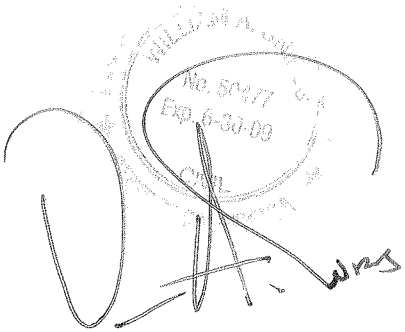
Snipes-Dye associates

CEQA PRELIMINARY HYDROLOGY/DRAINAGE STUDY

FOR

(TPM 20765, ER 03-15-006)

County of San Diego



Dated: January 31, 2008

Prepared By:
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PV0141

CEQA PRELIMINARY HYDROLOGY/DRAINAGE STUDY
FOR
TPM 20765

INTRODUCTION: The project is located on the southwest side of Old Highway 80 and approximately ¼ mile south from the intersection of Old Highway 80 and Pine Creek Road. The project proposes to subdivide an existing 34.88-acre vacant parcel into four parcels. The proposed parcel will be utilized for single-family residences as permitted under current zones. The attached preliminary hydraulic and hydrology calculations were prepared to support the preliminary grading design for the proposed private road, driveways and pads for the future home sites.

PRE-DEVELOPMENT CONDITIONS: The site topography slopes from an elevation of approximately 3920 at the southwest corner of the site to an elevation of approximately 3635 at the most northerly corner of the site. Due to the natural site terrains, the site drainage is divided into eight sub-basins; all of these basins are consisting of natural drainage creeks collecting runoff from the sub-basin areas then discharge to the Pine Valley Creek which located on the northeast side of Old Highway 80. There are three existing culverts located along Old Highway 80 property frontage which are collecting most of the runoff from the project site and discharge into the Pine Valley Creek. One of the sub-basin which runs through the project site is approximate 32 acres which is greater than 25 acres; therefore, the project property is subject to inundation during a 100-year storm. See attached calculations and exhibits for more details.

POST-DEVELOPMENT CONDITIONS: To accommodate the new residences on the four proposed parcels, the project proposes to create four flat pads and access private road and driveways which will generate some cut and fill slopes. A series of concrete brow ditches and rip raps are proposed to protect the proposed slopes. At any location where the proposed private road or drive is crossing the natural drainage creeks, culvert or cross-road drain is proposed to allow un-interrupted flow in the creek. See attached drainage maps for more details.

SUMMARY TABLE FOR PEAK 100-YEAR, 6-HOUR DURATION EVENT		
BASIN	Pre-development Discharge (Q)	Post-development Discharge (Q)
A	24.02 cfs	24.02 cfs
B	8.12 cfs	8.12 cfs
C	43.96 cfs	43.96 cfs
D	41.35 cfs	40.00 cfs
E	85.04 cfs	91.86 cfs
F	16.18 cfs	12.30 cfs
G	13.07 cfs	15.08 cfs
H	13.13 cfs	13.58 cfs
TOTAL	**244.87 cfs**	**248.92 cfs**

See attached calculations.

CONCLUSION: Post-development site drainage is collected and discharged off-site in a similar manner as pre-development. The minor alteration in runoff due to the proposed development of four single family residences is considered insignificant.

1. The post-development site creates a minor alteration of the on-site drainage patterns due to the required 24-foot wide paved access road and the creations of four new home sites. The runoff from the post-development site will discharge to the Pine Valley Creek in a similar fashion as the pre-development phase which will not create any potential erosion on-site or off-site.

2. The post-development site does not substantially alter the existing drainage pattern of the site or the course of an adjacent ditch. The proposed private road is crossing the existing on-site drainage creek; a proposed culvert at the crossing point with sufficient capacities to discharge the runoff would not alter the drainage pattern of the site or create any flood to the on-site or off-site properties.

3. The proposed installation of culverts under the private road shall be designed at the construction phase of the project and shall be reviewed by the County Department of Public Works to ensure that the proposed culvert will have adequate capacities to discharge the peak discharge of 100-year storm.

4. The proposed pads for future homes for all parcels are not within the 100-year flood hazard areas. See attached reference maps for the location limits of areas subject to inundation by the 100-year flood.

5. No structures are proposed within the 100-year flood hazard areas would impede or redirect flood flows, excepting the access private road which is crossing the creek. The proposed culvert located at the crossing point will provide a contiguous flow in the creek.

6. The proposed pads for the future homes for all parcels are at the much higher elevations and far away from any proposed drainage facilities. Any failure of the on-site or off-site drainage facilities will not cause any risks to people or structures.

Note that the Initial Time of Concentration should be reflective of the general land-use at the upstream end of a drainage basin. A single lot with an area of two or less acres does not have a significant effect where the drainage basin area is 20 to 600 acres.

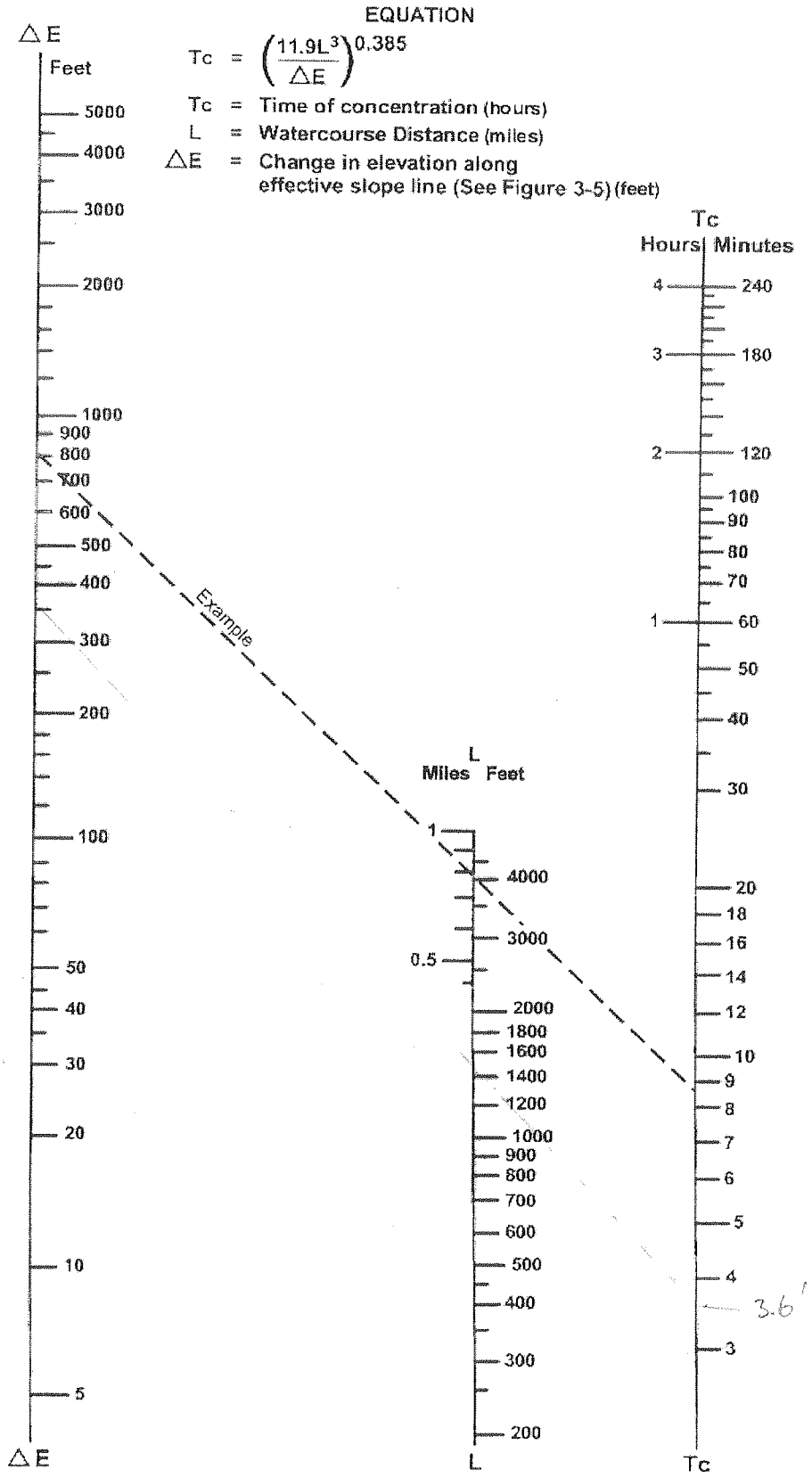
Table 3-2 provides limits of the length (Maximum Length (L_M)) of sheet flow to be used in hydrology studies. Initial T_i values based on average C values for the Land Use Element are also included. These values can be used in planning and design applications as described below. Exceptions may be approved by the "Regulating Agency" when submitted with a detailed study.

Table 3-2

MAXIMUM OVERLAND FLOW LENGTH (L_M) & INITIAL TIME OF CONCENTRATION (T_i)

Element*	DU/	.5%		1%		2%		3%		5%		10%	
	Acre	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i
Natural		50	13.2	70	12.5	85	10.9	100	10.3	100	8.7	100	6.9
LDR	1	50	12.2	70	11.5	85	10.0	100	9.5	100	8.0	100	6.4
LDR	2	50	11.3	70	10.5	85	9.2	100	8.8	100	7.4	100	5.8
LDR	2.9	50	10.7	70	10.0	85	8.8	95	8.1	100	7.0	100	5.6
MDR	4.3	50	10.2	70	9.6	80	8.1	95	7.8	100	6.7	100	5.3
MDR	7.3	50	9.2	65	8.4	80	7.4	95	7.0	100	6.0	100	4.8
MDR	10.9	50	8.7	65	7.9	80	6.9	90	6.4	100	5.7	100	4.5
MDR	14.5	50	8.2	65	7.4	80	6.5	90	6.0	100	5.4	100	4.3
HDR	24	50	6.7	65	6.1	75	5.1	90	4.9	95	4.3	100	3.5
HDR	43	50	5.3	65	4.7	75	4.0	85	3.8	95	3.4	100	2.7
N. Com		50	5.3	60	4.5	75	4.0	85	3.8	95	3.4	100	2.7
G. Com		50	4.7	60	4.1	75	3.6	85	3.4	90	2.9	100	2.4
O.P./Com		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
Limited I.		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
General I.		50	3.7	60	3.2	70	2.7	80	2.6	90	2.3	100	1.9

*See Table 3-1 for more detailed description

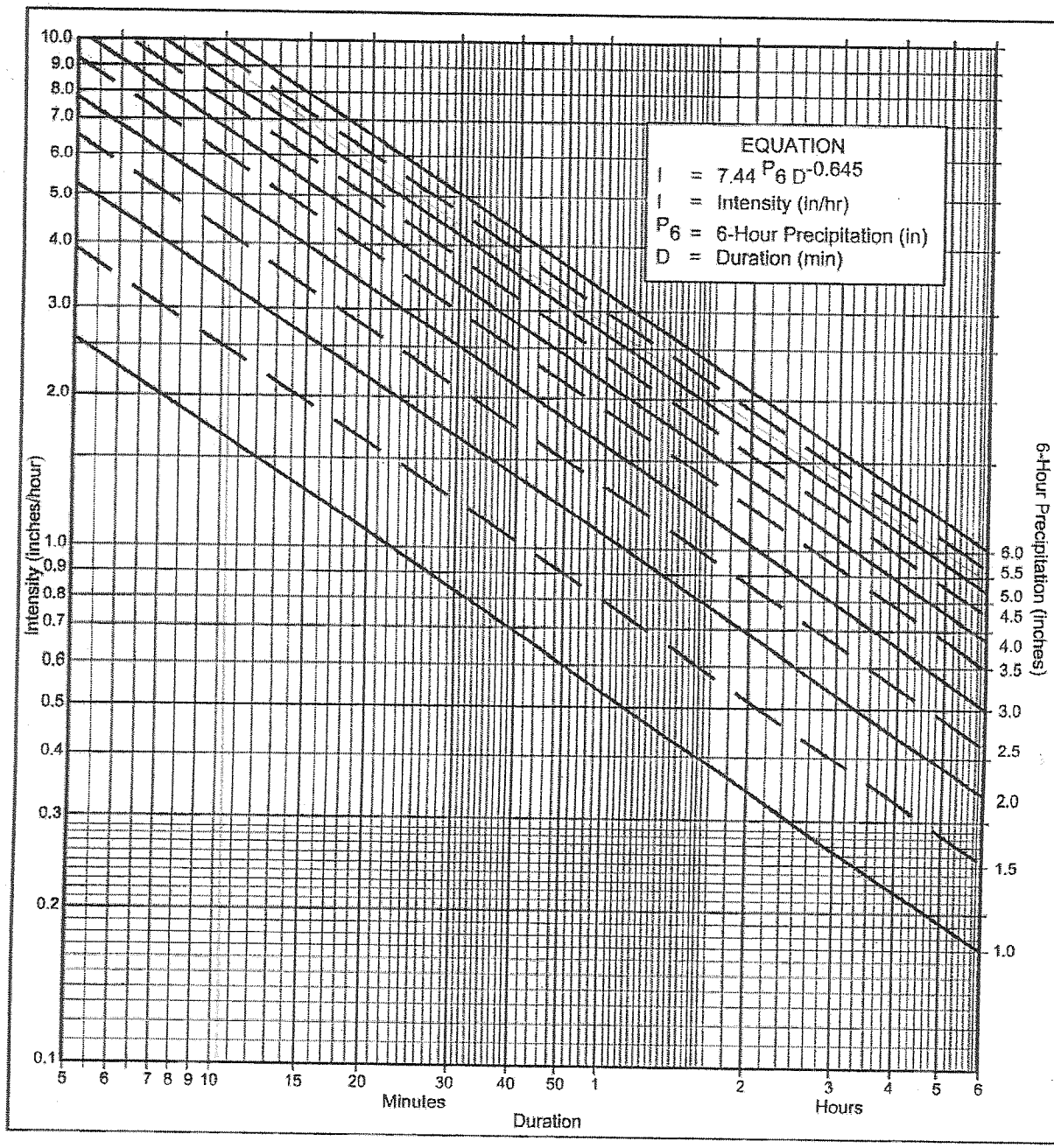


SOURCE: California Division of Highways (1941) and Kirpich (1940)

FIGURE

3-4

Nomograph for Determination of
Time of Concentration (Tc) or Travel Time (Tt) for Natural Watersheds



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 100 year

(b) P_6 = 5.0 in., P_{24} = 11.5, $\frac{P_6}{P_{24}}$ = 43.5 %(2)

(c) Adjusted $P_6^{(2)}$ = 5.2 in.

(d) t_x = 10.5 min.

(e) I = _____ in./hr.

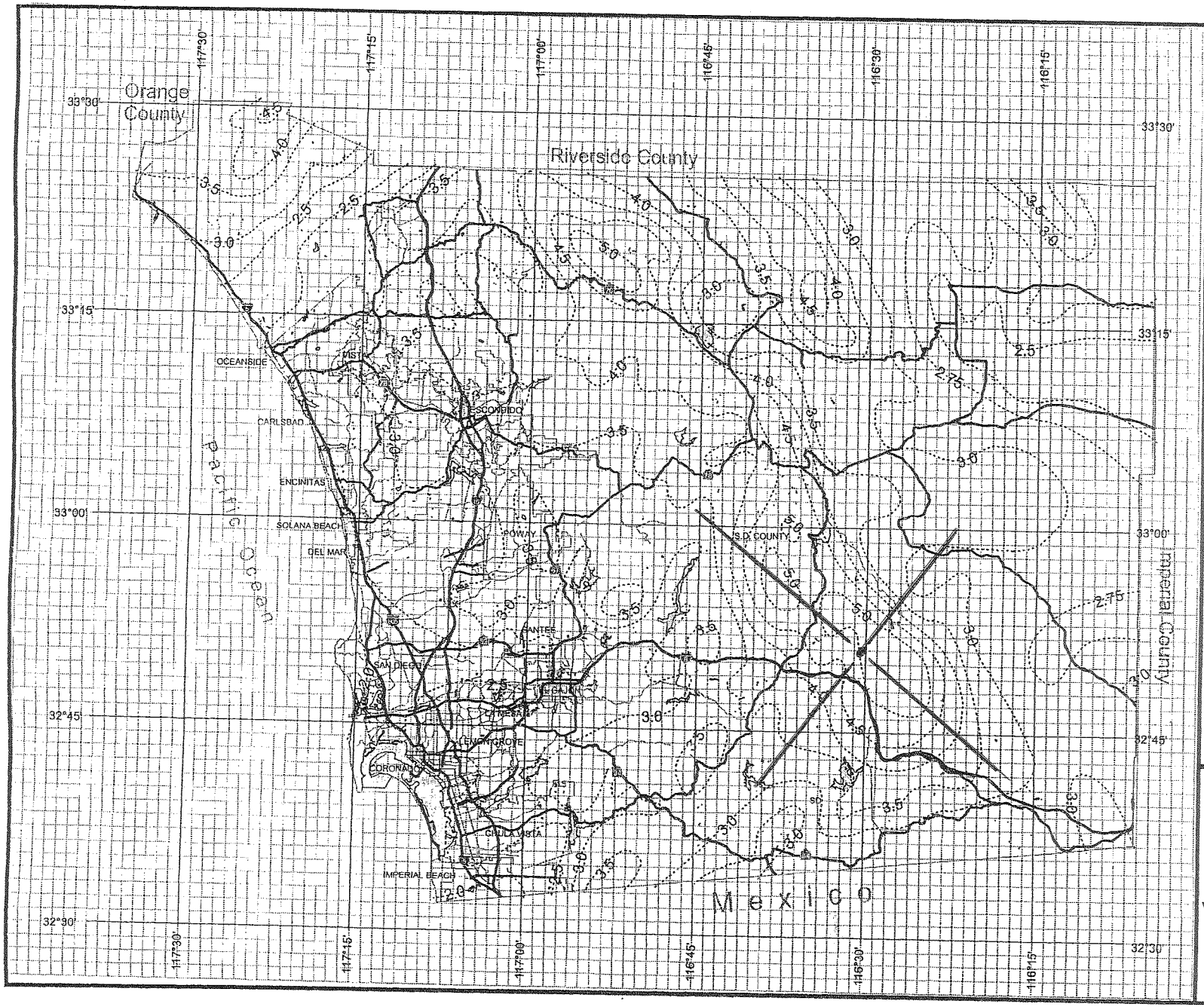
Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6 / Duration	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE

3-1



County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

5.0 Isopluvial (inches)

DPW GIS
Department of Public Works
Mapping & Information Services

SDGIS
We Have San Diego Covered!

N
W E
S

3 0 3 Miles

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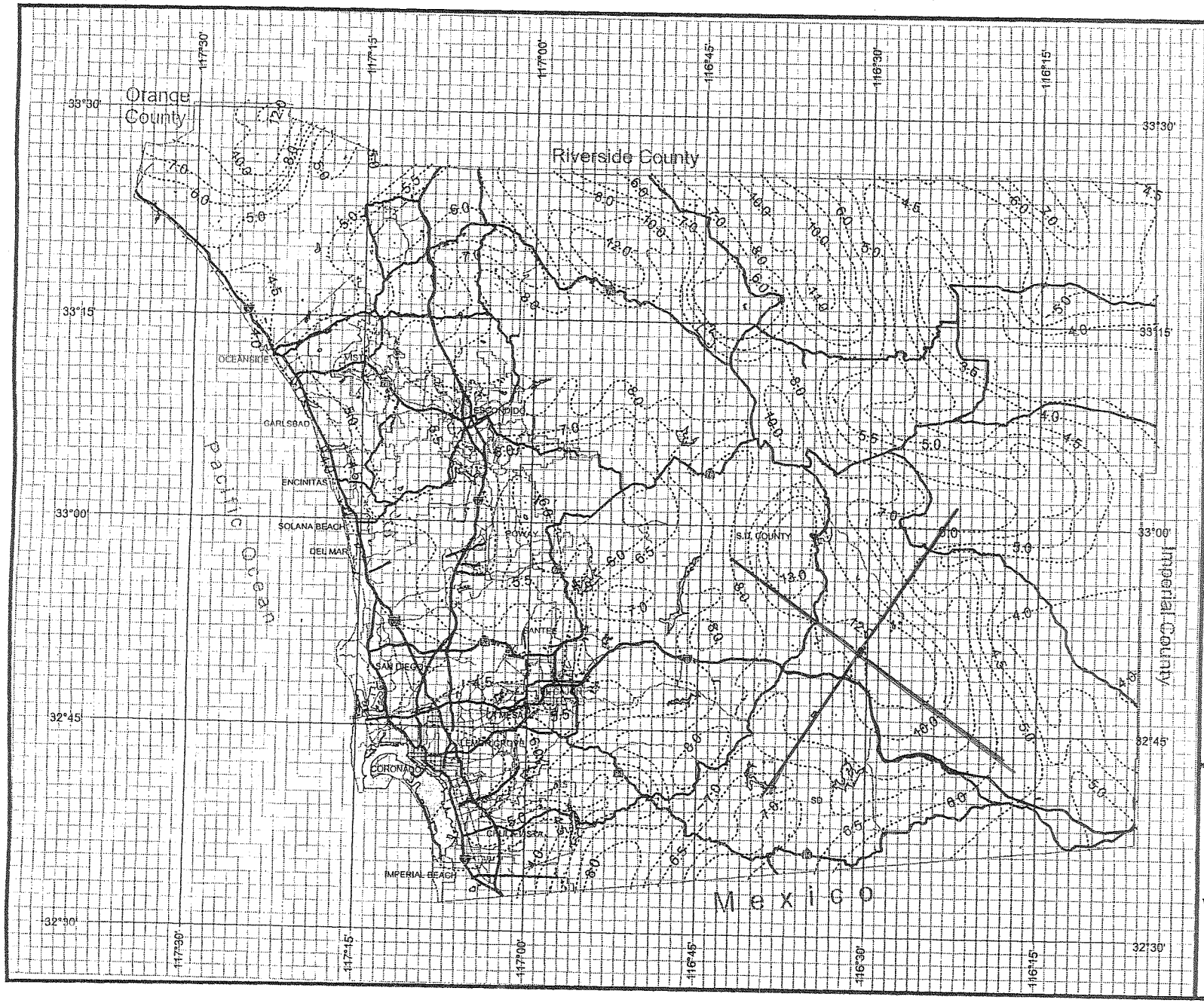

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

11.5 Isopluvial (inches)

DPW GIS

SanGIS We Have San Diego Covered!

N W E S

3 0 3 Miles

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TABLE - 15

INTERPRETATIONS FOR LAND MANAGEMENT

KEY TO INTERPRETATION RATING SYMBOLS:

HYDROLOGIC SOIL GROUPS:

A - HIGH INFILTRATION RATE
B - MODERATE INFILTRATION RATE
C - SLOW INFILTRATION RATE
D - VERY SLOW INFILTRATION RATE

LIMITATIONS:

SL - SLIGHT DEGREE OF LIMITATION
M - MODERATE DEGREE OF LIMITATION
SE - SEVERE DEGREE OF LIMITATION

Soil Map Symbol[a]	Interpretation Rating[b]		
	Hydrologic Group	Erodibility by Water	Conversion from Brush to Grass
(1)	(2)	(3)	(4)
AcG	D	SE (slp)	SE
AtC	D	SL	SL [d]
AtD	D	SL	SL [d]
AtD2	D	SL	SL [d]
AtE	D	M (slp)	SL [d]
AtE2	D	M (slp)	SL [d]
AtF	D	SE (slp)	M [d]
AuC	A	SE (str)	SL [e]
AuF	A	SE (str)	M
AvC	C	SE (str)	SL
AwC	D	SL	SL
AwD	D	SL	SL
AyE	D	M (slp)	SL
BaG	D	SE (slp)	SE
BbE	C	SE (str)	M
BbE2	C	SE (str)	M
BbG	C	SE (slp)	M
BbG2	C	SE (slp)	M
BeE	D	SE (str)	SL
BgE	D	SE (str)	M
BgF	D	SE (slp)	M
BIC	D	SE (dpt)	SL
BIC2	D	SE (dpt)	SL
BID2	D	SE (dpt)	SL
BmC	D	M (txt)	SL
BnB [c]			
(BI)	D	SE (dpt)	SL
(Fa)	C	SE (dpt)	SL
BoC	C	M (txt)	SL
BoE	C	M (slp)	SL
BrE	C	M (slp)	SL
BrG	C	SE (slp)	M

Soil Map Symbol[a]	Interpretation Rating[b]		
	Hydrologic Group	Erodibility by Water	Conversion from Brush to Grass
(1)	(2)	(3)	(4)
BsC	D	M (str)	SL [d]
BsD	D	M (str)	SL [d]
BsE	D	M (slp)	SL [d]
BtC	D	M (str)	SL [f]
BuB	C	SE (str)	SL [g]
BuC	C	SE (str)	SL [g]
BuD2	C	SE (str)	SL [g]
BuE2	C	SE (str)	SL [g]
CaB	B	M (txt)	SL [g]
CaC	B	M (txt)	SL [g]
CaC2	B	M (txt)	SL [g]
CaD2	B	M (txt)	SL [g]
CbB	C	SE (txt)	SL
CbC	C	SE (txt)	SL
CbD	C	SE (txt)	SL
CbE	C	SE (txt)	SL
CcC	D		
CcE	D		
CeC	A	SE (txt)	
CfB	D	SE (dpt)	SL
CfC	D	SE (dpt)	SL
CfD2	D	SE (dpt)	M
CgC [c]			
(Cf)	D		
(Ur)	D		
ChA	C	SE (str)	SL
ChB	C	SE (str)	SL
CkA	C	M (txt)	M
CID2	B	SE (str)	SE
CIE2	B	SE (str)	SE
CIG2	B	SE (slp)	SE
CmE2	B	SE (str)	SE

a. *For full soil name see* Appendix F, *Guide to Mapping Units.*

b. *Parenthetical symbols indicate properties adversely affecting suitability as follows:*

(dpt) = Depth to hard rock, or a hardpan, or any layer that restricts permeability.
(fld) = Flooding, ponding, or overflow
(slp) = Slope
(str) = Strength of granular, crumb, or blocky structure in the surface layer.

Absence of rating means no valid interpretation can be made.

c. *This is a soil complex comprised of two soil units in a complex pattern. See* Appendix F, *Guide to Mapping Units, for component soil units are not shown separately on the soil maps, it is recommended that the overall ratings for this complex be assumed to be the same as those for the component soil with the greatest degree of limitation.*

d. *Typically a grassland soil; conversion from brush usually not necessary.*

e. *Moderate on slopes of more than 30 percent; slight on slopes of less than 30 percent.*

f. *Stoniness or rockiness not a serious impediment to use of grass planting equipment.*

g. *On desert facing mountain slopes and valleys in Land Resource Area 20 E, the degree of limitation is severe because of climate, regardless of soil properties.*

SHEET NO. 58
SAN DIEGO AREA, CALIFORNIA
(DESCANSO QUADRANGLE)

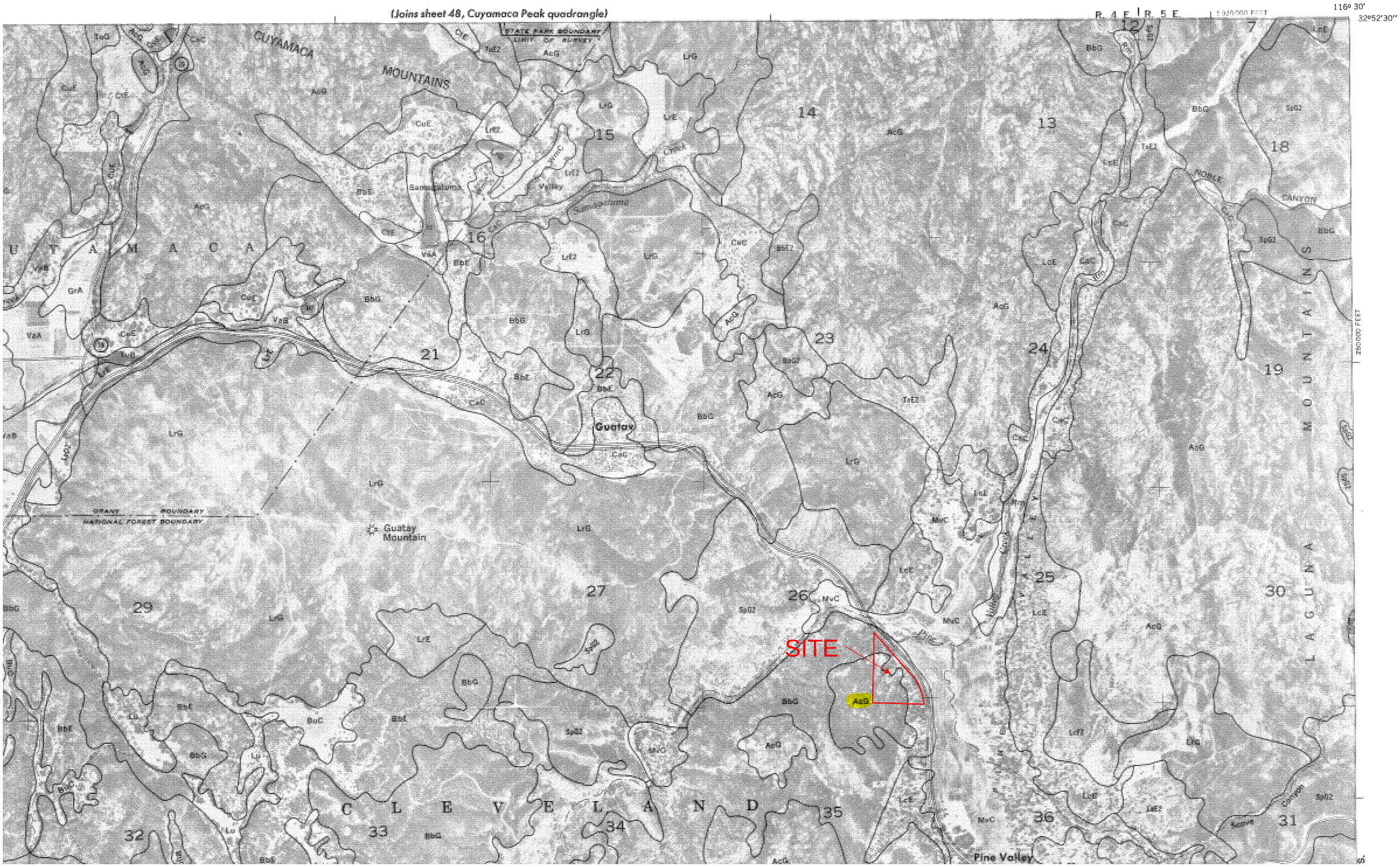


Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

Land Use		Runoff Coefficient "C"				
			Soil Type			
NRCS Elements	County Elements	% IMPER.	A	B	C	D
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35
Low Density Residential (LDR)	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N. Com)	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I.)	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	General Industrial	95	0.87	0.87	0.87	0.87

*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, Cp, for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).
DU/A = dwelling units per acre
NRCS = National Resources Conservation Service

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                        2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2005 Advanced Engineering Software (aes)
             Ver. 2.0 Release Date: 06/01/2005  License ID 1305

                          Analysis prepared by:

                           Snipes-Dye Associates
                         8348 Center Drive, Suite G
                           La Mesa, CA  91942-2910
                    Fax (619)460-2033  Phone (619)697-9234

 ************************** DESCRIPTION OF STUDY **************************
* CEQA PRELIMINARY DRAINAGE STUDY                                          *
* TPM 20765                                                                *
* PRE-DEVELOPMENT CONDITIONS                                               *
 ***************************************************************************

  FILE NAME: PV0142.DAT
  TIME/DATE OF STUDY: 14:13 10/02/2007
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   5.200
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
```

BASIN "A":

```
****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  82
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =   4082.00
  DOWNSTREAM ELEVATION(FEET) =   4080.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.441
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 11.636
  SUBAREA RUNOFF(CFS) =      0.19
  TOTAL AREA(ACRES) =      0.04   TOTAL RUNOFF(CFS) =      0.19
```

```
****************************************************************************
  FLOW PROCESS FROM NODE       2.00 TO NODE       3.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =   4080.00
  DOWNSTREAM NODE ELEVATION(FEET) =   3635.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1100.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.100
  PAVEMENT LIP(FEET) =  0.100   MANNING'S N = .1500
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.20000
  MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.004
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  82
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     12.45
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.62
  AVERAGE FLOW DEPTH(FEET) =   0.59   FLOOD WIDTH(FEET) =    8.88
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   5.06   Tc(MIN.) =  11.50
  SUBAREA AREA(ACRES) =    7.28       SUBAREA RUNOFF(CFS) =   23.89
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
  TOTAL AREA(ACRES) =      7.32         PEAK FLOW RATE(CFS) =      24.02

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.80   FLOOD WIDTH(FEET) =   11.01
  FLOW VELOCITY(FEET/SEC.) =   4.32   DEPTH*VELOCITY(FT*FT/SEC) =   3.46
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =  1160.00 FEET.
```

BASIN "B":

```
****************************************************************************
  FLOW PROCESS FROM NODE       4.00 TO NODE       5.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  82
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =   3928.00
  DOWNSTREAM ELEVATION(FEET) =   3925.00
  ELEVATION DIFFERENCE(FEET) =      3.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.626
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 12.696
  SUBAREA RUNOFF(CFS) =      0.36
  TOTAL AREA(ACRES) =      0.07   TOTAL RUNOFF(CFS) =      0.36

****************************************************************************
  FLOW PROCESS FROM NODE       5.00 TO NODE       6.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =   3925.00
  DOWNSTREAM NODE ELEVATION(FEET) =   3632.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   825.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.500
```

```
PAVEMENT LIP(FEET) =  0.200   MANNING'S N = .1500
PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.20000
MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.846
USER-SPECIFIED RUNOFF COEFFICIENT = .4100
S.C.S. CURVE NUMBER (AMC II) =  82
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      4.30
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.25
AVERAGE FLOW DEPTH(FEET) =   0.70   FLOOD WIDTH(FEET) =    5.00
"V" GUTTER FLOW TRAVEL TIME(MIN.) =   4.23   Tc(MIN.) =   9.85
SUBAREA AREA(ACRES) =    2.17       SUBAREA RUNOFF(CFS) =    7.87
AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
TOTAL AREA(ACRES) =      2.24         PEAK FLOW RATE(CFS) =       8.12

END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) =  0.73   FLOOD WIDTH(FEET) =    5.29
FLOW VELOCITY(FEET/SEC.) =   3.39   DEPTH*VELOCITY(FT*FT/SEC) =   2.47
LONGEST FLOWPATH FROM NODE      4.00 TO NODE      6.00 =   885.00 FEET.
```

BASIN "C":

```
****************************************************************************
FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
USER-SPECIFIED RUNOFF COEFFICIENT = .4100
S.C.S. CURVE NUMBER (AMC II) =  82
INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
UPSTREAM ELEVATION(FEET) =   4185.00
DOWNSTREAM ELEVATION(FEET) =   4180.00
ELEVATION DIFFERENCE(FEET) =      5.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.746
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 13.701
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) =      0.28
TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.28

****************************************************************************
FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  91
----------------------------------------------------------------------------
>>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
UPSTREAM NODE ELEVATION(FEET) =   4180.00
DOWNSTREAM NODE ELEVATION(FEET) =   3637.50
CHANNEL LENGTH THRU SUBAREA(FEET) =  1600.00
"V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.500
PAVEMENT LIP(FEET) =  0.400   MANNING'S N = .1500
PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.20000
MAXIMUM DEPTH(FEET) =   3.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.489
USER-SPECIFIED RUNOFF COEFFICIENT = .4100
S.C.S. CURVE NUMBER (AMC II) =  82
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     22.86
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.63
```

```
AVERAGE FLOW DEPTH(FEET) =   1.17   FLOOD WIDTH(FEET) =    7.66
"V" GUTTER FLOW TRAVEL TIME(MIN.) =   5.76   Tc(MIN.) =  10.50
SUBAREA AREA(ACRES) =   12.58       SUBAREA RUNOFF(CFS) =   43.79
AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
TOTAL AREA(ACRES) =     12.63         PEAK FLOW RATE(CFS) =      43.96

END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) =  1.53   FLOOD WIDTH(FEET) =   11.27
FLOW VELOCITY(FEET/SEC.) =   5.26   DEPTH*VELOCITY(FT*FT/SEC) =   8.04
LONGEST FLOWPATH FROM NODE      7.00 TO NODE      9.00 =  1660.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 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.) =  10.50
RAINFALL INTENSITY(INCH/HR) =   8.49
TOTAL STREAM AREA(ACRES) =    12.63
PEAK FLOW RATE(CFS) AT CONFLUENCE =     43.96
```

BASIN "D":

```
****************************************************************************
FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
USER-SPECIFIED RUNOFF COEFFICIENT = .4100
S.C.S. CURVE NUMBER (AMC II) =  82
INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
UPSTREAM ELEVATION(FEET) =   4232.00
DOWNSTREAM ELEVATION(FEET) =   4230.00
ELEVATION DIFFERENCE(FEET) =      2.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.441
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 11.636
SUBAREA RUNOFF(CFS) =      0.29
TOTAL AREA(ACRES) =      0.06   TOTAL RUNOFF(CFS) =      0.29

****************************************************************************
FLOW PROCESS FROM NODE    101.00 TO NODE      9.00 IS CODE =  91
----------------------------------------------------------------------------
>>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
UPSTREAM NODE ELEVATION(FEET) =   4230.00
DOWNSTREAM NODE ELEVATION(FEET) =   3637.50
CHANNEL LENGTH THRU SUBAREA(FEET) =  2150.00
"V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.500
PAVEMENT LIP(FEET) =  0.400   MANNING'S N = .1500
PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.20000
MAXIMUM DEPTH(FEET) =   3.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.764
USER-SPECIFIED RUNOFF COEFFICIENT = .4100
```

```
S.C.S. CURVE NUMBER (AMC II) =  82
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     21.62
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.22
AVERAGE FLOW DEPTH(FEET) =   1.19   FLOOD WIDTH(FEET) =    7.91
"V" GUTTER FLOW TRAVEL TIME(MIN.) =   8.49   Tc(MIN.) =  14.93
SUBAREA AREA(ACRES) =   14.85       SUBAREA RUNOFF(CFS) =   41.18
AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
TOTAL AREA(ACRES) =     14.91         PEAK FLOW RATE(CFS) =      41.35

END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) =  1.55   FLOOD WIDTH(FEET) =   11.53
FLOW VELOCITY(FEET/SEC.) =   4.78   DEPTH*VELOCITY(FT*FT/SEC) =   7.43
LONGEST FLOWPATH FROM NODE    100.00 TO NODE      9.00 =  2210.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 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.) =  14.93
RAINFALL INTENSITY(INCH/HR) =   6.76
TOTAL STREAM AREA(ACRES) =    14.91
PEAK FLOW RATE(CFS) AT CONFLUENCE =     41.35

** CONFLUENCE DATA **
STREAM     RUNOFF      Tc      INTENSITY      AREA
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1       43.96    10.50       8.489         12.63
    2       41.35    14.93       6.764         14.91

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

** PEAK FLOW RATE TABLE **
STREAM     RUNOFF      Tc      INTENSITY
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
    1       73.04    10.50       8.489
    2       76.38    14.93       6.764

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     76.38   Tc(MIN.) =   14.93
TOTAL AREA(ACRES) =     27.54
LONGEST FLOWPATH FROM NODE    100.00 TO NODE      9.00 =  2210.00 FEET.
```

BASIN "E":

```
****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  82
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =   4173.50
  DOWNSTREAM ELEVATION(FEET) =   4172.00
  ELEVATION DIFFERENCE(FEET) =      1.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.090
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 12.065
  SUBAREA RUNOFF(CFS) =      0.25
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.25

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =   4172.00
  DOWNSTREAM NODE ELEVATION(FEET) =   3640.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2510.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.400
  PAVEMENT LIP(FEET) =  0.400   MANNING'S N = .1500
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.20000
  MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.519
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  82
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     44.58
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.30
  AVERAGE FLOW DEPTH(FEET) =   1.61   FLOOD WIDTH(FEET) =   13.13
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   9.73   Tc(MIN.) =  15.82
  SUBAREA AREA(ACRES) =   31.77       SUBAREA RUNOFF(CFS) =   84.91
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
  TOTAL AREA(ACRES) =     31.82         PEAK FLOW RATE(CFS) =      85.04

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  2.07   FLOOD WIDTH(FEET) =   17.71
  FLOW VELOCITY(FEET/SEC.) =   4.88   DEPTH*VELOCITY(FT*FT/SEC) =  10.10
  LONGEST FLOWPATH FROM NODE    102.00 TO NODE    104.00 =  2560.00 FEET.
```

BASIN "F":

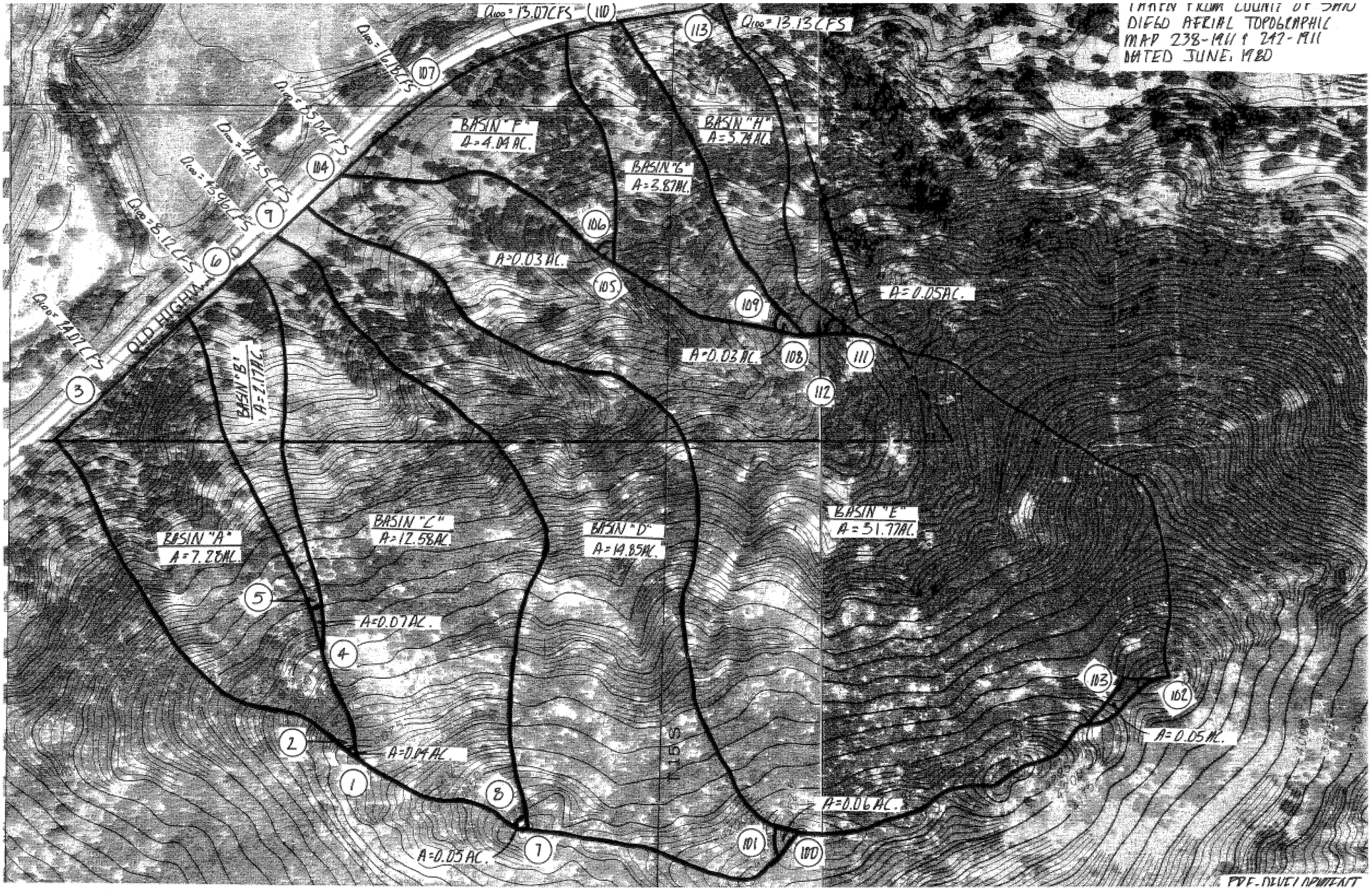
```
****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    106.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  82
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =   3775.00
  DOWNSTREAM ELEVATION(FEET) =   3772.00
  ELEVATION DIFFERENCE(FEET) =      3.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.833
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 13.701
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    107.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =   3773.00
  DOWNSTREAM NODE ELEVATION(FEET) =   3648.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   650.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.500
  PAVEMENT LIP(FEET) =  0.400   MANNING'S N = .1500
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.20000
  MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.697
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  82
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      8.36
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.92
  AVERAGE FLOW DEPTH(FEET) =   0.90   FLOOD WIDTH(FEET) =    5.00
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   3.71   Tc(MIN.) =   8.54
  SUBAREA AREA(ACRES) =    4.04       SUBAREA RUNOFF(CFS) =   16.06
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
  TOTAL AREA(ACRES) =      4.07         PEAK FLOW RATE(CFS) =      16.18

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  1.14   FLOOD WIDTH(FEET) =    7.36
  FLOW VELOCITY(FEET/SEC.) =   3.44   DEPTH*VELOCITY(FT*FT/SEC) =   3.90
  LONGEST FLOWPATH FROM NODE    105.00 TO NODE    107.00 =   700.00 FEET.
```

BASIN "G":

```
****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    109.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  82
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =   3832.00
  DOWNSTREAM ELEVATION(FEET) =   3830.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.441
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 11.636
  SUBAREA RUNOFF(CFS) =      0.14
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.14

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    110.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =   3830.00
  DOWNSTREAM NODE ELEVATION(FEET) =   3655.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   850.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.500
  PAVEMENT LIP(FEET) =  0.400   MANNING'S N = .1500
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.20000
  MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.177
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  82
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      6.63
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.02
  AVERAGE FLOW DEPTH(FEET) =   0.90   FLOOD WIDTH(FEET) =    5.00
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   4.69   Tc(MIN.) =  11.13
  SUBAREA AREA(ACRES) =    3.87       SUBAREA RUNOFF(CFS) =   12.97
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
  TOTAL AREA(ACRES) =      3.90         PEAK FLOW RATE(CFS) =      13.07

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  1.02   FLOOD WIDTH(FEET) =    6.20
  FLOW VELOCITY(FEET/SEC.) =   3.33   DEPTH*VELOCITY(FT*FT/SEC) =   3.40
  LONGEST FLOWPATH FROM NODE    108.00 TO NODE    110.00 =   910.00 FEET.
```

BASIN "H":

```
****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    112.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  82
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =   3882.00
  DOWNSTREAM ELEVATION(FEET) =   3880.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.441
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 11.636
  SUBAREA RUNOFF(CFS) =      0.24
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.24

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    113.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =   3880.00
  DOWNSTREAM NODE ELEVATION(FEET) =   3657.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   820.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.400
  PAVEMENT LIP(FEET) =  0.400   MANNING'S N = .1500
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.20000
  MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.447
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  82
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      6.71
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.30
  AVERAGE FLOW DEPTH(FEET) =   0.80   FLOOD WIDTH(FEET) =    5.00
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   4.14   Tc(MIN.) =  10.58
  SUBAREA AREA(ACRES) =    3.74       SUBAREA RUNOFF(CFS) =   12.95
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
  TOTAL AREA(ACRES) =      3.79         PEAK FLOW RATE(CFS) =      13.13

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.91   FLOOD WIDTH(FEET) =    6.10
  FLOW VELOCITY(FEET/SEC.) =   3.64   DEPTH*VELOCITY(FT*FT/SEC) =   3.31
  LONGEST FLOWPATH FROM NODE    111.00 TO NODE    113.00 =   880.00 FEET.
```


TAKEN FROM COUNTY OF SAN DIEGO AERIAL TOPOGRAPHIC MAP 238-1911 & 247-1911 DATED JUNE, 1980
Q_{100} = 13.07CFS
Q_{100} = 13.13CFS
Q_{100} = 1.18CFS
Q_{100} = 35.04CFS
Q_{100} = 41.35CFS
Q_{100} = 45.96CFS
Q_{100} = 8.12CFS
Q_{100} = 24.01CFS
BASIN "F"
A=4.04AC.
BASIN "H"
A=3.74AC.
BASIN "G"
A=3.87AC.
A=0.03AC.
A=0.05AC.
A=0.03AC.
OLD HIGHWAY
BASIN "B"
A=1.17AC.
BASIN "A"
A=7.78AC.
BASIN "C"
A=12.58AC.
BASIN "D"
A=14.85AC.
BASIN "E"
A=51.77AC.
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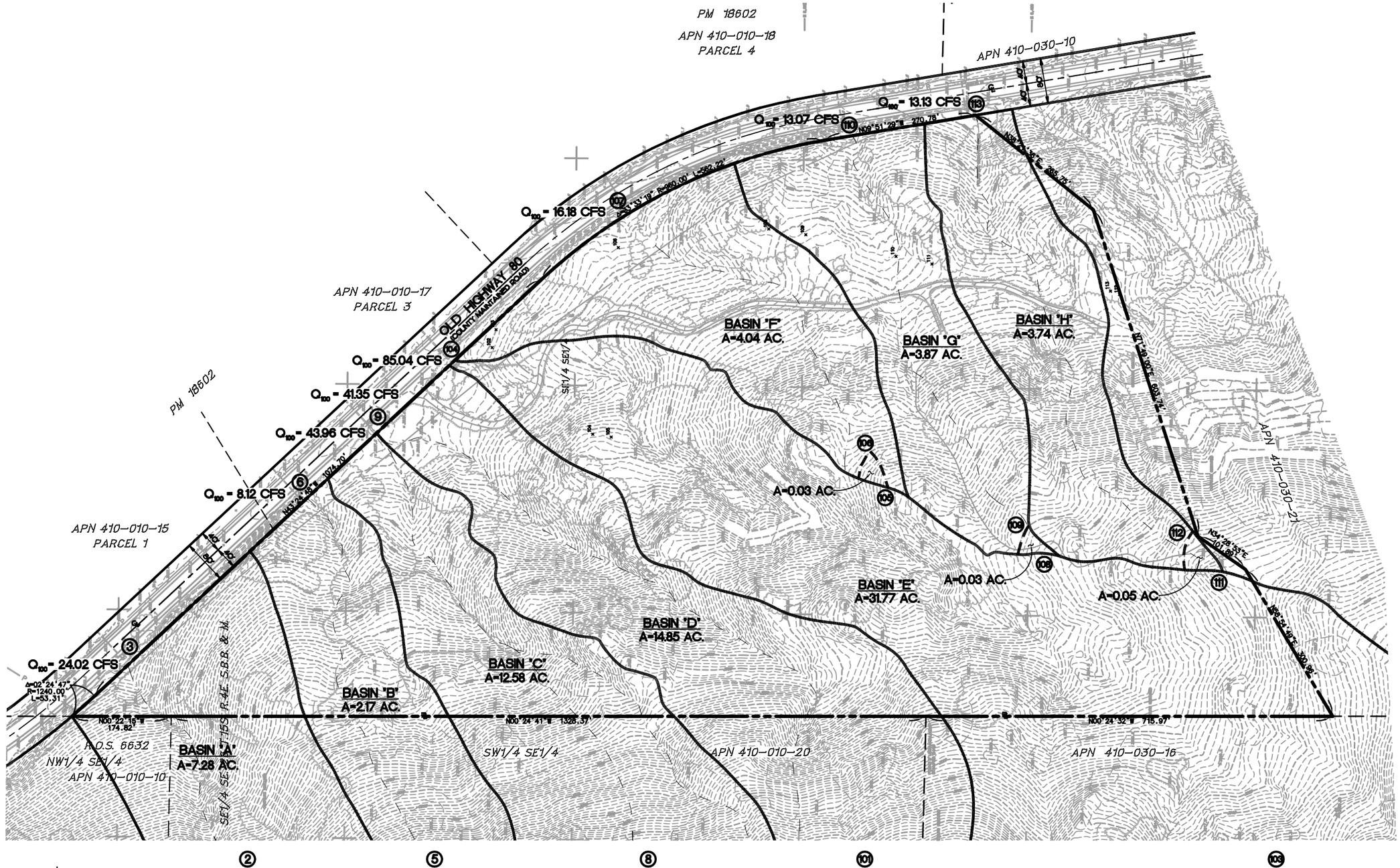
PRE-DEVELOPMENT



PRE-DEVELOPMENT DRAINAGE MAP
TPM 20765 RPL-1
LOG NO. 03-15-006

S:\SNIPES\PV0141X\DWG\TENTATIVE PARCEL MAP\PRE-POST DEVELOPMENT\PRE-DEVELOPMENT.DWG (Z-1)

SNIPES-DYE ASSOCIATES
CIVIL ENGINEERS AND LAND SURVEYORS
8348 CENTER DRIVE., STE. G, LA MESA, CA 91942
TELEPHONE (619) 697-8234 JOB NO. PV0141

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                        2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2005 Advanced Engineering Software (aes)
            Ver. 2.0 Release Date: 06/01/2005  License ID 1305

                          Analysis prepared by:

                           Snipes-Dye Associates
                         8348 Center Drive, Suite G
                           La Mesa, CA  91942-2910
                     Fax (619)460-2033  Phone (619)697-9234

 ************************** DESCRIPTION OF STUDY **************************
* CEQA PRELIMINARY DRAINAGE STUDY                                          *
* TPM 20765                                                                *
* POST-DEVELOPMENT CONDITIONS                                              *
 ***************************************************************************

  FILE NAME: PV0141.DAT
  TIME/DATE OF STUDY: 14:52 10/02/2007
---------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
---------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   5.200
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
```

BASIN "A":

```
****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
---------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
===========================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  82
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =   4082.00
  DOWNSTREAM ELEVATION(FEET) =   4080.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.441
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 11.636
  SUBAREA RUNOFF(CFS) =      0.19
  TOTAL AREA(ACRES) =      0.04   TOTAL RUNOFF(CFS) =      0.19
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =   4080.00
  DOWNSTREAM NODE ELEVATION(FEET) =   3635.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1100.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.100
  PAVEMENT LIP(FEET) =  0.100   MANNING'S N = .1500
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.20000
  MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.004
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  82
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     12.45
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.62
  AVERAGE FLOW DEPTH(FEET) =   0.59   FLOOD WIDTH(FEET) =    8.88
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   5.06   Tc(MIN.) =  11.50
  SUBAREA AREA(ACRES) =    7.28       SUBAREA RUNOFF(CFS) =   23.89
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
  TOTAL AREA(ACRES) =      7.32         PEAK FLOW RATE(CFS) =      24.02

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.80   FLOOD WIDTH(FEET) =   11.01
  FLOW VELOCITY(FEET/SEC.) =   4.32   DEPTH*VELOCITY(FT*FT/SEC) =   3.46
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =  1160.00 FEET.
```

BASIN "B":

```
****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  82
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =   3928.00
  DOWNSTREAM ELEVATION(FEET) =   3925.00
  ELEVATION DIFFERENCE(FEET) =      3.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.626
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 12.696
  SUBAREA RUNOFF(CFS) =      0.36
  TOTAL AREA(ACRES) =      0.07   TOTAL RUNOFF(CFS) =      0.36

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =   3925.00
  DOWNSTREAM NODE ELEVATION(FEET) =   3632.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   825.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.500
  PAVEMENT LIP(FEET) =  0.200   MANNING'S N = .1500
```

```
PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.20000
MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.846
USER-SPECIFIED RUNOFF COEFFICIENT = .4100
S.C.S. CURVE NUMBER (AMC II) =  82
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      4.30
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.25
AVERAGE FLOW DEPTH(FEET) =   0.70   FLOOD WIDTH(FEET) =    5.00
"V" GUTTER FLOW TRAVEL TIME(MIN.) =   4.23   Tc(MIN.) =   9.85
SUBAREA AREA(ACRES) =    2.17       SUBAREA RUNOFF(CFS) =    7.87
AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
TOTAL AREA(ACRES) =      2.24         PEAK FLOW RATE(CFS) =       8.12

END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) =  0.73   FLOOD WIDTH(FEET) =    5.29
FLOW VELOCITY(FEET/SEC.) =   3.39   DEPTH*VELOCITY(FT*FT/SEC) =   2.47
LONGEST FLOWPATH FROM NODE      4.00 TO NODE      6.00 =   885.00 FEET.
```

BASIN "C":

```
****************************************************************************
FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
USER-SPECIFIED RUNOFF COEFFICIENT = .4100
S.C.S. CURVE NUMBER (AMC II) =  82
INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
UPSTREAM ELEVATION(FEET) =   4185.00
DOWNSTREAM ELEVATION(FEET) =   4180.00
ELEVATION DIFFERENCE(FEET) =      5.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.746
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 13.701
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) =      0.28
TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.28

****************************************************************************
FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  91
----------------------------------------------------------------------------
>>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
UPSTREAM NODE ELEVATION(FEET) =   4180.00
DOWNSTREAM NODE ELEVATION(FEET) =   3637.50
CHANNEL LENGTH THRU SUBAREA(FEET) =  1600.00
"V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.500
PAVEMENT LIP(FEET) =  0.400   MANNING'S N = .1500
PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.20000
MAXIMUM DEPTH(FEET) =   3.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.489
USER-SPECIFIED RUNOFF COEFFICIENT = .4100
S.C.S. CURVE NUMBER (AMC II) =  82
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     22.86
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.63
AVERAGE FLOW DEPTH(FEET) =   1.17   FLOOD WIDTH(FEET) =    7.66
```

```
"V" GUTTER FLOW TRAVEL TIME(MIN.) =   5.76   Tc(MIN.) =  10.50
SUBAREA AREA(ACRES) =   12.58       SUBAREA RUNOFF(CFS) =   43.79
AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
TOTAL AREA(ACRES) =     12.63         PEAK FLOW RATE(CFS) =      43.96

END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) =  1.53   FLOOD WIDTH(FEET) =   11.27
FLOW VELOCITY(FEET/SEC.) =   5.26   DEPTH*VELOCITY(FT*FT/SEC) =   8.04
LONGEST FLOWPATH FROM NODE      7.00 TO NODE      9.00 =  1660.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 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.) =  10.50
RAINFALL INTENSITY(INCH/HR) =   8.49
TOTAL STREAM AREA(ACRES) =    12.63
PEAK FLOW RATE(CFS) AT CONFLUENCE =     43.96
```

BASIN "D":

```
****************************************************************************
FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
USER-SPECIFIED RUNOFF COEFFICIENT = .4100
S.C.S. CURVE NUMBER (AMC II) =  82
INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
UPSTREAM ELEVATION(FEET) =   4232.00
DOWNSTREAM ELEVATION(FEET) =   4230.00
ELEVATION DIFFERENCE(FEET) =      2.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.441
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 11.636
SUBAREA RUNOFF(CFS) =      0.29
TOTAL AREA(ACRES) =      0.06   TOTAL RUNOFF(CFS) =      0.29

****************************************************************************
FLOW PROCESS FROM NODE     11.00 TO NODE      9.00 IS CODE =  91
----------------------------------------------------------------------------
>>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
UPSTREAM NODE ELEVATION(FEET) =   4230.00
DOWNSTREAM NODE ELEVATION(FEET) =   3637.50
CHANNEL LENGTH THRU SUBAREA(FEET) =  2150.00
"V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.500
PAVEMENT LIP(FEET) =  0.400   MANNING'S N = .1500
PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.20000
MAXIMUM DEPTH(FEET) =   3.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.747
USER-SPECIFIED RUNOFF COEFFICIENT = .4100
S.C.S. CURVE NUMBER (AMC II) =  82
```

```
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      20.93
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.19
AVERAGE FLOW DEPTH(FEET) =   1.17   FLOOD WIDTH(FEET) =    7.74
"V" GUTTER FLOW TRAVEL TIME(MIN.) =   8.55   Tc(MIN.) =  15.00
SUBAREA AREA(ACRES) =   14.40       SUBAREA RUNOFF(CFS) =   39.83
AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
TOTAL AREA(ACRES) =     14.46         PEAK FLOW RATE(CFS) =      40.00

END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) =  1.53   FLOOD WIDTH(FEET) =   11.32
FLOW VELOCITY(FEET/SEC.) =   4.76   DEPTH*VELOCITY(FT*FT/SEC) =   7.29
LONGEST FLOWPATH FROM NODE     10.00 TO NODE      9.00 =  2210.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 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.) =  15.00
RAINFALL INTENSITY(INCH/HR) =   6.75
TOTAL STREAM AREA(ACRES) =    14.46
PEAK FLOW RATE(CFS) AT CONFLUENCE =     40.00

** CONFLUENCE DATA **
STREAM     RUNOFF      Tc      INTENSITY      AREA
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1       43.96    10.50        8.489        12.63
    2       40.00    15.00        6.747        14.46

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

** PEAK FLOW RATE TABLE **
STREAM     RUNOFF      Tc      INTENSITY
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
    1       71.97    10.50       8.489
    2       74.93    15.00       6.747

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     74.93   Tc(MIN.) =   15.00
TOTAL AREA(ACRES) =     27.09
LONGEST FLOWPATH FROM NODE     10.00 TO NODE      9.00 =  2210.00 FEET.
```

BASIN "E":

```
****************************************************************************
FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
USER-SPECIFIED RUNOFF COEFFICIENT = .4100
S.C.S. CURVE NUMBER (AMC II) =  82
INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
```

```
  UPSTREAM ELEVATION(FEET) =   4173.50
  DOWNSTREAM ELEVATION(FEET) =   4172.00
  ELEVATION DIFFERENCE(FEET) =      1.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.090
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 12.065
  SUBAREA RUNOFF(CFS) =      0.25
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.25

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =   4172.00
  DOWNSTREAM NODE ELEVATION(FEET) =   3805.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1410.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.500
  PAVEMENT LIP(FEET) =  0.400   MANNING'S N = .1500
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.20000
  MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.203
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  82
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     43.08
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.71
  AVERAGE FLOW DEPTH(FEET) =   1.60   FLOOD WIDTH(FEET) =   11.95
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   4.99   Tc(MIN.) =  11.08
  SUBAREA AREA(ACRES) =   25.00       SUBAREA RUNOFF(CFS) =   84.08
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
  TOTAL AREA(ACRES) =     25.05         PEAK FLOW RATE(CFS) =      84.24

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  2.06   FLOOD WIDTH(FEET) =   16.61
  FLOW VELOCITY(FEET/SEC.) =   5.34   DEPTH*VELOCITY(FT*FT/SEC) =  11.00
  LONGEST FLOWPATH FROM NODE     12.00 TO NODE     14.00 =  1460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =   3805.00
  DOWNSTREAM NODE ELEVATION(FEET) =   3655.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   820.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.500
  PAVEMENT LIP(FEET) =  0.400   MANNING'S N = .1500
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.20000
  MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.061
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  82
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     92.61
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.72
  AVERAGE FLOW DEPTH(FEET) =   2.28   FLOOD WIDTH(FEET) =   18.78
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   2.90   Tc(MIN.) =  13.97
  SUBAREA AREA(ACRES) =    5.78       SUBAREA RUNOFF(CFS) =   16.73
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
```

```
  TOTAL AREA(ACRES) =     30.83          PEAK FLOW RATE(CFS) =      89.25

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  2.25   FLOOD WIDTH(FEET) =   18.47
  FLOW VELOCITY(FEET/SEC.) =   4.68   DEPTH*VELOCITY(FT*FT/SEC) =  10.52
  LONGEST FLOWPATH FROM NODE     12.00 TO NODE     15.00 =  2280.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3655.00  DOWNSTREAM(FEET) =  3650.00
  FLOW LENGTH(FEET) =    85.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  19.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.99
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     89.25
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =  14.03
  LONGEST FLOWPATH FROM NODE     12.00 TO NODE     16.00 =  2365.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =   3650.00
  DOWNSTREAM NODE ELEVATION(FEET) =   3640.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =    55.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.500
  PAVEMENT LIP(FEET) =  0.400   MANNING'S N = .1500
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.20000
  MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.977
  USER-SPECIFIED RUNOFF COEFFICIENT = .3600
  S.C.S. CURVE NUMBER (AMC II) =  76
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     91.09
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.60
  AVERAGE FLOW DEPTH(FEET) =   2.29   FLOOD WIDTH(FEET) =   18.88
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.20   Tc(MIN.) =  14.23
  SUBAREA AREA(ACRES) =    1.46       SUBAREA RUNOFF(CFS) =    3.67
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.408
  TOTAL AREA(ACRES) =     32.29          PEAK FLOW RATE(CFS) =      91.86

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  2.30   FLOOD WIDTH(FEET) =   18.95
  FLOW VELOCITY(FEET/SEC.) =   4.60   DEPTH*VELOCITY(FT*FT/SEC) =  10.56
  LONGEST FLOWPATH FROM NODE     12.00 TO NODE     17.00 =  2420.00 FEET.
```

BASIN "F":

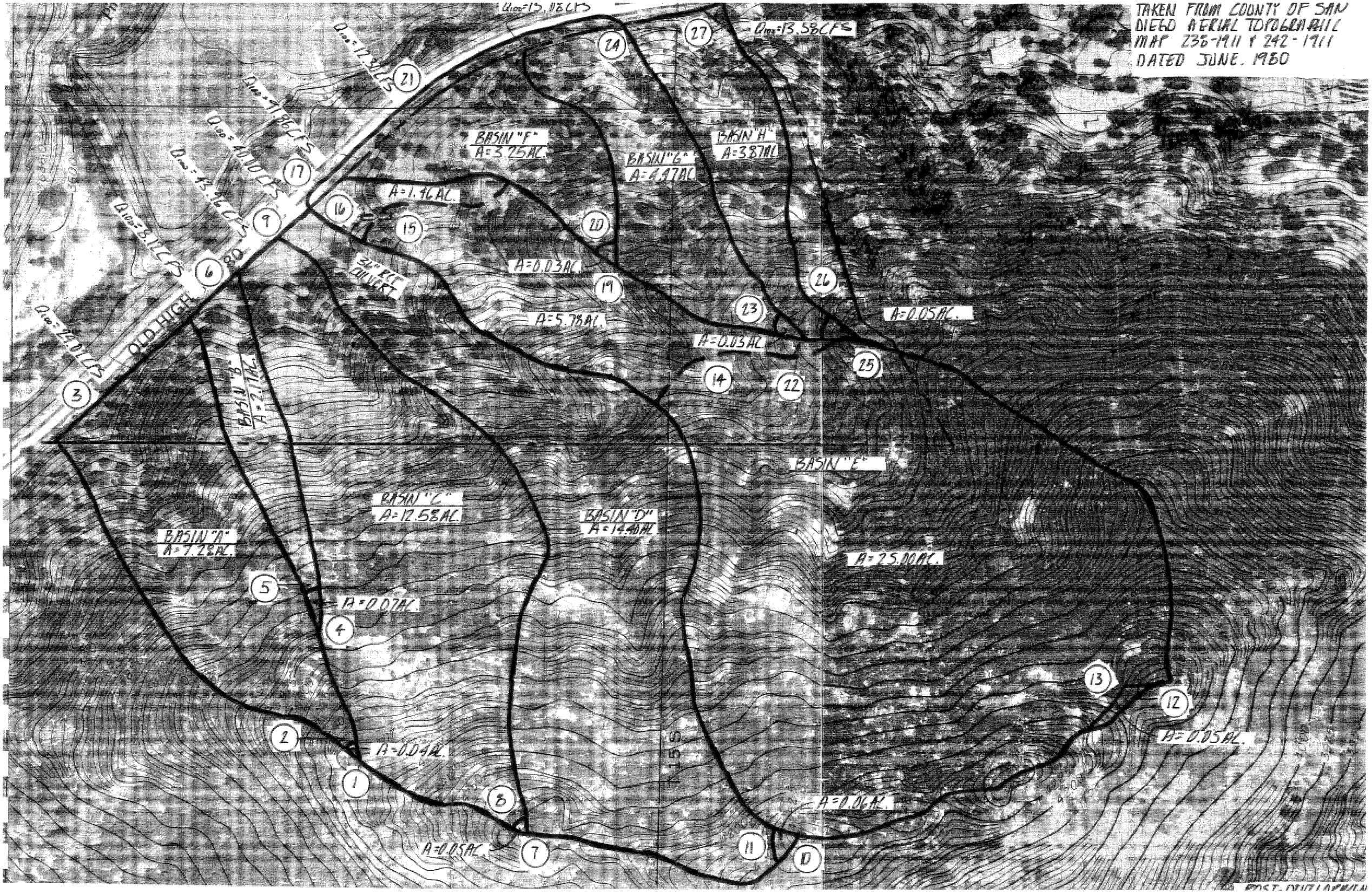
```
****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  82
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =   3775.00
  DOWNSTREAM ELEVATION(FEET) =   3772.00
  ELEVATION DIFFERENCE(FEET) =      3.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.626
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 12.696
  SUBAREA RUNOFF(CFS) =      0.16
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =   3772.00
  DOWNSTREAM NODE ELEVATION(FEET) =   3648.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   650.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.500
  PAVEMENT LIP(FEET) =  0.400   MANNING'S N = .1500
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.20000
  MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.148
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  82
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      6.25
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.91
  AVERAGE FLOW DEPTH(FEET) =   0.90   FLOOD WIDTH(FEET) =    5.00
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   3.73   Tc(MIN.) =   9.35
  SUBAREA AREA(ACRES) =    3.25       SUBAREA RUNOFF(CFS) =   12.19
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
  TOTAL AREA(ACRES) =      3.28         PEAK FLOW RATE(CFS) =      12.30

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  1.01   FLOOD WIDTH(FEET) =    6.10
  FLOW VELOCITY(FEET/SEC.) =   3.19   DEPTH*VELOCITY(FT*FT/SEC) =   3.22
  LONGEST FLOWPATH FROM NODE     19.00 TO NODE     21.00 =   710.00 FEET.
```

BASIN "G":

```
****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  82
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =   3832.00
  DOWNSTREAM ELEVATION(FEET) =   3830.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.441
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 11.636
  SUBAREA RUNOFF(CFS) =      0.14
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.14

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =   3830.00
  DOWNSTREAM NODE ELEVATION(FEET) =   3655.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   850.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.500
  PAVEMENT LIP(FEET) =  0.400   MANNING'S N = .1500
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.20000
  MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.174
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  82
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      7.71
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.02
  AVERAGE FLOW DEPTH(FEET) =   0.90   FLOOD WIDTH(FEET) =    5.00
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   4.70   Tc(MIN.) =  11.14
  SUBAREA AREA(ACRES) =    4.47       SUBAREA RUNOFF(CFS) =   14.98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
  TOTAL AREA(ACRES) =      4.50         PEAK FLOW RATE(CFS) =      15.08

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  1.09   FLOOD WIDTH(FEET) =    6.86
  FLOW VELOCITY(FEET/SEC.) =   3.46   DEPTH*VELOCITY(FT*FT/SEC) =   3.76
  LONGEST FLOWPATH FROM NODE     22.00 TO NODE     24.00 =   910.00 FEET.
```

BASIN "H":

```
****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     26.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  82
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =   3882.00
  DOWNSTREAM ELEVATION(FEET) =   3880.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.441
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 11.636
  SUBAREA RUNOFF(CFS) =      0.24
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.24

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     27.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =   3880.00
  DOWNSTREAM NODE ELEVATION(FEET) =   3657.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   820.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.400
  PAVEMENT LIP(FEET) =  0.400   MANNING'S N = .1500
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.20000
  MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.447
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  82
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      6.94
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.30
  AVERAGE FLOW DEPTH(FEET) =   0.80   FLOOD WIDTH(FEET) =    5.00
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   4.14   Tc(MIN.) =  10.58
  SUBAREA AREA(ACRES) =    3.87       SUBAREA RUNOFF(CFS) =   13.40
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
  TOTAL AREA(ACRES) =      3.92         PEAK FLOW RATE(CFS) =      13.58

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.92   FLOOD WIDTH(FEET) =    6.24
  FLOW VELOCITY(FEET/SEC.) =   3.67   DEPTH*VELOCITY(FT*FT/SEC) =   3.39
  LONGEST FLOWPATH FROM NODE     25.00 TO NODE     27.00 =   880.00 FEET.
```


TAKEN FROM COUNTY OF SAN DIEGO AERIAL TOPOGRAPHIC MAP 236-1911 & 242-1911 DATED JUNE, 1980
Q100=15.08CFS
Q100=12.38CFS
Q100=13.58CFS
Q100=41.86CFS
Q100=40.10CFS
Q100=43.76CFS
Q100=8.11CFS
Q100=24.01CFS
BASIN "F"
A=3.25AC.
BASIN "G"
A=4.47AC.
BASIN "H"
A=3.87AC.
A=1.46AC.
A=0.03AC.
A=5.75AC.
A=0.03AC.
A=0.05AC.
30" RCP CULVERT
OLD HIGH
BASIN "B"
A=2.71AC.
BASIN "C"
A=12.58AC.
BASIN "D"
A=14.40AC.
BASIN "E"
A=25.00AC.
BASIN "A"
A=7.28AC.
A=0.07AC.
A=0.04AC.
A=0.05AC.
A=0.06AC.
A=0.05AC.
ZTES
1
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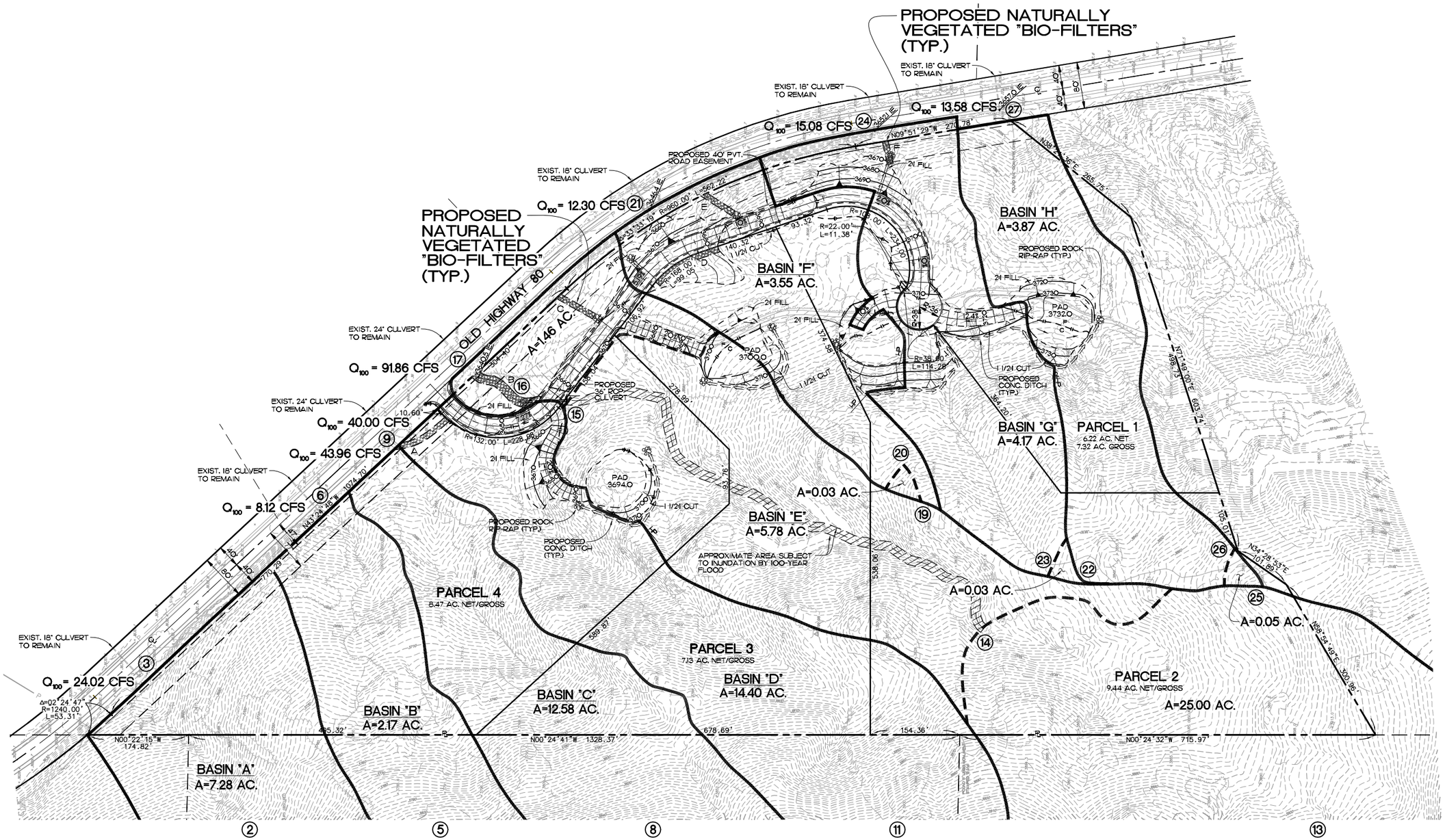

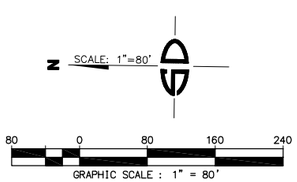

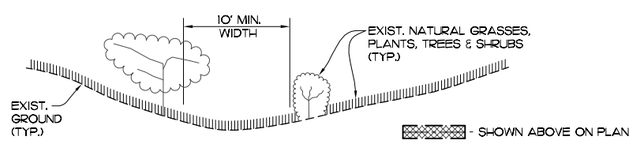

TYPICAL SECTION - NATURALLY VEGETATED "BIO-FILTER"
NO SCALE

VEGETATED "BIO-FILTERS"		
NO.	LENGTH (FT.)	AVG. SLOPE (%)
A	100	2.0
B	100	2.5
C	100	10
D	120	2.5
E	100	10
F	60	12.5

POST-DEVELOPMENT DRAINAGE MAP
TPM 20765 RPL-1
LOG NO. 03-15-006

SNIPES-DYE ASSOCIATES
CIVIL ENGINEERS AND LAND SURVEYORS
8348 CENTER DRIVE., STE. G, LA MESA, CA 91942
TELEPHONE (619) 697-9234 JOB NO. PV0141

S:\SNIPES\PV0141X\DWG\TENTATIVE PARCEL MAP\PRE-POST DEVELOPMENT\POST-DEVELOPMENT.DWG (Z-1)