UNSBC for Unit Hydrograph Method.

Hydrology Parameters

Hydrologic Soil Groups were determined using the soils maps provided in the San Bernardino County Hydrology Manual. The entire study area consists of Hydrologic Soil Group "C" soils (See Appendix F, Figure C-11).

Based on the San Bernardino County Hydrology Manual 100-Year/24-Hour Isohyetal Map (See Appendix F, Figure B-12), the 100-year rainfall depth is 3.0 inches.

The cover type assumed for the existing condition is barren land on "C" soils, which yields an AMC-2 Runoff Curve Number (RCN) of 91. Using Table C.1 of the San Bernardino County Hydrology Manual (See Appendix F), the equivalent AMC-3 (100-year) RCN is 98.

The cover types associated with the proposed condition will be concrete and building rooftop. Using Table 2-2a from the Urban Hydrology for Small Watersheds, Technical Release 55, (See Appendix F), the RCN for concrete and other impervious surfaces is 98.

V. STUDY FINDINGS

Upon development, building and concrete pad areas that discharge to the proposed storm drain system (Areas A1 and A2) will generate approximately 4.1 cfs for the 100-year storm event. The northwest portion of the proposed building (Area A3) will generate approximately 3.0 cfs for the 100-year storm event, which will discharge at ground level along the north side of the building via three roof drains. Finally, the loading dock (Area A4) will generate approximately 0.8 cfs for the 100-year storm event, which will

discharge to an existing exclusive storm drain system. This existing storm drain system discharges into an existing on-site drywell, and is separate from the storm drain system proposed by the Project.

Based on the results of the Unit Hydrograph analysis, the developed Project site will generate approximately 316,485 cf (7.27 ac-ft) of runoff for the 100-year/24-hour storm event, which is approximately 52 cf more than that of the existing condition, 316,433 cf (7.26 ac-ft).

VI. PROPOSED FACILITIES

The developed site proposes an on-site underground storm drain system designed to accept and convey flows from a portion of the proposed improvements. The areas discharging to the proposed storm drain system consist of building rooftop and uncovered concrete slabs. These areas drain directly to catch basins located within the concrete slabs, aligned with the roof drain downspouts. The storm drain system will be constructed entirely of 12" PVC pipe with longitudinal grades ranging from 0.5% to 1.1%, and discharge to a proposed on-site retention basin.

The proposed retention basin will be located at the downstream end of the Project site, and intercept flows from 100% of the developed area. The retention basin will be approximately 3 feet deep to accommodate the 12" PVC storm drain inlet pipe with 2 feet of cover. The basin will have 2:1 side slopes and comprise approximately 6,500 sf of footprint area. The basin bottom will be level at 2,783 feet above MSL, with dimensions of approximately 2 feet wide and 450 feet long.

The basin will be designed to retain the increased volume of runoff generated by the development of the Project site (52 cf). The overall capacity of the basin is approximately 10,850 cf.

VII. CONCLUSIONS

Based on the results of this study, it is concluded that implementation of the proposed retention basin and on-site storm drain system will provide protection of on-site facilities from the 100-year storm event without adversely impacting the existing downstream drainage conditions.

VIII. REFERENCES

1. San Bernardino County Hydrology Manual, August 1986.
2. USDA Urban Hydrology for Small Watersheds, Technical Release 55, June 1986.

IX. AMENDMENT

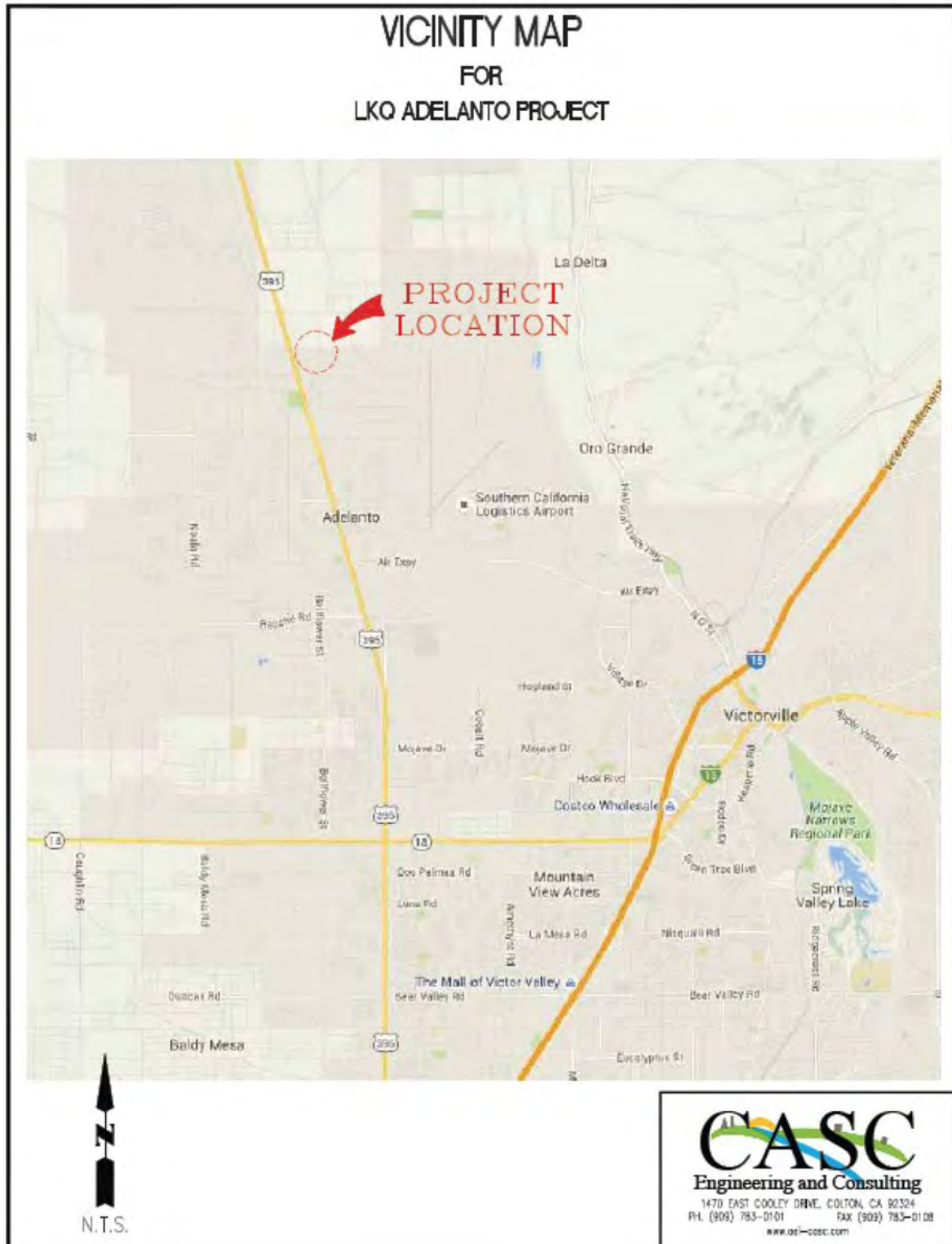
The amended Drainage Report now includes an analysis for an additional 54.35 acres located north of the original 30.7-acre site (APN 460-171-04 & 05) on the north side of Alden Road. The new area encompasses APNs 460-161-03, 31, 32, and 33. This site is enclosed by a metal screen fence and is bordered by Bellflower Street to the east, APN 460-161-47 (vacant parcel) to the north, and APNs 460-161-02 (vacant parcel) and 460-161-34 (Buddhist Meditation Center) to the west. The subject site remains undeveloped and has no impervious surfaces. It drains from south to north with an average gradient of approximately 0.60%, descending from an elevation of 2786 feet to 2778 feet above mean sea level. The area will serve as temporary storage for used vehicles, which will not include license plates, fuel tanks, engine oil, or transmission and brake fluids.

The analysis for the additional 54.35 acres incorporates rational method calculations for the 100-year storm event, evaluating both pre-development and post-development conditions to compare peak flow rates. The total area under consideration is now 85.05 acres. Detailed calculations are provided in Appendix F, with Exhibit C illustrating the analyzed area. The calculations indicate that the pre-developed condition results in a flow rate of 98.90 cfs, while the post-development condition shows a flow rate of 102.10 cfs.

As detailed in Section VI of the report, the site includes a retention basin designed to manage increased flow rates. The basin, with a capacity of 10,850 cubic feet, is sized to mitigate the increased flows resulting from the building and adjacent pavement. Given that the additional area to the north is downstream of the existing development and its associated retention basin, which mitigates increased flows, the proposed use of the additional 54.35 acres is not expected to elevate flows exiting the site towards the downstream area (APN 460-161-47). Consequently, no additional basins or drainage improvements are required to maintain the existing flow conditions.

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FIGURE 1: REGIONAL VICINITY MAP



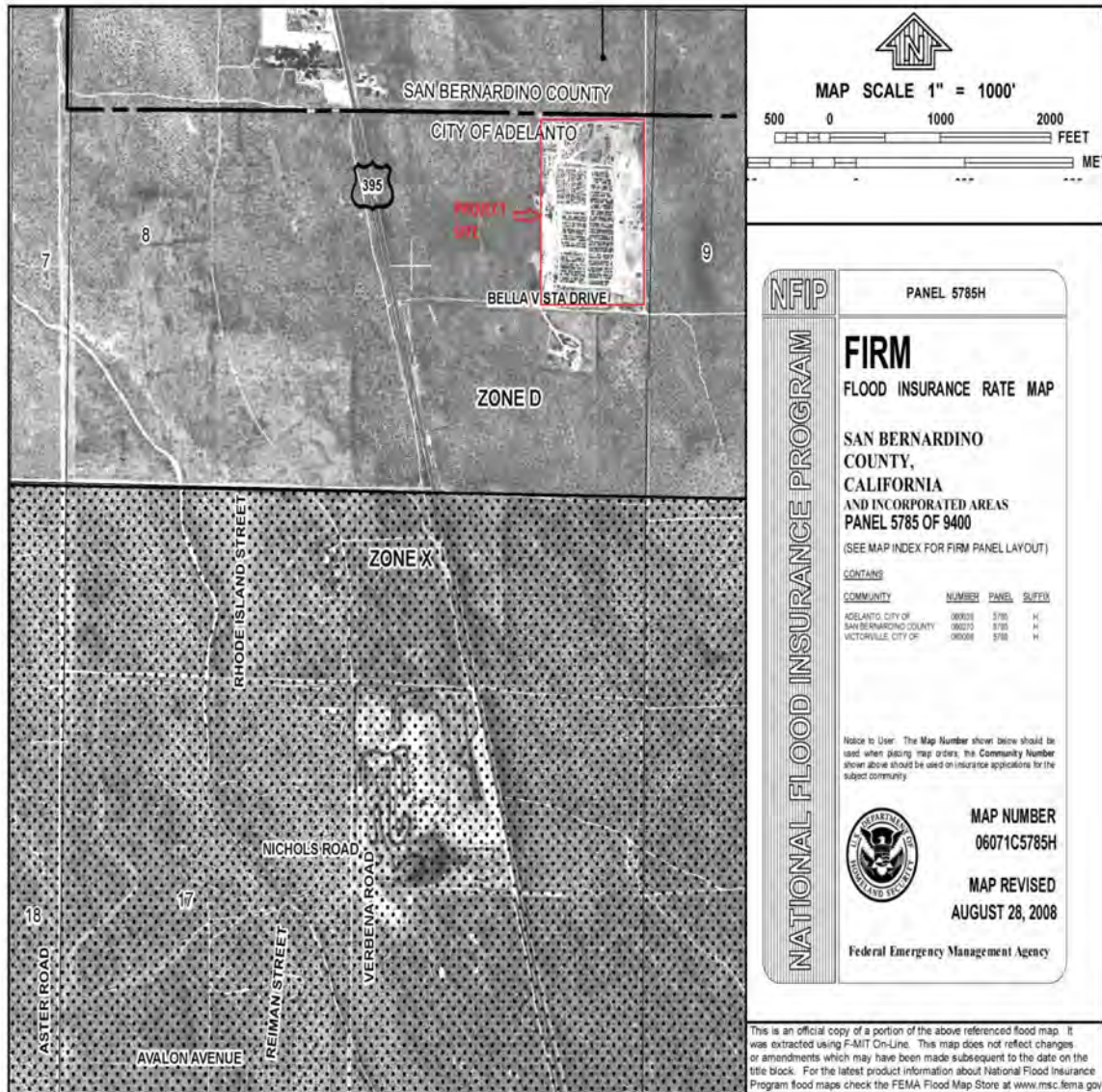
**DRAINAGE REPORT
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FIGURE 2: LOCAL VICINITY MAP



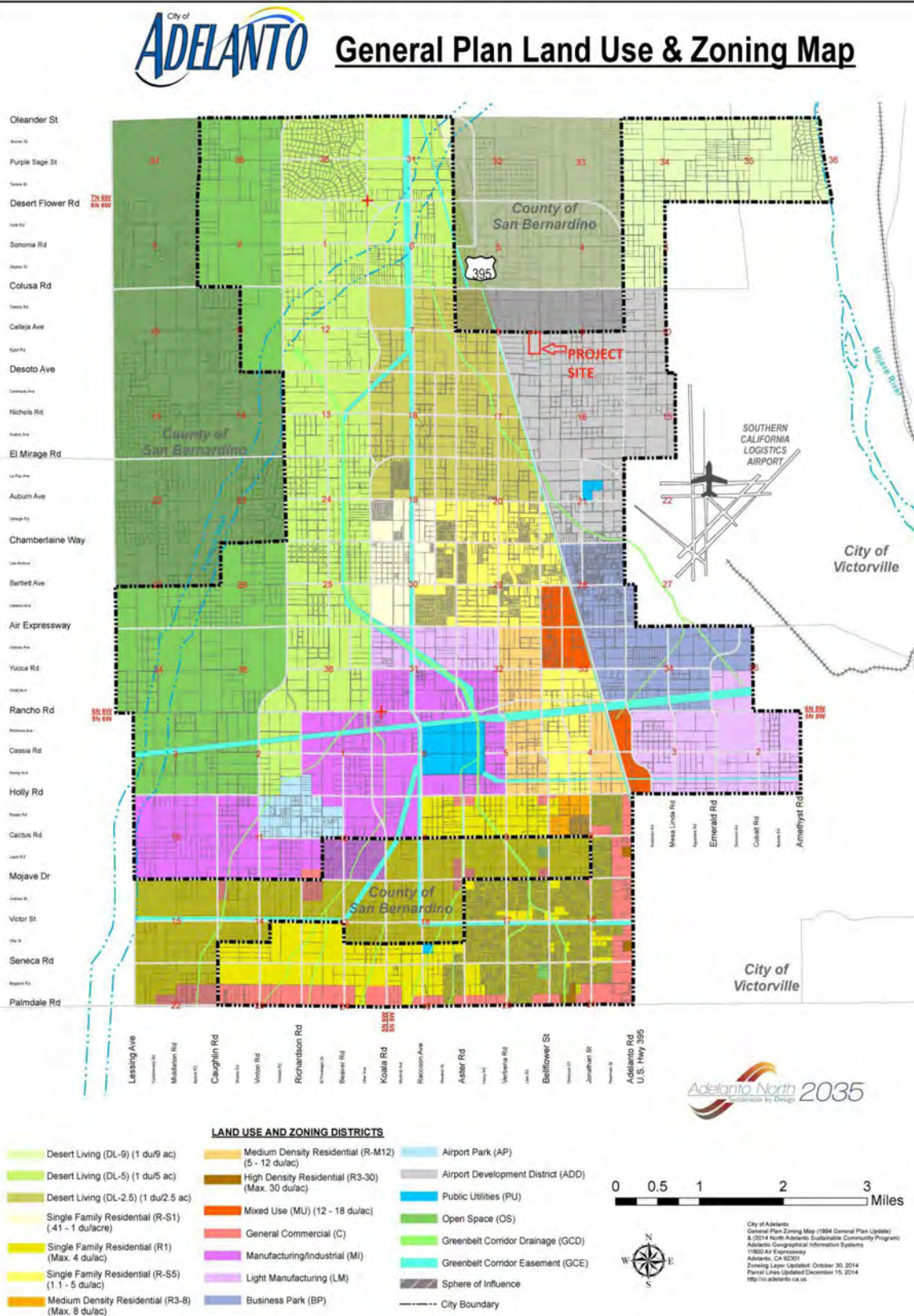
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FIGURE 3: FEMA FLOOD PLAIN MAP



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FIGURE 4: LAND USE MAP



APPENDIX A:
HYDROLOGY CALCULATIONS BASED ON PROPOSED CONDITION (RATIONAL METHOD)

APPENDIX A.1:
100-YEAR HYDROLOGY CALCULATIONS

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: 07/14/16

LKQ ADELANTO PROJECT
AREA A - PROPOSED CONDITION
100-YR
FN: APR100

Program License Serial Number 6268

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.200 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

+++++
Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 98.00
Adjusted SCS curve number for AMC 3 = 99.60
Pervious ratio(Ap) = 0.0100 Max loss rate(Fm)= 0.000 (In/Hr)
Initial subarea data:
Initial area flow distance = 427.000(Ft.)
Top (of initial area) elevation = 2800.300(Ft.)
Bottom (of initial area) elevation = 2799.800(Ft.)
Difference in elevation = 0.500(Ft.)
Slope = 0.00117 s(%)= 0.12
 $TC = k(0.277)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 12.047 min.
Rainfall intensity = 3.692(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.900
Subarea runoff = 1.861(CFS)
Total initial stream area = 0.560(Ac.)
Pervious area fraction = 0.010
Initial area Fm value = 0.000(In/Hr)

+++++
Process from Point/Station 101.000 to Point/Station 104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 2796.300(Ft.)
Downstream point/station elevation = 2795.700(Ft.)
Pipe length = 117.00(Ft.) Manning's N = 0.009
No. of pipes = 1 Required pipe flow = 1.861(CFS)
Nearest computed pipe diameter = 12.00(In.)
Calculated individual pipe flow = 1.861(CFS)

Normal flow depth in pipe = 6.04(In.)
Flow top width inside pipe = 12.00(In.)
Critical Depth = 6.97(In.)
Pipe flow velocity = 4.70(Ft/s)
Travel time through pipe = 0.41 min.
Time of concentration (TC) = 12.46 min.

+++++
Process from Point/Station 101.000 to Point/Station 104.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 1
Stream flow area = 0.560(Ac.)
Runoff from this stream = 1.861(CFS)
Time of concentration = 12.46 min.
Rainfall intensity = 3.606(In/Hr)
Area averaged loss rate (Fm) = 0.0001(In/Hr)
Area averaged Pervious ratio (Ap) = 0.0100
Program is now starting with Main Stream No. 2

+++++
Process from Point/Station 102.000 to Point/Station 103.000
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 98.00
Adjusted SCS curve number for AMC 3 = 99.60
Pervious ratio(Ap) = 0.0100 Max loss rate(Fm)= 0.000(In/Hr)
Initial subarea data:
Initial area flow distance = 291.000(Ft.)
Top (of initial area) elevation = 2800.300(Ft.)
Bottom (of initial area) elevation = 2799.600(Ft.)
Difference in elevation = 0.700(Ft.)
Slope = 0.00241 s(%)= 0.24
 $TC = k(0.277)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 8.948 min.
Rainfall intensity = 4.546(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.900
Subarea runoff = 2.373(CFS)
Total initial stream area = 0.580(Ac.)
Pervious area fraction = 0.010
Initial area Fm value = 0.000(In/Hr)

+++++
Process from Point/Station 103.000 to Point/Station 104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 2795.900(Ft.)
Downstream point/station elevation = 2795.700(Ft.)
Pipe length = 15.00(Ft.) Manning's N = 0.009
No. of pipes = 1 Required pipe flow = 2.373(CFS)
Nearest computed pipe diameter = 9.00(In.)
Calculated individual pipe flow = 2.373(CFS)
Normal flow depth in pipe = 6.43(In.)
Flow top width inside pipe = 8.13(In.)
Critical Depth = 8.19(In.)
Pipe flow velocity = 7.02(Ft/s)
Travel time through pipe = 0.04 min.

Time of concentration (TC) = 8.98 min.

+++++
Process from Point/Station 103.000 to Point/Station 104.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 2
Stream flow area = 0.580(Ac.)
Runoff from this stream = 2.373(CFS)
Time of concentration = 8.98 min.
Rainfall intensity = 4.534(In/Hr)
Area averaged loss rate (Fm) = 0.0001(In/Hr)
Area averaged Pervious ratio (Ap) = 0.0100
Summary of stream data:

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

1	1.86	0.560	12.46	0.000	3.606
2	2.37	0.580	8.98	0.000	4.534
Qmax(1) =					
	1.000 *	1.000 *	1.861) +		
	0.795 *	1.000 *	2.373) + =		3.748
Qmax(2) =					
	1.257 *	0.721 *	1.861) +		
	1.000 *	1.000 *	2.373) + =		4.060

Total of 2 main streams to confluence:

Flow rates before confluence point:

2.861 3.373

Maximum flow rates at confluence using above data:

3.748 4.060

Area of streams before confluence:

0.560 0.580

Effective area values after confluence:

1.140 0.984

Results of confluence:

Total flow rate = 4.060(CFS)
Time of concentration = 8.984 min.
Effective stream area after confluence = 0.984(Ac.)
Study area average Pervious fraction(Ap) = 0.010
Study area average soil loss rate(Fm) = 0.000(In/Hr)
Study area total = 1.14(Ac.)

+++++
Process from Point/Station 104.000 to Point/Station 105.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 2795.700(Ft.)
Downstream point/station elevation = 2783.000(Ft.)
Pipe length = 1197.00(Ft.) Manning's N = 0.009
No. of pipes = 1 Required pipe flow = 4.060(CFS)
Nearest computed pipe diameter = 12.00(In.)
Calculated individual pipe flow = 4.060(CFS)
Normal flow depth in pipe = 7.86(In.)
Flow top width inside pipe = 11.41(In.)
Critical Depth = 10.23(In.)

Pipe flow velocity = 7.44(Ft/s)
Travel time through pipe = 2.68 min.
Time of concentration (TC) = 11.67 min.

+++++
Process from Point/Station 104.000 to Point/Station 105.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 1
Stream flow area = 0.984(Ac.)
Runoff from this stream = 4.060(CFS)
Time of concentration = 11.67 min.
Rainfall intensity = 3.776(In/Hr)
Area averaged loss rate (Fm) = 0.0001(In/Hr)
Area averaged Pervious ratio (Ap) = 0.0100
Summary of stream data:

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

1	4.06	0.984	11.67	0.000	3.776
---	------	-------	-------	-------	-------

Qmax(1) = 1.000 * 1.000 * 4.060 + = 4.060

Total of 1 main streams to confluence:

Flow rates before confluence point:
5.060

Maximum flow rates at confluence using above data:
4.060

Area of streams before confluence:
0.984

Effective area values after confluence:
0.984

Results of confluence:

Total flow rate = 4.060(CFS)
Time of concentration = 11.667 min.
Effective stream area after confluence = 0.984(Ac.)
Study area average Pervious fraction(Ap) = 0.010
Study area average soil loss rate(Fm) = 0.000(In/Hr)
Study area total = 0.98(Ac.)

+++++
Process from Point/Station 200.000 to Point/Station 201.000
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user

USER INPUT of soil data for subarea

SCS curve number for soil(AMC 2) = 98.00

Adjusted SCS curve number for AMC 3 = 99.60

Pervious ratio(Ap) = 0.0100 Max loss rate(Fm)= 0.000(In/Hr)

Initial subarea data:

Initial area flow distance = 87.000(Ft.)

Top (of initial area) elevation = 2800.300(Ft.)

Bottom (of initial area) elevation = 2796.500(Ft.)

Difference in elevation = 3.800(Ft.)

Slope = 0.04368 s(%)= 4.37

TC = k(0.277)*[(length^3)/(elevation change)]^0.2

Initial area time of concentration = 3.092 min.
 Rainfall intensity = 9.567(In/Hr) for a 100.0 year storm
 Effective runoff coefficient used for area (Q=KCIA) is C = 0.900
 Subarea runoff = 0.775(CFS)
 Total initial stream area = 0.090(Ac.)
 Pervious area fraction = 0.010
 Initial area Fm value = 0.000(In/Hr)

+++++
 Process from Point/Station 200.000 to Point/Station 201.000
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 1
 Stream flow area = 0.090(Ac.)
 Runoff from this stream = 0.775(CFS)
 Time of concentration = 3.09 min.
 Rainfall intensity = 9.567(In/Hr)
 Area averaged loss rate (Fm) = 0.0001(In/Hr)
 Area averaged Pervious ratio (Ap) = 0.0100
 Summary of stream data:

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

1	0.77	0.090	3.09	0.000	9.567
---	------	-------	------	-------	-------

Qmax(1) = 1.000 * 1.000 * 0.775) + = 0.775

Total of 1 main streams to confluence:

Flow rates before confluence point:
 1.775

Maximum flow rates at confluence using above data:
 0.775

Area of streams before confluence:
 0.090

Effective area values after confluence:
 0.090

Results of confluence:

Total flow rate = 0.775(CFS)
 Time of concentration = 3.092 min.
 Effective stream area after confluence = 0.090(Ac.)
 Study area average Pervious fraction(Ap) = 0.010
 Study area average soil loss rate(Fm) = 0.000(In/Hr)
 Study area total = 0.09(Ac.)

+++++
 Process from Point/Station 300.000 to Point/Station 301.000
 **** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user

USER INPUT of soil data for subarea

SCS curve number for soil(AMC 2) = 98.00

Adjusted SCS curve number for AMC 3 = 99.60

Pervious ratio(Ap) = 0.0100 Max loss rate(Fm)= 0.000(In/Hr)

Initial subarea data:

Initial area flow distance = 150.000(Ft.)

Top (of initial area) elevation = 2804.200(Ft.)

Bottom (of initial area) elevation = 2800.300(Ft.)
 Difference in elevation = 3.900(Ft.)
 Slope = 0.02600 s(%) = 2.60
 $TC = k(0.277) * [(length^3) / (elevation\ change)]^{0.2}$
 Initial area time of concentration = 4.265 min.
 Rainfall intensity = 7.638(In/Hr) for a 100.0 year storm
 Effective runoff coefficient used for area (Q=KCIA) is C = 0.900
 Subarea runoff = 3.025(CFS)
 Total initial stream area = 0.440(Ac.)
 Pervious area fraction = 0.010
 Initial area Fm value = 0.000(In/Hr)

++++++
 Process from Point/Station 300.000 to Point/Station 301.000
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 1
 Stream flow area = 0.440(Ac.)
 Runoff from this stream = 3.025(CFS)
 Time of concentration = 4.26 min.
 Rainfall intensity = 7.638(In/Hr)
 Area averaged loss rate (Fm) = 0.0001(In/Hr)
 Area averaged Pervious ratio (Ap) = 0.0100
 Summary of stream data:

Stream Flow rate No.	Area (CFS)	TC (Ac.)	Fm (min)	Rainfall Intensity (In/Hr)
1	3.02	0.440	4.26	0.000
Qmax(1) = 1.000 * 1.000 * 3.025) + = 3.025				

Total of 1 main streams to confluence:

Flow rates before confluence point:

4.025

Maximum flow rates at confluence using above data:

3.025

Area of streams before confluence:

0.440

Effective area values after confluence:

0.440

Results of confluence:

Total flow rate = 3.025(CFS)
 Time of concentration = 4.265 min.
 Effective stream area after confluence = 0.440(Ac.)
 Study area average Pervious fraction(Ap) = 0.010
 Study area average soil loss rate(Fm) = 0.000(In/Hr)
 Study area total = 0.44(Ac.)
 End of computations, Total Study Area = 1.67 (Ac.)

The following figures may

be used for a unit hydrograph study of the same area.

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

Area averaged pervious area fraction(Ap) = 0.010

Area averaged SCS curve number = 98.0

APPENDIX B:
HYDROLOGY CALCULATIONS BASED ON EXISTING CONDITION (UNIT HYDROGRAPH
METHOD)

APPENDIX B.1:
100 YEAR/24-HOUR HYDROLOGY CALCULATIONS

Unit Hydrograph Analysis

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

Study date 07/14/16

+++++

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

Program License Serial Number 6268

LKQ ADELANTO PROJECT
AREA A - EXISTING CONDITION
100YR-24HR
FN: AEX10024

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		
30.70	1	1.20

Rainfall data for year 100
30.70 6 1.80

Rainfall data for year 100
30.70 24 3.00

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

SCS curve No. (AMCII)	SCS curve NO. (AMC 3)	Area (Ac.)	Area Fraction	Fp (Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
91.0	98.2	30.70	1.000	0.036	0.991	0.035

Area-averaged adjusted loss rate Fm (In/Hr) = 0.035

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

Area	Area	SCS CN	SCS CN	S	Pervious
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(Ac.)	Fract	(AMC2)	(AMC3)		Yield Fr
30.43	0.991	91.0	98.2	0.18	0.930
0.27	0.009	98.0	98.0	0.20	0.923

Area-averaged catchment yield fraction, Y = 0.930
Area-averaged low loss fraction, Yb = 0.070
++++
Watercourse length = 1414.00 (Ft.)
Length from concentration point to centroid = 663.00 (Ft.)
Elevation difference along watercourse = 16.00 (Ft.)
Mannings friction factor along watercourse = 0.035
Watershed area = 30.70 (Ac.)
Catchment Lag time = 0.106 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 78.3237
Hydrograph baseflow = 0.00 (CFS)
Average maximum watershed loss rate (Fm) = 0.035 (In/Hr)
Average low loss rate fraction (Yb) = 0.070 (decimal)
VALLEY UNDEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.569 (In)
Computed peak 30-minute rainfall = 0.975 (In)
Specified peak 1-hour rainfall = 1.200 (In)
Computed peak 3-hour rainfall = 1.539 (In)
Specified peak 6-hour rainfall = 1.800 (In)
Specified peak 24-hour rainfall = 3.000 (In)

Rainfall depth area reduction factors:
Using a total area of 30.70 (Ac.) (Ref: fig. E-4)

5-minute factor = 0.999	Adjusted rainfall = 0.569 (In)
30-minute factor = 0.999	Adjusted rainfall = 0.973 (In)
1-hour factor = 0.999	Adjusted rainfall = 1.198 (In)
3-hour factor = 1.000	Adjusted rainfall = 1.538 (In)
6-hour factor = 1.000	Adjusted rainfall = 1.800 (In)
24-hour factor = 1.000	Adjusted rainfall = 3.000 (In)

Unit Hydrograph
++++
Interval 'S' Graph Unit Hydrograph
Number Mean values ((CFS))

(K = 371.28 (CFS))

1	12.836	47.656
2	56.656	162.694
3	77.085	75.849
4	85.443	31.032
5	90.470	18.666
6	93.675	11.896
7	95.954	8.464
8	97.556	5.946
9	98.644	4.039
10	99.441	2.960
11	100.000	2.076

Peak Unit	Adjusted mass rainfall	Unit rainfall
Number	(In)	(In)
1	0.5686	0.5686
2	0.7000	0.1314
3	0.7906	0.0905
4	0.8618	0.0713

5	0.9215	0.0597
6	0.9733	0.0518
7	1.0194	0.0461
8	1.0610	0.0417
9	1.0992	0.0382
10	1.1345	0.0353
11	1.1674	0.0329
12	1.1983	0.0309
13	1.2203	0.0220
14	1.2410	0.0207
15	1.2607	0.0196
16	1.2793	0.0186
17	1.2971	0.0178
18	1.3140	0.0170
19	1.3303	0.0163
20	1.3459	0.0156
21	1.3609	0.0150
22	1.3754	0.0145
23	1.3894	0.0140
24	1.4029	0.0135
25	1.4160	0.0131
26	1.4287	0.0127
27	1.4410	0.0123
28	1.4529	0.0120
29	1.4646	0.0116
30	1.4759	0.0113
31	1.4870	0.0110
32	1.4977	0.0108
33	1.5083	0.0105
34	1.5185	0.0103
35	1.5286	0.0100
36	1.5384	0.0098
37	1.5480	0.0096
38	1.5574	0.0094
39	1.5665	0.0092
40	1.5756	0.0090
41	1.5844	0.0088
42	1.5931	0.0087
43	1.6016	0.0085
44	1.6099	0.0084
45	1.6181	0.0082
46	1.6262	0.0081
47	1.6341	0.0079
48	1.6420	0.0078
49	1.6496	0.0077
50	1.6572	0.0076
51	1.6646	0.0074
52	1.6720	0.0073
53	1.6792	0.0072
54	1.6863	0.0071
55	1.6933	0.0070
56	1.7003	0.0069
57	1.7071	0.0068
58	1.7138	0.0067
59	1.7205	0.0066
60	1.7270	0.0066
61	1.7335	0.0065
62	1.7399	0.0064
63	1.7462	0.0063
64	1.7525	0.0062
65	1.7586	0.0062
66	1.7647	0.0061
67	1.7707	0.0060

68	1.7767	0.0059
69	1.7826	0.0059
70	1.7884	0.0058
71	1.7941	0.0058
72	1.7998	0.0057
73	1.8090	0.0092
74	1.8181	0.0091
75	1.8271	0.0090
76	1.8360	0.0089
77	1.8449	0.0089
78	1.8537	0.0088
79	1.8624	0.0087
80	1.8711	0.0087
81	1.8797	0.0086
82	1.8882	0.0085
83	1.8966	0.0085
84	1.9050	0.0084
85	1.9134	0.0083
86	1.9216	0.0083
87	1.9298	0.0082
88	1.9380	0.0081
89	1.9461	0.0081
90	1.9541	0.0080
91	1.9621	0.0080
92	1.9700	0.0079
93	1.9778	0.0079
94	1.9857	0.0078
95	1.9934	0.0078
96	2.0011	0.0077
97	2.0088	0.0077
98	2.0164	0.0076
99	2.0239	0.0076
100	2.0315	0.0075
101	2.0389	0.0075
102	2.0463	0.0074
103	2.0537	0.0074
104	2.0610	0.0073
105	2.0683	0.0073
106	2.0755	0.0072
107	2.0827	0.0072
108	2.0899	0.0072
109	2.0970	0.0071
110	2.1041	0.0071
111	2.1111	0.0070
112	2.1181	0.0070
113	2.1250	0.0069
114	2.1320	0.0069
115	2.1388	0.0069
116	2.1457	0.0068
117	2.1525	0.0068
118	2.1592	0.0068
119	2.1659	0.0067
120	2.1726	0.0067
121	2.1793	0.0067
122	2.1859	0.0066
123	2.1925	0.0066
124	2.1991	0.0066
125	2.2056	0.0065
126	2.2121	0.0065
127	2.2185	0.0065
128	2.2249	0.0064
129	2.2313	0.0064
130	2.2377	0.0064

131	2.2440	0.0063
132	2.2503	0.0063
133	2.2566	0.0063
134	2.2628	0.0062
135	2.2690	0.0062
136	2.2752	0.0062
137	2.2814	0.0062
138	2.2875	0.0061
139	2.2936	0.0061
140	2.2996	0.0061
141	2.3057	0.0060
142	2.3117	0.0060
143	2.3177	0.0060
144	2.3236	0.0060
145	2.3296	0.0059
146	2.3355	0.0059
147	2.3414	0.0059
148	2.3472	0.0059
149	2.3530	0.0058
150	2.3589	0.0058
151	2.3646	0.0058
152	2.3704	0.0058
153	2.3761	0.0057
154	2.3818	0.0057
155	2.3875	0.0057
156	2.3932	0.0057
157	2.3988	0.0056
158	2.4045	0.0056
159	2.4101	0.0056
160	2.4156	0.0056
161	2.4212	0.0056
162	2.4267	0.0055
163	2.4322	0.0055
164	2.4377	0.0055
165	2.4432	0.0055
166	2.4486	0.0054
167	2.4541	0.0054
168	2.4595	0.0054
169	2.4648	0.0054
170	2.4702	0.0054
171	2.4756	0.0053
172	2.4809	0.0053
173	2.4862	0.0053
174	2.4915	0.0053
175	2.4967	0.0053
176	2.5020	0.0052
177	2.5072	0.0052
178	2.5124	0.0052
179	2.5176	0.0052
180	2.5228	0.0052
181	2.5279	0.0052
182	2.5331	0.0051
183	2.5382	0.0051
184	2.5433	0.0051
185	2.5484	0.0051
186	2.5535	0.0051
187	2.5585	0.0051
188	2.5635	0.0050
189	2.5686	0.0050
190	2.5736	0.0050
191	2.5785	0.0050
192	2.5835	0.0050
193	2.5885	0.0050

194	2.5934	0.0049
195	2.5983	0.0049
196	2.6032	0.0049
197	2.6081	0.0049
198	2.6130	0.0049
199	2.6178	0.0049
200	2.6227	0.0048
201	2.6275	0.0048
202	2.6323	0.0048
203	2.6371	0.0048
204	2.6419	0.0048
205	2.6466	0.0048
206	2.6514	0.0048
207	2.6561	0.0047
208	2.6609	0.0047
209	2.6656	0.0047
210	2.6703	0.0047
211	2.6749	0.0047
212	2.6796	0.0047
213	2.6843	0.0047
214	2.6889	0.0046
215	2.6935	0.0046
216	2.6981	0.0046
217	2.7027	0.0046
218	2.7073	0.0046
219	2.7119	0.0046
220	2.7164	0.0046
221	2.7210	0.0045
222	2.7255	0.0045
223	2.7300	0.0045
224	2.7345	0.0045
225	2.7390	0.0045
226	2.7435	0.0045
227	2.7480	0.0045
228	2.7524	0.0045
229	2.7569	0.0044
230	2.7613	0.0044
231	2.7657	0.0044
232	2.7701	0.0044
233	2.7745	0.0044
234	2.7789	0.0044
235	2.7833	0.0044
236	2.7876	0.0044
237	2.7920	0.0043
238	2.7963	0.0043
239	2.8006	0.0043
240	2.8049	0.0043
241	2.8092	0.0043
242	2.8135	0.0043
243	2.8178	0.0043
244	2.8221	0.0043
245	2.8263	0.0043
246	2.8306	0.0042
247	2.8348	0.0042
248	2.8390	0.0042
249	2.8433	0.0042
250	2.8475	0.0042
251	2.8517	0.0042
252	2.8558	0.0042
253	2.8600	0.0042
254	2.8642	0.0042
255	2.8683	0.0042
256	2.8725	0.0041

257	2.8766	0.0041
258	2.8807	0.0041
259	2.8848	0.0041
260	2.8889	0.0041
261	2.8930	0.0041
262	2.8971	0.0041
263	2.9012	0.0041
264	2.9052	0.0041
265	2.9093	0.0041
266	2.9133	0.0040
267	2.9173	0.0040
268	2.9214	0.0040
269	2.9254	0.0040
270	2.9294	0.0040
271	2.9334	0.0040
272	2.9374	0.0040
273	2.9413	0.0040
274	2.9453	0.0040
275	2.9493	0.0040
276	2.9532	0.0039
277	2.9571	0.0039
278	2.9611	0.0039
279	2.9650	0.0039
280	2.9689	0.0039
281	2.9728	0.0039
282	2.9767	0.0039
283	2.9806	0.0039
284	2.9845	0.0039
285	2.9883	0.0039
286	2.9922	0.0039
287	2.9960	0.0039
288	2.9999	0.0038

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0038	0.0003	0.0036
2	0.0039	0.0003	0.0036
3	0.0039	0.0003	0.0036
4	0.0039	0.0003	0.0036
5	0.0039	0.0003	0.0036
6	0.0039	0.0003	0.0036
7	0.0039	0.0003	0.0036
8	0.0039	0.0003	0.0037
9	0.0039	0.0003	0.0037
10	0.0040	0.0003	0.0037
11	0.0040	0.0003	0.0037
12	0.0040	0.0003	0.0037
13	0.0040	0.0003	0.0037
14	0.0040	0.0003	0.0037
15	0.0040	0.0003	0.0037
16	0.0040	0.0003	0.0038
17	0.0041	0.0003	0.0038
18	0.0041	0.0003	0.0038
19	0.0041	0.0003	0.0038
20	0.0041	0.0003	0.0038
21	0.0041	0.0003	0.0038
22	0.0041	0.0003	0.0038
23	0.0042	0.0003	0.0039
24	0.0042	0.0003	0.0039
25	0.0042	0.0003	0.0039
26	0.0042	0.0003	0.0039

27	0.0042	0.0003	0.0039
28	0.0042	0.0003	0.0039
29	0.0042	0.0003	0.0039
30	0.0043	0.0003	0.0040
31	0.0043	0.0003	0.0040
32	0.0043	0.0003	0.0040
33	0.0043	0.0003	0.0040
34	0.0043	0.0003	0.0040
35	0.0043	0.0003	0.0040
36	0.0044	0.0003	0.0041
37	0.0044	0.0003	0.0041
38	0.0044	0.0003	0.0041
39	0.0044	0.0003	0.0041
40	0.0044	0.0003	0.0041
41	0.0045	0.0003	0.0041
42	0.0045	0.0003	0.0042
43	0.0045	0.0003	0.0042
44	0.0045	0.0003	0.0042
45	0.0045	0.0003	0.0042
46	0.0045	0.0003	0.0042
47	0.0046	0.0003	0.0043
48	0.0046	0.0003	0.0043
49	0.0046	0.0003	0.0043
50	0.0046	0.0003	0.0043
51	0.0047	0.0003	0.0043
52	0.0047	0.0003	0.0043
53	0.0047	0.0003	0.0044
54	0.0047	0.0003	0.0044
55	0.0047	0.0003	0.0044
56	0.0048	0.0003	0.0044
57	0.0048	0.0003	0.0044
58	0.0048	0.0003	0.0045
59	0.0048	0.0003	0.0045
60	0.0048	0.0003	0.0045
61	0.0049	0.0003	0.0045
62	0.0049	0.0003	0.0045
63	0.0049	0.0003	0.0046
64	0.0049	0.0003	0.0046
65	0.0050	0.0003	0.0046
66	0.0050	0.0003	0.0046
67	0.0050	0.0004	0.0047
68	0.0050	0.0004	0.0047
69	0.0051	0.0004	0.0047
70	0.0051	0.0004	0.0047
71	0.0051	0.0004	0.0048
72	0.0051	0.0004	0.0048
73	0.0052	0.0004	0.0048
74	0.0052	0.0004	0.0048
75	0.0052	0.0004	0.0049
76	0.0052	0.0004	0.0049
77	0.0053	0.0004	0.0049
78	0.0053	0.0004	0.0049
79	0.0053	0.0004	0.0050
80	0.0054	0.0004	0.0050
81	0.0054	0.0004	0.0050
82	0.0054	0.0004	0.0050
83	0.0055	0.0004	0.0051
84	0.0055	0.0004	0.0051
85	0.0055	0.0004	0.0051
86	0.0056	0.0004	0.0052
87	0.0056	0.0004	0.0052
88	0.0056	0.0004	0.0052
89	0.0057	0.0004	0.0053

90	0.0057	0.0004	0.0053
91	0.0057	0.0004	0.0053
92	0.0058	0.0004	0.0054
93	0.0058	0.0004	0.0054
94	0.0058	0.0004	0.0054
95	0.0059	0.0004	0.0055
96	0.0059	0.0004	0.0055
97	0.0060	0.0004	0.0055
98	0.0060	0.0004	0.0056
99	0.0060	0.0004	0.0056
100	0.0061	0.0004	0.0056
101	0.0061	0.0004	0.0057
102	0.0062	0.0004	0.0057
103	0.0062	0.0004	0.0058
104	0.0062	0.0004	0.0058
105	0.0063	0.0004	0.0059
106	0.0063	0.0004	0.0059
107	0.0064	0.0004	0.0059
108	0.0064	0.0004	0.0060
109	0.0065	0.0005	0.0060
110	0.0065	0.0005	0.0061
111	0.0066	0.0005	0.0061
112	0.0066	0.0005	0.0062
113	0.0067	0.0005	0.0062
114	0.0067	0.0005	0.0063
115	0.0068	0.0005	0.0063
116	0.0068	0.0005	0.0064
117	0.0069	0.0005	0.0064
118	0.0069	0.0005	0.0065
119	0.0070	0.0005	0.0065
120	0.0071	0.0005	0.0066
121	0.0072	0.0005	0.0067
122	0.0072	0.0005	0.0067
123	0.0073	0.0005	0.0068
124	0.0073	0.0005	0.0068
125	0.0074	0.0005	0.0069
126	0.0075	0.0005	0.0069
127	0.0076	0.0005	0.0070
128	0.0076	0.0005	0.0071
129	0.0077	0.0005	0.0072
130	0.0078	0.0005	0.0072
131	0.0079	0.0005	0.0073
132	0.0079	0.0006	0.0074
133	0.0080	0.0006	0.0075
134	0.0081	0.0006	0.0075
135	0.0082	0.0006	0.0076
136	0.0083	0.0006	0.0077
137	0.0084	0.0006	0.0078
138	0.0085	0.0006	0.0079
139	0.0086	0.0006	0.0080
140	0.0087	0.0006	0.0080
141	0.0088	0.0006	0.0082
142	0.0089	0.0006	0.0082
143	0.0090	0.0006	0.0084
144	0.0091	0.0006	0.0085
145	0.0057	0.0004	0.0053
146	0.0058	0.0004	0.0054
147	0.0059	0.0004	0.0055
148	0.0059	0.0004	0.0055
149	0.0061	0.0004	0.0057
150	0.0062	0.0004	0.0057
151	0.0063	0.0004	0.0059
152	0.0064	0.0004	0.0059

153	0.0066	0.0005	0.0061
154	0.0066	0.0005	0.0062
155	0.0068	0.0005	0.0064
156	0.0069	0.0005	0.0064
157	0.0071	0.0005	0.0066
158	0.0072	0.0005	0.0067
159	0.0074	0.0005	0.0069
160	0.0076	0.0005	0.0070
161	0.0078	0.0005	0.0073
162	0.0079	0.0006	0.0074
163	0.0082	0.0006	0.0076
164	0.0084	0.0006	0.0078
165	0.0087	0.0006	0.0081
166	0.0088	0.0006	0.0082
167	0.0092	0.0006	0.0085
168	0.0094	0.0007	0.0087
169	0.0098	0.0007	0.0091
170	0.0100	0.0007	0.0093
171	0.0105	0.0007	0.0098
172	0.0108	0.0008	0.0100
173	0.0113	0.0008	0.0105
174	0.0116	0.0008	0.0108
175	0.0123	0.0009	0.0115
176	0.0127	0.0009	0.0118
177	0.0135	0.0009	0.0126
178	0.0140	0.0010	0.0130
179	0.0150	0.0010	0.0140
180	0.0156	0.0011	0.0145
181	0.0170	0.0012	0.0158
182	0.0178	0.0012	0.0165
183	0.0196	0.0014	0.0183
184	0.0207	0.0014	0.0193
185	0.0309	0.0022	0.0287
186	0.0329	0.0023	0.0306
187	0.0382	0.0027	0.0355
188	0.0417	0.0029	0.0388
189	0.0518	0.0030	0.0489
190	0.0597	0.0030	0.0567
191	0.0905	0.0030	0.0876
192	0.1314	0.0030	0.1285
193	0.5686	0.0030	0.5656
194	0.0713	0.0030	0.0683
195	0.0461	0.0030	0.0431
196	0.0353	0.0025	0.0328
197	0.0220	0.0015	0.0205
198	0.0186	0.0013	0.0173
199	0.0163	0.0011	0.0151
200	0.0145	0.0010	0.0135
201	0.0131	0.0009	0.0122
202	0.0120	0.0008	0.0111
203	0.0110	0.0008	0.0103
204	0.0103	0.0007	0.0096
205	0.0096	0.0007	0.0089
206	0.0090	0.0006	0.0084
207	0.0085	0.0006	0.0079
208	0.0081	0.0006	0.0075
209	0.0077	0.0005	0.0071
210	0.0073	0.0005	0.0068
211	0.0070	0.0005	0.0065
212	0.0067	0.0005	0.0063
213	0.0065	0.0005	0.0060
214	0.0062	0.0004	0.0058
215	0.0060	0.0004	0.0056

216	0.0058	0.0004	0.0054
217	0.0092	0.0006	0.0085
218	0.0089	0.0006	0.0083
219	0.0087	0.0006	0.0081
220	0.0085	0.0006	0.0079
221	0.0083	0.0006	0.0077
222	0.0081	0.0006	0.0076
223	0.0080	0.0006	0.0074
224	0.0078	0.0005	0.0073
225	0.0077	0.0005	0.0071
226	0.0075	0.0005	0.0070
227	0.0074	0.0005	0.0069
228	0.0072	0.0005	0.0067
229	0.0071	0.0005	0.0066
230	0.0070	0.0005	0.0065
231	0.0069	0.0005	0.0064
232	0.0068	0.0005	0.0063
233	0.0067	0.0005	0.0062
234	0.0066	0.0005	0.0061
235	0.0065	0.0005	0.0060
236	0.0064	0.0004	0.0059
237	0.0063	0.0004	0.0058
238	0.0062	0.0004	0.0057
239	0.0061	0.0004	0.0057
240	0.0060	0.0004	0.0056
241	0.0059	0.0004	0.0055
242	0.0059	0.0004	0.0054
243	0.0058	0.0004	0.0054
244	0.0057	0.0004	0.0053
245	0.0056	0.0004	0.0052
246	0.0056	0.0004	0.0052
247	0.0055	0.0004	0.0051
248	0.0054	0.0004	0.0051
249	0.0054	0.0004	0.0050
250	0.0053	0.0004	0.0050
251	0.0053	0.0004	0.0049
252	0.0052	0.0004	0.0048
253	0.0052	0.0004	0.0048
254	0.0051	0.0004	0.0047
255	0.0051	0.0004	0.0047
256	0.0050	0.0003	0.0047
257	0.0050	0.0003	0.0046
258	0.0049	0.0003	0.0046
259	0.0049	0.0003	0.0045
260	0.0048	0.0003	0.0045
261	0.0048	0.0003	0.0044
262	0.0047	0.0003	0.0044
263	0.0047	0.0003	0.0044
264	0.0046	0.0003	0.0043
265	0.0046	0.0003	0.0043
266	0.0046	0.0003	0.0042
267	0.0045	0.0003	0.0042
268	0.0045	0.0003	0.0042
269	0.0044	0.0003	0.0041
270	0.0044	0.0003	0.0041
271	0.0044	0.0003	0.0041
272	0.0043	0.0003	0.0040
273	0.0043	0.0003	0.0040
274	0.0043	0.0003	0.0040
275	0.0042	0.0003	0.0039
276	0.0042	0.0003	0.0039
277	0.0042	0.0003	0.0039
278	0.0041	0.0003	0.0039

279	0.0041	0.0003	0.0038
280	0.0041	0.0003	0.0038
281	0.0041	0.0003	0.0038
282	0.0040	0.0003	0.0037
283	0.0040	0.0003	0.0037
284	0.0040	0.0003	0.0037
285	0.0039	0.0003	0.0037
286	0.0039	0.0003	0.0036
287	0.0039	0.0003	0.0036
288	0.0039	0.0003	0.0036

 Total soil rain loss = 0.16(In)
 Total effective rainfall = 2.84(In)
 Peak flow rate in flood hydrograph = 110.17(CFS)

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

 Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	50.0	100.0	150.0	200.0
0+ 5	0.0012	0.17	Q				
0+10	0.0064	0.75	Q				
0+15	0.0134	1.03	Q				
0+20	0.0213	1.14	Q				
0+25	0.0296	1.21	Q				
0+30	0.0383	1.26	Q				
0+35	0.0472	1.29	Q				
0+40	0.0562	1.32	Q				
0+45	0.0654	1.34	Q				
0+50	0.0747	1.35	Q				
0+55	0.0841	1.36	Q				
1+ 0	0.0935	1.37	Q				
1+ 5	0.1030	1.37	Q				
1+10	0.1125	1.38	Q				
1+15	0.1220	1.38	Q				
1+20	0.1315	1.39	Q				
1+25	0.1411	1.39	Q				
1+30	0.1507	1.40	Q				
1+35	0.1604	1.40	Q				
1+40	0.1701	1.41	Q				
1+45	0.1798	1.41	Q				
1+50	0.1896	1.42	QV				
1+55	0.1994	1.42	QV				
2+ 0	0.2092	1.43	QV				
2+ 5	0.2191	1.43	QV				
2+10	0.2290	1.44	QV				
2+15	0.2389	1.44	QV				
2+20	0.2489	1.45	QV				
2+25	0.2589	1.45	QV				
2+30	0.2690	1.46	QV				
2+35	0.2791	1.47	QV				
2+40	0.2892	1.47	QV				
2+45	0.2994	1.48	QV				
2+50	0.3096	1.48	QV				
2+55	0.3199	1.49	QV				
3+ 0	0.3301	1.50	QV				
3+ 5	0.3405	1.50	QV				
3+10	0.3509	1.51	QV				

3+15	0.3613	1.51	QV				
3+20	0.3717	1.52	Q V				
3+25	0.3823	1.53	Q V				
3+30	0.3928	1.53	Q V				
3+35	0.4034	1.54	Q V				
3+40	0.4140	1.54	Q V				
3+45	0.4247	1.55	Q V				
3+50	0.4354	1.56	Q V				
3+55	0.4462	1.56	Q V				
4+ 0	0.4570	1.57	Q V				
4+ 5	0.4679	1.58	Q V				
4+10	0.4788	1.58	Q V				
4+15	0.4898	1.59	Q V				
4+20	0.5008	1.60	Q V				
4+25	0.5118	1.61	Q V				
4+30	0.5230	1.61	Q V				
4+35	0.5341	1.62	Q V				
4+40	0.5453	1.63	Q V				
4+45	0.5566	1.63	Q V				
4+50	0.5679	1.64	Q V				
4+55	0.5793	1.65	Q V				
5+ 0	0.5907	1.66	Q V				
5+ 5	0.6022	1.67	Q V				
5+10	0.6137	1.67	Q V				
5+15	0.6253	1.68	Q V				
5+20	0.6369	1.69	Q V				
5+25	0.6486	1.70	Q V				
5+30	0.6603	1.71	Q V				
5+35	0.6722	1.71	Q V				
5+40	0.6840	1.72	Q V				
5+45	0.6960	1.73	Q V				
5+50	0.7079	1.74	Q V				
5+55	0.7200	1.75	Q V				
6+ 0	0.7321	1.76	Q V				
6+ 5	0.7443	1.77	Q V				
6+10	0.7565	1.78	Q V				
6+15	0.7688	1.79	Q V				
6+20	0.7812	1.80	Q V				
6+25	0.7936	1.81	Q V				
6+30	0.8061	1.82	Q V				
6+35	0.8187	1.82	Q V				
6+40	0.8313	1.84	Q V				
6+45	0.8440	1.84	Q V				
6+50	0.8568	1.86	Q V				
6+55	0.8697	1.87	Q V				
7+ 0	0.8826	1.88	Q V				
7+ 5	0.8956	1.89	Q V				
7+10	0.9087	1.90	Q V				
7+15	0.9218	1.91	Q V				
7+20	0.9350	1.92	Q V				
7+25	0.9483	1.93	Q V				
7+30	0.9617	1.94	Q V				
7+35	0.9752	1.96	Q V				
7+40	0.9888	1.97	Q V				
7+45	1.0024	1.98	Q V				
7+50	1.0161	1.99	Q V				
7+55	1.0299	2.00	Q V				
8+ 0	1.0438	2.02	Q V				
8+ 5	1.0578	2.03	Q V				
8+10	1.0719	2.04	Q V				
8+15	1.0860	2.06	Q V				
8+20	1.1003	2.07	Q V				
8+25	1.1147	2.08	Q V				

8+30	1.1291	2.10	Q	V				
8+35	1.1437	2.11	Q	V				
8+40	1.1583	2.13	Q	V				
8+45	1.1731	2.14	Q	V				
8+50	1.1880	2.16	Q	V				
8+55	1.2029	2.17	Q	V				
9+ 0	1.2180	2.19	Q	V				
9+ 5	1.2332	2.21	Q	V				
9+10	1.2485	2.22	Q	V				
9+15	1.2639	2.24	Q	V				
9+20	1.2795	2.26	Q	V				
9+25	1.2951	2.27	Q	V				
9+30	1.3109	2.29	Q	V				
9+35	1.3268	2.31	Q	V				
9+40	1.3429	2.33	Q	V				
9+45	1.3590	2.35	Q	V				
9+50	1.3753	2.37	Q	V				
9+55	1.3917	2.39	Q	V				
10+ 0	1.4083	2.41	Q	V				
10+ 5	1.4250	2.43	Q	V				
10+10	1.4419	2.45	Q	V				
10+15	1.4589	2.47	Q	V				
10+20	1.4760	2.49	Q	V				
10+25	1.4933	2.51	Q	V				
10+30	1.5108	2.54	Q	V				
10+35	1.5284	2.56	Q	V				
10+40	1.5462	2.58	Q	V				
10+45	1.5642	2.61	Q	V				
10+50	1.5824	2.64	Q	V				
10+55	1.6007	2.66	Q	V				
11+ 0	1.6192	2.69	Q	V				
11+ 5	1.6379	2.71	Q	V				
11+10	1.6568	2.74	Q	V				
11+15	1.6759	2.77	Q	V				
11+20	1.6952	2.80	Q	V				
11+25	1.7147	2.83	Q	V				
11+30	1.7344	2.86	Q	V				
11+35	1.7543	2.90	Q	V				
11+40	1.7745	2.93	Q	V				
11+45	1.7949	2.96	Q	V				
11+50	1.8156	3.00	Q	V				
11+55	1.8365	3.03	Q	V				
12+ 0	1.8576	3.07	Q	V				
12+ 5	1.8780	2.95	Q	V				
12+10	1.8949	2.46	Q	V				
12+15	1.9103	2.24	Q	V				
12+20	1.9253	2.17	Q	V				
12+25	1.9400	2.14	Q	V				
12+30	1.9548	2.14	Q	V				
12+35	1.9696	2.15	Q	V				
12+40	1.9846	2.17	Q	V				
12+45	1.9997	2.20	Q	V				
12+50	2.0150	2.23	Q	V				
12+55	2.0306	2.26	Q	V				
13+ 0	2.0465	2.31	Q	V				
13+ 5	2.0628	2.36	Q	V				
13+10	2.0793	2.41	Q	V				
13+15	2.0963	2.46	Q	V				
13+20	2.1136	2.52	Q	V				
13+25	2.1313	2.57	Q	V				
13+30	2.1494	2.63	Q	V				
13+35	2.1680	2.69	Q	V				
13+40	2.1870	2.77	Q	V				

13+45	2.2066	2.83	Q		V				
13+50	2.2266	2.92	Q		V				
13+55	2.2473	2.99	Q		V				
14+ 0	2.2685	3.08	Q		V				
14+ 5	2.2903	3.17	Q		V				
14+10	2.3130	3.29	Q		V				
14+15	2.3363	3.39	Q		V				
14+20	2.3605	3.51	Q		V				
14+25	2.3855	3.63	Q		V				
14+30	2.4115	3.78	Q		V				
14+35	2.4385	3.92	Q		V				
14+40	2.4667	4.09	Q		V				
14+45	2.4960	4.26	Q		V				
14+50	2.5268	4.47	Q		V				
14+55	2.5590	4.68	Q		V				
15+ 0	2.5930	4.94	Q		V				
15+ 5	2.6289	5.21	Q		V				
15+10	2.6671	5.55	Q		V				
15+15	2.7077	5.90	Q		V				
15+20	2.7515	6.36	Q		V				
15+25	2.8009	7.18	Q		V				
15+30	2.8628	8.98	Q		V				
15+35	2.9339	10.33	Q		V				
15+40	3.0150	11.77	Q		V				
15+45	3.1075	13.43	Q		V				
15+50	3.2178	16.02	Q		V				
15+55	3.3545	19.85	Q		V				
16+ 0	3.5469	27.93	Q		V				
16+ 5	3.9486	58.33		Q		V			
16+10	4.7073	110.17			Q		V		
16+15	5.1433	63.31		Q			V		
16+20	5.3902	35.85	Q				V		
16+25	5.5642	25.26	Q				V		
16+30	5.6885	18.05	Q				V		
16+35	5.7843	13.91	Q				V		
16+40	5.8601	11.02	Q				V		
16+45	5.9211	8.85	Q				V		
16+50	5.9715	7.32	Q				V		
16+55	6.0132	6.05	Q				V		
17+ 0	6.0438	4.45	Q				V		
17+ 5	6.0713	3.99	Q				V		
17+10	6.0964	3.65	Q				V		
17+15	6.1197	3.37	Q				V		
17+20	6.1414	3.16	Q				V		
17+25	6.1619	2.98	Q				V		
17+30	6.1813	2.82	Q				V		
17+35	6.1997	2.68	Q				V		
17+40	6.2173	2.55	Q				V		
17+45	6.2341	2.44	Q				V		
17+50	6.2502	2.34	Q				V		
17+55	6.2657	2.25	Q				V		
18+ 0	6.2806	2.16	Q				V		
18+ 5	6.2960	2.24	Q				V		
18+10	6.3146	2.70	Q				V		
18+15	6.3344	2.88	Q				V		
18+20	6.3544	2.90	Q				V		
18+25	6.3744	2.89	Q				V		
18+30	6.3941	2.86	Q				V		
18+35	6.4136	2.83	Q				V		
18+40	6.4327	2.78	Q				V		
18+45	6.4516	2.74	Q				V		
18+50	6.4701	2.69	Q				V		
18+55	6.4884	2.65	Q				V		

19+ 0	6.5062	2.59	Q				V	
19+ 5	6.5238	2.55	Q				V	
19+10	6.5410	2.50	Q				V	
19+15	6.5579	2.46	Q				V	
19+20	6.5745	2.41	Q				V	
19+25	6.5909	2.37	Q				V	
19+30	6.6069	2.34	Q				V	
19+35	6.6228	2.30	Q				V	
19+40	6.6384	2.26	Q				V	
19+45	6.6537	2.23	Q				V	
19+50	6.6688	2.20	Q				V	
19+55	6.6837	2.16	Q				V	
20+ 0	6.6984	2.13	Q				V	
20+ 5	6.7129	2.10	Q				V	
20+10	6.7272	2.08	Q				V	
20+15	6.7413	2.05	Q				V	
20+20	6.7553	2.02	Q				V	
20+25	6.7690	2.00	Q				V	
20+30	6.7826	1.97	Q				V	
20+35	6.7960	1.95	Q				V	
20+40	6.8093	1.92	Q				V	
20+45	6.8224	1.90	Q				V	
20+50	6.8353	1.88	Q				V	
20+55	6.8481	1.86	Q				V	
21+ 0	6.8608	1.84	Q				V	
21+ 5	6.8733	1.82	Q				V	
21+10	6.8857	1.80	Q				V	
21+15	6.8980	1.78	Q				V	
21+20	6.9101	1.76	Q				V	
21+25	6.9221	1.74	Q				V	
21+30	6.9340	1.73	Q				V	
21+35	6.9458	1.71	Q				V	
21+40	6.9574	1.69	Q				V	
21+45	6.9690	1.68	Q				V	
21+50	6.9804	1.66	Q				V	
21+55	6.9917	1.65	Q				V	
22+ 0	7.0030	1.63	Q				V	
22+ 5	7.0141	1.62	Q				V	
22+10	7.0251	1.60	Q				V	
22+15	7.0360	1.59	Q				V	
22+20	7.0469	1.57	Q				V	
22+25	7.0576	1.56	Q				V	
22+30	7.0683	1.55	Q				V	
22+35	7.0788	1.53	Q				V	
22+40	7.0893	1.52	Q				V	
22+45	7.0997	1.51	Q				V	
22+50	7.1100	1.50	Q				V	
22+55	7.1202	1.49	Q				V	
23+ 0	7.1304	1.47	Q				V	
23+ 5	7.1404	1.46	Q				V	
23+10	7.1504	1.45	Q				V	
23+15	7.1604	1.44	Q				V	
23+20	7.1702	1.43	Q				V	
23+25	7.1800	1.42	Q				V	
23+30	7.1897	1.41	Q				V	
23+35	7.1993	1.40	Q				V	
23+40	7.2089	1.39	Q				V	
23+45	7.2184	1.38	Q				V	
23+50	7.2278	1.37	Q				V	
23+55	7.2372	1.36	Q				V	
24+ 0	7.2465	1.35	Q				V	
24+ 5	7.2545	1.17	Q				V	
24+10	7.2585	0.58	Q				V	

24+15	7.2607	0.31	Q				V
24+20	7.2620	0.20	Q				V
24+25	7.2629	0.13	Q				V
24+30	7.2635	0.09	Q				V
24+35	7.2639	0.05	Q				V
24+40	7.2641	0.03	Q				V
24+45	7.2642	0.02	Q				V
24+50	7.2643	0.01	Q				V

APPENDIX C:
HYDROLOGY CALCULATIONS BASED ON PROPOSED CONDITION (UNIT HYDROGRAPH
METHOD)

APPENDIX C.1:
100 YEAR/24-HOUR HYDROLOGY CALCULATIONS

Unit Hydrograph Analysis

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Study date 07/14/16

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

Program License Serial Number 6268

LKQ ADELANTO PROJECT
AREA A - PROPOSED CONDITION
100YR-24HR
FN: APR10024

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		
30.70	1	1.20

Rainfall data for year 100
30.70 6 1.80

Rainfall data for year 100
30.70 24 3.00

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

SCS curve No. (AMCII)	SCS curve NO. (AMC 3)	Area (Ac.)	Area Fraction	Fp (Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
91.0	98.2	30.70	1.000	0.036	0.936	0.033

Area-averaged adjusted loss rate Fm (In/Hr) = 0.033

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

Area	Area	SCS CN	SCS CN	S	Pervious
------	------	--------	--------	---	----------

(Ac.)	Fract	(AMC2)	(AMC3)		Yield Fr
28.73	0.936	91.0	98.2	0.18	0.930
1.97	0.064	98.0	98.0	0.20	0.923

Area-averaged catchment yield fraction, Y = 0.930
Area-averaged low loss fraction, Yb = 0.070
++++
Watercourse length = 1414.00 (Ft.)
Length from concentration point to centroid = 663.00 (Ft.)
Elevation difference along watercourse = 16.00 (Ft.)
Mannings friction factor along watercourse = 0.035
Watershed area = 30.70 (Ac.)
Catchment Lag time = 0.106 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 78.3237
Hydrograph baseflow = 0.00 (CFS)
Average maximum watershed loss rate (Fm) = 0.033 (In/Hr)
Average low loss rate fraction (Yb) = 0.070 (decimal)
VALLEY UNDEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.569 (In)
Computed peak 30-minute rainfall = 0.975 (In)
Specified peak 1-hour rainfall = 1.200 (In)
Computed peak 3-hour rainfall = 1.539 (In)
Specified peak 6-hour rainfall = 1.800 (In)
Specified peak 24-hour rainfall = 3.000 (In)

Rainfall depth area reduction factors:
Using a total area of 30.70 (Ac.) (Ref: fig. E-4)

5-minute factor = 0.999	Adjusted rainfall = 0.569 (In)
30-minute factor = 0.999	Adjusted rainfall = 0.973 (In)
1-hour factor = 0.999	Adjusted rainfall = 1.198 (In)
3-hour factor = 1.000	Adjusted rainfall = 1.538 (In)
6-hour factor = 1.000	Adjusted rainfall = 1.800 (In)
24-hour factor = 1.000	Adjusted rainfall = 3.000 (In)

Unit Hydrograph
++++
Interval 'S' Graph Unit Hydrograph
Number Mean values ((CFS))

(K = 371.28 (CFS))

1	12.836	47.656
2	56.656	162.694
3	77.085	75.849
4	85.443	31.032
5	90.470	18.666
6	93.675	11.896
7	95.954	8.464
8	97.556	5.946
9	98.644	4.039
10	99.441	2.960
11	100.000	2.076

Peak Unit	Adjusted mass rainfall	Unit rainfall
Number	(In)	(In)
1	0.5686	0.5686
2	0.7000	0.1314
3	0.7906	0.0905
4	0.8618	0.0713

5	0.9215	0.0597
6	0.9733	0.0518
7	1.0194	0.0461
8	1.0610	0.0417
9	1.0992	0.0382
10	1.1345	0.0353
11	1.1674	0.0329
12	1.1983	0.0309
13	1.2203	0.0220
14	1.2410	0.0207
15	1.2607	0.0196
16	1.2793	0.0186
17	1.2971	0.0178
18	1.3140	0.0170
19	1.3303	0.0163
20	1.3459	0.0156
21	1.3609	0.0150
22	1.3754	0.0145
23	1.3894	0.0140
24	1.4029	0.0135
25	1.4160	0.0131
26	1.4287	0.0127
27	1.4410	0.0123
28	1.4529	0.0120
29	1.4646	0.0116
30	1.4759	0.0113
31	1.4870	0.0110
32	1.4977	0.0108
33	1.5083	0.0105
34	1.5185	0.0103
35	1.5286	0.0100
36	1.5384	0.0098
37	1.5480	0.0096
38	1.5574	0.0094
39	1.5665	0.0092
40	1.5756	0.0090
41	1.5844	0.0088
42	1.5931	0.0087
43	1.6016	0.0085
44	1.6099	0.0084
45	1.6181	0.0082
46	1.6262	0.0081
47	1.6341	0.0079
48	1.6420	0.0078
49	1.6496	0.0077
50	1.6572	0.0076
51	1.6646	0.0074
52	1.6720	0.0073
53	1.6792	0.0072
54	1.6863	0.0071
55	1.6933	0.0070
56	1.7003	0.0069
57	1.7071	0.0068
58	1.7138	0.0067
59	1.7205	0.0066
60	1.7270	0.0066
61	1.7335	0.0065
62	1.7399	0.0064
63	1.7462	0.0063
64	1.7525	0.0062
65	1.7586	0.0062
66	1.7647	0.0061
67	1.7707	0.0060

68	1.7767	0.0059
69	1.7826	0.0059
70	1.7884	0.0058
71	1.7941	0.0058
72	1.7998	0.0057
73	1.8090	0.0092
74	1.8181	0.0091
75	1.8271	0.0090
76	1.8360	0.0089
77	1.8449	0.0089
78	1.8537	0.0088
79	1.8624	0.0087
80	1.8711	0.0087
81	1.8797	0.0086
82	1.8882	0.0085
83	1.8966	0.0085
84	1.9050	0.0084
85	1.9134	0.0083
86	1.9216	0.0083
87	1.9298	0.0082
88	1.9380	0.0081
89	1.9461	0.0081
90	1.9541	0.0080
91	1.9621	0.0080
92	1.9700	0.0079
93	1.9778	0.0079
94	1.9857	0.0078
95	1.9934	0.0078
96	2.0011	0.0077
97	2.0088	0.0077
98	2.0164	0.0076
99	2.0239	0.0076
100	2.0315	0.0075
101	2.0389	0.0075
102	2.0463	0.0074
103	2.0537	0.0074
104	2.0610	0.0073
105	2.0683	0.0073
106	2.0755	0.0072
107	2.0827	0.0072
108	2.0899	0.0072
109	2.0970	0.0071
110	2.1041	0.0071
111	2.1111	0.0070
112	2.1181	0.0070
113	2.1250	0.0069
114	2.1320	0.0069
115	2.1388	0.0069
116	2.1457	0.0068
117	2.1525	0.0068
118	2.1592	0.0068
119	2.1659	0.0067
120	2.1726	0.0067
121	2.1793	0.0067
122	2.1859	0.0066
123	2.1925	0.0066
124	2.1991	0.0066
125	2.2056	0.0065
126	2.2121	0.0065
127	2.2185	0.0065
128	2.2249	0.0064
129	2.2313	0.0064
130	2.2377	0.0064

131	2.2440	0.0063
132	2.2503	0.0063
133	2.2566	0.0063
134	2.2628	0.0062
135	2.2690	0.0062
136	2.2752	0.0062
137	2.2814	0.0062
138	2.2875	0.0061
139	2.2936	0.0061
140	2.2996	0.0061
141	2.3057	0.0060
142	2.3117	0.0060
143	2.3177	0.0060
144	2.3236	0.0060
145	2.3296	0.0059
146	2.3355	0.0059
147	2.3414	0.0059
148	2.3472	0.0059
149	2.3530	0.0058
150	2.3589	0.0058
151	2.3646	0.0058
152	2.3704	0.0058
153	2.3761	0.0057
154	2.3818	0.0057
155	2.3875	0.0057
156	2.3932	0.0057
157	2.3988	0.0056
158	2.4045	0.0056
159	2.4101	0.0056
160	2.4156	0.0056
161	2.4212	0.0056
162	2.4267	0.0055
163	2.4322	0.0055
164	2.4377	0.0055
165	2.4432	0.0055
166	2.4486	0.0054
167	2.4541	0.0054
168	2.4595	0.0054
169	2.4648	0.0054
170	2.4702	0.0054
171	2.4756	0.0053
172	2.4809	0.0053
173	2.4862	0.0053
174	2.4915	0.0053
175	2.4967	0.0053
176	2.5020	0.0052
177	2.5072	0.0052
178	2.5124	0.0052
179	2.5176	0.0052
180	2.5228	0.0052
181	2.5279	0.0052
182	2.5331	0.0051
183	2.5382	0.0051
184	2.5433	0.0051
185	2.5484	0.0051
186	2.5535	0.0051
187	2.5585	0.0051
188	2.5635	0.0050
189	2.5686	0.0050
190	2.5736	0.0050
191	2.5785	0.0050
192	2.5835	0.0050
193	2.5885	0.0050

194	2.5934	0.0049
195	2.5983	0.0049
196	2.6032	0.0049
197	2.6081	0.0049
198	2.6130	0.0049
199	2.6178	0.0049
200	2.6227	0.0048
201	2.6275	0.0048
202	2.6323	0.0048
203	2.6371	0.0048
204	2.6419	0.0048
205	2.6466	0.0048
206	2.6514	0.0048
207	2.6561	0.0047
208	2.6609	0.0047
209	2.6656	0.0047
210	2.6703	0.0047
211	2.6749	0.0047
212	2.6796	0.0047
213	2.6843	0.0047
214	2.6889	0.0046
215	2.6935	0.0046
216	2.6981	0.0046
217	2.7027	0.0046
218	2.7073	0.0046
219	2.7119	0.0046
220	2.7164	0.0046
221	2.7210	0.0045
222	2.7255	0.0045
223	2.7300	0.0045
224	2.7345	0.0045
225	2.7390	0.0045
226	2.7435	0.0045
227	2.7480	0.0045
228	2.7524	0.0045
229	2.7569	0.0044
230	2.7613	0.0044
231	2.7657	0.0044
232	2.7701	0.0044
233	2.7745	0.0044
234	2.7789	0.0044
235	2.7833	0.0044
236	2.7876	0.0044
237	2.7920	0.0043
238	2.7963	0.0043
239	2.8006	0.0043
240	2.8049	0.0043
241	2.8092	0.0043
242	2.8135	0.0043
243	2.8178	0.0043
244	2.8221	0.0043
245	2.8263	0.0043
246	2.8306	0.0042
247	2.8348	0.0042
248	2.8390	0.0042
249	2.8433	0.0042
250	2.8475	0.0042
251	2.8517	0.0042
252	2.8558	0.0042
253	2.8600	0.0042
254	2.8642	0.0042
255	2.8683	0.0042
256	2.8725	0.0041

257	2.8766	0.0041
258	2.8807	0.0041
259	2.8848	0.0041
260	2.8889	0.0041
261	2.8930	0.0041
262	2.8971	0.0041
263	2.9012	0.0041
264	2.9052	0.0041
265	2.9093	0.0041
266	2.9133	0.0040
267	2.9173	0.0040
268	2.9214	0.0040
269	2.9254	0.0040
270	2.9294	0.0040
271	2.9334	0.0040
272	2.9374	0.0040
273	2.9413	0.0040
274	2.9453	0.0040
275	2.9493	0.0040
276	2.9532	0.0039
277	2.9571	0.0039
278	2.9611	0.0039
279	2.9650	0.0039
280	2.9689	0.0039
281	2.9728	0.0039
282	2.9767	0.0039
283	2.9806	0.0039
284	2.9845	0.0039
285	2.9883	0.0039
286	2.9922	0.0039
287	2.9960	0.0039
288	2.9999	0.0038

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0038	0.0003	0.0036
2	0.0039	0.0003	0.0036
3	0.0039	0.0003	0.0036
4	0.0039	0.0003	0.0036
5	0.0039	0.0003	0.0036
6	0.0039	0.0003	0.0036
7	0.0039	0.0003	0.0036
8	0.0039	0.0003	0.0037
9	0.0039	0.0003	0.0037
10	0.0040	0.0003	0.0037
11	0.0040	0.0003	0.0037
12	0.0040	0.0003	0.0037
13	0.0040	0.0003	0.0037
14	0.0040	0.0003	0.0037
15	0.0040	0.0003	0.0037
16	0.0040	0.0003	0.0038
17	0.0041	0.0003	0.0038
18	0.0041	0.0003	0.0038
19	0.0041	0.0003	0.0038
20	0.0041	0.0003	0.0038
21	0.0041	0.0003	0.0038
22	0.0041	0.0003	0.0038
23	0.0042	0.0003	0.0039
24	0.0042	0.0003	0.0039
25	0.0042	0.0003	0.0039
26	0.0042	0.0003	0.0039

27	0.0042	0.0003	0.0039
28	0.0042	0.0003	0.0039
29	0.0042	0.0003	0.0039
30	0.0043	0.0003	0.0040
31	0.0043	0.0003	0.0040
32	0.0043	0.0003	0.0040
33	0.0043	0.0003	0.0040
34	0.0043	0.0003	0.0040
35	0.0043	0.0003	0.0040
36	0.0044	0.0003	0.0041
37	0.0044	0.0003	0.0041
38	0.0044	0.0003	0.0041
39	0.0044	0.0003	0.0041
40	0.0044	0.0003	0.0041
41	0.0045	0.0003	0.0041
42	0.0045	0.0003	0.0042
43	0.0045	0.0003	0.0042
44	0.0045	0.0003	0.0042
45	0.0045	0.0003	0.0042
46	0.0045	0.0003	0.0042
47	0.0046	0.0003	0.0042
48	0.0046	0.0003	0.0043
49	0.0046	0.0003	0.0043
50	0.0046	0.0003	0.0043
51	0.0047	0.0003	0.0043
52	0.0047	0.0003	0.0043
53	0.0047	0.0003	0.0044
54	0.0047	0.0003	0.0044
55	0.0047	0.0003	0.0044
56	0.0048	0.0003	0.0044
57	0.0048	0.0003	0.0044
58	0.0048	0.0003	0.0045
59	0.0048	0.0003	0.0045
60	0.0048	0.0003	0.0045
61	0.0049	0.0003	0.0045
62	0.0049	0.0003	0.0045
63	0.0049	0.0003	0.0046
64	0.0049	0.0003	0.0046
65	0.0050	0.0003	0.0046
66	0.0050	0.0004	0.0046
67	0.0050	0.0004	0.0047
68	0.0050	0.0004	0.0047
69	0.0051	0.0004	0.0047
70	0.0051	0.0004	0.0047
71	0.0051	0.0004	0.0048
72	0.0051	0.0004	0.0048
73	0.0052	0.0004	0.0048
74	0.0052	0.0004	0.0048
75	0.0052	0.0004	0.0049
76	0.0052	0.0004	0.0049
77	0.0053	0.0004	0.0049
78	0.0053	0.0004	0.0049
79	0.0053	0.0004	0.0050
80	0.0054	0.0004	0.0050
81	0.0054	0.0004	0.0050
82	0.0054	0.0004	0.0050
83	0.0055	0.0004	0.0051
84	0.0055	0.0004	0.0051
85	0.0055	0.0004	0.0051
86	0.0056	0.0004	0.0052
87	0.0056	0.0004	0.0052
88	0.0056	0.0004	0.0052
89	0.0057	0.0004	0.0053

90	0.0057	0.0004	0.0053
91	0.0057	0.0004	0.0053
92	0.0058	0.0004	0.0054
93	0.0058	0.0004	0.0054
94	0.0058	0.0004	0.0054
95	0.0059	0.0004	0.0055
96	0.0059	0.0004	0.0055
97	0.0060	0.0004	0.0055
98	0.0060	0.0004	0.0056
99	0.0060	0.0004	0.0056
100	0.0061	0.0004	0.0056
101	0.0061	0.0004	0.0057
102	0.0062	0.0004	0.0057
103	0.0062	0.0004	0.0058
104	0.0062	0.0004	0.0058
105	0.0063	0.0004	0.0059
106	0.0063	0.0004	0.0059
107	0.0064	0.0004	0.0059
108	0.0064	0.0005	0.0060
109	0.0065	0.0005	0.0060
110	0.0065	0.0005	0.0061
111	0.0066	0.0005	0.0061
112	0.0066	0.0005	0.0062
113	0.0067	0.0005	0.0062
114	0.0067	0.0005	0.0063
115	0.0068	0.0005	0.0063
116	0.0068	0.0005	0.0064
117	0.0069	0.0005	0.0064
118	0.0069	0.0005	0.0065
119	0.0070	0.0005	0.0065
120	0.0071	0.0005	0.0066
121	0.0072	0.0005	0.0066
122	0.0072	0.0005	0.0067
123	0.0073	0.0005	0.0068
124	0.0073	0.0005	0.0068
125	0.0074	0.0005	0.0069
126	0.0075	0.0005	0.0069
127	0.0076	0.0005	0.0070
128	0.0076	0.0005	0.0071
129	0.0077	0.0005	0.0072
130	0.0078	0.0005	0.0072
131	0.0079	0.0006	0.0073
132	0.0079	0.0006	0.0074
133	0.0080	0.0006	0.0075
134	0.0081	0.0006	0.0075
135	0.0082	0.0006	0.0076
136	0.0083	0.0006	0.0077
137	0.0084	0.0006	0.0078
138	0.0085	0.0006	0.0079
139	0.0086	0.0006	0.0080
140	0.0087	0.0006	0.0080
141	0.0088	0.0006	0.0082
142	0.0089	0.0006	0.0082
143	0.0090	0.0006	0.0084
144	0.0091	0.0006	0.0085
145	0.0057	0.0004	0.0053
146	0.0058	0.0004	0.0053
147	0.0059	0.0004	0.0055
148	0.0059	0.0004	0.0055
149	0.0061	0.0004	0.0057
150	0.0062	0.0004	0.0057
151	0.0063	0.0004	0.0059
152	0.0064	0.0004	0.0059

153	0.0066	0.0005	0.0061
154	0.0066	0.0005	0.0062
155	0.0068	0.0005	0.0063
156	0.0069	0.0005	0.0064
157	0.0071	0.0005	0.0066
158	0.0072	0.0005	0.0067
159	0.0074	0.0005	0.0069
160	0.0076	0.0005	0.0070
161	0.0078	0.0005	0.0073
162	0.0079	0.0006	0.0074
163	0.0082	0.0006	0.0076
164	0.0084	0.0006	0.0078
165	0.0087	0.0006	0.0081
166	0.0088	0.0006	0.0082
167	0.0092	0.0006	0.0085
168	0.0094	0.0007	0.0087
169	0.0098	0.0007	0.0091
170	0.0100	0.0007	0.0093
171	0.0105	0.0007	0.0098
172	0.0108	0.0008	0.0100
173	0.0113	0.0008	0.0105
174	0.0116	0.0008	0.0108
175	0.0123	0.0009	0.0115
176	0.0127	0.0009	0.0118
177	0.0135	0.0009	0.0126
178	0.0140	0.0010	0.0130
179	0.0150	0.0011	0.0140
180	0.0156	0.0011	0.0145
181	0.0170	0.0012	0.0158
182	0.0178	0.0012	0.0165
183	0.0196	0.0014	0.0182
184	0.0207	0.0015	0.0193
185	0.0309	0.0022	0.0287
186	0.0329	0.0023	0.0306
187	0.0382	0.0027	0.0355
188	0.0417	0.0028	0.0389
189	0.0518	0.0028	0.0490
190	0.0597	0.0028	0.0569
191	0.0905	0.0028	0.0878
192	0.1314	0.0028	0.1286
193	0.5686	0.0028	0.5658
194	0.0713	0.0028	0.0685
195	0.0461	0.0028	0.0433
196	0.0353	0.0025	0.0328
197	0.0220	0.0015	0.0205
198	0.0186	0.0013	0.0173
199	0.0163	0.0011	0.0151
200	0.0145	0.0010	0.0135
201	0.0131	0.0009	0.0122
202	0.0120	0.0008	0.0111
203	0.0110	0.0008	0.0103
204	0.0103	0.0007	0.0096
205	0.0096	0.0007	0.0089
206	0.0090	0.0006	0.0084
207	0.0085	0.0006	0.0079
208	0.0081	0.0006	0.0075
209	0.0077	0.0005	0.0071
210	0.0073	0.0005	0.0068
211	0.0070	0.0005	0.0065
212	0.0067	0.0005	0.0063
213	0.0065	0.0005	0.0060
214	0.0062	0.0004	0.0058
215	0.0060	0.0004	0.0056

216	0.0058	0.0004	0.0054
217	0.0092	0.0006	0.0085
218	0.0089	0.0006	0.0083
219	0.0087	0.0006	0.0081
220	0.0085	0.0006	0.0079
221	0.0083	0.0006	0.0077
222	0.0081	0.0006	0.0076
223	0.0080	0.0006	0.0074
224	0.0078	0.0005	0.0073
225	0.0077	0.0005	0.0071
226	0.0075	0.0005	0.0070
227	0.0074	0.0005	0.0069
228	0.0072	0.0005	0.0067
229	0.0071	0.0005	0.0066
230	0.0070	0.0005	0.0065
231	0.0069	0.0005	0.0064
232	0.0068	0.0005	0.0063
233	0.0067	0.0005	0.0062
234	0.0066	0.0005	0.0061
235	0.0065	0.0005	0.0060
236	0.0064	0.0004	0.0059
237	0.0063	0.0004	0.0058
238	0.0062	0.0004	0.0057
239	0.0061	0.0004	0.0057
240	0.0060	0.0004	0.0056
241	0.0059	0.0004	0.0055
242	0.0059	0.0004	0.0054
243	0.0058	0.0004	0.0054
244	0.0057	0.0004	0.0053
245	0.0056	0.0004	0.0052
246	0.0056	0.0004	0.0052
247	0.0055	0.0004	0.0051
248	0.0054	0.0004	0.0051
249	0.0054	0.0004	0.0050
250	0.0053	0.0004	0.0050
251	0.0053	0.0004	0.0049
252	0.0052	0.0004	0.0048
253	0.0052	0.0004	0.0048
254	0.0051	0.0004	0.0047
255	0.0051	0.0004	0.0047
256	0.0050	0.0004	0.0046
257	0.0050	0.0003	0.0046
258	0.0049	0.0003	0.0046
259	0.0049	0.0003	0.0045
260	0.0048	0.0003	0.0045
261	0.0048	0.0003	0.0044
262	0.0047	0.0003	0.0044
263	0.0047	0.0003	0.0044
264	0.0046	0.0003	0.0043
265	0.0046	0.0003	0.0043
266	0.0046	0.0003	0.0042
267	0.0045	0.0003	0.0042
268	0.0045	0.0003	0.0042
269	0.0044	0.0003	0.0041
270	0.0044	0.0003	0.0041
271	0.0044	0.0003	0.0041
272	0.0043	0.0003	0.0040
273	0.0043	0.0003	0.0040
274	0.0043	0.0003	0.0040
275	0.0042	0.0003	0.0039
276	0.0042	0.0003	0.0039
277	0.0042	0.0003	0.0039
278	0.0041	0.0003	0.0038

279	0.0041	0.0003	0.0038
280	0.0041	0.0003	0.0038
281	0.0041	0.0003	0.0038
282	0.0040	0.0003	0.0037
283	0.0040	0.0003	0.0037
284	0.0040	0.0003	0.0037
285	0.0039	0.0003	0.0037
286	0.0039	0.0003	0.0036
287	0.0039	0.0003	0.0036
288	0.0039	0.0003	0.0036

 Total soil rain loss = 0.16(In)
 Total effective rainfall = 2.84(In)
 Peak flow rate in flood hydrograph = 110.23(CFS)

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

 Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	50.0	100.0	150.0	200.0
0+ 5	0.0012	0.17	Q				
0+10	0.0064	0.75	Q				
0+15	0.0134	1.02	Q				
0+20	0.0213	1.14	Q				
0+25	0.0296	1.21	Q				
0+30	0.0382	1.26	Q				
0+35	0.0471	1.29	Q				
0+40	0.0562	1.32	Q				
0+45	0.0654	1.34	Q				
0+50	0.0747	1.35	Q				
0+55	0.0841	1.36	Q				
1+ 0	0.0935	1.37	Q				
1+ 5	0.1029	1.37	Q				
1+10	0.1124	1.38	Q				
1+15	0.1219	1.38	Q				
1+20	0.1315	1.39	Q				
1+25	0.1411	1.39	Q				
1+30	0.1507	1.40	Q				
1+35	0.1603	1.40	Q				
1+40	0.1700	1.41	Q				
1+45	0.1797	1.41	Q				
1+50	0.1895	1.42	QV				
1+55	0.1993	1.42	QV				
2+ 0	0.2091	1.43	QV				
2+ 5	0.2190	1.43	QV				
2+10	0.2289	1.44	QV				
2+15	0.2388	1.44	QV				
2+20	0.2488	1.45	QV				
2+25	0.2588	1.45	QV				
2+30	0.2689	1.46	QV				
2+35	0.2789	1.47	QV				
2+40	0.2891	1.47	QV				
2+45	0.2993	1.48	QV				
2+50	0.3095	1.48	QV				
2+55	0.3197	1.49	QV				
3+ 0	0.3300	1.49	QV				
3+ 5	0.3403	1.50	QV				
3+10	0.3507	1.51	QV				

3+15	0.3611	1.51	QV				
3+20	0.3716	1.52	Q V				
3+25	0.3821	1.52	Q V				
3+30	0.3926	1.53	Q V				
3+35	0.4032	1.54	Q V				
3+40	0.4138	1.54	Q V				
3+45	0.4245	1.55	Q V				
3+50	0.4352	1.56	Q V				
3+55	0.4460	1.56	Q V				
4+ 0	0.4568	1.57	Q V				
4+ 5	0.4677	1.58	Q V				
4+10	0.4786	1.58	Q V				
4+15	0.4896	1.59	Q V				
4+20	0.5006	1.60	Q V				
4+25	0.5116	1.60	Q V				
4+30	0.5227	1.61	Q V				
4+35	0.5339	1.62	Q V				
4+40	0.5451	1.63	Q V				
4+45	0.5563	1.63	Q V				
4+50	0.5676	1.64	Q V				
4+55	0.5790	1.65	Q V				
5+ 0	0.5904	1.66	Q V				
5+ 5	0.6019	1.66	Q V				
5+10	0.6134	1.67	Q V				
5+15	0.6250	1.68	Q V				
5+20	0.6366	1.69	Q V				
5+25	0.6483	1.70	Q V				
5+30	0.6601	1.71	Q V				
5+35	0.6719	1.71	Q V				
5+40	0.6837	1.72	Q V				
5+45	0.6956	1.73	Q V				
5+50	0.7076	1.74	Q V				
5+55	0.7197	1.75	Q V				
6+ 0	0.7318	1.76	Q V				
6+ 5	0.7439	1.77	Q V				
6+10	0.7562	1.78	Q V				
6+15	0.7685	1.79	Q V				
6+20	0.7808	1.80	Q V				
6+25	0.7933	1.80	Q V				
6+30	0.8058	1.81	Q V				
6+35	0.8183	1.82	Q V				
6+40	0.8310	1.83	Q V				
6+45	0.8437	1.84	Q V				
6+50	0.8564	1.86	Q V				
6+55	0.8693	1.86	Q V				
7+ 0	0.8822	1.88	Q V				
7+ 5	0.8952	1.89	Q V				
7+10	0.9083	1.90	Q V				
7+15	0.9214	1.91	Q V				
7+20	0.9346	1.92	Q V				
7+25	0.9479	1.93	Q V				
7+30	0.9613	1.94	Q V				
7+35	0.9748	1.95	Q V				
7+40	0.9883	1.97	Q V				
7+45	1.0019	1.98	Q V				
7+50	1.0157	1.99	Q V				
7+55	1.0295	2.00	Q V				
8+ 0	1.0434	2.02	Q V				
8+ 5	1.0573	2.03	Q V				
8+10	1.0714	2.04	Q V				
8+15	1.0856	2.06	Q V				
8+20	1.0998	2.07	Q V				
8+25	1.1142	2.08	Q V				

8+30	1.1286	2.10	Q	V				
8+35	1.1432	2.11	Q	V				
8+40	1.1578	2.13	Q	V				
8+45	1.1726	2.14	Q	V				
8+50	1.1874	2.16	Q	V				
8+55	1.2024	2.17	Q	V				
9+ 0	1.2175	2.19	Q	V				
9+ 5	1.2327	2.20	Q	V				
9+10	1.2480	2.22	Q	V				
9+15	1.2634	2.24	Q	V				
9+20	1.2789	2.26	Q	V				
9+25	1.2946	2.27	Q	V				
9+30	1.3103	2.29	Q	V				
9+35	1.3262	2.31	Q	V				
9+40	1.3423	2.33	Q	V				
9+45	1.3584	2.35	Q	V				
9+50	1.3747	2.37	Q	V				
9+55	1.3911	2.38	Q	V				
10+ 0	1.4077	2.41	Q	V				
10+ 5	1.4244	2.42	Q	V				
10+10	1.4412	2.45	Q	V				
10+15	1.4582	2.47	Q	V				
10+20	1.4754	2.49	Q	V				
10+25	1.4927	2.51	Q	V				
10+30	1.5101	2.54	Q	V				
10+35	1.5278	2.56	Q	V				
10+40	1.5456	2.58	Q	V				
10+45	1.5635	2.61	Q	V				
10+50	1.5817	2.63	Q	V				
10+55	1.6000	2.66	Q	V				
11+ 0	1.6185	2.69	Q	V				
11+ 5	1.6371	2.71	Q	V				
11+10	1.6560	2.74	Q	V				
11+15	1.6751	2.77	Q	V				
11+20	1.6944	2.80	Q	V				
11+25	1.7139	2.83	Q	V				
11+30	1.7336	2.86	Q	V				
11+35	1.7535	2.89	Q	V				
11+40	1.7737	2.93	Q	V				
11+45	1.7941	2.96	Q	V				
11+50	1.8148	3.00	Q	V				
11+55	1.8356	3.03	Q	V				
12+ 0	1.8568	3.07	Q	V				
12+ 5	1.8771	2.95	Q	V				
12+10	1.8940	2.45	Q	V				
12+15	1.9095	2.24	Q	V				
12+20	1.9244	2.17	Q	V				
12+25	1.9392	2.14	Q	V				
12+30	1.9539	2.14	Q	V				
12+35	1.9687	2.15	Q	V				
12+40	1.9837	2.17	Q	V				
12+45	1.9988	2.19	Q	V				
12+50	2.0141	2.23	Q	V				
12+55	2.0297	2.26	Q	V				
13+ 0	2.0456	2.31	Q	V				
13+ 5	2.0618	2.35	Q	V				
13+10	2.0784	2.41	Q	V				
13+15	2.0953	2.46	Q	V				
13+20	2.1127	2.51	Q	V				
13+25	2.1303	2.57	Q	V				
13+30	2.1485	2.63	Q	V				
13+35	2.1670	2.69	Q	V				
13+40	2.1861	2.77	Q	V				

13+45	2.2056	2.83	Q		V				
13+50	2.2257	2.91	Q		V				
13+55	2.2463	2.99	Q		V				
14+ 0	2.2675	3.08	Q		V				
14+ 5	2.2893	3.17	Q		V				
14+10	2.3119	3.28	Q		V				
14+15	2.3353	3.39	Q		V				
14+20	2.3595	3.51	Q		V				
14+25	2.3845	3.63	Q		V				
14+30	2.4105	3.77	Q		V				
14+35	2.4374	3.92	Q		V				
14+40	2.4656	4.09	Q		V				
14+45	2.4949	4.26	Q		V				
14+50	2.5257	4.47	Q		V				
14+55	2.5579	4.68	Q		V				
15+ 0	2.5919	4.94	Q		V				
15+ 5	2.6277	5.20	Q		V				
15+10	2.6659	5.54	Q		V				
15+15	2.7065	5.90	Q		V				
15+20	2.7503	6.36	Q		V				
15+25	2.7997	7.17	Q		V				
15+30	2.8615	8.97	Q		V				
15+35	2.9326	10.32	Q		V				
15+40	3.0137	11.77	Q		V				
15+45	3.1063	13.46	Q		V				
15+50	3.2170	16.06	Q		V				
15+55	3.3540	19.90	Q		V				
16+ 0	3.5468	27.99	Q		V				
16+ 5	3.9489	58.38		Q	V				
16+10	4.7080	110.23		Q	V				
16+15	5.1444	63.36		Q	V				
16+20	5.3917	35.90	Q		V				
16+25	5.5658	25.28	Q		V				
16+30	5.6902	18.06	Q		V				
16+35	5.7860	13.91	Q		V				
16+40	5.8619	11.02	Q		V				
16+45	5.9228	8.85	Q		V				
16+50	5.9732	7.32	Q		V				
16+55	6.0149	6.05	Q		V				
17+ 0	6.0456	4.45	Q		V				
17+ 5	6.0730	3.99	Q		V				
17+10	6.0982	3.65	Q		V				
17+15	6.1214	3.37	Q		V				
17+20	6.1431	3.16	Q		V				
17+25	6.1636	2.97	Q		V				
17+30	6.1830	2.82	Q		V				
17+35	6.2014	2.67	Q		V				
17+40	6.2190	2.55	Q		V				
17+45	6.2358	2.44	Q		V				
17+50	6.2519	2.34	Q		V				
17+55	6.2673	2.24	Q		V				
18+ 0	6.2822	2.16	Q		V				
18+ 5	6.2976	2.24	Q		V				
18+10	6.3163	2.70	Q		V				
18+15	6.3361	2.88	Q		V				
18+20	6.3561	2.90	Q		V				
18+25	6.3760	2.89	Q		V				
18+30	6.3957	2.86	Q		V				
18+35	6.4152	2.83	Q		V				
18+40	6.4343	2.78	Q		V				
18+45	6.4532	2.74	Q		V				
18+50	6.4717	2.69	Q		V				
18+55	6.4899	2.64	Q		V				

19+ 0	6.5078	2.59	Q				V	
19+ 5	6.5253	2.54	Q				V	
19+10	6.5425	2.50	Q				V	
19+15	6.5594	2.45	Q				V	
19+20	6.5760	2.41	Q				V	
19+25	6.5924	2.37	Q				V	
19+30	6.6084	2.33	Q				V	
19+35	6.6243	2.30	Q				V	
19+40	6.6398	2.26	Q				V	
19+45	6.6552	2.23	Q				V	
19+50	6.6703	2.19	Q				V	
19+55	6.6852	2.16	Q				V	
20+ 0	6.6999	2.13	Q				V	
20+ 5	6.7144	2.10	Q				V	
20+10	6.7287	2.08	Q				V	
20+15	6.7428	2.05	Q				V	
20+20	6.7567	2.02	Q				V	
20+25	6.7704	2.00	Q				V	
20+30	6.7840	1.97	Q				V	
20+35	6.7974	1.95	Q				V	
20+40	6.8107	1.92	Q				V	
20+45	6.8238	1.90	Q				V	
20+50	6.8367	1.88	Q				V	
20+55	6.8495	1.86	Q				V	
21+ 0	6.8622	1.84	Q				V	
21+ 5	6.8747	1.82	Q				V	
21+10	6.8871	1.80	Q				V	
21+15	6.8993	1.78	Q				V	
21+20	6.9115	1.76	Q				V	
21+25	6.9235	1.74	Q				V	
21+30	6.9353	1.73	Q				V	
21+35	6.9471	1.71	Q				V	
21+40	6.9588	1.69	Q				V	
21+45	6.9703	1.68	Q				V	
21+50	6.9817	1.66	Q				V	
21+55	6.9931	1.64	Q				V	
22+ 0	7.0043	1.63	Q				V	
22+ 5	7.0154	1.61	Q				V	
22+10	7.0264	1.60	Q				V	
22+15	7.0373	1.59	Q				V	
22+20	7.0482	1.57	Q				V	
22+25	7.0589	1.56	Q				V	
22+30	7.0696	1.55	Q				V	
22+35	7.0801	1.53	Q				V	
22+40	7.0906	1.52	Q				V	
22+45	7.1010	1.51	Q				V	
22+50	7.1113	1.50	Q				V	
22+55	7.1215	1.48	Q				V	
23+ 0	7.1316	1.47	Q				V	
23+ 5	7.1417	1.46	Q				V	
23+10	7.1517	1.45	Q				V	
23+15	7.1616	1.44	Q				V	
23+20	7.1715	1.43	Q				V	
23+25	7.1812	1.42	Q				V	
23+30	7.1909	1.41	Q				V	
23+35	7.2005	1.40	Q				V	
23+40	7.2101	1.39	Q				V	
23+45	7.2196	1.38	Q				V	
23+50	7.2290	1.37	Q				V	
23+55	7.2384	1.36	Q				V	
24+ 0	7.2477	1.35	Q				V	
24+ 5	7.2557	1.17	Q				V	
24+10	7.2598	0.58	Q				V	

24+15	7.2619	0.31	Q				V
24+20	7.2632	0.20	Q				V
24+25	7.2641	0.13	Q				V
24+30	7.2647	0.09	Q				V
24+35	7.2651	0.05	Q				V
24+40	7.2653	0.03	Q				V
24+45	7.2654	0.02	Q				V
24+50	7.2655	0.01	Q				V

APPENDIX D:
RETENTION BASIN SIZING CALCULATIONS

LKQ Adelanto Project

Retention Basin Design Calculation

100-yr/24-hr Runoff Volume

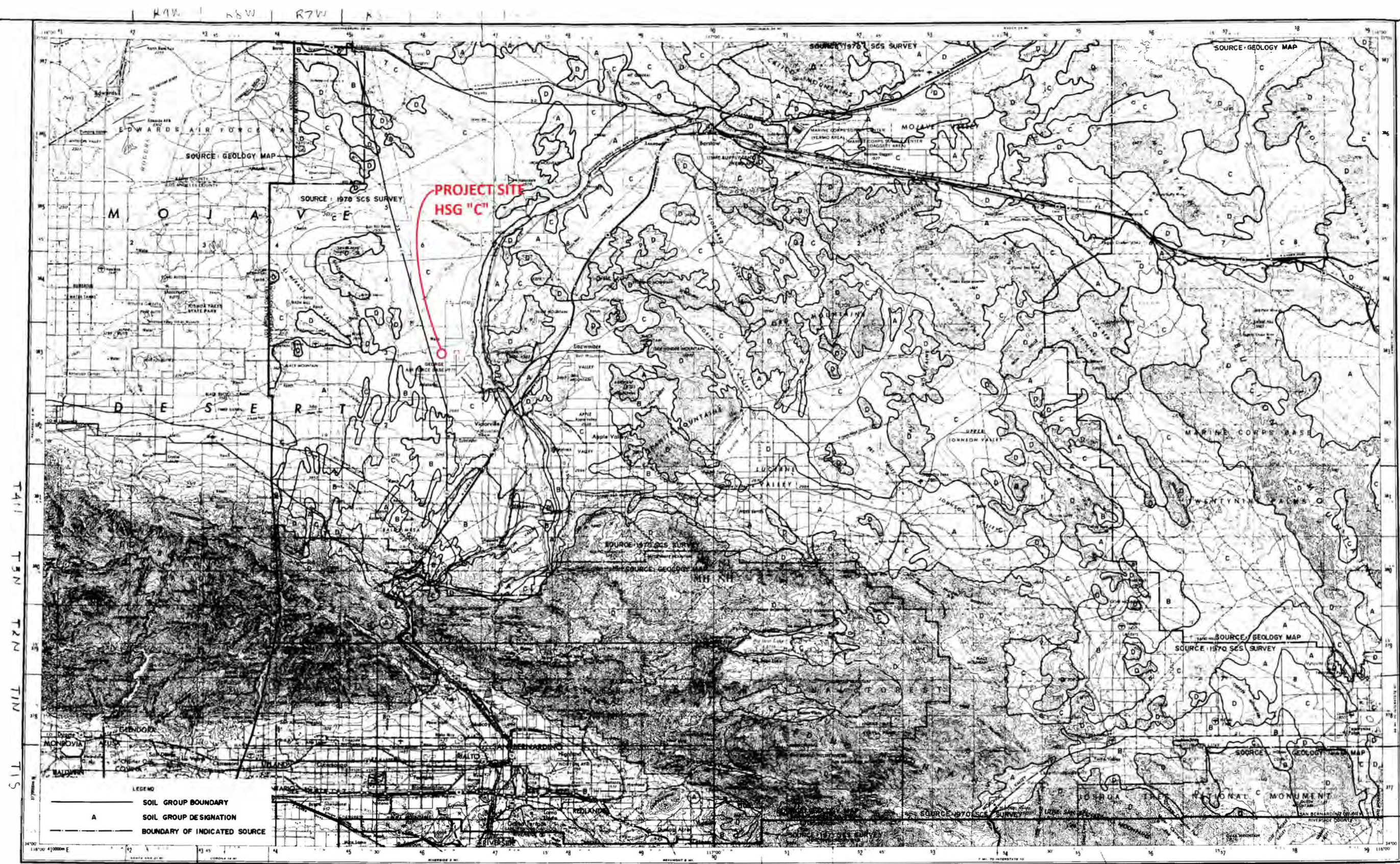
Existing Condition	316,433	CF
Proposed Condition	316,485	CF
Volume Increase	52	CF

Basin 1					
Contour Elevation	Contour Area (SF)	Contour Area (AC)	*Contour Interval Volume (CF)	Total Basin Volume (CF)	Total Basin Depth (FT)
2786.0	6,462	0.148		10,849	3.0
			5,496		
2785.0	4,584	0.105		5,353	2.0
			3,618		
2784.0	2,731	0.063		1,735	1.0
			1,735		
2783.0	904	0.021		0	0.0

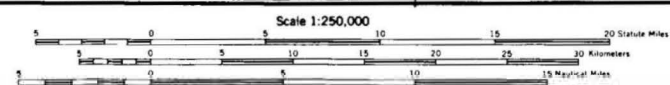
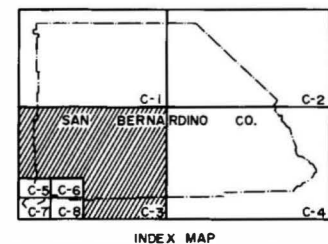
* Contour volume calculations are based on the volume of the frustum of a pyramid:

$$Volume = \frac{1}{3}h(A_1 + A_2 + \sqrt{A_1 \times A_2})$$

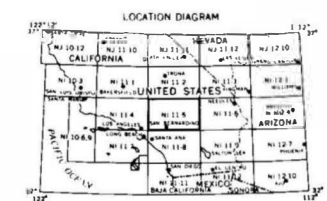
APPENDIX E:
REFERENCE FIGURES, TABLES, AND PLATES



LEGEND
 — SOIL GROUP BOUNDARY
 A SOIL GROUP DESIGNATION
 — BOUNDARY OF INDICATED SOURCE



Scale 1:250,000
 CONTOUR INTERVAL 200 FEET
 WITH SUPPLEMENTARY CONTOURS AT 100 FOOT INTERVALS
 TRANSVERSE MERCATOR PROJECTION
 BASE MAP REPRODUCED FROM U.S.G.S. "SAN BERNARDINO" TOPOGRAPHIC MAP
SCALE REDUCED BY 1/2



SAN BERNARDINO COUNTY **HYDROLOGY MANUAL**

HYDROLOGIC SOILS GROUP MAP FOR SOUTHCENTRAL AREA

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 <i>EXISTING CONDITION</i> (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

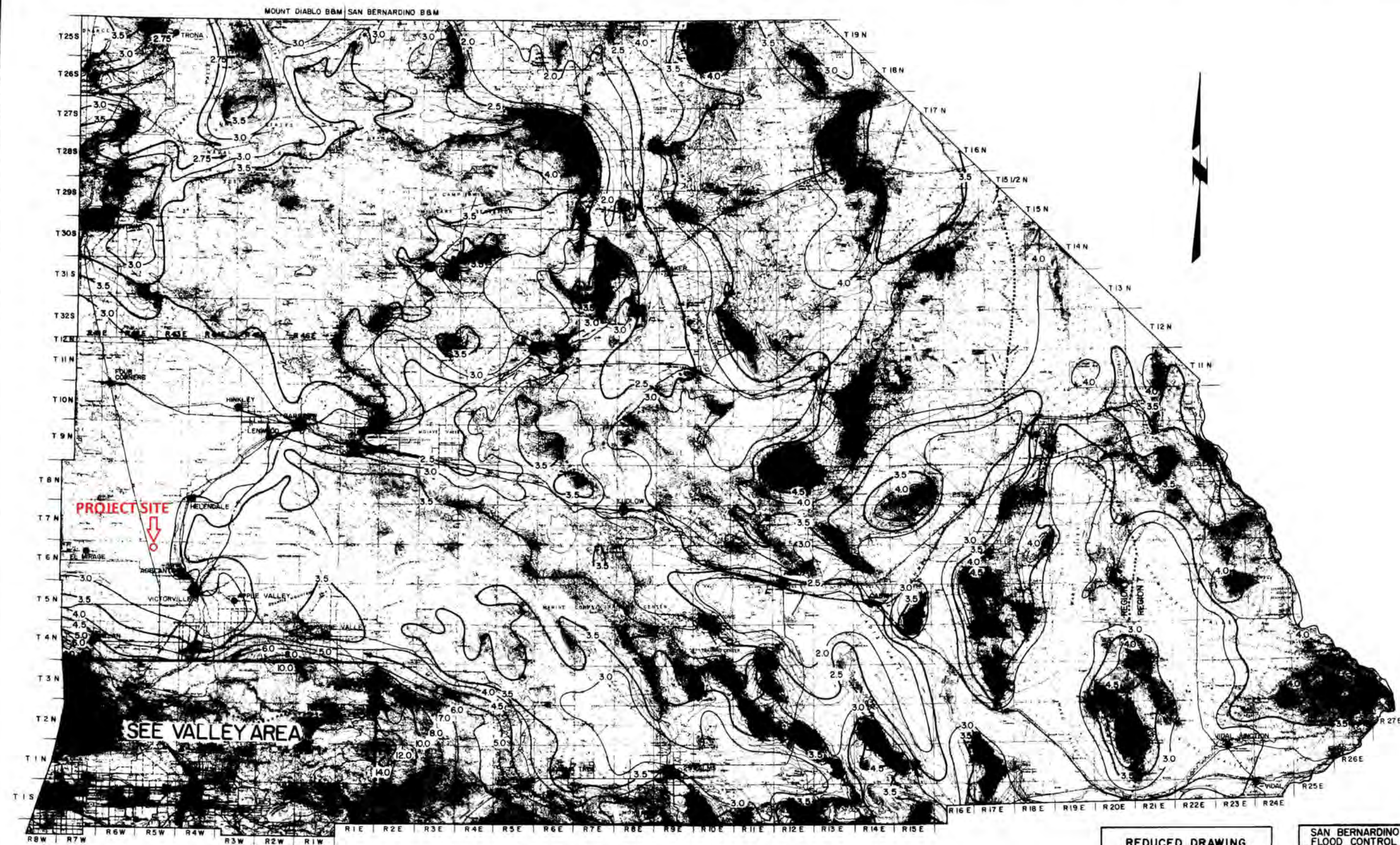
SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

**CURVE NUMBERS
FOR
PERVIOUS AREAS**

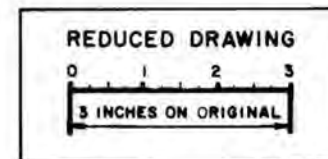
Table 2-2a Runoff curve numbers for urban areas ^{1/}

Cover description		Curve numbers for hydrologic soil group			
Cover type and hydrologic condition	Average percent impervious area ^{2/}	A	B	C	D
<i>Fully developed urban areas (vegetation established)</i>					
Open space (lawns, parks, golf courses, cemeteries, etc.) ^{3/} :					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. CONCRETE (excluding right-of-way)	PROPOSED CONDITION	98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) ^{4/}		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
<i>Developing urban areas</i>					
Newly graded areas (pervious areas only, no vegetation) ^{5/}					
		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

^{1/} Average runoff condition, and $I_a = 0.2S$.^{2/} The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.^{3/} CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.^{4/} Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.^{5/} Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.



SAN BERNARDINO COUNTY
HYDROLOGY MANUAL



LEGEND:
 3.5 ISOLINES PRECIPITATION (INCHES)

SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT			
DESERT AREA			
ISOHYETALS			
X ₄ -100 YEAR 24 HOUR			
BASED ON USDC, NOAA ATLAS 2, 1973			
APPROVED BY: <i>[Signature]</i>			
FLOOD CONTROL ENGINEER			
DATE	SCALE	FILE NO.	DWG NO.
1982	1" = 6 MI.	WRD-1	12 of 12

TABLE C.1. CURVE NUMBER RELATIONSHIPS

CN for AMC Condition II	Corresponding CN for AMC Condition	
	I	III
100	100	100
95	87	99
91 → 90	78	98
85	70	97
80	63	94
75	57	91
70	51	87
65	45	83
60	40	79
55	35	75
50	31	70
45	27	65
40	23	60
35	19	55
30	15	50
25	12	45
20	9	39
15	7	33
10	4	26
5	2	17
0	0	0

← 98.2 BY INTERPOLATION

WILL USE 98

C.6. ESTIMATION OF LOSS RATES

In estimating loss rates for design hydrology, a watershed curve number (CN) is determined for each soil-cover complex within the watershed using Figure C-3. The working range of CN values is between 0 and 98, where a low CN indicates low runoff potential (high infiltration), and a high CN indicates high runoff potential (low infiltration). Selection of a CN takes into account the major factors affecting loss rates on pervious surfaces including the hydrologic soil group, cover type and quality, and antecedent moisture condition (AMC).

Also included in the CN selection are the effects of "initial abstraction" (I_a) which represents the combined effects of other effective rainfall losses including depression storage, vegetation interception, evaporation, and transpiration, among other factors.



NOAA Atlas 14, Volume 6, Version 2
Location name: Adelanto, California, USA*
Latitude: 34.6223°, Longitude: -117.4199°
Elevation: 2789 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 & aeriels](#)

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	0.074 (0.061-0.091)	0.102 (0.084-0.126)	0.142 (0.117-0.174)	0.175 (0.143-0.217)	0.223 (0.176-0.286)	0.262 (0.202-0.343)	0.303 (0.228-0.406)	0.346 (0.254-0.477)	0.407 (0.287-0.585)	0.456 (0.310-0.677)
10-min	0.106 (0.087-0.130)	0.147 (0.121-0.180)	0.203 (0.167-0.250)	0.251 (0.205-0.312)	0.320 (0.252-0.410)	0.376 (0.290-0.491)	0.434 (0.327-0.582)	0.497 (0.364-0.684)	0.584 (0.411-0.838)	0.653 (0.444-0.970)
15-min	0.128 (0.106-0.157)	0.177 (0.146-0.218)	0.246 (0.202-0.302)	0.304 (0.248-0.377)	0.387 (0.305-0.496)	0.454 (0.351-0.594)	0.525 (0.396-0.704)	0.601 (0.440-0.827)	0.706 (0.497-1.01)	0.790 (0.537-1.17)
30-min	0.173 (0.143-0.212)	0.240 (0.197-0.294)	0.332 (0.273-0.409)	0.411 (0.335-0.509)	0.523 (0.413-0.671)	0.614 (0.474-0.803)	0.710 (0.535-0.951)	0.811 (0.595-1.12)	0.954 (0.671-1.37)	1.07 (0.726-1.58)
60-min	0.215 (0.177-0.263)	0.298 (0.245-0.365)	0.413 (0.339-0.507)	0.510 (0.415-0.632)	0.650 (0.512-0.833)	0.762 (0.589-0.997)	0.882 (0.665-1.18)	1.01 (0.739-1.39)	1.18 (0.834-1.70)	1.32 (0.901-1.97)
2-hr	0.298 (0.246-0.365)	0.401 (0.330-0.492)	0.545 (0.448-0.670)	0.667 (0.543-0.827)	0.842 (0.664-1.08)	0.984 (0.760-1.29)	1.13 (0.853-1.52)	1.29 (0.945-1.78)	1.51 (1.06-2.16)	1.68 (1.14-2.49)
3-hr	0.354 (0.292-0.434)	0.473 (0.389-0.580)	0.637 (0.523-0.783)	0.777 (0.633-0.963)	0.978 (0.771-1.25)	1.14 (0.880-1.49)	1.31 (0.987-1.75)	1.49 (1.09-2.05)	1.74 (1.22-2.49)	1.93 (1.31-2.87)
6-hr	0.469 (0.387-0.575)	0.623 (0.513-0.764)	0.833 (0.684-1.02)	1.01 (0.825-1.26)	1.27 (1.00-1.63)	1.47 (1.14-1.93)	1.69 (1.27-2.26)	1.91 (1.40-2.64)	2.23 (1.57-3.20)	2.47 (1.68-3.68)
12-hr	0.579 (0.477-0.709)	0.785 (0.646-0.963)	1.07 (0.877-1.31)	1.30 (1.06-1.62)	1.64 (1.29-2.10)	1.90 (1.47-2.48)	2.17 (1.64-2.91)	2.46 (1.80-3.39)	2.85 (2.01-4.09)	3.16 (2.15-4.69)
24-hr	0.732 (0.649-0.842)	1.02 (0.906-1.18)	1.42 (1.25-1.63)	1.74 (1.52-2.03)	2.19 (1.86-2.64)	2.55 (2.11-3.13)	2.91 (2.36-3.67)	3.29 (2.59-4.26)	3.82 (2.88-5.15)	4.22 (3.08-5.90)
2-day	0.833 (0.739-0.959)	1.18 (1.05-1.36)	1.66 (1.47-1.92)	2.05 (1.80-2.39)	2.59 (2.20-3.12)	3.01 (2.50-3.70)	3.44 (2.79-4.33)	3.89 (3.06-5.04)	4.49 (3.40-6.07)	4.96 (3.62-6.93)
3-day	0.897 (0.795-1.03)	1.28 (1.14-1.48)	1.82 (1.61-2.10)	2.25 (1.98-2.62)	2.85 (2.41-3.43)	3.31 (2.75-4.07)	3.78 (3.06-4.76)	4.27 (3.36-5.53)	4.93 (3.73-6.66)	5.45 (3.98-7.62)
4-day	0.943 (0.837-1.08)	1.36 (1.20-1.56)	1.93 (1.71-2.23)	2.40 (2.10-2.80)	3.04 (2.58-3.66)	3.53 (2.93-4.34)	4.04 (3.27-5.09)	4.56 (3.59-5.91)	5.27 (3.98-7.12)	5.81 (4.24-8.12)
7-day	0.988 (0.876-1.14)	1.43 (1.27-1.65)	2.06 (1.82-2.38)	2.58 (2.26-3.00)	3.28 (2.78-3.95)	3.83 (3.18-4.71)	4.37 (3.54-5.51)	4.93 (3.89-6.39)	5.68 (4.29-7.67)	6.24 (4.55-8.72)
10-day	1.02 (0.909-1.18)	1.50 (1.33-1.73)	2.17 (1.92-2.51)	2.73 (2.39-3.18)	3.51 (2.97-4.22)	4.10 (3.40-5.04)	4.70 (3.81-5.92)	5.31 (4.19-6.88)	6.14 (4.64-8.30)	6.75 (4.93-9.44)
20-day	1.15 (1.02-1.33)	1.74 (1.54-2.00)	2.58 (2.28-2.98)	3.30 (2.89-3.84)	4.33 (3.67-5.22)	5.15 (4.27-6.33)	5.98 (4.85-7.54)	6.84 (5.39-8.87)	7.98 (6.03-10.8)	8.83 (6.45-12.3)
30-day	1.27 (1.13-1.46)	1.94 (1.72-2.24)	2.94 (2.60-3.39)	3.81 (3.34-4.43)	5.08 (4.31-6.12)	6.09 (5.06-7.49)	7.13 (5.78-8.99)	8.21 (6.46-10.6)	9.65 (7.29-13.0)	10.7 (7.82-15.0)
45-day	1.45 (1.29-1.67)	2.24 (1.99-2.58)	3.44 (3.04-3.98)	4.51 (3.95-5.26)	6.12 (5.19-7.37)	7.44 (6.18-9.15)	8.81 (7.13-11.1)	10.2 (8.05-13.2)	12.1 (9.16-16.4)	13.6 (9.90-19.0)
60-day	1.61 (1.43-1.85)	2.48 (2.20-2.86)	3.85 (3.40-4.45)	5.09 (4.46-5.92)	6.95 (5.89-8.36)	8.50 (7.06-10.5)	10.2 (8.22-12.8)	11.8 (9.32-15.3)	14.2 (10.7-19.1)	15.9 (11.6-22.3)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

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PF graphical

APPENDIX F:
HYDROLOGY CALCULATIONS INCLUDING NORTH AREA-RATIONAL METHOD
(AMENDED)

APPENDIX F.1:
100 YEAR HYDROLOGY CALCULATIONS - PRE-DEVELOPED (AMENDED)

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2019 Version 9.1
Rational Hydrology Study Date: 09/26/24

1403-0002 LKQ ADELANTO
PRE-DEVELOPED CONDITION
100-YEAR STORM EVENT

Program License Serial Number 6522

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

Rational hydrology study storm event year is 100.0
10 Year storm 1 hour rainfall = 0.510(In.)
100 Year storm 1 hour rainfall = 0.882(In.)
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 0.882 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

+++++
Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 91.00
Adjusted SCS curve number for AMC 3 = 98.20
Pervious ratio(Ap) = 0.9730 Max loss rate(Fm)= 0.035(In/Hr)
Initial subarea data:
Initial area flow distance = 517.000(Ft.)
Top (of initial area) elevation = 2802.000(Ft.)
Bottom (of initial area) elevation = 2795.500(Ft.)
Difference in elevation = 6.500(Ft.)
Slope = 0.01257 s(%)= 1.26
 $TC = k(0.514) * [(length^3) / (elevation\ change)]^{0.2}$
Initial area time of concentration = 15.026 min.
Rainfall intensity = 2.325(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.887
Subarea runoff = 20.610(CFS)
Total initial stream area = 10.000(Ac.)
Pervious area fraction = 0.973
Initial area Fm value = 0.035(In/Hr)

```

+++++
Process from Point/Station      101.000 to Point/Station      102.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

```

```

Estimated mean flow rate at midpoint of channel =      0.000 (CFS)
Depth of flow =  0.405 (Ft.), Average velocity =  2.091 (Ft/s)
      ***** Irregular Channel Data *****

```

```

Information entered for subchannel number 1 :
Point number      'X' coordinate      'Y' coordinate
      1              0.00              2.30
      2             230.00              0.00
      3            1000.00              7.70
Manning's 'N' friction factor =  0.025

```

```

Sub-Channel flow =  34.228 (CFS)
'      ' flow top width =  80.908 (Ft.)
'      ' velocity =  2.091 (Ft/s)
'      ' area =  16.365 (Sq.Ft)
'      ' Froude number =  0.820

```

```

Upstream point elevation =  2795.500 (Ft.)
Downstream point elevation =  2786.000 (Ft.)
Flow length =  911.000 (Ft.)
Travel time =  7.26 min.
Time of concentration =  22.29 min.
Depth of flow =  0.405 (Ft.)
Average velocity =  2.091 (Ft/s)
Total irregular channel flow =  34.228 (CFS)
Irregular channel normal depth above invert elev. =  0.405 (Ft.)
Average velocity of channel(s) =  2.091 (Ft/s)
Adding area flow to channel
Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil (AMC 2) = 91.00
Adjusted SCS curve number for AMC 3 = 98.20
Pervious ratio (Ap) = 1.0000      Max loss rate (Fm) =  0.036 (In/Hr)
Rainfall intensity =  1.764 (In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area, (total area with modified
rational method) (Q=KCIA) is C = 0.882
Subarea runoff =  27.157 (CFS) for 20.700 (Ac.)
Total runoff =  47.767 (CFS)
Effective area this stream =  30.70 (Ac.)
Total Study Area (Main Stream No. 1) =  30.70 (Ac.)
Area averaged Fm value =  0.035 (In/Hr)
Depth of flow =  0.458 (Ft.), Average velocity =  2.273 (Ft/s)

```

```

+++++
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 = 0.566(Ft.), Average velocity = 1.950(Ft/s)
***** Irregular Channel Data *****

Information entered for subchannel number 1 :

Point number	'X' coordinate	'Y' coordinate
1	0.00	3.90
2	390.00	0.00
3	1200.00	8.10

Manning's 'N' friction factor = 0.025

Sub-Channel flow = 62.418(CFS)
' ' flow top width = 113.141(Ft.)
' ' velocity= 1.950(Ft/s)
' ' area = 32.002(Sq.Ft)
' ' Froude number = 0.646

Upstream point elevation = 2786.000(Ft.)
Downstream point elevation = 2782.300(Ft.)
Flow length = 638.000(Ft.)
Travel time = 5.45 min.
Time of concentration = 27.74 min.
Depth of flow = 0.566(Ft.)
Average velocity = 1.950(Ft/s)
Total irregular channel flow = 62.417(CFS)
Irregular channel normal depth above invert elev. = 0.566(Ft.)
Average velocity of channel(s) = 1.950(Ft/s)

Adding area flow to channel

Soil classification AP and SCS values input by user

USER INPUT of soil data for subarea

SCS curve number for soil(AMC 2) = 91.00

Adjusted SCS curve number for AMC 3 = 98.20

Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.036(In/Hr)

Rainfall intensity = 1.514(In/Hr) for a 100.0 year storm

Effective runoff coefficient used for area, (total area with modified rational method) (Q=KCIA) is C = 0.879

Subarea runoff = 29.242(CFS) for 27.190(Ac.)

Total runoff = 77.009(CFS)

Effective area this stream = 57.89(Ac.)

Total Study Area (Main Stream No. 1) = 57.89(Ac.)

Area averaged Fm value = 0.036(In/Hr)

Depth of flow = 0.612(Ft.), Average velocity = 2.056(Ft/s)

+++++
Process from Point/Station 103.000 to Point/Station 104.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel = 0.000(CFS)

Depth of flow = 0.642(Ft.), Average velocity = 2.135(Ft/s)

***** Irregular Channel Data *****

Information entered for subchannel number 1 :

Point number	'X' coordinate	'Y' coordinate
1	0.00	4.10

2	410.00	0.00
3	1150.00	7.40

Manning's 'N' friction factor = 0.025

Sub-Channel flow = 87.985(CFS)

'	'	flow top width =	128.377(Ft.)
'	'	velocity=	2.135(Ft/s)
'	'	area =	41.202(Sq.Ft)
'	'	Froude number =	0.664

Upstream point elevation = 2782.300(Ft.)
 Downstream point elevation = 2778.000(Ft.)
 Flow length = 732.000(Ft.)
 Travel time = 5.71 min.
 Time of concentration = 33.45 min.
 Depth of flow = 0.642(Ft.)
 Average velocity = 2.135(Ft/s)
 Total irregular channel flow = 87.985(CFS)
 Irregular channel normal depth above invert elev. = 0.642(Ft.)
 Average velocity of channel(s) = 2.135(Ft/s)
 Adding area flow to channel
 Soil classification AP and SCS values input by user
 USER INPUT of soil data for subarea
 SCS curve number for soil(AMC 2) = 91.00
 Adjusted SCS curve number for AMC 3 = 98.20
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.036(In/Hr)
 Rainfall intensity = 1.328(In/Hr) for a 100.0 year storm
 Effective runoff coefficient used for area, (total area with modified rational method) (Q=KCIA) is C = 0.876
 Subarea runoff = 21.890(CFS) for 27.160(Ac.)
 Total runoff = 98.899(CFS)
 Effective area this stream = 85.05(Ac.)
 Total Study Area (Main Stream No. 1) = 85.05(Ac.)
 Area averaged Fm value = 0.036(In/Hr)
 Depth of flow = 0.671(Ft.), Average velocity = 2.199(Ft/s)
 End of computations, Total Study Area = 85.05 (Ac.)
 The following figures may
 be used for a unit hydrograph study of the same area.
 Note: These figures do not consider reduced effective area effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.997
 Area averaged SCS curve number = 91.0

APPENDIX F.2:
100 YEAR HYDROLOGY CALCULATIONS – DEVELOPED (AMENDED)

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2019 Version 9.1
Rational Hydrology Study Date: 09/26/24

1403-0002 LKQ ADELANTO
POST-DEVELOPED CONDITION
100-YEAR STORM EVENT

Program License Serial Number 6522

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

Rational hydrology study storm event year is 100.0
10 Year storm 1 hour rainfall = 0.510(In.)
100 Year storm 1 hour rainfall = 0.882(In.)
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 0.882 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

+++++
Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 91.00
Adjusted SCS curve number for AMC 3 = 98.20
Pervious ratio(Ap) = 0.8030 Max loss rate(Fm)= 0.029(In/Hr)
Initial subarea data:
Initial area flow distance = 517.000(Ft.)
Top (of initial area) elevation = 2802.000(Ft.)
Bottom (of initial area) elevation = 2795.500(Ft.)
Difference in elevation = 6.500(Ft.)
Slope = 0.01257 s(%)= 1.26
 $TC = k(0.473)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 13.802 min.
Rainfall intensity = 2.467(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.890
Subarea runoff = 21.947(CFS)
Total initial stream area = 10.000(Ac.)
Pervious area fraction = 0.803
Initial area Fm value = 0.029(In/Hr)

```

+++++
Process from Point/Station      101.000 to Point/Station      102.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

```

```

Estimated mean flow rate at midpoint of channel =      0.000 (CFS)
Depth of flow =  0.412 (Ft.), Average velocity =  2.118 (Ft/s)
***** Irregular Channel Data *****

```

```

Information entered for subchannel number 1 :
Point number      'X' coordinate      'Y' coordinate
      1              0.00              2.30
      2             230.00              0.00
      3            1000.00              7.70
Manning's 'N' friction factor =  0.025

```

```

Sub-Channel flow =  35.989 (CFS)
'      ' flow top width =  82.445 (Ft.)
'      ' velocity =  2.118 (Ft/s)
'      ' area =  16.993 (Sq.Ft)
'      ' Froude number =  0.822

```

```

Upstream point elevation =  2795.500 (Ft.)
Downstream point elevation =  2786.000 (Ft.)
Flow length =  911.000 (Ft.)
Travel time =  7.17 min.
Time of concentration =  20.97 min.
Depth of flow =  0.412 (Ft.)
Average velocity =  2.118 (Ft/s)
Total irregular channel flow =  35.989 (CFS)
Irregular channel normal depth above invert elev. =  0.412 (Ft.)
Average velocity of channel(s) =  2.118 (Ft/s)
Adding area flow to channel
Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil (AMC 2) = 91.00
Adjusted SCS curve number for AMC 3 = 98.20
Pervious ratio (Ap) = 1.0000      Max loss rate (Fm) =  0.036 (In/Hr)
Rainfall intensity =  1.841 (In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area, (total area with modified
rational method) (Q=KCIA) is C = 0.884
Subarea runoff =  27.994 (CFS) for 20.700 (Ac.)
Total runoff =  49.941 (CFS)
Effective area this stream =  30.70 (Ac.)
Total Study Area (Main Stream No. 1) =  30.70 (Ac.)
Area averaged Fm value =  0.033 (In/Hr)
Depth of flow =  0.466 (Ft.), Average velocity =  2.299 (Ft/s)

```

```

+++++
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 = 0.574(Ft.), Average velocity = 1.970(Ft/s)
***** Irregular Channel Data *****

Information entered for subchannel number 1 :

Point number	'X' coordinate	'Y' coordinate
1	0.00	3.90
2	390.00	0.00
3	1200.00	8.10

Manning's 'N' friction factor = 0.025

Sub-Channel flow = 64.957(CFS)
' ' flow top width = 114.846(Ft.)
' ' velocity = 1.970(Ft/s)
' ' area = 32.974(Sq.Ft)
' ' Froude number = 0.648

Upstream point elevation = 2786.000(Ft.)
Downstream point elevation = 2782.300(Ft.)
Flow length = 638.000(Ft.)
Travel time = 5.40 min.
Time of concentration = 26.37 min.
Depth of flow = 0.574(Ft.)
Average velocity = 1.970(Ft/s)
Total irregular channel flow = 64.957(CFS)
Irregular channel normal depth above invert elev. = 0.574(Ft.)
Average velocity of channel(s) = 1.970(Ft/s)

Adding area flow to channel

Soil classification AP and SCS values input by user

USER INPUT of soil data for subarea

SCS curve number for soil(AMC 2) = 91.00

Adjusted SCS curve number for AMC 3 = 98.20

Pervious ratio(Ap) = 1.0000 Max loss rate(Fm) = 0.036(In/Hr)

Rainfall intensity = 1.568(In/Hr) for a 100.0 year storm

Effective runoff coefficient used for area, (total area with modified rational method) (Q=KCIA) is C = 0.880

Subarea runoff = 29.967(CFS) for 27.190(Ac.)

Total runoff = 79.908(CFS)

Effective area this stream = 57.89(Ac.)

Total Study Area (Main Stream No. 1) = 57.89(Ac.)

Area averaged Fm value = 0.035(In/Hr)

Depth of flow = 0.621(Ft.), Average velocity = 2.075(Ft/s)

+++++
Process from Point/Station 103.000 to Point/Station 104.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel = 0.000(CFS)

Depth of flow = 0.650(Ft.), Average velocity = 2.154(Ft/s)

***** Irregular Channel Data *****

Information entered for subchannel number 1 :

Point number	'X' coordinate	'Y' coordinate
1	0.00	4.10

2	410.00	0.00
3	1150.00	7.40

Manning's 'N' friction factor = 0.025

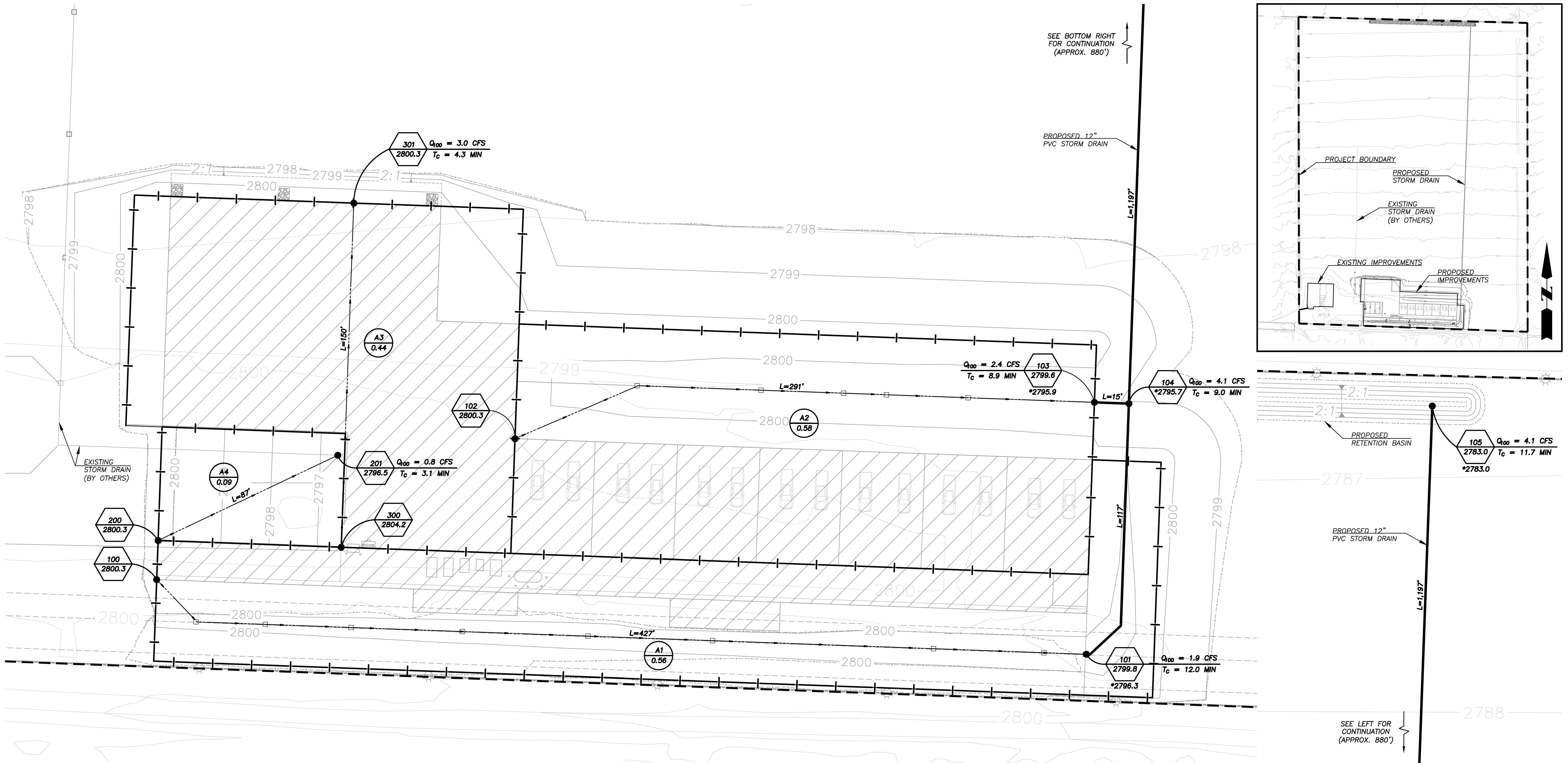
Sub-Channel flow = 91.029(CFS)
' ' flow top width = 130.025(Ft.)
' ' velocity= 2.154(Ft/s)
' ' area = 42.266(Sq.Ft)
' ' Froude number = 0.666

Upstream point elevation = 2782.300(Ft.)
Downstream point elevation = 2778.000(Ft.)
Flow length = 732.000(Ft.)
Travel time = 5.66 min.
Time of concentration = 32.03 min.
Depth of flow = 0.650(Ft.)
Average velocity = 2.154(Ft/s)
Total irregular channel flow = 91.028(CFS)
Irregular channel normal depth above invert elev. = 0.650(Ft.)
Average velocity of channel(s) = 2.154(Ft/s)
Adding area flow to channel
Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 91.00
Adjusted SCS curve number for AMC 3 = 98.20
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.036(In/Hr)
Rainfall intensity = 1.369(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area, (total area with modified
rational method) (Q=KCIA) is C = 0.877
Subarea runoff = 22.173(CFS) for 27.160(Ac.)
Total runoff = 102.081(CFS)
Effective area this stream = 85.05(Ac.)
Total Study Area (Main Stream No. 1) = 85.05(Ac.)
Area averaged Fm value = 0.035(In/Hr)
Depth of flow = 0.679(Ft.), Average velocity = 2.216(Ft/s)
End of computations, Total Study Area = 85.05 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.977
Area averaged SCS curve number = 91.0

EXHIBIT A:
RATIONAL METHOD HYDROLOGY MAP

Drawing Name: Q:\403-0001 LKQ\Study Drainage\Gentgroup-Adelanto Project\Hydrology Maps\Gentgroup-Adelanto Project\On-Site_Rational_Proj.dwg
Last Opened: Jul 15, 2016 -- 2:20pm by amiatreto



LEGEND



NODE/CONCENTRATION POINT
ELEVATION



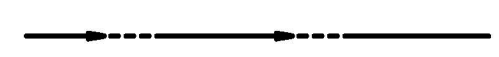
SUBAREA
ACRES

L=XXX'

MAIN FLOW PATH

*XX.X

PIPE INVERT ELEVATION



FLOW PATH



PIPE FLOW PATH



PROJECT BOUNDARY



WATERSHED BOUNDARY



PROPOSED BUILDING FOOTPRINT

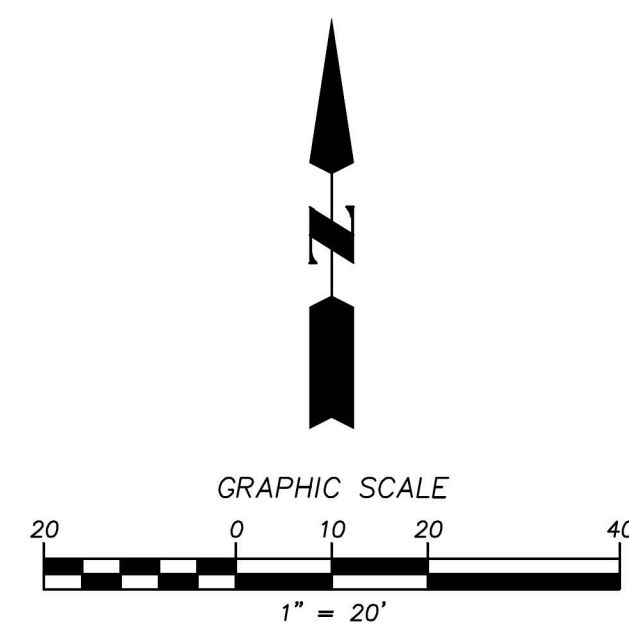


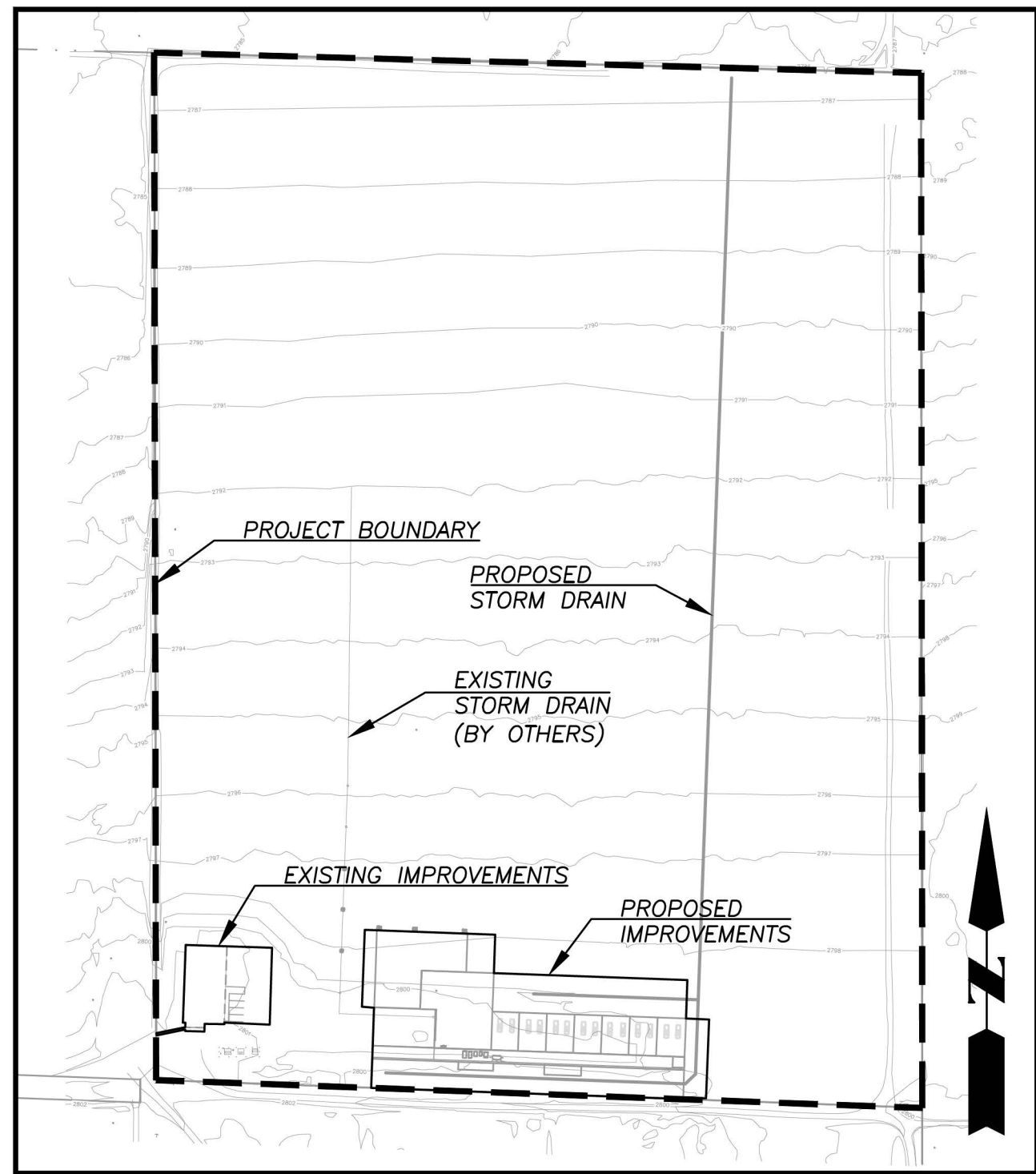
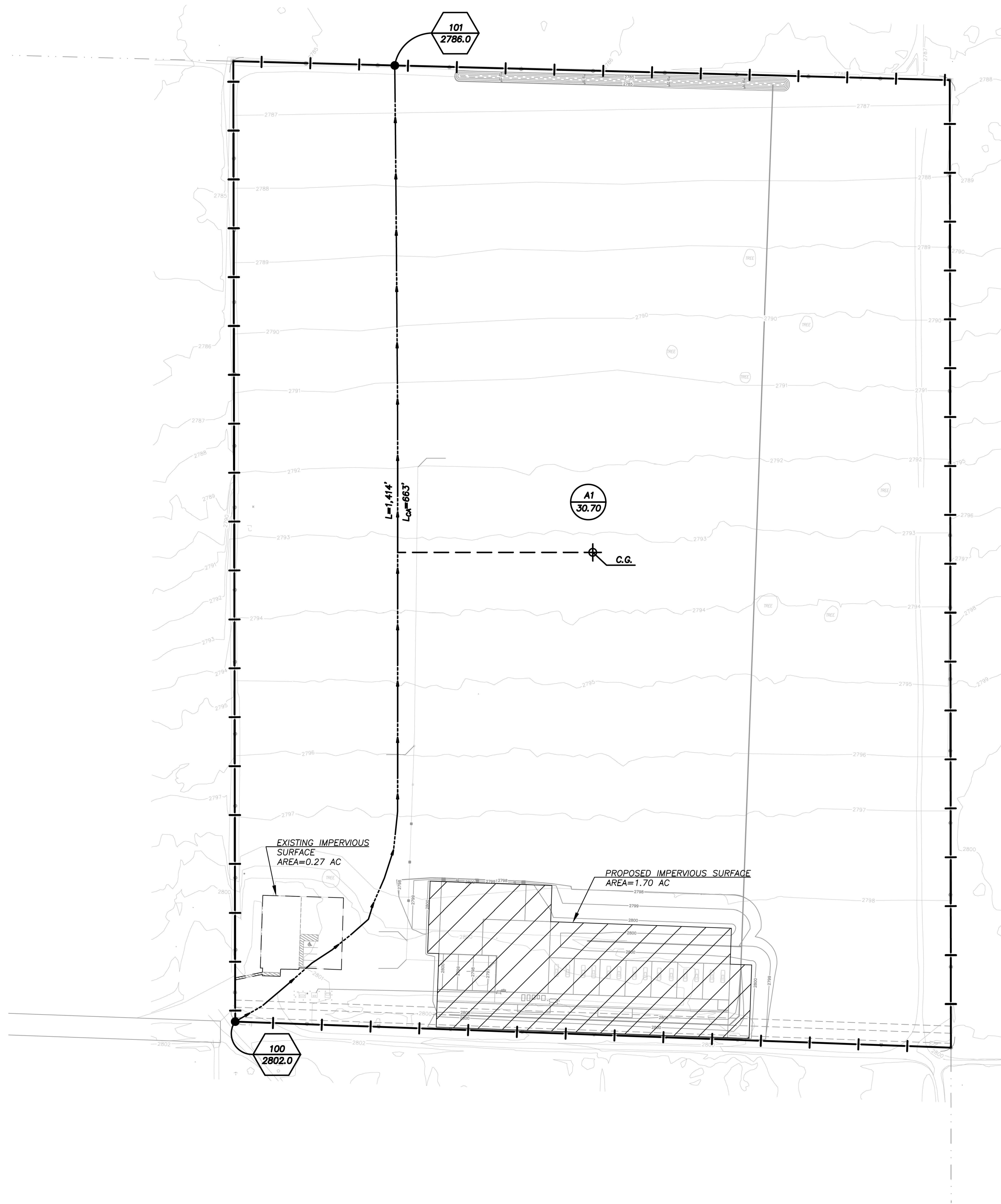
EXHIBIT "A" HYDROLOGY MAP FOR LKQ ADELANTO PROJECT ONSITE WATERSHED AREAS RATIONAL METHOD

CASC
Engineering and Consulting

1470 EAST COOLEY DRIVE, COLTON, CA 92324
PH. (909) 783-0101 FAX (909) 783-0108
www.cae-casc.com

EXHIBIT B:
UNIT HYDROGRAPH METHOD HYDROLOGY MAP

Drawing Name: O:\403-0001 LKQ\Study Drainage\Gentgroup-Adelanto Project\Hydrology Maps\Gentgroup-Adelanto Project_On-Site_UH_Prop.dwg
Last Opened: Jul 14, 2016 -- 7:07pm by amiatreto



LEGEND

	<u>NODE/CONCENTRATION POINT</u> ELEVATION		FLOW PATH
	<u>SUBAREA</u> ACRES		PROJECT BOUNDARY
$L=XXX'$	MAIN FLOW PATH		WATERSHED BOUNDARY
$L_{CA}=XXX'$	FLOW DISTANCE MEASURED UPSTREAM TO POINT OF CENTROID		PROPOSED IMPERVIOUS SURFACE
	C.G.		

HYDROLOGY SUMMARY

	100-YEAR/24-HOUR		
DESCRIPTION	EXISTING CONDITION	PROPOSED CONDITION	INCREASE
PEAK FLOW RATE (CFS)	110.17	110.23	0.06
FLOOD VOLUME (CF)	316,433	316,485	52
FLOOD VOLUME (AC-FT)	7.2643	7.2655	0.0012

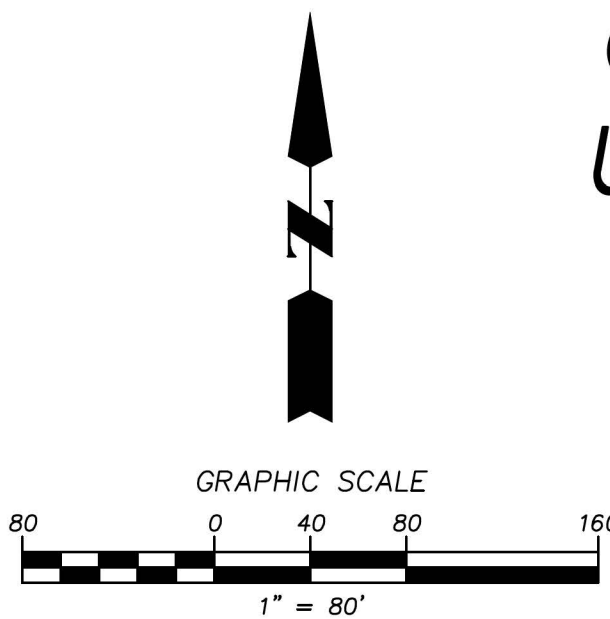
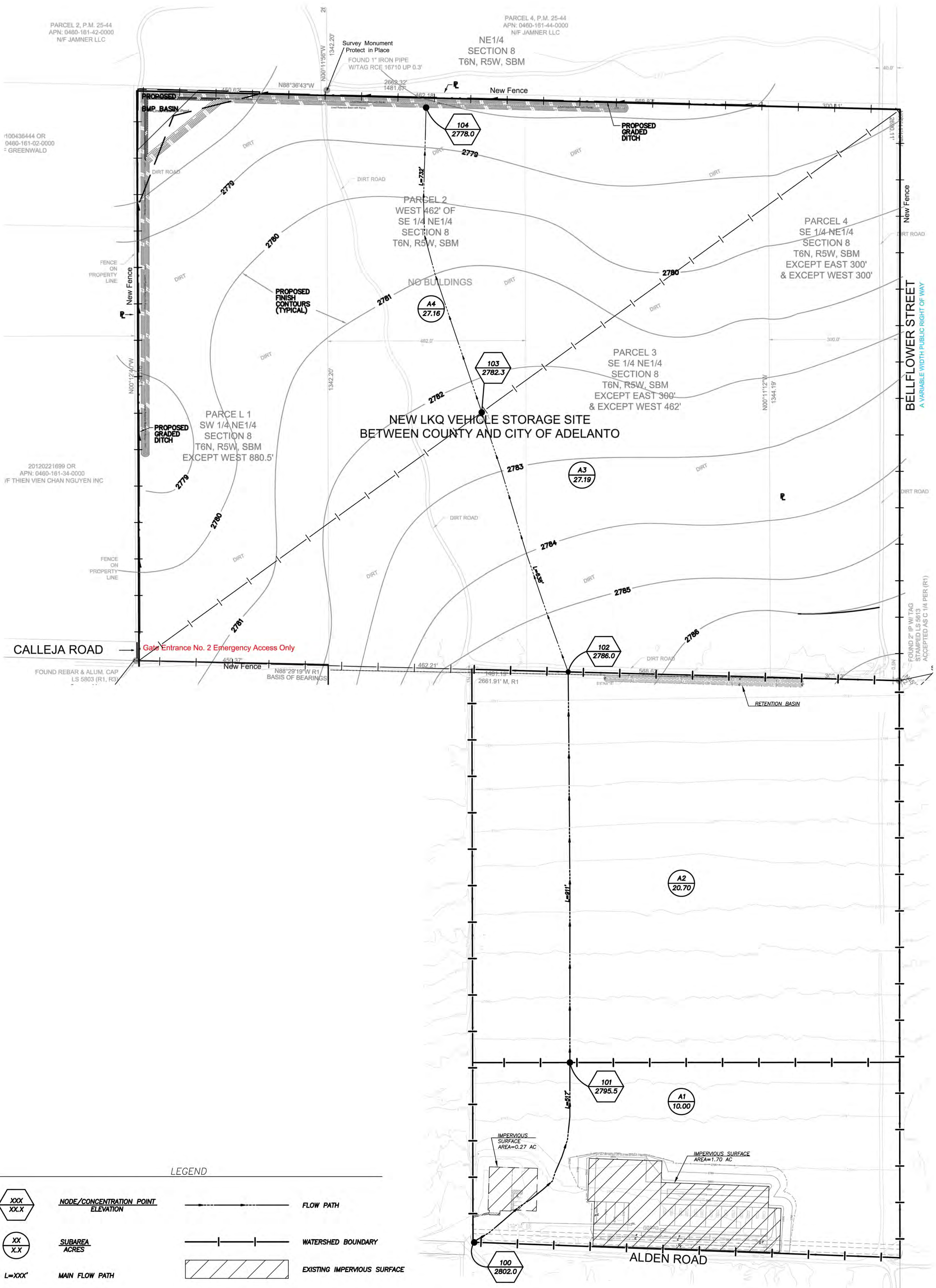


EXHIBIT "A"
HYDROLOGY MAP FOR
LKQ ADELANTO PROJECT
ONSITE WATERSHED AREAS
UNIT HYDROGRAPH METHOD

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EXHIBIT C:
RATIONAL METHOD HYDROLOGY MAP (AMENDED)



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