6/12/15
2nd.

DRAINAGE STUDY
FOR
RANCHO GUEJITO – ROCKWOOD VILLAGE

Job Number 14557BB
June 4, 2015

RICK ENGINEERING COMPANY

RICK
ENGINEERING COMPANY

rickengineering.com

DRAINAGE STUDY

FOR

RANCHO GUEJITO – ROCKWOOD VILLAGE

Job Number 14557BB

Prepared for:

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June 4, 2015

REGISTERED PROFESSIONAL ENGINEER
TIMOTHY WARREN GABRIELSON
NO. 51503
CIVIL
STATE OF CALIFORNIA

Declaration of Responsible Charge

I hereby declare that I am the engineer of work for the drainage-related components of this project. That I have exercised responsible charge over the design of the project as defined in Section 6703 of the Business and Professions Code and that the design is consistent with current standards.

I understand that the check of project drawings and specifications by the County of San Diego is confined to a review only and does not relieve me as engineer of work, of my responsibilities for project design.

Timothy Gabrielson, P.E.
R.C.E. #

June 4, 2015
Date

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1.0 INTRODUCTION

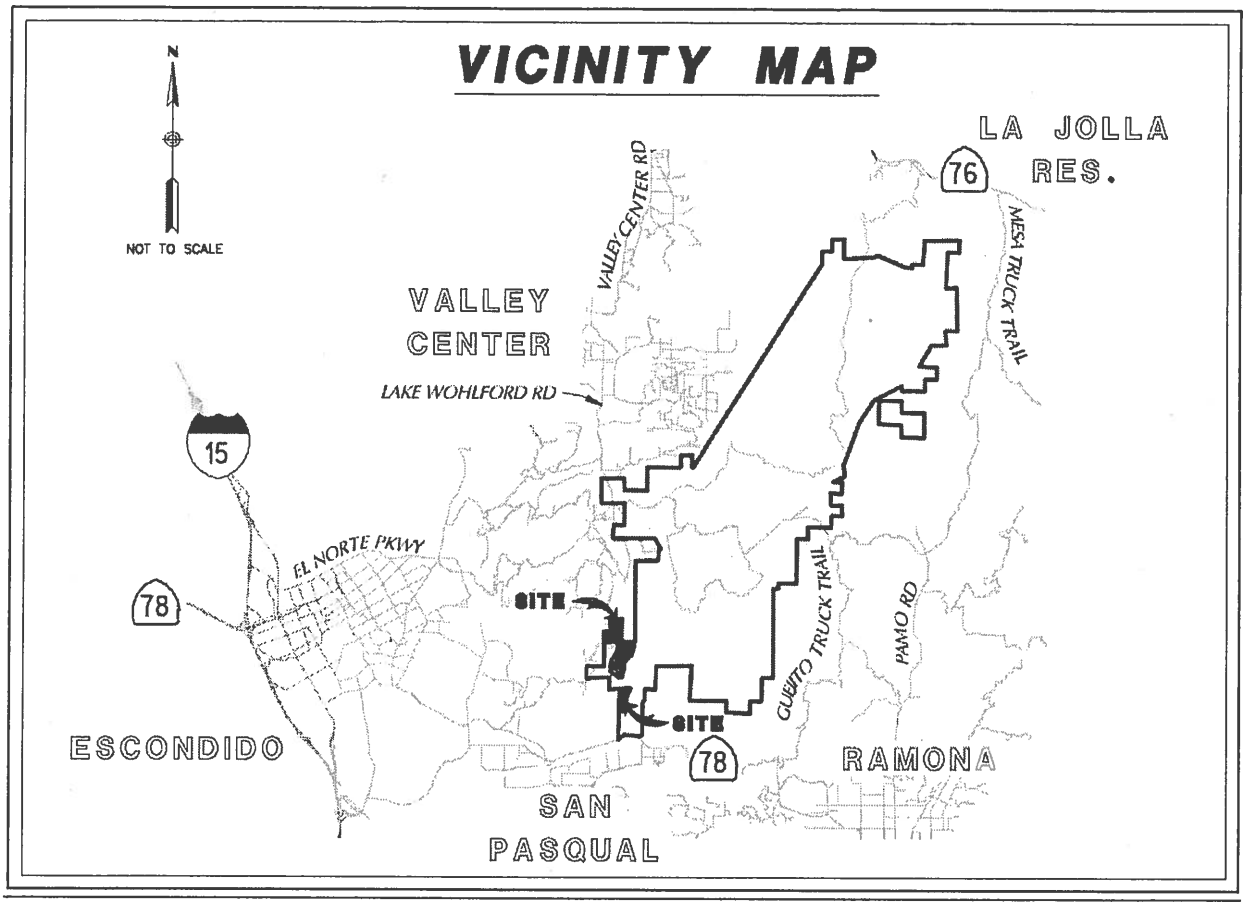
1.1 Project Description

This drainage study presents hydrologic analysis for Rancho Guejito Rockwood Village. The project location is on the 2009 San Diego County Thomas Guide on page 1131, Grid F7. See Figure 1, Vicinity Map, located at the end of Section 1.0. The project consists of 2 permit areas: the northern portion is 221.3 acres, and the southern portion is 57.8 acres. The areas will be cleared and grove roads will be graded for agricultural use.

1.2 Hydrology

Hydrology is discussed in detail in Section 2.0 of this report.

Figure 1: Vicinity Map



2.0 HYDROLOGY

2.1 Hydrologic Methodology and Criteria

The hydrologic methodology and criteria utilized for the project has been taken from the San Diego County Hydrology Manual, dated June 2003. The hydrology for the onsite drainage basins has been computed utilizing the Modified Rational Method. The following describes methodology and parameters that were used in the analyses.

2.1.1 Modified Rational Method

The *San Diego County Hydrology Manual June 2003* requires that the modified rational method be used for hydrologic analysis of a watershed less than approximately 1.0 square mile. The drainage areas tributary to each of the existing surface outfall locations total less than 1.0 square mile.

The Modified 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:

Subarea Hydrologic Processes (Codes)

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

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 are shown on the drainage exhibits located in the map pockets.

Design Storm:	100-year, 6-hour
100-Year, 6-Hour Precipitation (inches):	P = 3.6
Runoff Coefficients:	
0% Impervious	C = 0.30
Soil Type:	C
Rainfall Data:	Based on 100-year, 6-hour Rainfall Isopluvial

* A soils map and isopluvial maps are located in Appendix B.

2.2 Results

Pre-Project Conditions

Fifteen (15) drainage basins have been defined from stream outfall locations in and around the project boundary. The soil is predominantly Type C. Basins 100, 200, 300, 500, 600, 800, 900, 1000, 1100, 1200, 1300, 1400 and 1500 drain via surface flow to the east, ultimately discharging into Rockwood Canyon. Basins 400 and 700 drain via surface flow to the southwest.

Post-Project Conditions

The agricultural clearing and mass grading of farm roads will not add any impervious areas and will maintain existing drainage patterns. The farm roads will be graded to out-slope runoff in a sheet flow condition.

This report has analyzed the surface outfall locations around the project area and computed hydrologic results using the modified rational method, in accordance with the San Diego County Hydrology Manual.

The 100-year, 6-hour peak flow rates for the pre-project and post-project conditions can be found in Table 2.2-1, below:

Table 2.2-1: Summary of Pre-Project and Post-Project Peak Discharge Rates

Drainage Node at Outfall	Area, A (acres)	Pre-Project 100-year, 6-hour Discharge Rate, Q (cfs)*	Post-Project 100-year, 6-hour Discharge Rate, Q (cfs)*
125	20.1	36.3	36.3

210	0.6	1.3	1.3
310	1.4	2.7	2.7
420	49.6	77.7	77.7
510	2.0	3.3	3.3
625	66.3	115.0	115.0
715	20.1	37.7	37.7
820	42.5	75.6	75.6
915	5.5	10.4	10.4
1010**	25.5	48.2	48.2
1115	12.3	22.5	22.5
1220	7.1	12.0	12.0
1315	5.0	9.5	9.5
1420**	23.0	37.6	37.6
1515	16.0	26.7	26.7

*cfs = cubic feet per second
** Sheet flow condition – no concentrated flow
Note: The results above represent the values at the surface outfall location.

Rational Method computer outputs can be found in Appendix A.

Watershed boundaries, Rational Method node numbers, and areas for pre-project and post-project conditions can be found on the workmaps located in Map Pocket 1.

3.0 CONCLUSION

This drainage study presents the hydrologic analysis for the Rancho Guejito Rockwood Village project. The 100-year, 6-hour peak flow rates to fifteen (15) surface outfall locations were determined using the Modified Rational Method based on the hydrologic methodology and criteria described in the County of San Diego Hydrology Manual, dated June 2003.

Areas within the project boundary which were not included as tributary areas for this drainage study primarily convey runoff as sheet flow towards Rockwood Canyon. The goal of this drainage study is to demonstrate that because the project will not introduce any impervious areas, and the grove roads to be graded will primarily out-slope runoff in a sheet flow condition, existing hydrologic characteristics will be maintained and there will be no increase in surface runoff from the pre-project to post-project conditions.

APPENDIX A

Rational Method Calculations (100-year, 6-hour)

Pre-Project Conditions

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2003 Advanced Engineering Software (aes)
            Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                       San Diego, California 92110
                     619-291-0707   Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* RANCHO GUEJITO - ROCKWOOD VILLAGE J-14557BB (3/12/15)                   *
* BASIN 100; 100-YR - 6 HOUR PRECIPITATION                                *
* PRE-PROJECT                                                             *
 ***************************************************************************

  FILE NAME: RGRV100.RAT
  TIME/DATE OF STUDY: 14:00 03/12/2015
---------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
---------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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*
     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    105.00 IS CODE =  21
---------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
===========================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   154.00
  UPSTREAM ELEVATION(FEET) =   2254.00
  DOWNSTREAM ELEVATION(FEET) =   2200.00
  ELEVATION DIFFERENCE(FEET) =     54.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  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) =  7.865
SUBAREA RUNOFF(CFS) =      0.47
TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.47

****************************************************************************
FLOW PROCESS FROM NODE    105.00 TO NODE    110.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   2200.00  DOWNSTREAM(FEET) =   2000.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   327.00   CHANNEL SLOPE =  0.6116
CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.831
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.88
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.34
AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   1.63
Tc(MIN.) =   8.32
SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    0.82
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =      0.60         PEAK FLOW RATE(CFS) =       1.23

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.03   FLOW VELOCITY(FEET/SEC.) =   3.56
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =   481.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    110.00 TO NODE    115.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   2000.00  DOWNSTREAM(FEET) =   1760.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   839.00   CHANNEL SLOPE =  0.2861
CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   4.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.201
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     14.10
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.39
AVERAGE FLOW DEPTH(FEET) =   0.32   TRAVEL TIME(MIN.) =   1.35
Tc(MIN.) =   9.66
SUBAREA AREA(ACRES) =    13.80       SUBAREA RUNOFF(CFS) =   25.67
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =     14.40         PEAK FLOW RATE(CFS) =      26.79

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.45   FLOW VELOCITY(FEET/SEC.) =  12.51
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    115.00 =  1320.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    115.00 TO NODE    120.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1760.00  DOWNSTREAM(FEET) =   1700.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   257.00   CHANNEL SLOPE =  0.2335
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.073
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     31.44
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  13.40
  AVERAGE FLOW DEPTH(FEET) =   0.57   TRAVEL TIME(MIN.) =   0.32
  Tc(MIN.) =   9.98
  SUBAREA AREA(ACRES) =     5.10       SUBAREA RUNOFF(CFS) =    9.29
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =     19.50         PEAK FLOW RATE(CFS) =      35.52

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.61   FLOW VELOCITY(FEET/SEC.) =  13.93
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    120.00 =  1577.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    125.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1700.00  DOWNSTREAM(FEET) =   1650.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   140.00   CHANNEL SLOPE =  0.3571
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.017
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     36.07
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  16.20
  AVERAGE FLOW DEPTH(FEET) =   0.54   TRAVEL TIME(MIN.) =   0.14
  Tc(MIN.) =  10.13
  SUBAREA AREA(ACRES) =     0.60       SUBAREA RUNOFF(CFS) =    1.08
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =     20.10         PEAK FLOW RATE(CFS) =      36.28

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.54   FLOW VELOCITY(FEET/SEC.) =  16.29
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    125.00 =  1717.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     20.10  TC(MIN.) =     10.13
  PEAK FLOW RATE(CFS)   =     36.28
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

♀

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

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             Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                        San Diego, California 92110
                     619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* RANCHO GUEJITO - ROCKWOOD VILLAGE J-14557BB (3/12/15)                 *
* BASIN 200; 100-YR - 6 HOUR PRECIPITATION                              *
* PRE-PROJECT                                                           *
 ************************************************************************

  FILE NAME: RGRV200.RAT
  TIME/DATE OF STUDY: 14:04 03/12/2015
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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*
     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    200.00 TO NODE    205.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   148.00
  UPSTREAM ELEVATION(FEET) =   1850.00
  DOWNSTREAM ELEVATION(FEET) =   1825.00
  ELEVATION DIFFERENCE(FEET) =     25.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  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) =  7.865
  SUBAREA RUNOFF(CFS) =      0.47
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.47

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    210.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1825.00  DOWNSTREAM(FEET) =   1700.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   218.00   CHANNEL SLOPE =  0.5734
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.149
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.90
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.41
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   1.07
  Tc(MIN.) =   7.75
  SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    0.86
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =      0.60         PEAK FLOW RATE(CFS) =       1.29

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.03   FLOW VELOCITY(FEET/SEC.) =   3.73
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    210.00 =   366.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      0.60  TC(MIN.) =      7.75
  PEAK FLOW RATE(CFS)   =      1.29
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

♀

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
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            Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                       San Diego, California 92110
                     619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* RANCHO GUEJITO - ROCKWOOD VILLAGE J-14557BB (3/12/15)                 *
* BASIN 300; 100-YR - 6 HOUR PRECIPITATION                              *
* PRE-PROJECT                                                           *
 ************************************************************************

  FILE NAME: RGRV300.RAT
  TIME/DATE OF STUDY: 14:09 03/12/2015
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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*
     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    300.00 TO NODE    305.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   184.00
  UPSTREAM ELEVATION(FEET) =   1980.00
  DOWNSTREAM ELEVATION(FEET) =   1925.00
  ELEVATION DIFFERENCE(FEET) =     55.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  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) =  7.865
SUBAREA RUNOFF(CFS) =      0.47
TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.47

****************************************************************************
FLOW PROCESS FROM NODE    305.00 TO NODE    310.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1925.00  DOWNSTREAM(FEET) =   1700.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   526.00   CHANNEL SLOPE =  0.4278
CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.521
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.66
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.89
AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   2.25
Tc(MIN.) =   8.94
SUBAREA AREA(ACRES) =     1.20       SUBAREA RUNOFF(CFS) =    2.35
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =      1.40         PEAK FLOW RATE(CFS) =       2.74

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   4.61
LONGEST FLOWPATH FROM NODE    300.00 TO NODE    310.00 =   710.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =      1.40  TC(MIN.) =      8.94
PEAK FLOW RATE(CFS)   =      2.74
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

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

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                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                       San Diego, California 92110
                     619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* RANCHO GUEJITO - ROCKWOOD VILLAGE J-14557BB (6/4/15)                  *
* BASIN 400; 100-YR - 6 HOUR PRECIPITATION                              *
* PRE-PROJECT                                                           *
 ************************************************************************

  FILE NAME: RGRV400.RAT
  TIME/DATE OF STUDY: 10:01 06/04/2015
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SPECIFIED CONSTANT RUNOFF COEFFICIENT = 0.300
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *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    400.00 TO NODE    405.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(GLOBAL):
  ORCHARDS(EVERGREEN) GOOD COVER RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  86
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   2254.00
  DOWNSTREAM ELEVATION(FEET) =   2225.00
  ELEVATION DIFFERENCE(FEET) =     29.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.865
SUBAREA RUNOFF(CFS) =      0.47
TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.47

****************************************************************************
FLOW PROCESS FROM NODE    405.00 TO NODE    410.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   2225.00  DOWNSTREAM(FEET) =   1925.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   943.00   CHANNEL SLOPE =  0.3181
CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.401
*USER SPECIFIED(GLOBAL):
ORCHARDS(EVERGREEN) GOOD COVER RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  86
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      8.34
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.25
AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   2.51
Tc(MIN.) =   9.20
SUBAREA AREA(ACRES) =     8.10       SUBAREA RUNOFF(CFS) =   15.55
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =      8.30         PEAK FLOW RATE(CFS) =      15.94

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.17   FLOW VELOCITY(FEET/SEC.) =   7.87
LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =  1043.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    410.00 TO NODE    415.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1925.00  DOWNSTREAM(FEET) =   1825.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1310.00   CHANNEL SLOPE =  0.0763
CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   5.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.421
*USER SPECIFIED(GLOBAL):
ORCHARDS(EVERGREEN) GOOD COVER RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  86
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     36.64
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.07
AVERAGE FLOW DEPTH(FEET) =   0.70   TRAVEL TIME(MIN.) =   2.71
Tc(MIN.) =  11.90
SUBAREA AREA(ACRES) =    25.40       SUBAREA RUNOFF(CFS) =   41.30
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =     33.70         PEAK FLOW RATE(CFS) =      54.80

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.85   FLOW VELOCITY(FEET/SEC.) =   8.90
LONGEST FLOWPATH FROM NODE    400.00 TO NODE    415.00 =  2353.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    415.00 TO NODE    420.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1825.00  DOWNSTREAM(FEET) =   1760.00
```

```
CHANNEL LENGTH THRU SUBAREA(FEET) =   527.00   CHANNEL SLOPE =  0.1233
CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.223
*USER SPECIFIED(GLOBAL):
ORCHARDS(EVERGREEN) GOOD COVER RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  86
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     67.26
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  12.42
AVERAGE FLOW DEPTH(FEET) =   0.93   TRAVEL TIME(MIN.) =   0.71
Tc(MIN.) =  12.61
SUBAREA AREA(ACRES) =    15.90       SUBAREA RUNOFF(CFS) =   24.91
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =     49.60         PEAK FLOW RATE(CFS) =      77.71

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  1.00   FLOW VELOCITY(FEET/SEC.) =  12.91
LONGEST FLOWPATH FROM NODE    400.00 TO NODE    420.00 =  2880.00 FEET.
================================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =     49.60  TC(MIN.) =     12.61
PEAK FLOW RATE(CFS)   =     77.71
================================================================================
================================================================================
END OF RATIONAL METHOD ANALYSIS
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                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                        San Diego, California 92110
                      619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* RANCHO GUEJITO - ROCKWOOD VILLAGE J-14557BB (3/12/15)                 *
* BASIN 500; 100-YR - 6 HOUR PRECIPITATION                              *
* PRE-PROJECT                                                           *
 ************************************************************************

  FILE NAME: RGRV500.RAT
  TIME/DATE OF STUDY: 14:20 03/12/2015
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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*
     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    500.00 TO NODE    505.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   586.00
  UPSTREAM ELEVATION(FEET) =   1853.00
  DOWNSTREAM ELEVATION(FEET) =   1687.50
  ELEVATION DIFFERENCE(FEET) =    165.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
```

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          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.865
  SUBAREA RUNOFF(CFS) =      0.47
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.47

****************************************************************************
  FLOW PROCESS FROM NODE    505.00 TO NODE    510.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1687.50  DOWNSTREAM(FEET) =    945.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1308.00   CHANNEL SLOPE =  0.5677
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.523
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.00
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.47
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   4.88
  Tc(MIN.) =  11.57
  SUBAREA AREA(ACRES) =     1.80       SUBAREA RUNOFF(CFS) =    2.98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =      2.00         PEAK FLOW RATE(CFS) =       3.31

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   5.38
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    510.00 =  1894.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      2.00  TC(MIN.) =     11.57
  PEAK FLOW RATE(CFS)   =      3.31
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

♀

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                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                        San Diego, California 92110
                      619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* RANCHO GUEJITO - ROCKWOODVILLAGE J-14557BB (6/4/15)                    *
* BASIN 600; 100-YR - 6 HOUR PRECIPITATION                               *
* PRE-PROJECT                                                            *
 ************************************************************************

  FILE NAME: RGRV600.RAT
  TIME/DATE OF STUDY: 10:01 06/04/2015
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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*
     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    600.00 TO NODE    605.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1810.00
  DOWNSTREAM ELEVATION(FEET) =   1800.00
  ELEVATION DIFFERENCE(FEET) =     10.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.865
```

```
  SUBAREA RUNOFF(CFS) =       0.47
  TOTAL AREA(ACRES) =       0.20   TOTAL RUNOFF(CFS) =       0.47

****************************************************************************
  FLOW PROCESS FROM NODE    605.00 TO NODE    610.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1800.00  DOWNSTREAM(FEET) =   1775.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   324.00   CHANNEL SLOPE =  0.0772
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.746
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.94
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.01
  AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   1.80
  Tc(MIN.) =   8.48
  SUBAREA AREA(ACRES) =     3.40       SUBAREA RUNOFF(CFS) =    6.88
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =      3.60         PEAK FLOW RATE(CFS) =       7.29

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   3.79
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    610.00 =   424.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    610.00 TO NODE    615.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1775.00  DOWNSTREAM(FEET) =   1650.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   557.00   CHANNEL SLOPE =  0.2244
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.243
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.47
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.58
  AVERAGE FLOW DEPTH(FEET) =   0.29   TRAVEL TIME(MIN.) =   1.08
  Tc(MIN.) =   9.56
  SUBAREA AREA(ACRES) =     3.40       SUBAREA RUNOFF(CFS) =    6.37
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =      7.00         PEAK FLOW RATE(CFS) =      13.11

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.33   FLOW VELOCITY(FEET/SEC.) =   9.16
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    615.00 =   981.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    615.00 TO NODE    620.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1650.00  DOWNSTREAM(FEET) =   1375.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   770.00   CHANNEL SLOPE =  0.3571
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.875
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     27.75
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  13.58
AVERAGE FLOW DEPTH(FEET) =   0.43   TRAVEL TIME(MIN.) =   0.94
Tc(MIN.) =  10.51
SUBAREA AREA(ACRES) =    16.60       SUBAREA RUNOFF(CFS) =   29.26
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =     23.60         PEAK FLOW RATE(CFS) =      41.59

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.53   FLOW VELOCITY(FEET/SEC.) =  15.28
LONGEST FLOWPATH FROM NODE    600.00 TO NODE    620.00 =  1751.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    620.00 TO NODE    625.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1375.00  DOWNSTREAM(FEET) =   1150.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   350.00   CHANNEL SLOPE =  0.6429
CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   4.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.784
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     78.63
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  22.59
AVERAGE FLOW DEPTH(FEET) =   0.63   TRAVEL TIME(MIN.) =   0.26
Tc(MIN.) =  10.77
SUBAREA AREA(ACRES) =    42.70       SUBAREA RUNOFF(CFS) =   74.09
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =     66.30         PEAK FLOW RATE(CFS) =     115.03

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.76   FLOW VELOCITY(FEET/SEC.) =  25.06
LONGEST FLOWPATH FROM NODE    600.00 TO NODE    625.00 =  2101.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =     66.30  TC(MIN.) =     10.77
PEAK FLOW RATE(CFS)   =    115.03
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
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            Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                         Analysis prepared by:

                       RICK ENGINEERING COMPANY
                           5620 Friars Road
                       San Diego, California 92110
                     619-291-0707   Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* RANCHO GUEJITO - ROCKWOOD VILLAGE J-14557BB (3/12/15)                   *
* BASIN 700; 100-YR - 6 HOUR PRECIPITATION                                *
* PRE-PROJECT                                                             *
 ***************************************************************************

  FILE NAME: RGRV700.RAT
  TIME/DATE OF STUDY: 14:38 03/12/2015
---------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
---------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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*
     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    700.00 TO NODE    705.00 IS CODE =  21
---------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
===========================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   194.00
  UPSTREAM ELEVATION(FEET) =   1790.00
  DOWNSTREAM ELEVATION(FEET) =   1725.00
  ELEVATION DIFFERENCE(FEET) =     65.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  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) =  7.865
SUBAREA RUNOFF(CFS) =      0.47
TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.47

****************************************************************************
FLOW PROCESS FROM NODE    705.00 TO NODE    710.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1725.00  DOWNSTREAM(FEET) =   1295.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1150.00   CHANNEL SLOPE =  0.3739
CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.459
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     13.83
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.03
AVERAGE FLOW DEPTH(FEET) =   0.15   TRAVEL TIME(MIN.) =   2.39
Tc(MIN.) =   9.07
SUBAREA AREA(ACRES) =    13.70       SUBAREA RUNOFF(CFS) =   26.55
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =     13.90         PEAK FLOW RATE(CFS) =      26.94

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.22   FLOW VELOCITY(FEET/SEC.) =   9.82
LONGEST FLOWPATH FROM NODE    700.00 TO NODE    710.00 =  1344.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    710.00 TO NODE    715.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1295.00  DOWNSTREAM(FEET) =   1275.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   262.00   CHANNEL SLOPE =  0.0763
CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.250
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     32.75
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.19
AVERAGE FLOW DEPTH(FEET) =   0.78   TRAVEL TIME(MIN.) =   0.48
Tc(MIN.) =   9.55
SUBAREA AREA(ACRES) =     6.20       SUBAREA RUNOFF(CFS) =   11.63
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =     20.10         PEAK FLOW RATE(CFS) =      37.69

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.84   FLOW VELOCITY(FEET/SEC.) =   9.55
LONGEST FLOWPATH FROM NODE    700.00 TO NODE    715.00 =  1606.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =     20.10  TC(MIN.) =      9.55
PEAK FLOW RATE(CFS)    =     37.69
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
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             Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                        San Diego, California 92110
                      619-291-0707   Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* RANCHO GUEJITO - ROCKWOOD VILLAGE J-14557BB (6/4/15)                    *
* BASIN 800; 100-YR - 6 HOUR PRECIPITATION                                *
* PRE-PROJECT                                                             *
 ***************************************************************************

  FILE NAME: RGRV800.RAT
  TIME/DATE OF STUDY: 10:10 06/04/2015
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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*
     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    800.00 TO NODE    805.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   164.00
  UPSTREAM ELEVATION(FEET) =   1397.00
  DOWNSTREAM ELEVATION(FEET) =   1365.00
  ELEVATION DIFFERENCE(FEET) =     32.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
```

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          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.865
  SUBAREA RUNOFF(CFS) =      0.94
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS) =      0.94

****************************************************************************
  FLOW PROCESS FROM NODE    805.00 TO NODE    810.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1365.00  DOWNSTREAM(FEET) =   1190.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   800.00   CHANNEL SLOPE =  0.2188
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.615
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     12.95
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.48
  AVERAGE FLOW DEPTH(FEET) =   0.17   TRAVEL TIME(MIN.) =   2.06
  Tc(MIN.) =   8.74
  SUBAREA AREA(ACRES) =    12.00       SUBAREA RUNOFF(CFS) =   23.81
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =     12.40         PEAK FLOW RATE(CFS) =      24.61

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.25   FLOW VELOCITY(FEET/SEC.) =   7.99
  LONGEST FLOWPATH FROM NODE    800.00 TO NODE    810.00 =   964.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    810.00 TO NODE    815.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1190.00  DOWNSTREAM(FEET) =    950.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   928.00   CHANNEL SLOPE =  0.2586
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.140
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     42.29
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  14.44
  AVERAGE FLOW DEPTH(FEET) =   0.61   TRAVEL TIME(MIN.) =   1.07
  Tc(MIN.) =   9.81
  SUBAREA AREA(ACRES) =    19.20       SUBAREA RUNOFF(CFS) =   35.36
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =     31.60         PEAK FLOW RATE(CFS) =      58.20

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.72   FLOW VELOCITY(FEET/SEC.) =  15.67
  LONGEST FLOWPATH FROM NODE    800.00 TO NODE    815.00 =  1892.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    815.00 TO NODE    820.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    950.00  DOWNSTREAM(FEET) =    525.00
```

```
CHANNEL LENGTH THRU SUBAREA(FEET) =   756.00   CHANNEL SLOPE =  0.5622
CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.929
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     67.90
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  23.07
AVERAGE FLOW DEPTH(FEET) =   0.68   TRAVEL TIME(MIN.) =   0.55
Tc(MIN.) =  10.36
SUBAREA AREA(ACRES) =    10.90       SUBAREA RUNOFF(CFS) =   19.39
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =     42.50         PEAK FLOW RATE(CFS) =      75.59

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.71   FLOW VELOCITY(FEET/SEC.) =  23.90
LONGEST FLOWPATH FROM NODE    800.00 TO NODE    820.00 =  2648.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =     42.50  TC(MIN.) =     10.36
PEAK FLOW RATE(CFS)   =     75.59
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
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             Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                        San Diego, California 92110
                      619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* RANCHO GUEJITO - ROCKWOOD VILLAGE J-14557BB (6/4/15)                  *
* BASIN 900; 100-YR - 6 HOUR PRECIPITATION                              *
* PRE-PROJECT                                                           *
 ************************************************************************

  FILE NAME: RGRV900.RAT
  TIME/DATE OF STUDY: 10:14 06/04/2015
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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*
     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    900.00 TO NODE    905.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   120.00
  UPSTREAM ELEVATION(FEET) =   1864.50
  DOWNSTREAM ELEVATION(FEET) =   1855.00
  ELEVATION DIFFERENCE(FEET) =      9.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.226
  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) =  7.480
SUBAREA RUNOFF(CFS) =      0.45
TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.45

****************************************************************************
FLOW PROCESS FROM NODE    905.00 TO NODE    910.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1855.00  DOWNSTREAM(FEET) =   1825.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   225.00   CHANNEL SLOPE =  0.1333
CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.705
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.97
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.81
AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   1.34
Tc(MIN.) =   8.56
SUBAREA AREA(ACRES) =     1.50       SUBAREA RUNOFF(CFS) =    3.02
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =      1.70         PEAK FLOW RATE(CFS) =       3.42

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   3.54
LONGEST FLOWPATH FROM NODE    900.00 TO NODE    910.00 =   345.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    910.00 TO NODE    915.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1825.00  DOWNSTREAM(FEET) =   1665.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   445.00   CHANNEL SLOPE =  0.3596
CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   5.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.307
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      7.02
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.71
AVERAGE FLOW DEPTH(FEET) =   0.20   TRAVEL TIME(MIN.) =   0.85
Tc(MIN.) =   9.41
SUBAREA AREA(ACRES) =     3.80       SUBAREA RUNOFF(CFS) =    7.19
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =      5.50         PEAK FLOW RATE(CFS) =      10.41

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.25   FLOW VELOCITY(FEET/SEC.) =   9.85
LONGEST FLOWPATH FROM NODE    900.00 TO NODE    915.00 =   790.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =      5.50  TC(MIN.) =      9.41
PEAK FLOW RATE(CFS)   =     10.41
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
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            Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                        San Diego, California 92110
                      619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* RANCHO GUEJITO - ROCKWOOD VILLAGE J-14557BB (6/4/15)                  *
* BASIN 1000; 100-YR - 6 HOUR PRECIPITATION                             *
* PRE-PROJECT                                                           *
 ************************************************************************

  FILE NAME: RGRV1000.RAT
  TIME/DATE OF STUDY: 10:21 06/04/2015
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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*
     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   1000.00 TO NODE   1005.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   200.00
  UPSTREAM ELEVATION(FEET) =   1853.00
  DOWNSTREAM ELEVATION(FEET) =   1835.00
  ELEVATION DIFFERENCE(FEET) =     18.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.923
  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) =  7.689
SUBAREA RUNOFF(CFS) =      0.46
TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.46

****************************************************************************
FLOW PROCESS FROM NODE   1005.00 TO NODE   1010.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1835.00  DOWNSTREAM(FEET) =   1000.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1600.00   CHANNEL SLOPE =  0.5219
CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.306
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     24.72
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.70
AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =   2.49
Tc(MIN.) =   9.42
SUBAREA AREA(ACRES) =    25.30       SUBAREA RUNOFF(CFS) =   47.86
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =     25.50         PEAK FLOW RATE(CFS) =      48.24

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.28   FLOW VELOCITY(FEET/SEC.) =  13.49
LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1010.00 =  1800.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =     25.50  TC(MIN.) =      9.42
PEAK FLOW RATE(CFS)   =     48.24
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

♀

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

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            Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                       San Diego, California 92110
                     619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* RANCHO GUEJITO - ROCKWOOD VILLAGE J-14557BB (6/4/15)                  *
* BASIN 1100; 100-YR - 6 HOUR PRECIPITATION                             *
* PRE-PROJECT                                                           *
 ************************************************************************

  FILE NAME: RGRV1100.RAT
  TIME/DATE OF STUDY: 10:25 06/04/2015
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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*
     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   1100.00 TO NODE   1105.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   205.00
  UPSTREAM ELEVATION(FEET) =   1853.00
  DOWNSTREAM ELEVATION(FEET) =   1830.00
  ELEVATION DIFFERENCE(FEET) =     23.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  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) =  7.865
SUBAREA RUNOFF(CFS) =      0.47
TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.47

****************************************************************************
FLOW PROCESS FROM NODE   1105.00 TO NODE   1110.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1830.00  DOWNSTREAM(FEET) =   1675.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   720.00   CHANNEL SLOPE =  0.2153
CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   5.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.716
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      4.73
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.47
AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =   1.86
Tc(MIN.) =   8.54
SUBAREA AREA(ACRES) =     4.20       SUBAREA RUNOFF(CFS) =    8.46
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =      4.40         PEAK FLOW RATE(CFS) =       8.86

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.26   FLOW VELOCITY(FEET/SEC.) =   7.84
LONGEST FLOWPATH FROM NODE   1100.00 TO NODE   1110.00 =   925.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1110.00 TO NODE   1115.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1675.00  DOWNSTREAM(FEET) =   1025.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1090.00   CHANNEL SLOPE =  0.5963
CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   5.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.100
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     16.11
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  13.23
AVERAGE FLOW DEPTH(FEET) =   0.28   TRAVEL TIME(MIN.) =   1.37
Tc(MIN.) =   9.91
SUBAREA AREA(ACRES) =     7.90       SUBAREA RUNOFF(CFS) =   14.46
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =     12.30         PEAK FLOW RATE(CFS) =      22.51

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.33   FLOW VELOCITY(FEET/SEC.) =  14.61
LONGEST FLOWPATH FROM NODE   1100.00 TO NODE   1115.00 =  2015.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =     12.30  TC(MIN.) =      9.91
PEAK FLOW RATE(CFS)    =     22.51
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
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                         2003,1985,1981 HYDROLOGY MANUAL
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                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                       San Diego, California 92110
                     619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* RANCHO GUEJITO - ROCKWOOD VILLAGE J-14557BB (6/4/15)                  *
* BASIN 1200; 100-YR - 6 HOUR PRECIPITATION                             *
* PRE-PROJECT                                                           *
 ************************************************************************

  FILE NAME: RGRV1200.RAT
  TIME/DATE OF STUDY: 10:32 06/04/2015
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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*
     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   1200.00 TO NODE   1205.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   220.00
  UPSTREAM ELEVATION(FEET) =   1393.00
  DOWNSTREAM ELEVATION(FEET) =   1345.00
  ELEVATION DIFFERENCE(FEET) =     48.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  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) =  7.865
SUBAREA RUNOFF(CFS) =      0.47
TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.47

****************************************************************************
FLOW PROCESS FROM NODE   1205.00 TO NODE   1210.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1345.00  DOWNSTREAM(FEET) =   1200.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   475.00   CHANNEL SLOPE =  0.3053
CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.501
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.76
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.45
AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =   2.30
Tc(MIN.) =   8.98
SUBAREA AREA(ACRES) =     1.30       SUBAREA RUNOFF(CFS) =    2.54
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =      1.50         PEAK FLOW RATE(CFS) =       2.93

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   4.30
LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1210.00 =   695.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1210.00 TO NODE   1215.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1200.00  DOWNSTREAM(FEET) =   1050.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   470.00   CHANNEL SLOPE =  0.3191
CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   5.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.047
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      4.83
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.35
AVERAGE FLOW DEPTH(FEET) =   0.17   TRAVEL TIME(MIN.) =   1.07
Tc(MIN.) =  10.05
SUBAREA AREA(ACRES) =     2.10       SUBAREA RUNOFF(CFS) =    3.81
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =      3.60         PEAK FLOW RATE(CFS) =       6.53

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.20   FLOW VELOCITY(FEET/SEC.) =   8.10
LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1215.00 =  1165.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1215.00 TO NODE   1220.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1050.00  DOWNSTREAM(FEET) =    525.00
```

```
CHANNEL LENGTH THRU SUBAREA(FEET) =   850.00   CHANNEL SLOPE =  0.6176
CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.641
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      9.49
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  12.40
AVERAGE FLOW DEPTH(FEET) =   0.21   TRAVEL TIME(MIN.) =   1.14
Tc(MIN.) =  11.19
SUBAREA AREA(ACRES) =     3.50       SUBAREA RUNOFF(CFS) =    5.92
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =      7.10         PEAK FLOW RATE(CFS) =      12.02

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.24   FLOW VELOCITY(FEET/SEC.) =  13.37
LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1220.00 =  2015.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =      7.10  TC(MIN.) =     11.19
PEAK FLOW RATE(CFS)   =     12.02
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
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                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                        San Diego, California 92110
                      619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* RANCHO GUEJITO - ROCKWOOD VILLAGE J-14557BB (6/4/15)                  *
* BASIN 1300; 100-YR - 6 HOUR PRECIPITATION                             *
* PRE-PROJECT                                                           *
 ************************************************************************

  FILE NAME: RGRV1300.RAT
  TIME/DATE OF STUDY: 10:35 06/04/2015
---------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
---------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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*
     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   1300.00 TO NODE   1305.00 IS CODE =  21
---------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
===========================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   230.00
  UPSTREAM ELEVATION(FEET) =   1333.00
  DOWNSTREAM ELEVATION(FEET) =   1275.00
  ELEVATION DIFFERENCE(FEET) =     58.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  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) =  7.865
SUBAREA RUNOFF(CFS) =      0.71
TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      0.71

****************************************************************************
FLOW PROCESS FROM NODE   1305.00 TO NODE   1310.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1275.00  DOWNSTREAM(FEET) =   1025.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   420.00   CHANNEL SLOPE =  0.5952
CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.937
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.49
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.87
AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =   1.44
Tc(MIN.) =   8.12
SUBAREA AREA(ACRES) =     1.70       SUBAREA RUNOFF(CFS) =    3.54
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =      2.00         PEAK FLOW RATE(CFS) =       4.16

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.07   FLOW VELOCITY(FEET/SEC.) =   5.94
LONGEST FLOWPATH FROM NODE   1300.00 TO NODE   1310.00 =   650.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1310.00 TO NODE   1315.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1025.00  DOWNSTREAM(FEET) =    535.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   850.00   CHANNEL SLOPE =  0.5765
CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.308
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      7.00
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.97
AVERAGE FLOW DEPTH(FEET) =   0.18   TRAVEL TIME(MIN.) =   1.29
Tc(MIN.) =   9.41
SUBAREA AREA(ACRES) =     3.00       SUBAREA RUNOFF(CFS) =    5.68
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =      5.00         PEAK FLOW RATE(CFS) =       9.46

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.22   FLOW VELOCITY(FEET/SEC.) =  11.98
LONGEST FLOWPATH FROM NODE   1300.00 TO NODE   1315.00 =  1500.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =      5.00  TC(MIN.) =      9.41
PEAK FLOW RATE(CFS)   =      9.46
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
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                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                       San Diego, California 92110
                     619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* RANCHO GUEJITO - ROCKWOOD VILLAGE J-14557BB (6/4/15)                  *
* BASIN 1400; 100-YR - 6 HOUR PRECIPITATION                             *
* PRE-PROJECT                                                           *
 ************************************************************************

  FILE NAME: RGRV1400.RAT
  TIME/DATE OF STUDY: 10:38 06/04/2015
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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*
     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   1400.00 TO NODE   1405.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   170.00
  UPSTREAM ELEVATION(FEET) =   1318.00
  DOWNSTREAM ELEVATION(FEET) =   1305.00
  ELEVATION DIFFERENCE(FEET) =     13.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.310
  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) =  7.424
SUBAREA RUNOFF(CFS) =      0.67
TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      0.67

****************************************************************************
 FLOW PROCESS FROM NODE   1405.00 TO NODE   1410.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1305.00  DOWNSTREAM(FEET) =   1280.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   200.00   CHANNEL SLOPE =  0.1250
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.717
 USER-SPECIFIED RUNOFF COEFFICIENT = .3000
 S.C.S. CURVE NUMBER (AMC II) =  91
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.67
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.72
 AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   1.23
 Tc(MIN.) =   8.54
 SUBAREA AREA(ACRES) =     1.00       SUBAREA RUNOFF(CFS) =    2.02
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
 TOTAL AREA(ACRES) =      1.30         PEAK FLOW RATE(CFS) =       2.62

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.08   FLOW VELOCITY(FEET/SEC.) =   3.07
 LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1410.00 =   370.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1410.00 TO NODE   1415.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1280.00  DOWNSTREAM(FEET) =   1175.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   515.00   CHANNEL SLOPE =  0.2039
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   5.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.127
 USER-SPECIFIED RUNOFF COEFFICIENT = .3000
 S.C.S. CURVE NUMBER (AMC II) =  91
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      5.10
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.56
 AVERAGE FLOW DEPTH(FEET) =   0.20   TRAVEL TIME(MIN.) =   1.31
 Tc(MIN.) =   9.84
 SUBAREA AREA(ACRES) =     2.70       SUBAREA RUNOFF(CFS) =    4.96
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
 TOTAL AREA(ACRES) =      4.00         PEAK FLOW RATE(CFS) =       7.35

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.24   FLOW VELOCITY(FEET/SEC.) =   7.24
 LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1415.00 =   885.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1415.00 TO NODE   1420.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1175.00  DOWNSTREAM(FEET) =    525.00
```

```
CHANNEL LENGTH THRU SUBAREA(FEET) =  1230.00   CHANNEL SLOPE =  0.5285
CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.447
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     22.93
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.40
AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =   1.97
Tc(MIN.) =  11.82
SUBAREA AREA(ACRES) =    19.00       SUBAREA RUNOFF(CFS) =   31.05
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =     23.00         PEAK FLOW RATE(CFS) =      37.58

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.24   FLOW VELOCITY(FEET/SEC.) =  12.55
LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1420.00 =  2115.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =     23.00  TC(MIN.) =     11.82
PEAK FLOW RATE(CFS)   =     37.58
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
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                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                        San Diego, California 92110
                      619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* RANCHO GUEJITO - ROCKWOOD VILLAGE J-14557BB (6/4/15)                  *
* BASIN 1500; 100-YR - 6 HOUR PRECIPITATION                             *
* PRE-PROJECT                                                           *
 ************************************************************************

  FILE NAME: RGRV1500.RAT
  TIME/DATE OF STUDY: 10:40 06/04/2015
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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*
     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   1500.00 TO NODE   1505.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   210.00
  UPSTREAM ELEVATION(FEET) =   1318.00
  DOWNSTREAM ELEVATION(FEET) =   1305.00
  ELEVATION DIFFERENCE(FEET) =     13.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.843
  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) =  7.095
SUBAREA RUNOFF(CFS) =      0.43
TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.43

****************************************************************************
FLOW PROCESS FROM NODE   1505.00 TO NODE   1510.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1305.00  DOWNSTREAM(FEET) =   1200.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   545.00   CHANNEL SLOPE =  0.1927
CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   5.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.189
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.39
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.91
AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   1.85
Tc(MIN.) =   9.69
SUBAREA AREA(ACRES) =     2.10       SUBAREA RUNOFF(CFS) =    3.90
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =      2.30         PEAK FLOW RATE(CFS) =       4.27

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.18   FLOW VELOCITY(FEET/SEC.) =   6.07
LONGEST FLOWPATH FROM NODE   1500.00 TO NODE   1510.00 =   755.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1510.00 TO NODE   1515.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1200.00  DOWNSTREAM(FEET) =    525.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1450.00   CHANNEL SLOPE =  0.4655
CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.557
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     15.72
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  13.71
AVERAGE FLOW DEPTH(FEET) =   0.32   TRAVEL TIME(MIN.) =   1.76
Tc(MIN.) =  11.45
SUBAREA AREA(ACRES) =    13.70       SUBAREA RUNOFF(CFS) =   22.84
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =     16.00         PEAK FLOW RATE(CFS) =      26.67

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.42   FLOW VELOCITY(FEET/SEC.) =  16.33
LONGEST FLOWPATH FROM NODE   1500.00 TO NODE   1515.00 =  2205.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =     16.00  TC(MIN.) =     11.45
PEAK FLOW RATE(CFS)   =     26.67
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
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Post-Project Conditions

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                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                        San Diego, California 92110
                      619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* RANCHO GUEJITO - ROCKWOOD VILLAGE J-14557BB (3/12/15)                 *
* BASIN 100; 100-YR - 6 HOUR PRECIPITATION                              *
* POST-PROJECT                                                           *
 ************************************************************************

  FILE NAME: RGRV100_POST.RAT
  TIME/DATE OF STUDY: 14:00 03/12/2015
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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*
     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    105.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   154.00
  UPSTREAM ELEVATION(FEET) =   2254.00
  DOWNSTREAM ELEVATION(FEET) =   2200.00
  ELEVATION DIFFERENCE(FEET) =     54.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  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) =  7.865
  SUBAREA RUNOFF(CFS) =      0.47
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.47

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    110.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2200.00  DOWNSTREAM(FEET) =   2000.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   327.00   CHANNEL SLOPE =  0.6116
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.831
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.88
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.34
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   1.63
  Tc(MIN.) =   8.32
  SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    0.82
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =      0.60         PEAK FLOW RATE(CFS) =       1.23

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.03   FLOW VELOCITY(FEET/SEC.) =   3.56
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =   481.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    115.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2000.00  DOWNSTREAM(FEET) =   1760.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   839.00   CHANNEL SLOPE =  0.2861
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.201
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     14.10
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.39
  AVERAGE FLOW DEPTH(FEET) =   0.32   TRAVEL TIME(MIN.) =   1.35
  Tc(MIN.) =   9.66
  SUBAREA AREA(ACRES) =    13.80       SUBAREA RUNOFF(CFS) =   25.67
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =     14.40         PEAK FLOW RATE(CFS) =      26.79

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.45   FLOW VELOCITY(FEET/SEC.) =  12.51
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    115.00 =  1320.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    120.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1760.00  DOWNSTREAM(FEET) =   1700.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   257.00   CHANNEL SLOPE =  0.2335
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.073
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     31.44
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  13.40
  AVERAGE FLOW DEPTH(FEET) =   0.57   TRAVEL TIME(MIN.) =   0.32
  Tc(MIN.) =   9.98
  SUBAREA AREA(ACRES) =     5.10       SUBAREA RUNOFF(CFS) =    9.29
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =     19.50         PEAK FLOW RATE(CFS) =      35.52

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.61   FLOW VELOCITY(FEET/SEC.) =  13.93
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    120.00 =  1577.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    125.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1700.00  DOWNSTREAM(FEET) =   1650.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   140.00   CHANNEL SLOPE =  0.3571
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.017
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     36.07
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  16.20
  AVERAGE FLOW DEPTH(FEET) =   0.54   TRAVEL TIME(MIN.) =   0.14
  Tc(MIN.) =  10.13
  SUBAREA AREA(ACRES) =     0.60       SUBAREA RUNOFF(CFS) =    1.08
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =     20.10         PEAK FLOW RATE(CFS) =      36.28

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.54   FLOW VELOCITY(FEET/SEC.) =  16.29
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    125.00 =  1717.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =     20.10  TC(MIN.) =     10.13
  PEAK FLOW RATE(CFS)    =     36.28
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

♀

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

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                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                        San Diego, California 92110
                      619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* RANCHO GUEJITO - ROCKWOOD VILLAGE J-14557BB (3/12/15)                 *
* BASIN 200; 100-YR - 6 HOUR PRECIPITATION                              *
* POST-PROJECT                                                           *
 ************************************************************************

  FILE NAME: RGRV200_POST.RAT
  TIME/DATE OF STUDY: 14:04 03/12/2015
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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*
     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    200.00 TO NODE    205.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   148.00
  UPSTREAM ELEVATION(FEET) =   1850.00
  DOWNSTREAM ELEVATION(FEET) =   1825.00
  ELEVATION DIFFERENCE(FEET) =     25.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  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) =  7.865
  SUBAREA RUNOFF(CFS) =      0.47
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.47

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    210.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1825.00  DOWNSTREAM(FEET) =   1700.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   218.00   CHANNEL SLOPE =  0.5734
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.149
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.90
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.41
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   1.07
  Tc(MIN.) =   7.75
  SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    0.86
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =      0.60         PEAK FLOW RATE(CFS) =       1.29

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.03   FLOW VELOCITY(FEET/SEC.) =   3.73
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    210.00 =   366.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      0.60  TC(MIN.) =      7.75
  PEAK FLOW RATE(CFS)   =      1.29
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

♀

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

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                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                        San Diego, California 92110
                      619-291-0707   Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* RANCHO GUEJITO - ROCKWOOD VILLAGE J-14557BB )(3/12/15)                  *
* BASIN 300; 100-YR - 6 HOUR PRECIPITATION                                *
* POST-PROJECT                                                             *
 ***************************************************************************

  FILE NAME: RGRV300_POST.RAT
  TIME/DATE OF STUDY: 14:09 03/12/2015
---------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
---------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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*
     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    300.00 TO NODE    305.00 IS CODE =  21
---------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
===========================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   184.00
  UPSTREAM ELEVATION(FEET) =   1980.00
  DOWNSTREAM ELEVATION(FEET) =   1925.00
  ELEVATION DIFFERENCE(FEET) =     55.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  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) =  7.865
SUBAREA RUNOFF(CFS) =      0.47
TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.47

****************************************************************************
FLOW PROCESS FROM NODE    305.00 TO NODE    310.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1925.00  DOWNSTREAM(FEET) =   1700.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   526.00   CHANNEL SLOPE =  0.4278
CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.521
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.66
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.89
AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   2.25
Tc(MIN.) =   8.94
SUBAREA AREA(ACRES) =     1.20       SUBAREA RUNOFF(CFS) =    2.35
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =      1.40         PEAK FLOW RATE(CFS) =       2.74

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   4.61
LONGEST FLOWPATH FROM NODE    300.00 TO NODE    310.00 =   710.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =      1.40  TC(MIN.) =      8.94
PEAK FLOW RATE(CFS)   =      2.74
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

♀

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

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                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                       San Diego, California 92110
                     619-291-0707   Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* RANCHO GUEJITO - ROCKWOOD VILLAGE J-14557BB (6/4/15)                    *
* BASIN 400; 100-YR - 6 HOUR PRECIPITATION                                *
* POST-PROJECT                                                             *
 ***************************************************************************

  FILE NAME: RGRV400.RAT
  TIME/DATE OF STUDY: 10:01 06/04/2015
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SPECIFIED CONSTANT RUNOFF COEFFICIENT = 0.300
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *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    400.00 TO NODE    405.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(GLOBAL):
  ORCHARDS(EVERGREEN) GOOD COVER RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  86
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   2254.00
  DOWNSTREAM ELEVATION(FEET) =   2225.00
  ELEVATION DIFFERENCE(FEET) =     29.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.865
SUBAREA RUNOFF(CFS) =      0.47
TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.47

****************************************************************************
FLOW PROCESS FROM NODE    405.00 TO NODE    410.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   2225.00  DOWNSTREAM(FEET) =   1925.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   943.00   CHANNEL SLOPE =  0.3181
CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.401
*USER SPECIFIED(GLOBAL):
ORCHARDS(EVERGREEN) GOOD COVER RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  86
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      8.34
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.25
AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   2.51
Tc(MIN.) =   9.20
SUBAREA AREA(ACRES) =     8.10       SUBAREA RUNOFF(CFS) =   15.55
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =      8.30         PEAK FLOW RATE(CFS) =      15.94

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.17   FLOW VELOCITY(FEET/SEC.) =   7.87
LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =  1043.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    410.00 TO NODE    415.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1925.00  DOWNSTREAM(FEET) =   1825.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1310.00   CHANNEL SLOPE =  0.0763
CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   5.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.421
*USER SPECIFIED(GLOBAL):
ORCHARDS(EVERGREEN) GOOD COVER RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  86
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     36.64
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.07
AVERAGE FLOW DEPTH(FEET) =   0.70   TRAVEL TIME(MIN.) =   2.71
Tc(MIN.) =  11.90
SUBAREA AREA(ACRES) =    25.40       SUBAREA RUNOFF(CFS) =   41.30
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =     33.70         PEAK FLOW RATE(CFS) =      54.80

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.85   FLOW VELOCITY(FEET/SEC.) =   8.90
LONGEST FLOWPATH FROM NODE    400.00 TO NODE    415.00 =  2353.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    415.00 TO NODE    420.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1825.00  DOWNSTREAM(FEET) =   1760.00
```

```
CHANNEL LENGTH THRU SUBAREA(FEET) =   527.00   CHANNEL SLOPE =  0.1233
CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.223
*USER SPECIFIED(GLOBAL):
ORCHARDS(EVERGREEN) GOOD COVER RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  86
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     67.26
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  12.42
AVERAGE FLOW DEPTH(FEET) =   0.93   TRAVEL TIME(MIN.) =   0.71
Tc(MIN.) =  12.61
SUBAREA AREA(ACRES) =    15.90       SUBAREA RUNOFF(CFS) =   24.91
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =     49.60         PEAK FLOW RATE(CFS) =      77.71

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  1.00   FLOW VELOCITY(FEET/SEC.) =  12.91
LONGEST FLOWPATH FROM NODE    400.00 TO NODE    420.00 =  2880.00 FEET.
****************************************************************************
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =     49.60  TC(MIN.) =     12.61
PEAK FLOW RATE(CFS)   =     77.71
****************************************************************************
****************************************************************************
END OF RATIONAL METHOD ANALYSIS
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                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                        San Diego, California 92110
                      619-291-0707   Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* RANCHO GUEJITO - ROCKWOOD VILLAGE J-14557BB (3/12/15)                   *
* BASIN 500; 100-YR - 6 HOUR PRECIPITATION                                *
* POST-PROJECT                                                             *
 ***************************************************************************

  FILE NAME: RGRV500_POST.RAT
  TIME/DATE OF STUDY: 14:20 03/12/2015
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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*
     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    500.00 TO NODE    505.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   586.00
  UPSTREAM ELEVATION(FEET) =   1853.00
  DOWNSTREAM ELEVATION(FEET) =   1687.50
  ELEVATION DIFFERENCE(FEET) =    165.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  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) =  7.865
  SUBAREA RUNOFF(CFS) =      0.47
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.47

****************************************************************************
  FLOW PROCESS FROM NODE    505.00 TO NODE    510.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1687.50  DOWNSTREAM(FEET) =    945.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1308.00   CHANNEL SLOPE =  0.5677
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.523
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.00
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.47
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   4.88
  Tc(MIN.) =  11.57
  SUBAREA AREA(ACRES) =     1.80       SUBAREA RUNOFF(CFS) =    2.98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =      2.00         PEAK FLOW RATE(CFS) =       3.31

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   5.38
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    510.00 =  1894.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      2.00  TC(MIN.) =     11.57
  PEAK FLOW RATE(CFS)   =      3.31
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

♀

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

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            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                          2003,1985,1981 HYDROLOGY MANUAL
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            Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                        San Diego, California 92110
                      619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* RANCHO GUEJITO - ROCKWOODVILLAGE J-14557BB (6/4/15)                    *
* BASIN 600; 100-YR - 6 HOUR PRECIPITATION                               *
* POST-PROJECT                                                            *
 ************************************************************************

  FILE NAME: RGRV600.RAT
  TIME/DATE OF STUDY: 10:01 06/04/2015
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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*
     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    600.00 TO NODE    605.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1810.00
  DOWNSTREAM ELEVATION(FEET) =   1800.00
  ELEVATION DIFFERENCE(FEET) =     10.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.865
```

```
  SUBAREA RUNOFF(CFS) =      0.47
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.47

****************************************************************************
  FLOW PROCESS FROM NODE    605.00 TO NODE    610.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1800.00  DOWNSTREAM(FEET) =   1775.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   324.00   CHANNEL SLOPE =  0.0772
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.746
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.94
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.01
  AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   1.80
  Tc(MIN.) =   8.48
  SUBAREA AREA(ACRES) =     3.40       SUBAREA RUNOFF(CFS) =    6.88
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =      3.60         PEAK FLOW RATE(CFS) =       7.29

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   3.79
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    610.00 =   424.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    610.00 TO NODE    615.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1775.00  DOWNSTREAM(FEET) =   1650.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   557.00   CHANNEL SLOPE =  0.2244
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.243
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     10.47
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.58
  AVERAGE FLOW DEPTH(FEET) =   0.29   TRAVEL TIME(MIN.) =   1.08
  Tc(MIN.) =   9.56
  SUBAREA AREA(ACRES) =     3.40       SUBAREA RUNOFF(CFS) =    6.37
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =      7.00         PEAK FLOW RATE(CFS) =      13.11

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.33   FLOW VELOCITY(FEET/SEC.) =   9.16
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    615.00 =   981.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    615.00 TO NODE    620.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1650.00  DOWNSTREAM(FEET) =   1375.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   770.00   CHANNEL SLOPE =  0.3571
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.875
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     27.75
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  13.58
AVERAGE FLOW DEPTH(FEET) =   0.43   TRAVEL TIME(MIN.) =   0.94
Tc(MIN.) =  10.51
SUBAREA AREA(ACRES) =    16.60       SUBAREA RUNOFF(CFS) =   29.26
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =     23.60         PEAK FLOW RATE(CFS) =      41.59

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.53   FLOW VELOCITY(FEET/SEC.) =  15.28
LONGEST FLOWPATH FROM NODE    600.00 TO NODE    620.00 =  1751.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    620.00 TO NODE    625.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1375.00  DOWNSTREAM(FEET) =   1150.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   350.00   CHANNEL SLOPE =  0.6429
CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   4.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.784
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     78.63
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  22.59
AVERAGE FLOW DEPTH(FEET) =   0.63   TRAVEL TIME(MIN.) =   0.26
Tc(MIN.) =  10.77
SUBAREA AREA(ACRES) =    42.70       SUBAREA RUNOFF(CFS) =   74.09
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =     66.30         PEAK FLOW RATE(CFS) =     115.03

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.76   FLOW VELOCITY(FEET/SEC.) =  25.06
LONGEST FLOWPATH FROM NODE    600.00 TO NODE    625.00 =  2101.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =     66.30  TC(MIN.) =     10.77
PEAK FLOW RATE(CFS)   =    115.03
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
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                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                        San Diego, California 92110
                      619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* RANCHO GUEJITO - ROCKWOOD VILLAGE J-14557BB (3/12/15)                 *
* BASIN 700; 100-YR - 6 HOUR PRECIPITATION                              *
* POST-PROJECT                                                           *
 ************************************************************************

  FILE NAME: RGRV700_POST.RAT
  TIME/DATE OF STUDY: 14:38 03/12/2015
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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*
     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    700.00 TO NODE    705.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   194.00
  UPSTREAM ELEVATION(FEET) =   1790.00
  DOWNSTREAM ELEVATION(FEET) =   1725.00
  ELEVATION DIFFERENCE(FEET) =     65.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  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) =  7.865
SUBAREA RUNOFF(CFS) =      0.47
TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.47

****************************************************************************
FLOW PROCESS FROM NODE    705.00 TO NODE    710.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1725.00  DOWNSTREAM(FEET) =   1295.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1150.00   CHANNEL SLOPE =  0.3739
CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.459
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     13.83
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.03
AVERAGE FLOW DEPTH(FEET) =   0.15   TRAVEL TIME(MIN.) =   2.39
Tc(MIN.) =   9.07
SUBAREA AREA(ACRES) =    13.70       SUBAREA RUNOFF(CFS) =   26.55
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =     13.90         PEAK FLOW RATE(CFS) =      26.94

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.22   FLOW VELOCITY(FEET/SEC.) =   9.82
LONGEST FLOWPATH FROM NODE    700.00 TO NODE    710.00 =  1344.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    710.00 TO NODE    715.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1295.00  DOWNSTREAM(FEET) =   1275.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   262.00   CHANNEL SLOPE =  0.0763
CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.250
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     32.75
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.19
AVERAGE FLOW DEPTH(FEET) =   0.78   TRAVEL TIME(MIN.) =   0.48
Tc(MIN.) =   9.55
SUBAREA AREA(ACRES) =     6.20       SUBAREA RUNOFF(CFS) =   11.63
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =     20.10         PEAK FLOW RATE(CFS) =      37.69

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.84   FLOW VELOCITY(FEET/SEC.) =   9.55
LONGEST FLOWPATH FROM NODE    700.00 TO NODE    715.00 =  1606.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =     20.10  TC(MIN.) =      9.55
PEAK FLOW RATE(CFS)    =     37.69
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

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                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                       San Diego, California 92110
                     619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* RANCHO GUEJITO - ROCKWOOD VILLAGE J-14557BB (6/4/15)                  *
* BASIN 800; 100-YR - 6 HOUR PRECIPITATION                              *
* POST-PROJECT                                                           *
 ************************************************************************

  FILE NAME: RGRV800.RAT
  TIME/DATE OF STUDY: 10:10 06/04/2015
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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*
     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    800.00 TO NODE    805.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   164.00
  UPSTREAM ELEVATION(FEET) =   1397.00
  DOWNSTREAM ELEVATION(FEET) =   1365.00
  ELEVATION DIFFERENCE(FEET) =     32.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  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) =  7.865
SUBAREA RUNOFF(CFS) =      0.94
TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS) =      0.94

****************************************************************************
FLOW PROCESS FROM NODE    805.00 TO NODE    810.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1365.00  DOWNSTREAM(FEET) =   1190.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   800.00   CHANNEL SLOPE =  0.2188
CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.615
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     12.95
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.48
AVERAGE FLOW DEPTH(FEET) =   0.17   TRAVEL TIME(MIN.) =   2.06
Tc(MIN.) =   8.74
SUBAREA AREA(ACRES) =    12.00       SUBAREA RUNOFF(CFS) =   23.81
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =     12.40         PEAK FLOW RATE(CFS) =      24.61

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.25   FLOW VELOCITY(FEET/SEC.) =   7.99
LONGEST FLOWPATH FROM NODE    800.00 TO NODE    810.00 =   964.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    810.00 TO NODE    815.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1190.00  DOWNSTREAM(FEET) =    950.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   928.00   CHANNEL SLOPE =  0.2586
CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.140
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     42.29
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  14.44
AVERAGE FLOW DEPTH(FEET) =   0.61   TRAVEL TIME(MIN.) =   1.07
Tc(MIN.) =   9.81
SUBAREA AREA(ACRES) =    19.20       SUBAREA RUNOFF(CFS) =   35.36
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =     31.60         PEAK FLOW RATE(CFS) =      58.20

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.72   FLOW VELOCITY(FEET/SEC.) =  15.67
LONGEST FLOWPATH FROM NODE    800.00 TO NODE    815.00 =  1892.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    815.00 TO NODE    820.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    950.00  DOWNSTREAM(FEET) =    525.00
```

```
CHANNEL LENGTH THRU SUBAREA(FEET) =   756.00   CHANNEL SLOPE =  0.5622
CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.929
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     67.90
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  23.07
AVERAGE FLOW DEPTH(FEET) =   0.68   TRAVEL TIME(MIN.) =   0.55
Tc(MIN.) =  10.36
SUBAREA AREA(ACRES) =    10.90       SUBAREA RUNOFF(CFS) =   19.39
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =     42.50         PEAK FLOW RATE(CFS) =      75.59

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.71   FLOW VELOCITY(FEET/SEC.) =  23.90
LONGEST FLOWPATH FROM NODE    800.00 TO NODE    820.00 =  2648.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =     42.50  TC(MIN.) =     10.36
PEAK FLOW RATE(CFS)   =     75.59
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
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                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                       San Diego, California 92110
                     619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* RANCHO GUEJITO - ROCKWOOD VILLAGE J-14557BB (6/4/15)                  *
* BASIN 900; 100-YR - 6 HOUR PRECIPITATION                              *
* POST-PROJECT                                                           *
 ************************************************************************

  FILE NAME: RGRV900.RAT
  TIME/DATE OF STUDY: 10:14 06/04/2015
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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*
     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    900.00 TO NODE    905.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   120.00
  UPSTREAM ELEVATION(FEET) =   1864.50
  DOWNSTREAM ELEVATION(FEET) =   1855.00
  ELEVATION DIFFERENCE(FEET) =      9.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.226
  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) =  7.480
SUBAREA RUNOFF(CFS) =      0.45
TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.45

****************************************************************************
FLOW PROCESS FROM NODE    905.00 TO NODE    910.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1855.00  DOWNSTREAM(FEET) =   1825.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   225.00   CHANNEL SLOPE =  0.1333
CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.705
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.97
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.81
AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   1.34
Tc(MIN.) =   8.56
SUBAREA AREA(ACRES) =     1.50       SUBAREA RUNOFF(CFS) =    3.02
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =      1.70         PEAK FLOW RATE(CFS) =       3.42

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   3.54
LONGEST FLOWPATH FROM NODE    900.00 TO NODE    910.00 =   345.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    910.00 TO NODE    915.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1825.00  DOWNSTREAM(FEET) =   1665.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   445.00   CHANNEL SLOPE =  0.3596
CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   5.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.307
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      7.02
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.71
AVERAGE FLOW DEPTH(FEET) =   0.20   TRAVEL TIME(MIN.) =   0.85
Tc(MIN.) =   9.41
SUBAREA AREA(ACRES) =     3.80       SUBAREA RUNOFF(CFS) =    7.19
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =      5.50         PEAK FLOW RATE(CFS) =      10.41

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.25   FLOW VELOCITY(FEET/SEC.) =   9.85
LONGEST FLOWPATH FROM NODE    900.00 TO NODE    915.00 =   790.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =      5.50  TC(MIN.) =      9.41
PEAK FLOW RATE(CFS)    =     10.41
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
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                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                       San Diego, California 92110
                     619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* RANCHO GUEJITO - ROCKWOOD VILLAGE J-14557BB (6/4/15)                  *
* BASIN 1000; 100-YR - 6 HOUR PRECIPITATION                             *
* POST-PROJECT                                                           *
 ************************************************************************

  FILE NAME: RGRV1000.RAT
  TIME/DATE OF STUDY: 10:21 06/04/2015
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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*
     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   1000.00 TO NODE   1005.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   200.00
  UPSTREAM ELEVATION(FEET) =   1853.00
  DOWNSTREAM ELEVATION(FEET) =   1835.00
  ELEVATION DIFFERENCE(FEET) =     18.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.923
  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) =  7.689
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.46

****************************************************************************
  FLOW PROCESS FROM NODE   1005.00 TO NODE   1010.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1835.00  DOWNSTREAM(FEET) =   1000.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1600.00   CHANNEL SLOPE =  0.5219
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.306
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     24.72
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.70
  AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =   2.49
  Tc(MIN.) =   9.42
  SUBAREA AREA(ACRES) =    25.30       SUBAREA RUNOFF(CFS) =   47.86
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =     25.50         PEAK FLOW RATE(CFS) =      48.24

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.28   FLOW VELOCITY(FEET/SEC.) =  13.49
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1010.00 =  1800.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     25.50  TC(MIN.) =      9.42
  PEAK FLOW RATE(CFS)   =     48.24
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
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                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                       San Diego, California 92110
                     619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* RANCHO GUEJITO - ROCKWOOD VILLAGE J-14557BB (6/4/15)                  *
* BASIN 1100; 100-YR - 6 HOUR PRECIPITATION                             *
* POST-PROJECT                                                           *
 ************************************************************************

  FILE NAME: RGRV1100.RAT
  TIME/DATE OF STUDY: 10:25 06/04/2015
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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*
     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   1100.00 TO NODE   1105.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   205.00
  UPSTREAM ELEVATION(FEET) =   1853.00
  DOWNSTREAM ELEVATION(FEET) =   1830.00
  ELEVATION DIFFERENCE(FEET) =     23.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  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) =  7.865
SUBAREA RUNOFF(CFS) =      0.47
TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.47

****************************************************************************
FLOW PROCESS FROM NODE   1105.00 TO NODE   1110.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1830.00  DOWNSTREAM(FEET) =   1675.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   720.00   CHANNEL SLOPE =  0.2153
CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   5.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.716
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      4.73
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.47
AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =   1.86
Tc(MIN.) =   8.54
SUBAREA AREA(ACRES) =     4.20       SUBAREA RUNOFF(CFS) =    8.46
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =      4.40         PEAK FLOW RATE(CFS) =       8.86

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.26   FLOW VELOCITY(FEET/SEC.) =   7.84
LONGEST FLOWPATH FROM NODE   1100.00 TO NODE   1110.00 =   925.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1110.00 TO NODE   1115.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1675.00  DOWNSTREAM(FEET) =   1025.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1090.00   CHANNEL SLOPE =  0.5963
CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   5.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.100
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     16.11
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  13.23
AVERAGE FLOW DEPTH(FEET) =   0.28   TRAVEL TIME(MIN.) =   1.37
Tc(MIN.) =   9.91
SUBAREA AREA(ACRES) =     7.90       SUBAREA RUNOFF(CFS) =   14.46
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =     12.30         PEAK FLOW RATE(CFS) =      22.51

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.33   FLOW VELOCITY(FEET/SEC.) =  14.61
LONGEST FLOWPATH FROM NODE   1100.00 TO NODE   1115.00 =  2015.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =     12.30  TC(MIN.) =      9.91
PEAK FLOW RATE(CFS)   =     22.51
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
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                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                             5620 Friars Road
                         San Diego, California 92110
                      619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* RANCHO GUEJITO - ROCKWOOD VILLAGE J-14557BB (6/4/15)                  *
* BASIN 1200; 100-YR - 6 HOUR PRECIPITATION                             *
* POST-PROJECT                                                           *
 ************************************************************************

  FILE NAME: RGRV1200.RAT
  TIME/DATE OF STUDY: 10:32 06/04/2015
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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*
     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   1200.00 TO NODE   1205.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   220.00
  UPSTREAM ELEVATION(FEET) =   1393.00
  DOWNSTREAM ELEVATION(FEET) =   1345.00
  ELEVATION DIFFERENCE(FEET) =     48.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  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) =  7.865
  SUBAREA RUNOFF(CFS) =       0.47
  TOTAL AREA(ACRES) =       0.20   TOTAL RUNOFF(CFS) =       0.47

****************************************************************************
  FLOW PROCESS FROM NODE   1205.00 TO NODE   1210.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1345.00  DOWNSTREAM(FEET) =   1200.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   475.00   CHANNEL SLOPE =  0.3053
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.501
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.76
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.45
  AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =   2.30
  Tc(MIN.) =   8.98
  SUBAREA AREA(ACRES) =     1.30       SUBAREA RUNOFF(CFS) =    2.54
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =       1.50        PEAK FLOW RATE(CFS) =       2.93

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   4.30
  LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1210.00 =   695.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1210.00 TO NODE   1215.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1200.00  DOWNSTREAM(FEET) =   1050.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   470.00   CHANNEL SLOPE =  0.3191
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.047
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.83
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.35
  AVERAGE FLOW DEPTH(FEET) =   0.17   TRAVEL TIME(MIN.) =   1.07
  Tc(MIN.) =  10.05
  SUBAREA AREA(ACRES) =     2.10       SUBAREA RUNOFF(CFS) =    3.81
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =       3.60        PEAK FLOW RATE(CFS) =       6.53

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.20   FLOW VELOCITY(FEET/SEC.) =   8.10
  LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1215.00 =  1165.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1215.00 TO NODE   1220.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1050.00  DOWNSTREAM(FEET) =    525.00
```

```
CHANNEL LENGTH THRU SUBAREA(FEET) =   850.00   CHANNEL SLOPE =  0.6176
CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.641
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      9.49
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  12.40
AVERAGE FLOW DEPTH(FEET) =   0.21   TRAVEL TIME(MIN.) =   1.14
Tc(MIN.) =  11.19
SUBAREA AREA(ACRES) =     3.50       SUBAREA RUNOFF(CFS) =    5.92
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =      7.10         PEAK FLOW RATE(CFS) =      12.02

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.24   FLOW VELOCITY(FEET/SEC.) =  13.37
LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1220.00 =  2015.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =      7.10  TC(MIN.) =     11.19
PEAK FLOW RATE(CFS)   =     12.02
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

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

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            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
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             Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                       San Diego, California 92110
                     619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* RANCHO GUEJITO - ROCKWOOD VILLAGE J-14557BB (6/4/15)                  *
* BASIN 1300; 100-YR - 6 HOUR PRECIPITATION                             *
* POST-PROJECT                                                           *
 ************************************************************************

  FILE NAME: RGRV1300.RAT
  TIME/DATE OF STUDY: 10:35 06/04/2015
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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*
     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   1300.00 TO NODE   1305.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   230.00
  UPSTREAM ELEVATION(FEET) =   1333.00
  DOWNSTREAM ELEVATION(FEET) =   1275.00
  ELEVATION DIFFERENCE(FEET) =     58.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  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) =  7.865
SUBAREA RUNOFF(CFS) =      0.71
TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      0.71

****************************************************************************
FLOW PROCESS FROM NODE   1305.00 TO NODE   1310.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1275.00  DOWNSTREAM(FEET) =   1025.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   420.00   CHANNEL SLOPE =  0.5952
CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.937
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.49
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.87
AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =   1.44
Tc(MIN.) =   8.12
SUBAREA AREA(ACRES) =     1.70       SUBAREA RUNOFF(CFS) =    3.54
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =      2.00         PEAK FLOW RATE(CFS) =       4.16

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.07   FLOW VELOCITY(FEET/SEC.) =   5.94
LONGEST FLOWPATH FROM NODE   1300.00 TO NODE   1310.00 =   650.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1310.00 TO NODE   1315.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1025.00  DOWNSTREAM(FEET) =    535.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   850.00   CHANNEL SLOPE =  0.5765
CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.308
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      7.00
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.97
AVERAGE FLOW DEPTH(FEET) =   0.18   TRAVEL TIME(MIN.) =   1.29
Tc(MIN.) =   9.41
SUBAREA AREA(ACRES) =     3.00       SUBAREA RUNOFF(CFS) =    5.68
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =      5.00         PEAK FLOW RATE(CFS) =       9.46

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.22   FLOW VELOCITY(FEET/SEC.) =  11.98
LONGEST FLOWPATH FROM NODE   1300.00 TO NODE   1315.00 =  1500.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =      5.00  TC(MIN.) =      9.41
PEAK FLOW RATE(CFS)   =      9.46
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
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****************************************************************************

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             Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                       San Diego, California 92110
                     619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* RANCHO GUEJITO - ROCKWOOD VILLAGE J-14557BB (6/4/15)                  *
* BASIN 1400; 100-YR - 6 HOUR PRECIPITATION                             *
* POST-PROJECT                                                           *
 ************************************************************************

  FILE NAME: RGRV1400.RAT
  TIME/DATE OF STUDY: 10:38 06/04/2015
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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*
     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   1400.00 TO NODE   1405.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   170.00
  UPSTREAM ELEVATION(FEET) =   1318.00
  DOWNSTREAM ELEVATION(FEET) =   1305.00
  ELEVATION DIFFERENCE(FEET) =     13.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.310
  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) =  7.424
  SUBAREA RUNOFF(CFS) =      0.67
  TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      0.67

****************************************************************************
  FLOW PROCESS FROM NODE   1405.00 TO NODE   1410.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1305.00  DOWNSTREAM(FEET) =   1280.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   200.00   CHANNEL SLOPE =  0.1250
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.717
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.67
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.72
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   1.23
  Tc(MIN.) =   8.54
  SUBAREA AREA(ACRES) =     1.00       SUBAREA RUNOFF(CFS) =    2.02
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =      1.30         PEAK FLOW RATE(CFS) =       2.62

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.08   FLOW VELOCITY(FEET/SEC.) =   3.07
  LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1410.00 =   370.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1410.00 TO NODE   1415.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1280.00  DOWNSTREAM(FEET) =   1175.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   515.00   CHANNEL SLOPE =  0.2039
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.127
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      5.10
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.56
  AVERAGE FLOW DEPTH(FEET) =   0.20   TRAVEL TIME(MIN.) =   1.31
  Tc(MIN.) =   9.84
  SUBAREA AREA(ACRES) =     2.70       SUBAREA RUNOFF(CFS) =    4.96
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =      4.00         PEAK FLOW RATE(CFS) =       7.35

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.24   FLOW VELOCITY(FEET/SEC.) =   7.24
  LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1415.00 =   885.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1415.00 TO NODE   1420.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1175.00  DOWNSTREAM(FEET) =    525.00
```

```
CHANNEL LENGTH THRU SUBAREA(FEET) =  1230.00   CHANNEL SLOPE =  0.5285
CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.447
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     22.93
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.40
AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =   1.97
Tc(MIN.) =  11.82
SUBAREA AREA(ACRES) =    19.00       SUBAREA RUNOFF(CFS) =   31.05
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =     23.00         PEAK FLOW RATE(CFS) =      37.58

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.24   FLOW VELOCITY(FEET/SEC.) =  12.55
LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1420.00 =  2115.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =     23.00  TC(MIN.) =     11.82
PEAK FLOW RATE(CFS)   =     37.58
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

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

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                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                       San Diego, California 92110
                     619-291-0707   Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* RANCHO GUEJITO - ROCKWOOD VILLAGE J-14557BB (6/4/15)                    *
* BASIN 1500; 100-YR - 6 HOUR PRECIPITATION                               *
* POST-PROJECT                                                             *
 ***************************************************************************

  FILE NAME: RGRV1500.RAT
  TIME/DATE OF STUDY: 10:40 06/04/2015
---------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
---------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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*
     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   1500.00 TO NODE   1505.00 IS CODE =  21
---------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
===========================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  91
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   210.00
  UPSTREAM ELEVATION(FEET) =   1318.00
  DOWNSTREAM ELEVATION(FEET) =   1305.00
  ELEVATION DIFFERENCE(FEET) =     13.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.843
  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) =  7.095
SUBAREA RUNOFF(CFS) =      0.43
TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.43

****************************************************************************
FLOW PROCESS FROM NODE   1505.00 TO NODE   1510.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1305.00  DOWNSTREAM(FEET) =   1200.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   545.00   CHANNEL SLOPE =  0.1927
CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   5.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.189
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.39
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.91
AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   1.85
Tc(MIN.) =   9.69
SUBAREA AREA(ACRES) =     2.10       SUBAREA RUNOFF(CFS) =    3.90
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =      2.30         PEAK FLOW RATE(CFS) =       4.27

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.18   FLOW VELOCITY(FEET/SEC.) =   6.07
LONGEST FLOWPATH FROM NODE   1500.00 TO NODE   1510.00 =   755.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1510.00 TO NODE   1515.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1200.00  DOWNSTREAM(FEET) =    525.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1450.00   CHANNEL SLOPE =  0.4655
CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.557
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =  91
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     15.72
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  13.71
AVERAGE FLOW DEPTH(FEET) =   0.32   TRAVEL TIME(MIN.) =   1.76
Tc(MIN.) =  11.45
SUBAREA AREA(ACRES) =    13.70       SUBAREA RUNOFF(CFS) =   22.84
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =     16.00         PEAK FLOW RATE(CFS) =      26.67

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.42   FLOW VELOCITY(FEET/SEC.) =  16.33
LONGEST FLOWPATH FROM NODE   1500.00 TO NODE   1515.00 =  2205.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =     16.00  TC(MIN.) =     11.45
PEAK FLOW RATE(CFS)    =     26.67
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

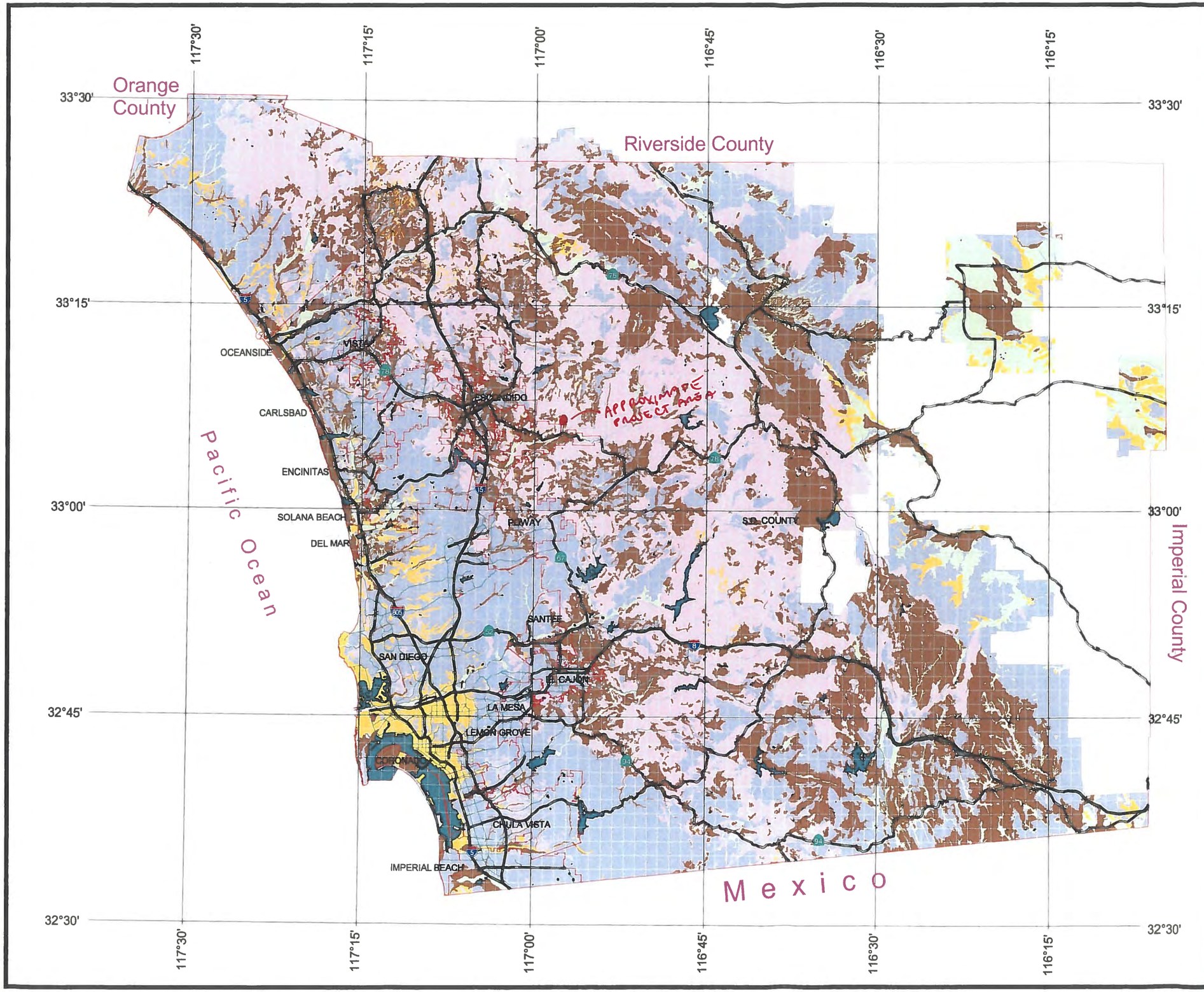
♀

APPENDIX B

Soils and Isopluvial Maps

County of San Diego Hydrology Manual

Soil Hydrologic Groups



Legend

Soil Groups

- Group A
- Group B
- Group C
- Group D
- Undetermined
- Data Unavailable

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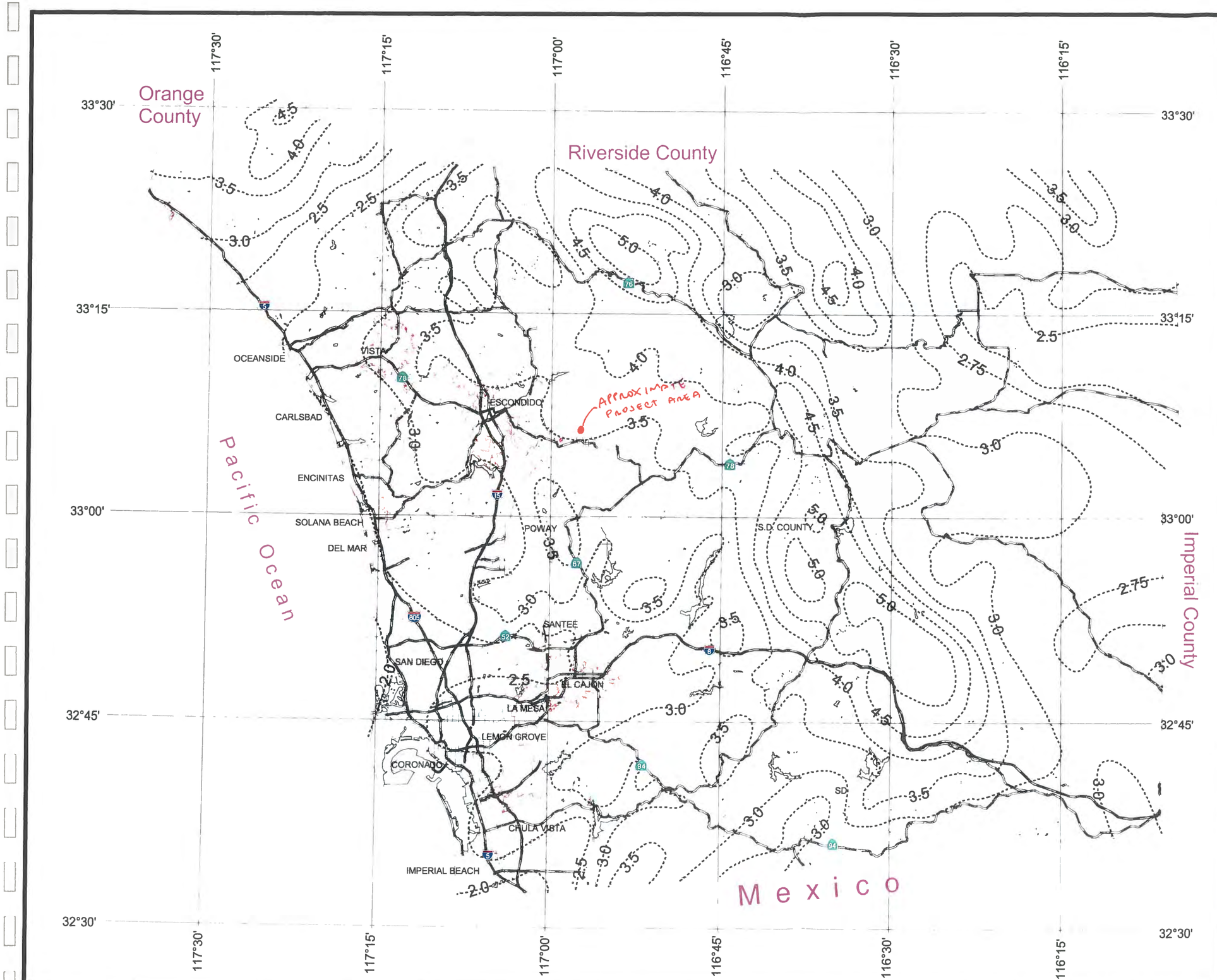
3 0 3 Miles

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)



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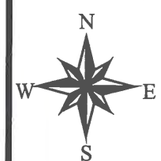

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3 0 3 Miles

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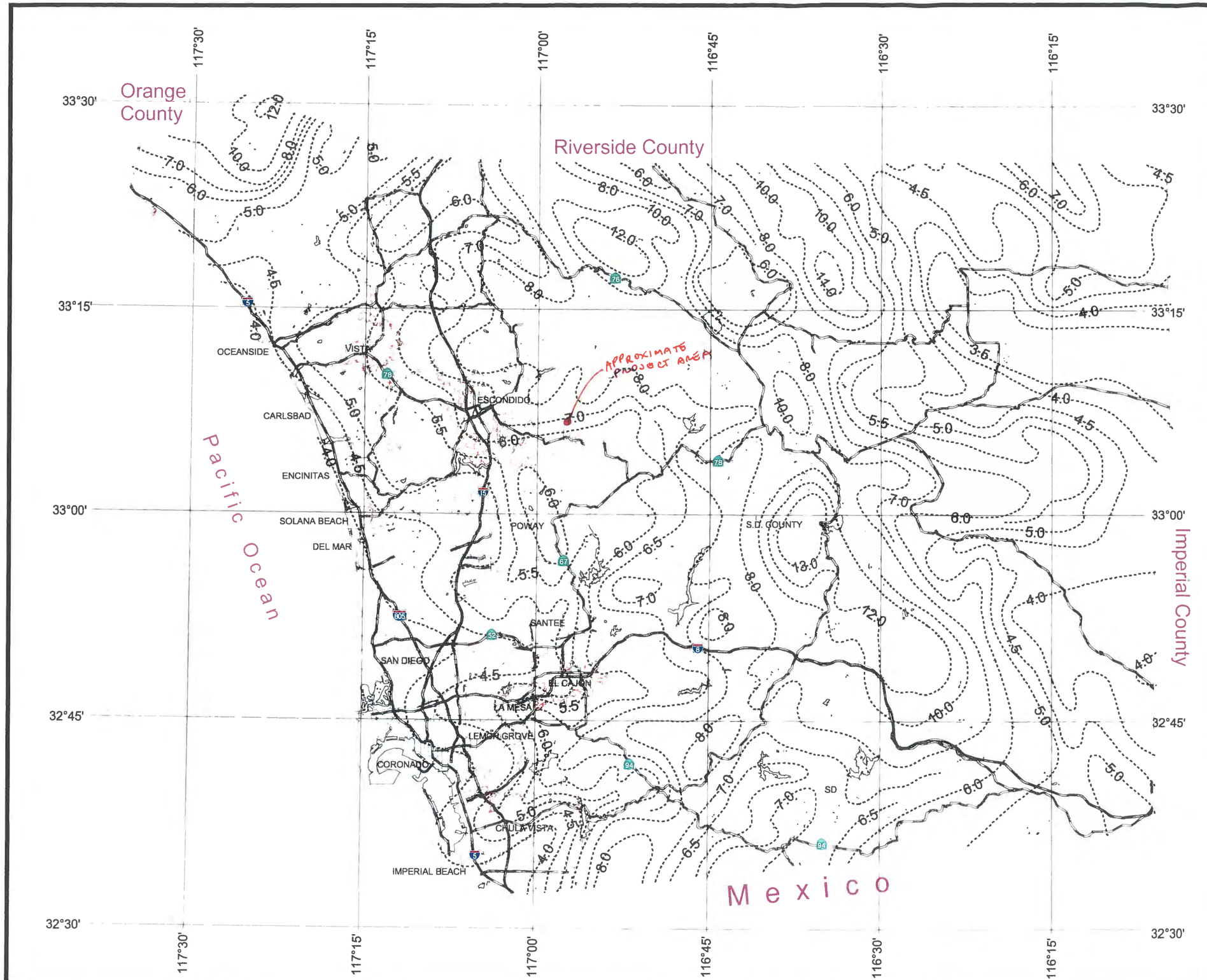
Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)



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N W E S

3 0 3 Miles

MAP POCKET 1

Drainage Study Exhibits
for
Rancho Guejito Rockwood Village
(2 Sheets)