PRELIMINARY DRAINAGE STUDY

IN THE

CITY OF VICTORVILLE

FOR

TENTATIVE TRACT 20274

SEPTEMBER 9TH, 2019

MADOLE & ASSOCIATES, INC.

Engineering Communities for Life

Reference: 652-1985

PREPARED BY:

Madole & Associates, Inc.

PRELIMINARY
DRAINAGE STUDY
IN THE
CITY OF VICTORVILLE
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Reference: 652-1985

PREPARED BY:

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R.C.E. 42868

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INTRODUCTION

INTRODUCTION

EXECUTIVE SUMMARY

The following report is a hydrologic analysis of the contributing drainage areas discharging storm water flows from the proposed development of Tentative Tract 20274 to the Oro Grande Wash. The proposed development is located approximately 4.2 miles southwest of the City Hall of the City of Victorville and 0.3 mile west of the Interstate Freeway 15 (See the following vicinity map (Figures 1, 2, and 3). The proposed development is adjacent to the east side of Amethyst Road about 450 feet north of Eucalyptus Street.

The proposed development will be a residential tract with 3.8 dwellings per acre on about 45.2 gross acres. There will be interior and exterior street improvements with an intract storm drain system that will collect the storm water runoff. The interior storm flows will be directed near the northeast corner of the tract where there will be a site detention and infiltration basin that will also serve as a Water Quality BMP Infiltration Basin. The proposed tract will be a Water Quality "Priority Project".

Net Area:	43.6 acres
Numbered Lots:	168
Units per Acre:	3.8
Minimum Lot Size:	7,200 S.F.
Zoning Land Use:	R-1
General Plan:	Low Density Residential

Owner/Developer: KB Home
36310 Inland Valley Drive
Wildomar, CA 92595

The proposed development will intercept the intract storm water and mitigate the 100-year peak runoff flow with the detention basin. The Peak Flow from the proposed development will be reduced to less than the PreDeveloped Peak Flow generated from the project area.

The Basin will also serve to infiltrate runoff from the tract. The Basin will have 1.48 acre-feet of capacity for the the infiltration of low flow runoff.

100-Year Stormwater Runoff
(Table 1-a)

PROJECT AREA (ACRES)	COMBINED PRE-DEV. RUNOFF Q (C.F.S.)	0.9 * PRE-DEV. RUNOFF (C.F.S.)	TOTAL DEV. UNMITIGATED RUNOFF Q (C.F.S.)	BASIN PEAK DISCHARGE Q (C.F.S.)	CATCH BASIN 'H' DISCHARGE (C.F.S.)	TOTAL MITIGATED SITE DISCHARGE (C.F.S.)
≈45.2	97	87	113	39	10.5	50
3.86 (OFFSITE)	8.9		8.9			

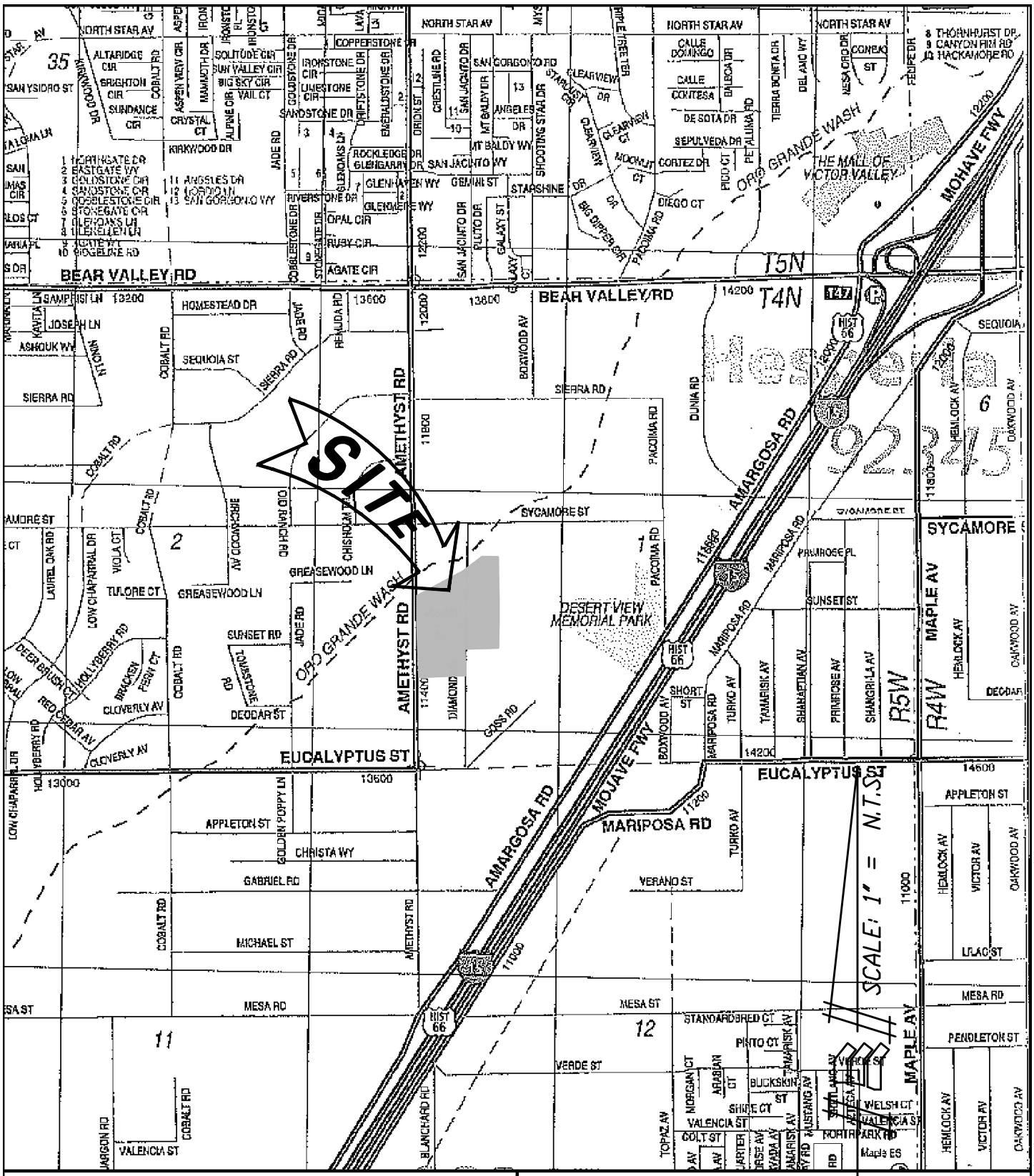
NET AREA = 43.6 AC.
AMETHYST ROAD = 1.6 AC.

The Pre-Developed storm water runoff of 97 c.f.s. was estimated for the project site. This estimation was the combination of the runoff from the project site at six locations at the tract boundary.

The storm water analysis of the Developed Conditions estimated the unmitigated runoff flow rate of about 113 c.f.s. This included the intract flow of 97 c.f.s., 11 c.f.s. from the northern most catch basin, and the possible runoff from Amethyst Road half street improvements of about 5 c.f.s.

To mitigate Developed Condition storm water discharge to less than the Predeveloped discharge, the intract storm water runoff for the developed condition was routed into and through a proposed detention basin located near the northeasterly corner of the project site. The Developed peak flow of 113 c.f.s. was reduced to a discharged 50 c.f.s. Flows from offsite subarea adjacent the southern boundary of the project will be directed into a graded swale and enter a culvert underneath the proposed access road and released on the other side.

From the unit hydrograph flood routing analysis, the detention basin would fill to a water surface elevation of 3247.2. The elevation of the top of the basin was set at 3252. The following table is a summary of the detention basin hydrologic analysis performed.



VICINITY MAP
(FIG. 1)

TENTATIVE TRACT 20274
IN THE CITY OF VICTORVILLE, CA.

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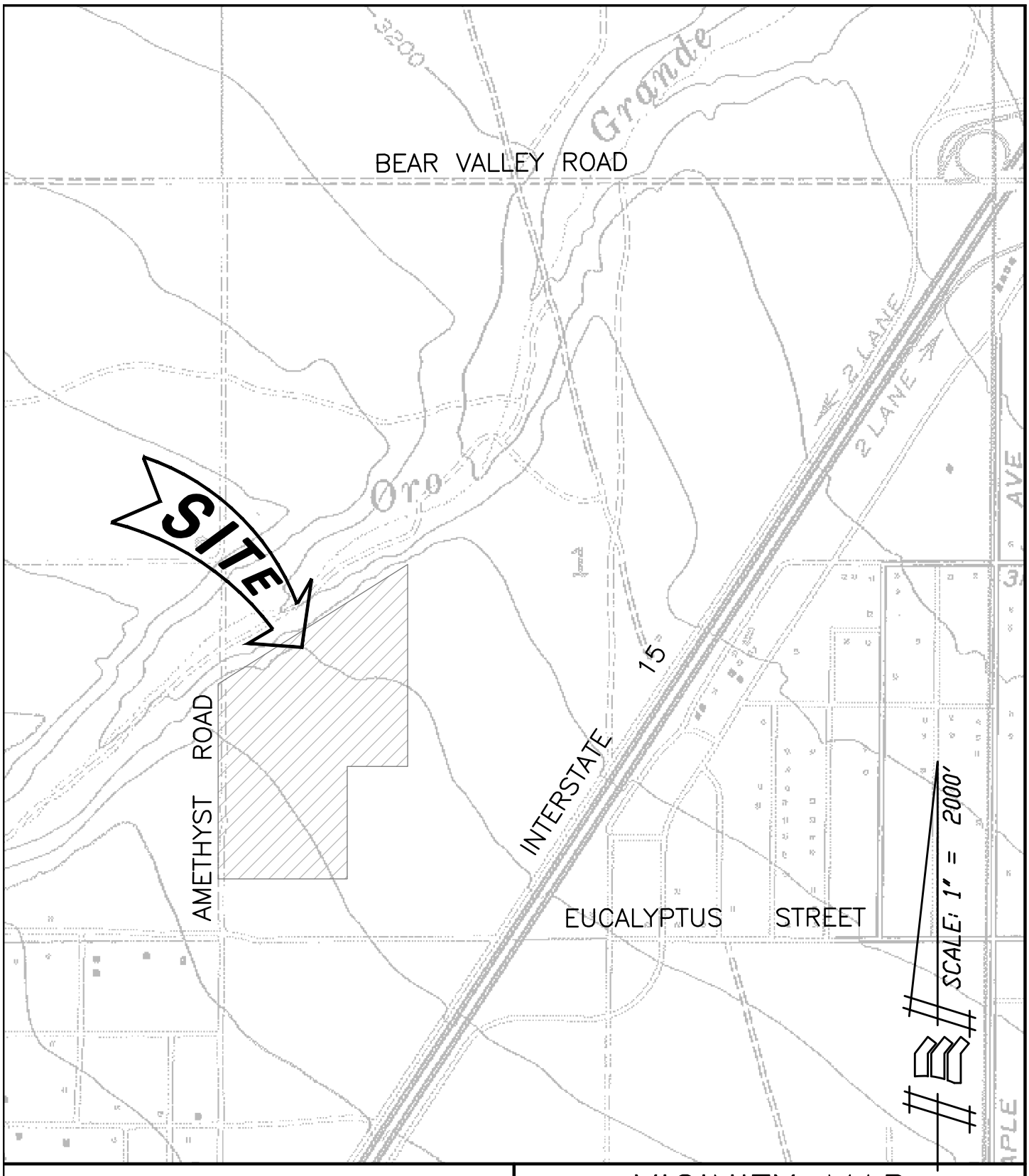

VICINITY MAP
(FIG. 2)

TENTATIVE TRACT 20274
IN THE CITY OF VICTORVILLE, CA.

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JN: 652-1985

Contributing Drainage Area: 45.2 acres.

TRACT 17046 DETENTION BASIN SUMMARY DATA
(TABLE 1-b)

	RATIONAL Qp INFLOW (C.F.S.)	UNIT HYDRO. Qp INFLOW (C.F.S.)	BASIN BOTTOM ELEV.	PEAK DISCHARGE (C.F.S.)	WATER SURFACE ELEV.	TOP OF BASIN ELEV.	FREEBOARD (FT)	PEAK VOL. STORED (AC.-FT.)	BASIN STORAGE VOL. AT ELEV. 3252 (AC.-FT.)	RUNOFF VOL. (AC.-FT.)
PREDEVEL.	96.7									
DEVELOPED (to Basin)	87.6	97	3240	**39**	**3247.2**	3252	4.8	2.6	5.54	6.1
DEVELOPED (to Catch Basin 'H')	11									
ESTIMATED AMETHYST ROAD	5									

TOTAL DISCHARGE FROM SD LINE 'C' = 50 C.F.S.
TOTAL DISCHARGE FROM AMETHYST ROAD = 5 C.F.S.

SECTION 2.0

SITE DISCUSSION

EXISTING CONDITIONS

The U.S.G.S. topographic contours for this area indicate that the general terrain falls from the southwest to the northeast. The area is mostly undeveloped with few residential homes. There is cemetary located near the east side of the project with a commercial storage site further east. There is a water reservoir and residential homes located northwest, across the Oro Grande Wash.

The site itself is sparsely covered with desert brush.

For this general area, the soil is typically silty granular sand.

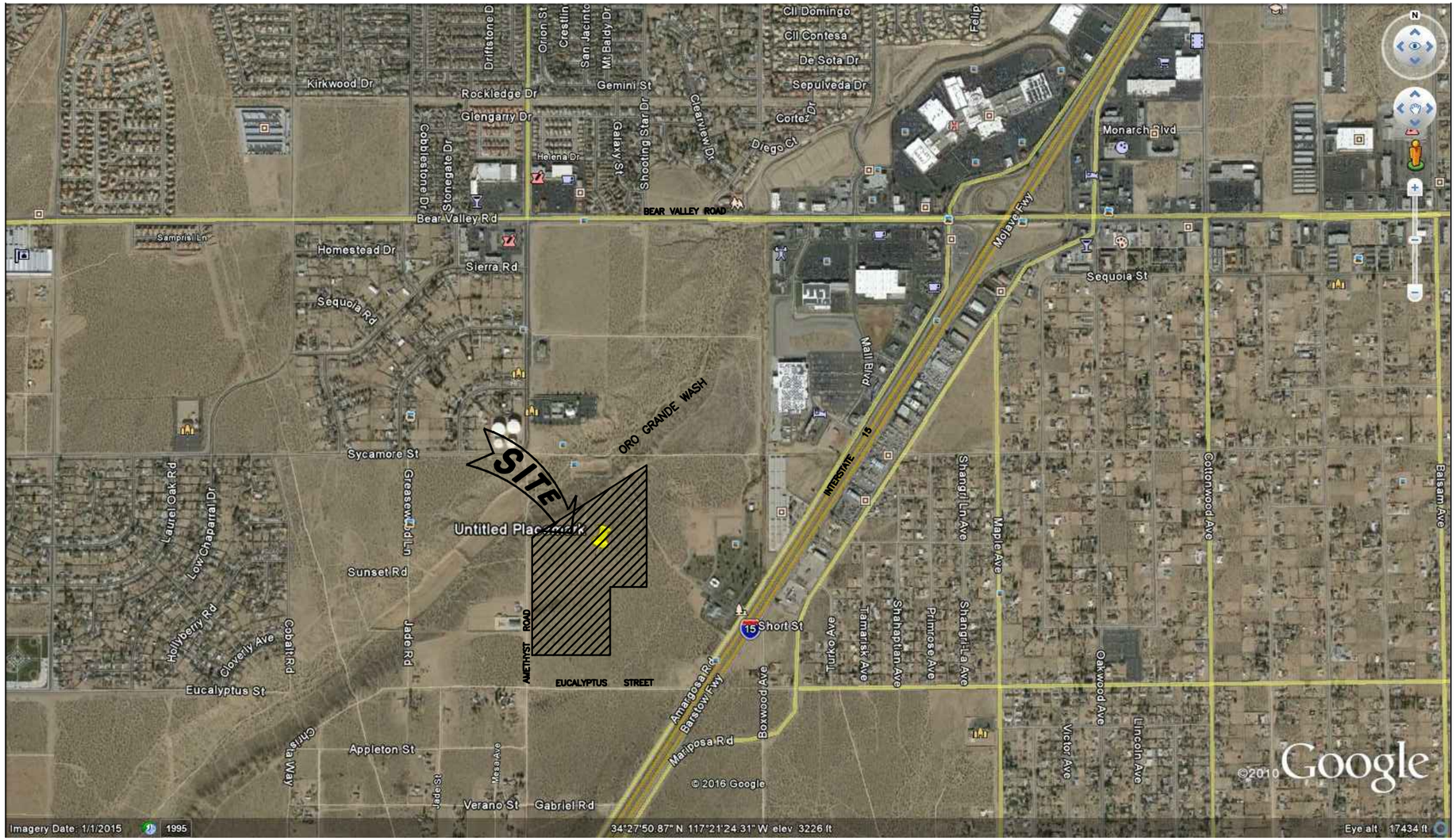
A review of the PreDeveloped drainage area of the topography over the project site indicates that the general area sheet flows in a northeasterly direction almost parallel to and in the flow path direction of the Oro Grande Wash (See enclosed Hydrologic Drainage Maps Fig. 6 and 7). The PreDeveloped topographic site conditions indicate that there are several subareas discharging runoff from the project site area. The estimated PreDeveloped runoff was taken from each of the subareas within the project site boundary, and then combined for the sum of the site runoff flows. It is understood that there is the possibility of runon from the adjacent areas, therefore those flows are excluded from the PreDeveloped flow rate generated from the project site. The sum total PreDeveloped flow was estimate as 97 c.f.s.

PROPOSED SITE DEVELOPMENT

This development is a tract in its entirety. The proposed site will intercept the onsite storm water and provide for Water Quality infiltration of the 85th percentile runoff. The 100-year storm water will be intercepted, detained in a detention basin, and discharged at a reduced flow rate. The reduced rate of flow will be discharged from a detention basin located near the northeast corner of the site. The discharge will be near the detention basin into the Oro Grande Wash. The Oro Grande Wash is designated as Line A-01 of the Victorville Master Plan of Drainage (See Figure 8 and Appendix, Section 8.5).

A future Line A-10-01 is designated in Eucalyptus Street south (upstream) from the proposed project site.

The following exhibit shows the location of the proposed Tentative Tract 20274 in relation to the surrounding streets and existing development.



SCALE: 1" = N.T.S.

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LOCATION MAP
(FIG. 3)

TENTATIVE TRACT 20274
IN THE CITY OF VICTORVILLE, CA.

JN: 652-1985

SECTION 3.0

RAINFALL, HYDROLOGIC, AND LAND USE DATA

METHOD OF STUDY: HYDROLOGY STUDY AND HYDRAULIC CALCULATIONS

Rational Method and Unit Hydrograph Method

The Rational Method of Hydrologic Modeling and the Unit Hydrograph for Catchment Runoff, as defined by the County of San Bernardino Hydrology Manual, 1986, was performed in the estimation of the storm water runoff peak flow rates (See Appendix, Sections 8.1.1 & 8.1.2) and flood routing analysis (Appendix, Section 8.1.3). AES software was utilized for the hydrologic calculations, street flow analysis, and detention basin analysis.

Hydrologic Data

The storm water runoff losses as listed in Section C of the County's Hydrology Manual were incorporated and accounted for in the study and analysis. The Hydrologic Soil Groups, the Hydrologic Conditions, and the Development Conditions were considered in the estimation of loss rates. For this project:

Soil Groups: B

Rainfall Intensities: Refer to the table on the following page.

(The Hydrologic Soil Group Map and the NOAA Atlas 14 Point Precipitation Frequency Estimates are attached in Appendix, Section 8.1.5. Hydrologic References & Maps).

Antecedent Moisture Condition

For this project, AMC II was used in the 100-year study.

(Reference is made to San Bernardino County Hydrology Manual, 1986 and the revision dated April 6, 2010).

Proposed Land Use

RESIDENTIAL
The data input of dwelling units / acre for computer software:

3-4 DU/Ac.

For this project, a Commercial designation was used for the street.

(Refer to Appendix, Section 8.1.4. Hydrologic References & Maps for Impervious Cover for Developed Areas).

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Job	TR 17046		652-1985
Sheet No.		of	
Calculated by:	TGS	Date	4/11/2019
Checked by:		Date	
		Scale	nts

Rainfall Intensity Data

TABLE 3-a

Slope of Intensity/Duration curve: 0.7

Duration	Return Period (year)					
hr	1	2	5	10	25	100
1	0.33	0.46	0.62	0.75	0.92	1.17
3	0.45	0.62	1.01	1.3	1.69	2.26
6	0.28	0.75	1.38	1.85	2.48	3.43
24	0.79	1.2	1.74	2.15	2.68	3.5
slope	-0.09	0.27	0.45	0.50	0.55	0.60

=values taken from Isohyetals, County Hydrology Manual

All other values "interpolated" using logarithmic equations as follows:

--> Exp(+/- Slope x Ln(T des) + Ln(ref I) -/+ Slope x Ln(ref T))

--> I100 - I10 / Ln(100/10) x Ln(des Period / 10) + I10

SUMMARY:

Rational Method (Reference Appendix, Sections 8.1.1 & 8.1.2)

100-Year Study
AMC II
1-Hour Rainfall Intensity: 1.17 in/hr.
Soil Group B

PreDeveloped Conditions: Desert Brush 30% Coverage

Developed Conditions: 4 DU/Ac

Unit Hydrograph Method (Reference Appendix, Section 8.1.3)

TENTATIVE TRACT 20274
INPUT SUMMARY FOR UNIT HYDROGRAPH
DEVELOPED CONDITIONS

(Table 3-b)

NODE	SUBAREA	LAG TIME (HR.)	Tc (MIN.)	AREA (AC.)	S-GRAPH	MAX. LOSS, Fm (IN/HR)	LOW LOSS Y-BAR	
140 & 545	**A-C**	0.19	14.54 (USE 14)	41.1	DESERT	0.44	0.57	

WATERSHED AREA-AVERAGED POINT RAINFALL DATA INPUT FOR UNIT HYDROGRAPH

(Table 3-c)

100-YEAR DEVELOPED

5-Minute Point Rainfall	inches	**0.43**
30-Minute Point Rainfall	inches	**0.89**
1-Hour Point Rainfall	inches	**1.17**
3-Hour Point Rainfall	inches	**2.26**
6-Hour Point Rainfall	inches	**3.43**
24-Hour Point Rainfall	inches	**3.50**

UNDEVELOPED CONDITION - RUNOFF COEFFICIENT, C

$C=0.90(a_i + (((I - F_p)*a_p)/I)$

COVER TYPE: DESERT BRUSH (30%)
CURVE NUMBER: 84

a_i (IMPERVIOUS AREA RATIO) =	0	
a_p (PERVIOUS AREA RATIO) =	1	
F_p =	0.31	
I =	3.5	IN/HR
C =	**0.82**	

DEVELOPED CONDITION - RUNOFF COEFFICIENT, C

$C=0.90(a_i + (((I - F_p)*a_p)/I)$

COVER TYPE: RESIDENTIAL 3-4 DU/ACRE
CURVE NUMBER: 56

a_i (IMPERVIOUS AREA RATIO) =	0.4	
a_p (PERVIOUS AREA RATIO) =	0.6	
F_p =	0.74	
I =	3.5	IN/HR
C =	0.79	

SECTION 4.0

ONSITE STORM WATER RUNOFF

DISCUSSION OF RESULTS

This drainage study estimated the storm water runoff from the existing predeveloped area of the project site and from the site when developed. A detention basin is proposed for the mitigation of the developed flows to less than the predeveloped discharge rate. The detention basin is proposed for near the northeast corner of the tract site. The detention basin will have a raised and grassy play area for recreational purposes when the basin is dry.

Basin Flood Routing

The flood routing analysis through the detention basin indicates that the water will fill to a depth of about 7.2 feet (Water Surface Elevation 3247.2) with a unit hydrograph peak inflow of about 97 c.f.s. and an outflow peak discharge flow rate of Q100=39 c.f.s. The stored volume at peak flow would be about 2.6 acre-feet. (Refer to Fig. 4 and Table 1-b).

Proposed Conceptual Inflow Drainage Facilities

The storm water will be intercepted by street improvements and underground storm drain system. The drainage system will convey the runoff to the detention basin.

Proposed Detention Basin Facilities

The detention basin will be constructed to allow retention for water quality low flow infiltration to occur. The basin outlet structure will be set at an elevation above the determined 85th percentile storm water volume to be captured and infiltrated. The water quality volume to be stored is 1.48 ac-ft. The basin outlet will be at elevation 3245.0, and allow a maximum discharge of 39 cfs through a 36” RCP to the Oro Grande Wash. The 100-year storm flow is estimated to fill the detention basin to elevation 3247.2, about 7.2 feet above the bottom of the basin.

Proposed Conceptual Outflow Drainage Facilities

The outflow will be metered by a 36” diameter pipe structure located on the north side of the basin. The structure will control the discharge flow rate and meter the flow to less than the pre-developed runoff flow rate.

RESULTS OF THE FLOOD ROUTING ANALYSIS

A flood routing analysis for the Detention Basin produced a metered peak discharge flow rate of 39 c.f.s. The peak water depth in the detention basin would be about 7.2 feet above the bottom of thr Basin (elevation 3247.2) and a peak stored volume of approximately 2.6 ac-ft.

Contributing Drainage Area: 45.2 acres.

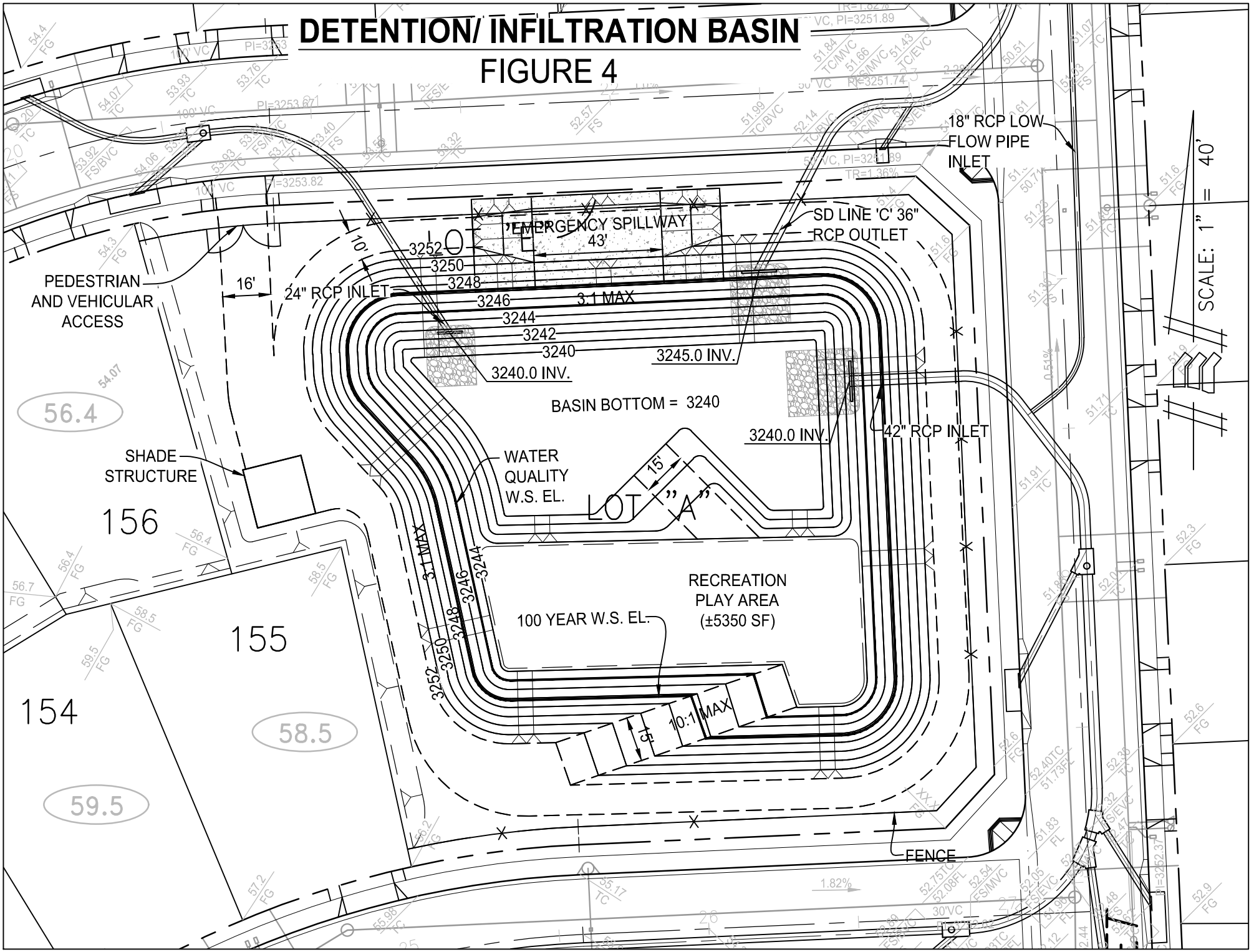
TRACT 17046 DETENTION BASIN SUMMARY DATA

(TABLE 1-b)

	RATIONAL Qp INFLOW (C.F.S.)	**UNIT HYDRO. Qp INFLOW** (C.F.S.)	**BASIN 1 BOTTOM ELEV.**	**PEAK DISCHARGE** (C.F.S.)	**WATER SURFACE ELEV.**	**TOP OF BASIN ELEV.**	**FREEBOARD** (FT)	**PEAK VOL. STORED** (AC.-FT.)	**BASIN STORAGE VOL. AT ELEV.** 3252 (AC.-FT.)	**RUNOFF VOL.** (AC.-FT.)
PREDEVEL.	96.7									
DEVELOPED (to Basin)	87.6	97	3240.0	**39**	**3247.2**	3252	4.8	2.6	5.54	6.1
DEVELOPED (to Catch Basin 'H')	10.5									
ESTIMATED AMETHYST ROAD	5									

DETENTION/ INFILTRATION BASIN

FIGURE 4



SECTION 5.0

OFFSITE STORM WATER RUNOFF

DISCUSSION OF RESULTS

This drainage study estimated the storm water runoff from the developed project site. An onsite drainage system with a detention basin is proposed for the interception, conveyance, and the mitigation of the storm water discharge from the project development.

Referring to the Hydrologic Drainage Map for the Developed Conditions (Figure 6) and a copy of the portion of the Victorville Master Plan of Drainage for Line A-10C, the offsite storm water will be intercepted by the street improvements for Amethyst Road and Eucalyptus Street. The MPD Line A-10-01 proposed for Eucalyptus Street south of the project site will be an added drainage facility.

The street improvements immediately adjacent to the proposed tract was estimated to about 5 c.f.s. Offsite, upstream flows from the project area was not determined. The 5 c.f.s from the street improvements on Amethyst Road will be directed via gutterflow to a concreted rock drain splash pad at the northwest corner of the project boundary (See Rough Grading Sheet 8 in References).

Off-site flows that approach the southern tract boundary will be intercepted by Ditch “A”, and routed into an 18” CSP pipe. This culvert will carry flows away from the southern track boundaries and travel underneath the existing 30.0 ft wide emergency access easement (at the southeast corner of the project boundary), where it will outlet. A rational method analysis of this area determined approximately 8.9 cfs will be intercepted by Ditch “A” and travel through the a proposed storm drain, and outlet on the eastern side of the proposed EVA access road.

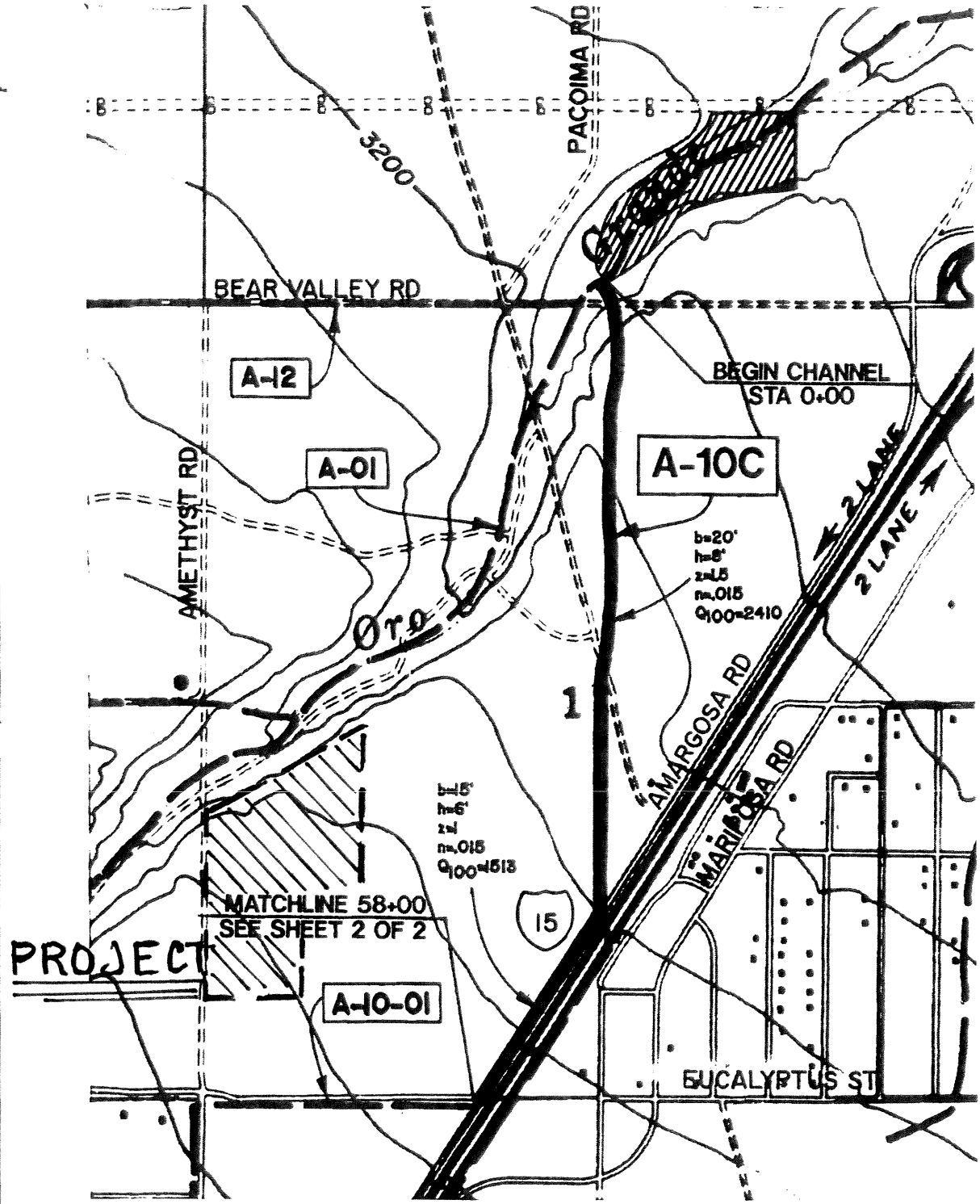


FIGURE 8

LEGEND			
	PROPOSED FACILITY		FLOODPLAIN
	FACILITY SHOWN ELSEWHERE		FLOODWAY
	WATERSHED BOUNDARY		DETENTION BASIN

VICTORVILLE MASTER PLAN OF DRAINAGE	COMPREHENSIVE STORM DRAIN PLAN LINE A-10C SHEET 1 OF 2	SCALE 1"=1000' WILLIAMSON & SCHMID

SECTION 6.0

STORM WATER QUALITY TREATMENT

DISCUSSION OF RESULTS

This preliminary drainage study estimated the storm water runoff from the developed project site. An onsite drainage system with a detention basin is proposed for the interception, conveyance, and the mitigation of the storm water discharge from the project development.

The detention basin will also serve as the Water Quality BMP. Referring to Figure 4 in Section 4.0, the basin will be constructed with a high outlet elevation to allow for the retention and infiltration of the determined low flow water quality runoff volume.

A function for the Basin will be to provide water quality interception and infiltration of low flow waters. For the development of Tentative Tract 20274, the Design Capture Volume (DCV) was estimated to 1.48 Acre-Feet (For Water Quality BMP Calculations, Refer to Section 8.3).

Water Quality Depth: 4.95-Feet (5 Feet)
Basin Elevation: 3244.95 (3245)

DCV: 1.48 Acre-Feet

Therefore, adequate volume capacity will be provided in Basin for the runoff infiltration.

Infiltration testing was performed on the site at the proposed area of the basin (See Percolation Report, by Geotek, Inc. in Appendix 8.6). An infiltration rate of 43 in/hr was calculated for the project site. After applying a Factor of Safety of 2, the design infiltration rate of the infiltration basin is 21.5 in/hr. Based on this rate the Design Capture Volume would drain within approximately 6.4 hours of filling, therefore avoiding any vector problems on site.

SECTION 7.0

CONCLUSION

CONCLUSION

The above hydrologic study showed that the interception of the onsite storm water (developed condition) with street improvements, storm drain system and the detention basin runoff is collected and routed (through the basin) for a reduction of the runoff discharge to less than the combined flows from the predeveloped project site.

PreDeveloped Combined Discharge:	97 c.f.s.
Mitigated Discharge (OVERALL SITE):	=39+11+5= 55 c.f.s.
Mitigated Discharge from SD Line C:	=39+11 = 50 c.f.s.

The storm water treatment for Water Quality is addressed with the Basin infiltration of the runoff.

Basin Water Quality Volume:	1.50 Acre-Feet
Project DCV:	1.48 Acre-Feet

The detention basin has adequate volume to detain flows during a 100-year storm event. The study also showed that there would remain about 4.8 feet freeboard within the basin.

A concrete emergency spillway will be implemented in the basin design to accommodate the 1000 year storm. See calculation below for the design width.

EMERGENCY SPILLWAY

DESIGN CAPACITY = 1,000-YEAR PEAK FLOW RATE

$Q = 1.35 \times Q_{100}$

Q_{100} = **97**

DESIGN Q = **130.95** **C.F.S.**

Weir Discharge Equation (Trapezoidal w/3:1 upstream slope)

Q = C L H ^(3/2)

Q =	**130.95**
C =	3.08
H =	1.00

L = **42.5** **FT.**

DESIGN L = **43.0** **FT.**

APPENDIX 8.0

APPENDIX 8.1

100-YEAR HYDROLOGY STUDY

APPENDIX 8.1.1

100-YEAR RATIONAL METHOD HYDROLOGY STUDY FOR PRE-DEVELOPED CONDITIONS

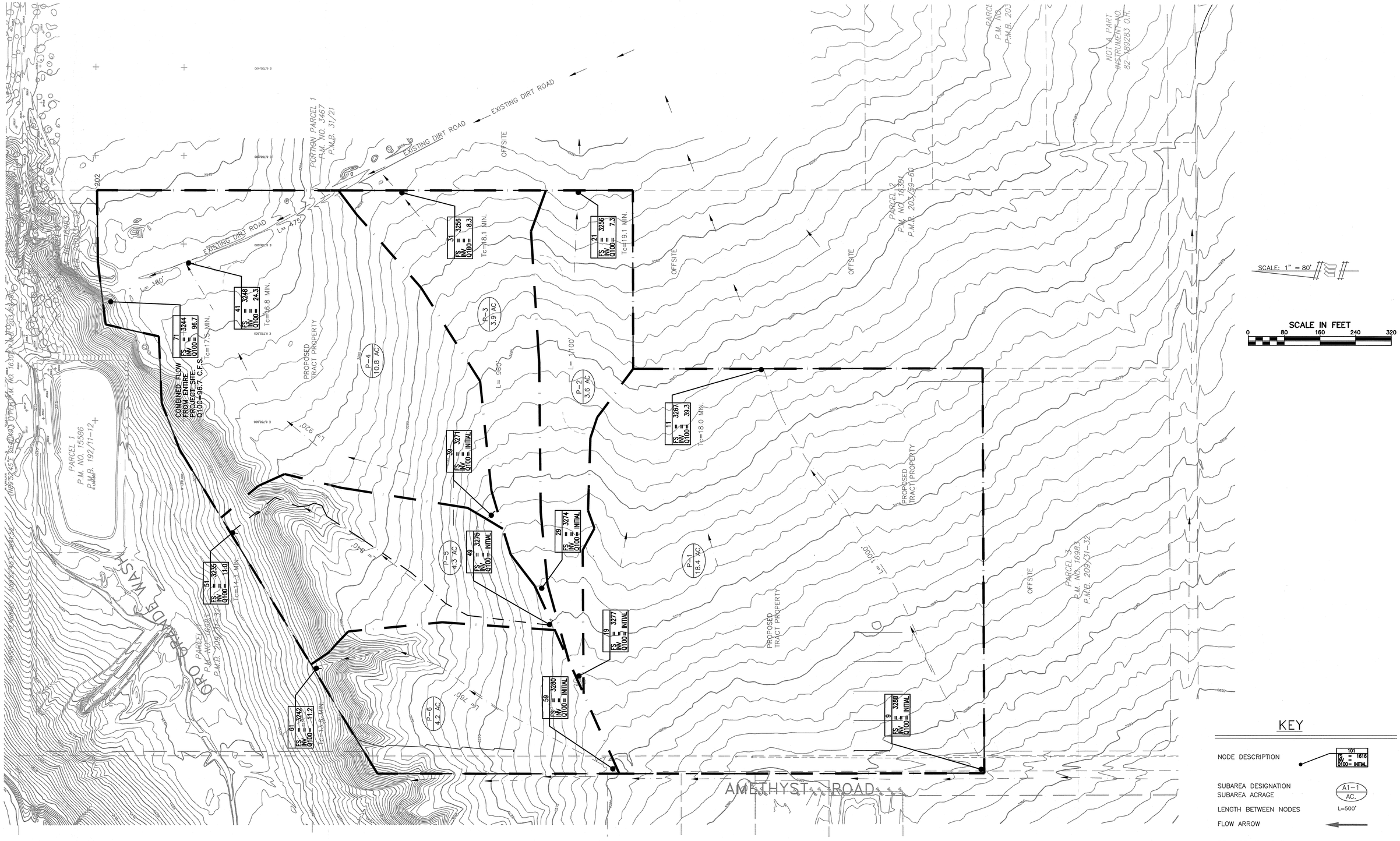
TENTATIVE TRACT No. 20274 – VICTORVILLE, CA

RATIONAL ANALYSIS FOR THE CATCHMENT AREA

Pre-Developed Conditions

The following rational method anaylsis was performed on the exisitng project site, i.e. existing conditions. As shown on the Drainage Map for the Pre-Developed Conditions, the existing terrain tends fall generally northeasterly, parallel with the Oro Grande Wash. With the Oro Grande located along the northerly property boundary, there is a drop off along that location.

It should be noted that the site has several points of discharge along the property boundary.



KEY

NODE DESCRIPTION — 101 FS = 1616 INV = Q100= INITIAL

SUBAREA DESIGNATION / SUBAREA ACRAGE — A1-1 / AC.

LENGTH BETWEEN NODES — L=500'

FLOW ARROW

DRAINAGE BOUNDARY

SUMMARY OF PREDEVELOPED RUNOFF

NODE	SUBAREA	ACRES	Tc (MIN.)	Q (C.F.S.)
11	P-1	18.4	18.0	39.3
21	P-2	3.6	19.1	7.3
31	P-3	3.9	18.1	8.3
41	P-4	10.8	16.8	24.3
51	P-5	4.3	14.3	11.0
61	P-6	4.2	13.6	11.2
71	COMBINED	45.2	17.5	96.7

NOTE

ALL SOILS GROUP "B"

6/29/2016

FIGURE 5

HYDROLOGIC DRAINAGE MAP

TRACT 17046

PREDEVELOPED CONDITION

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JOB NUMBER 652-1985

SHEET 1 OF 2

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**************************************************************************
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         (c) Copyright 1983-2014 Advanced Engineering Software (aes)
             Ver. 21.0  Release Date: 06/01/2014  License ID 1251

                          Analysis prepared by:

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 ************************** DESCRIPTION OF STUDY **************************
* TRACT 17046 RATIONAL METHOD DRAINAGE STUDY                              *
* 100 YEAR STUDY PREDEVELOPED CONDITIONS                                  *
* JN 652-1985     wli     17046pre.dat                                    *
 **************************************************************************

  FILE NAME: 17046PRE.DAT
  TIME/DATE OF STUDY: 10:01 06/29/2016
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.7000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.1700

  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   20.0     10.0    0.020/0.020/0.020   0.67    1.50 0.0300 0.100 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     11.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1000.00
  ELEVATION DATA: UPSTREAM(FEET) =   3288.00  DOWNSTREAM(FEET) =   3267.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   18.018
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.716
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)    B       18.40      0.34      1.000    82   18.02
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
```

```
  SUBAREA RUNOFF(CFS) =     39.28
  TOTAL AREA(ACRES) =     18.40   PEAK FLOW RATE(CFS) =     39.28

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     21.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   18.02
  RAINFALL INTENSITY(INCH/HR) =   2.72
  AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      18.40
  TOTAL STREAM AREA(ACRES) =      18.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      39.28

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     21.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1100.00
  ELEVATION DATA: UPSTREAM(FEET) =   3277.00  DOWNSTREAM(FEET) =   3256.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   19.079
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.609
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)    B        3.60      0.34     1.000    82   19.08
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       7.34
  TOTAL AREA(ACRES) =      3.60   PEAK FLOW RATE(CFS) =      7.34

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   19.08
  RAINFALL INTENSITY(INCH/HR) =   2.61
  AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       3.60
  TOTAL STREAM AREA(ACRES) =       3.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.34

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       39.28   18.02    2.716  0.34( 0.34) 1.00      18.4       9.00
      2        7.34   19.08    2.609  0.34( 0.34) 1.00       3.6      19.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       46.53   18.02    2.716  0.34( 0.34) 1.00      21.8       9.00
```

```
     2       44.85   19.08    2.609  0.34( 0.34) 1.00      22.0       19.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      46.53    Tc(MIN.) =    18.02
  EFFECTIVE AREA(ACRES) =      21.80   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       22.0
  LONGEST FLOWPATH FROM NODE     19.00 TO NODE     21.00 =    1100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     31.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   18.02
  RAINFALL INTENSITY(INCH/HR) =   2.72
  AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      21.80
  TOTAL STREAM AREA(ACRES) =      22.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      46.53

****************************************************************************
  FLOW PROCESS FROM NODE     29.00 TO NODE     31.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   960.00
  ELEVATION DATA: UPSTREAM(FEET) =   3274.00  DOWNSTREAM(FEET) =   3256.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   18.133
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.704
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)    B        3.90      0.34      1.000    82   18.13
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      8.28
  TOTAL AREA(ACRES) =      3.90   PEAK FLOW RATE(CFS) =      8.28

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     31.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   18.13
  RAINFALL INTENSITY(INCH/HR) =   2.70
  AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       3.90
  TOTAL STREAM AREA(ACRES) =       3.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.28

  ** CONFLUENCE DATA **
   STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1       46.53   18.02    2.716  0.34( 0.34) 1.00       21.8        9.00
      1       44.85   19.08    2.609  0.34( 0.34) 1.00       22.0       19.00
      2        8.28   18.13    2.704  0.34( 0.34) 1.00        3.9       29.00
```

```
  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
      1       54.81   18.02    2.716  0.34( 0.34) 1.00       25.7        9.00
      2       54.63   18.13    2.704  0.34( 0.34) 1.00       25.7       29.00
      3       52.80   19.08    2.609  0.34( 0.34) 1.00       25.9       19.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      54.81    Tc(MIN.) =    18.02
  EFFECTIVE AREA(ACRES) =      25.68   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       25.9
  LONGEST FLOWPATH FROM NODE     19.00 TO NODE     31.00 =    1100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     41.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   18.02
  RAINFALL INTENSITY(INCH/HR) =   2.72
  AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      25.68
  TOTAL STREAM AREA(ACRES) =      25.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      54.81

****************************************************************************
  FLOW PROCESS FROM NODE     39.00 TO NODE     41.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   920.00
  ELEVATION DATA: UPSTREAM(FEET) =   3271.00  DOWNSTREAM(FEET) =   3248.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   16.830
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.849
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
        LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)    B       10.80      0.34      1.000    82   16.83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     24.34
  TOTAL AREA(ACRES) =     10.80   PEAK FLOW RATE(CFS) =     24.34

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     71.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3248.00  DOWNSTREAM(FEET) =   3244.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   180.00   CHANNEL SLOPE =  0.0222
  CHANNEL FLOW THRU SUBAREA(CFS) =      24.34
  FLOW VELOCITY(FEET/SEC) =   4.71 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.64   Tc(MIN.) =   17.47
  LONGEST FLOWPATH FROM NODE     39.00 TO NODE     71.00 =    1100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     71.00 TO NODE     71.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.47
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.776
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)    B        4.30       0.34      1.000    82
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)    B        4.20       0.34      1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     8.50      SUBAREA RUNOFF(CFS) =   18.60
  EFFECTIVE AREA(ACRES) =     19.30   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       19.3       PEAK FLOW RATE(CFS) =      42.24

****************************************************************************
  FLOW PROCESS FROM NODE     71.00 TO NODE     71.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   17.47
  RAINFALL INTENSITY(INCH/HR) =   2.78
  AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      19.30
  TOTAL STREAM AREA(ACRES) =      19.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      42.24

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1       54.81   18.02    2.716  0.34( 0.34) 1.00      25.7       9.00
      1       54.63   18.13    2.704  0.34( 0.34) 1.00      25.7      29.00
      1       52.80   19.08    2.609  0.34( 0.34) 1.00      25.9      19.00
      2       42.24   17.47    2.776  0.34( 0.34) 1.00      19.3      39.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1       96.70   17.47    2.776  0.34( 0.34) 1.00      44.2      39.00
      2       96.00   18.02    2.716  0.34( 0.34) 1.00      45.0       9.00
      3       95.62   18.13    2.704  0.34( 0.34) 1.00      45.0      29.00
      4       92.15   19.08    2.609  0.34( 0.34) 1.00      45.2      19.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      96.70    Tc(MIN.) =    17.47
  EFFECTIVE AREA(ACRES) =      44.19   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       45.2
  LONGEST FLOWPATH FROM NODE     19.00 TO NODE     71.00 =    1100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     51.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   840.00
  ELEVATION DATA: UPSTREAM(FEET) =   3275.00  DOWNSTREAM(FEET) =   3235.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
```

```
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.266
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.198
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)    B        4.30      0.34      1.000    82   14.27
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     11.04
  TOTAL AREA(ACRES) =      4.30   PEAK FLOW RATE(CFS) =     11.04

****************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     61.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   760.00
  ELEVATION DATA: UPSTREAM(FEET) =   3280.00  DOWNSTREAM(FEET) =   3242.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.573
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.311
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)    B        4.20      0.34      1.000    82   13.57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     11.22
  TOTAL AREA(ACRES) =      4.20   PEAK FLOW RATE(CFS) =     11.22
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        4.2  TC(MIN.) =     13.57
  EFFECTIVE AREA(ACRES) =      4.20  AREA-AVERAGED Fm(INCH/HR)=  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =      11.22
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

APPENDIX 8.1.2

100-YEAR RATIONAL METHOD HYDROLOGY STUDY FOR DEVELOPED CONDITIONS

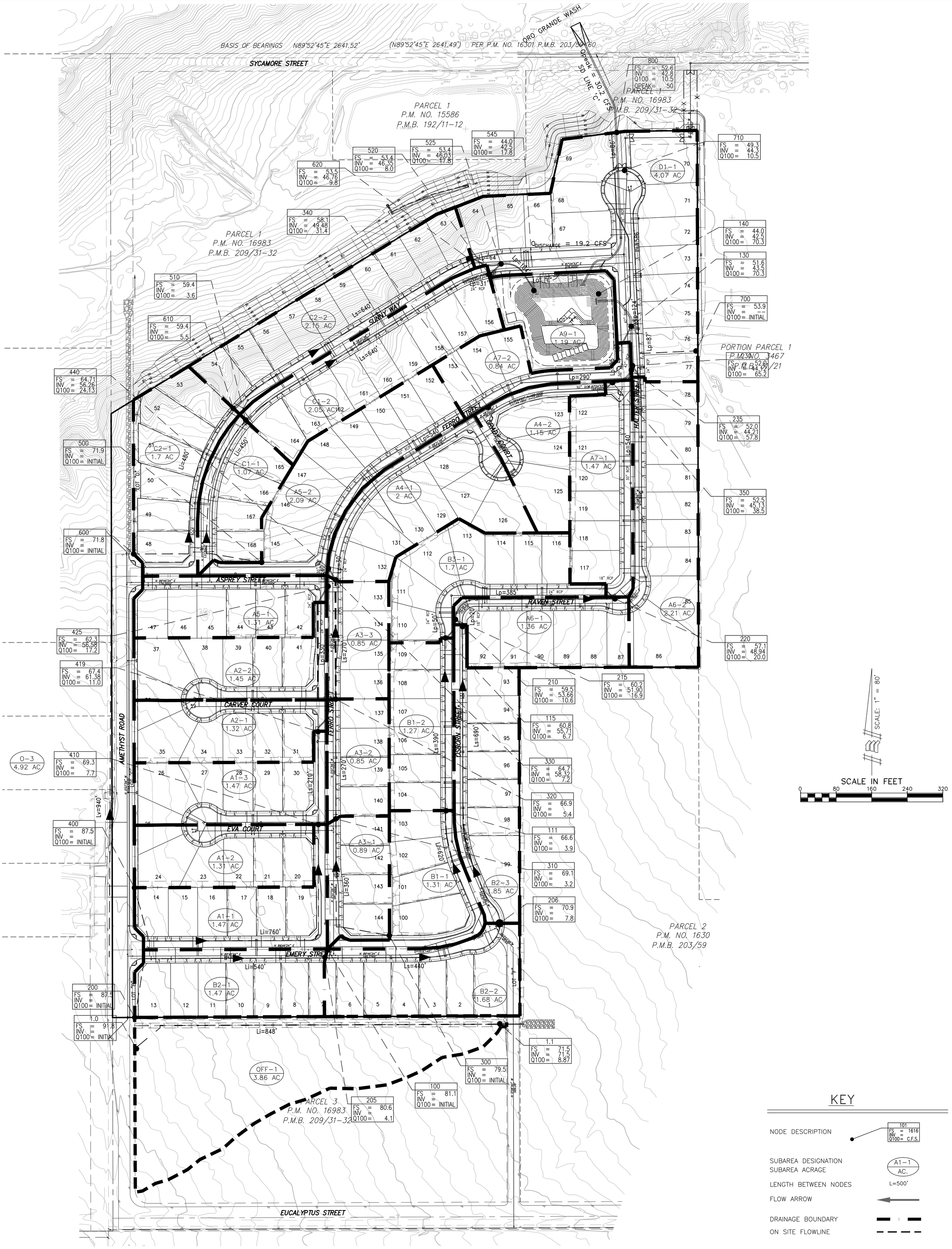
TENTATIVE TRACT No. 20274 – VICTORVILLE, CA

RATIONAL ANALYSIS FOR THE CATCHMENT AREA

Developed Conditions

The following rational method analysis was performed along the mainline drainage paths of the catchment area. The rational hydrology study was performed to estimate the peak runoff data for the subject drainage areas. The data from the rational study will be used as input to obtain the unit hydrograph for the catchment area at the proposed detention basin.

The data from the rational hydrology study represents the future development within the catchment area.



KEY

NODE DESCRIPTION — 101 FS = 1616 INV = Q100 = C.F.S.

SUBAREA DESIGNATION / SUBAREA ACRAGE — A1-1 / AC.

LENGTH BETWEEN NODES — L=500'

FLOW ARROW

DRAINAGE BOUNDARY

ON SITE FLOWLINE

OFF-SITE DRAINAGE BOUNDARY

OFF-SITE FLOWLINE

SUMMARY OF DEVELOPED RUNOFF

NODE	AREA (ACRES)	RATIONAL DEV. Q (C.F.S.)	U.H. Q (C.F.S.)	RATIONAL PREDEV. Q (C.F.S.)	0.9 PREDEV. Q .(C.F.S.)	MITIGATED Q (C.F.S.)
BASIN	39.53	87.6	92.5	97	87	39
800	4.07					11
AMETHYST ROAD	1.6					5
TOTAL	45.2					55

TOTAL BASIN DISCHARGE = 39 C.F.S.
TOTAL SD LINE 'C' DISCHARGE = 50 C.F.S.
AMETHYST ROAD DISCHARGE = 5 C.F.S.

09/05/2019

NOTE
ALL SOILS GROUP "B"

FIGURE 6
HYDROLOGIC DRAINAGE MAP
TENTATIVE TRACT 20274
DEVELOPED CONDITION

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JOB NUMBER 652-1985
SHEET 2 OF 2

TRACT 17046 - DEVELOPED CONDITION

```
**************************************************************************
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         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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            Ver. 23.0  Release Date: 07/01/2016  License ID 1251

                              Analysis prepared by:

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                            RANCHO CUCAMONGA, CA 91730


 ************************* DESCRIPTION OF STUDY *************************
* TENTATIVE TRACT MAP No. 20274 – VICTORVILLE, CA                       *
* 100 YEAR DEVELOPED CONDITION RATIONAL METHOD ANALYSIS                 *
*                                                                       *
 *************************************************************************

  FILE NAME: 17046DEV.DAT
  TIME/DATE OF STUDY: 14:41 04/09/2019
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.7000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.1700

  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   20.0     10.0    0.020/0.020/0.020   0.67    1.50 0.0300 0.100 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    410.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
```

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==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   760.00
  ELEVATION DATA: UPSTREAM(FEET) =   3287.50  DOWNSTREAM(FEET) =   3269.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.342
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.539
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        1.47      0.75     0.600    56   12.34
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      4.09
  TOTAL AREA(ACRES) =      1.47   PEAK FLOW RATE(CFS) =      4.09

**************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   12.34
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.539
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        1.31      0.75     0.600    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    1.31      SUBAREA RUNOFF(CFS) =    3.64
  EFFECTIVE AREA(ACRES) =      2.78   AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        2.8       PEAK FLOW RATE(CFS) =       7.73

**************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    419.00 IS CODE =  62
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) = 3269.30  DOWNSTREAM ELEVATION(FEET) = 3267.40
  STREET LENGTH(FEET) =   210.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.63
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
```

```
    STREET FLOW DEPTH(FEET) =  0.45
    HALFSTREET FLOOD WIDTH(FEET) =   17.70
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.98
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.35
  STREET FLOW TRAVEL TIME(MIN.) =   1.17   Tc(MIN.) =   13.51
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.321
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        1.47      0.75     0.600    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    1.47      SUBAREA RUNOFF(CFS) =    3.80
  EFFECTIVE AREA(ACRES) =      4.25    AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        4.2        PEAK FLOW RATE(CFS) =      10.99

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.47   HALFSTREET FLOOD WIDTH(FEET) =  18.63
  FLOW VELOCITY(FEET/SEC.) =  3.08   DEPTH*VELOCITY(FT*FT/SEC.) =   1.46
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    419.00 =     970.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    419.00 TO NODE    425.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3260.50  DOWNSTREAM(FEET) =  3258.30
  FLOW LENGTH(FEET) =   330.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.91
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.99
  PIPE TRAVEL TIME(MIN.) =   0.93    Tc(MIN.) =   14.45
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    425.00 =    1300.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    425.00 TO NODE    425.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.45
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.170
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        1.45      0.75     0.600    56
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        1.32      0.75     0.600    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    2.77      SUBAREA RUNOFF(CFS) =    6.78
  EFFECTIVE AREA(ACRES) =      7.02   AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.60
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  TOTAL AREA(ACRES) =        7.0       PEAK FLOW RATE(CFS) =      17.19

****************************************************************************
  FLOW PROCESS FROM NODE    425.00 TO NODE    440.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3258.30  DOWNSTREAM(FEET) =  3255.85
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.41
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.19
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   14.49
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    440.00 =    1340.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    440.00 TO NODE    440.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.49
  RAINFALL INTENSITY(INCH/HR) =   3.16
  AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.75
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       7.02
  TOTAL STREAM AREA(ACRES) =       7.02
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      17.19

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    310.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   360.00
  ELEVATION DATA: UPSTREAM(FEET) =   3279.50  DOWNSTREAM(FEET) =   3269.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.816
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.479
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        0.89      0.75     0.600    56    8.82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      3.23
  TOTAL AREA(ACRES) =      0.89   PEAK FLOW RATE(CFS) =      3.23

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    320.00 IS CODE =  62
```

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----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 3269.10  DOWNSTREAM ELEVATION(FEET) = 3266.90
  STREET LENGTH(FEET) =   270.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.55
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   13.48
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.38
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.88
  STREET FLOW TRAVEL TIME(MIN.) =   1.89   Tc(MIN.) =   10.71
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.910
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        0.85      0.75     0.600    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    0.85      SUBAREA RUNOFF(CFS) =    2.65
  EFFECTIVE AREA(ACRES) =      1.74    AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        1.7        PEAK FLOW RATE(CFS) =       5.42

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  14.41
  FLOW VELOCITY(FEET/SEC.) =  2.49   DEPTH*VELOCITY(FT*FT/SEC.) =   0.97
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    320.00 =     630.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    330.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 3266.90  DOWNSTREAM ELEVATION(FEET) = 3264.70
  STREET LENGTH(FEET) =   270.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
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  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.60
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.41
    HALFSTREET FLOOD WIDTH(FEET) =   15.59
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.61
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.07
  STREET FLOW TRAVEL TIME(MIN.) =   1.72   Tc(MIN.) =   12.43
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.522
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        0.85      0.75     0.600    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    0.85      SUBAREA RUNOFF(CFS) =    2.35
  EFFECTIVE AREA(ACRES) =      2.59    AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        2.6        PEAK FLOW RATE(CFS) =       7.16

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  16.13
  FLOW VELOCITY(FEET/SEC.) =  2.65   DEPTH*VELOCITY(FT*FT/SEC.) =   1.12
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    330.00 =     900.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    330.00 TO NODE    440.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3256.00  DOWNSTREAM(FEET) =  3255.85
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.67
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.16
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   12.54
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    440.00 =     930.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    440.00 TO NODE    440.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.54
  RAINFALL INTENSITY(INCH/HR) =   3.50
  AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.75
  AREA-AVERAGED Ap =  0.60
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  EFFECTIVE STREAM AREA(ACRES) =       2.59
  TOTAL STREAM AREA(ACRES) =       2.59
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.16

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       17.19   14.49    3.163  0.75( 0.45) 0.60       7.0     400.00
      2        7.16   12.54    3.501  0.75( 0.45) 0.60       2.6     300.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       23.89   12.54    3.501  0.75( 0.45) 0.60       8.7     300.00
      2       23.56   14.49    3.163  0.75( 0.45) 0.60       9.6     400.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      23.89    Tc(MIN.) =    12.54
  EFFECTIVE AREA(ACRES) =       8.66   AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        9.6
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    440.00 =    1340.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    440.00 TO NODE    340.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3255.85  DOWNSTREAM(FEET) =  3250.35
  FLOW LENGTH(FEET) =   540.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.48
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.89
  PIPE TRAVEL TIME(MIN.) =   1.06    Tc(MIN.) =   13.60
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    340.00 =    1880.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.60
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.307
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        1.31      0.75     0.600    56
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        2.09      0.75     0.600    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
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  SUBAREA AREA(ACRES) =    3.40      SUBAREA RUNOFF(CFS) =    8.75
  EFFECTIVE AREA(ACRES) =     12.06   AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =       13.0       PEAK FLOW RATE(CFS) =      31.03

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    350.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3250.35  DOWNSTREAM(FEET) =  3243.25
  FLOW LENGTH(FEET) =   290.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.43
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      31.03
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =   13.99
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    350.00 =    2170.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    350.00 TO NODE    350.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.99
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.242
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        2.00      0.75     0.600    56
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        1.15      0.75     0.600    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    3.15      SUBAREA RUNOFF(CFS) =    7.92
  EFFECTIVE AREA(ACRES) =     15.21   AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =       16.2       PEAK FLOW RATE(CFS) =      38.25

****************************************************************************
  FLOW PROCESS FROM NODE    350.00 TO NODE    235.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3243.25  DOWNSTREAM(FEET) =  3242.85
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.34
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      38.25
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   14.10
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    235.00 =    2225.00 FEET.

****************************************************************************
```

```
  FLOW PROCESS FROM NODE    235.00 TO NODE    235.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    111.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   620.00
  ELEVATION DATA: UPSTREAM(FEET) =   3281.10  DOWNSTREAM(FEET) =   3266.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.430
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.735
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        1.31      0.75     0.600    56   11.43
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      3.87
  TOTAL AREA(ACRES) =      1.31   PEAK FLOW RATE(CFS) =      3.87

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    115.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 3266.60  DOWNSTREAM ELEVATION(FEET) = 3260.00
  STREET LENGTH(FEET) =   390.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.53
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   12.54
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.31
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.16
  STREET FLOW TRAVEL TIME(MIN.) =   1.96   Tc(MIN.) =   13.39
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.342
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        1.27      0.75     0.600    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    1.27      SUBAREA RUNOFF(CFS) =    3.31
  EFFECTIVE AREA(ACRES) =      2.58    AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        2.6        PEAK FLOW RATE(CFS) =       6.72

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  13.55
  FLOW VELOCITY(FEET/SEC.) =  3.47   DEPTH*VELOCITY(FT*FT/SEC.) =   1.29
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    115.00 =    1010.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    215.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3252.00  DOWNSTREAM(FEET) =  3251.75
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.65
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.72
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   13.57
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    215.00 =    1060.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    215.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.57
  RAINFALL INTENSITY(INCH/HR) =   3.31
  AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.75
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       2.58
  TOTAL STREAM AREA(ACRES) =       2.58
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.72

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    205.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   540.00
  ELEVATION DATA: UPSTREAM(FEET) =   3287.50  DOWNSTREAM(FEET) =   3280.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.206
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.567
```

```
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        1.47      0.75     0.600    56   12.21
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      4.13
  TOTAL AREA(ACRES) =      1.47   PEAK FLOW RATE(CFS) =      4.13

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 3280.60  DOWNSTREAM ELEVATION(FEET) = 3270.90
  STREET LENGTH(FEET) =   440.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.22
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   12.46
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.77
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.32
  STREET FLOW TRAVEL TIME(MIN.) =   1.95   Tc(MIN.) =   14.15
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.216
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        1.68      0.75     0.600    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    1.68      SUBAREA RUNOFF(CFS) =    4.18
  EFFECTIVE AREA(ACRES) =      3.15    AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        3.2        PEAK FLOW RATE(CFS) =       7.85

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  13.71
  FLOW VELOCITY(FEET/SEC.) =  3.97   DEPTH*VELOCITY(FT*FT/SEC.) =   1.48
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    206.00 =     980.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    210.00 IS CODE =  62
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) = 3270.90  DOWNSTREAM ELEVATION(FEET) = 3259.50
  STREET LENGTH(FEET) =   690.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.81
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.42
    HALFSTREET FLOOD WIDTH(FEET) =   15.82
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.77
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.57
  STREET FLOW TRAVEL TIME(MIN.) =   3.05   Tc(MIN.) =   17.20
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.806
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        1.85      0.75     0.600    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    1.85      SUBAREA RUNOFF(CFS) =    3.92
  EFFECTIVE AREA(ACRES) =      5.00    AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        5.0        PEAK FLOW RATE(CFS) =      10.61

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  16.37
  FLOW VELOCITY(FEET/SEC.) =  3.82   DEPTH*VELOCITY(FT*FT/SEC.) =   1.63
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    210.00 =    1670.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    215.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3252.00  DOWNSTREAM(FEET) =  3251.75
  FLOW LENGTH(FEET) =    20.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.36
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.61
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   17.25
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    215.00 =    1690.00 FEET.

****************************************************************************
```

```
 FLOW PROCESS FROM NODE    215.00 TO NODE    215.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   17.25
 RAINFALL INTENSITY(INCH/HR) =   2.80
 AREA-AVERAGED Fm(INCH/HR) =  0.45
 AREA-AVERAGED Fp(INCH/HR) =  0.75
 AREA-AVERAGED Ap =  0.60
 EFFECTIVE STREAM AREA(ACRES) =       5.00
 TOTAL STREAM AREA(ACRES) =       5.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      10.61

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        6.72   13.57    3.312  0.75( 0.45) 0.60       2.6     100.00
     2       10.61   17.25    2.800  0.75( 0.45) 0.60       5.0     200.00

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       16.88   13.57    3.312  0.75( 0.45) 0.60       6.5     100.00
     2       16.12   17.25    2.800  0.75( 0.45) 0.60       7.6     200.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      16.88    Tc(MIN.) =    13.57
 EFFECTIVE AREA(ACRES) =       6.52   AREA-AVERAGED Fm(INCH/HR) =  0.45
 AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.60
 TOTAL AREA(ACRES) =        7.6
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    215.00 =    1690.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    215.00 TO NODE    220.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  3251.75  DOWNSTREAM(FEET) =  3249.30
 FLOW LENGTH(FEET) =   385.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.37
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      16.88
 PIPE TRAVEL TIME(MIN.) =   1.01    Tc(MIN.) =   14.58
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    220.00 =    2075.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==============================================================================
  MAINLINE Tc(MIN.) =   14.58
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.150
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        1.70      0.75     0.600    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    1.70      SUBAREA RUNOFF(CFS) =    4.13
  EFFECTIVE AREA(ACRES) =      8.22   AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        9.3       PEAK FLOW RATE(CFS) =      19.97

******************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    235.00 IS CODE =  31
------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3248.85  DOWNSTREAM(FEET) =  3244.12
  FLOW LENGTH(FEET) =   540.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.48
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.97
  PIPE TRAVEL TIME(MIN.) =   1.20    Tc(MIN.) =   15.78
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    235.00 =    2615.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE    235.00 TO NODE    235.00 IS CODE =  11
------------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
==============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       19.97   15.78    2.980  0.75( 0.45) 0.60       8.2     100.00
      2       18.73   19.47    2.573  0.75( 0.45) 0.60       9.3     200.00
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    235.00 =    2615.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       38.25   14.10    3.225  0.75( 0.45) 0.60      15.2     300.00
      2       36.50   16.05    2.944  0.75( 0.45) 0.60      16.2     400.00
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    235.00 =    2225.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       57.82   14.10    3.225  0.75( 0.45) 0.60      22.6     300.00
      2       56.72   15.78    2.980  0.75( 0.45) 0.60      24.2     100.00
      3       56.38   16.05    2.944  0.75( 0.45) 0.60      24.5     400.00
      4       49.79   19.47    2.573  0.75( 0.45) 0.60      25.4     200.00
```

```
    TOTAL AREA(ACRES) =        25.4

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       57.82  Tc(MIN.) =   14.098
  EFFECTIVE AREA(ACRES) =     22.55  AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =       25.4
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    235.00 =    2615.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    235.00 TO NODE    230.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3244.21  DOWNSTREAM(FEET) =  3244.12
  FLOW LENGTH(FEET) =    10.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  27.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.91
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      57.82
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   14.12
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    230.00 =    2625.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    230.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.12
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.222
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        1.36      0.75     0.600    56
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        2.21      0.75     0.600    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    3.57      SUBAREA RUNOFF(CFS) =    8.91
  EFFECTIVE AREA(ACRES) =     26.12   AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =       29.0       PEAK FLOW RATE(CFS) =      65.20

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    130.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3244.12  DOWNSTREAM(FEET) =  3243.50
  FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.18
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      65.20
```

```
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   14.28
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    130.00 =    2715.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.28
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.196
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        0.84      0.75     0.600    56
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        1.47      0.75     0.600    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    2.31      SUBAREA RUNOFF(CFS) =    5.71
  EFFECTIVE AREA(ACRES) =     28.43   AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =       31.3       PEAK FLOW RATE(CFS) =      70.30

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    140.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3243.50  DOWNSTREAM(FEET) =  3242.50
  FLOW LENGTH(FEET) =   124.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.93
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      70.30
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   14.49
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    140.00 =    2839.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    510.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   450.00
  ELEVATION DATA: UPSTREAM(FEET) =   3271.90  DOWNSTREAM(FEET) =   3259.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.715
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.185
```

```
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        1.07      0.75     0.600    56    9.71
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      3.60
  TOTAL AREA(ACRES) =      1.07   PEAK FLOW RATE(CFS) =      3.60

****************************************************************************
  FLOW PROCESS FROM NODE    510.00 TO NODE    520.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 3259.40  DOWNSTREAM ELEVATION(FEET) = 3253.40
  STREET LENGTH(FEET) =   640.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.24
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   14.80
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.73
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.08
  STREET FLOW TRAVEL TIME(MIN.) =   3.91   Tc(MIN.) =   13.63
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.302
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        2.05      0.75     0.600    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    2.05      SUBAREA RUNOFF(CFS) =    5.26
  EFFECTIVE AREA(ACRES) =      3.12    AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        3.1        PEAK FLOW RATE(CFS) =       8.01

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  16.37
  FLOW VELOCITY(FEET/SEC.) =  2.89   DEPTH*VELOCITY(FT*FT/SEC.) =   1.23
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    520.00 =    1090.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    520.00 TO NODE    525.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3246.35  DOWNSTREAM(FEET) =  3246.05
  FLOW LENGTH(FEET) =    20.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.52
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.01
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   13.67
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    525.00 =    1110.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    525.00 TO NODE    525.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.67
  RAINFALL INTENSITY(INCH/HR) =   3.29
  AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.75
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       3.12
  TOTAL STREAM AREA(ACRES) =       3.12
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.01

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    610.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   480.00
  ELEVATION DATA: UPSTREAM(FEET) =   3271.80  DOWNSTREAM(FEET) =   3259.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.115
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.068
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        1.70      0.75     0.600    56   10.11
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      5.54
  TOTAL AREA(ACRES) =      1.70   PEAK FLOW RATE(CFS) =      5.54

****************************************************************************
  FLOW PROCESS FROM NODE    610.00 TO NODE    620.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 3259.40  DOWNSTREAM ELEVATION(FEET) = 3253.50
```

```
  STREET LENGTH(FEET) =   640.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.28
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.43
    HALFSTREET FLOOD WIDTH(FEET) =   16.60
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.90
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.25
  STREET FLOW TRAVEL TIME(MIN.) =   3.68   Tc(MIN.) =   13.79
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.275
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        2.15      0.75     0.600    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    2.15      SUBAREA RUNOFF(CFS) =    5.47
  EFFECTIVE AREA(ACRES) =      3.85    AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        3.9        PEAK FLOW RATE(CFS) =       9.79

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.46   HALFSTREET FLOOD WIDTH(FEET) =  17.77
  FLOW VELOCITY(FEET/SEC.) =  3.01   DEPTH*VELOCITY(FT*FT/SEC.) =   1.37
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    620.00 =    1120.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    620.00 TO NODE    525.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3246.74  DOWNSTREAM(FEET) =  3246.03
  FLOW LENGTH(FEET) =    64.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.91
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.79
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   13.94
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    525.00 =    1184.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    525.00 TO NODE    525.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
```

```
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.94
  RAINFALL INTENSITY(INCH/HR) =   3.25
  AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.75
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       3.85
  TOTAL STREAM AREA(ACRES) =       3.85
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.79

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        8.01   13.67    3.295  0.75( 0.45) 0.60       3.1     500.00
      2        9.79   13.94    3.249  0.75( 0.45) 0.60       3.9     600.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       17.77   13.67    3.295  0.75( 0.45) 0.60       6.9     500.00
      2       17.68   13.94    3.249  0.75( 0.45) 0.60       7.0     600.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      17.77    Tc(MIN.) =    13.67
  EFFECTIVE AREA(ACRES) =       6.89   AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        7.0
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    525.00 =    1184.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    525.00 TO NODE    545.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3246.03  DOWNSTREAM(FEET) =  3242.50
  FLOW LENGTH(FEET) =   104.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.14
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.77
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   13.81
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    545.00 =    1288.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
```

```
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1       17.77   13.81    3.271  0.75( 0.45) 0.60       6.9     500.00
    2       17.68   14.09    3.226  0.75( 0.45) 0.60       7.0     600.00
 LONGEST FLOWPATH FROM NODE    600.00 TO NODE    140.00 =    1288.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1       70.30   14.49    3.164  0.75( 0.45) 0.60      28.4     300.00
    2       67.98   16.17    2.929  0.75( 0.45) 0.60      30.1     100.00
    3       67.50   16.44    2.895  0.75( 0.45) 0.60      30.3     400.00
    4       59.39   19.86    2.537  0.75( 0.45) 0.60      31.3     200.00
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    140.00 =    2839.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1       87.45   13.81    3.271  0.75( 0.45) 0.60      34.0     500.00
    2       87.62   14.09    3.226  0.75( 0.45) 0.60      34.6     600.00
    3       87.58   14.49    3.164  0.75( 0.45) 0.60      35.4     300.00
    4       83.76   16.17    2.929  0.75( 0.45) 0.60      37.1     100.00
    5       83.07   16.44    2.895  0.75( 0.45) 0.60      37.3     400.00
    6       72.68   19.86    2.537  0.75( 0.45) 0.60      38.3     200.00
  TOTAL AREA(ACRES) =        38.3

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       87.62  Tc(MIN.) =   14.087
 EFFECTIVE AREA(ACRES) =     34.62  AREA-AVERAGED Fm(INCH/HR) =  0.45
 AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.60
 TOTAL AREA(ACRES) =       38.3
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    140.00 =    2839.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    700.00 TO NODE    710.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   566.00
 ELEVATION DATA: UPSTREAM(FEET) =   3253.90  DOWNSTREAM(FEET) =   3249.30

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.616
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.304
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE"       B        4.07      0.75     0.600    56   13.62
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
```

```
  SUBAREA RUNOFF(CFS) =     10.46
  TOTAL AREA(ACRES) =      4.07   PEAK FLOW RATE(CFS) =     10.46
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        4.1  TC(MIN.) =     13.62
  EFFECTIVE AREA(ACRES) =      4.07  AREA-AVERAGED Fm(INCH/HR)=  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap = 0.600
  PEAK FLOW RATE(CFS)   =      10.46
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

APPENDIX 8.1.3

100-YEAR DETENTION BASIN FLOOD ROUTING ANALYSIS

WATERSHED AREA-AVERAGED POINT RAINFALL DATA INPUT FOR UNIT HYDROGRAPH

(Table 3-c)

100-YEAR DEVELOPED

5-Minute Point Rainfall	inches	**0.43**
30-Minute Point Rainfall	inches	**0.89**
1-Hour Point Rainfall	inches	**1.17**
3-Hour Point Rainfall	inches	**2.26**
6-Hour Point Rainfall	inches	**3.43**
24-Hour Point Rainfall	inches	**3.50**

TTM 20274

652-1985
4/11/2019

Low Loss Fraction & Maximum Loss Rate | **100-year Developed** | Set # 6

Cover	Area	%	Soil type	Area	%	CN-II	CN-III	Ap	%	S	Ia	Y	Y (wght)	Fp (F.C-6)	Fm	Fm (wght)
Commercial	0	0.00	B	0	0.00	56	76	0.1	0.00	7.86	1.57	0.11	0.000	0.74	0.07	0.00
Condominiums	0	0.00	A	0	0.00	32	52	0.35	0.00	21.25	4.25	0.01	0.000	0.97	0.34	0.00
Residential 8-10	0	0.00	A	0	0.00	32	52	0.4	0.00	21.25	4.25	0.01	0.000	0.97	0.39	0.00
Residential 3-4	**41.1**	**1.00**	**B**	**41.1**	**1.00**	**56**	**76**	**0.6**	**0.60**	**7.86**	**1.57**	**0.11**	**0.066**	**0.74**	**0.44**	**0.44**
Residential 3-4 (60%)	0	0.00	C	0	0.00	72	89	0.85	0.00	3.89	0.78	0.32	0.000	0.51	0.43	0.00
Residential 2-3	0	0.00	B	0	0.00	56	76	0.9	0.00	7.86	1.57	0.11	0.000	0.74	0.67	0.00
Residential 5-7(4-6)	0	0.00	A	0	0.00	32	52	0.5	0.00	21.25	4.25	0.01	0.000	0.97	0.49	0.00
Park	0	0.00	A	0	0.00	33	53	0.85	0.00	20.3	4.06	0.00	0.000	0.97	0.82	0.00
Basin	0	0.00	A	0	0.00	78	93	1	0.00	2.82	0.56	0.43	0.000	0.41	0.41	0.00
	41.1			41.1						PERVIOUS		Y=	0.07		Fm=	0.44
										IMPERVIOUS		Y=	0.37			
										SUM			0.44			

P-24= 3.50 in

Est Vol = 0.79 ac-ft

Low Loss Fraction,Y-bar = 0.562

Return Period 100

AMC Type II (I,II or III)

Lag Time

Tc = 14 min from Rational Method Study

Lag = 11.2 min Run:

Lag = 0.19 hr

24-hr Rainfall (other than 100 yr)

T (yr)	I (in)
2	1.2
100	3.5
100	3.5

Tributary area

WATERSHED LOSS DETERMINATIONS

INPUT SUMMARY FOR UNIT HYDROGRAPH

(Table 8-a)

Project: **TTM 20274** Date: 4/11/2019 652-1985

Engineer: TGS

Notes: **100-year Developed** **Set #6**

				1st-24hr	2nd-24hr
1	Design Storm		yr	100	
2	Catchment Lag time		hrs	0.190	
3	Catchment Area		acres	14 41.1	
4	Base flow		cfs/sq mi	0	
5	S-graph			Desert	
6	Maximum loss rate, Fm		in/hr	0.44	
7	Low loss fraction, Y-bar			0.56	
8	Watershed area-averaged	5 -minute point rainfall	inches	0.36	0.13
	Watershed area-averaged	30 -minute point rainfall	inches	0.84	0.30
	Watershed area-averaged	1 -hour point rainfall	inches	1.17	0.42
	Watershed area-averaged	3 -hour point rainfall	inches	2.26	0.81
	Watershed area-averaged	6 -hour point rainfall	inches	3.43	1.23
	Watershed area-averaged	24 -hour point rainfall	inches	3.50	1.26
9	24-hour storm unit interval		minutes	5	

Point rainfall unadjusted by depth-area factors

10	Depth-area adjustment factors (Fig E-4)	5-min	
		30-min	
		1-hr	
		3-hr	
		6-hr	
		24-hr	

DETENTION BASIN VOLUME-DISCHARGE DATA

DETENTION BASIN VOLUME-DISCHARGE DATA

CALCULATION SET-UP

The detention basin will have a bottom elevation set at 3240, and a top elevation of 3252 with 3:1 side slopes.

This study included a preliminary outlet structure with a 36" pipe that will control the outflow. The pipe would be placed above the required retention of the water quality volume at an invert elevation of 3245.

DEPTH OF WATER AT THE OUTLET STRUCTURE

Therefore, the output data from the Unit Hydrograph Flood Routing indicates that the depth of the water in the basin is 7.2 feet.

Bottom of Basin: 3240.

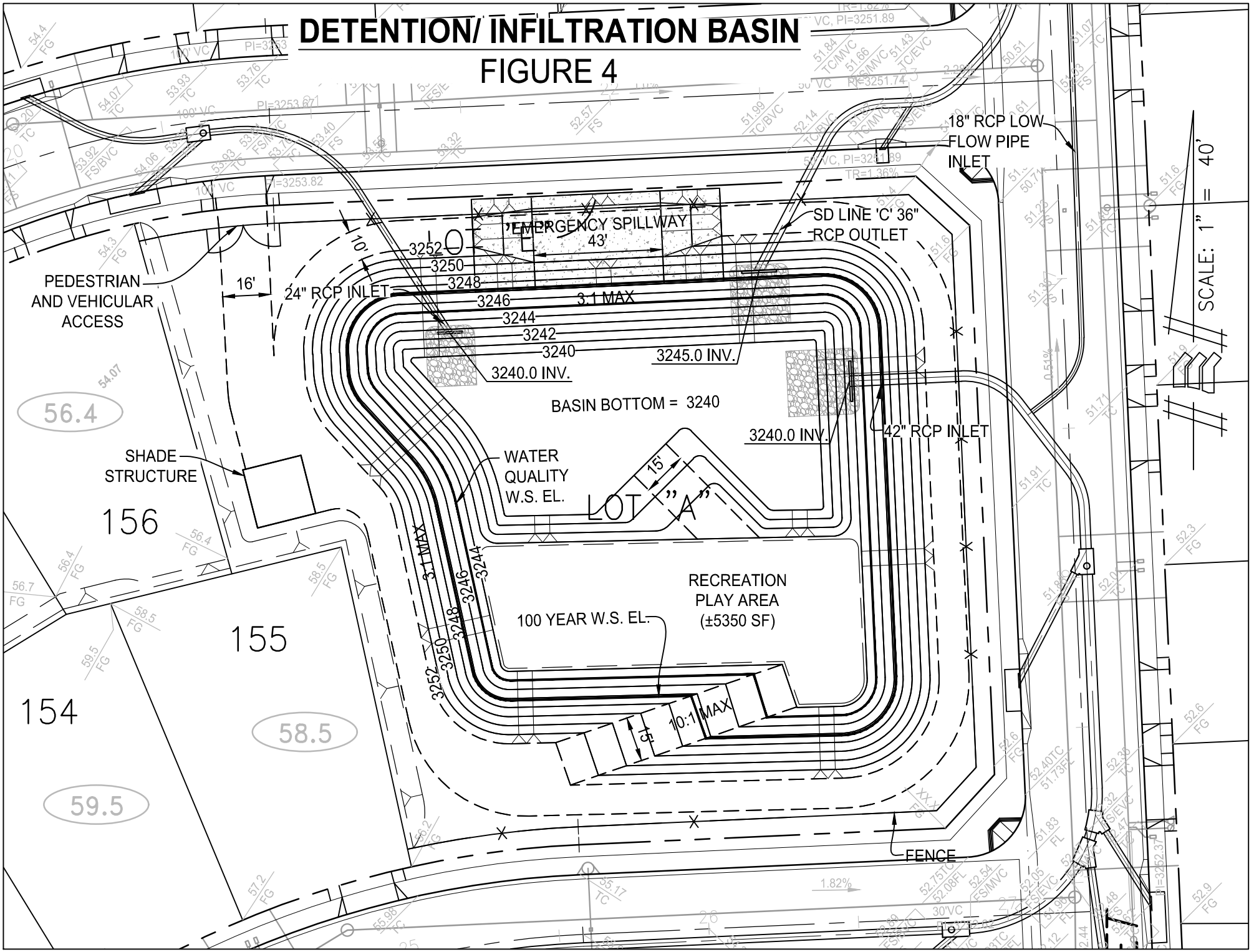
Top Basin: 3252
Depth of Basin: 3252-3240=**12 Feet**

Water needs to fill the basin with the water quality volume before entering the outlet structure. The maximum retained water quality volume is 1.50 ac-ft at a depth of 5 feet. After this volume is filled the 36" RCP storm drain will start metering the outflow to the Oro Grande Wash.

Maximum 100 year Water Surface: El 3247.2 = **7.2 ft**

DETENTION/ INFILTRATION BASIN

FIGURE 4



TTM20274 ***Detention Basin Volume*** 9/6/2019

J.N 652-1985

Contours Elevation	Area (Sf)	Depth (Ft)	Volume (Cu. Ft)	Volume (Ac. Ft)	Total Volume (Ac-Ft)	
3240	5,649		0		0	
		1	7,815	0.18		
3241	7,098				0.18	
		1	9,290	0.21		
3242	8,531				0.39	
		1	13,370	0.31		
3243	10,048				0.70	
		1	17,127	0.39		
3244	16,692				1.09	
		0.5	8,564	0.20		
3244.5	17,562				1.29	
		0.5	9,005	0.21		WQ VOLUME = 1.48
OUTLET 3245	18,457				1.50	AC. FT
		0.5	9,452	0.22		
3245.5	19,351				1.71	
		0.5	9,906	0.23		
3246	20,274				1.94	
		0.5	10,368	0.24		
3246.5	21,196				2.18	
		0.5	10,836	0.25		
3247	22,148				2.43	
		0.5	11,312	0.26		
3247.5	23,098				2.69	
		0.5	11,794	0.27		
3248	24,077				2.96	
		0.5	12,284	0.28		
3248.5	25,057				3.24	
		0.5	12,780	0.29		
3249	26,063				3.53	
		1	27,084	0.62		
3250	28,105				4.15	
		1	29,154	0.67		
3251	30,203				4.82	
		1	31,280	0.72		
3252	32,357				5.54	

BASIN - DEPTH VS. DISCHARGE

C		0.92	
D		3	ft
A		7.1	ft2
g		32.2	ft/sec

$Q=C*A*((2*g*H_0)^{0.5})$

INFILTRATION RATE	43	IN/HR
FACTOR OF SAFETY	2	
	0.000497685	FT/SEC

No. of Pipes	1

INLET EL. 3245
H0 3246.50

Elevation	Depth	Area	Head	H0	Volume	Infiltration	Single Pipe Outflow	Total Pipe Outflow	Effective Outflow
ft	ft	sq. ft.	ft	ft	ac-ft	cfs	cfs	cfs	cfs
3240	0.0	5,649	0.00	0.00	0	0.0	0.0	0.0	0.0
3241.0	1.0	7,098	0.00	0.00	0.18	3.5	0.0	0.0	3.5
3242.0	2.0	8,531	0.00	0.00	0.39	4.2	0.0	0.0	4.2
3243.0	3.0	10,048	0.00	0.00	0.70	5.0	0.0	0.0	5.0
3244.0	4.0	16,692	0.00	0.00	1.09	8.3	0.0	0.0	8.3
3244.5	4.5	17,562	0.00	0.00	1.29	8.7	0.0	0.0	8.7
3245.0	5.0	18,457	0.00	0.00	1.50	9.2	0.0	0.0	9.2
3245.5	5.5	19,351	0.50	0.00	1.71	9.6	2.9	2.9	12.5
3246.0	6.0	20,274	1.00	0.00	1.94	10.1	11.3	11.3	21.4
3246.5	6.5	21,196	1.50	0.00	2.18	10.5	23.6	23.6	34.1
3247.0	7.0	22,148	2.00	0.50	2.43	11.0	36.9	36.9	47.9
3247.5	7.5	23,098	2.50	1.00	2.69	11.5	52.2	52.2	63.7
3248.0	8.0	24,077	3.00	1.50	2.96	12.0	63.9	63.9	75.9
3248.5	8.5	25,057	3.50	2.00	3.24	12.5	73.8	73.8	86.3
3249.0	9.0	26,063	4.00	2.50	3.53	13.0	82.5	82.5	95.5
3250.0	10.0	28,105	5.00	3.50	4.15	14.0	97.6	97.6	111.6
3251.0	11.0	30,203	6.00	4.50	4.82	15.0	110.7	110.7	125.7
3252.0	12.0	32,357	7.00	5.50	5.54	16.1	122.4	122.4	138.5

**COEFFICIENT OF DISCHARGE CALIBRATED TO REFLECT PIPE FLOW @ S=0.005
SEE HYDRAULIC CALCULATIONS ATTACHED.

```
**************************************************************************
 >>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<
--------------------------------------------------------------------------
   PIPE DIAMETER(FEET) =   3.000
   FLOWDEPTH(FEET) =   0.500
   PIPE SLOPE(FEET/FEET) =  0.0050
   MANNINGS FRICTION FACTOR = 0.013000
   >>>>> NORMAL DEPTH FLOW(CFS) =      2.85
==========================================================================
   NORMAL-DEPTH FLOW INFORMATION:
--------------------------------------------------------------------------
   NORMAL DEPTH(FEET) =      0.50
   FLOW AREA(SQUARE FEET) =      0.77
   FLOW TOP-WIDTH(FEET) =     2.236
   FLOW PRESSURE + MOMENTUM(POUNDS) =          30.36
   FLOW VELOCITY(FEET/SEC.) =          3.678
   FLOW VELOCITY HEAD(FEET) =          0.210
   HYDRAULIC DEPTH(FEET) =      0.35
   FROUDE NUMBER =     1.101
   SPECIFIC ENERGY(FEET) =          0.71
==========================================================================


**************************************************************************
 >>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<
--------------------------------------------------------------------------
   PIPE DIAMETER(FEET) =   3.000
   FLOWDEPTH(FEET) =   1.000
   PIPE SLOPE(FEET/FEET) =  0.0050
   MANNINGS FRICTION FACTOR = 0.013000
   >>>>> NORMAL DEPTH FLOW(CFS) =     11.31
==========================================================================
   NORMAL-DEPTH FLOW INFORMATION:
--------------------------------------------------------------------------
   NORMAL DEPTH(FEET) =      1.00
   FLOW AREA(SQUARE FEET) =      2.06
   FLOW TOP-WIDTH(FEET) =     2.828
   FLOW PRESSURE + MOMENTUM(POUNDS) =         173.73
   FLOW VELOCITY(FEET/SEC.) =          5.482
   FLOW VELOCITY HEAD(FEET) =          0.467
   HYDRAULIC DEPTH(FEET) =      0.73
   FROUDE NUMBER =     1.131
   SPECIFIC ENERGY(FEET) =          1.47
==========================================================================
```

```
*****************************************************************************
 >>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<
-----------------------------------------------------------------------------
   PIPE DIAMETER(FEET) =   3.000
   FLOWDEPTH(FEET) =   1.500
   PIPE SLOPE(FEET/FEET) =  0.0050
   MANNINGS FRICTION FACTOR = 0.013000
   >>>>> NORMAL DEPTH FLOW(CFS) =     23.58
=============================================================================
   NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
   NORMAL DEPTH(FEET) =      1.50
   FLOW AREA(SQUARE FEET) =      3.53
   FLOW TOP-WIDTH(FEET) =     3.000
   FLOW PRESSURE + MOMENTUM(POUNDS) =         445.17
   FLOW VELOCITY(FEET/SEC.) =          6.672
   FLOW VELOCITY HEAD(FEET) =          0.691
   HYDRAULIC DEPTH(FEET) =      1.18
   FROUDE NUMBER =     1.083
   SPECIFIC ENERGY(FEET) =          2.19
=============================================================================

*****************************************************************************
 >>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<
-----------------------------------------------------------------------------
   PIPE DIAMETER(FEET) =   3.000
   FLOWDEPTH(FEET) =   2.000
   PIPE SLOPE(FEET/FEET) =  0.0050
   MANNINGS FRICTION FACTOR = 0.013000
   >>>>> NORMAL DEPTH FLOW(CFS) =     36.97
=============================================================================
   NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
   NORMAL DEPTH(FEET) =      2.00
   FLOW AREA(SQUARE FEET) =      5.01
   FLOW TOP-WIDTH(FEET) =     2.828
   FLOW PRESSURE + MOMENTUM(POUNDS) =         803.05
   FLOW VELOCITY(FEET/SEC.) =          7.385
   FLOW VELOCITY HEAD(FEET) =          0.847
   HYDRAULIC DEPTH(FEET) =      1.77
   FROUDE NUMBER =     0.978
   SPECIFIC ENERGY(FEET) =          2.85
=============================================================================
```

DETENTION BASIN UNIT HYDROGRAPH FLOOD ROUTING ANALYSIS

TENTATIVE TRACT No. 20274 – VICTORVILLE, CA

TRACT 17046
INPUT SUMMARY FOR UNIT HYDROGRAPH
DEVELOPED CONDITIONS

(Table 3-b)

NODE	SUBAREA	LAG TIME (HR.)	Tc (MIN.)	AREA (AC.)	S-GRAPH	MAX. LOSS, Fm (IN/HR)	LOW LOSS Y-BAR	
140 & 545	**A-C**	0.19	14.54 (use 14)	41.1	DESERT	0.44	0.57	

```
**************************************************************************
                    SMALL AREA UNIT HYDROGRAPH MODEL
==========================================================================
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             Ver. 23.0  Release Date: 07/01/2016  License ID 1251

                              Analysis prepared by:

                                MADOLE & ASSOCIATES, INC.
                              9302 PITTSBURGH AVENUE, SUITE 230
                                 RANCHO CUCAMONGA, CA 91730


**************************************************************************
--------------------------------------------------------------------------

 Problem Descriptions:
  100 YEAR DEVELOPED UNIT HYDROGRAPH AND BASIN ROUTING ANALYSIS


--------------------------------------------------------------------------


    RATIONAL METHOD CALIBRATION COEFFICIENT = 1.00
    TOTAL CATCHMENT AREA(ACRES) =   41.10
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.440
    LOW LOSS FRACTION = 0.570
    TIME OF CONCENTRATION(MIN.) = 14.00
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    USER SPECIFIED RAINFALL VALUES ARE USED
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.43
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.89
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.17
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.26
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  3.43
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  3.50

--------------------------------------------------------------------------

    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     6.09
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     5.90

**************************************************************************
  TIME     VOLUME       Q    0.       25.0      50.0      75.0     100.0
 (HOURS)    (AF)      (CFS)
--------------------------------------------------------------------------
  0.13      0.0000      0.00  Q         .         .         .         .
  0.37      0.0004      0.04  Q         .         .         .         .
  0.60      0.0011      0.04  Q         .         .         .         .
  0.83      0.0019      0.04  Q         .         .         .         .
  1.07      0.0026      0.04  Q         .         .         .         .
  1.30      0.0034      0.04  Q         .         .         .         .
  1.53      0.0042      0.04  Q         .         .         .         .
  1.77      0.0050      0.04  Q         .         .         .         .
  2.00      0.0058      0.04  Q         .         .         .         .
  2.23      0.0066      0.04  Q         .         .         .         .
```

2.47	0.0074	0.04	Q	.	.	.	.
2.70	0.0083	0.04	Q	.	.	.	.
2.93	0.0091	0.05	Q	.	.	.	.
3.17	0.0100	0.05	Q	.	.	.	.
3.40	0.0109	0.05	Q	.	.	.	.
3.63	0.0118	0.05	Q	.	.	.	.
3.87	0.0128	0.05	Q	.	.	.	.
4.10	0.0137	0.05	Q	.	.	.	.
4.33	0.0147	0.05	Q	.	.	.	.
4.57	0.0156	0.05	Q	.	.	.	.
4.80	0.0166	0.05	Q	.	.	.	.
5.03	0.0177	0.05	Q	.	.	.	.
5.27	0.0187	0.05	Q	.	.	.	.
5.50	0.0198	0.06	Q	.	.	.	.
5.73	0.0209	0.06	Q	.	.	.	.
5.97	0.0220	0.06	Q	.	.	.	.
6.20	0.0231	0.06	Q	.	.	.	.
6.43	0.0243	0.06	Q	.	.	.	.
6.67	0.0255	0.06	Q	.	.	.	.
6.90	0.0267	0.06	Q	.	.	.	.
7.13	0.0280	0.07	Q	.	.	.	.
7.37	0.0292	0.07	Q	.	.	.	.
7.60	0.0306	0.07	Q	.	.	.	.
7.83	0.0319	0.07	Q	.	.	.	.
8.07	0.0333	0.07	Q	.	.	.	.
8.30	0.0347	0.08	Q	.	.	.	.
8.53	0.0362	0.08	Q	.	.	.	.
8.77	0.0377	0.08	Q	.	.	.	.
9.00	0.0393	0.08	Q	.	.	.	.
9.23	0.0409	0.09	Q	.	.	.	.
9.47	0.0426	0.09	Q	.	.	.	.
9.70	0.0443	0.09	Q	.	.	.	.
9.93	0.0461	0.09	Q	.	.	.	.
10.17	0.0480	0.10	Q	.	.	.	.
10.40	0.0499	0.10	Q	.	.	.	.
10.63	0.0519	0.11	Q	.	.	.	.
10.87	0.0540	0.11	Q	.	.	.	.
11.10	0.0562	0.12	Q	.	.	.	.
11.33	0.0585	0.12	Q	.	.	.	.
11.57	0.0609	0.13	Q	.	.	.	.
11.80	0.0634	0.13	Q	.	.	.	.
12.03	0.0661	0.14	Q	.	.	.	.
12.27	0.1100	4.41	.Q	.	.	.	.
12.50	0.2133	6.30	. Q	.	.	.	.
12.73	0.3359	6.41	. Q	.	.	.	.
12.97	0.4619	6.66	. Q	.	.	.	.
13.20	0.5915	6.79	. Q	.	.	.	.
13.43	0.7253	7.09	. Q	.	.	.	.
13.67	0.8636	7.26	. Q	.	.	.	.
13.90	1.0073	7.64	. Q	.	.	.	.
14.13	1.1567	7.86	. Q	.	.	.	.
14.37	1.3129	8.34	. Q	.	.	.	.
14.60	1.4769	8.65	. Q	.	.	.	.
14.83	1.6511	9.42	. Q	.	.	.	.
15.07	1.8375	9.91	. Q	.	.	.	.
15.30	2.0412	11.22	. Q	.	.	.	.
15.53	2.2550	10.96	. Q	.	.	.	.
15.77	2.4709	11.43	. Q	.	.	.	.

16.00	2.7673	19.31	. Q	.	.	.	.
16.23	**3.8884**	**96.96**	**.**	**.**	**.**	**.**	**Q .**
16.47	4.9125	9.26	. Q	.	.	.	.
16.70	5.1029	10.49	. Q	.	.	.	.
16.93	5.2909	9.01	. Q	.	.	.	.
17.17	5.4557	8.08	. Q	.	.	.	.
17.40	5.6052	7.44	. Q	.	.	.	.
17.63	5.7438	6.93	. Q	.	.	.	.
17.87	5.8736	6.53	. Q	.	.	.	.
18.10	5.9964	6.20	. Q	.	.	.	.
18.33	6.0575	0.14	Q	.	.	.	.
18.57	6.0600	0.12	Q	.	.	.	.
18.80	6.0623	0.11	Q	.	.	.	.
19.03	6.0644	0.10	Q	.	.	.	.
19.27	6.0663	0.10	Q	.	.	.	.
19.50	6.0681	0.09	Q	.	.	.	.
19.73	6.0698	0.08	Q	.	.	.	.
19.97	6.0714	0.08	Q	.	.	.	.
20.20	6.0728	0.07	Q	.	.	.	.
20.43	6.0742	0.07	Q	.	.	.	.
20.67	6.0756	0.07	Q	.	.	.	.
20.90	6.0768	0.06	Q	.	.	.	.
21.13	6.0780	0.06	Q	.	.	.	.
21.37	6.0791	0.06	Q	.	.	.	.
21.60	6.0802	0.06	Q	.	.	.	.
21.83	6.0813	0.05	Q	.	.	.	.
22.07	6.0823	0.05	Q	.	.	.	.
22.30	6.0832	0.05	Q	.	.	.	.
22.53	6.0842	0.05	Q	.	.	.	.
22.77	6.0851	0.05	Q	.	.	.	.
23.00	6.0859	0.04	Q	.	.	.	.
23.23	6.0868	0.04	Q	.	.	.	.
23.47	6.0876	0.04	Q	.	.	.	.
23.70	6.0884	0.04	Q	.	.	.	.
23.93	6.0891	0.04	Q	.	.	.	.
24.17	6.0899	0.04	Q	.	.	.	.
24.40	6.0902	0.00	Q	.	.	.	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

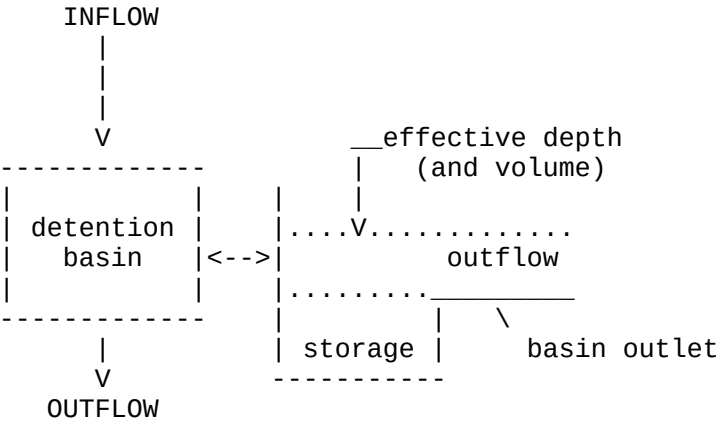
Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1442.0
10%	98.0
20%	14.0
30%	14.0
40%	14.0
50%	14.0
60%	14.0
70%	14.0
80%	14.0
90%	14.0

Problem Descriptions:

==========

FLOW-THROUGH DETENTION BASIN MODEL

SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
CONSTANT HYDROGRAPH TIME UNIT(MINUTES) = 14.000
DEAD STORAGE(AF) = 0.00
SPECIFIED DEAD STORAGE(AF) FILLED = 0.00
ASSUMED INITIAL DEPTH(FEET) IN STORAGE BASIN = 0.00



DEPTH-VS.-STORAGE AND DEPTH-VS.-DISCHARGE INFORMATION:
TOTAL NUMBER OF BASIN DEPTH INFORMATION ENTRIES = 16

*BASIN-DEPTH (FEET)	STORAGE (ACRE-FEET)	OUTFLOW (CFS)	**	**BASIN-DEPTH (FEET)	STORAGE (ACRE-FEET)	OUTFLOW (CFS)	*
0.000	0.000	0.000	**	1.000	0.180	3.500	*
2.000	0.390	4.200	**	3.000	0.700	5.000	*
4.000	1.090	8.300	**	4.500	1.290	8.700	*
5.000	1.500	9.200	**	5.500	1.710	12.500	*
6.000	1.940	21.400	**	6.500	2.180	34.100	*
7.000	2.430	47.900	**	8.000	2.960	75.900	*
9.000	3.530	95.500	**	10.000	4.150	111.600	*
11.000	4.820	125.700	**	12.000	5.540	138.500	*

BASIN STORAGE, OUTFLOW AND DEPTH ROUTING VALUES:

INTERVAL NUMBER	DEPTH (FEET)	{S-O*DT/2} (ACRE-FEET)	{S+O*DT/2} (ACRE-FEET)
1	0.00	0.00000	0.00000
2	1.00	0.14625	0.21375
3	2.00	0.34950	0.43050
4	3.00	0.65179	0.74821
5	4.00	1.00997	1.17003
6	4.50	1.20612	1.37388
7	5.00	1.41129	1.58871
8	5.50	1.58948	1.83052
9	6.00	1.73366	2.14634

10	6.50	1.85121	2.50879
11	7.00	1.96815	2.89185
12	8.00	2.22818	3.69182
13	9.00	2.60920	4.45080
14	10.00	3.07397	5.22603
15	11.00	3.60802	6.03198
16	12.00	4.20460	6.87540

WHERE S=STORAGE(AF);O=OUTFLOW(AF/MIN.);DT=UNIT INTERVAL(MIN.)

DETENTION BASIN ROUTING RESULTS:

NOTE: COMPUTED BASIN DEPTH, OUTFLOW, AND STORAGE QUANTITIES OCCUR AT THE GIVEN TIME. BASIN INFLOW VALUES REPRESENT THE AVERAGE INFLOW DURING THE RECENT HYDROGRAPH UNIT INTERVAL.

TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	EFFECTIVE DEPTH(FT)	OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
0.133	0.000	0.00	0.00	0.00	0.000
0.367	0.000	0.04	0.00	0.01	0.001
0.600	0.000	0.04	0.01	0.02	0.001
0.833	0.000	0.04	0.01	0.02	0.001
1.067	0.000	0.04	0.01	0.03	0.002
1.300	0.000	0.04	0.01	0.03	0.002
1.533	0.000	0.04	0.01	0.03	0.002
1.767	0.000	0.04	0.01	0.04	0.002
2.000	0.000	0.04	0.01	0.04	0.002
2.233	0.000	0.04	0.01	0.04	0.002
2.467	0.000	0.04	0.01	0.04	0.002
2.700	0.000	0.04	0.01	0.04	0.002
2.933	0.000	0.05	0.01	0.04	0.002
3.167	0.000	0.05	0.01	0.04	0.002
3.400	0.000	0.05	0.01	0.04	0.002
3.633	0.000	0.05	0.01	0.05	0.002
3.867	0.000	0.05	0.01	0.05	0.002
4.100	0.000	0.05	0.01	0.05	0.002
4.333	0.000	0.05	0.01	0.05	0.002
4.567	0.000	0.05	0.01	0.05	0.003
4.800	0.000	0.05	0.01	0.05	0.003
5.033	0.000	0.05	0.01	0.05	0.003
5.267	0.000	0.05	0.01	0.05	0.003
5.500	0.000	0.06	0.02	0.05	0.003
5.733	0.000	0.06	0.02	0.05	0.003
5.967	0.000	0.06	0.02	0.06	0.003
6.200	0.000	0.06	0.02	0.06	0.003
6.433	0.000	0.06	0.02	0.06	0.003
6.667	0.000	0.06	0.02	0.06	0.003
6.900	0.000	0.06	0.02	0.06	0.003
7.133	0.000	0.07	0.02	0.06	0.003
7.367	0.000	0.07	0.02	0.06	0.003
7.600	0.000	0.07	0.02	0.06	0.003
7.833	0.000	0.07	0.02	0.07	0.003
8.067	0.000	0.07	0.02	0.07	0.004
8.300	0.000	0.08	0.02	0.07	0.004
8.533	0.000	0.08	0.02	0.07	0.004
8.767	0.000	0.08	0.02	0.07	0.004
9.000	0.000	0.08	0.02	0.08	0.004
9.233	0.000	0.09	0.02	0.08	0.004
9.467	0.000	0.09	0.02	0.08	0.004

9.700	0.000	0.09	0.02	0.08	0.004
9.933	0.000	0.09	0.03	0.09	0.005
10.167	0.000	0.10	0.03	0.09	0.005
10.400	0.000	0.10	0.03	0.09	0.005
10.633	0.000	0.11	0.03	0.10	0.005
10.867	0.000	0.11	0.03	0.10	0.005
11.100	0.000	0.12	0.03	0.10	0.005
11.333	0.000	0.12	0.03	0.11	0.006
11.567	0.000	0.13	0.03	0.11	0.006
11.800	0.000	0.13	0.03	0.12	0.006
12.033	0.000	0.14	0.04	0.13	0.007
12.267	0.000	4.41	0.42	0.80	0.076
12.500	0.000	6.30	0.86	2.24	0.154
12.733	0.000	6.41	1.16	3.31	0.214
12.967	0.000	6.66	1.43	3.71	0.271
13.200	0.000	6.79	1.70	3.90	0.327
13.433	0.000	7.09	1.98	4.09	0.385
13.667	0.000	7.26	2.17	4.26	0.443
13.900	0.000	7.64	2.37	4.42	0.505
14.133	0.000	7.86	2.57	4.58	0.568
14.367	0.000	8.34	2.80	4.75	0.637
14.600	0.000	8.65	3.02	4.96	0.709
14.833	0.000	9.42	3.22	5.40	0.786
15.067	0.000	9.91	3.41	6.04	0.861
15.300	0.000	11.22	3.63	6.73	0.947
15.533	0.000	10.96	3.81	7.38	1.016
15.767	0.000	11.43	3.98	7.96	1.083
16.000	0.000	19.31	4.51	8.47	1.292
16.233	**0.000**	**96.96**	**7.23**	31.56	**2.553**
16.467	0.000	9.26	6.08	**38.97**	1.980
16.700	0.000	10.49	5.70	19.78	1.801
16.933	0.000	9.01	5.48	14.19	1.701
17.167	0.000	8.08	5.31	11.80	1.629
17.400	0.000	7.44	5.16	10.73	1.566
17.633	0.000	6.93	5.03	9.80	1.511
17.867	0.000	6.53	4.90	9.23	1.458
18.100	0.000	6.20	4.77	9.04	1.404
18.333	0.000	0.14	4.37	8.78	1.237
18.567	0.000	0.12	3.97	8.39	1.078
18.800	0.000	0.11	3.60	7.59	0.933
19.033	0.000	0.10	3.28	6.46	0.811
19.267	0.000	0.10	3.02	5.50	0.707
19.500	0.000	0.09	2.72	4.92	0.614
19.733	0.000	0.08	2.44	4.66	0.525
19.967	0.000	0.08	2.17	4.44	0.441
20.200	0.000	0.07	1.86	4.22	0.361
20.433	0.000	0.07	1.50	3.98	0.286
20.667	0.000	0.07	1.17	3.74	0.215
20.900	0.000	0.06	0.85	3.30	0.153
21.133	0.000	0.06	0.59	2.51	0.106
21.367	0.000	0.06	0.41	1.74	0.073
21.600	0.000	0.06	0.28	1.21	0.051
21.833	0.000	0.05	0.20	0.84	0.036
22.067	0.000	0.05	0.14	0.59	0.025
22.300	0.000	0.05	0.10	0.42	0.018
22.533	0.000	0.05	0.07	0.30	0.013
22.767	0.000	0.05	0.05	0.22	0.010
23.000	0.000	0.04	0.04	0.17	0.007

23.233	0.000	0.04	0.03	0.13	0.006
23.467	0.000	0.04	0.03	0.10	0.005
23.700	0.000	0.04	0.02	0.08	0.004
23.933	0.000	0.04	0.02	0.07	0.003
24.167	0.000	0.04	0.02	0.06	0.003
24.400	0.000	0.00	0.01	0.05	0.002
24.633	0.000	0.00	0.01	0.03	0.001
24.867	0.000	0.00	0.01	0.02	0.001

APPENDIX 8.1.4
HYDROLOGIC REFERENCES AND MAPS

REFERENCE SOURCES

- County of San Bernardino Hydrology Manual, August 1986.
- NOAA ATLAS 14 Point Precipitation Frequency Estimates.
- County of San Bernardino Victorville Master Plan of Drainage, Oro Grande Wash, (March 1992).

RAINFALL INTENSITY DATA, SOIL GROUP MAP,

MADOLE & ASSOCIATES, INC.
Civil Engineers-Land Surveyors-Planners
9302 Pittsburgh Avenue, Suite
Rancho Cucamonga, CA 91730
(909) 481-6322 fax 481-6320

Job	TR 17046		652-1985
Sheet No.		of	
Calculated by:	TGS	Date	4/11/2019
Checked by:		Date	
		Scale	nts

Rainfall Intensity Data

TABLE 3-a

Slope of Intensity/Duration curve: 0.7

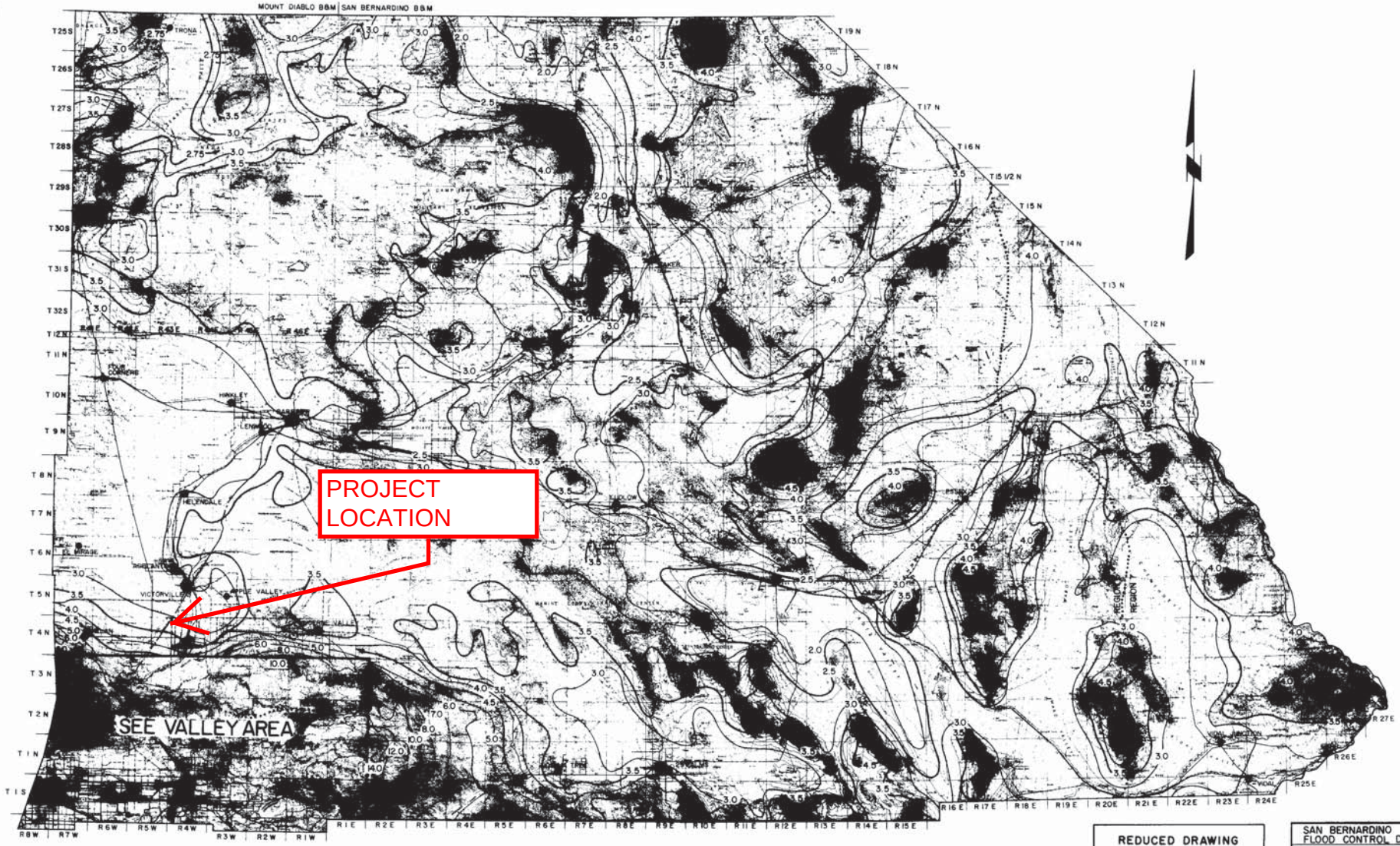
Duration	Return Period (year)					
hr	1	2	5	10	25	100
1	0.33	0.46	0.62	0.75	0.92	1.17
3	0.45	0.62	1.01	1.3	1.69	2.26
6	0.28	0.75	1.38	1.85	2.48	3.43
24	0.79	1.2	1.74	2.15	2.68	3.5
slope	-0.09	0.27	0.45	0.50	0.55	0.60

=values taken from Isohyetals, County Hydrology Manual

All other values "interpolated" using logarithmic equations as follows:

--> Exp(+/- Slope x Ln(T des) + Ln(ref I) -/+ Slope x Ln(ref T))

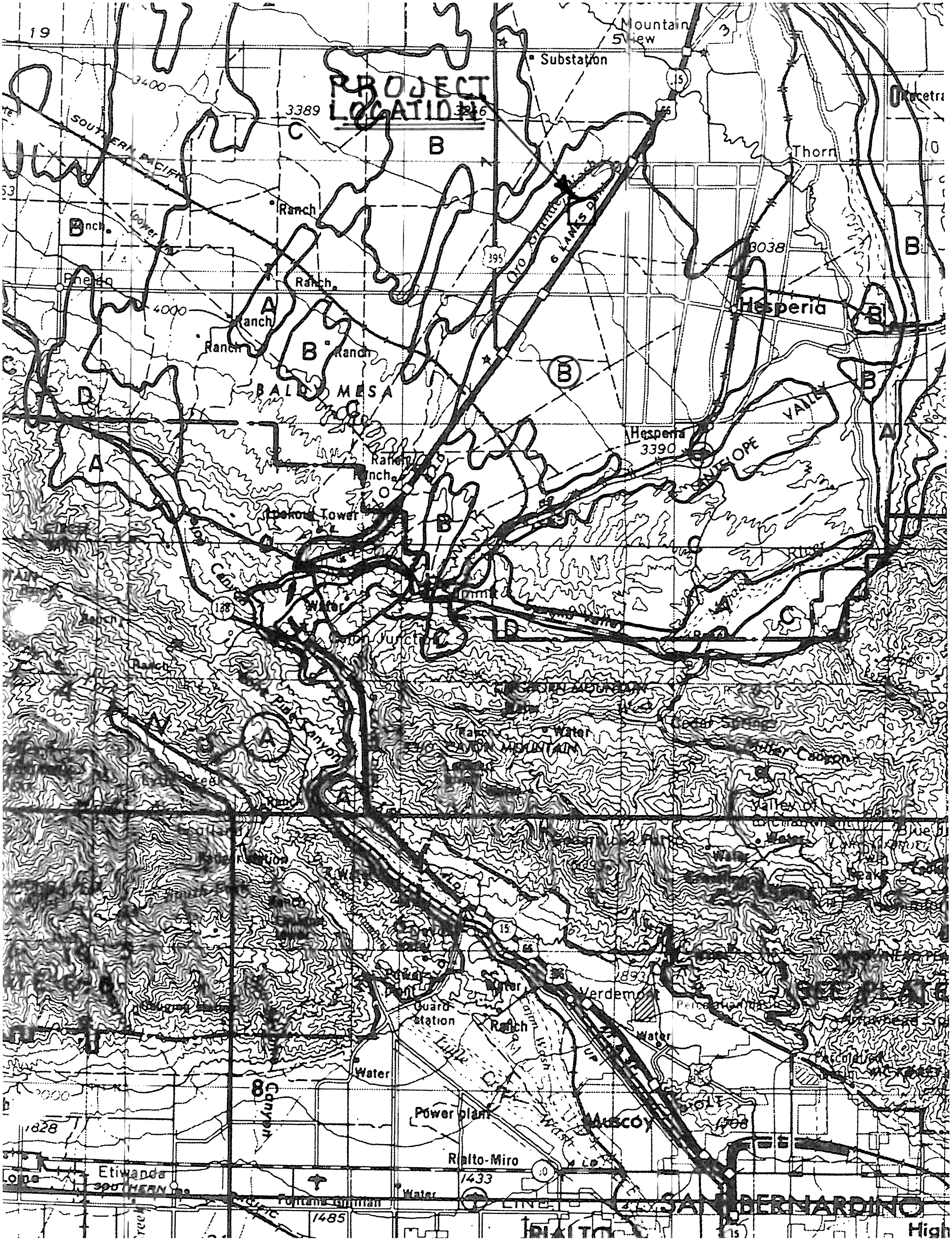
--> I100 - I10 / Ln(100/10) x Ln(des Period / 10) + I10



SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

FIGURE B-12


PROJECT LOCATION
Mountain View
Substation
SOUTHERN PACIFIC
3400
3389
Thorn
Ranch
Phelan
4000
3038
Hesperia
BALDY MESA
6 LANES DIV
Hesperia
3390
ANTELOPE VALLEY
Lookout Tower
Water
Cajon Junction
Verdemont
Guard station
Power plant
Muscoy
Rialto-Miro
1433
Etiwanda
1485
1828
1708
SAN BERNARDINO
High
A
B
C
D

IMPERVIOUS COVER FOR DEVELOPED AREAS

TENTATIVE TRACT No. 20274 – VICTORVILLE, CA

ACTUAL IMPERVIOUS COVER

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

Notes:

1. Land use should be based on ultimate development of the watershed. Long range master plans for the County and incorporated cities should be reviewed to insure reasonable land use assumptions.

2. Recommended values are based on average conditions which may not apply to a particular study area. The percentage impervious may vary greatly even on comparable sized lots due to differences in dwelling size, improvements, etc. Landscape practices should also be considered as it is common in some areas to use ornamental gravels underlain by impervious plastic materials in place of lawns and shrubs. A field investigation of a study area shall always be made, and a review of aerial photos, where available, may assist in estimating the percentage of impervious cover in developed areas.

3. For typical equestrian subdivisions increase impervious area 5 percent over the values recommended in the table above.

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

ACTUAL IMPERVIOUS COVER
FOR
DEVELOPED AREAS

Figure C-4

APPENDIX 8.2

HYDRAULIC CALCULATIONS

HYDRAULIC CALCULATIONS
OUTLET STRUCTURES

TENTATIVE TRACT No. 20274 – VICTORVILLE, CA

MADOLE & ASSOCIATES, INC.
Civil Engineers-Land Surveyors-Planners
9302 Pittsburgh Street, Suite 230
Rancho Cucamonga, CA 91730
(909) 481-6322

Sheet No.		of	
Calculated by:	TGS	Date	9/9/2019
Checked by:		Date	
		Scale	

EMERGENCY SPILLWAY

DESIGN CAPACITY = 1,000-YEAR PEAK FLOW RATE

$Q = 1.35 \times Q_{100}$

Q_{100} = **97**

DESIGN Q = **130.95** **C.F.S.**

Weir Discharge Equation (Trapezoidal w/3:1 upstream slope)

Q = C L H ^(3/2)

Q =	**130.95**
C =	3.08
H =	1.00

L = **42.5** **FT.**

DESIGN L = **43.0** **FT.**

APPENDIX 8.3

WATER QUALITY BMP CALCULATIONS

Form 4.2-3 Hydromodification Assessment for Runoff Volume (DA 1)

Weighted Curve Number Determination for: Pre-developed DA	DMA A	DMA B	DMA C	DMA D	DMA E	DMA F	DMA G	DMA H
1a Land Cover type	OPEN BRUSH							
2a Hydrologic Soil Group (HSG)	B							
3a DMA Area, ft² *sum of areas of DMA should equal area of DA*	1,970,268							
4a Curve Number (CN) *use Items 1 and 2 to select the appropriate CN from Appendix C-2 of the TGD for WQMP*	76							
Weighted Curve Number Determination for: Post-developed DA	DMA A	DMA B	DMA C	DMA D	DMA E	DMA F	DMA G	DMA H
1b Land Cover type	RESIDENTIAL	STREET						
2b Hydrologic Soil Group (HSG)	B	B						
3b DMA Area, ft² *sum of areas of DMA should equal area of DA*	1,199,256	771,012						
4b Curve Number (CN) *use Items 5 and 6 to select the appropriate CN from Appendix C-2 of the TGD for WQMP*	56	98						

5 Pre-Developed area-weighted CN: 76	**7** Pre-developed soil storage capacity, S (in): 3.16 *S = (1000 / Item 5) - 10*	**9** Initial abstraction, I_a (in): 0.63 *I_a = 0.2 * Item 7*
6 Post-Developed area-weighted CN: 73	**8** Post-developed soil storage capacity, S (in): *S = (1000 / Item 6) - 10* 3.70	**10** Initial abstraction, I_a (in): *I_a = 0.2 * Item 8* 0.74

11 Precipitation for 10 yr, 24 hr storm (in): 3.01
Go to: http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html

12 Pre-developed Volume (ft³): 147,876 ft³
*V_{pre} =(1 / 12) * (Item sum of Item 3) * [(Item 11 – Item 9)^2 / ((Item 11 – Item 9 + Item 7)*

13 Post-developed Volume (ft³): 141,717 ft³
*V_{pre} =(1 / 12) * (Item sum of Item 3) * [(Item 11 – Item 10)^2 / ((Item 11 – Item 10 + Item 8)*

14 Volume Reduction needed to meet hydromodification requirement, (ft³):
*Vhydro = (Item 13 * 0.95) – Item 12* Ø

Form 4.2-4 Hydromodification Assessment for Time of Concentration (DA 1)

Compute time of concentration for pre and post developed conditions for each DA *(For projects using the Hydrology Manual complete the form below)* See attached Rational method

Variables	Pre-developed DA1 *Use additional forms if there are more than 4 DMA*				Post-developed DA1 *Use additional forms if there are more than 4 DMA*			
	DMA A	DMA B	DMA C	DMA D	DMA A	DMA B	DMA C	DMA D
1 Length of flowpath (ft) *Use Form 3-2 Item 5 for pre-developed condition*								
2 Change in elevation (ft)								
3 Slope (ft/ft), S_o = *Item 2 / Item 1*								
4 Land cover								
5 Initial DMA Time of Concentration (min) *Appendix C-1 of the TGD for WQMP*								
6 Length of conveyance from DMA outlet to project site outlet (ft) *May be zero if DMA outlet is at project site outlet*								
7 Cross-sectional area of channel (ft^2)								
8 Wetted perimeter of channel (ft)								
9 Manning's roughness of channel (n)								
10 Channel flow velocity (ft/sec) V_{fps} = *(1.49 / Item 9) * (Item 7/Item 8)^0.67 * (Item 3)^0.5*								
11 Travel time to outlet (min) T_t = *Item 6 / (Item 10 * 60)*								
12 Total time of concentration (min) T_c = *Item 5 + Item 11*								

13 Pre-developed time of concentration (min): 17.0 *Minimum of Item 12 pre-developed DMA*

14 Post-developed time of concentration (min): 15.03 *Minimum of Item 12 post-developed DMA*

15 Additional time of concentration needed to meet hydromodification requirement (min): 1.7 $T_{C\text{-}Hydro}$ = *(Item 13 * 0.95) – Item 14*

Form 4.2-5 Hydromodification Assessment for Peak Runoff (DA 1)

Compute peak runoff for pre- and post-developed conditions

Variables		Pre-developed DA to Project Outlet (*Use additional forms if more than 3 DMA*)			Post-developed DA to Project Outlet (*Use additional forms if more than 3 DMA*)		
		DMA A	DMA B	DMA C	DMA A	DMA B	DMA C
1 Rainfall Intensity for storm duration equal to time of concentration *I_{peak} = 10^(LOG Form 4.2-1 Item 4 - 0.7 LOG Form 4.2-4 Item 5 /60)*							
2 Drainage Area of each DMA (Acres) *For DMA with outlet at project site outlet, include upstream DMA (Using example schematic in Form 3-1, DMA A will include drainage from DMA C)*							
3 Ratio of pervious area to total area *For DMA with outlet at project site outlet, include upstream DMA (Using example schematic in Form 3-1, DMA A will include drainage from DMA C)*							
4 Pervious area infiltration rate (in/hr) *Use pervious area CN and antecedent moisture condition with Appendix C-3 of the TGD for WQMP*							
5 Maximum loss rate (in/hr) *F_m = Item 3 * Item 4* *Use area-weighted F_m from DMA with outlet at project site outlet, include upstream DMA (Using example schematic in Form 3-1, DMA A will include drainage from DMA C)*							
6 Peak Flow from DMA (cfs) *Q_p =Item 2 * 0.9 * (Item 1 - Item 5)*							
7 Time of concentration adjustment factor for other DMA to site discharge point *Form 4.2-4 Item 12 DMA / Other DMA upstream of site discharge point (If ratio is greater than 1.0, then use maximum value of 1.0)*	DMA A	*n/a*			*n/a*		
	DMA B		*n/a*			*n/a*	
	DMA C			*n/a*			*n/a*

8 Pre-developed Q_p at T_c for DMA A: *Q_p = Item 6_{DMAA} + [Item 6_{DMAB} * (Item 1_{DMAA} - Item 5_{DMAB})/(Item 1_{DMAB} - Item 5_{DMAB})* Item $7_{DMAA/2}$] + [Item 6_{DMAC} * (Item 1_{DMAA} - Item 5_{DMAC})/(Item 1_{DMAC} - Item 5_{DMAC})* Item $7_{DMAA/3}$]*	**9** Pre-developed Q_p at T_c for DMA B: *Q_p = Item 6_{DMAB} + [Item 6_{DMAA} * (Item 1_{DMAB} - Item 5_{DMAA})/(Item 1_{DMAA} - Item 5_{DMAA})* Item $7_{DMAB/1}$] + [Item 6_{DMAC} * (Item 1_{DMAB} - Item 5_{DMAC})/(Item 1_{DMAC} - Item 5_{DMAC})* Item $7_{DMAB/3}$]*	**10** Pre-developed Q_p at T_c for DMA C: *Q_p = Item 6_{DMAC} + [Item 6_{DMAA} * (Item 1_{DMAC} - Item 5_{DMAA})/(Item 1_{DMAA} - Item 5_{DMAA})* Item $7_{DMAC/1}$] + [Item 6_{DMAB} * (Item 1_{DMAC} - Item 5_{DMAB})/(Item 1_{DMAB} - Item 5_{DMAB})* Item $7_{DMAC/2}$]*

10 Peak runoff from pre-developed condition confluence analysis (cfs): 52.7 CFS *Maximum of Item 8, 9, and 10 (including additional forms as needed)*

11 Post-developed Q_p at T_c for DMA A: *Same as Item 8 for post-developed values*	**12** Post-developed Q_p at T_c for DMA B: *Same as Item 9 for post-developed values*	**13** Post-developed Q_p at T_c for DMA C: *Same as Item 10 for post-developed values*

14 Peak runoff from post-developed condition confluence analysis (cfs): 50.5 *Maximum of Item 11, 12, and 13 (including additional forms as needed)*

15 Peak runoff reduction needed to meet Hydromodification Requirement (cfs): Ø *$Q_{p\text{-}hydro}$ = (Item 14 * 0.95) – Item 10*

MADOLE & ASSOCIATES, INC.
Engineering Communities for Life

Job TRACT 17046
Job No. 652-1985
Calculated by: TS
Date: 3/14/2017

DESIGN CAPTURE VOLUME - POST DEVELOPED

DEVELOPMENT AREA =	1,912,035	ft^2	43.9 ACRES
DU/ACRE =	4.1		
IMPERVIOUSNESS =	0.6		
R_C=	0.41		
$P_{2YR-1HR}$=	0.408	in	

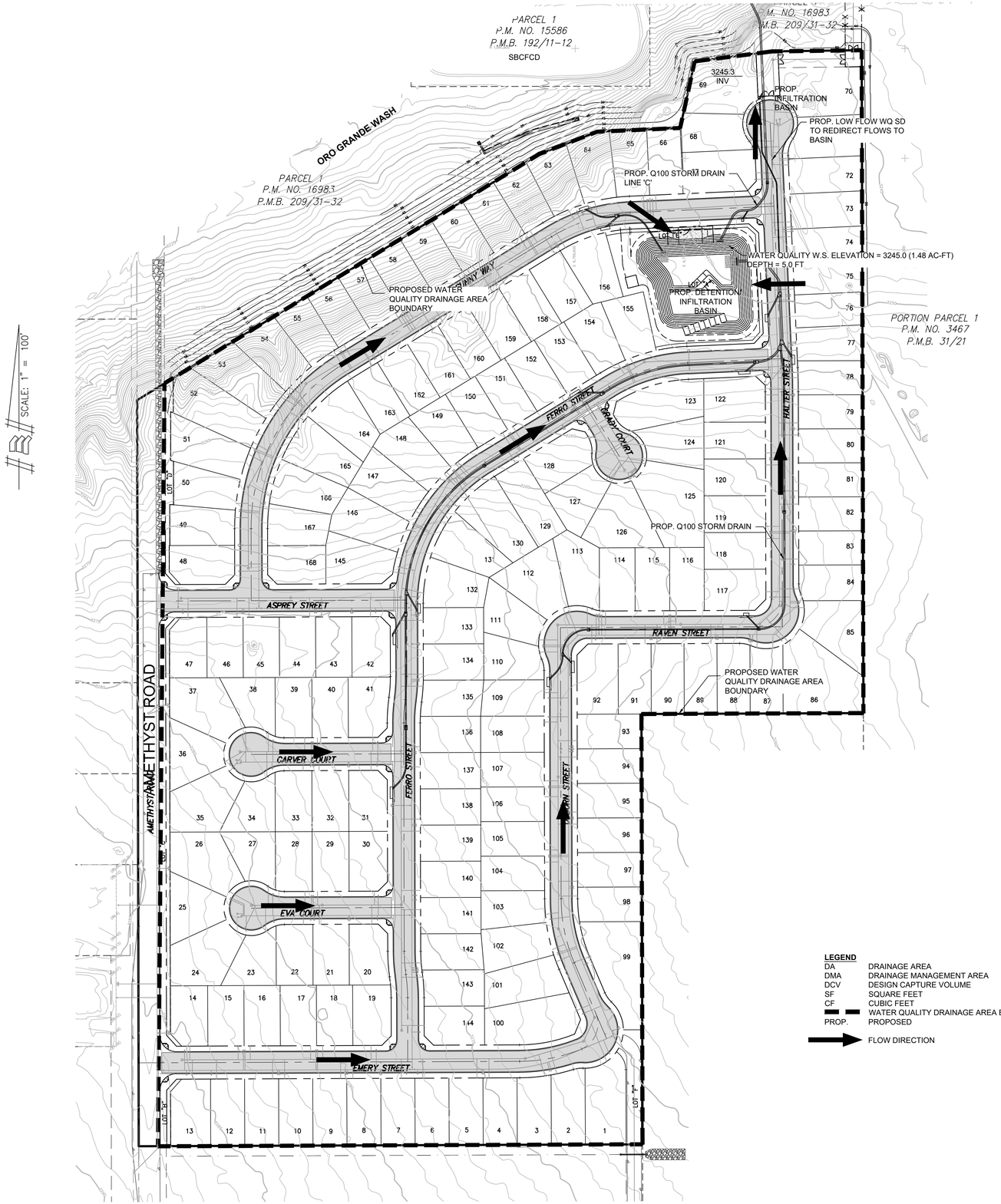
http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=ca

$P_6 = P_{2YR-1HR}$ *1.2371 =	0.505	in	
DRAWDOWN RATE =	1.963	*48 HOUR*	

Design Capture Volume (DCV) = (1/12)(AREA)(R_C)(P_6)(DRAWDOWN RATE)

DCV =	**64,558 ft^3**	**1.48 AC-FT**

TRACT 17046
POST DEVELOPED WATER QUALITY EXHIBIT



HYDROMODIFICATION ASSESSMENT - POST DEVELOPED

		COVER TYPE	CN	WEIGHTED CN	POST-DEVELOPED RUNOFF VOLUME (FT^3)	POST-DEVELOPED TIME OF CONCENTRATION (MIN)	POST-DEVELOPED PEAK RUNOFF (CFS)
DA1	DMA A	3-4 DU/ACRE	56	73	141,717	15	51
	DMA B	STREETS	98				

HYDROMODIFICATION ASSESSMENT - PRE DEVELOPED

		COVER TYPE	CN	WEIGHTED CN	PRE-DEVELOPED RUNOFF VOLUME (FT^3)	PRE-DEVELOPED TIME OF CONCENTRATION (MIN)	PRE-DEVELOPED PEAK RUNOFF (CFS)
DA1	DMA A	DESERT BRUSH	56	56	167,876	15	51

VOLUME REDUCTION NEEDED TO MEET HYDROMODIFICATION REQUIREMENT = 0 CF

WATER QUALITY MITIGATION SUMMARY

1. ALL STORMWATER RUNOFF AND NUISANCE FLOWS FROM THE PROJECT SITE WILL SHEETFLOW, GUTTERFLOW, AND TRAVEL VIA Q100 STORM DRAIN TO A DETENTION/INFILTRATION BASIN IN THE NORTH EAST CORNER OF THE PROJECT SITE. ALL WATER QUALITY FLOWS WILL BE DETAINED FOR INFILTRATION THROUGH THE BOTTOM OF THE BASIN.
2. SINCE ALL FLOWS FROM THE POST DEVELOPED PROJECT SITE WILL BE DIRECTED TO THE BASIN THE SITE IS BROKEN UP INTO TWO DMA'S TO ACCOUNT FOR THE STREETS AND THE 3-4 DU/ACRE RESIDENTIAL DEVELOPMENT LAND COVER TYPES. DMA A REPRESENTS ALL OF THE LOTS, WHILE DMA B ACCOUNTS FOR THE STREETS WITHIN THE DEVELOPMENT.

WATER QUALITY INFILTRATION BASIN - DESIGN CAPTURE VOLUME

DESIGN CAPTURE VOLUME - POST DEVELOPED

DEVELOPMENT AREA = 1,912,035 ft^2 43.9 ACRES
DU/ACRE = 4.1
IMPERVIOUSNESS = 0.6
R_C= 0.41
$P_{2YR-1HR}$= 0.408 in
http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=ca
$P_6 = P_{2YR-1HR}$ *1.2371 = 0.505 in
DRAWDOWN RATE = 1.963 **48 HOUR*

Design Capture Volume (DCV) = (1/12)(AREA)(R_C)(P_6)(DRAWDOWN RATE)

DCV =	64,558 ft^3	1.48 AC-FT

LEGEND

DA	DRAINAGE AREA
DMA	DRAINAGE MANAGEMENT AREA
DCV	DESIGN CAPTURE VOLUME
SF	SQUARE FEET
CF	CUBIC FEET
	WATER QUALITY DRAINAGE AREA BOUNDARY
PROP.	PROPOSED
	FLOW DIRECTION

NOTE
ALL SOILS GROUP "B"

WATER QUALITY MANAGEMENT PLAN

TRACT 17046
DEVELOPED CONDITION

MADOLE & ASSOCIATES, INC.
Engineering Communities for Life
9302 PITTSBURGH AVE., SUITE 230
RANCHO CUCAMONGA, CA. 91730
PHONE: 909.4816322
FAX: 909.4816320

JOB NUMBER 652-1985
SHEET 1 OF 2

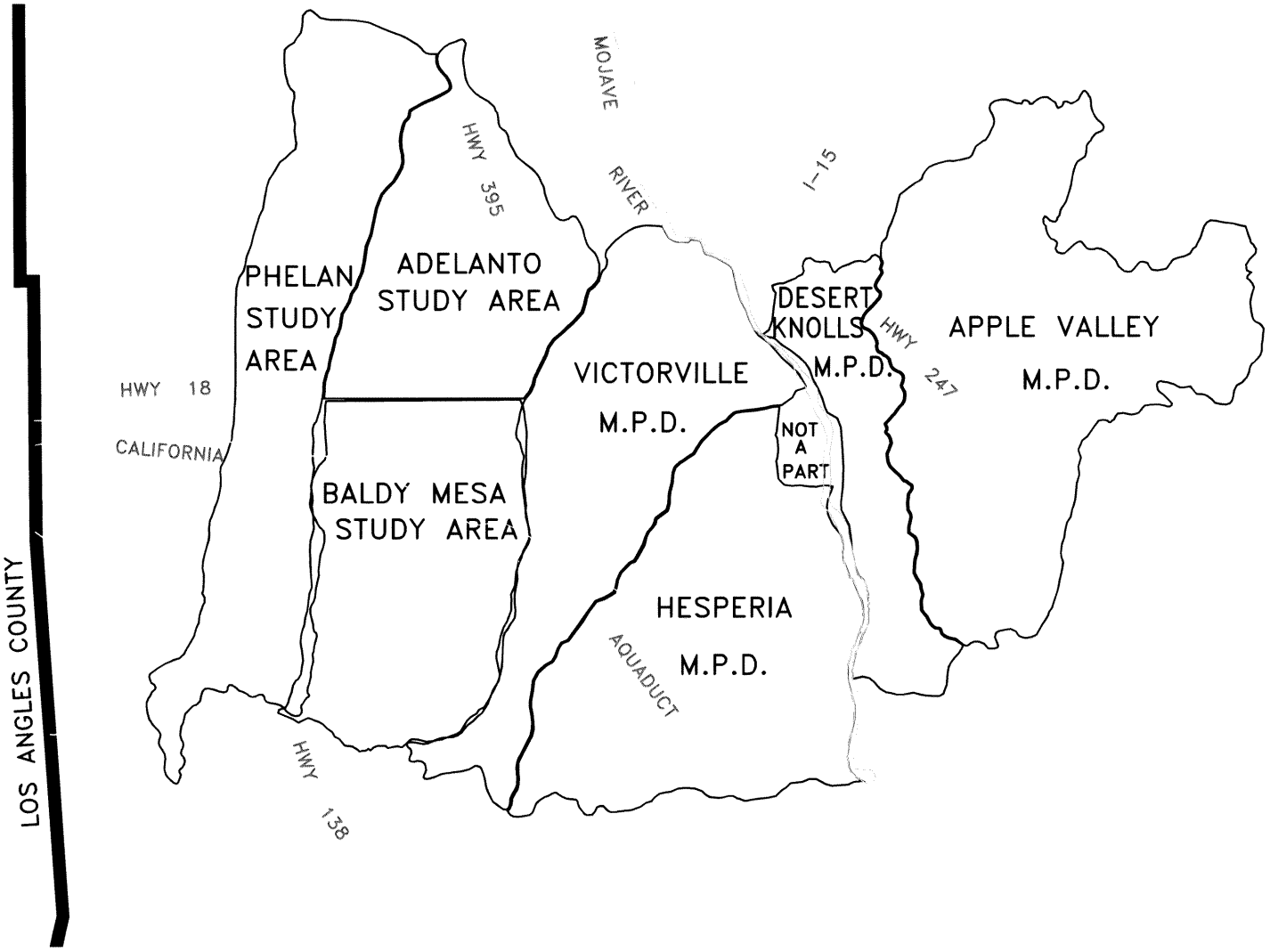
APPENDIX 8.5

VICTORVILLE MASTER PLAN OF DRAINAGE FOR ORO GRANDE WASH

TENTATIVE TRACT No. 20274 – VICTORVILLE, CA

STATISTICS

Area	20,105 Sq. Mi.
Width	210 Mi
Length	135 Mi
Max. Elev.	11,502 Ft.
Min. Elev.	Sea Level



SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT
HIGH DESERT VICTORVILLE AREA

VICTORVILLE

MASTER PLAN OF DRAINAGE

FOR

ORO GRANDE WASH AND ADJACENT WATERSHEDS THAT ARE TRIBUTARY TO THE MOJAVE RIVER

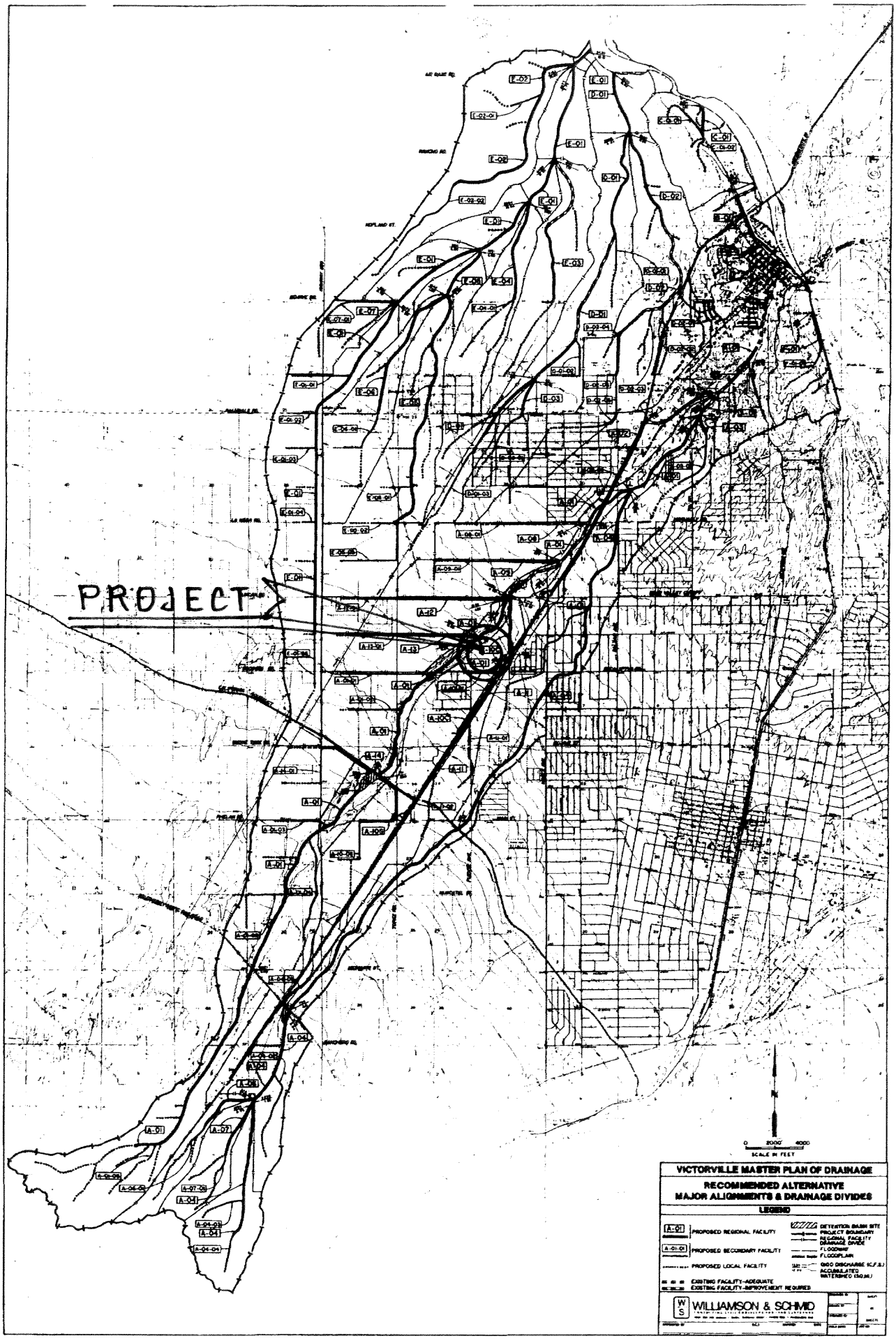
MARCH 1992

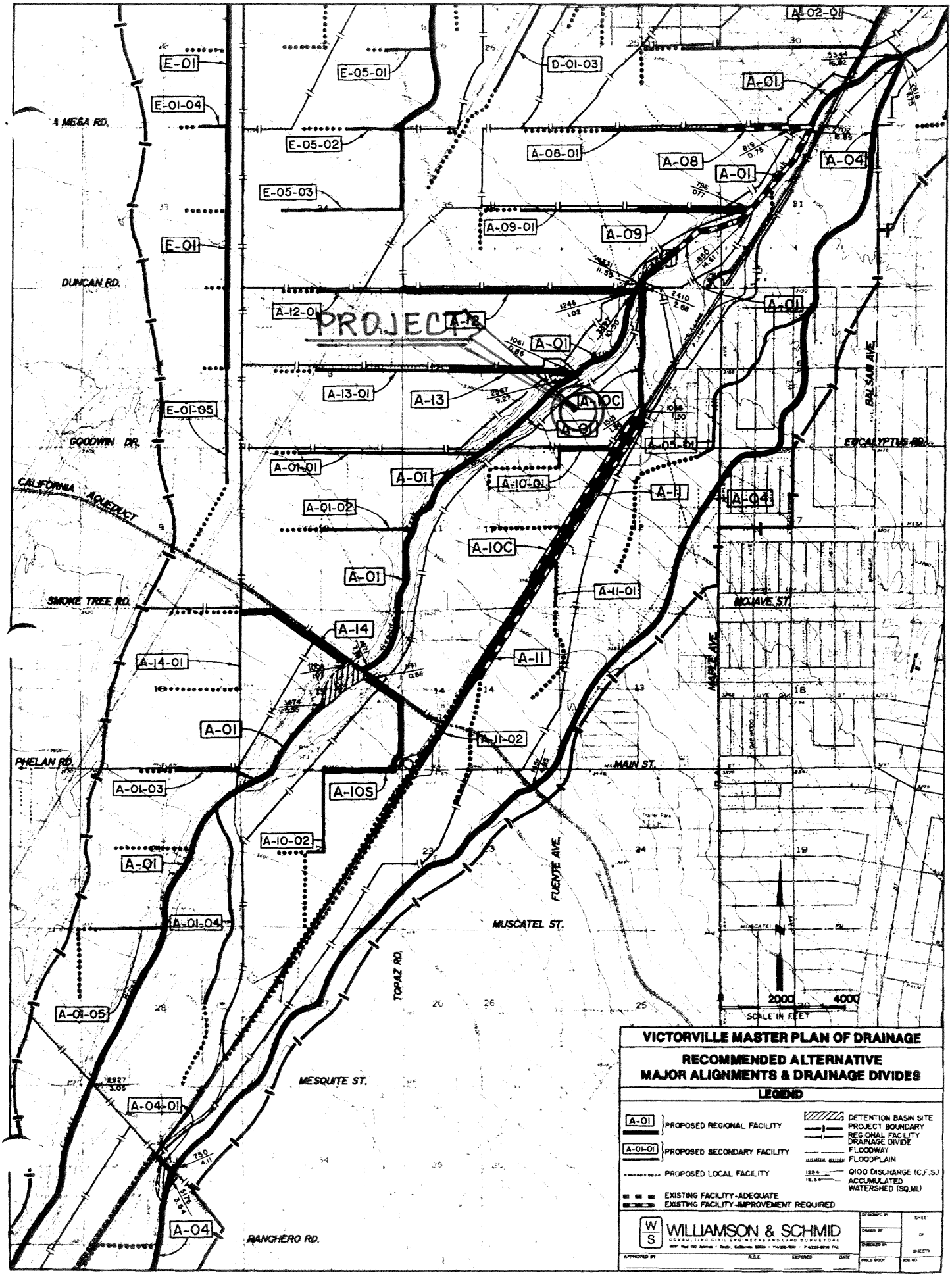
VOLUME I - Final Report

PREPARED FOR

SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT

WILLIAMSON & SCHMID
CONSULTING CIVIL ENGINEERS AND LAND SURVEYORS


PROJECT
0 2000 4000
SCALE IN FEET
VICTORVILLE MASTER PLAN OF DRAINAGE
RECOMMENDED ALTERNATIVE
MAJOR ALIGNMENTS & DRAINAGE DIVIDES
LEGEND
PROPOSED REGIONAL FACILITY
PROPOSED SECONDARY FACILITY
PROPOSED LOCAL FACILITY
EXISTING FACILITY-ADEQUATE
EXISTING FACILITY-IMPROVEMENT REQUIRED
DETENTION BASIN SITE
PROJECT BOUNDARY
REGIONAL FACILITY DRAINAGE DIVIDE
FLOODWAY
FLOODPLAIN
Q100 DISCHARGE (C.F.S.)
ACCUMULATED WATERSHED (SQ.MI.)
WILLIAMSON & SCHMID



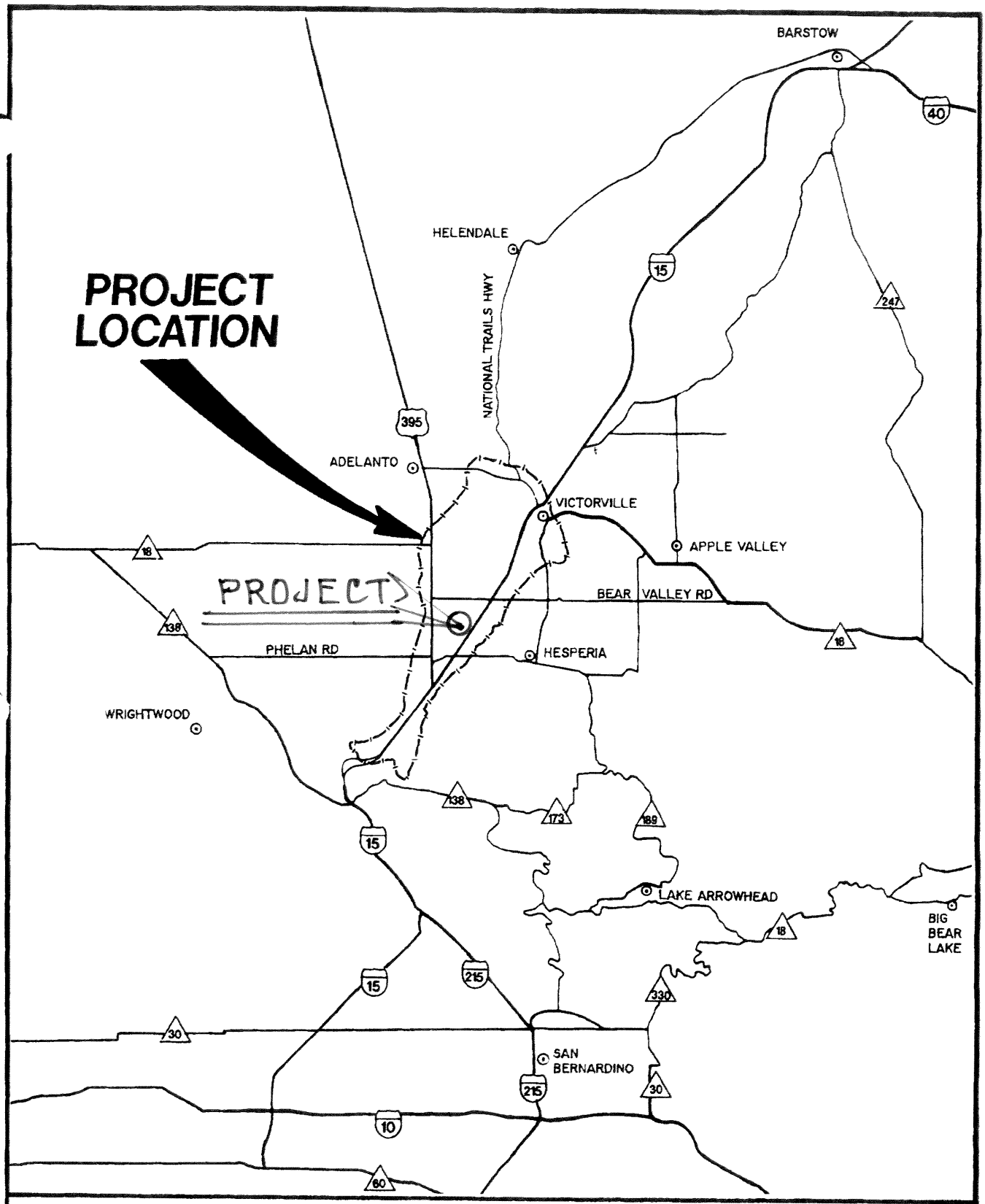
VICTORVILLE MASTER PLAN OF DRAINAGE

RECOMMENDED ALTERNATIVE MAJOR ALIGNMENTS & DRAINAGE DIVIDES

LEGEND

- A-01 — PROPOSED REGIONAL FACILITY
- A-01-01 — PROPOSED SECONDARY FACILITY
- PROPOSED LOCAL FACILITY
- EXISTING FACILITY-ADEQUATE
- EXISTING FACILITY-IMPROVEMENT REQUIRED
- DETENTION BASIN SITE
- PROJECT BOUNDARY
- REGIONAL FACILITY DRAINAGE DIVIDE
- FLOODWAY
- FLOODPLAIN
- Q100 DISCHARGE (C.F.S.)
- ACCUMULATED WATERSHED (SQ.MI.)

WILLIAMSON & SCHMID
CONSULTING CIVIL ENGINEERS AND LAND SURVEYORS



LEGEND

—|—|— WATERSHED BOUNDARY

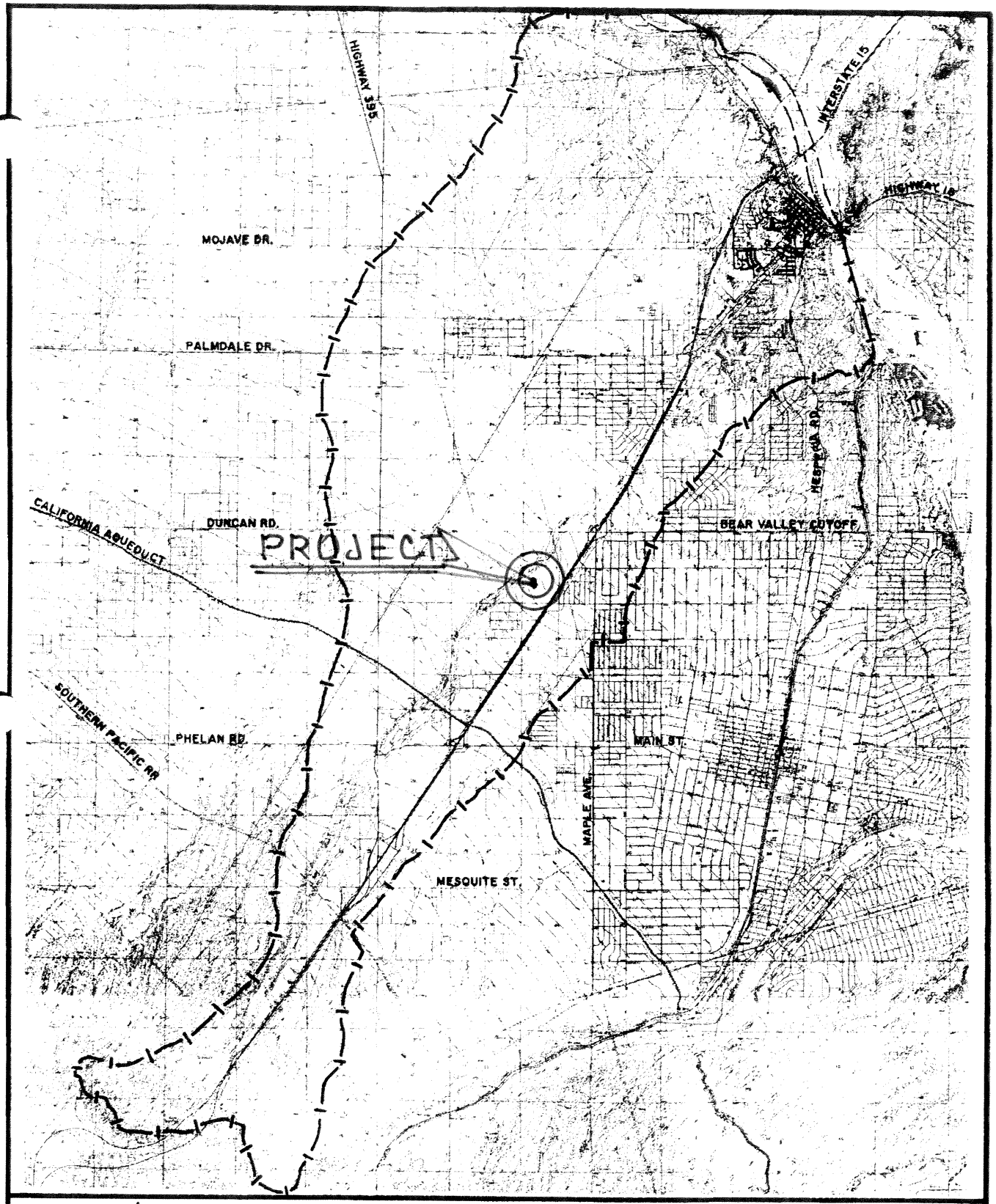
⊙ COMMUNITY LOCATION

VICTORVILLE MASTER PLAN OF DRAINAGE

PROJECT LOCATION MAP
FIGURE 1.1
1-2

SCALE 1"=7 MILES

WILLIAMSON & SCHMID

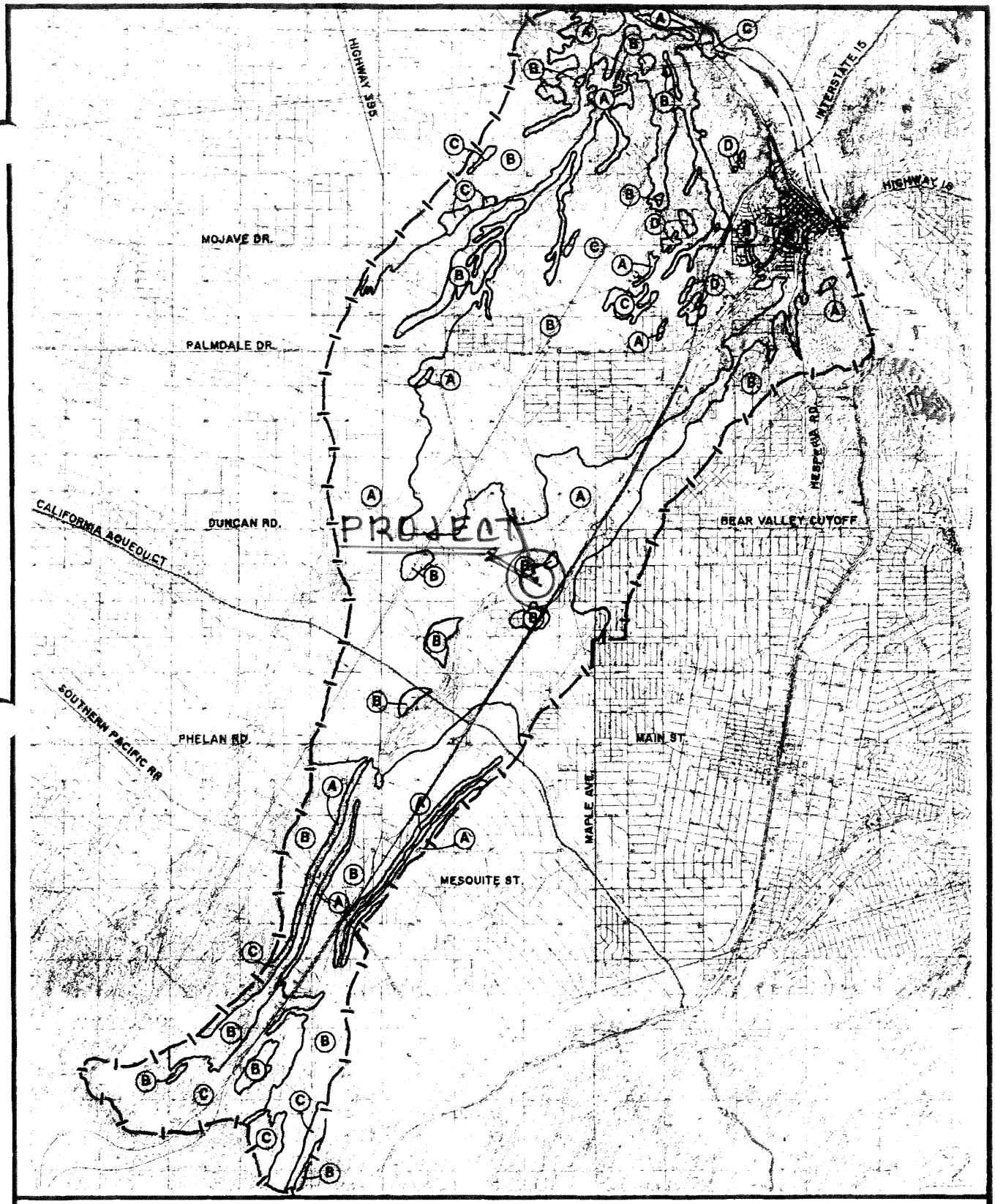


LEGEND

—1— WATERSHED BOUNDARY

— — MOJAVE RIVER FLOODWAY

VICTORVILLE MASTER PLAN OF DRAINAGE	WATERSHED BOUNDARY FIGURE 3.1 3-2	SCALE 1"=10000' WILLIAMSON & SCHMID



LEGEND

WATERSHED BOUNDARY

SOIL GROUP BOUNDARY

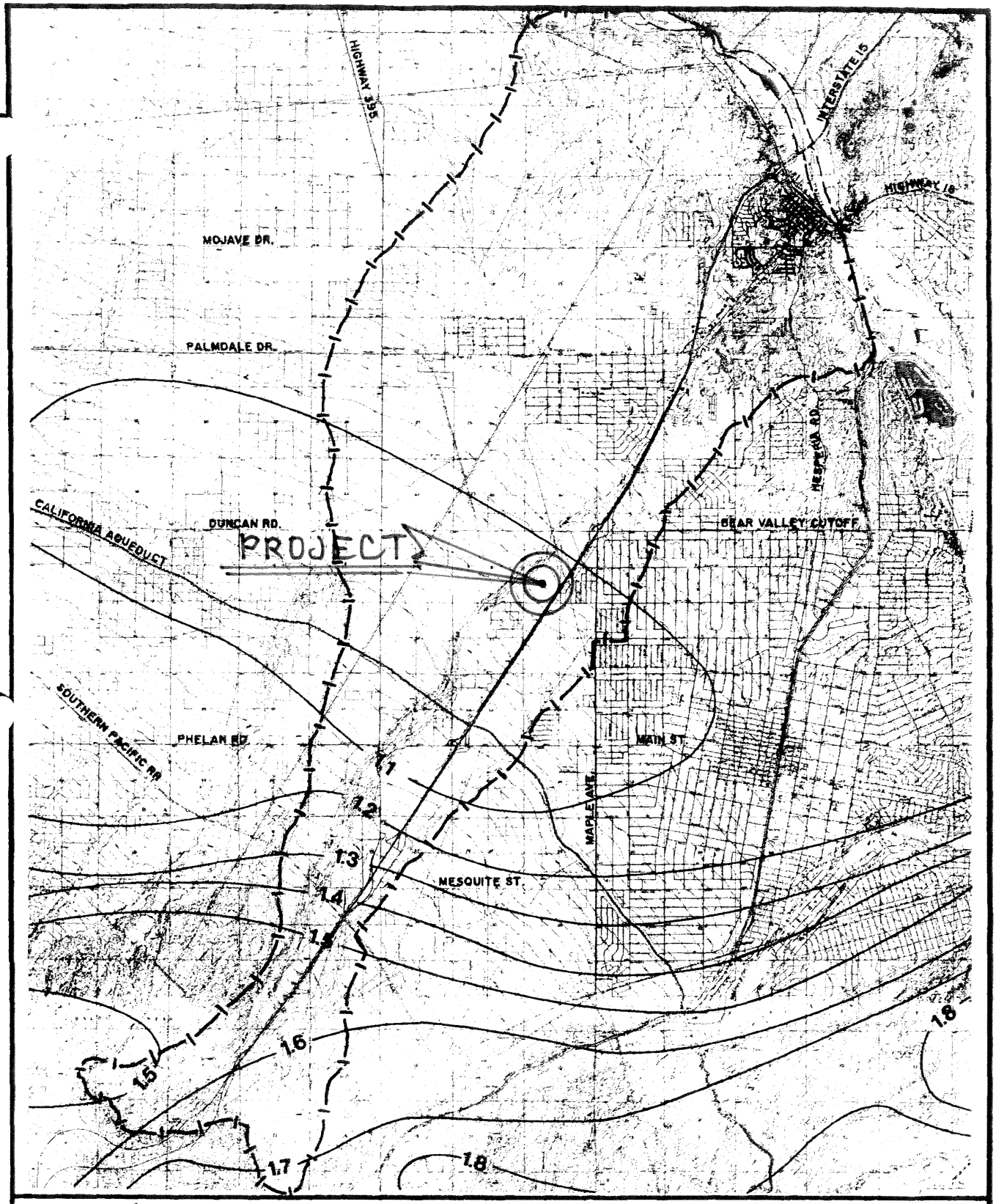
(A) HYDROLOGIC SOIL GROUP

VICTORVILLE MASTER PLAN OF DRAINAGE

HYDROLOGIC SOIL GROUPS
FIGURE 4.2
4-6

SCALE 1"=10000'

WILLIAMSON & SCHMID



LEGEND

—I— WATERSHED BOUNDARY

— — MOJAVE RIVER FLOODWAY

——— RAINFALL ISOHYETAL

VICTORVILLE MASTER PLAN OF DRAINAGE

RAINFALL ISOHYETAL 100 YEAR 1 HOUR
FIGURE 5.5
5-6

SCALE 1"=10000'

WILLIAMSON & SCHMID

VICTORVILLE

MASTER PLAN OF DRAINAGE

FOR

ORO GRANDE WASH AND ADJACENT WATERSHEDS THAT ARE TRIBUTARY TO THE MOJAVE RIVER

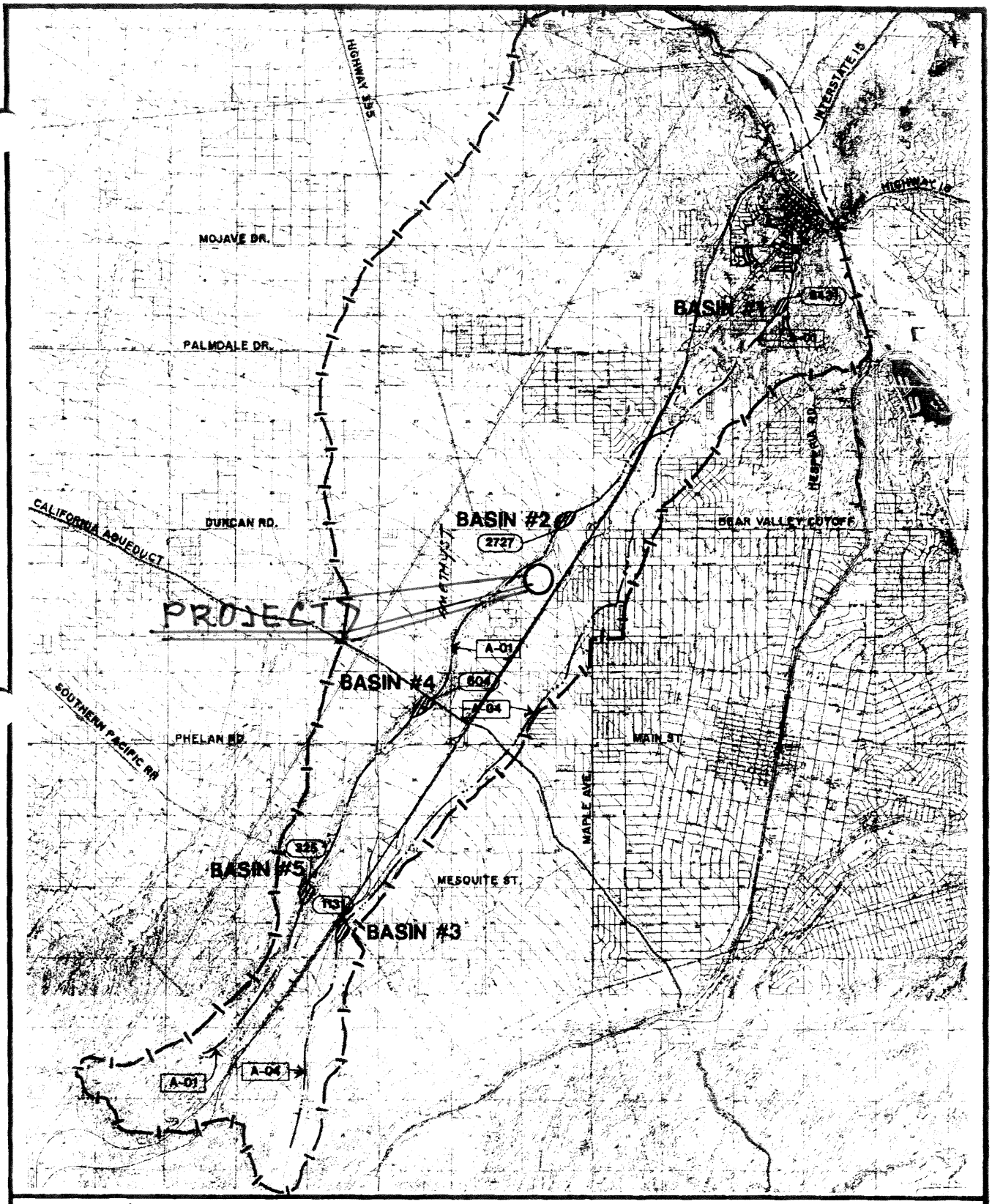
MARCH 1992

VOLUME II - Plans and Profiles - Line A (Oro Grande Wash)

PREPARED FOR

SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT

WILLIAMSON & SCHMID
CONSULTING CIVIL ENGINEERS AND LAND SURVEYORS



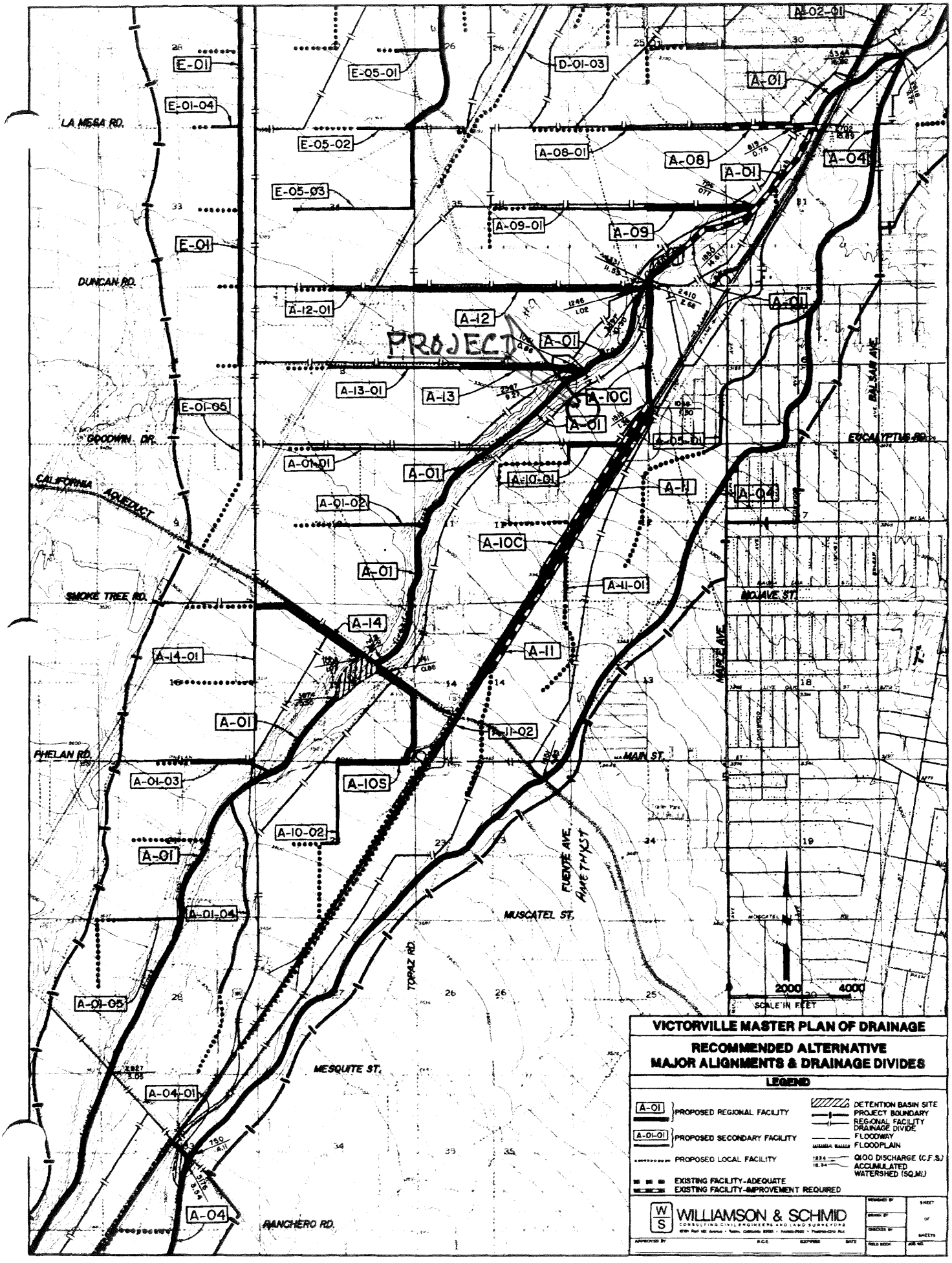
LEGEND			
	WATERSHED BOUNDARY	A-01	FACILITY DESIGNATION
	MOJAVE RIVER FLOODWAY	325	NODE NUMBER
	PROPOSED FACILITY		BASIN LOCATION

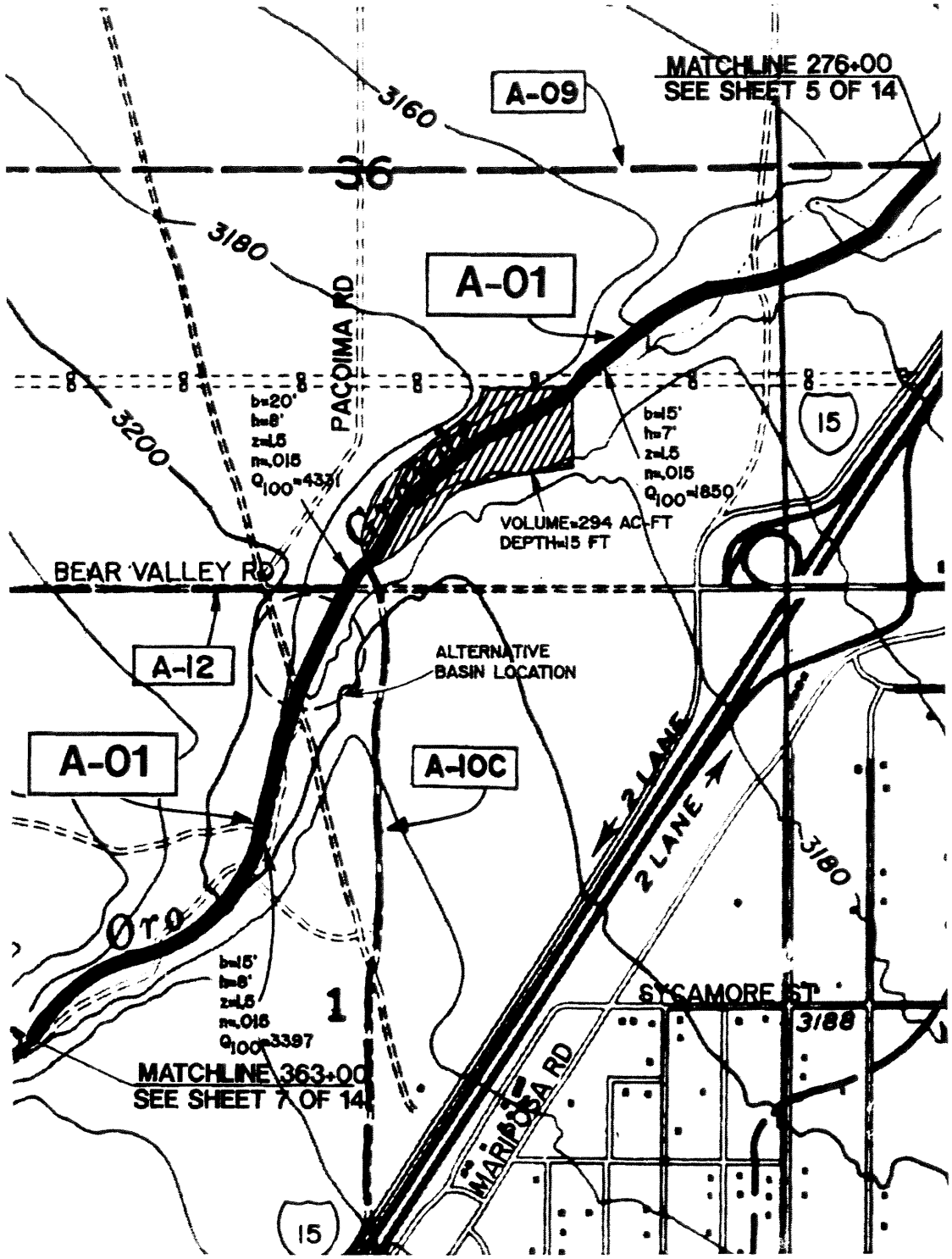
VICTORVILLE MASTER PLAN OF DRAINAGE

DETENTION BASIN LOCATION MAP
FIGURE 8.1

SCALE 1"=10000'

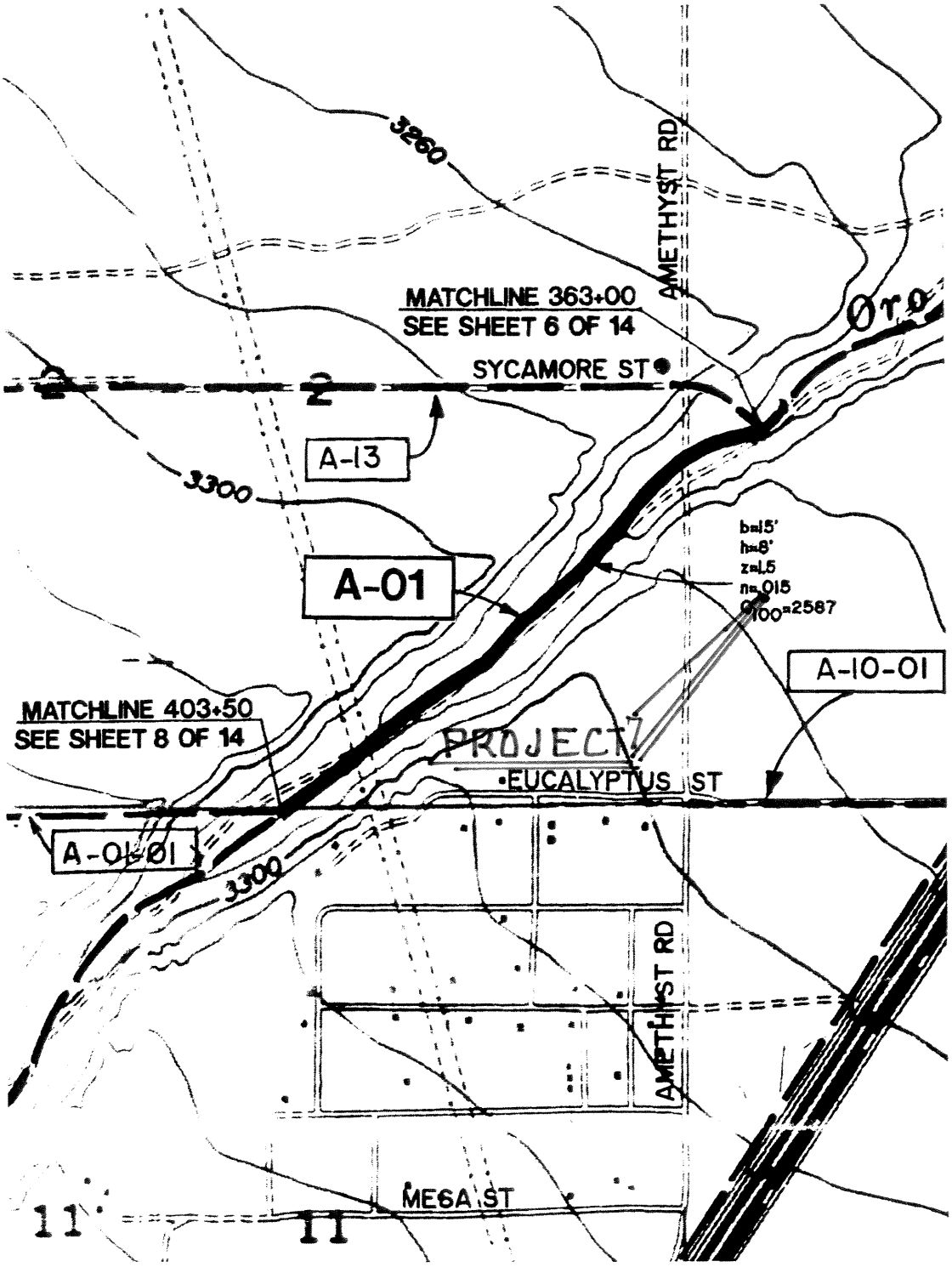
WILLIAMSON & SCHMID


PROJECT
LA MESA RD.
DUNCAN RD.
GOODWIN DR.
CALIFORNIA AQUEDUCT
SMOKE TREE RD.
PHELAN RD.
MESQUITE ST.
RANCHERO RD.
TOPAZ RD.
FUENTE AVE.
MAPLE ST.
MUSCATEL ST.
MAIN ST.
MOJAVE ST.
EUCALYPTUS RD.
BALSAM AVE.
MAPLE AVE.
E-01
E-01-04
E-05-01
E-05-02
E-05-03
E-01-05
D-01-03
A-02-01
A-01
A-08-01
A-08
A-04
A-09-01
A-09
A-12-01
A-12
A-13-01
A-13
A-10C
A-01-01
A-10-01
A-11
A-01-02
A-14
A-14-01
A-11-01
A-11-02
A-10S
A-10-02
A-01-03
A-01-04
A-01-05
A-04-01
2000
4000
SCALE IN FEET
VICTORVILLE MASTER PLAN OF DRAINAGE
RECOMMENDED ALTERNATIVE
MAJOR ALIGNMENTS & DRAINAGE DIVIDES
LEGEND
PROPOSED REGIONAL FACILITY
PROPOSED SECONDARY FACILITY
PROPOSED LOCAL FACILITY
EXISTING FACILITY-ADEQUATE
EXISTING FACILITY-IMPROVEMENT REQUIRED
DETENTION BASIN SITE
PROJECT BOUNDARY
REGIONAL FACILITY DRAINAGE DIVIDE
FLOODWAY
FLOODPLAIN
Q100 DISCHARGE (C.F.S.)
ACCUMULATED WATERSHED (SQ.MI.)
WILLIAMSON & SCHMID
CONSULTING CIVIL ENGINEERS AND LAND SURVEYORS



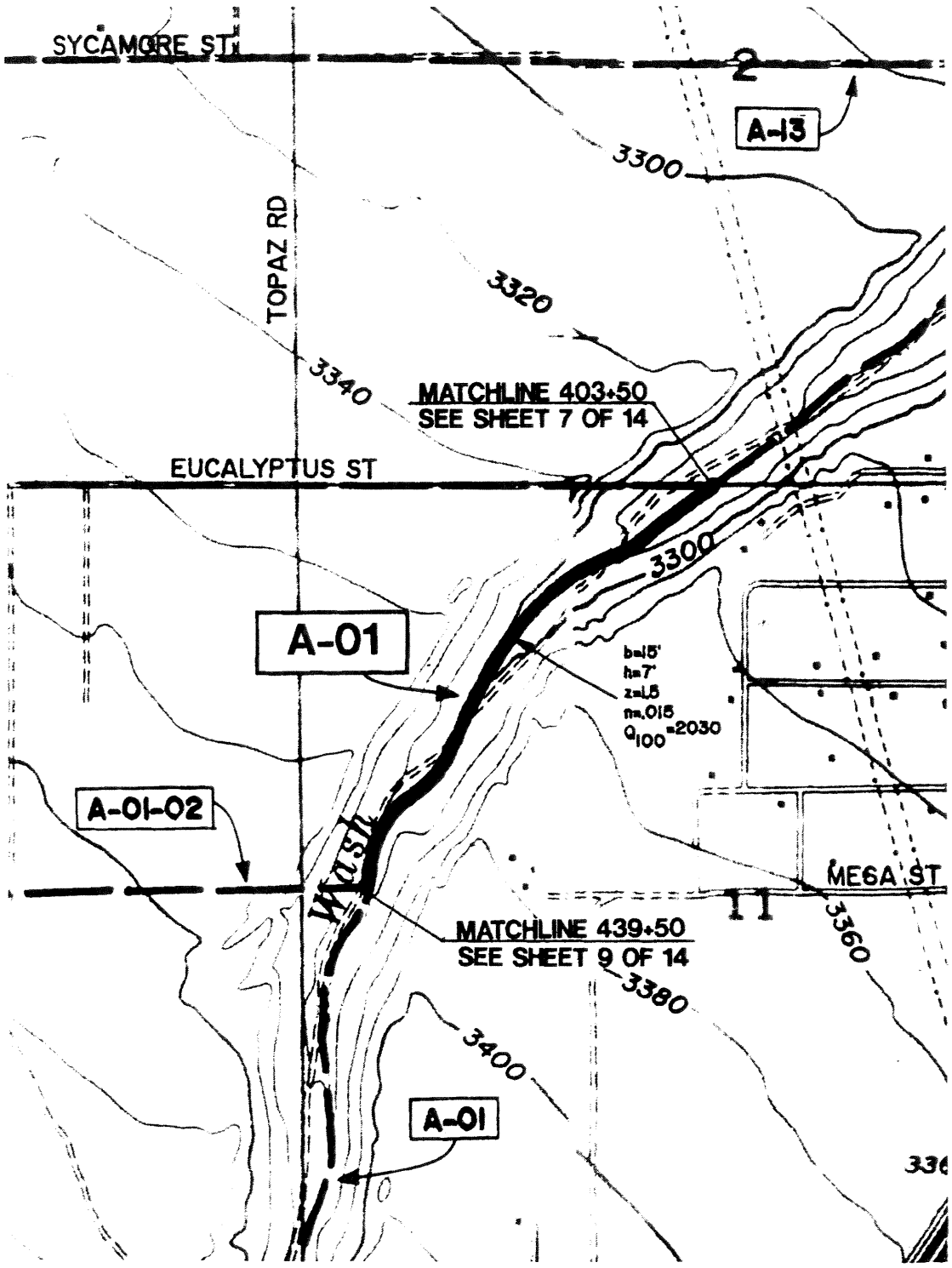
LEGEND			
	PROPOSED FACILITY		FLOODPLAIN
	FACILITY SHOWN ELSEWHERE		FLOODWAY
	WATERSHED BOUNDARY		DETENTION BASIN

VICTORVILLE MASTER PLAN OF DRAINAGE	COMPREHENSIVE STORM DRAIN PLAN LINE A-01 SHEET 6 OF 14	SCALE 1"=1000' WILLIAMSON & SCHMID



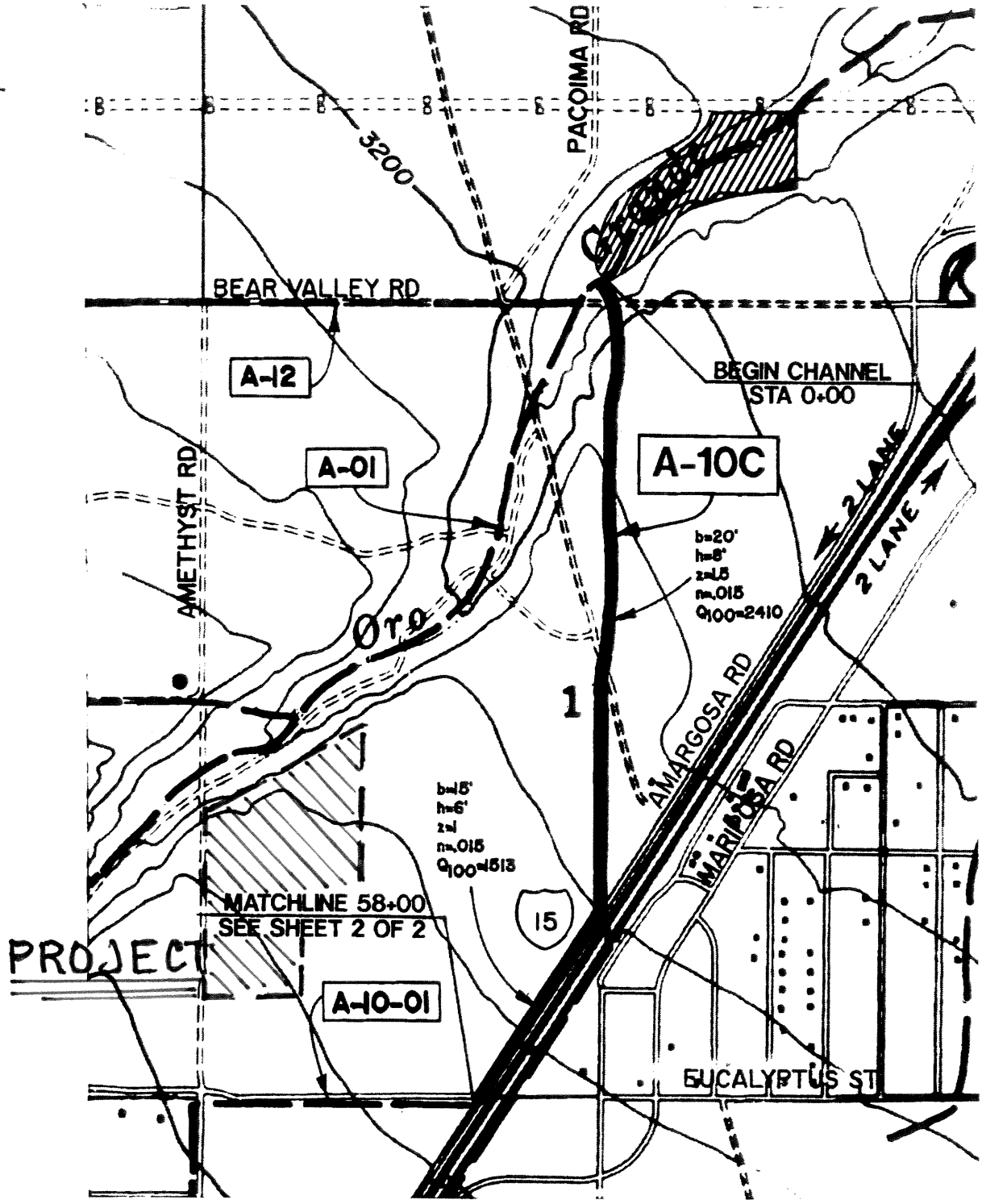
LEGEND			
	PROPOSED FACILITY		FLOODPLAIN
	FACILITY SHOWN ELSEWHERE		FLOODWAY
	WATERSHED BOUNDARY		DETENTION BASIN

VICTORVILLE MASTER PLAN OF DRAINAGE	COMPREHENSIVE STORM DRAIN PLAN LINE A-01 SHEET 7 OF 14	SCALE 1"=1000' WILLIAMSON & SCHMID



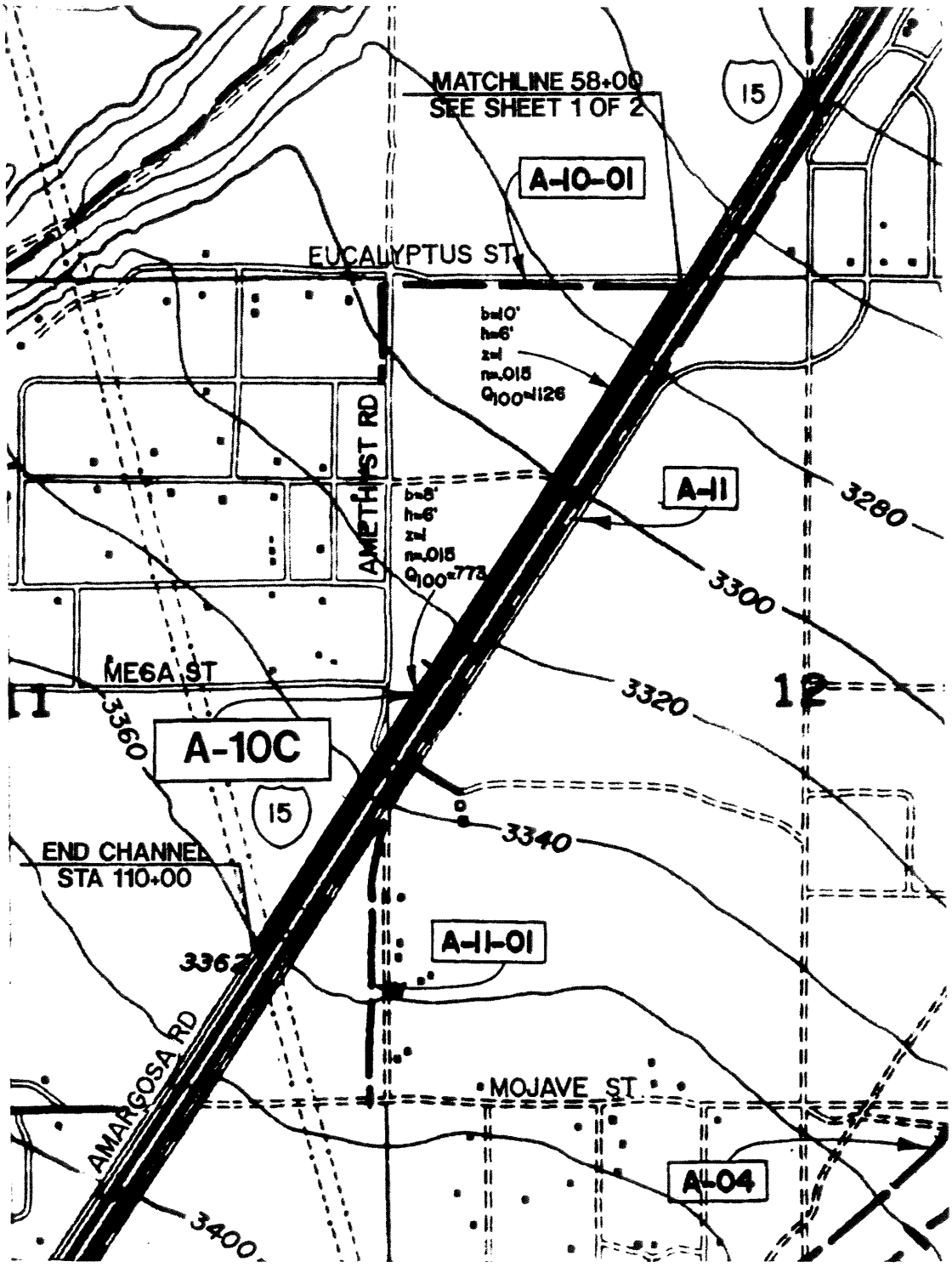
LEGEND			
	PROPOSED FACILITY		FLOODPLAIN
	FACILITY SHOWN ELSEWHERE		FLOODWAY
	WATERSHED BOUNDARY		DETENTION BASIN

VICTORVILLE MASTER PLAN OF DRAINAGE	COMPREHENSIVE STORM DRAIN PLAN LINE A-01 SHEET 8 OF 14	SCALE 1"=1000' WILLIAMSON & SCHMID



LEGEND			
	PROPOSED FACILITY		FLOODPLAIN
	FACILITY SHOWN ELSEWHERE		FLOODWAY
	WATERSHED BOUNDARY		DETENTION BASIN

VICTORVILLE MASTER PLAN OF DRAINAGE	COMPREHENSIVE STORM DRAIN PLAN LINE A-10C SHEET 1 OF 2	SCALE 1"=1000' WILLIAMSON & SCHMID



LEGEND	PROPOSED FACILITY	FLOODPLAIN
	FACILITY SHOWN ELSEWHERE	FLOODWAY
	WATERSHED BOUNDARY	DETENTION BASIN

VICTORVILLE MASTER PLAN OF DRAINAGE	COMPREHENSIVE STORM DRAIN PLAN LINE A-10C SHEET 2 OF 2	SCALE 1"=1000' WILLIAMSON & SCHMID

APPENDIX 8.6

REFERENCE MAPS AND DETAILS

OWNER/DEVELOPER:

KB HOME
36310 INLAND VALLEY DRIVE
WILDOMAR, CA 92595
(951) 691-5300

ENGINEER:

MADOLE & ASSOCIATES, INC.
9302 PITTSBURGH AVENUE, SUITE 230
RANCHO CUCAMONGA, CA 91730
(909) 481-6322

ASSESSOR'S PARCEL NO:

A PORTION OF APN 3072-251-34

ZONING & LAND USE:

PROPOSED R-1

GENERAL PLAN DESIGNATION:

LOW DENSITY RESIDENTIAL

SERVICES:

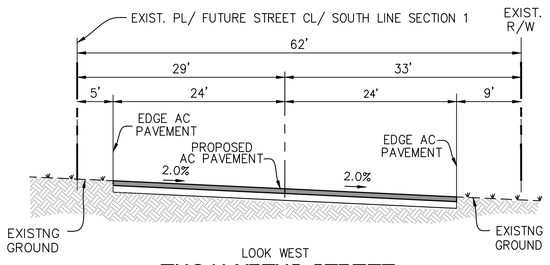
ELECTRICITY	SOUTHERN CALIFORNIA EDISON COMPANY	12353 HESPERIA ROAD, VICTORVILLE, CA 92392
WATER	CITY OF VICTORVILLE	14343 CIVIC DRIVE, VICTORVILLE, CA 92392
SEWER	CITY OF VICTORVILLE	14343 CIVIC DRIVE, VICTORVILLE, CA 92392
GAS	SOUTHWEST GAS COMPANY	14950 CIRCLE DRIVE, VICTORVILLE, CA 92392
TELEPHONE	VERIZON	15055 LA PAZ DRIVE, VICTORVILLE, CA 92392

AREAS:

TOTAL AREA	1,900,859 S.F. 43.63 NET AC
TOTAL NUMBERED LOTS	168 LOTS
UNITS PER ACRE RES.	3.8 U.P.A.
MINIMUM LOT SIZE RES.	7,200 S.F.

NOTES:

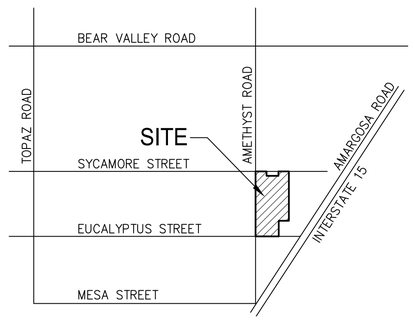
- CONTOUR SOURCE: LUDWIG ENGINEERING FIELD TOPO
- DEVELOPMENT OF SITE WILL HAVE MINIMAL EFFECT ON EXISTING DRAINAGE PATTERNS. STORM WATER RUNOFF WILL FOLLOW EXISTING AN NATURAL DRAINAGE COURSES OR BE CARRIED IN PROPOSED STREETS AND DRAINAGE FACILITIES AS INDICATED ON THE MAP AND OUTLINED IN ACCOMPANYING DRAINAGE STUDY.
- EARTHWORK WILL BE BALANCED ON SITE. (ROUGH GRADING PLAN HAS BEEN PRE ESTIMATED EARTHWORK QUANTITY: 171,00 AND 156,00 FILL
- IMPROVEMENTS ARE PER TYPICAL SUBDIVISION AND ARE TO BE BUILT ACCORDING TO CITY OF VICTORVILLE STANDARDS.
- SETBACKS: 20' - FRONT AND REAR; 10' - STREET SIDE YARD; 5' - SIDE YARD
- THIS IS A CALCULATED MAP, LOT CLOSURES ARE AVAILABLE. THE DEVELOPER REQUESTS REVIEW FOR COMPLIANCE WITH CURRENT CODES AND POLICIES WITH REGARD TO GEOMETRICS.
- SECONDARY ACCESS TO BE PROVIDED WHERE NECESSARY.



LOOK WEST

EUCALYPTUS STREET

NTS



VICINITY MAP

NTS

NOT TO SCALE

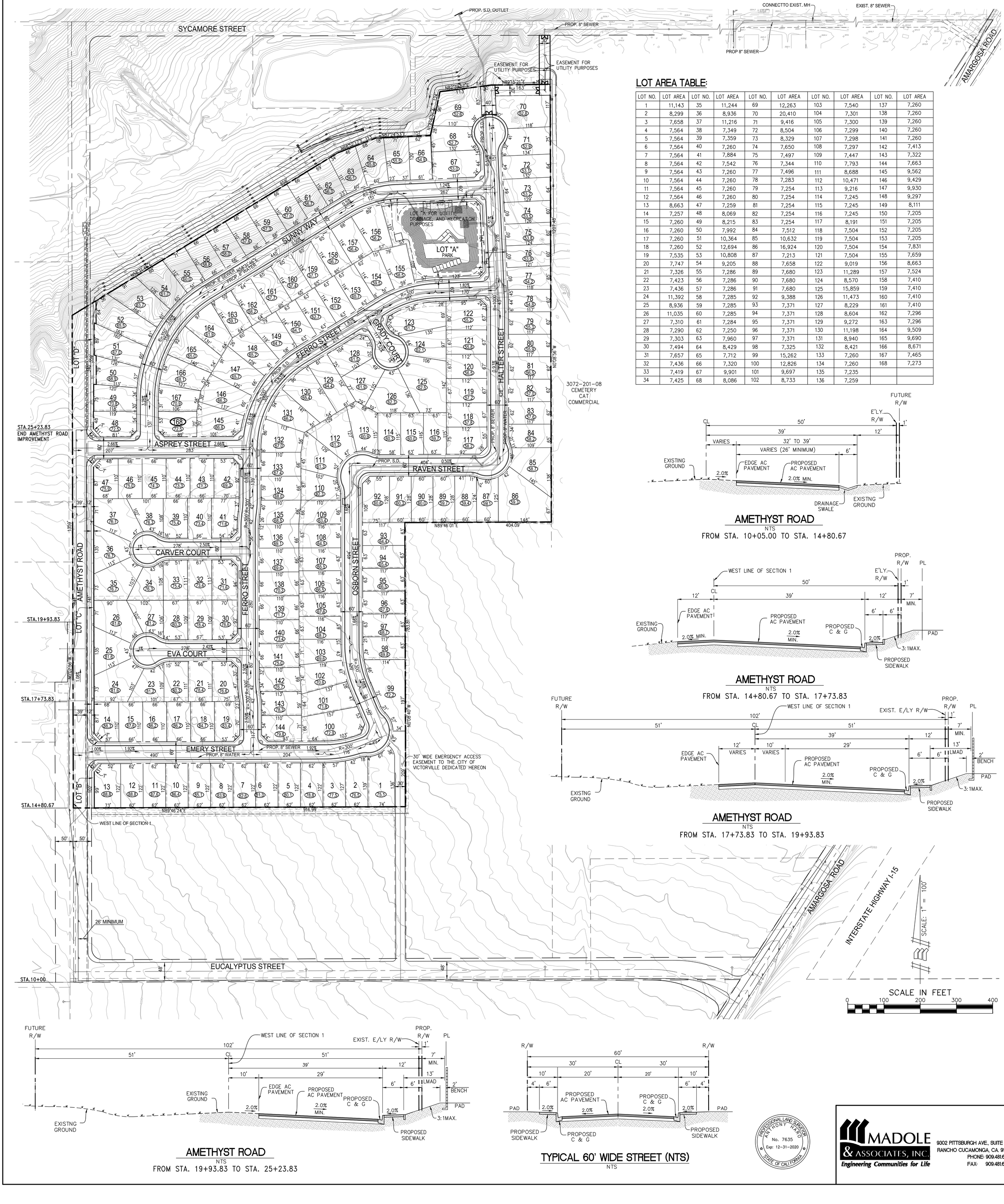
IN THE CITY OF VICTORVILLE,
COUNTY OF SAN BERNARDINO, CALIFORNIA
VESTING TENTATIVE MAP

TENTATIVE TRACT NO. 20274

A PORTION OF PARCEL MAP NO. 16301 IN THE CITY OF VICTORVILLE, COUNTY OF SAN BERNARDINO, CALIFORNIA, PER PLAT RECORDED IN BOOK 203 OF PARCEL MAPS PAGES 59 AND 60, RECORDS OF SAID COUNTY

MADOLE AND ASSOCIATES, INC **JULY 24, 2019**

TOTAL LOT AREA (168)	1,386,442 S.F.	31.83 AC.
LOT A	51,697 S.F.	1.19 AC.
LOT B	741 S.F.	0.02 AC.
LOT C	5,241 S.F.	0.12 AC.
LOT D	3,930 S.F.	0.09 AC.



LOT AREA TABLE:

LOT NO.	LOT AREA	LOT NO.	LOT AREA	LOT NO.	LOT AREA	LOT NO.	LOT AREA	LOT NO.	LOT AREA
1	11,143	35	11,244	69	12,263	103	7,540	137	7,260
2	8,299	36	8,936	70	20,410	104	7,301	138	7,260
3	7,658	37	11,216	71	9,416	105	7,300	139	7,260
4	7,564	38	7,349	72	8,504	106	7,299	140	7,260
5	7,564	39	7,359	73	8,329	107	7,298	141	7,260
6	7,564	40	7,260	74	7,650	108	7,297	142	7,413
7	7,564	41	7,884	75	7,497	109	7,447	143	7,322
8	7,564	42	7,542	76	7,344	110	7,793	144	7,663
9	7,564	43	7,260	77	7,496	111	8,688	145	9,562
10	7,564	44	7,260	78	7,283	112	10,471	146	9,429
11	7,564	45	7,260	79	7,254	113	9,216	147	9,930
12	7,564	46	7,260	80	7,254	114	7,245	148	9,297
13	8,663	47	7,259	81	7,254	115	7,245	149	8,111
14	7,257	48	8,069	82	7,254	116	7,245	150	7,205
15	7,260	49	8,215	83	7,254	117	8,191	151	7,205
16	7,260	50	7,992	84	7,512	118	7,504	152	7,205
17	7,260	51	10,364	85	10,632	119	7,504	153	7,205
18	7,260	52	12,694	86	16,924	120	7,504	154	7,831
19	7,535	53	10,808	87	7,213	121	7,504	155	7,659
20	7,747	54	9,205	88	7,658	122	9,019	156	8,663
21	7,326	55	7,286	89	7,680	123	11,289	157	7,524
22	7,423	56	7,286	90	7,680	124	8,570	158	7,410
23	7,436	57	7,286	91	7,680	125	15,859	159	7,410
24	11,392	58	7,285	92	9,388	126	11,473	160	7,410
25	8,936	59	7,285	93	7,371	127	8,229	161	7,410
26	11,035	60	7,285	94	7,371	128	8,604	162	7,296
27	7,310	61	7,284	95	7,371	129	9,272	163	7,296
28	7,290	62	7,250	96	7,371	130	11,198	164	9,509
29	7,303	63	7,960	97	7,371	131	8,940	165	9,690
30	7,494	64	8,429	98	7,325	132	8,421	166	8,671
31	7,657	65	7,712	99	15,262	133	7,260	167	7,465
32	7,436	66	7,320	100	12,826	134	7,260	168	7,273
33	7,419	67	9,901	101	9,697	135	7,235		
34	7,425	68	8,086	102	8,733	136	7,259		

AMETHYST ROAD

NTS

FROM STA. 10+05.00 TO STA. 14+80.67

AMETHYST ROAD

NTS

FROM STA. 14+80.67 TO STA. 17+73.83

AMETHYST ROAD

NTS

FROM STA. 17+73.83 TO STA. 19+93.83

AMETHYST ROAD

NTS

FROM STA. 19+93.83 TO STA. 25+23.83

TYPICAL 60' WIDE STREET (NTS)

NTS

PROFESSIONAL LAND SURVEYOR ANTHONY HARO No. 7635 Exp: 12-31-2020 STATE OF CALIFORNIA

MADOLE & ASSOCIATES, INC.
Engineering Communities for Life
9302 PITTSBURGH AVE., SUITE 230
RANCHO CUCAMONGA, CA. 91730
PHONE: 909.481.6322
FAX: 909.481.6320

J.N. 652-1985; REVISED TENTATIVE TRACT NO 17046

IN THE CITY OF VICTORVILLE, COUNTY OF SAN BERNARDINO, CALIFORNIA

PARCEL MAP NO. 16983

SECTION 1 BEING A SUBDIVISION OF PARCEL 1 OF PARCEL MAP NO. 16301 PMB 203/59-60. TOWNSHIP 4 NORTH, RANGE 5 WEST, S.B.M., IN THE CITY OF VICTORVILLE, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA.

LUDWIG ENGINEERING

MARCH, 2005

209/31

OWNER'S STATEMENT

WE HEREBY STATE THAT WE ARE ALL OF THE PARTIES HAVING ANY RECORD TITLE INTEREST IN THE LAND SUBDIVIDED AS SHOWN ON THE ANNEXED PARCEL MAP AND THAT WE ARE THE ONLY PERSONS WHOSE CONSENT IS NECESSARY TO PASS TITLE TO SAID LAND, AND WE CONSENT TO THE PREPARATION AND RECORDATION OF SAID PARCEL MAP AND SUBDIVISION AS SHOWN WITHIN THE PARCEL MAP BORDER LINE, AND

WE HEREBY DEDICATE TO THE CITY OF VICTORVILLE A "SLOPE AND DRAINAGE EASEMENT" OVER THE ENTIRE PARCEL 1, AND AN "EMERGENCY ACCESS EASEMENT" ACROSS PARCEL 3 ALL SHOWN HEREON.

WE HEREBY RESERVE A SLOPE EASEMENT ACROSS PARCEL 1 AS SHOWN HEREON FOR THE SOLE BENEFIT OF OURSELVES, OUR SUCCESSORS AND ASSIGNEES.

WE HEREBY RESERVE A ROAD EASEMENT ACROSS PARCEL 1 AS SHOWN HEREON FOR THE BENEFIT OF OURSELVES, OUR SUCCESSORS AND ASSIGNEES.

BAYSHORE, L.L.C., A CALIFORNIA LIMITED LIABILITY COMPANY; A REED SPRINGS, LLC, A CALIFORNIA LIMITED LIABILITY COMPANY; DESERT CONSERVANCY INTERNATIONAL, LLC, A CALIFORNIA LIMITED LIABILITY COMPANY:

Don Dahl
BAYSHORE, LLC
BY:

Don Dahl
DESERT CONSERVANCY INTERNATIONAL, LLC
BY:

Troy M Ford
REED SPRINGS LLC
BY:

NOTARY ACKNOWLEDGEMENT

STATE OF CALIFORNIA
COUNTY OF ORANGE } ss.

ON JULY 5 2005 BEFORE ME, CYNTHIA A. McDONALD NOTARY

PERSONALLY APPEARED LARRY R. FORD

PERSONALLY KNOWN TO ME (OR PROVED TO ME ON THE BASIS OF SATISFACTORY EVIDENCE) TO BE THE PERSON(S) WHOSE NAME(S) IS/ARE SUBSCRIBED TO THE WITHIN INSTRUMENT AND ACKNOWLEDGED TO ME THAT HE/SHE/THEY EXECUTED THE SAME IN HIS/HER/THEIR AUTHORIZED CAPACITY(IES), AND THAT BY HIS/HER/THEIR SIGNATURE(S) ON THE INSTRUMENT THE PERSON(S), OR THE ENTITY UPON BEHALF OF WHICH THE PERSON(S) ACTED, EXECUTED THE INSTRUMENT.

WITNESS MY HAND.

SIGNATURE Cynthia A McDonald
MY COMMISSION EXPIRES: 12/07/2007
NAME: CYNTHIA A. McDONALD

MY PRINCIPAL PLACE OF BUSINESS IS IN ORANGE COUNTY.

NOTARY ACKNOWLEDGEMENT

STATE OF CALIFORNIA
COUNTY OF Los Angeles } ss.

ON July 5, 2005 BEFORE ME, NANCY PAU, notary

PERSONALLY APPEARED DANI SALEH

PERSONALLY KNOWN TO ME (OR PROVED TO ME ON THE BASIS OF SATISFACTORY EVIDENCE) TO BE THE PERSON(S) WHOSE NAME(S) IS/ARE SUBSCRIBED TO THE WITHIN INSTRUMENT AND ACKNOWLEDGED TO ME THAT HE/SHE/THEY EXECUTED THE SAME IN HIS/HER/THEIR AUTHORIZED CAPACITY(IES), AND THAT BY HIS/HER/THEIR SIGNATURE(S) ON THE INSTRUMENT THE PERSON(S), OR THE ENTITY UPON BEHALF OF WHICH THE PERSON(S) ACTED, EXECUTED THE INSTRUMENT.

WITNESS MY HAND.

SIGNATURE
MY COMMISSION EXPIRES: 2/28/2006
NAME: NANCY PAU

NANCY PAU
Comm. # 1475512
NOTARY PUBLIC - CALIFORNIA
Los Angeles County
My Comm. Expires FEB 19, 2006

MY PRINCIPAL PLACE OF BUSINESS IS IN Los Angeles COUNTY.

CITY ENGINEER'S STATEMENT OF IMPROVEMENTS REQUIRED

THE FOLLOWING REQUIREMENTS FOR THE CONSTRUCTION OF OFFSITE AND ON-SITE IMPROVEMENTS ALONG THE STREET FRONTAGES OF EACH PARCEL CREATED BY THIS SUBDIVISION ARE A CONDITION OF THE APPROVAL OF THIS PARCEL MAP. IN ACCORDANCE WITH THE PROVISIONS OF SECTION 66411.1 OF THE SUBDIVISION MAP ACT. THE IMPROVEMENTS SHALL BE INSTALLED AT SUCH TIME AS A PERMIT OR OTHER GRANT OF APPROVAL FOR DEVELOPMENT OF ANY OR ALL PARCELS CREATED BY THIS SUBDIVISION IS ISSUED BY THE CITY OF VICTORVILLE.

1. THE SUBDIVIDER OR ANY SUCCESSOR IN INTEREST OF ANY PARCELS TO BE CREATED BY THIS SUBDIVISION SHALL BE RESPONSIBLE FOR ANY COST INCURRED IN THE RELOCATION OF EXISTING UTILITY FACILITIES WHERE SUCH FACILITIES CONFLICT WITH THE IMPROVEMENTS REQUIRED WHEN SAID IMPROVEMENTS ARE INSTALLED AND FOR THE UNDERGROUNDING OF ALL EXISTING OVERHEAD UTILITIES.
2. THE SUBDIVIDER OR ANY SUCCESSOR IN INTEREST OF ANY OF THE PARCELS TO BE CREATED BY THIS SUBDIVISION SHALL BE REQUIRED TO PROVIDE UNDERGROUND ELECTRICAL, TELEPHONE AND COMMUNICATIONS CABLE TO EACH PARCEL CREATED BY THIS SUBDIVISION.
3. THE SUBDIVIDER OR ANY SUCCESSOR IN INTEREST OF ANY OF THE PARCELS TO BE CREATED BY THIS SUBDIVISION SHALL PROVIDE SEWER SERVICE TO EACH PARCEL CREATED BY THIS SUBDIVISION IN ACCORDANCE WITH THE REQUIREMENTS OF THE SANITARY DIVISION OF THE CITY AND THE CITY ENGINEER.
4. THE SUBDIVIDER OR ANY SUCCESSOR IN INTEREST OF ANY OF THE PARCELS TO BE CREATED BY THIS SUBDIVISION SHALL INSTALL STREET LIGHTS ALONG THE STREET FRONTAGES IN ACCORDANCE WITH THE REQUIREMENTS OF THE MASTER STREET LIGHTING PLANS OF THE CITY OF VICTORVILLE, THE SOUTHERN CALIFORNIA EDISON COMPANY AND AS REQUIRED BY THE CITY ENGINEER.
5. THE SUBDIVIDER OR ANY SUCCESSOR IN INTEREST OF ANY OF THE PARCELS TO BE CREATED BY THIS SUBDIVISION SHALL PROVIDE WATER SERVICE TO EACH PARCEL CREATED BY THIS SUBDIVISION IN ACCORDANCE WITH THE REQUIREMENTS OF THE VICTOR VALLEY WATER DISTRICT AND THE CITY ENGINEER.
6. THE SUBDIVIDER OR ANY SUCCESSOR IN INTEREST OF ANY OF THE PARCELS TO BE CREATED BY THIS SUBDIVISION SHALL INSTALL FIRE HYDRANTS AND ONSITE FIRE PROTECTION TO SERVE EACH PARCEL CREATED BY THIS SUBDIVISION IN ACCORDANCE WITH THE REQUIREMENTS OF THE VICTORVILLE FIRE DEPARTMENT AND THE CITY ENGINEER.
7. THE SUBDIVIDER OR ANY SUCCESSOR IN INTEREST OF ANY OF THE PARCELS TO BE CREATED BY THIS SUBDIVISION SHALL INSTALL CURBS, GUTTERS, SIDEWALKS, DRIVE APPROACHES, ASPHALT PAVEMENT AND DRAINAGE FACILITIES ALONG THE STREET FRONTAGES OF THIS SUBDIVISION IN ACCORDANCE WITH STANDARD SPECIFICATIONS OF PUBLIC IMPROVEMENTS OF THE CITY OF VICTORVILLE.
8. THE SUBDIVIDER OR ANY SUCCESSOR IN INTEREST OF ANY OF THE PARCELS TO BE CREATED BY THIS SUBDIVISION SHALL PROVIDE GAS SERVICE TO EACH PARCEL CREATED BY THIS SUBDIVISION.
9. THE SUBDIVIDER OR ANY SUCCESSOR IN INTEREST OF ANY OF THE PARCELS TO BE CREATED BY THIS SUBDIVISION SHALL INSTALL PHYSICALLY HANDICAPPED RAMPS AT ALL INTERSECTIONS.

Brian W. Gengler
BRIAN W. GENGLER ASSISTANT CITY ENGINEER
R.C.E. C44730 EXPIRES 3-31-06

DATE: 7-14-05

REGISTERED PROFESSIONAL ENGINEER BRIAN W. GENGLER No. C44730 Exp. 3-31-06 CIVIL STATE OF CALIFORNIA

ENGINEER'S STATEMENT

I, GLEN L. LUDWIG, HEREBY STATE THAT I AM A REGISTERED CIVIL ENGINEER OF THE STATE OF CALIFORNIA AND THAT THIS PARCEL MAP, CONSISTING OF TWO SHEETS, WAS PREPARED BY ME OR UNDER MY DIRECTION AND IS BASED UPON A FIELD SURVEY IN CONFORMANCE WITH THE SUBDIVISION MAP ACT AND LOCAL ORDINANCE AT THE REQUEST OF LARRY FORD IN AUGUST 2003, AND THAT ALL MONUMENTS SHOWN HEREON ARE OF THE CHARACTER AND OCCUPY THE POSITIONS INDICATED, OR WILL BE SET IN SUCH POSITIONS ON OR BEFORE MARCH, 2006 IN COMPLIANCE WITH SECTIONS 66495 AND 66496 OF THE SUBDIVISION MAP ACT AND WILL BE SUFFICIENT TO ENABLE THE SURVEY TO BE RETRACED, I HEREBY STATE THAT THIS PARCEL MAP SUBSTANTIALLY CONFORMS TO THE CONDITIONALLY APPROVED TENTATIVE MAP.

DATED: 7-11-05

Glen L Ludwig
GLEN L. LUDWIG, R.C.E. 13191
EXPIRES 3-31-07

REGISTERED PROFESSIONAL ENGINEER GLEN L. LUDWIG No. 13191 EXP. 3-31-07 CIVIL STATE OF CALIFORNIA

CITY ENGINEER'S STATEMENT

I HEREBY STATE THAT I HAVE EXAMINED THE ANNEXED PARCEL MAP, THAT THE SUBDIVISION SHOWN THEREON IS SUBSTANTIALLY THE SAME AS IT APPEARED ON THE TENTATIVE MAP AND ANY APPROVED ALTERATIONS THERETO AND THAT ALL THE PROVISIONS OF CHAPTER 2 OF THE SUBDIVISION MAP ACT AND TITLE 17 OF THE VICTORVILLE MUNICIPAL CODE HAVE BEEN COMPLIED WITH.

DATED: 7-14-05

Brian W. Gengler
BRIAN W. GENGLER ASSISTANT CITY ENGINEER
CITY OF VICTORVILLE, CALIFORNIA
R.C.E. C44730 EXPIRES 3-31-06

REGISTERED PROFESSIONAL ENGINEER BRIAN W. GENGLER No. C44730 Exp. 3-31-06 CIVIL STATE OF CALIFORNIA

CITY SURVEYOR'S STATEMENT

I AM SATISFIED THAT THIS PARCEL MAP IS TECHNICALLY CORRECT.

DATED: 7-14-05

Michael D. Coy
MICHAEL D. COY, CITY SURVEYOR
CITY OF VICTORVILLE, CALIFORNIA
L.S. 7337 EXPIRES 12-31-05

LICENSED LAND SURVEYOR MICHAEL D. COY EXP. 12/31/05 NO. LS7337 STATE OF CALIFORNIA

CITY COUNCIL'S ACCEPTANCE CERTIFICATE

I HEREBY CERTIFY THAT THE CITY COUNCIL OF THE CITY OF VICTORVILLE BY RESOLUTION NO. 76-15, ADOPTED ON THE 17TH DAY OF FEBRUARY, 1976, HAS AUTHORIZED ME, ACTING ON THEIR BEHALF, TO ACKNOWLEDGE THE FOREGOING OFFERS OF DEDICATIONS FOR SLOPE AND DRAINAGE, AND ALSO ACCEPTS THE EMERGENCY ACCESS EASEMENT ALL SHOWN HEREON.

Candy Reed
CANDY REED, CITY CLERK OF THE CITY OF VICTORVILLE
STATE OF CALIFORNIA

DATE: 7-13-05

BY: _____, DEPUTY

AUDITOR'S CERTIFICATE

I HEREBY CERTIFY THAT ACCORDING TO THE RECORDS OF THIS OFFICE, AS OF THIS DATE, THERE ARE NO LIENS AGAINST THE REAL PROPERTY SHOWN UPON THE ANNEXED MAP FOR UNPAID STATE, COUNTY, MUNICIPAL OR LOCAL TAXES OR SPECIAL ASSESSMENTS COLLECTED AS TAXES, EXCEPT TAXES OR SPECIAL ASSESSMENTS NOT YET PAYABLE, ESTIMATED TO BE $ 9,000.00

DATED: 07/29/05

LARRY WALKER, COUNTY AUDITOR
COUNTY OF SAN BERNARDINO, CALIFORNIA

BY: Geri Mooney, DEPUTY

BOARD OF SUPERVISORS' CERTIFICATE

I HEREBY CERTIFY THAT A BOND IN THE SUM OF $ 9,000.00 HAS BEEN EXECUTED AND FILED WITH THE BOARD OF SUPERVISORS OF THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, CONDITIONED UPON THE PAYMENT OF ALL TAXES, STATE, COUNTY, MUNICIPAL OR LOCAL, AND ALL SPECIAL ASSESSMENTS COLLECTED AS TAXES, WHICH AT THE TIME OF THE FILING OF THE ANNEXED MAP WITH THE COUNTY RECORDER ARE A LIEN AGAINST SAID PROPERTY, BUT NOT YET PAYABLE AND THAT THE SUBDIVIDER HAS FILED WITH ME A CERTIFICATE BY THE PROPER OFFICER GIVING HIS ESTIMATE OF THE AMOUNT OF SAID TAXES AND ASSESSMENTS, AND SAID BOND IS HEREBY ACCEPTED.

DATED: 07/29/05

DENA M. SMITH
INTERIM CLERK OF THE BOARD OF SUPERVISORS
OF THE COUNTY OF SAN BERNARDINO

BY: Geri Mooney, DEPUTY

SIGNATURE OMISSIONS

THE SIGNATURES OF THE GOVERNING BODY OF THE UNITED STATES OF AMERICA, THE OWNERS OF ANY VESTED OR ACCRUED WATER RIGHTS FOR MINING, AGRICULTURAL, MANUFACTURING OR OTHER PURPOSES, AND RIGHTS TO DITCHES AND RESERVOIRS USED IN CONNECTION WITH SUCH WATER RIGHTS, AS DISCLOSED BY U.S. PATENT NO. 427347 RECORDED JUNE 23, 1915 IN BOOK 'J' PAGE 338, OF PATENTS, RECORDS OF SAN BERNARDINO COUNTY, HAVE BEEN OMITTED UNDER THE PROVISIONS OF SECTION 66436 (b) (1) OF THE SUBDIVISION MAP ACT. SAID RIGHTS AND RESERVATIONS COVER THE ENTIRE AREA BEING SUBDIVIDED.

THE SIGNATURE(S) OF INYO TELEPHONE COMPANY, THE RECORD OWNER(S) OF A 30' WIDE EASEMENT FOR POLE LINES AND INCIDENTAL PURPOSES, AS DISCLOSED BY A DOCUMENT RECORDED NOVEMBER 26, 1915 IN BOOK 581, PAGE 124, OF DEEDS, HAS BEEN OMITTED PURSUANT TO THE PROVISIONS OF SECTION 66436 (3) OF THE SUBDIVISION MAP ACT. SAID EASEMENT CANNOT BE LOCATED FROM THE RECORD.

THE SIGNATURE(S) OF BALDY MESA WATER DISTRICT, THE RECORD OWNER(S) OF AN EASEMENT FOR WATER PIPELINES AND INCIDENTAL PURPOSES, AS DISCLOSED BY INSTRUMENT NO. 82-07707 O.R. HAS BEEN OMITTED PURSUANT TO THE PROVISIONS OF SECTION 66436 (3) OF THE SUBDIVISION MAP ACT. SAID EASEMENT IS SHOWN HEREON.

THE SIGNATURE(S) OF MT. VIEW CEMTERY OF SAN BERNARDINO, THE RECORD OWNER(S) OF AN EASEMENT FOR WATER PIPELINES AND INCIDENTAL PURPOSES, AS DISCLOSED BY INSTRUMENT NO. 82-189283 O.R. HAS BEEN OMITTED PURSUANT TO THE PROVISIONS OF SECTION 66436 (3) OF THE SUBDIVISION MAP ACT. SAID EASEMENT IS SHOW HEREON.

THE SIGNATURE(S) OF SOUTHERN CALIFORNIA EDISON COMPANY, A CORPORATION AND CONTINENTAL TELEPHONE COMPANY OF CALIFORNIA, THE RECORD OWNER(S) OF AN EASEMENT FOR ABOVE GROUND OR UNDERGROUND CONDUITS OR BOTH AND INCIDENTAL PURPOSES, AS DISCLOSED BY INSTRUMENT NO. 82-273657 O.R. HAS BEEN OMITTED PURSUANT TO THE PROVISIONS OF SECTION 66436 (3) OF THE SUBDIVISION MAP ACT. SAID EASEMENT IS SHOW HEREON.

SAN BERNARDINO COUNTY RECORDER'S CERTIFICATE

THIS MAP HAS BEEN FILED UNDER DOCUMENT NUMBER 2005-0553178
THIS 29 DAY OF JULY 2005 AT 2:56 P.M. IN BOOK 209 OF PARCEL MAPS AT PAGES 31 AND 32 AT THE REQUEST OF First American Title Company
IN THE AMOUNT OF $ 0.00

LARRY WALKER
AUDITOR-CONTROLLER/RECORDER
COUNTY OF SAN BERNARDINO

BY: Virginia Furnish
DEPUTY RECORDER

209/31

IN THE CITY OF VICTORVILLE, COUNTY OF SAN BERNARDINO, CALIFORNIA

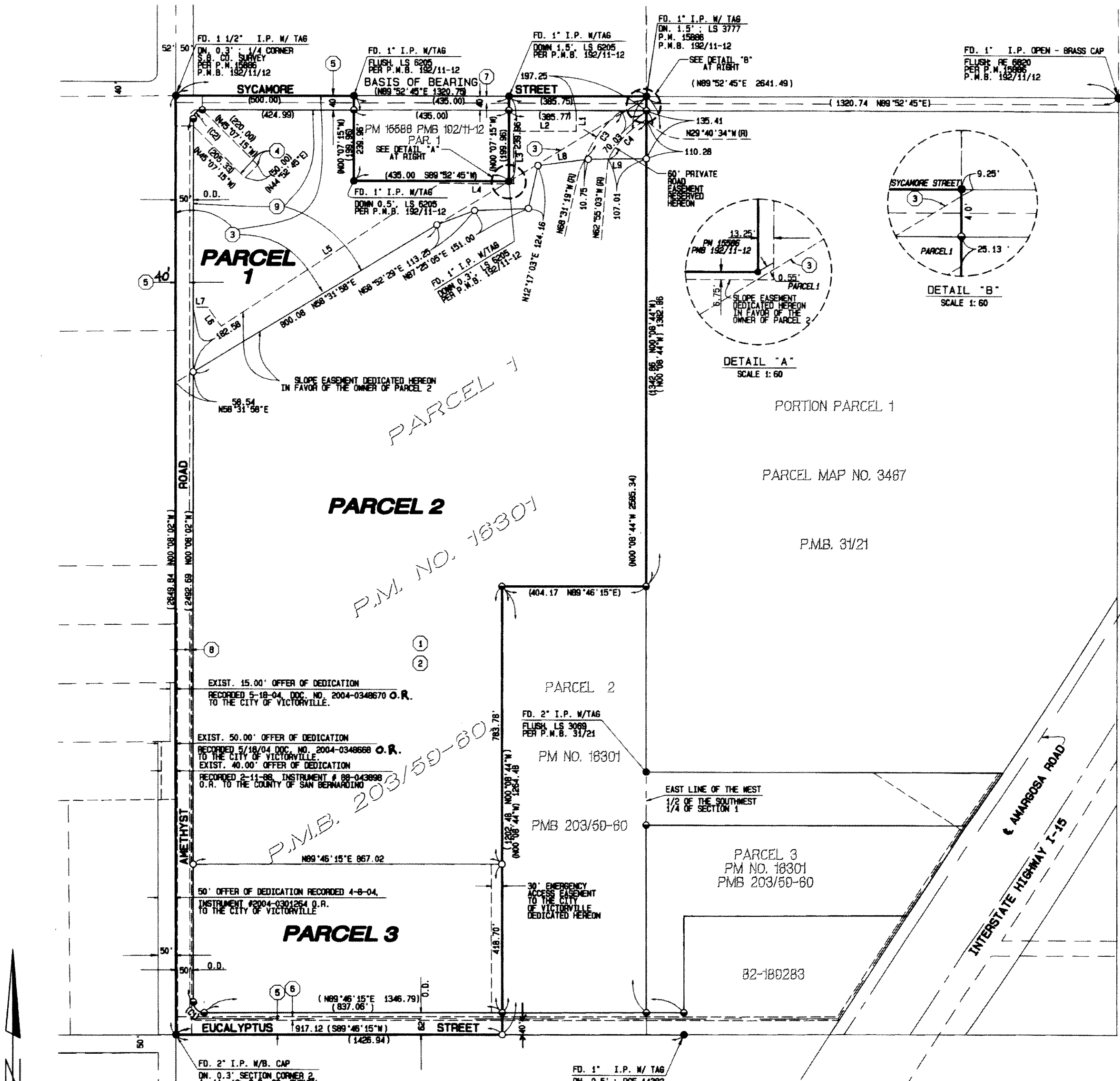
PARCEL MAP NO. 16983

BEING A SUBDIVISION OF PARCEL 1 OF PARCEL MAP NO. 16301 PMB 203/59-60.
SECTION 1 TOWNSHIP 4 NORTH, RANGE 5 WEST, S.B.M., IN THE CITY OF VICTORVILLE, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA.

LUDWIG ENGINEERING

MARCH, 2005

1691



CURVE DATA TABLE

CURVE	DELTA	RADIUS	ARC	TANGENT
(C1	90°05'43"	30.00	47.17	30.05
(C2	90°00'47"	25.00	39.28	25.01
C3	30°23'20"	330.00	175.03	89.62
C4	33°14'29"	270.00	156.65	80.60

ENGINEER'S NOTES:

1. BASIS OF BEARINGS IS THE NORTH LINE OF THE SW 1/4 OF SECTION 1, T. 4N, R. 5W S.B.M. PER PARCEL MAP 15586 P.M.B. 192/11-12, BEING N89°52'45"E.
2. ( ) INDICATES RECORD & MEASURED PER PARCEL MAP 16301 P.M.B. 203/59-60.
3. ● INDICATES FOUND MONUMENT AS NOTED
4. ◒ INDICATES FOUND 1" I.P. TAGGED R.C.E. 13191 UNLESS OTHERWISE NOTED. CENTERLINE MONUMENTS SET 1/4" BELOW FINISHED PAVEMENT SURFACE W/ BRASS TAG & NAIL PER PM 16301 P.M.B. 203/59-60.
5. ○ INDICATES SET 1" I.P. AND TAG RCE 13191. CENTERLINE MONUMENTS SET 1/4" BELOW FINISHED PAVEMENT SURFACE W/ BRASS TAG & NAIL.
6. I.P. INDICATES "IRON PIPE".
7. FD. INDICATES "FOUND".
8. O.D. INDICATES "OFFER OF DEDICATION" TO THE CITY OF VICTORVILLE FOR PUBLIC USE PER P.M. 16301 P.M.B. 203/59-60.
9. ——— INDICATES PARCEL MAP BORDER LINE.
10. TENTATIVE PARCEL MAP NO. PM-04-033
11. ALL FOUND MONUMENTS DISTURBED AND/OR DESTROYED AS A RESULT OF CONSTRUCTION WILL BE RESET WITH LIKE KIND TAGGED R.C.E. 13191, UNLESS OTHERWISE NOTED.
12. THIS PARCEL MAP CONTAINS 3 NUMBERED PARCELS

LINE DATA TABLE

LINE	BEARING	DISTANCE
L1	S00°00'00"W	59.08
L2	N90°00'00"E	175.14
L3	S00°07'15"E	147.99
L4	S89°52'45"W	206.96
L5	N56°26'59"E	733.43
L6	N35°32'16"W	66.00
L7	N89°51'58"E	40.81
L8	N82°40'09"E	142.18
L9	S89°15'33"W	163.04

EASEMENT NOTES

THE EFFECTS OF EASEMENTS SHOWN IN FIRST AMERICAN TITLE POLICY NO. NHSB-1879065 DATED MAY 31, 2005 ARE SHOWN UNLESS OTHERWISE NOTED.

(1) AN EASEMENT FOR WATER LINES AND DITCHES RECORDED JUNE 23, 1915 AS BOOK "J", PAGE 336 OF PATENTS. BLANKET EASEMENT

(2) AN EASEMENT FOR POLE LINES AND INCIDENTAL PURPOSES, IN FAVOR OF INYO TELEPHONE COMPANY RECORDED NOVEMBER 26, 1915 IN BOOK 581 OF DEEDS, PAGE 124. SAID EASEMENT CANNOT BE LOCATED FROM RECORD.

(3) AN OFFER OF DEDICATION FOR DRAINAGE AND FLOWAGE, RECORDED AUGUST 16, 1982 AS INSTRUMENT NO. 82-160666 OF OFFICIAL RECORDS, TO THE COUNTY OF SAN BERNARDINO.

(4) AN OFFER OF DEDICATION FOR DRAINAGE AND INCIDENTAL PURPOSES IN FAVOR OF THE CITY OF VICTORVILLE, RECORDED AUGUST 30, 1994 AS INSTRUMENT NO. 94-363346 OF OFFICIAL RECORDS.

(5) AN OFFER TO DEDICATE FOR PUBLIC ROADS AND/OR PUBLIC UTILITIES, RECORDED AUGUST 16, 1982 AS INSTRUMENT NO. 82-160667 OF OFFICIAL RECORDS, TO THE COUNTY OF SAN BERNARDINO.

(6) RESERVATION OF A 10' EASEMENT FOR WATER LINES AND INCIDENTAL PURPOSES IN FAVOR OF MT. VIEW CEMETERY OF SAN BERNARDINO, RECORDED SEPTEMBER 22, AS INSTRUMENT NO 82-189283 OF OFFICIAL RECORDS.

(7) AN EASEMENT FOR WATER PIPE LINES AND INCIDENTAL PURPOSES IN FAVOR OF BALDY MESA WATER DISTRICT RECORDED APRIL 20, 1982 AS INSTRUMENT NO. 82-077077 OF OFFICIAL RECORDS.

(8) 5' X 1200' EASEMENT FOR ABOVE GROUND OR UNDERGROUND CONDUITS OR BOTH AND INCIDENTAL PURPOSES IN FAVOR OF SOUTHERN CALIFORNIA EDISON COMPANY AND CONTINENTAL TELEPHONE COMPANY OF CALIFORNIA, RECORDED SEPTEMBER 13, 1983 AS INSTRUMENT NO. 83-213657 OF OFFICIAL RECORDS. THIS EASEMENT MAY HAVE A BAD LEGAL DESCRIPTION BOTH LOCATIONS ARE SHOWN HERE. SEE ALSO PARCEL MAP NO. 15586, P.M.B. 192/11-12

(9) OFFER OF DEDICATION OF "SLOPE AND DRAINAGE EASEMENT " TO THE CITY OF VICTORVILLE SHOWN HEREON.

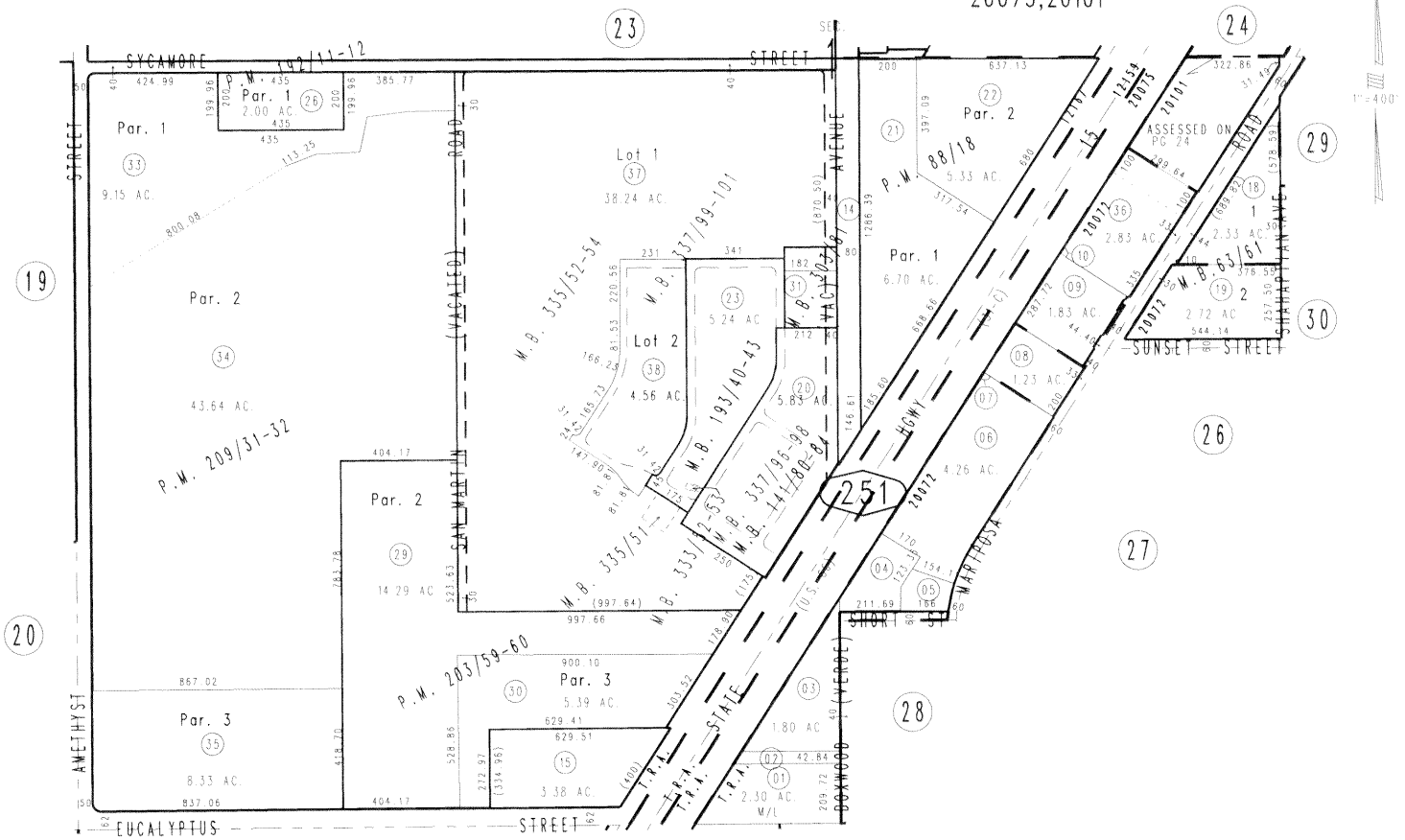
1691

THIS MAP IS FOR THE PURPOSE OF AD VALOREM TAXATION ONLY.

Ptn. S.1/2 Fract'l Sec. 1, T.4N., R.5W., S.B.M.

City of Hesperia
City of Victorville
Tax Rate Area
12159,12167,20072
20075,20101

3072 - 25



Tract No. 18896, M.B. 337/99-101
Tract No. 15753, M.B. 337/96-98
Tract No. 18828, M.B. 333/52-54, Desert View Memorial Park
Tract No. 18753, M.B. 333/51, Pet Cemetery
Tract No. 18682, 333/24-25, Desert View Memorial Park, Amending Map 333/52-53
Tract No. 17197, M.B. 303/81, Desert View Memorial Park
Ptn. Tract No. 13416, M.B. 193/40-43, Desert View Memorial Park
Tract No. 10267, M.B. 141/80-84, Desert View Memorial Park
Ptn. Tract No. 5174, M.B. 63/61

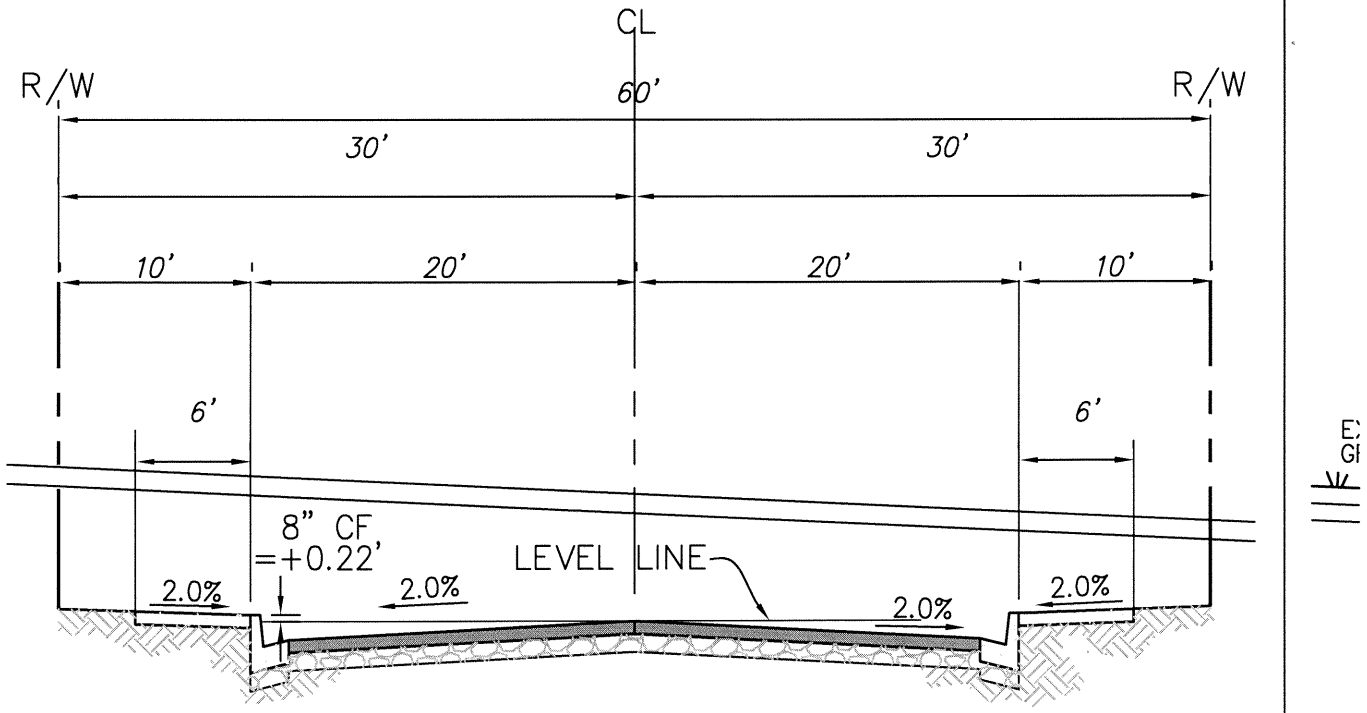
0405
04

Parcel Map No. 16983, P.M. 209/31-32
Ptn. Parcel Map No. 16301, P.M. 203/59-60
Parcel Map No. 15586, P.M. 192/11-12
Parcel Map No. 8319, P.M. 88/18

Assessor's Map
Book 3072 Page 25
San Bernardino County

JUNE 1991

REVISED
04/20/16 GW
06/07/16 GW-MC



TYPICAL SECTION

EMERY STREET, EVA COURT, CARVER COURT,
ASPREY STREET, FERRO STREET, SUNNY WAY
OSBORNE STREET, RAVEN STREET, HALTER STREET
GRADY COURT
N.T.S.

GeoTek, Inc.
710 E. Parkridge Avenue, Suite 105, Corona, California 92879-1097
(951) 710-1160 Office (951) 710-1167 Fax www.geotekusa.com

September 9, 2014
Project No. 1228-CR3

KB Home | Southern California
36310 Inland Valley Drive
Wildomar, California 92595

Attention: Mr. Rudy Provoost

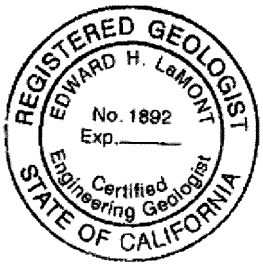
Subject: Percolation Evaluation
Proposed Temporary Basin
Tract 17406
City of Victorville, San Bernardino County, California

References: *See Page 5*

Dear Mr. Provoost:

As requested and authorized, GeoTek, Inc. (GeoTek) has performed a percolation evaluation for the temporary basin within the planned single-family residential development located in the City of Victorville, San Bernardino County, California. This report presents the results of our study and discussion of our findings. The opportunity to be of service is sincerely appreciated. If you should have any questions, please do not hesitate to call our office.

Respectfully submitted,
GeoTek, Inc.



Edward H. LaMont
CEG 1892, Exp. 07/31/16
Principal Geologist/Branch Manager

Distribution: (1) Addressee via email

G:\Projects\1201 to 1250\1228CR3 KB Home Tract 17046 Victorville\Percolation Report\1228CR3 Percolation Evaluation Temporary Basin Tract 17046 Victorville.doc

TABLE OF CONTENTS

ENCLOSURES

Figure 1 – Site Location Map
Figure 2 – Rough Grading Plan
Figure 3 – Boring Location Map

Appendix A – Log of Exploratory Excavation
Appendix B – Percolation Data Sheet and Percolation Conversation Sheet

1 PURPOSE AND SCOPE OF SERVICES

The purpose of this study was to evaluate the percolation rates and physical characteristics of the onsite soils within the area of the proposed temporary basin. Services provided for this study included the following:

- Research and review of available published and other data regarding geologic and soil conditions at the site.
- Site exploration consisting of the excavation and logging of one (1) exploratory boring.
- Percolation testing within the exploratory boring on September 6, 2014.
- Compilation of this report that presents our findings.

2 SITE DESCRIPTION AND PROPOSED DEVELOPMENT

2.1 SITE DESCRIPTION

Tract 17406, which consists of approximately 44 acres, is bounded by Amethyst Road (paved road) on the west, vacant land to the east and south and Oro Grande Wash to the north in the City of Victorville, San Bernardino County, California (see Figure 1). The County of San Bernardino Assessor Parcel Number for the site is APN 3072-251-34-0000.

The site is generally bounded by vacant land. Overall, the project site area is generally irregular in shape and consists of relatively flat terrain, with surface drainage generally directed toward the north-northeast. Site specific topography is shown on the enclosed *Rough Grading Plan* (see Figure 2) for the project, prepared by Madole & Associates, Inc. Vegetation on the site consists of native vegetation which will be removed during the earthwork construction of the project. No existing structures are located on the site. No rock outcroppings exist on the site.

No known wells are located within 300 feet of the site. It is our understanding that the source of domestic water will be via a new water line located within the site street areas.

2.2 PROPOSED DEVELOPMENT

It is our understanding that currently proposed site improvements include a single-family residential development (179 residences), with associated streets and utility improvements. The proposed residences will be wood-framed, utilizing conventionally reinforced slab-on-grade with continuous wall and/or spread footings. A temporary storm water basin is proposed to be constructed within the northeast corner of the site in the vicinity of Lots 69 through 75 (see Figure 3). Current elevations within the area of the basin range from approximately 3240 to 3250. It is our understanding that the bottom of the proposed basin is to be constructed at an approximate elevation of 3240 msl, which is approximately at to 10 feet below existing grades.

2.3 FIELD EXPLORATION

GeoTek's field exploration was conducted on August 29, 2014. One (1) boring was excavated with a CME 75 hollow-stem auger drill rig to a maximum depth of approximately twenty feet below the existing grade (i.e. approximately 10 feet below the bottom of the proposed basin).

The boring diameter was approximately eight (8) inches. A three (3) inch diameter perforated PVC pipe, wrapped in a filter sock and surrounded by gravel, was placed in the boring excavation prior to percolation testing. The approximate location of the boring is shown on Figure 3 (Boring Location Map). A geologist representing our firm logged the boring (see Appendix A).

3 GEOLOGIC AND SOILS CONDITIONS

3.1 SUBSURFACE SOIL CONDITIONS

A brief description of the earth materials encountered in our exploratory boring is presented in the following sections. A more detailed description of these materials is provided on the log of exploratory boring included in Appendix A. Based on our site reconnaissance, subsurface excavation, and review of published geologic maps, the site is underlain by alluvium to the depths explored.

Alluvium

Alluvium, comprised primarily of gravelly silty sand, was encountered in our exploratory excavation (see log in Appendix A). This alluvial material predominantly appeared to be medium dense becoming dense at depth.

4 PERCOLATION TESTING

4.1 PERCOLATION TESTING

Percolation testing was performed in general accordance with the procedures of the Technical Guidance Document for Water Quality Management Plans prepared for The County of San Bernardino Areawide Stormwater Program with an effective date of September 19, 2013.

4.2 SUMMARY OF PERCOLATION TEST RESULTS

Percolation test data (field data) is included in Appendix B. A percolation conversion to infiltration data sheet is also included in Appendix B.

Based on the obtained rates, the onsite soils displayed adequate percolation rates for the proposed basin.

4.2.1 Pre-Soaking

The boring (Boring B-1) was initially filled with clear water upon completion of excavation. The water seeped away faster than half the initial wetted depth for four (4) consecutive readings in 30 minutes or less for the percolation boring.

4.2.2 Testing Procedures

GeoTek performed testing per the above requirements by the Technical Guidance Document for Water Quality Management Plans prepared for The County of San Bernardino Areawide Stormwater Program with an effective date of September 19, 2013. Test results are included herein in Appendix B.

The test hole remained open to the original drilled depth of approximately 20 feet due to the placement of the perforated PVC pipe in the test hole. Some caving occurred around the piping in all due to the gravelly and sandy nature of the underlying materials.

Measurements, utilizing a measuring tape with 1/8-inch divisions, were taken at timed intervals for the test period.

The test resulted in an infiltration rate of 43 inches per hour after the infiltration rate had generally stabilized.

Over the lifetime of the storm water disposal area(s), the infiltration rates may be affected by silt build up and biological activities, as well as local variations in near surface soil conditions. An appropriate factor of safety no less than 2.0 should be applied to the measured infiltration rate based on the suitability of the underlying soils for infiltration and the infiltration design.

5 INTENT

It is the intent of this report to aid in the design and construction of the proposed development. The professional opinions and geotechnical information contained in this report are not intended to imply total performance of the project or guarantee that unusual or variable conditions will not be discovered during or after construction.

The scope of our study is limited to the area explored, which is shown on Figure 3 (Boring Location Map). This evaluation does not and should in no way be construed to encompass any areas beyond the specific area of the proposed construction as indicated to us by the client. The scope is based on our understanding of the project and the client's needs and geotechnical engineering standards normally used on similar projects in this region.

6 LIMITATIONS

The materials observed on the project site appear to be representative of the area; however, soil and natural materials vary in character between excavations and natural outcrops or conditions exposed during site construction. Site conditions may vary due to seasonal changes or other factors. GeoTek, Inc. assumes no responsibility or liability for work, testing or recommendations performed or provided by others.

Since our recommendations are based on the site conditions observed and encountered, and laboratory testing, our conclusion and recommendations are professional opinions that are limited to the extent of the available data. Observations during construction are important to

allow for any change in recommendations found to be warranted. These opinions have been derived in accordance with current standards of practice and no warranty is expressed or implied. Standards of practice are subject to change with time.

7 REFERENCES

Technical Guidance Document for Water Quality Management Plans, prepared for the County of San Bernardino Areawide Stormwater program, effective date September 19, 2013.

LOR Geotechnical Group, Inc., 2003, "Preliminary Geotechnical Investigation, 71± acres at the SEC Sycamore Street and Amethyst Road, Victorville, California," Project No. 11775.1, dated August 14.

KB Home Southern California
Tract 17046
Proposed Temporary Basin
City of Victorville, San Bernardino County, California

GeoTek Project No. 1228-CR3

N

Figure 1

Site Location Map

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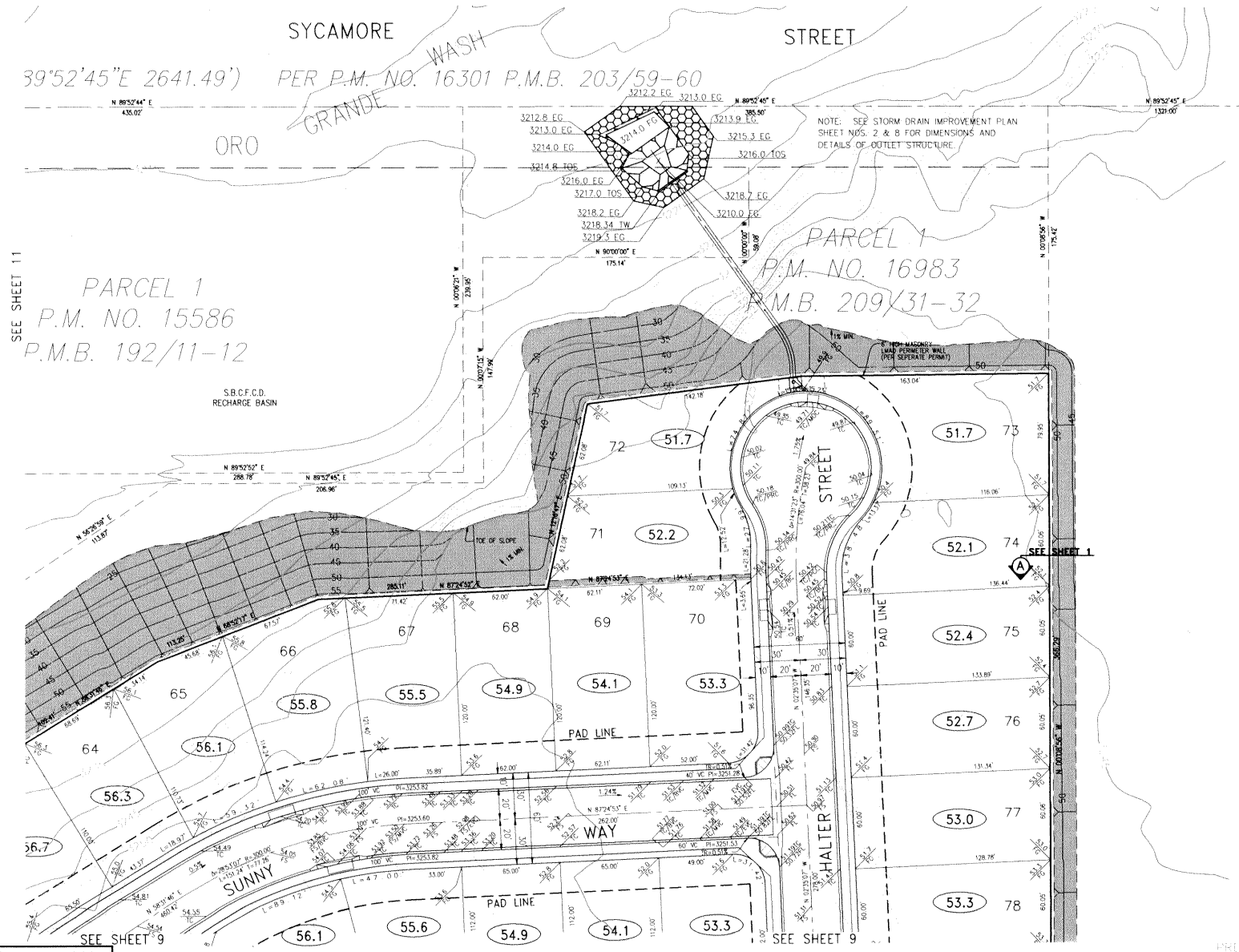


BENCH MARK
LOCATION: CITY OF VICTORVILLE
1" IRON PIPE, RCE 22502 @ EAST R/W OF COBALT RD. & LADWP; 100 FT. +/- NORTH TULORE CT.
ELEVATION 3299.89 NO: V-225

NOTE:
ALL WALLS PER SEPARATE PLAN AND PERMIT.

GEOTEK
Figure 2

PRELIMINARY - NOT FOR CONSTRUCTION

DIGALERT
DIAL BEFORE YOU DIG
TWO WORKING DAYS BEFORE YOU DIG
TOLL FREE 1-800-227-2600
A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

REV.	REVISION DESCRIPTION	BY	DATE

DESIGNED RK
DRAWN KM/EYR
CHECKED TM

WENDELL L. IWATSURU R.C.E. 36637 EXP. 06-30-08 DATE

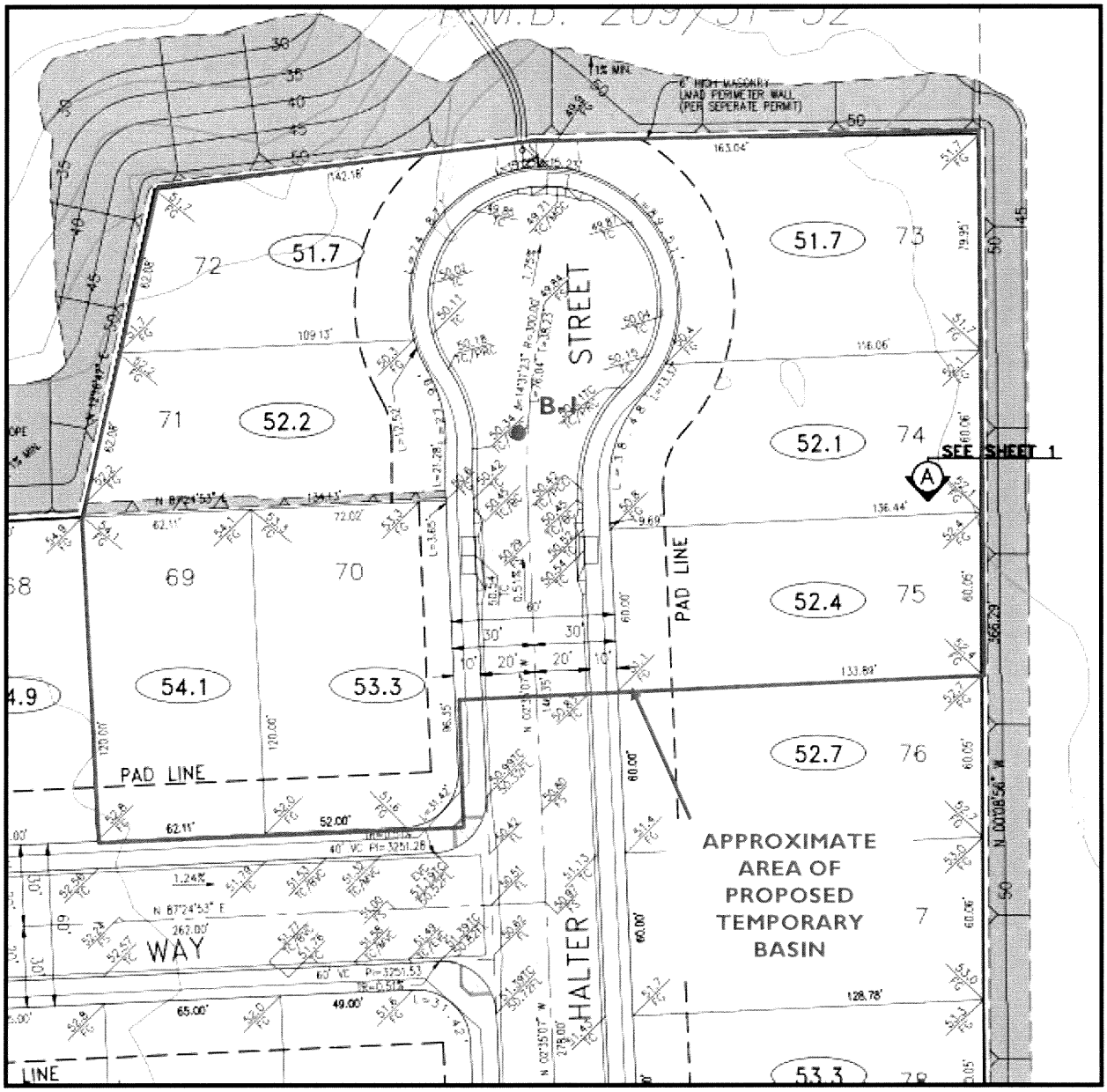
MADOLE
Engineering Communities for Life
14393 PARK AVENUE, STE 100
VICTORVILLE, CA 92392
760.241.4344
www.madoleinc.com

SCALE 1"=30'
WORK ORDER NO.

CITY OF VICTORVILLE
ENGINEERING DEPARTMENT
APPROVED
BY: _____ DATE: _____
JOHN A. McGLADE CITY ENGINEER
RCE 40935 EXP. 3-31-07

ROUGH GRADING PLAN
TRACT 17046
LOTS 64-72 & 73-77
CITY OF VICTORVILLE

SHEET 10 OF 11



LEGEND

B-1 ● **Approximate Location of Exploratory Boring**

KB Home Southern California
Proposed Temporary Basin
Tract 17046
City of Victorville
County of San Bernardino, California

GeoTek Project No. 1228-CR3

Figure 3

Boring Location Map

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APPENDIX A

LOG OF EXPLORATORY EXCAVATION

(Boring B-1)

Tract 17046

Victorville, San Bernardino County, California

Project No. 1228-CR3

GEOTEK

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	KB Home	**DRILLER:**	2R Drilling	**LOGGED BY:**	AMS
PROJECT NAME:	Tract 17046	**DRILL METHOD:**	8" Hollow Stem	**OPERATOR:**	Miguel
PROJECT NO.:	1228-CR3	**HAMMER:**	Auto 140#/30"	**RIG TYPE:**	CME 75
LOCATION:	See Boring Location Map			**DATE:**	8/29/2014

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	BORING NO.: B-1 / MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
				SM	**Alluvium:** Silty f-c SAND with gravel, light brown, dry, loose			
5					Silty f-c SAND with gravel, light brown, slightly moist, medium dense to dense			
10								
15								
20					**BORING TERMINATED AT 20 FEET** No groundwater encountered			
25								
30								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

APPENDIX B

PERCOLATION DATA SHEET AND
PERCOLATION CONVERSION SHEET

Tract 17406

Victorville, San Bernardino County, California

Project No. 1228-CR3

GEOTEK

PERCOLATION DATA SHEET

TRACK 17046

Project: S. OF SYCAMORE ST & NW OF AMARGOSA RD. Job No.: 1228-CR3

Test Hole No.: B-1 Tested By: DVG Date: _____

Depth of Hole As Drilled: 240 INCHES Before Test: 240 INCHES After Test: 240 INCHES

Reading No.	Time PM	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ In Water Level (Inches)	Comments
1	1:05	0	240	240			FILL TO TOP 1ST TRIAL
2	1:16	5:15	240		120	120	10' DROP
3	1:24	0	240	240			FILL TO TOP 2ND TRIAL
4	1:34	10:15	240		120	120	10' DROP
5	1:54	0	240	240			FILL TO TOP 3RDTRIAL
6	2:06	11:15	240		120	120	10' DROP SANDY SOIL
7	2:14	0	240	240			1ST 10 MIN
8	2:24	10	240		126	114	
9	2:32	0	240	240			2ND 10 MIN
10	2:42	10	240		132	108	
11	2:50	0	240	240			3RD 10 MIN
12	3:00	10	240		139	101	
13	3:08	0	240	240			4TH 10 MIN
14	3:18	10	240		147	93	
15	3:26	0	240	240			5TH 10MIN
16	3:36	10	240		156	84	
17	3:44	0	240	192			6TH 10 MIN FROM 48 INCHES
18	3:54	10	240		120	72	

GEOTEK

SHEET 1 OF 1

CALCULATED BY: _____ DATE: 9/9/14

CHECKED BY: _____ DATE: _____

CLIENT: KB Home PROJECT: Tr 17046 W.O. 1228-XS SCALE: _____

Percolation Rate (Porchet Method)

Time Interval, Δt = 10 minutes

Final Depth to Water, D_F = 72 inches

Test Hole Radius, r = 8 inches

Initial Depth to Water, D_O = 0 inches

Total Test Hole Depth, D_T = 192 inches

Equation $$I_t = \frac{\Delta H\,(60r)}{\Delta t\,(r + 2H_{avg})}$$

$H_O = D_T - D_O = 192 - 0 = 192$ inches

$H_F = D_T - D_F = 192 - 72 = 120$ inches

$\Delta H = \Delta D = H_O - H_F = 192 - 120 = 72$ inches

$H_{avg} = (H_O - H_F)/2 = 72/2 = 36$ inches

$$I_t = \frac{(72 \text{ inches})\left(\frac{60 \text{ min}}{\text{hr}}\right)(8 \text{ inches})}{(10 \text{ minutes})\,[8 \text{ inches} + 2(36 \text{ inches})]}$$

$$= \frac{34560}{800} = 43 \text{ in./hr}$$