PRELIMINARY HYDROLOGY STUDY

FOR

LOT 31 RANCHO DEL SOL

SAN DIEGO, CALIFORNIA

Prepared For:

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Spokane, Washington 99224

April 19, 2019

Revised 12-20-20

TABLE OF CON-TENTS

APPENDICES

Introduction

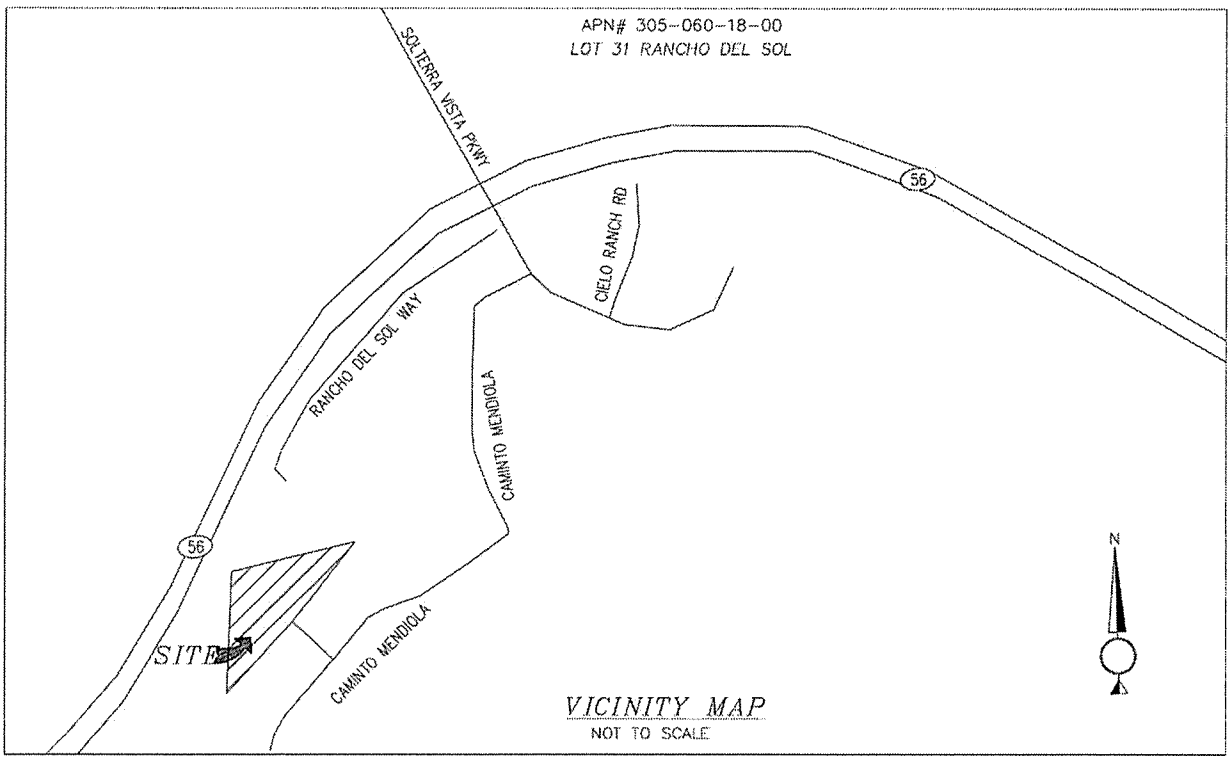
The existing site is located at Assessor's Parcel No. 305-060-18-00, lot 31, located in the Rancho del Sol Unit 1 subdivision, according to Recorded Map No. 12477, in the City and County of San Diego, State of California. For the location of the subject site, refer to the Vicinity Map

This new development proposes to construct a single residential home and a horse barn. The property is bordered on the north by a southeast descending, relatively undisturbed hillside with five residential properties bordering a small portion of the very northwest property boundary; on the west by a relatively undisturbed southerly descending hillside; and on the southeast by existing residential properties lower in elevation.

Existing Conditions

The existing site is vacant with no storm drains within the lot. The property sheet flows from north to south to an existing brow ditch located behind the existing homes and eventually discharging to curb inlets located at Caminito Mendiola street. The site has no offsite runoff from the neighbor on the north side.

Vicinity Map



N

Proposed Improvements

The proposed development will drain via a graded swale as shown on the grading plans to a proposed detention basins. This will allow the runoff to be treated before leaving the site via an 18-inch concrete pipe. Additionally, the driveway has been designed with porous pavement to provide treatment for the proposed runoff. The runoff will then be captured and conveyed via three-inch pipes to an 18-inch pipe that will discharge on Caminito Mendiola as well. The open space will keep the same sheet flow and will be conveyed via new concrete brow ditch.

EXISTING CONDITIONS	**NODE 400**	**Q100=2.31**
EXISTING CONDITIONS	**NODE 300**	**Q100=10.49**
PROPOSED DEVELOPMENT	**NODE 200**	**Q100=1.80**
PROPOSED DEVELOPMENT	**NODE 100**	**Q100=10.86**

Conclusion

The proposed sheet flow has been redirected slightly to discharge to on Caminito Mendiola and the peak runoff will decrease. Therefore, it is our opinion that the redirection of the runoff will not impact the neighbors because the overall location of discharge will remain the same. The project will also install retention basins to collect storm water runoff to be used for treatment and control peak flow purposes. This will decrease any runoff the development site may produce. The site is located next to an open space. However, the project is not required to obtain a 401/404 Permit as required by the Regional Water Quality Control Board under the Federal Clean Water Act.

Rational Method Methodology

The County of San Diego's Drainage Manual requires that the Rational Method be used for hydrologic analysis of a watershed less than 0.5 square-miles.

The Rational Method computer program developed by Advanced Engineering Software (AES) was used for this study because it satisfies the County of San Diego's design criteria. The hydrologic model is developed by creating independent node-link models of each interior drainage basin and linking these sub-models together at confluence points. The program has the capability to perform calculations for 15 hydrologic processes. These processes are assigned code numbers that appear in the results. The code numbers and their significance are as follows:

Code 1: Confluence analysis at a node
Code 2: Initial subarea analysis
Code 3: Pipe flow travel time (computer estimated pipe sizes)
Code 4: Pipe flow travel time (user specified pipe size)
Code 5: Trapezoidal channel travel time
Code 6: Street flow analysis through a subarea
Code 7: User specified information at a node
Code 8: Addition of the subarea runoff to mainline
Code 9: V-Gutter flow through subarea
Code 10: Copy mainstream data onto a memory bank
Code 11: Confluence a memory bank with the mainstream memory
Code 12: Clear a memory bank
Code 13: Clear the mainstream memory
Code 14: Copy a memory bank onto the mainstream memory
Code 15: Hydrologic data bank storage functions

Criteria

In order to perform the hydrologic analysis; base information for the study area is required. This information includes the existing drainage facility locations and sizes, existing land uses, flow patterns, drainage basin boundaries, and topographic elevations. Drainage basin boundaries, flow patterns, and topographic elevations were determined from the Drainage Maps which are located in Appendix B. The hydrologic conditions were analyzed in accordance with the County of San Diego's design criteria as follows:

Design Storm: 100-year 6-hour event

Runoff Coefficients: "C" Valves varied from 0.55 to 0.95 depending on the land use

Soil Type: "B"

Rainfall Intensity: County of San Diego *Drainage Design Manual*

References

City of San Diego Drainage Design Manual, 2018.

APPENDIX A

City of San Diego Design Charts

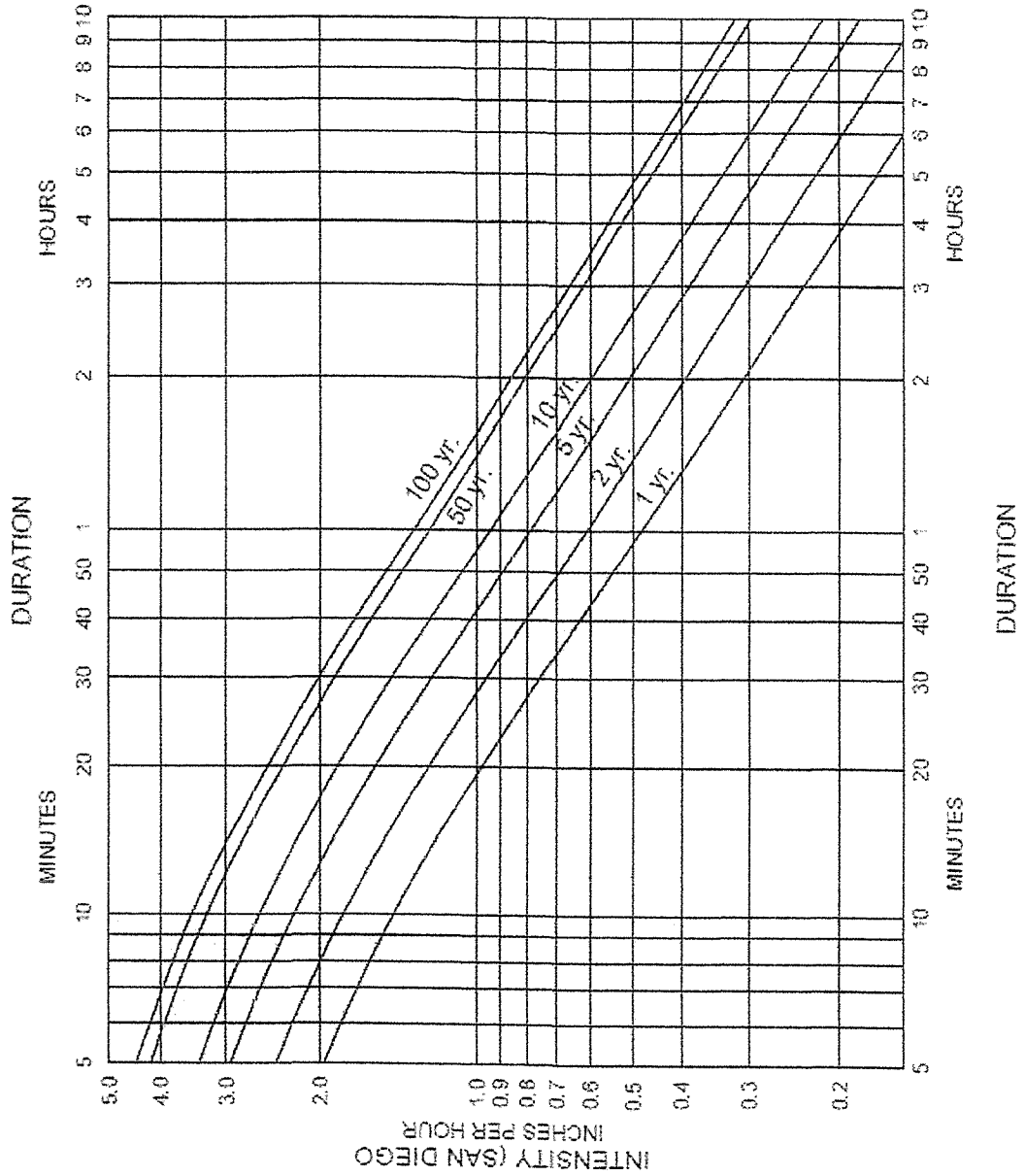
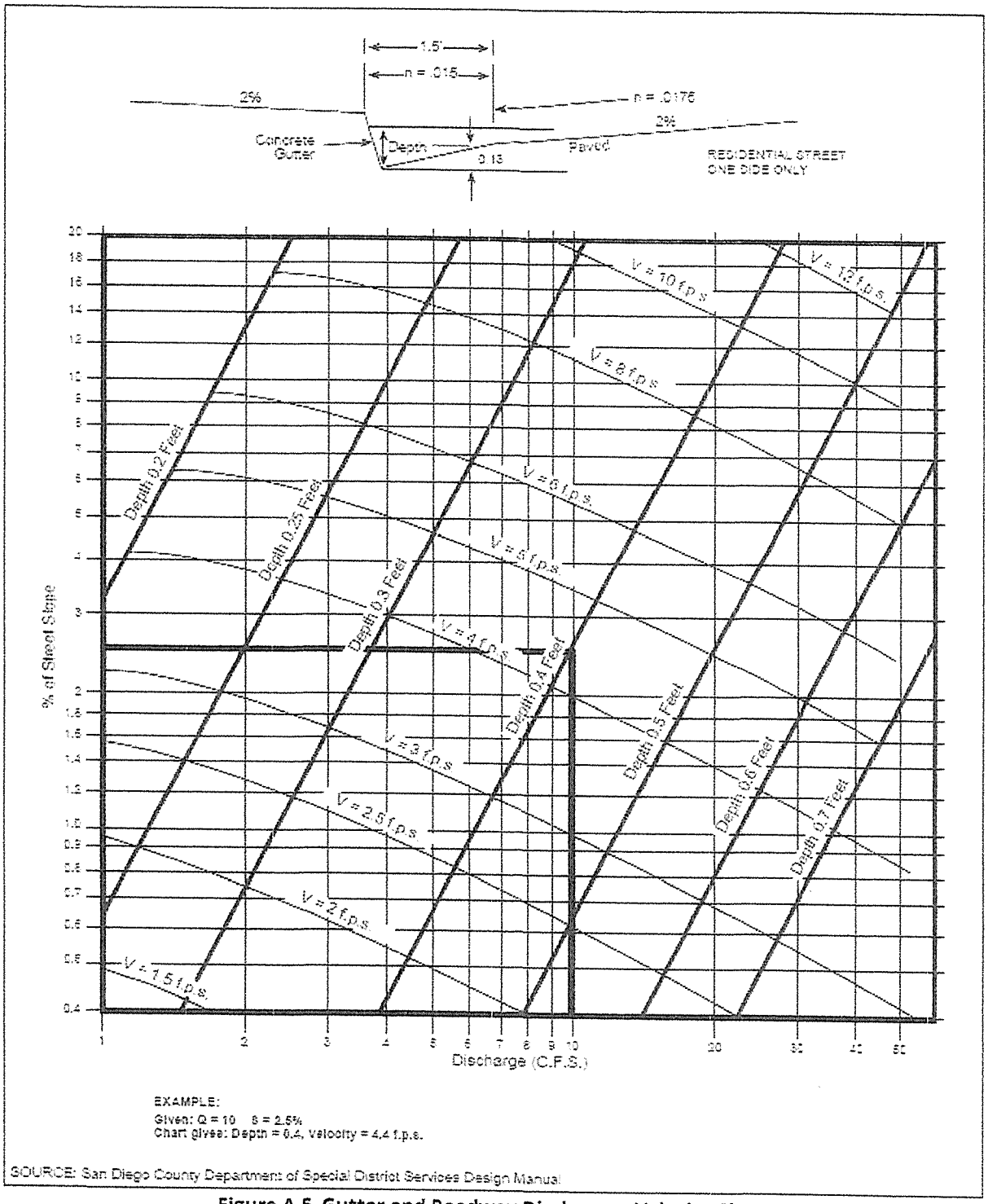


Figure A-1. Intensity-Duration-Frequency Design Chart



SOURCE: San Diego County Department of Special District Services Design Manual

Figure A-5. Gutter and Roadway Discharge – Velocity Chart

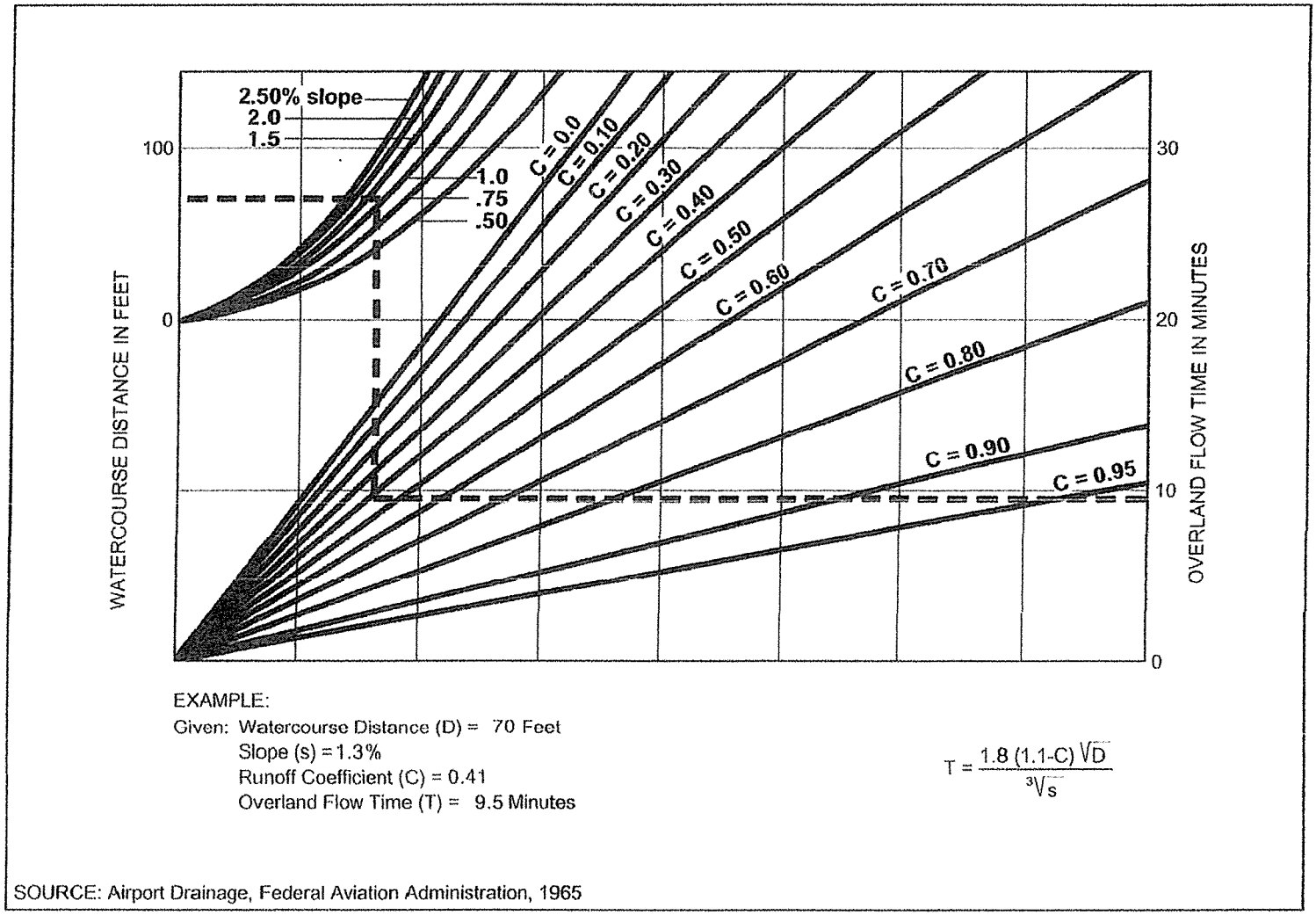


Figure A-4. Rational Formula – Overland Time of Flow Nomograph

Note: Use formula for watercourse distances in excess of 100 feet.

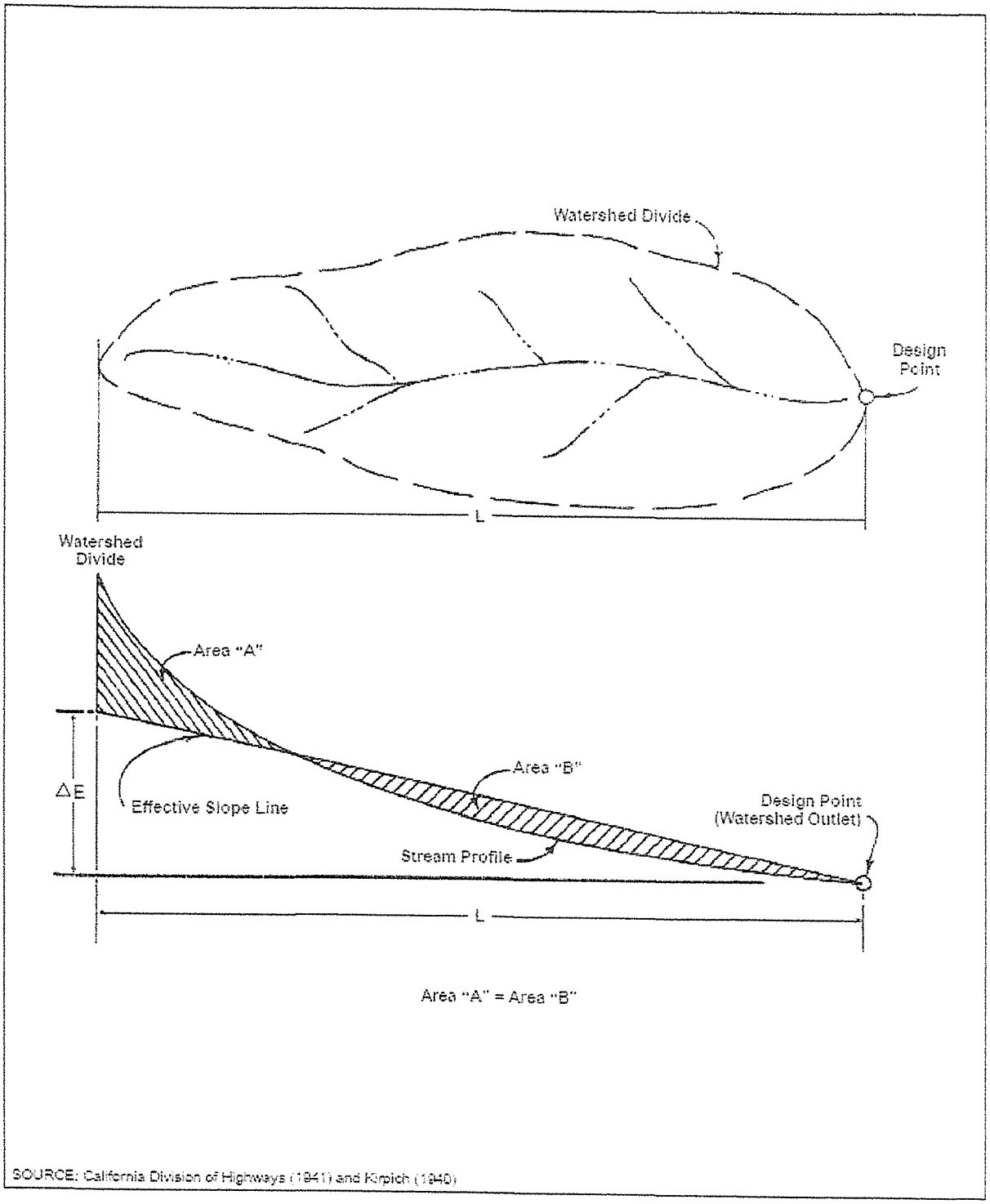


Figure A-3. Computation of Effective Slope for Natural Watersheds

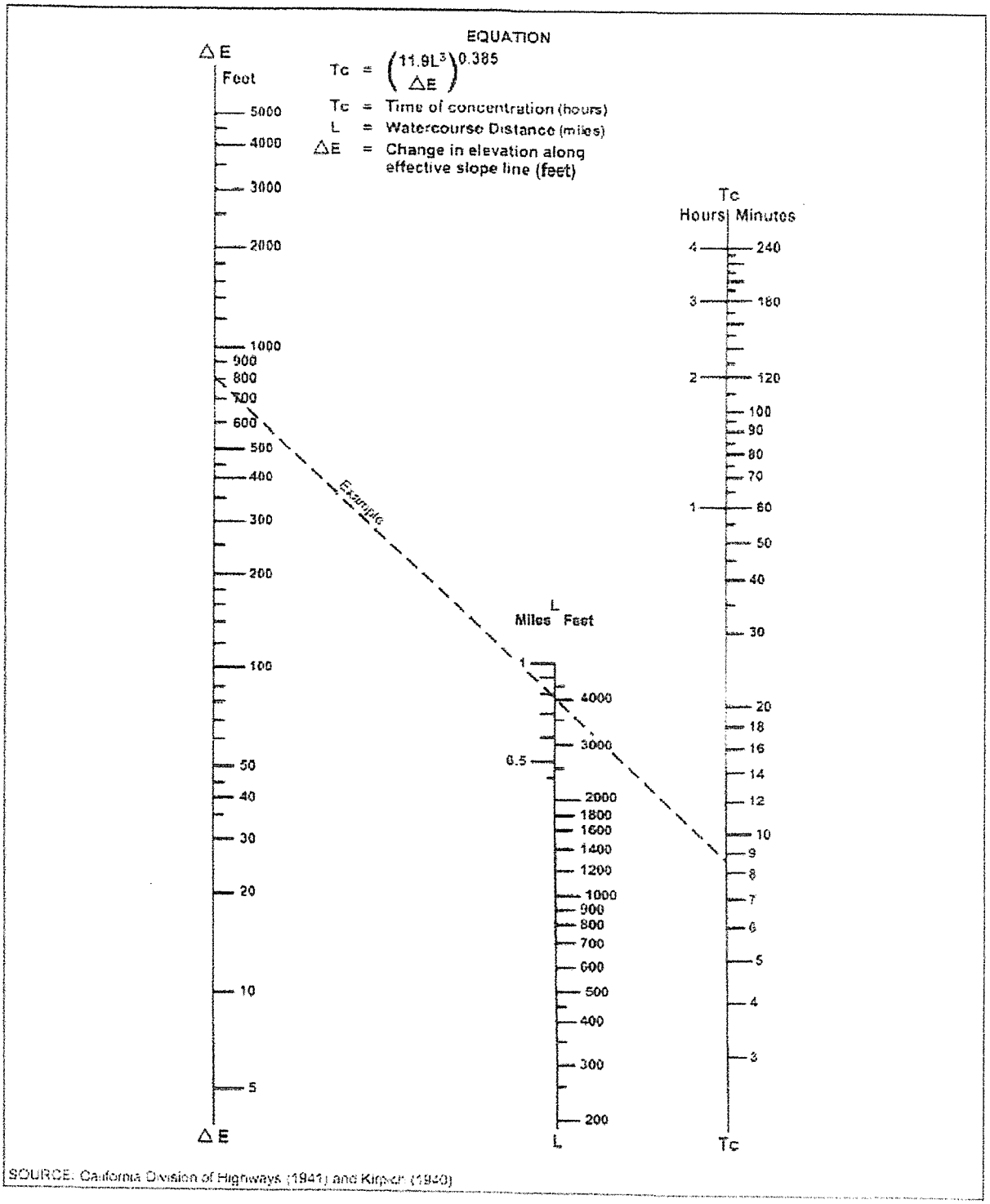


Figure A-2. Nomograph for Determination of T_c for Natural Watersheds

Note: Add ten minutes to the computed time of concentration from Figure A-2.

3.2.2.4 Grated Inlets in Sag

A grated inlet in a sag location operates as a weir at shallower depths and as an orifice at larger depths. The designer shall estimate the capacity of the inlet under both weir flow and orifice flow conditions, then adopt a design capacity equal to the smaller of the two results. Figure 3-5 provides a nomograph for calculating the capacity of grated inlets in sag locations.

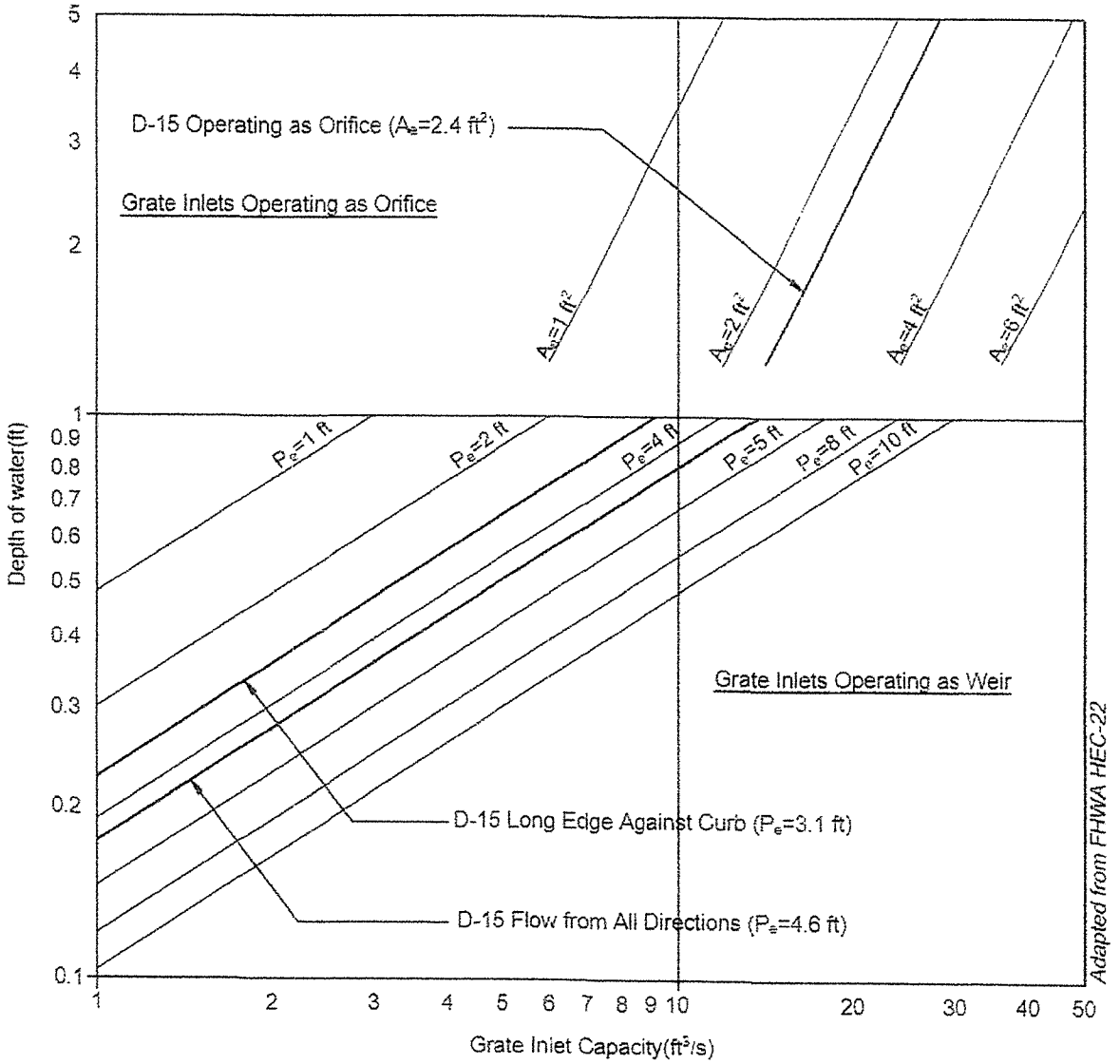


Figure 3-5. Capacity of Grate Inlets in Sag Locations

Step 1. Calculate the capacity of a grate inlet operating as a weir using the weir equation (Equation 3-10) with a length equivalent to perimeter of the grate. When the grate is located next to a curb, disregard the length of the grate against the curb.

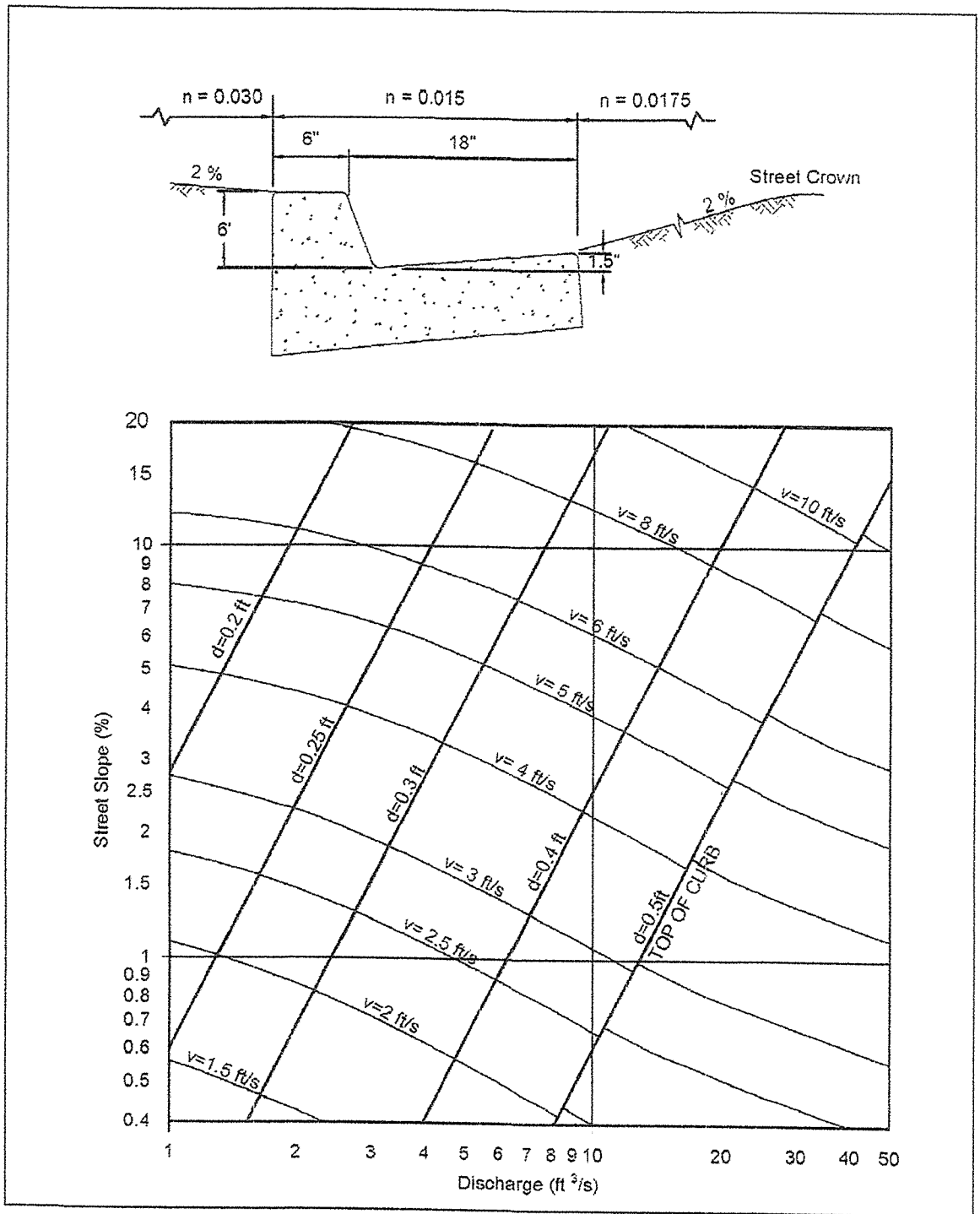


Figure 3-2: Gutter and Roadway Discharge-Velocity Chart (6" Curb)

TABLE 2

RUNOFF COEFFICIENTS (RATIONAL METHOD)

DEVELOPED AREAS (URBAN)

Land Use	Coefficient, C Soil Type (1)
	D
Residential:	
Single Family	.55
Multi-Units	.70
Mobile Homes	.65
Rural (lots greater than 1/2 acre)	.45
Commercial (2) 80% Impervious	.85
Industrial (2) 90% Impervious	.95

NOTES:

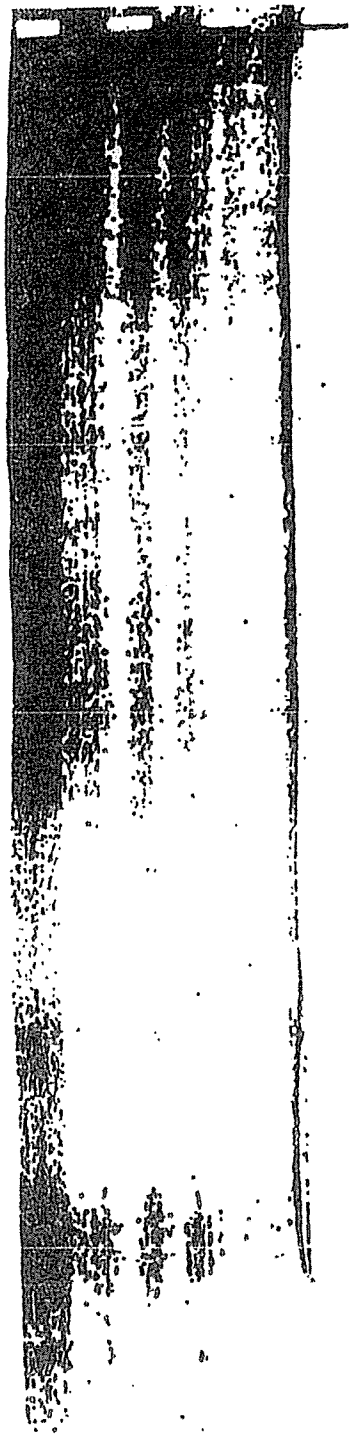
(1) Type D soil to be used for all areas.

(2) Where actual conditions deviate significantly from the tabulated imperviousness values of 80% or 90%, the values given for coefficient C, may be revised by multiplying 80% or 90% by the ratio of actual imperviousness to the tabulated imperviousness. However, in no case shall the final coefficient be less than 0.50. For example: Consider commercial property on D soil.

Actual imperviousness = 50%

Tabulated imperviousness = 80%

Revised C = $\frac{50}{80} \times 0.85 = 0.53$



6

#200-1.6.1 Selection of Riprap and Filter Blanket Material

Vel. Ft/Sec (1)	Rock Class (2)	Riprap Thickness "T"	Filter Blanket (3)			
			Upper Layer(s)			Lower Layer (6)
			Opt. 1 Sec. 200 (4)	Opt. 2 Sec. 400 (4)	Opt. 3 (5)	
6-7	No. 3 Backing	.6	3/16"	C2	D.G.	—
7-8	No. 2 Backing	1.0	1/4"	B3	D.G.	—
8-9.5	Facing	1.4	3/8"	—	D.G.	—
9.5-11	Light	2.0	1/2"	—	3/4", 1 1/2" P.B.	—
11-13	1/4 Ton	2.7	3/4"	—	3/4", 1 1/2" P.B.	Sand
13-15	1/2 Ton	3.4	1"	—	3/4", 1 1/2" P.B.	Sand
15-17	1 Ton	4.3	1 1/2"	—	Type B	Sand
17-20	2 Ton	5.4	2"	—	Type B	Sand

Practical use of this table is limited to situations where "T" is less than D.

(1) Average velocity in pipe or bottom velocity in energy dissipator, whichever is greater.

(2) If desired riprap and filter blanket class is not available, use next larger class.

(3) Filter blanket thickness = 1 Foot or "T", whichever is less.

(4) Standard Specifications for Public Works Construction.

(5) D.G. = Disintegrated Granite, 1 MM to 10 MM

P.B. = Processed Miscellaneous Base

Type B = Type B bedding material, (minimum 75% crushed particles, 100% passing 2 1/2" sieve, 10% passing 1" sieve)

(6) Sand 75% retained on #200 sieve.

SECTION 201 - CONCRETE, MORTAR AND RELATED MATERIALS

201-1 PORTLAND CEMENT CONCRETE

201-1.1.2 Concrete Specified By Class (Pg. 88)

In "Concrete Class Use Table" modify as follows:

(1) Revise:
Concrete Pavement (not integral with curb) 520-A-2500

To Read:
Concrete Pavement (not integral with curb), Cross Gutter and Alley Aprons 560-C-3250

(2) Revise:
Curb, Integral Curb and Pavement, Gutter, Walk, Alley Aprons 520-C-2500

To Read:
Curb and Gutter (separate or combined) and Walks 520-C-2500

(3) Change concrete class for "Sidehill Surface Drainage Facilities" from "300-C-2500" to "520-C-2500".

APPENDIX B

Existing and Proposed Drainage Maps

LEGEND

SUBDIVISION BOUNDARY

BASIN LIMITS

FLOW DIRECTION

PAD ELEVATION — PAD 000

NODE NUMBER — XXX

NODE NUMBER — AC

40 0 40 80

Scale: 1" = 40'

LOT 31, RANCHO DEL SOL UNIT 1

PRE DEVELOPMENT DRAINAGE MAP

PREPARED BY:
NAME: ARC CONSTRUCTION & ENGINEERING INC.
ADDRESS: 11679 VIA FIRUL
SAN DIEGO, CA 92128
PHONE NO.: 858-675-9490

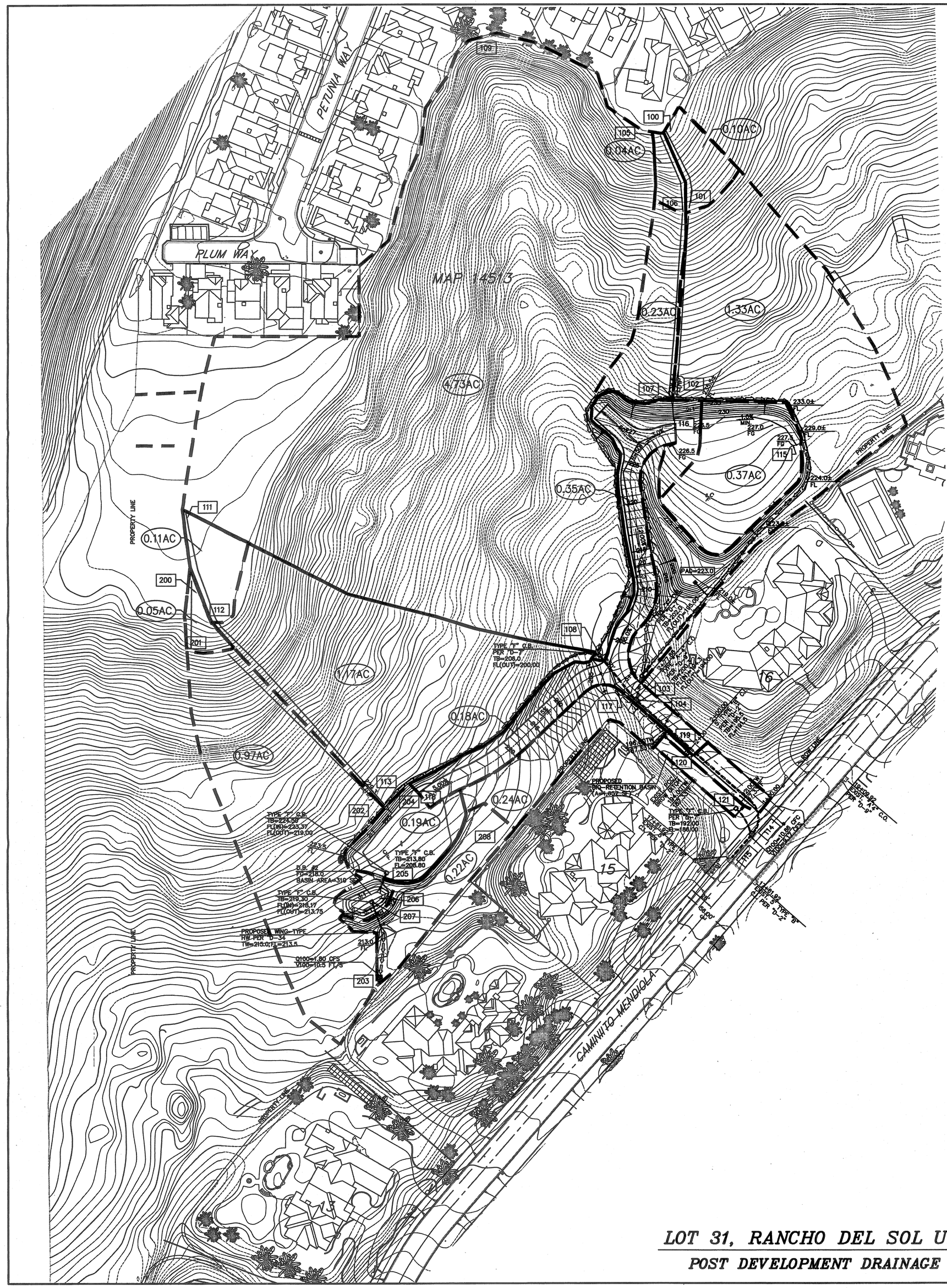
PROJECT ADDRESS:
13165 CAMINITO MENDIOLA
SAN DIEGO, CA 92130

PROJECT NAME:
RANCHO DEL SOL

SHEET TITLE:
PRELIMINARY POST DEVELOPMENT
LOT 31 RANCHO DEL SOL
DRAINAGE MAP

SHEET NO: PRE DEVELOPMENT

REVISION 1:	12-20-20
REVISION 2:	
REVISION 3:	
REVISION 4:	
REVISION 5:	
REVISION 6:	
REVISION 7:	
REVISION 8:	
REVISION 9:	
REVISION 10:	
ORIG. DATE:	4-20-20
SHEET	1 OF 2
P.T.S. NO.	508590
PERMIT NO.	



LEGEND

- SUBDIVISION BOUNDARY
- BASIN LIMITS
- FLOW DIRECTION
- PAD ELEVATION — PAD 000
- NODE NUMBER — XXX
- NODE NUMBER — AC

40 0 40 80
Scale: 1" = 40'

LOT 31, RANCHO DEL SOL UNIT 1

POST DEVELOPMENT DRAINAGE MAP

PREPARED BY:
NAME: ARC CONSTRUCTION & ENGINEERING INC.
ADDRESS: 11679 VIA FIRUL
SAN DIEGO, CA 92128
PHONE NO.: 858-675-9490

PROJECT ADDRESS:
13165 CAMINITO MENDIOLA
SAN DIEGO, CA 92130

PROJECT NAME:
RANCHO DEL SOL

SHEET TITLE:
PRELIMINARY POST DEVELOPMENT
LOT 31 RANCHO DEL SOL
DRAINAGE MAP

SHEET NO: POST DEVELOPMENT

REVISION 1:	12-20-20
REVISION 2:	
REVISION 3:	
REVISION 4:	
REVISION 5:	
REVISION 6:	
REVISION 7:	
REVISION 8:	
REVISION 9:	
REVISION 10:	
ORIG. DATE:	4-20-20
SHEET	1 OF 2
P.T.S. NO.	506590
PERMIT NO.	

APPENDIX C

Existing Drainage Basin Calculations

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            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
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              Ver. 21.0 Release Date: 06/01/2014  License ID 1667

                              Analysis prepared by:

                         ARC CONSTRUCTION & ENGINEERING INC.
                                 10948 ELDERWOOD LANE
                                  SAN DIEGO CA 92131


  ************************** DESCRIPTION OF STUDY
**************************
 * 100 YEAR EVENT
*
 * LOT 31 RANCHO DEL SOL
*
 * DATE:4/20/20
*

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*

   FILE NAME: LOT32.DAT
   TIME/DATE OF STUDY: 07:55 04/21/2020
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   USER SPECIFIED STORM EVENT(YEAR) = 100.00
   SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
   SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =
0.95
   RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
   *USER SPECIFIED:
   NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
    1)   5.000;  4.410
    2)  10.000;  3.480
    3)  15.000;  3.000
    4)  20.000;  2.530
    5)  25.000;  2.400
    6)  30.000;  2.000
    7)  40.000;  1.650
    8)  50.000;  1.500
```

```
    9)  60.000;  1.400
   SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
   NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
   *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   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167
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.*


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   FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
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============================================================================
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   NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
   SOIL CLASSIFICATION IS "D"
   S.C.S. CURVE NUMBER (AMC II) =  88
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   116.00
   UPSTREAM ELEVATION(FEET) =    287.00
   DOWNSTREAM ELEVATION(FEET) =    259.00
   ELEVATION DIFFERENCE(FEET) =     28.00
   URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
   WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
            THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
            (Reference: Table 3-1B of Hydrology Manual)
            THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.174
   SUBAREA RUNOFF(CFS) =      0.38
   TOTAL AREA(ACRES) =      0.26   TOTAL RUNOFF(CFS) =      0.38


****************************************************************************
***
   FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  51
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 ----------------------------------------------------------------------
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   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

======================================================================
===
   ELEVATION DATA: UPSTREAM(FEET) =    259.00  DOWNSTREAM(FEET) =
189.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   819.84   CHANNEL SLOPE =  0.0854
   CHANNEL BASE(FEET) =   50.00   "Z" FACTOR =  10.000
   MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.413
   NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
   SOIL CLASSIFICATION IS "D"
   S.C.S. CURVE NUMBER (AMC II) =  88
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.48
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.08
   AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   4.43
   Tc(MIN.) =   10.70
   SUBAREA AREA(ACRES) =     8.50       SUBAREA RUNOFF(CFS) =   10.15
   AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
   TOTAL AREA(ACRES) =        8.8         PEAK FLOW RATE(CFS) =
10.46

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.05   FLOW VELOCITY(FEET/SEC.) =   4.10
   LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     935.84
FEET.

======================================================================
===
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)     =        8.8  TC(MIN.) =     10.70
   PEAK FLOW RATE(CFS)   =      10.46

======================================================================
===

======================================================================
===
   END OF RATIONAL METHOD ANALYSIS
```

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**************************************************************************
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                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2014 Advanced Engineering Software (aes)
              Ver. 21.0 Release Date: 06/01/2014  License ID 1667

                              Analysis prepared by:

                        ARC CONSTRUCTION & ENGINEERING INC.
                                10948 ELDERWOOD LANE
                                 SAN DIEGO CA 92131


  ************************** DESCRIPTION OF STUDY
**************************
 * 100 YEAR EVENT
*
 * LOT 31 RANCHO DEL SOL
*
 * DATE:4/20/20
*

**************************************************************************
*

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   TIME/DATE OF STUDY: 06:30 04/21/2020
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   SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
   SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =
0.95
   RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
   *USER SPECIFIED:
   NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
    1)   5.000;  4.410
    2)  10.000;  3.480
    3)  15.000;  3.000
    4)  20.000;  2.530
    5)  25.000;  2.400
    6)  30.000;  2.000
    7)  40.000;  1.650
    8)  50.000;  1.500
```

```
    9)  60.000;  1.400
   SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
   NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
   *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   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167
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.*


****************************************************************************
***
   FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =  21
 --------------------------------------------------------------------------
----
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

============================================================================
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   SOIL CLASSIFICATION IS "D"
   S.C.S. CURVE NUMBER (AMC II) =  88
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   133.00
   UPSTREAM ELEVATION(FEET) =    291.50
   DOWNSTREAM ELEVATION(FEET) =    270.00
   ELEVATION DIFFERENCE(FEET) =     21.50
   URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
   WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
            THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
            (Reference: Table 3-1B of Hydrology Manual)
            THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.174
   SUBAREA RUNOFF(CFS) =      0.28
   TOTAL AREA(ACRES) =      0.19   TOTAL RUNOFF(CFS) =      0.28


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   >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA<<<<<

======================================================================
===
   ELEVATION DATA: UPSTREAM(FEET) =    270.00  DOWNSTREAM(FEET) =
219.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   298.37   CHANNEL SLOPE =  0.1709
   NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
   NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
   CHANNEL FLOW THRU SUBAREA(CFS) =       0.28
   FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY
MANUAL)
   TRAVEL TIME(MIN.) =   1.05   Tc(MIN.) =    7.31
   LONGEST FLOWPATH FROM NODE    400.00 TO NODE    403.00 =     431.37
FEET.


****************************************************************************
***
   FLOW PROCESS FROM NODE    402.00 TO NODE    403.00 IS CODE =  51
 ----------------------------------------------------------------------
----
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

======================================================================
===
   ELEVATION DATA: UPSTREAM(FEET) =    219.00  DOWNSTREAM(FEET) =
209.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   266.91   CHANNEL SLOPE =  0.0375
   CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
   MANNING'S FACTOR = 0.013   MAXIMUM DEPTH(FEET) =   1.00
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.819
   NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
   SOIL CLASSIFICATION IS "D"
   S.C.S. CURVE NUMBER (AMC II) =  88
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.31
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.17
   AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   0.86
   Tc(MIN.) =    8.17
   SUBAREA AREA(ACRES) =     1.54       SUBAREA RUNOFF(CFS) =    2.06
   AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
   TOTAL AREA(ACRES) =        1.7         PEAK FLOW RATE(CFS) =
2.31

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.17   FLOW VELOCITY(FEET/SEC.) =   6.24
   LONGEST FLOWPATH FROM NODE    400.00 TO NODE    403.00 =     698.28
FEET.
```

```
================================================================================
===
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)      =         1.7  TC(MIN.) =      8.17
   PEAK FLOW RATE(CFS)    =        2.31

================================================================================
===

================================================================================
===
   END OF RATIONAL METHOD ANALYSIS
```

APPENDIX D

Proposed Drainage Basin Calculations

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

              RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
              Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                           2003,1985,1981 HYDROLOGY MANUAL
           (c) Copyright 1982-2014 Advanced Engineering Software (aes)
               Ver. 21.0 Release Date: 06/01/2014  License ID 1667

                                Analysis prepared by:

                          ARC CONSTRUCTION & ENGINEERING INC.
                                  10948 ELDERWOOD LANE
                                   SAN DIEGO CA 92131


  ************************** DESCRIPTION OF STUDY
**************************
 * 100 YEAR EVENT
*
 * LOT 31 RANCHO DEL SOL
*
 * DATE:12/20/20
*

*****************************************************************************
*

   FILE NAME: LOT30.DAT
   TIME/DATE OF STUDY: 10:55 12/28/2010
 ----------------------------------------------------------------------------
----
   USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
 ----------------------------------------------------------------------------
----
   USER SPECIFIED STORM EVENT(YEAR) = 100.00
   SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
   SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =
0.95
   RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
   *USER SPECIFIED:
   NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
    1)   5.000;  4.410
    2)  10.000;  3.480
    3)  15.000;  3.000
    4)  20.000;  2.530
    5)  25.000;  2.400
    6)  30.000;  2.000
    7)  40.000;  1.650
    8)  50.000;  1.500
```

```
    9)  60.000;  1.400
   SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
   NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
   *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   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167
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.*


****************************************************************************
***
   FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
 --------------------------------------------------------------------------
----
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

============================================================================
===
   NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
   SOIL CLASSIFICATION IS "D"
   S.C.S. CURVE NUMBER (AMC II) =  88
   INITIAL SUBAREA FLOW-LENGTH(FEET) =    87.73
   UPSTREAM ELEVATION(FEET) =    291.00
   DOWNSTREAM ELEVATION(FEET) =    273.00
   ELEVATION DIFFERENCE(FEET) =     18.00
   URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.870
   WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc
CALCULATION!
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.248
   SUBAREA RUNOFF(CFS) =      0.15
   TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.15


****************************************************************************
***
   FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  52
 --------------------------------------------------------------------------
----
   >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
```

```
   >>>>>TRAVELTIME THRU SUBAREA<<<<<

================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    273.00  DOWNSTREAM(FEET) =
238.50
   CHANNEL LENGTH THRU SUBAREA(FEET) =   193.46   CHANNEL SLOPE =  0.1783
   NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
   NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
   CHANNEL FLOW THRU SUBAREA(CFS) =       0.15
   FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY
MANUAL)
   TRAVEL TIME(MIN.) =   0.68   Tc(MIN.) =    6.55
   LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     281.19
FEET.


****************************************************************************
***
   FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  51
 ----------------------------------------------------------------------------
----
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    238.50  DOWNSTREAM(FEET) =
195.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   481.74   CHANNEL SLOPE =  0.0903
   CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
   MANNING'S FACTOR = 0.013   MAXIMUM DEPTH(FEET) =   1.00
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.883
   NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
   SOIL CLASSIFICATION IS "D"
   S.C.S. CURVE NUMBER (AMC II) =  88
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.05
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.24
   AVERAGE FLOW DEPTH(FEET) =   0.08   TRAVEL TIME(MIN.) =   1.29
   Tc(MIN.) =    7.84
   SUBAREA AREA(ACRES) =     1.33       SUBAREA RUNOFF(CFS) =    1.81
   AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
   TOTAL AREA(ACRES) =        1.4         PEAK FLOW RATE(CFS) =
1.94

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   7.69
   LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =     762.93
FEET.


****************************************************************************
***
   FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  31
```

```
 ----------------------------------------------------------------------
----
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

======================================================================
===
   ELEVATION DATA: UPSTREAM(FEET) =   195.00  DOWNSTREAM(FEET) =   194.30
   FLOW LENGTH(FEET) =    23.52   MANNING'S N =  0.013
   DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.5 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   6.81
   ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =       1.94
   PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    7.89
   LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =     786.45
FEET.


****************************************************************************
***
   FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =  10
 ----------------------------------------------------------------------
----
   >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<

======================================================================
===


****************************************************************************
***
   FLOW PROCESS FROM NODE    105.00 TO NODE    106.00 IS CODE =  21
 ----------------------------------------------------------------------
----
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

======================================================================
===
   NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
   SOIL CLASSIFICATION IS "D"
   S.C.S. CURVE NUMBER (AMC II) =  88
   INITIAL SUBAREA FLOW-LENGTH(FEET) =    85.52
   UPSTREAM ELEVATION(FEET) =    291.00
   DOWNSTREAM ELEVATION(FEET) =    273.00
   ELEVATION DIFFERENCE(FEET) =     18.00
   URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.795
   WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc
CALCULATION!
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.262
   SUBAREA RUNOFF(CFS) =      0.15
   TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.15
```

```
****************************************************************************
***
   FLOW PROCESS FROM NODE    106.00 TO NODE    107.00 IS CODE =  52
 ----------------------------------------------------------------------------
----
   >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA<<<<<

============================================================================
===
   ELEVATION DATA: UPSTREAM(FEET) =    273.00  DOWNSTREAM(FEET) =
238.50
   CHANNEL LENGTH THRU SUBAREA(FEET) =   195.21   CHANNEL SLOPE =  0.1767
   NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
   NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
   CHANNEL FLOW THRU SUBAREA(CFS) =       0.15
   FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY
MANUAL)
   TRAVEL TIME(MIN.) =   0.69   Tc(MIN.) =    6.48
   LONGEST FLOWPATH FROM NODE    105.00 TO NODE    107.00 =     280.73
FEET.


****************************************************************************
***
   FLOW PROCESS FROM NODE    107.00 TO NODE    108.00 IS CODE =  51
 ----------------------------------------------------------------------------
----
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

============================================================================
===
   ELEVATION DATA: UPSTREAM(FEET) =    238.50  DOWNSTREAM(FEET) =
205.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   380.00   CHANNEL SLOPE =  0.0882
   CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
   MANNING'S FACTOR = 0.013   MAXIMUM DEPTH(FEET) =   1.00
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.009
   NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
   SOIL CLASSIFICATION IS "D"
   S.C.S. CURVE NUMBER (AMC II) =  88
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.47
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.37
   AVERAGE FLOW DEPTH(FEET) =   0.17   TRAVEL TIME(MIN.) =   0.68
   Tc(MIN.) =    7.16
   SUBAREA AREA(ACRES) =     4.73       SUBAREA RUNOFF(CFS) =    6.64
   AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
   TOTAL AREA(ACRES) =        4.8         PEAK FLOW RATE(CFS) =
6.78

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.25   FLOW VELOCITY(FEET/SEC.) =  11.80
```

```
   LONGEST FLOWPATH FROM NODE    105.00 TO NODE    108.00 =     660.73
FEET.


****************************************************************************
***
   FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =  10
 ----------------------------------------------------------------------------
----
   >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<

============================================================================
===


****************************************************************************
***
   FLOW PROCESS FROM NODE    111.00 TO NODE    112.00 IS CODE =  21
 ----------------------------------------------------------------------------
----
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

============================================================================
===
   NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
   SOIL CLASSIFICATION IS "D"
   S.C.S. CURVE NUMBER (AMC II) =  88
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   117.00
   UPSTREAM ELEVATION(FEET) =    292.50
   DOWNSTREAM ELEVATION(FEET) =    291.00
   ELEVATION DIFFERENCE(FEET) =      1.50
   URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.707
   WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
            THE MAXIMUM OVERLAND FLOW LENGTH =    74.23
            (Reference: Table 3-1B of Hydrology Manual)
            THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.412
   SUBAREA RUNOFF(CFS) =      0.13
   TOTAL AREA(ACRES) =      0.11   TOTAL RUNOFF(CFS) =      0.13


****************************************************************************
***
   FLOW PROCESS FROM NODE    112.00 TO NODE    113.00 IS CODE =  52
 ----------------------------------------------------------------------------
----
   >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA<<<<<

============================================================================
===
   ELEVATION DATA: UPSTREAM(FEET) =    291.00  DOWNSTREAM(FEET) =
229.30
   CHANNEL LENGTH THRU SUBAREA(FEET) =   266.00   CHANNEL SLOPE =  0.2320
```

```
   NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
   NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
   CHANNEL FLOW THRU SUBAREA(CFS) =        0.13
   FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY
MANUAL)
   TRAVEL TIME(MIN.) =   0.93   Tc(MIN.) =   11.64
   LONGEST FLOWPATH FROM NODE    111.00 TO NODE    113.00 =     383.00
FEET.


****************************************************************************
***
   FLOW PROCESS FROM NODE    113.00 TO NODE    108.00 IS CODE =  51
 --------------------------------------------------------------------------
----
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

============================================================================
===
   ELEVATION DATA: UPSTREAM(FEET) =    229.30  DOWNSTREAM(FEET) =
206.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   286.41   CHANNEL SLOPE =  0.0814
   CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
   MANNING'S FACTOR = 0.013   MAXIMUM DEPTH(FEET) =   1.00
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.237
   NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
   SOIL CLASSIFICATION IS "D"
   S.C.S. CURVE NUMBER (AMC II) =  88
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.79
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.36
   AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   0.89
   Tc(MIN.) =   12.53
   SUBAREA AREA(ACRES) =     1.17       SUBAREA RUNOFF(CFS) =    1.33
   AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
   TOTAL AREA(ACRES) =        1.3         PEAK FLOW RATE(CFS) =
1.45

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   6.76
   LONGEST FLOWPATH FROM NODE    111.00 TO NODE    108.00 =     669.41
FEET.


****************************************************************************
***
   FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =  11
 --------------------------------------------------------------------------
----
   >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<

============================================================================
===
```

```
   ** MAIN STREAM CONFLUENCE DATA **
   STREAM     RUNOFF      Tc       INTENSITY     AREA
   NUMBER      (CFS)     (MIN.)    (INCH/HOUR)   (ACRE)
       1        1.45    12.53        3.237        1.28
   LONGEST FLOWPATH FROM NODE    111.00 TO NODE    108.00 =     669.41
FEET.

   ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM     RUNOFF      Tc       INTENSITY     AREA
   NUMBER      (CFS)     (MIN.)    (INCH/HOUR)   (ACRE)
       1        6.78     7.16        4.009        4.83
   LONGEST FLOWPATH FROM NODE    105.00 TO NODE    108.00 =     660.73
FEET.

   ** PEAK FLOW RATE TABLE **
   STREAM    RUNOFF       Tc       INTENSITY
   NUMBER     (CFS)      (MIN.)    (INCH/HOUR)
       1       7.61       7.16        4.009
       2       6.92      12.53        3.237

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =       7.61   Tc(MIN.) =    7.16
   TOTAL AREA(ACRES) =        6.1


****************************************************************************
***
   FLOW PROCESS FROM NODE    108.00 TO NODE    104.00 IS CODE =  31
 --------------------------------------------------------------------------
----
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

==========================================================================
===
   ELEVATION DATA: UPSTREAM(FEET) =   200.00  DOWNSTREAM(FEET) =   194.00
   FLOW LENGTH(FEET) =    59.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.3 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =  15.19
   ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =       7.61
   PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    7.22
   LONGEST FLOWPATH FROM NODE    111.00 TO NODE    104.00 =     728.41
FEET.


****************************************************************************
***
   FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =  11
 --------------------------------------------------------------------------
----
   >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
```

```
================================================================================
===

   ** MAIN STREAM CONFLUENCE DATA **
   STREAM      RUNOFF       Tc       INTENSITY      AREA
   NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
       1         7.61      7.22        3.997         6.11
   LONGEST FLOWPATH FROM NODE    111.00 TO NODE    104.00 =     728.41
FEET.

   ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM      RUNOFF       Tc       INTENSITY      AREA
   NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
       1         1.94      7.89        3.872         1.43
   LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =     786.45
FEET.

   ** PEAK FLOW RATE TABLE **
   STREAM     RUNOFF       Tc       INTENSITY
   NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
       1        9.38       7.22        3.997
       2        9.31       7.89        3.872

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =       9.38   Tc(MIN.) =    7.22
   TOTAL AREA(ACRES) =        7.5


****************************************************************************
***
   FLOW PROCESS FROM NODE    104.00 TO NODE    114.00 IS CODE =  31
 --------------------------------------------------------------------------
----
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

================================================================================
===
   ELEVATION DATA: UPSTREAM(FEET) =   194.00  DOWNSTREAM(FEET) =   182.00
   FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.4 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =  13.18
   ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =       9.38
   PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =    7.47
   LONGEST FLOWPATH FROM NODE    100.00 TO NODE    114.00 =     986.45
FEET.


****************************************************************************
***
   FLOW PROCESS FROM NODE    114.00 TO NODE    114.00 IS CODE =  10
```

```
 ------------------------------------------------------------------------
----
   >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<

========================================================================
===


************************************************************************
***
   FLOW PROCESS FROM NODE    115.00 TO NODE    116.00 IS CODE =  21
 ------------------------------------------------------------------------
----
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

========================================================================
===
   RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
   SOIL CLASSIFICATION IS "D"
   S.C.S. CURVE NUMBER (AMC II) =  82
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   114.30
   UPSTREAM ELEVATION(FEET) =    227.50
   DOWNSTREAM ELEVATION(FEET) =    226.30
   ELEVATION DIFFERENCE(FEET) =      1.20
   URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.279
   WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
            THE MAXIMUM OVERLAND FLOW LENGTH =    70.75
            (Reference: Table 3-1B of Hydrology Manual)
            THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.453
   SUBAREA RUNOFF(CFS) =      0.52
   TOTAL AREA(ACRES) =      0.37   TOTAL RUNOFF(CFS) =      0.52


************************************************************************
***
   FLOW PROCESS FROM NODE    116.00 TO NODE    119.00 IS CODE =  61
 ------------------------------------------------------------------------
----
   >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>(STANDARD CURB SECTION USED)<<<<<

========================================================================
===
   UPSTREAM ELEVATION(FEET) =  226.30  DOWNSTREAM ELEVATION(FEET) =
204.00
   STREET LENGTH(FEET) =   416.00   CURB HEIGHT(INCHES) =  6.0
   STREET HALFWIDTH(FEET) = 10.00

   DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.50
   INSIDE STREET CROSSFALL(DECIMAL) =  0.020
   OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

   SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
```

```
   STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
   Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =
0.0130
   Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

     **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.03
     STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
     STREET FLOW DEPTH(FEET) =  0.16
     HALFSTREET FLOOD WIDTH(FEET) =    1.50
     AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.04
     PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.79
   STREET FLOW TRAVEL TIME(MIN.) =   1.38   Tc(MIN.) =   11.65
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.321
   STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
   SOIL CLASSIFICATION IS "D"
   S.C.S. CURVE NUMBER (AMC II) =  98
   AREA-AVERAGE RUNOFF COEFFICIENT =  0.634
   SUBAREA AREA(ACRES) =    0.35      SUBAREA RUNOFF(CFS) =    1.01
   TOTAL AREA(ACRES) =        0.7        PEAK FLOW RATE(CFS) =       1.52

   END OF SUBAREA STREET FLOW HYDRAULICS:
   DEPTH(FEET) = 0.17   HALFSTREET FLOOD WIDTH(FEET) =   2.29
   FLOW VELOCITY(FEET/SEC.) =  4.44   DEPTH*VELOCITY(FT*FT/SEC.) =   0.76
   LONGEST FLOWPATH FROM NODE    115.00 TO NODE    119.00 =     530.30
FEET.


****************************************************************************
***
   FLOW PROCESS FROM NODE    118.00 TO NODE    119.00 IS CODE =  81
 ----------------------------------------------------------------------------
----
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
===
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.321
   STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
   SOIL CLASSIFICATION IS "D"
   S.C.S. CURVE NUMBER (AMC II) =  98
   AREA-AVERAGE RUNOFF COEFFICIENT = 0.6809
   SUBAREA AREA(ACRES) =    0.18   SUBAREA RUNOFF(CFS) =    0.52
   TOTAL AREA(ACRES) =        0.9   TOTAL RUNOFF(CFS) =       2.04
   TC(MIN.) =   11.65


****************************************************************************
***
   FLOW PROCESS FROM NODE    119.00 TO NODE    120.00 IS CODE =  31
 ----------------------------------------------------------------------------
----
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
===
   ELEVATION DATA: UPSTREAM(FEET) =   191.50  DOWNSTREAM(FEET) =   190.00
   FLOW LENGTH(FEET) =     5.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.6 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =  16.38
   ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =       2.04
   PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.66
   LONGEST FLOWPATH FROM NODE    115.00 TO NODE    120.00 =     535.30
FEET.


****************************************************************************
***
   FLOW PROCESS FROM NODE    117.00 TO NODE    120.00 IS CODE =  81
 --------------------------------------------------------------------------
----
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

==========================================================================
===
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.321
   NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
   SOIL CLASSIFICATION IS "D"
   S.C.S. CURVE NUMBER (AMC II) =  88
   AREA-AVERAGE RUNOFF COEFFICIENT = 0.6112
   SUBAREA AREA(ACRES) =    0.24   SUBAREA RUNOFF(CFS) =    0.28
   TOTAL AREA(ACRES) =       1.1   TOTAL RUNOFF(CFS) =       2.31
   TC(MIN.) =   11.66


****************************************************************************
***
   FLOW PROCESS FROM NODE    121.00 TO NODE    114.00 IS CODE =  31
 --------------------------------------------------------------------------
----
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

==========================================================================
===
   ELEVATION DATA: UPSTREAM(FEET) =   186.00  DOWNSTREAM(FEET) =   182.00
   FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN   9.0 INCH PIPE IS   3.9 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =  12.52
   ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =       2.31
   PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   11.70
   LONGEST FLOWPATH FROM NODE    115.00 TO NODE    114.00 =     565.30
FEET.
```

```
****************************************************************************
***
   FLOW PROCESS FROM NODE    114.00 TO NODE    114.00 IS CODE =  11
 ----------------------------------------------------------------------------
----
   >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<

============================================================================
===

   ** MAIN STREAM CONFLUENCE DATA **
   STREAM      RUNOFF       Tc       INTENSITY      AREA
   NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
       1         2.31     11.70        3.317         1.14
   LONGEST FLOWPATH FROM NODE    115.00 TO NODE    114.00 =     565.30
FEET.

   ** MEMORY BANK #  3 CONFLUENCE DATA **
   STREAM      RUNOFF       Tc       INTENSITY      AREA
   NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
       1         9.38      7.47        3.950         7.54
   LONGEST FLOWPATH FROM NODE    100.00 TO NODE    114.00 =     986.45
FEET.

   ** PEAK FLOW RATE TABLE **
   STREAM     RUNOFF       Tc       INTENSITY
   NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
       1       10.86       7.47         3.950
       2       10.19      11.70         3.317

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =       10.86   Tc(MIN.) =     7.47
   TOTAL AREA(ACRES) =         8.7

============================================================================
===
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)      =         8.7  TC(MIN.) =       7.47
   PEAK FLOW RATE(CFS)    =       10.86

============================================================================
===

============================================================================
===
   END OF RATIONAL METHOD ANALYSIS
```

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2014 Advanced Engineering Software (aes)
              Ver. 21.0 Release Date: 06/01/2014  License ID 1667

                              Analysis prepared by:

                        ARC CONSTRUCTION & ENGINEERING INC.
                                10948 ELDERWOOD LANE
                                 SAN DIEGO CA 92131


  ************************** DESCRIPTION OF STUDY
**************************
 * 100 YEAR EVENT
*
 * LOT 31 RANCHO DEL SOL
*
 * DATE:12/20/20
*

*****************************************************************************
*

   FILE NAME: LOT31.DAT
   TIME/DATE OF STUDY: 10:56 12/28/2010
 ----------------------------------------------------------------------------
----
   USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
 ----------------------------------------------------------------------------
----
   USER SPECIFIED STORM EVENT(YEAR) = 100.00
   SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
   SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =
0.95
   RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
   *USER SPECIFIED:
   NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
    1)   5.000;  4.410
    2)  10.000;  3.480
    3)  15.000;  3.000
    4)  20.000;  2.530
    5)  25.000;  2.400
    6)  30.000;  2.000
    7)  40.000;  1.650
    8)  50.000;  1.500
```

```
    9)  60.000;  1.400
   SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
   NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
   *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   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167
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.*


****************************************************************************
***
   FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
 --------------------------------------------------------------------------
----
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

============================================================================
===
   NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
   SOIL CLASSIFICATION IS "D"
   S.C.S. CURVE NUMBER (AMC II) =  88
   INITIAL SUBAREA FLOW-LENGTH(FEET) =    72.20
   UPSTREAM ELEVATION(FEET) =    291.00
   DOWNSTREAM ELEVATION(FEET) =    285.00
   ELEVATION DIFFERENCE(FEET) =      6.00
   URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.664
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.287
   SUBAREA RUNOFF(CFS) =      0.15
   TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.15


****************************************************************************
***
   FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  52
 --------------------------------------------------------------------------
----
   >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA<<<<<
```

```
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     285.00  DOWNSTREAM(FEET) =
229.30
   CHANNEL LENGTH THRU SUBAREA(FEET) =   231.50   CHANNEL SLOPE =  0.2406
   NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
   NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
   CHANNEL FLOW THRU SUBAREA(CFS) =        0.15
   FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY
MANUAL)
   TRAVEL TIME(MIN.) =   0.81   Tc(MIN.) =    6.48
   LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     303.70
FEET.


****************************************************************************
***
   FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE =  51
 --------------------------------------------------------------------------
----
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

================================================================================
===
   ELEVATION DATA: UPSTREAM(FEET) =     229.30  DOWNSTREAM(FEET) =
212.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   243.00   CHANNEL SLOPE =  0.0712
   CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
   MANNING'S FACTOR = 0.013   MAXIMUM DEPTH(FEET) =   1.00
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.997
   NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
   SOIL CLASSIFICATION IS "D"
   S.C.S. CURVE NUMBER (AMC II) =  88
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =        0.83
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.44
   AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   0.74
   Tc(MIN.) =    7.22
   SUBAREA AREA(ACRES) =     0.97       SUBAREA RUNOFF(CFS) =    1.36
   AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
   TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =
1.50

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.11   FLOW VELOCITY(FEET/SEC.) =   6.47
   LONGEST FLOWPATH FROM NODE    200.00 TO NODE    203.00 =     546.70
FEET.


****************************************************************************
***
   FLOW PROCESS FROM NODE    203.00 TO NODE    203.00 IS CODE =  10
```

```
 ----------------------------------------------------------------------
----
   >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<

======================================================================
===


**********************************************************************
***
   FLOW PROCESS FROM NODE    204.00 TO NODE    205.00 IS CODE =  21
 ----------------------------------------------------------------------
----
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

======================================================================
===
   RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
   SOIL CLASSIFICATION IS "D"
   S.C.S. CURVE NUMBER (AMC II) =  82
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   114.45
   UPSTREAM ELEVATION(FEET) =    225.00
   DOWNSTREAM ELEVATION(FEET) =    224.50
   ELEVATION DIFFERENCE(FEET) =      0.50
   URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =   11.065
   WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
            THE MAXIMUM OVERLAND FLOW LENGTH =    50.00
            (Reference: Table 3-1B of Hydrology Manual)
            THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.378
   SUBAREA RUNOFF(CFS) =      0.26
   TOTAL AREA(ACRES) =      0.19   TOTAL RUNOFF(CFS) =      0.26


**********************************************************************
***
   FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  31
 ----------------------------------------------------------------------
----
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

======================================================================
===
   ELEVATION DATA: UPSTREAM(FEET) =   223.37  DOWNSTREAM(FEET) =   219.30
   FLOW LENGTH(FEET) =    18.00   MANNING'S N =  0.013
   ESTIMATED PIPE DIAMETER(INCH) INCREASED TO  6.000
   DEPTH OF FLOW IN   6.0 INCH PIPE IS   1.3 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   8.49
   ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =       0.26
   PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   11.10
   LONGEST FLOWPATH FROM NODE    204.00 TO NODE    206.00 =     132.45
FEET.
```

```
****************************************************************************
***
   FLOW PROCESS FROM NODE    207.00 TO NODE    203.00 IS CODE =  31
 ----------------------------------------------------------------------------
----
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
===
   ELEVATION DATA: UPSTREAM(FEET) =   213.75  DOWNSTREAM(FEET) =   213.00
   FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.3 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   3.85
   ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =       0.26
   PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   11.23
   LONGEST FLOWPATH FROM NODE    204.00 TO NODE    203.00 =     162.45
FEET.


****************************************************************************
***
   FLOW PROCESS FROM NODE    208.00 TO NODE    203.00 IS CODE =  81
 ----------------------------------------------------------------------------
----
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
===
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.362
   NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
   SOIL CLASSIFICATION IS "D"
   S.C.S. CURVE NUMBER (AMC II) =  88
   AREA-AVERAGE RUNOFF COEFFICIENT = 0.3808
   SUBAREA AREA(ACRES) =    0.18   SUBAREA RUNOFF(CFS) =    0.21
   TOTAL AREA(ACRES) =       0.4   TOTAL RUNOFF(CFS) =       0.47
   TC(MIN.) =   11.23


****************************************************************************
***
   FLOW PROCESS FROM NODE    203.00 TO NODE    203.00 IS CODE =  11
 ----------------------------------------------------------------------------
----
   >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<

============================================================================
===

   ** MAIN STREAM CONFLUENCE DATA **
   STREAM     RUNOFF      Tc       INTENSITY     AREA
```

```
   NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
       1         0.47     11.23        3.362         0.37
   LONGEST FLOWPATH FROM NODE    204.00 TO NODE    203.00 =     162.45
FEET.

   ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM      RUNOFF       Tc       INTENSITY      AREA
   NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
       1         1.50      7.22        3.997         1.07
   LONGEST FLOWPATH FROM NODE    200.00 TO NODE    203.00 =     546.70
FEET.

   ** PEAK FLOW RATE TABLE **
   STREAM     RUNOFF        Tc       INTENSITY
   NUMBER      (CFS)      (MIN.)    (INCH/HOUR)
       1        1.80        7.22         3.997
       2        1.73       11.23         3.362

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =        1.80   Tc(MIN.) =     7.22
   TOTAL AREA(ACRES) =         1.4

================================================================================
===
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)      =         1.4  TC(MIN.) =       7.22
   PEAK FLOW RATE(CFS)    =        1.80

================================================================================
===

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===
   END OF RATIONAL METHOD ANALYSIS
```