FINAL
DRAINAGE STUDY

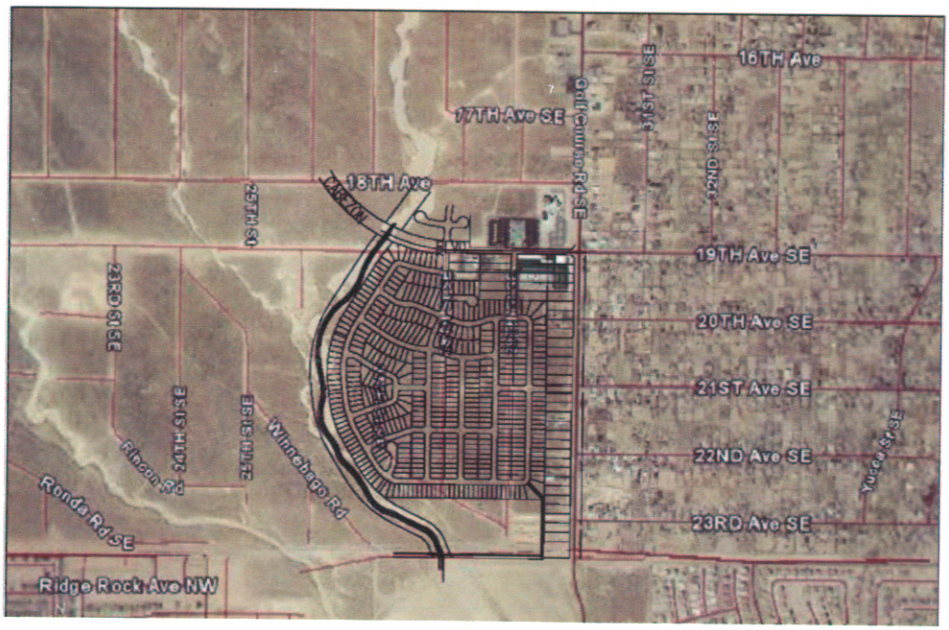
CABEZON TRACT 10A

Rio Rancho Estates Unit 16
Rio Rancho, New Mexico

for

CURB NORTH, INC
5160 SAN FRANCISCO NE
ALBUQUERQUE, NEW MEXICO 87109

March 3, 2006



Prepared By:

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CITY OF RIO RANCHO
DEPARTMENT OF
PUBLIC INFRASTRUCTURE
APPROVED: DPI
DATE: 10-16-06

DRAINAGE STUDY
FOR
TRACT 10A SUBDIVISION

TABLE OF CONTENTS

APPENDICES

FINAL DRAINAGE STUDY
FOR
TRACT 10A SUBDIVISION

PURPOSE

This drainage report addresses the storm water runoff and proposed infrastructure needed to convey the runoff from the Tract 10A Subdivision of the Cabezon Redevelopment. This report will also demonstrate that the development of this project complies with the approved Cabezon Communities Phase II Drainage Management Plan and the Cabezon Communities Drainage Implementation Plan.

PROJECT LOCATION AND DESCRIPTION

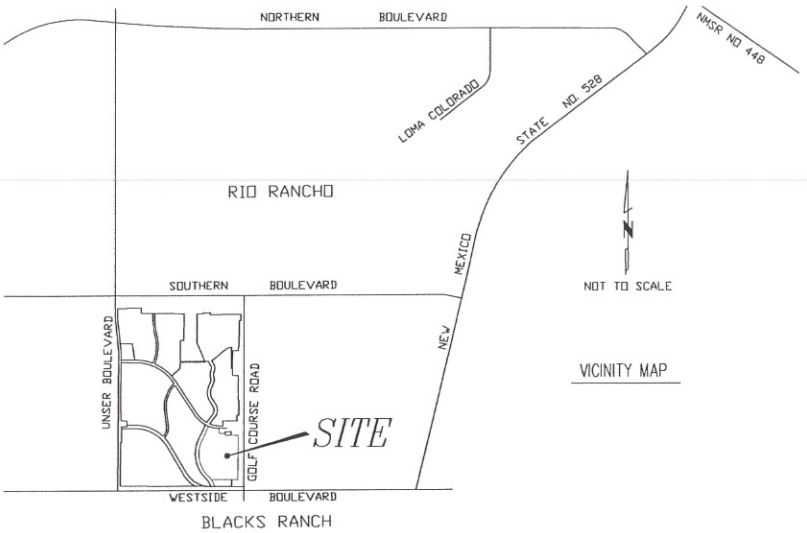

Exhibit 1 – Vicinity Map

The project is located at the southeast corner of the Cabezon Subdivision. The tract is at the northwest corner of the intersection of Westside Boulevard and Golf Course Road within Unit 16 of Rio Rancho Estates, City of Rio Rancho; see **Exhibit 1**. The site is currently undeveloped and in its natural condition. The east branch of the Blacks Arroyo is currently being hard lined to the west of the development. Cabezon Blvd. is being constructed to the north of the development. The development is bound by; Westside Blvd. to the south, Golf Course Road to the east, Cabezon Blvd. to the north and the East Branch Channel of the Blacks Arroyo to the west.

ZONING AND PLATTING STATUS

The zoning for this project is R-4, Single Family Residential, of approximately 78.19 acres. The project is located in Tract 10A within Rio Rancho Estates Unit 16. This report is an attachment to the Final Plat Submittal for this project.

FLOOD HAZARD ZONES

Per FEMA's Flood Insurance Rate Map (FIRM) 35043C0894 C, dated July 16, 1996, a portion of the project site is located within a FEMA 100-year Flood Hazard Zone. See **Appendix A-1**. Wilson & Co. is under contract with the developer for the corresponding CLOMR and LOMR needed to reconfigure the existing flood zone. The CLOMR has been submitted to FEMA by Wilson & Co. per discussions with the City of Rio Rancho, the developer has agreed to restrict building permit requests for the lots that are located within the current FEMA Floodplain. Once the CLOMR/LOMR process has revised the Floodplain, the developer can proceed with building permits for the affected lots. Refer to **Appendix A-2** for an exhibit indicating the affected lots.

JURISDICTIONS OF PUBLIC AGENCIES

Local
This project is located entirely within the City of Rio Rancho (CoRR) Municipal Limits and is therefore within their jurisdiction and must comply with the City's development requirements.

Regional
This project is located within the jurisdiction of the Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA) and is therefore subject to their review.

RELATED REPORTS

The ***Cabezon Communities Phase II Drainage Management Plan*** prepared by Wilson & Company, Engineers & Architects and dated August 2004, provides an overall master plan for this area. This report has been approved by the City and SSCAFCA. It determined the pre-developed drainage patterns of this development and the design parameters for the buildout of the subdivision. However, this study only gave a conceptual design for the Tract 10A Subdivision.

The ***Cabezon Communities Drainage Implementation Plan*** prepared by Wilson & Company, Engineers & Architects and dated February 19, 2004, provides permissible discharge rates for individual tracts as well as offsite flow rates entering individual tracts.

METHODOLOGY

This drainage study is based on the procedures outlined in the CoRR's "Grading and Drainage Design Requirements and Policies for Land Development in Rio Rancho (Revised 3-18-93)." That policy states, "The minimum criteria for hydrology and hydraulic calculations and design shall be as described in the Development Process Manual Section 22.2, City of Albuquerque (CoA DPM), latest revision, or the AHYMO version of the ARS HYMO Computer Program." This drainage study follows the

procedures outlined in both the CoA DPM Section 22.2 and the AHYMO Computer Program.

PRECIPITATION

This project will not utilize an on-site detention pond. Storm water will be conveyed through underground pipe systems that will discharge into the East Branch of the Blacks Arroyo at two separate locations. The 100-yr 24-hr design storm was used for this analysis. The AHYMO Computer Program requires the 1, 6 and 24-hour precipitation values. These values were obtained from the ***Cabezon Communities Phase II Drainage Management Plan*** and are shown on **Table 1**.

Table 1
Precipitation Values

Return Period (yrs)	24 hr Rainfall (in)	6 hr Rainfall (in)	1 hr Rainfall (in)
100	2.7	2.2	1.8

LAND TREATMENTS

The land treatments used in the AHYMO Computer model are as described by Table A-4 of the CoA DPM Section 22.2, 1993 revision, and are summarized in **Table 2**.

Table 2
Land Treatment Classifications

Treatment	Land Condition
A	Soil uncompacted by human activity with 0 to 10 percent slopes. Native grasses, weeds and shrubs in typical densities with minimal disturbance to grading, groundcover and infiltration capacity. Croplands. Unlined Arroyos.
B	Irrigated lawns, parks and golf courses with 0 to 10 percent slopes. Soil uncompacted by human activity with slopes greater than 10 percent and less than 20 percent.
C	Soil compacted by human activity. Unpaved parking, roads and trail. Most vacant lots. Gravel or rock on plastic (desert landscaping)
D	Impervious areas, pavement and roofs.

Table A-5 of the CoA DPM Section 22.2, 1993 revision summarizes the Percent of Treatment D with a corresponding land use. Since this project site is a Single Family Residential Subdivision, the corresponding Percent of Treatment D is determined by the equation: 7*((N*N)+(5*N))^0.5 where, N=units/acre (N=456units/78.19=5.83). The remaining was split between Treatment B and C. Therefore the Land Treatments for this site are as follows: **%A = 0, %B = 22.2, %C = 22.2, and %D = 55.6**.

STREET AND INLET CAPACITY CALCULATIONS

Both street and inlet capacities were calculated using the plates in the ***City of Albuquerque DPM***. Tract 10A Subdivision incorporated flow splits into the creation of each actual drainage basin. See **Appendix C** for additional information.

STORM DRAIN HYDRAULICS

Storm Drains were modeled using Haestad Method's "StormCad" software (see Appendix C). Headlosses were calculated using the procedures outlined in the ***City of Albuquerque DPM.*** The storm drain was designed based on peak discharges as indicated in the AHYMO model and the storm drain design is included in **Appendix D**.

PRE-DEVELOPMENT CONDITIONS

This project site is in its pre-development condition with existing natural vegetation throughout the site. The project site naturally slopes from northeast to the southwest across the site. The project is bounded by commercial properties to the east. These lots currently drain into the project site. The project is bounded to the west by the East Branch of the Blacks Arroyo. The Arroyo is concrete lined and on-site runoff sheet flows across the site and concentrates into it. The runoff discharges through Unit 16 of Rio Rancho Estates, crosses into Bernalillo County and into the Blacks Arroyo Dam.

INTERIM DEVELOPED CONDITIONS

The commercial properties to the east make up **Basin 201**. Based on discussions with the City of Rio Rancho, **Basin 201** will drain to a temporary retention pond in **Tract 10B** via a temporary concrete drainage swale. This swale will be contained within parallel easements on both properties. When the storm drain in Westside Blvd. is constructed the runoff from **Basin 201** will be conveyed to that system. See **Exhibit 3** for details of the drainage swale and **Appendix C** for hydraulic calculations.

ULTIMATE DEVELOPED CONDITIONS

The runoff from **Basin 101** will enter **Basin 102** at **Analysis Point #1**. Their runoff will combine to create **Analysis Point #2**. At this point most of the runoff from these basins will drain into the beginning of storm drain **System #200**. The remaining runoff will bypass and combine with **Basin 103** at **Analysis Point #3**. **Basin 103** will enter **Basin 104** and combine to create **Analysis Point #4**. This flow will enter **Basin 109** and drain into the second battery of inlets as part of storm drain **System #200** (**Analysis Point #9**). The remaining flows will bypass to a sump inlet (**Analysis Point #10**).

The runoff from **Basin 105** will enter **Basin 106** at **Analysis Point #5**. Their runoff will combine to create **Analysis Point #6**. At this point most of the runoff from these basins will drain into storm drain **System #100**. The remaining will bypass into **Basin 107**. **Basin 107** will drain into **Basin 108** at **Analysis Point #7**. These flows will combine and

drain into storm drain **System #300** at **Analysis Point #8**. The remaining flows will bypass to the sump inlet at **Analysis Point #10**.

CONCLUSION

Table 3 compares the findings of the analysis of the Tract 10A Subdivision with the results of both the approved ***Cabezon Communities Phase II Drainage Management Plan*** and the ***Cabezon Communities Drainage Implementation Plan***

Table 3
Runoff Comparison for Tract 6A

Description	Basin Area (Mi^2)	Time to Peak (hr)	100-Yr Runoff Volume (Ac-ft)	100-Yr Peak Discharge (Ft^3/s)
Wilson & Co. DMP	0.130	1.50	12.60	301
Wilson & Co. DIP	0.130	1.50	12.60	295
HZI Plan	0.122	1.50	11.74	275

The Wilson & Co. DMP allows for 301 cfs to flow directly from Tract 10A. The total discharge from the developed subdivision is 275 cfs. Therefore this report does comply with the ***Cabezon Communities Phase II Drainage Management Plan*** and the ***Cabezon Communities Drainage Implementation Plan.***

GOLF COURSE ROAD

33-A 34-A 35-A 36-A 37-A 38-A 39-A 40-A 41-A 42-A 43-A 44-A 45-A 46-A

32 31 30 29 28

29TH STREET

27 28 29 30 31

26 25 24

CABEZON BLVD. (19TH AVE)

DRAINAGE SWALE
SEE EXHIBIT 3

A
A

201
7.48 AC

TEMPORARY
RETENTION POND

101
13.45 AC

102
10.74 AC

TRACT 10B

WESTSIDE BLVD.

STORM DRAIN
SYSTEM #200

103
8.14 AC

104
8.57 AC

STORM DRAIN
SYSTEM #200

105
8.91 AC

106
10.21 AC

109 **2.34 AC**

107
11.57 AC

108
4.30 AC

STORM DRAIN
SYSTEM #300

STORM DRAIN
SYSTEM #100

EAST BLACKS BRANCH ARROYO

N

LEGEND

- DRAINAGE BASIN BOUNDARY
- DRAINAGE FLOW ARROW
- (100) DRAINAGE BASIN NUMBER
- (1) ANALYSIS POINT

C:\Proj\17057501-CABEZON T10A\Drn_Study\Exhibits\10ABASINMAP.DWG

NO.	REVISION	DATE
-	-	- -
-	-	- -

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Designed for:

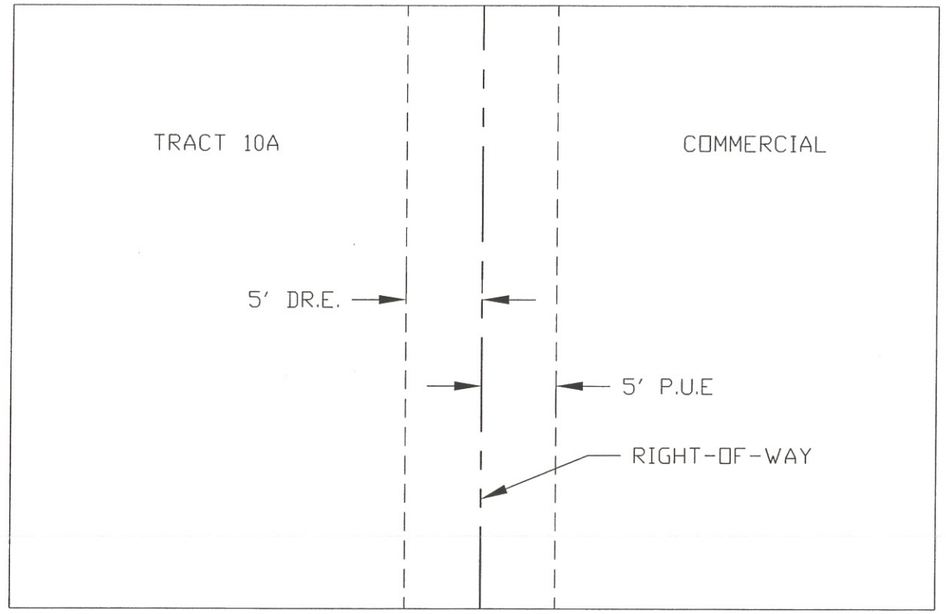
CURB NORTH, INC.

BASIN MAP

CABEZON REDEVELOPMENT
TRACT 10A SUBDIVISION

DATE: NOV. 2, 2005
DRAWN: RJS
DESIGNED: RJS
CHECKED: JLL
PROJ. NO.: 17-0575-01

SHEET: EX-2



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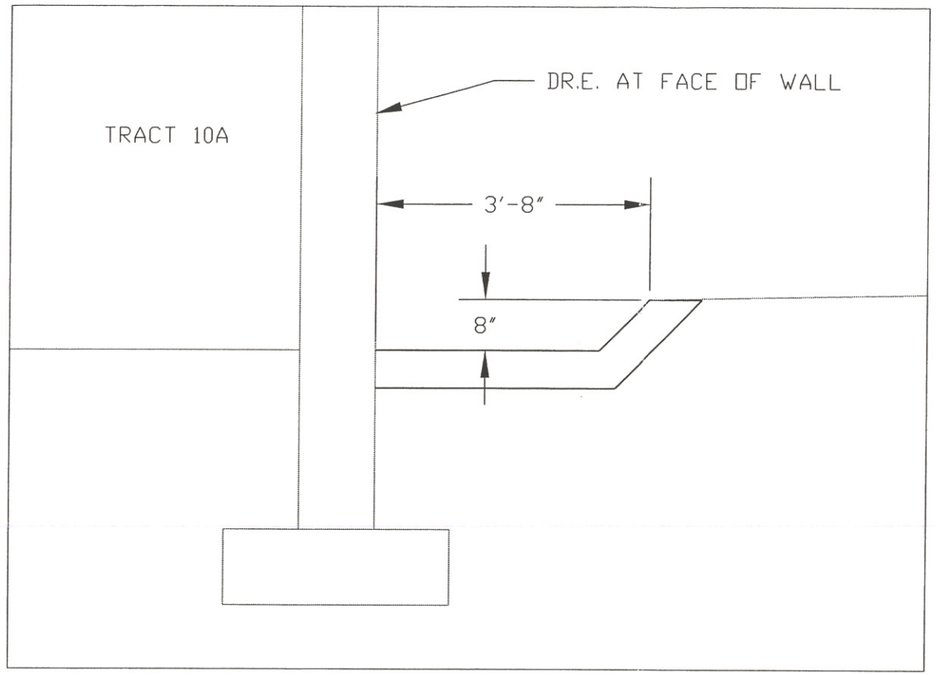

SECTION A-A

SCALE: 1"=2'

EXHIBIT 3

Designed For:

CURB NORTH, INC.

DRAINAGE SWALE DETAIL

CABEZON TRACT 10A
RIO RANCHO, NM

Designed By:

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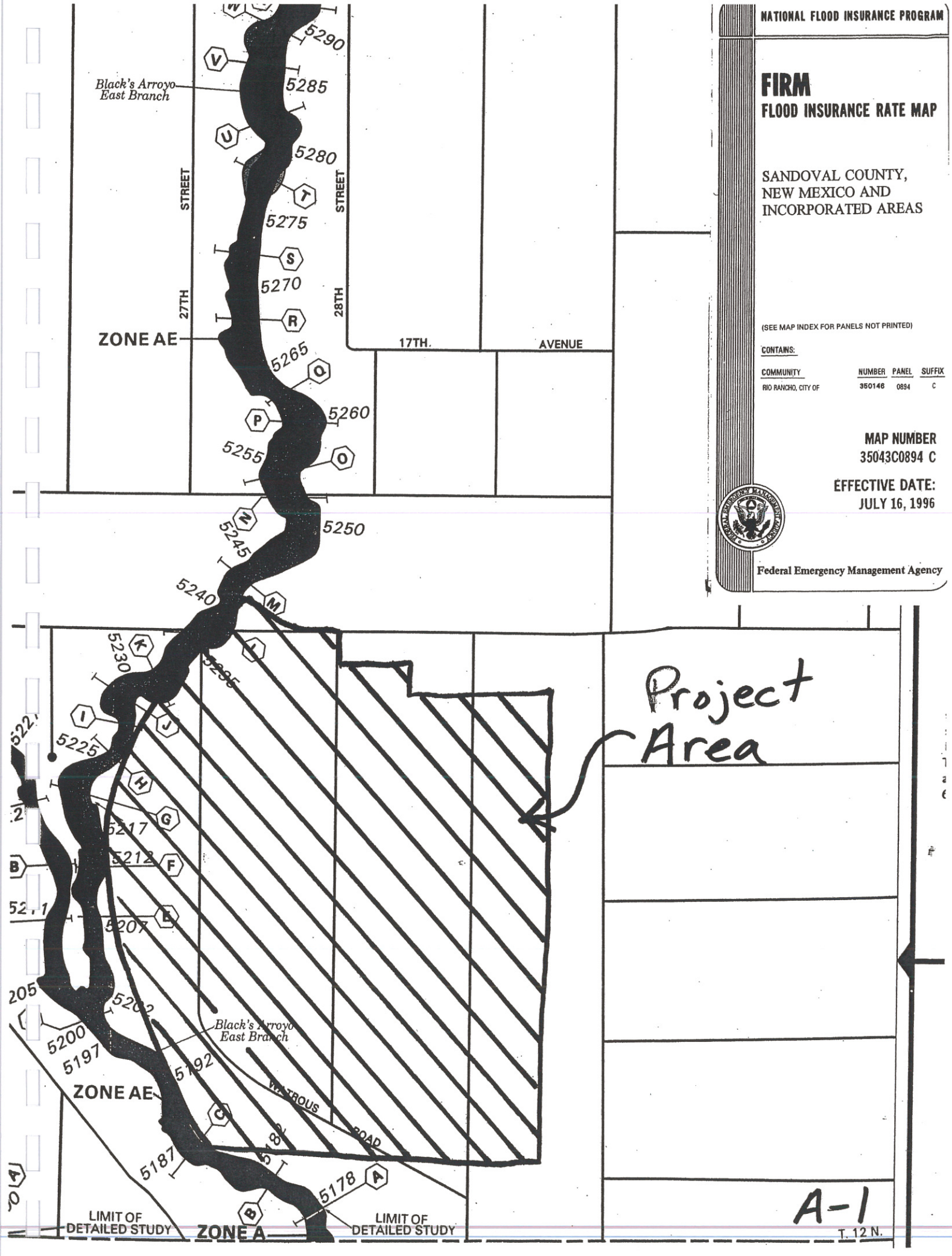
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
SANDOVAL COUNTY, NEW MEXICO AND INCORPORATED AREAS
(SEE MAP INDEX FOR PANELS NOT PRINTED)
CONTAINS:
COMMUNITY | NUMBER | PANEL | SUFFIX
RIO RANCHO, CITY OF | 350146 | 0894 | C
MAP NUMBER
35043C0894 C
EFFECTIVE DATE:
JULY 16, 1996
Federal Emergency Management Agency
Black's Arroyo East Branch
ZONE AE
ZONE A
LIMIT OF DETAILED STUDY
LIMIT OF DETAILED STUDY
27TH STREET
28TH STREET
17TH. AVENUE
5290
5285
5280
5275
5270
5265
5260
5255
5250
5245
5240
5230
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5217
5212
5207
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5197
5192
5187
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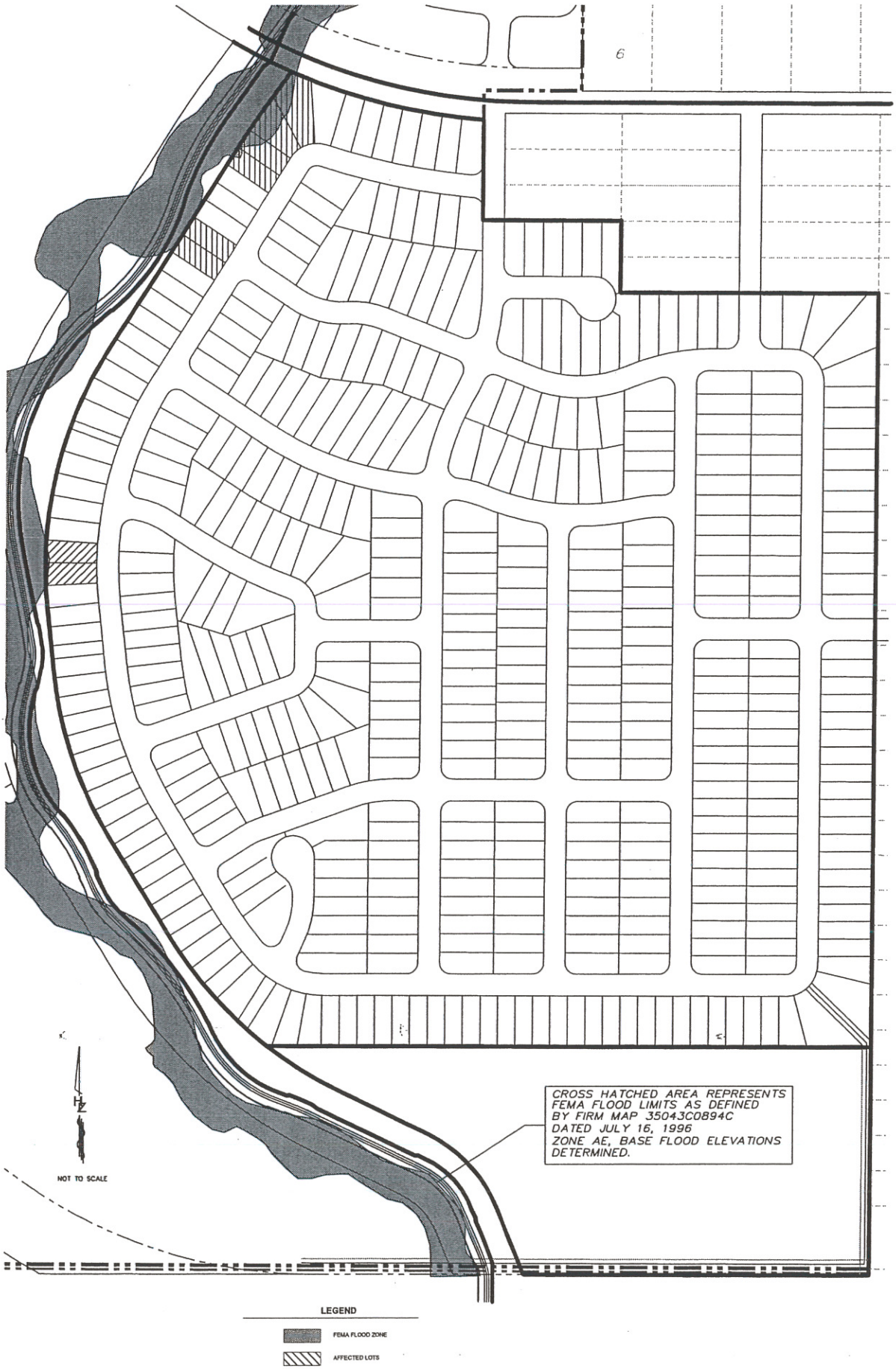
Project Area
A-1
T. 12 N.



Designed For:

CURB NORTH, LLC

EXISTING FEMA FLOOD ZONE

TRACT 10A CABEZON REDEVELOPMENT

NOVEMBER 2005

Designed By:

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A-2

Cabezon Tract 10A
100-Year 24-Hour Duration Storm-Developed
AHYMO Summary File

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  COMMAND       IDENTIFICATION   NO.  NO.       (SQ MI)     (CFS)       (AC-FT)     (INCHES)    (HOURS)    ACRE      NOTATION

  START                                                                                                          TIME=       .00
  LOCATION                       RIO RANCHO
  *S
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  *S
  *S    FN:CAB10_DEV.DAT  -  HYMO PER JAN 1997 DPM REVISIONS
  *S
  *S
  *S
  RAINFALL  TYPE= 2                                                                                              RAIN24=   2.700
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  COMPUTE NM HYD        102.00   -     2        .01678       37.78       1.611      1.80021    1.500    3.518 PER IMP=  55.60
  *S--------------------------------------------------------------------------
  *S ADD 101 TO 102
  ADD HYD                AP.2  1& 2   3        .03780       85.11       3.629      1.80019    1.500    3.518
  *S--------------------------------------------------------------------------
  *S DIVIDE AP.2
  *S ID=4 IS 68.00 CFS INTO INLETS
  *S ID=5 IS 17.11 CFS BYPASSING INLET TO BASIN103
  DIVIDE HYD      AP.2.TO.INLE    3    4        .03649       68.00       3.503      1.80019    1.450    2.912
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  COMPUTE NM HYD        103.00   -     6        .01272       28.64       1.221      1.80021    1.500    3.519 PER IMP=  55.60
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  COMPUTE NM HYD        104.00   -     8        .01339       30.15       1.286      1.80021    1.500    3.519 PER IMP=  55.60
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  *S ADD 104 TO AP.3
  ADD HYD                AP.4  7& 8   9        .02742       75.91       2.633      1.80019    1.500    4.325
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  COMPUTE NM HYD        105.00   -    10        .01392       31.35       1.336      1.80021    1.500    3.518 PER IMP=  55.60
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  COMPUTE NM HYD        106.00   -    11        .01595       35.92       1.531      1.80021    1.500    3.518 PER IMP=  55.60
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  *S ADD 105 TO 106
  ADD HYD                AP.5 10&11  12        .02987       67.26       2.868      1.80019    1.500    3.518
  *S--------------------------------------------------------------------------
  *S DIVIDE AP-6
  *S ID=13 IS 52.00 CFS INTO INLETS
  *S ID=14 IS 15.26 CFS BYPASSING INLET TO BASIN103
  DIVIDE HYD              #100   12   13        .02861       52.00       2.747      1.80019    1.450    2.840
                  AP.6.BYPASS  and   14        .00126       15.26        .121      1.80019    1.500   18.887
  *S--------------------------------------------------------------------------
  *S COMPUTE ONSITE BASIN 107
  COMPUTE NM HYD        107.00   -    15        .01808       40.71       1.736      1.80021    1.500    3.518 PER IMP=  55.60
  *S--------------------------------------------------------------------------
  *S ADD 107 TO AP.6.BYPASS
  ADD HYD                AP.7 14&15  16        .01934       55.97       1.857      1.80019    1.500    4.521
  *S--------------------------------------------------------------------------
  *S COMPUTE ONSITE BASIN 108
  COMPUTE NM HYD        108.00   -    17        .00672       15.14        .645      1.80021    1.500    3.521 PER IMP=  55.60
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  *S COMPUTE ONSITE BASIN 109
  COMPUTE NM HYD        109.00   -    18        .00366        8.25        .351      1.80021    1.500    3.523 PER IMP=  55.60
  *S--------------------------------------------------------------------------
  *S ADD 108 TO AP.7
```

Cabezon Tract 10A
100-Year 24-Hour Duration Storm-Developed
AHYMO Summary File

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
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*S----------										
*S ADD 109 TO AP.4										
ADD HYD	AP.9	18& 9	20	.03108	84.16	2.984	1.80018	1.500	4.231	
*S----------										
*S DIVIDE AP-8										
*S ID=21 IS 54.00 CFS INTO INLETS										
*S ID=22 IS 17.11 CFS BYPASSING TO SUMP										
DIVIDE HYD	AP.8.TO.INLE	19	21	.02515	54.00	2.415	1.80019	1.450	3.355	
	AP.8.BYPASS	and	22	.00091	17.11	.088	1.80018	1.500	29.267	
*S----------										
*S DIVIDE AP-9										
*S ID=23 IS 60.00 CFS INTO INLETS										
*S ID=24 IS 24.16 CFS BYPASSING TO SUMP										
DIVIDE HYD	AP.9.TO.INLE	20	23	.02957	60.00	2.839	1.80018	1.450	3.171	
	AP.9.BYPASS	and	24	.00152	24.16	.146	1.80018	1.500	24.868	
*S----------										
*S ADD SUMP INLET TOTAL										
ADD HYD	AP.10	22&24	25	.00243	41.27	.233	1.80018	1.500	26.521	
*S----------										
*S ADD INLET FLOWS										
ADD HYD	#200A	4&21	26	.06164	122.00	5.918	1.80019	1.450	3.093	
*S----------										
*S ADD INLET FLOWS										
ADD HYD	#300	23&25	27	.03200	101.27	3.072	1.80018	1.500	4.945	
*S----------										
*S ADD SOUTH OUTFALL										
ADD HYD	#200	26&27	28	.09363	223.27	8.990	1.80019	1.500	3.726	
*S----------										
*S ADD TOTAL DISCHARGE										
ADD HYD	TOTAL	28&13	29	.12224	275.27	11.736	1.80019	1.500	3.519	
*S----------										
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COMPUTE NM HYD	201.D	-	30	.00781	21.05	1.010	2.42469	1.500	4.212	PER IMP= 90.00
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COMPUTE NM HYD	201.H	-	31	.00781	6.47	.184	.44094	1.500	1.295	PER IMP= .00
*S----------										
FINISH										

_(s0p10h4099T_&l6D__

Cabezon Tract 10A
100-Year 24-Hour Duration Storm-Developed
AHYMO Output File

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       Land Treatment     Initial Abstr.(in)     Unif. Infilt.(in/hour)
            A             0.65                   1.67
            B             0.50                   1.25
            C             0.35                   0.83
            D             0.10                   0.04

  *S
  *S    CABEZON TRACT 10A
  *S
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  *S
  *S
  *S
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                       RAIN SIX=2.2      RAIN DAY=2.7      DT=.05

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                          MASS RAINFALL=-1

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       AREA =      .011687 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
       RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000


       K =   .118383HR    TP =   .133000HR    K/TP RATIO =   .890100     SHAPE CONSTANT, N =  3.984532
       UNIT PEAK =   24.851    CFS   UNIT VOLUME =    1.001       B =   354.14      P60 = 1.8000
       AREA =      .009333 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
       RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000

      BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

  PRINT HYD               ID=1 CODE=10

                                    PARTIAL HYDROGRAPH   101.00

       TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
        HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS
       .000        .0          5.000       .3         10.000       .3         15.000       .2         20.000       .2
       .500        .0          5.500       .3         10.500       .3         15.500       .2         20.500       .2
      1.000        .2          6.000       .3         11.000       .3         16.000       .2         21.000       .2
      1.500       47.3         6.500       .3         11.500       .2         16.500       .2         21.500       .2
      2.000        9.4         7.000       .3         12.000       .2         17.000       .2         22.000       .2
      2.500        1.4         7.500       .3         12.500       .2         17.500       .2         22.500       .2
      3.000         .5         8.000       .3         13.000       .2         18.000       .2         23.000       .2
      3.500         .3         8.500       .3         13.500       .2         18.500       .2         23.500       .2
      4.000         .3         9.000       .3         14.000       .2         19.000       .2         24.000       .2
      4.500         .3         9.500       .3         14.500       .2         19.500       .2         24.500       .0

      RUNOFF VOLUME =     1.80021 INCHES     =       2.0181 ACRE-FEET
      PEAK DISCHARGE RATE =      47.33 CFS  AT   1.500 HOURS   BASIN AREA =    .0210 SQ. MI.



  *S-------------------------------------------------------------------
  *S COMPUTE ONSITE BASIN 102
  COMPUTE NM HYD          ID=2 HYD=102 AREA=0.01678 SQ MI
                          %A=0 %B=22.2 %C=22.2 %D=55.6 TP=0.133 HR
                          MASS RAINFALL=-1

       K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
       UNIT PEAK =   36.917    CFS   UNIT VOLUME =    .9988       B =   526.28      P60 = 1.8000
       AREA =      .009330 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
       RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000


       K =   .118383HR    TP =   .133000HR    K/TP RATIO =   .890100     SHAPE CONSTANT, N =  3.984532
       UNIT PEAK =   19.838    CFS   UNIT VOLUME =    1.001       B =   354.14      P60 = 1.8000
       AREA =      .007450 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
       RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000

      BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

  PRINT HYD               ID=2 CODE=10
```

Cabezon Tract 10A
100-Year 24-Hour Duration Storm-Developed
AHYMO Output File

PARTIAL HYDROGRAPH 102.00

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	5.000	.2	10.000	.2	15.000	.2	20.000	.1
.500	.0	5.500	.2	10.500	.2	15.500	.2	20.500	.1
1.000	.1	6.000	.2	11.000	.2	16.000	.2	21.000	.1
1.500	37.8	6.500	.3	11.500	.2	16.500	.2	21.500	.1
2.000	7.5	7.000	.3	12.000	.2	17.000	.2	22.000	.1
2.500	1.1	7.500	.2	12.500	.2	17.500	.2	22.500	.1
3.000	.4	8.000	.2	13.000	.2	18.000	.2	23.000	.1
3.500	.3	8.500	.2	13.500	.2	18.500	.1	23.500	.1
4.000	.2	9.000	.2	14.000	.2	19.000	.1	24.000	.1
4.500	.2	9.500	.2	14.500	.2	19.500	.1	24.500	.0

RUNOFF VOLUME = 1.80021 INCHES = 1.6111 ACRE-FEET
PEAK DISCHARGE RATE = 37.78 CFS AT 1.500 HOURS BASIN AREA = .0168 SQ. MI.

```
*S--------------------------------------------------------------------
*S ADD 101 TO 102
ADD HYD              ID=3 HYD=AP.2 IDi=1 IDii=2
PRINT HYD            ID=3 CODE=10
```

HYDROGRAPH FROM AREA AP.2

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	5.000	.5	10.000	.5	15.000	.4	20.000	.3
.500	.0	5.500	.5	10.500	.5	15.500	.4	20.500	.3
1.000	.3	6.000	.6	11.000	.5	16.000	.4	21.000	.3
1.500	85.1	6.500	.6	11.500	.4	16.500	.4	21.500	.3
2.000	16.9	7.000	.6	12.000	.4	17.000	.4	22.000	.3
2.500	2.6	7.500	.5	12.500	.4	17.500	.3	22.500	.3
3.000	1.0	8.000	.5	13.000	.4	18.000	.3	23.000	.3
3.500	.6	8.500	.5	13.500	.4	18.500	.3	23.500	.3
4.000	.5	9.000	.5	14.000	.4	19.000	.3	24.000	.3
4.500	.5	9.500	.5	14.500	.4	19.500	.3	24.500	.0

RUNOFF VOLUME = 1.80019 INCHES = 3.6292 ACRE-FEET
PEAK DISCHARGE RATE = 85.11 CFS AT 1.500 HOURS BASIN AREA = .0378 SQ. MI.

```
*S--------------------------------------------------------------------
*S DIVIDE AP.2
*S ID=4 IS 68.00 CFS INTO INLETS
*S ID=5 IS 17.11 CFS BYPASSING INLET TO BASIN103
DIVIDE HYD              ID=3 Q=68.0 IDi=4 HYD=AP.2.TO.INLETS
                                    IDii=5 HYD=AP.2.BYPASS
*S--------------------------------------------------------------------
*S COMPUTE ONSITE BASIN 103
COMPUTE NM HYD          ID=6 HYD=103 AREA=0.01272 SQ MI
                        %A=0 %B=22.2 %C=22.2 %D=55.6 TP=0.133 HR
                        MASS RAINFALL=-1
```

K = .072485HR TP = .133000HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 27.985 CFS UNIT VOLUME = .9987 B = 526.28 P60 = 1.8000
AREA = .007072 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .050000

K = .118383HR TP = .133000HR K/TP RATIO = .890100 SHAPE CONSTANT, N = 3.984532
UNIT PEAK = 15.038 CFS UNIT VOLUME = 1.000 B = 354.14 P60 = 1.8000
AREA = .005648 SQ MI IA = .42500 INCHES INF = 1.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .050000

BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.05000 AT PEAK FLOW.

```
PRINT HYD               ID=6 CODE=10
```

PARTIAL HYDROGRAPH 103.00

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	5.000	.2	10.000	.2	15.000	.1	20.000	.1
.500	.0	5.500	.2	10.500	.2	15.500	.1	20.500	.1
1.000	.1	6.000	.2	11.000	.2	16.000	.1	21.000	.1
1.500	28.6	6.500	.2	11.500	.1	16.500	.1	21.500	.1
2.000	5.7	7.000	.2	12.000	.1	17.000	.1	22.000	.1
2.500	.9	7.500	.2	12.500	.1	17.500	.1	22.500	.1
3.000	.3	8.000	.2	13.000	.1	18.000	.1	23.000	.1
3.500	.2	8.500	.2	13.500	.1	18.500	.1	23.500	.1
4.000	.2	9.000	.2	14.000	.1	19.000	.1	24.000	.1
4.500	.2	9.500	.2	14.500	.1	19.500	.1	24.500	.0

RUNOFF VOLUME = 1.80021 INCHES = 1.2213 ACRE-FEET
PEAK DISCHARGE RATE = 28.64 CFS AT 1.500 HOURS BASIN AREA = .0127 SQ. MI.

```
*S--------------------------------------------------------------------
*S ADD 103 TO AP.2.BYPASS
```

Cabezon Tract 10A
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AHYMO Output File

```
ADD HYD              ID=7 HYD=AP.3 IDi=5 IDii=6
PRINT HYD            ID=7 CODE=10

                                HYDROGRAPH FROM AREA AP.3

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS
     .000        .0         5.000        .2        10.000        .2        15.000        .1        20.000        .1
     .500        .0         5.500        .2        10.500        .2        15.500        .1        20.500        .1
    1.000        .1         6.000        .2        11.000        .2        16.000        .1        21.000        .1
    1.500      45.8         6.500        .2        11.500        .1        16.500        .1        21.500        .1
    2.000       5.7         7.000        .2        12.000        .1        17.000        .1        22.000        .1
    2.500        .9         7.500        .2        12.500        .1        17.500        .1        22.500        .1
    3.000        .3         8.000        .2        13.000        .1        18.000        .1        23.000        .1
    3.500        .2         8.500        .2        13.500        .1        18.500        .1        23.500        .1
    4.000        .2         9.000        .2        14.000        .1        19.000        .1        24.000        .1
    4.500        .2         9.500        .2        14.500        .1        19.500        .1        24.500        .0

   RUNOFF VOLUME =     1.80018 INCHES     =       1.3473 ACRE-FEET
   PEAK DISCHARGE RATE =      45.76 CFS  AT   1.500 HOURS   BASIN AREA =    .0140 SQ. MI.


*S--------------------------------------------------------------------
*S COMPUTE ONSITE BASIN 104
COMPUTE NM HYD       ID=8 HYD=104 AREA=0.01339 SQ MI
                     %A=0 %B=22.2 %C=22.2 %D=55.6 TP=0.133 HR
                     MASS RAINFALL=-1

     K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   29.459    CFS   UNIT VOLUME =    .9987       B =   526.28      P60 = 1.8000
     AREA =       .007445 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000


     K =   .118383HR    TP =   .133000HR    K/TP RATIO =   .890100     SHAPE CONSTANT, N =  3.984532
     UNIT PEAK =   15.830    CFS   UNIT VOLUME =    1.000       B =   354.14      P60 = 1.8000
     AREA =       .005945 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000

   BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD            ID=8 CODE=10

                               PARTIAL HYDROGRAPH   104.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS
     .000        .0         5.000        .2        10.000        .2        15.000        .1        20.000        .1
     .500        .0         5.500        .2        10.500        .2        15.500        .1        20.500        .1
    1.000        .1         6.000        .2        11.000        .2        16.000        .1        21.000        .1
    1.500      30.2         6.500        .2        11.500        .2        16.500        .1        21.500        .1
    2.000       6.0         7.000        .2        12.000        .2        17.000        .1        22.000        .1
    2.500        .9         7.500        .2        12.500        .1        17.500        .1        22.500        .1
    3.000        .3         8.000        .2        13.000        .1        18.000        .1        23.000        .1
    3.500        .2         8.500        .2        13.500        .1        18.500        .1        23.500        .1
    4.000        .2         9.000        .2        14.000        .1        19.000        .1        24.000        .1
    4.500        .2         9.500        .2        14.500        .1        19.500        .1        24.500        .0

   RUNOFF VOLUME =     1.80021 INCHES     =       1.2856 ACRE-FEET
   PEAK DISCHARGE RATE =      30.15 CFS  AT   1.500 HOURS   BASIN AREA =    .0134 SQ. MI.


*S--------------------------------------------------------------------
*S ADD 104 TO AP.3
ADD HYD              ID=9 HYD=AP.4 IDi=7 IDii=8
PRINT HYD            ID=9 CODE=10

                                HYDROGRAPH FROM AREA AP.4

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS
     .000        .0         5.000        .3        10.000        .3        15.000        .3        20.000        .2
     .500        .0         5.500        .4        10.500        .3        15.500        .3        20.500        .2
    1.000        .2         6.000        .4        11.000        .3        16.000        .3        21.000        .2
    1.500      75.9         6.500        .4        11.500        .3        16.500        .2        21.500        .2
    2.000      11.7         7.000        .4        12.000        .3        17.000        .2        22.000        .2
    2.500       1.8         7.500        .4        12.500        .3        17.500        .2        22.500        .2
    3.000        .7         8.000        .4        13.000        .3        18.000        .2        23.000        .2
    3.500        .4         8.500        .4        13.500        .3        18.500        .2        23.500        .2
    4.000        .3         9.000        .3        14.000        .3        19.000        .2        24.000        .2
    4.500        .3         9.500        .3        14.500        .3        19.500        .2        24.500        .0

   RUNOFF VOLUME =     1.80019 INCHES     =       2.6329 ACRE-FEET
   PEAK DISCHARGE RATE =      75.91 CFS  AT   1.500 HOURS   BASIN AREA =    .0274 SQ. MI.


*S--------------------------------------------------------------------
*S COMPUTE ONSITE BASIN 105
COMPUTE NM HYD       ID=10 HYD=105 AREA=0.01392 SQ MI
                     %A=0 %B=22.2 %C=22.2 %D=55.6 TP=0.133 HR
                     MASS RAINFALL=-1
```

Cabezon Tract 10A
100-Year 24-Hour Duration Storm-Developed
AHYMO Output File

```
     K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   30.625    CFS   UNIT VOLUME =    .9988       B =   526.28       P60 = 1.8000
     AREA =       .007740 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000


     K =   .118383HR    TP =   .133000HR    K/TP RATIO =   .890100     SHAPE CONSTANT, N =  3.984532
     UNIT PEAK =   16.457    CFS   UNIT VOLUME =    1.000       B =   354.14       P60 = 1.8000
     AREA =       .006180 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000

    BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD             ID=10 CODE=10

                                  PARTIAL HYDROGRAPH   105.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS
      .000       .0         5.000        .2        10.000        .2        15.000        .1        20.000        .1
      .500       .0         5.500        .2        10.500        .2        15.500        .1        20.500        .1
     1.000       .1         6.000        .2        11.000        .2        16.000        .1        21.000        .1
     1.500      31.3         6.500        .2        11.500        .2        16.500        .1        21.500        .1
     2.000       6.2         7.000        .2        12.000        .2        17.000        .1        22.000        .1
     2.500        .9         7.500        .2        12.500        .2        17.500        .1        22.500        .1
     3.000        .4         8.000        .2        13.000        .2        18.000        .1        23.000        .1
     3.500        .2         8.500        .2        13.500        .1        18.500        .1        23.500        .1
     4.000        .2         9.000        .2        14.000        .1        19.000        .1        24.000        .1
     4.500        .2         9.500        .2        14.500        .1        19.500        .1        24.500        .0

    RUNOFF VOLUME =     1.80021 INCHES     =       1.3365 ACRE-FEET
    PEAK DISCHARGE RATE =      31.35 CFS  AT   1.500 HOURS   BASIN AREA =   .0139 SQ. MI.


*S--------------------------------------------------------------------
*S COMPUTE ONSITE BASIN 106
COMPUTE NM HYD        ID=11 HYD=106 AREA=0.01595 SQ MI
                      %A=0 %B=22.2 %C=22.2 %D=55.6 TP=0.133 HR
                      MASS RAINFALL=-1

     K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   35.091    CFS   UNIT VOLUME =    .9988       B =   526.28       P60 = 1.8000
     AREA =       .008868 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000


     K =   .118383HR    TP =   .133000HR    K/TP RATIO =   .890100     SHAPE CONSTANT, N =  3.984532
     UNIT PEAK =   18.857    CFS   UNIT VOLUME =    1.001       B =   354.14       P60 = 1.8000
     AREA =       .007082 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000

    BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD             ID=11 CODE=10

                                  PARTIAL HYDROGRAPH   106.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS
      .000       .0         5.000        .2        10.000        .2        15.000        .2        20.000        .1
      .500       .0         5.500        .2        10.500        .2        15.500        .2        20.500        .1
     1.000       .1         6.000        .2        11.000        .2        16.000        .2        21.000        .1
     1.500      35.9         6.500        .2        11.500        .2        16.500        .2        21.500        .1
     2.000       7.1         7.000        .2        12.000        .2        17.000        .1        22.000        .1
     2.500       1.1         7.500        .2        12.500        .2        17.500        .1        22.500        .1
     3.000        .4         8.000        .2        13.000        .2        18.000        .1        23.000        .1
     3.500        .3         8.500        .2        13.500        .2        18.500        .1        23.500        .1
     4.000        .2         9.000        .2        14.000        .2        19.000        .1        24.000        .1
     4.500        .2         9.500        .2        14.500        .2        19.500        .1        24.500        .0

    RUNOFF VOLUME =     1.80021 INCHES     =       1.5314 ACRE-FEET
    PEAK DISCHARGE RATE =      35.92 CFS  AT   1.500 HOURS   BASIN AREA =   .0160 SQ. MI.


*S--------------------------------------------------------------------
*S ADD 105 TO 106
ADD HYD               ID=12 HYD=AP.5 IDi=10 IDii=11
PRINT HYD             ID=12 CODE=10

                                  HYDROGRAPH FROM AREA AP.5

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS
      .000       .0         5.000        .4        10.000        .4        15.000        .3        20.000        .2
      .500       .0         5.500        .4        10.500        .4        15.500        .3        20.500        .2
     1.000       .2         6.000        .4        11.000        .4        16.000        .3        21.000        .2
     1.500      67.3         6.500        .5        11.500        .3        16.500        .3        21.500        .2
     2.000      13.3         7.000        .4        12.000        .3        17.000        .3        22.000        .2
     2.500       2.0         7.500        .4        12.500        .3        17.500        .3        22.500        .2
     3.000        .8         8.000        .4        13.000        .3        18.000        .3        23.000        .2
     3.500        .5         8.500        .4        13.500        .3        18.500        .3        23.500        .2
```

4.000	.4	9.000	.4	14.000	.3	19.000	.3	24.000	.2
4.500	.4	9.500	.4	14.500	.3	19.500	.3	24.500	.0

RUNOFF VOLUME = 1.80019 INCHES = 2.8678 ACRE-FEET
PEAK DISCHARGE RATE = 67.26 CFS AT 1.500 HOURS BASIN AREA = .0299 SQ. MI.

```
*S--------------------------------------------------------------------
*S DIVIDE AP-6
*S ID=13 IS 52.00 CFS INTO INLETS
*S ID=14 IS 15.26 CFS BYPASSING INLET TO BASIN103
DIVIDE HYD              ID=12 Q=52.0 IDi=13 HYD=#100
                                    IDii=14 HYD=AP.6.BYPASS
*S--------------------------------------------------------------------
*S COMPUTE ONSITE BASIN 107
COMPUTE NM HYD          ID=15 HYD=107 AREA=0.01808 SQ MI
                        %A=0 %B=22.2 %C=22.2 %D=55.6 TP=0.133 HR
                        MASS RAINFALL=-1
```

K = .072485HR TP = .133000HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 39.777 CFS UNIT VOLUME = .9989 B = 526.28 P60 = 1.8000
AREA = .010052 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .050000

K = .118383HR TP = .133000HR K/TP RATIO = .890100 SHAPE CONSTANT, N = 3.984532
UNIT PEAK = 21.375 CFS UNIT VOLUME = 1.001 B = 354.14 P60 = 1.8000
AREA = .008028 SQ MI IA = .42500 INCHES INF = 1.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .050000

BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.05000 AT PEAK FLOW.

```
PRINT HYD               ID=15 CODE=10
```

PARTIAL HYDROGRAPH 107.00

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	5.000	.2	10.000	.2	15.000	.2	20.000	.2
.500	.0	5.500	.2	10.500	.2	15.500	.2	20.500	.1
1.000	.1	6.000	.3	11.000	.2	16.000	.2	21.000	.1
1.500	40.7	6.500	.3	11.500	.2	16.500	.2	21.500	.1
2.000	8.1	7.000	.3	12.000	.2	17.000	.2	22.000	.1
2.500	1.2	7.500	.3	12.500	.2	17.500	.2	22.500	.1
3.000	.5	8.000	.3	13.000	.2	18.000	.2	23.000	.1
3.500	.3	8.500	.3	13.500	.2	18.500	.2	23.500	.1
4.000	.2	9.000	.2	14.000	.2	19.000	.2	24.000	.1
4.500	.2	9.500	.2	14.500	.2	19.500	.2	24.500	.0

RUNOFF VOLUME = 1.80021 INCHES = 1.7359 ACRE-FEET
PEAK DISCHARGE RATE = 40.71 CFS AT 1.500 HOURS BASIN AREA = .0181 SQ. MI.

```
*S--------------------------------------------------------------------
*S ADD 107 TO AP.6.BYPASS
ADD HYD                 ID=16 HYD=AP.7 IDi=14 IDii=15
PRINT HYD               ID=16 CODE=10
```

HYDROGRAPH FROM AREA AP.7

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	5.000	.2	10.000	.2	15.000	.2	20.000	.2
.500	.0	5.500	.2	10.500	.2	15.500	.2	20.500	.1
1.000	.1	6.000	.3	11.000	.2	16.000	.2	21.000	.1
1.500	56.0	6.500	.3	11.500	.2	16.500	.2	21.500	.1
2.000	8.1	7.000	.3	12.000	.2	17.000	.2	22.000	.1
2.500	1.2	7.500	.3	12.500	.2	17.500	.2	22.500	.1
3.000	.5	8.000	.3	13.000	.2	18.000	.2	23.000	.1
3.500	.3	8.500	.3	13.500	.2	18.500	.2	23.500	.1
4.000	.2	9.000	.2	14.000	.2	19.000	.2	24.000	.1
4.500	.2	9.500	.2	14.500	.2	19.500	.2	24.500	.0

RUNOFF VOLUME = 1.80019 INCHES = 1.8571 ACRE-FEET
PEAK DISCHARGE RATE = 55.97 CFS AT 1.500 HOURS BASIN AREA = .0193 SQ. MI.

```
*S--------------------------------------------------------------------
*S COMPUTE ONSITE BASIN 108
COMPUTE NM HYD          ID=17 HYD=108 AREA=0.00672 SQ MI
                        %A=0 %B=22.2 %C=22.2 %D=55.6 TP=0.133 HR
                        MASS RAINFALL=-1
```

K = .072485HR TP = .133000HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 14.784 CFS UNIT VOLUME = .9983 B = 526.28 P60 = 1.8000
AREA = .003736 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .050000

K = .118383HR TP = .133000HR K/TP RATIO = .890100 SHAPE CONSTANT, N = 3.984532
UNIT PEAK = 7.9446 CFS UNIT VOLUME = .9996 B = 354.14 P60 = 1.8000

```
     AREA =      .002984 SQ MI     IA =     .42500 INCHES     INF =    1.04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .050000

    BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD             ID=17 CODE=10

                                  PARTIAL HYDROGRAPH   108.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS
      .000       .0         5.000        .1        10.000        .1        15.000        .1        20.000        .1
      .500       .0         5.500        .1        10.500        .1        15.500        .1        20.500        .1
     1.000       .0         6.000        .1        11.000        .1        16.000        .1        21.000        .1
     1.500      15.1         6.500        .1        11.500        .1        16.500        .1        21.500        .1
     2.000       3.0         7.000        .1        12.000        .1        17.000        .1        22.000        .1
     2.500        .5         7.500        .1        12.500        .1        17.500        .1        22.500        .1
     3.000        .2         8.000        .1        13.000        .1        18.000        .1        23.000        .1
     3.500        .1         8.500        .1        13.500        .1        18.500        .1        23.500        .1
     4.000        .1         9.000        .1        14.000        .1        19.000        .1        24.000        .0
     4.500        .1         9.500        .1        14.500        .1        19.500        .1        24.500        .0

    RUNOFF VOLUME =     1.80021 INCHES     =        .6452 ACRE-FEET
    PEAK DISCHARGE RATE =      15.14 CFS  AT   1.500 HOURS   BASIN AREA =    .0067 SQ. MI.


*S--------------------------------------------------------------------
*S COMPUTE ONSITE BASIN 109
COMPUTE NM HYD        ID=18 HYD=109 AREA=0.00366 SQ MI
                      %A=0 %B=22.2 %C=22.2 %D=55.6 TP=0.133 HR
                      MASS RAINFALL=-1

     K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   8.0523    CFS   UNIT VOLUME =    .9979       B =   526.28      P60 = 1.8000
     AREA =      .002035 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .050000


     K =   .118383HR    TP =   .133000HR    K/TP RATIO =   .890100     SHAPE CONSTANT, N =  3.984532
     UNIT PEAK =   4.3270    CFS   UNIT VOLUME =    .9984       B =   354.14      P60 = 1.8000
     AREA =      .001625 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .050000

    BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD             ID=18 CODE=10

                                  PARTIAL HYDROGRAPH   109.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS
      .000       .0         5.000        .0        10.000        .0        15.000        .0        20.000        .0
      .500       .0         5.500        .0        10.500        .0        15.500        .0        20.500        .0
     1.000       .0         6.000        .1        11.000        .0        16.000        .0        21.000        .0
     1.500       8.3         6.500        .1        11.500        .0        16.500        .0        21.500        .0
     2.000       1.6         7.000        .1        12.000        .0        17.000        .0        22.000        .0
     2.500        .2         7.500        .1        12.500        .0        17.500        .0        22.500        .0
     3.000        .1         8.000        .1        13.000        .0        18.000        .0        23.000        .0
     3.500        .1         8.500        .1        13.500        .0        18.500        .0        23.500        .0
     4.000        .0         9.000        .0        14.000        .0        19.000        .0        24.000        .0
     4.500        .0         9.500        .0        14.500        .0        19.500        .0        24.500        .0

    RUNOFF VOLUME =     1.80021 INCHES     =        .3514 ACRE-FEET
    PEAK DISCHARGE RATE =       8.25 CFS  AT   1.500 HOURS   BASIN AREA =    .0037 SQ. MI.


*S--------------------------------------------------------------------
*S ADD 108 TO AP.7
ADD HYD               ID=19 HYD=AP.8 IDi=16 IDii=17
PRINT HYD             ID=19 CODE=10

                                HYDROGRAPH FROM AREA AP.8

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS
      .000       .0         5.000        .3        10.000        .3        15.000        .2        20.000        .2
      .500       .0         5.500        .3        10.500        .3        15.500        .2        20.500        .2
     1.000       .2         6.000        .4        11.000        .3        16.000        .2        21.000        .2
     1.500      71.1         6.500        .4        11.500        .3        16.500        .2        21.500        .2
     2.000      11.1         7.000        .4        12.000        .3        17.000        .2        22.000        .2
     2.500       1.7         7.500        .4        12.500        .3        17.500        .2        22.500        .2
     3.000        .6         8.000        .4        13.000        .3        18.000        .2        23.000        .2
     3.500        .4         8.500        .3        13.500        .3        18.500        .2        23.500        .2
     4.000        .3         9.000        .3        14.000        .3        19.000        .2        24.000        .2
     4.500        .3         9.500        .3        14.500        .3        19.500        .2        24.500        .0

    RUNOFF VOLUME =     1.80019 INCHES     =       2.5022 ACRE-FEET
    PEAK DISCHARGE RATE =      71.11 CFS  AT   1.500 HOURS   BASIN AREA =    .0261 SQ. MI.


*S--------------------------------------------------------------------
```

```
*S ADD 109 TO AP.4
ADD HYD              ID=20 HYD=AP.9 IDi=18 IDii=9
PRINT HYD            ID=20 CODE=10
```

HYDROGRAPH FROM AREA AP.9

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	5.000	.4	10.000	.4	15.000	.3	20.000	.2
.500	.0	5.500	.4	10.500	.4	15.500	.3	20.500	.2
1.000	.2	6.000	.4	11.000	.4	16.000	.3	21.000	.2
1.500	84.2	6.500	.5	11.500	.3	16.500	.3	21.500	.2
2.000	13.3	7.000	.4	12.000	.3	17.000	.3	22.000	.2
2.500	2.0	7.500	.4	12.500	.3	17.500	.3	22.500	.2
3.000	.8	8.000	.4	13.000	.3	18.000	.3	23.000	.2
3.500	.5	8.500	.4	13.500	.3	18.500	.3	23.500	.2
4.000	.4	9.000	.4	14.000	.3	19.000	.3	24.000	.2
4.500	.4	9.500	.4	14.500	.3	19.500	.3	24.500	.0

RUNOFF VOLUME = 1.80018 INCHES = 2.9843 ACRE-FEET
PEAK DISCHARGE RATE = 84.16 CFS AT 1.500 HOURS BASIN AREA = .0311 SQ. MI.

```
*S--------------------------------------------------------------------
*S DIVIDE AP-8
*S ID=21 IS 54.00 CFS INTO INLETS
*S ID=22 IS 17.11 CFS BYPASSING TO SUMP
DIVIDE HYD           ID=19 Q=54.0 IDi=21 HYD=AP.8.TO.INLETS
                                  IDii=22 HYD=AP.8.BYPASS
*S--------------------------------------------------------------------
*S DIVIDE AP-9
*S ID=23 IS 60.00 CFS INTO INLETS
*S ID=24 IS 24.16 CFS BYPASSING TO SUMP
DIVIDE HYD           ID=20 Q=60.0 IDi=23 HYD=AP.9.TO.INLETS
                                  IDii=24 HYD=AP.9.BYPASS
*S--------------------------------------------------------------------
*S ADD SUMP INLET TOTAL
ADD HYD              ID=25 HYD=AP.10 IDi=22 IDii=24
PRINT HYD            ID=25 CODE=10
```

HYDROGRAPH FROM AREA AP.10

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	.500	.0	1.000	.0	1.500	41.3		

RUNOFF VOLUME = 1.80018 INCHES = .2335 ACRE-FEET
PEAK DISCHARGE RATE = 41.27 CFS AT 1.500 HOURS BASIN AREA = .0024 SQ. MI.

```
*S--------------------------------------------------------------------
*S ADD INLET FLOWS
ADD HYD              ID=26 HYD=#200A IDi=4 IDii=21
PRINT HYD            ID=26 CODE=10
```

HYDROGRAPH FROM AREA #200A

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	5.000	.8	10.000	.8	15.000	.6	20.000	.5
.500	.0	5.500	.8	10.500	.8	15.500	.6	20.500	.5
1.000	.5	6.000	.9	11.000	.8	16.000	.6	21.000	.5
1.500	122.0	6.500	1.0	11.500	.7	16.500	.6	21.500	.5
2.000	28.0	7.000	.9	12.000	.7	17.000	.6	22.000	.5
2.500	4.3	7.500	.9	12.500	.7	17.500	.6	22.500	.5
3.000	1.6	8.000	.9	13.000	.7	18.000	.6	23.000	.5
3.500	1.0	8.500	.9	13.500	.7	18.500	.5	23.500	.5
4.000	.8	9.000	.8	14.000	.7	19.000	.5	24.000	.5
4.500	.8	9.500	.8	14.500	.6	19.500	.5	24.500	.0

RUNOFF VOLUME = 1.80019 INCHES = 5.9176 ACRE-FEET
PEAK DISCHARGE RATE = 122.00 CFS AT 1.450 HOURS BASIN AREA = .0616 SQ. MI.

```
*S--------------------------------------------------------------------
*S ADD INLET FLOWS
ADD HYD              ID=27 HYD=#300 IDi=23 IDii=25
PRINT HYD            ID=27 CODE=10
```

HYDROGRAPH FROM AREA #300

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	5.000	.4	10.000	.4	15.000	.3	20.000	.2
.500	.0	5.500	.4	10.500	.4	15.500	.3	20.500	.2
1.000	.2	6.000	.4	11.000	.4	16.000	.3	21.000	.2
1.500	101.3	6.500	.5	11.500	.3	16.500	.3	21.500	.2
2.000	13.3	7.000	.4	12.000	.3	17.000	.3	22.000	.2
2.500	2.0	7.500	.4	12.500	.3	17.500	.3	22.500	.2
3.000	.8	8.000	.4	13.000	.3	18.000	.3	23.000	.2
3.500	.5	8.500	.4	13.500	.3	18.500	.3	23.500	.2

4.000	.4	9.000	.4	14.000	.3	19.000	.3	24.000	.2
4.500	.4	9.500	.4	14.500	.3	19.500	.3	24.500	.0

RUNOFF VOLUME = 1.80018 INCHES = 3.0720 ACRE-FEET
PEAK DISCHARGE RATE = 101.27 CFS AT 1.500 HOURS BASIN AREA = .0320 SQ. MI.

```
*S--------------------------------------------------------------------
*S ADD SOUTH OUTFALL
ADD HYD              ID=28 HYD=#200 IDi=26 IDii=27
PRINT HYD            ID=28 CODE=10
```

HYDROGRAPH FROM AREA #200

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	5.000	1.2	10.000	1.2	15.000	.9	20.000	.8
.500	.0	5.500	1.3	10.500	1.1	15.500	.9	20.500	.8
1.000	.7	6.000	1.4	11.000	1.1	16.000	.9	21.000	.7
1.500	223.3	6.500	1.4	11.500	1.1	16.500	.9	21.500	.7
2.000	41.3	7.000	1.4	12.000	1.0	17.000	.9	22.000	.7
2.500	6.3	7.500	1.3	12.500	1.0	17.500	.8	22.500	.7
3.000	2.3	8.000	1.3	13.000	1.0	18.000	.8	23.000	.7
3.500	1.4	8.500	1.3	13.500	1.0	18.500	.8	23.500	.7
4.000	1.2	9.000	1.2	14.000	1.0	19.000	.8	24.000	.7
4.500	1.2	9.500	1.2	14.500	.9	19.500	.8	24.500	.0

RUNOFF VOLUME = 1.80019 INCHES = 8.9896 ACRE-FEET
PEAK DISCHARGE RATE = 223.27 CFS AT 1.500 HOURS BASIN AREA = .0936 SQ. MI.

```
*S--------------------------------------------------------------------
*S ADD TOTAL DISCHARGE
ADD HYD              ID=29 HYD=TOTAL IDi=28 IDii=13
PRINT HYD            ID=29 CODE=10
```

HYDROGRAPH FROM AREA TOTAL

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	5.000	1.6	10.000	1.5	15.000	1.2	20.000	1.0
.500	.0	5.500	1.7	10.500	1.5	15.500	1.2	20.500	1.0
1.000	.9	6.000	1.8	11.000	1.5	16.000	1.2	21.000	1.0
1.500	275.3	6.500	1.9	11.500	1.4	16.500	1.2	21.500	1.0
2.000	54.6	7.000	1.8	12.000	1.4	17.000	1.1	22.000	.9
2.500	8.3	7.500	1.8	12.500	1.4	17.500	1.1	22.500	1.0
3.000	3.1	8.000	1.7	13.000	1.3	18.000	1.1	23.000	.9
3.500	1.9	8.500	1.7	13.500	1.3	18.500	1.1	23.500	.9
4.000	1.6	9.000	1.6	14.000	1.3	19.000	1.1	24.000	.9
4.500	1.5	9.500	1.6	14.500	1.2	19.500	1.0	24.500	.0

RUNOFF VOLUME = 1.80019 INCHES = 11.7362 ACRE-FEET
PEAK DISCHARGE RATE = 275.27 CFS AT 1.500 HOURS BASIN AREA = .1222 SQ. MI.

```
*S--------------------------------------------------------------------
*S COMPUTE COMMERCIAL BASIN 201
COMPUTE NM HYD       ID=30 HYD=201.D AREA=0.00781 SQ MI
                     %A=0 %B=0 %C=10 %D=90 TP=0.133 HR
                     MASS RAINFALL=-1

     K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   27.813    CFS   UNIT VOLUME =    .9987       B =   526.28       P60 = 1.8000
     AREA =       .007029 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000


     K =   .104841HR    TP =   .133000HR    K/TP RATIO =   .788276     SHAPE CONSTANT, N =  4.552994
     UNIT PEAK =   2.2930    CFS   UNIT VOLUME =    .9963       B =   390.49       P60 = 1.8000
     AREA =       .000781 SQ MI    IA =    .35000 INCHES    INF =    .83000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000

    BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD            ID=30 CODE=10
```

HYDROGRAPH FROM AREA 201.D

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	5.000	.2	10.000	.2	15.000	.1	20.000	.1
.500	.0	5.500	.2	10.500	.2	15.500	.1	20.500	.1
1.000	.1	6.000	.2	11.000	.2	16.000	.1	21.000	.1
1.500	21.1	6.500	.2	11.500	.1	16.500	.1	21.500	.1
2.000	5.0	7.000	.2	12.000	.1	17.000	.1	22.000	.1
2.500	.7	7.500	.2	12.500	.1	17.500	.1	22.500	.1
3.000	.3	8.000	.2	13.000	.1	18.000	.1	23.000	.1
3.500	.2	8.500	.2	13.500	.1	18.500	.1	23.500	.1
4.000	.2	9.000	.2	14.000	.1	19.000	.1	24.000	.1
4.500	.2	9.500	.2	14.500	.1	19.500	.1	24.500	.0

Cabezon Tract 10A
100-Year 24-Hour Duration Storm-Developed
AHYMO Output File

```
      RUNOFF VOLUME =     2.42469 INCHES     =       1.0100 ACRE-FEET
      PEAK DISCHARGE RATE =      21.05 CFS  AT   1.500 HOURS   BASIN AREA =   .0078 SQ. MI.


   *S--------------------------------------------------------------------
   *S COMPUTE COMMERCIAL BASIN 201
   COMPUTE NM HYD        ID=31 HYD=201.H AREA=0.00781 SQ MI
                         %A=100 %B=0 %C=0 %D=0 TP=0.133 HR
                         MASS RAINFALL=-1

        K =   .165076HR    TP =   .133000HR    K/TP RATIO =  1.241174     SHAPE CONSTANT, N =  2.871844
        UNIT PEAK =   15.925    CFS   UNIT VOLUME =    .9974       B =   271.20      P60 = 1.8000
        AREA =      .007810 SQ MI    IA =    .65000 INCHES    INF =   1.67000 INCHES PER HOUR
        RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000

      BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

   PRINT HYD             ID=31 CODE=10

                                        HYDROGRAPH FROM AREA 201.H

        TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
         HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS
        .000        .0          1.000        .0          2.000        .6          3.000        .1          4.000        .0
        .500        .0          1.500       6.5          2.500        .2          3.500        .0          4.500        .0

      RUNOFF VOLUME =      .44094 INCHES     =        .1837 ACRE-FEET
      PEAK DISCHARGE RATE =       6.47 CFS  AT   1.500 HOURS   BASIN AREA =   .0078 SQ. MI.


   *S--------------------------------------------------------------------
   FINISH

      NORMAL PROGRAM FINISH          END TIME (HR:MIN:SEC) = 09:23:46
_(s0p10h4099T_&l6D__
```

CABEZON TRACT 10A
Street Flow Analysis

					Inlet #1						Inlet #2				
Analysis Point	Hyrdograph ID	Q (cfs)	Road Slope	Q Half Street (cfs)	Flow Depth (ft)	Velocity (ft/s)	Depth x Velocity	Inlet Type	Q Inlet (cfs)	Q Bypass (cfs)	Inlet Type	Flow Depth (ft)	Q Inlet (cfs)	Q Bypass (cfs)	Notes
1	101	47.3	0.51%	23.7	0.65	3.2	2.1	NONE	0	23.7	NONE	0.65	0.0	23.7	BYPASS FLOW TO BASIN 102
2	102	85.1	0.51%	42.6	0.87	3.8	3.3	DOUBLE C	17	25.6	DOUBLE C	0.87	17	8.6	2- DOUBLE C BATTERY, BYPASS TO BASIN 103
3	103	45.8	0.51%	22.9	0.6	3	1.8	NONE	0.00	22.9	NONE	0.6	0	22.9	BYPASS FLOW TO BASIN 104
4	104	75.91	0.51%	37.96	0.78	3.6	2.8	NONE	0	38.0	NONE	0.78	0	38.0	BYPASS FLOW TO BASIN 109
5	105	31.35	1.44%	15.68	0.48	3.8	1.8	NONE	0.00	15.68	NONE	0.48	0	15.675	BYPASS FLOW TO BASIN 106
6	106	67.26	1.44%	33.63	0.62	5.4	3.3	DOUBLE C	13	20.63	DOUBLE C	0.62	13	7.63	2- DOUBLE C BATTERY, BYPASS TO BASIN 107
7	107	55.97	2.29%	27.99	0.5	4	2.0	NONE	0	27.985	NONE	0.5	0	27.985	BYPASS FLOW TO BASIN 108
8	108	71.11	2.3%	35.56	0.56	5.8	3.248	DOUBLE C	13.5	22.055	DOUBLE C	0.56	13.5	8.555	2- DOUBLE C BATTERY, BYPASS FLOW TO SUMP
9	109	84.16	0.5%	42	0.83	2.8	2.324	DOUBLE C	15	27	DOUBLE C	0.83	15	12.08	2- DOUBLE C BATTERY, BYPASS FLOW TO SUMP
10		41.26	SUMP	NA				SUMP	41.26	0					COLLECT 41.26 IN SUMP INLET

Assumptions

1. Street Flow Depths and Velocities taken from City of Albuquerque Plate 22.3 D-1
2. Double C Grate Capacities taken from City of Albuquerque Plate 22.3 D-6
3. Triple C Grate Capacities were extrapolated from the Double C Capacities.
4. All Grate Capacities do not account for curb opening inflow. Therefore, inlet inflows shown are conservative and provide a safety factor for items such as inlet clogging

C-1

Cabezon Tract10A Headloss Calculations

Description	Q1	V1	Q2	V2	X1	X3	Q3	V3	A1	A2	dia1	dia2	Q4	x4	A3	A4	D3	D4
J-101	26	8.28	52	18	45	45	26	8.28	3.140	7.065	24	36			3.140	0.000	24	
J-201	34	6.93	68	11.23	45	45	34	6.93	4.906	9.616	30	42			9.616	0.000	42	
J-204	68	7.07	128	12.92	0	60	30	23	9.616	12.560	42	48	30	60	3.140	3.140	24	24
J-205	128	12.92	198	23	60	60	54	23.37	12.560	12.560	48	48	41.3	90	7.065	3.140	36	24
J-301	27	19.59	54	23.37	30	30	27	17.25	3.140	7.065	24	36			3.140		24	

EQUATION FROM MODERN SEWER DESIGN, THIRD EDITION, 1995

	Headloss, FT	# PIPES
J-101	1.47	3
J-201	1.98	3
J-204	2.40	4
J-205	5.58	4
J-301	1.06	4

CALCULATED K VALUES

Descrip	Angle	coeff	K
I-103	45	0.0033	**0.15**
I-104	45	0.0033	**0.15**
J-102	90	0.0033	**0.30**
J-103	30	0.0033	**0.10**
I-203	45	0.0033	**0.15**
I-204	45	0.0033	**0.15**
I-207	60	0.0033	**0.20**
I-208	60	0.0033	**0.20**
J-206	20	0.0033	**0.07**
I-303	60	0.0033	**0.20**
I-304	30	0.0033	**0.10**

C-2

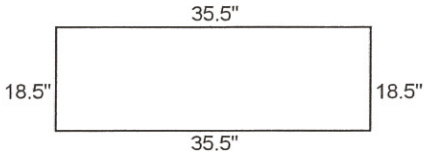
Huitt~Zollars, Inc.

Inlet Worksheet (Sump Condition) for Basin 109

Objective : Design a Double Type C Inlet in Sump Condition for a maximum 100-year flow of: 41.3

1 Inlet to collect discharge before overtopping curb.
Standard 8" curb and gutter.
Dmax=10.75 in (0.9 ft) - Not 8" because standard inlet has 10.75" depression.

2 Grate Dimensions



**Net dimensions of open area of a single grate. (Total Area less Area of Bars)

Weir Perimeter - Double 'C' = 2*18.5" + 4*35.5" = 14.92 ft
Area of Orifice - Double 'C' =18.5" x 2*35.5" = 9.12 sq. ft

3 Calculate Orifice and Weir Flow into Grate at Design Depth (0.9 ft)

Orifice Equation		Weir Equation	
Q = 0.6 x A x (2 x g x h)^1/2		Q=2.65 x P x H^1/2	
Where		Where	
A =	9.12 sq. ft.	P=	14.9 ft
g =	32.2 ft ^2/sec	H=	0.9 ft
h =	0.9 ft		
Therefore		Therefore	
Q =	41.7 cfs	Q =	37.5 cfs

Weir Equation controls
Double "C" Inlet Grate Capacity @ TBC = 37.5 cfs

4 Calculate Inlet Throat Capacity Using Weir Equation at Design Depth (6.25 in)

Weir Equation	
Q=2.65 x P x H^1/2	
Where	
P=	7.0 ft
H=	0.52 ft
Therefore	
Q =	13.3 cfs

Double "C" Inlet Throat Capacity = 13.3 cfs

5 Calculate Inlet Capacity with a grate clogging factor of 25%

Total Capacity	**50.8 cfs**
Minus Grate Clogging Factor of 25%	**9.38 cfs**

Therefore Capacity of Double C Inlet in Sump Condition = ***41.4 cfs.***

Worksheet
Worksheet for Irregular Channel

Project Description	
Worksheet	Irregular Channel
Flow Element	Irregular Channel
Method	Manning's Formul
Solve For	Discharge

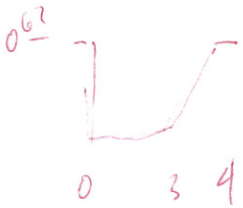
Input Data		
Channel Slope	042000	ft/ft
Water Surface Elev	0.67	ft

Options	
Current Roughness Metho	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coeffic	0.017	
Elevation Range	0.00 to 0.67	
Discharge	24.67	cfs
Flow Area	2.2	ft²
Wetted Perimeter	4.62	ft
Top Width	3.67	ft
Actual Depth	0.67	ft
Critical Elevation	1.18	ft
Critical Slope	0.007191	ft/ft
Velocity	11.04	ft/s
Velocity Head	1.89	ft
Specific Energy	2.56	ft
Froude Number	2.49	
Flow Type	Supercritical	

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00	0+04	0.017

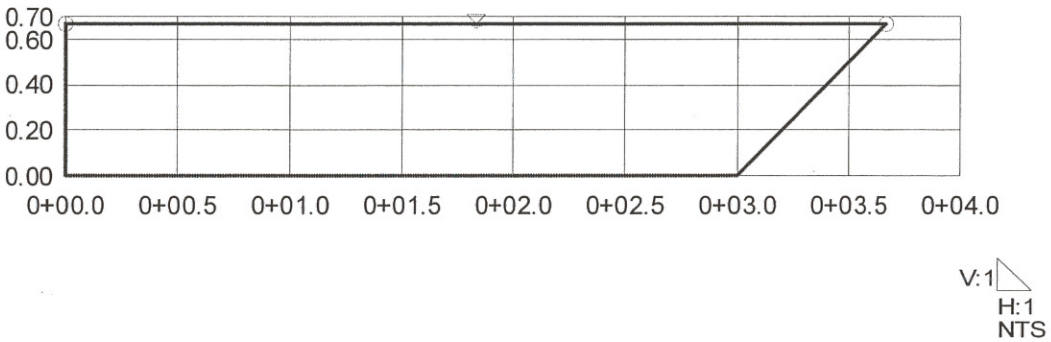
Natural Channel Points	
Station (ft)	Elevation (ft)
0+00	0.67
0+00	0.00
0+03	0.00
0+04	0.67



Cross Section
Cross Section for Irregular Channel

Project Description	
Worksheet	Irregular Channel
Flow Element	Irregular Channel
Method	Manning's Formul
Solve For	Discharge

Section Data		
Mannings Coefficie	0.017	
Channel Slope	0.042000	ft/ft
Water Surface Elev	0.67	ft
Elevation Range	.00 to 0.67	
Discharge	24.67	cfs



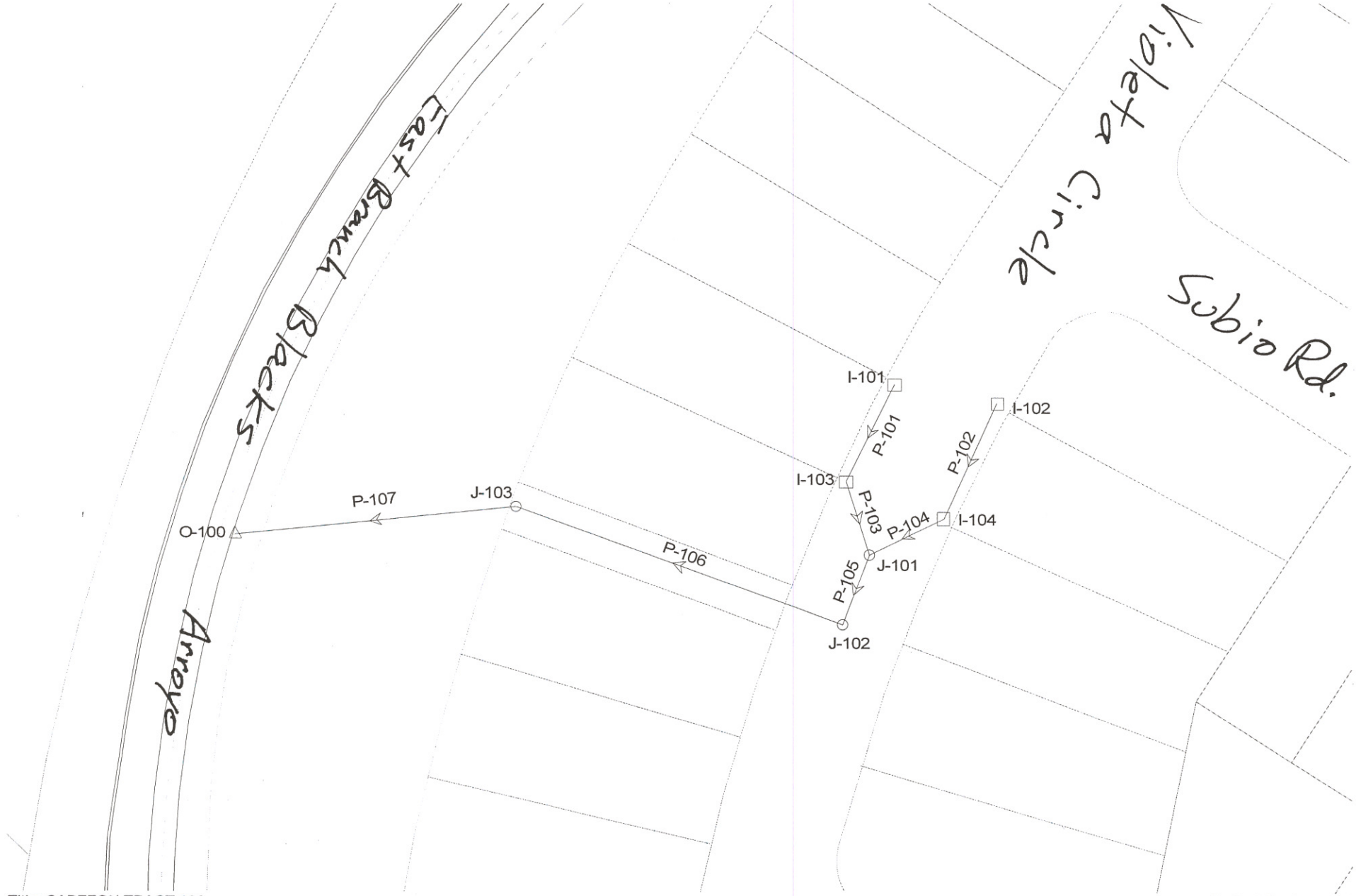
Scenario: Base

Combined Pipe\Node Report

Label	Length (ft)	Section Size	Total Flow (cfs)	Full Capacity (cfs)	Average Velocity (ft/s)	Upstream Node	Downstream Node	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Constructed Slope (ft/ft)	Hydraulic Grade Line In (ft)	Upstream Ground Elevation (ft)	Hydraulic Grade Line Out (ft)	Downstream Ground Elevation (ft)
P-101	44.00	18 inch	13.00	16.38	7.36	I-101	I-103	5,232.04	5,230.97	0.024318	5,234.42	5,234.59	5,233.75	5,233.95
P-102	52.00	18 inch	13.00	13.19	7.36	I-102	I-104	5,232.20	5,231.38	0.015769	5,234.57	5,234.74	5,233.78	5,233.96
P-103	31.00	24 inch	26.00	47.55	8.28	I-103	J-101	5,230.87	5,229.50	0.044194	5,233.11	5,233.95	5,232.70	5,233.87
P-104	33.00	24 inch	26.00	46.26	8.28	I-104	J-101	5,230.88	5,229.50	0.041818	5,233.14	5,233.96	5,232.70	5,233.87
P-105	31.00	36 inch	52.00	136.58	18.01	J-101	J-102	5,229.40	5,228.10	0.041935	5,231.75	5,233.87	5,231.30	5,233.48
P-106	140.00	36 inch	52.00	136.68	18.02	J-102	J-103	5,228.00	5,222.12	0.042000	5,230.35	5,233.48	5,225.08	5,233.00
P-107	113.00	36 inch	52.00	141.41	18.48	J-103	O-100	5,222.02	5,216.94	0.044956	5,224.37	5,233.00	5,218.28	5,223.00
P-201	85.00	24 inch	17.00	28.40	5.41	I-201	I-203	5,196.00	5,194.66	0.015765	5,198.93	5,199.46	5,198.45	5,198.99
P-202	42.00	24 inch	17.00	41.45	5.41	I-202	I-204	5,196.07	5,194.66	0.033571	5,198.71	5,199.21	5,198.47	5,199.00
P-203	36.00	30 inch	34.00	36.17	6.93	I-203	J-201	5,194.56	5,194.28	0.007778	5,198.00	5,198.99	5,197.76	5,199.13
P-204	39.00	30 inch	34.00	34.75	6.93	I-204	J-201	5,194.56	5,194.28	0.007179	5,198.02	5,199.00	5,197.76	5,199.13
P-205	209.00	42 inch	68.00	100.60	11.23	J-201	J-202	5,194.18	5,192.09	0.010000	5,196.76	5,199.13	5,195.19	5,198.09
P-206	285.00	42 inch	68.00	100.60	11.23	J-202	J-203	5,191.99	5,189.14	0.010000	5,194.57	5,198.09	5,193.52	5,196.64
P-207	215.00	42 inch	68.00	100.60	7.07	J-203	J-204	5,189.04	5,186.89	0.010000	5,193.14	5,196.64	5,192.15	5,195.55
P-208	43.00	24 inch	15.00	39.33	11.67	I-206	I-208	5,192.98	5,191.68	0.030233	5,194.38	5,195.52	5,194.35	5,195.16
P-209	36.00	24 inch	15.00	39.72	11.76	I-205	I-207	5,192.97	5,191.86	0.030833	5,194.53	5,195.51	5,194.53	5,195.34
P-210	24.00	24 inch	30.00	77.13	23.01	I-208	J-204	5,191.58	5,188.79	0.116250	5,193.44	5,195.16	5,192.15	5,195.55
P-211	26.00	24 inch	30.00	76.46	22.87	I-207	J-204	5,191.76	5,188.79	0.114231	5,193.62	5,195.34	5,192.15	5,195.55
P-212	66.00	48 inch	128.00	143.64	12.92	J-204	J-205	5,186.79	5,186.13	0.010000	5,190.18	5,195.55	5,189.93	5,196.00
P-213	125.00	48 inch	223.27	263.91	23.56	J-205	J-206	5,186.03	5,181.81	0.033760	5,189.93	5,196.00	5,184.93	5,193.00
P-214	82.00	48 inch	223.27	454.22	35.99	J-206	O-2	5,181.71	5,173.51	0.100000	5,185.61	5,193.00	5,175.98	5,179.00
P-215	15.00	24 inch	41.27	63.98	21.64	I-209	J-205	5,192.56	5,191.36	0.080000	5,194.52	5,195.10	5,192.92	5,196.00
P-301	75.00	18 inch	13.50	17.11	10.73	I-301	I-303	5,195.50	5,193.51	0.026533	5,196.87	5,198.04	5,195.22	5,196.49
P-302	40.00	18 inch	13.50	19.15	11.74	I-302	I-304	5,195.00	5,193.67	0.033250	5,196.37	5,197.53	5,195.38	5,196.65
P-303	30.00	24 inch	27.00	64.38	19.59	I-303	J-301	5,193.41	5,190.98	0.081000	5,195.22	5,196.49	5,193.27	5,196.11
P-304	45.00	24 inch	27.00	54.27	17.25	I-304	J-301	5,193.57	5,190.98	0.057556	5,195.38	5,196.65	5,193.27	5,196.11
P-305	57.00	36 inch	54.00	192.53	23.37	J-301	J-205	5,190.88	5,186.13	0.083333	5,193.27	5,196.11	5,189.93	5,196.00

D-1

Scenario: Base



P-2

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Huitt-Zollars, Inc.
 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: hzi
StormCAD v5.5 [5.5003]

Scenario: Base

D-3

Title: CABEZON TRACT 10A
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Project Engineer: hzi
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