CITY OF ALBUQUERQUE

November 16, 2005

Craig W. Hoover, P.E.
Bohannan Huston Inc.
7500 Jefferson St. NE – Courtyard I
Albuquerque, NM 87109

Re: Stormcloud Subdivision, Tract I-2, Sundoro Unit 1, Amendment No. 1 Drainage Report dated 11-10-05 (J8-D1)

Dear Mr. Hoover,

Based upon the information provided in your submittal dated 11-10-05, the above referenced report is approved as amended.

If you have any questions, you can contact me at 924-3990.

Sincerely,

Phillip J. Lovato, E.I., C.F.M.
Engineering Associate, Hydrology,
Development and Building Services,
Planning Department

cc: file

P.O. Box 1293

Albuquerque

New Mexico 87103

www.cabq.gov

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Post-it® Fax Note 7671	Date 11-15	# of pages ▶ 1
To BRAD BINGHAM	From LYNN MAZUR	
Co./Dept HYDROLOGY	Co. AMAFCA	
Phone #	Phone #	
Fax #	Fax #	

November 15, 2005

Mr. Craig W. Hoover, P.E.
Bohannan Huston, Inc.
7500 Jefferson St. NE, Courtyard I
Albuquerque, New Mexico 87109

Re: Amendment No. 1 for Stormcloud Subdivision Drainage Report, ZAP J-8
Engineer's Stamp dated November 10, 2005

Dear Mr. Hoover:

AMAFCA has reviewed the referenced concise and well-written report with regard to the Ladera Dam system. AMAFCA will allow development of the Stormcloud Subdivision to proceed without upsizing Dams 9 and 10 with the understanding that future upstream development may require an expansion of the dams.

If you have any questions, please call me at 884-2215.

Sincerely,
AMAFCA

Lynn M. Mazur

Lynn M. Mazur, P.E., C.F.M.
Development Review Engineer

Cc: Brad Bingham, COA Hydrology

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Meeting Summary for September 22, 2005
10:00 A.M. at AMAFCA Office
Stormcloud Subdivision

1. Introductions/Attendees:

   Leroy Chavez, Westland Development Corporation
   Fred Ambrogi, Westland Development Corporation
   John Nelson, Westland Development Corporation
   John Kelly, AMAFCA
   Lynn Mazur, AMAFCA
   Jerry Lovato, AMAFCA
   Marty Eckert, AMAFCA
   Doug Hughes, Mark Goodwin & Associates
   Craig Hoover, Bohannan Huston Inc

2. Discussion

   a. John Kelly emphasized the need for development of the subdivision to be part of an overall drainage plan for the area. Leroy Chavez responded that the Westland is following the approved West I-40 Drainage Management Plan. Both agreed a more detailed plan is needed.

   b Craig Hoover then summarized the results of the drainage analysis that has been completed for Stormcloud Subdivision by BHI building upon the West I-40 DMP hydrology. Specfically relating to the Ladera Dams, Craig Hoover noted that the development of Stormcloud does not require the expansion of Ladera Dams 9 and 10 Previous analysis with the entire watershed fully developed revealed that expansions of these two dams would be required to accommodate the fully developed 100-year runoff and provide 1 foot of freeboard from the maximum 100-year water surface and to crest of the emergency spillway in Ladera Dams 6-11 (the Ladera Dams immediately adjacent to Stormcloud). However, the hydrology model for the watershed with existing development plus Stormcloud and the remainder of the upland watershed undeveloped does not require expansion of the Ladera Dams. Craig Hoover noted that the development of Stormcloud is not the "trigger" that requires the expansion of Ladera Dams 9 and 10.

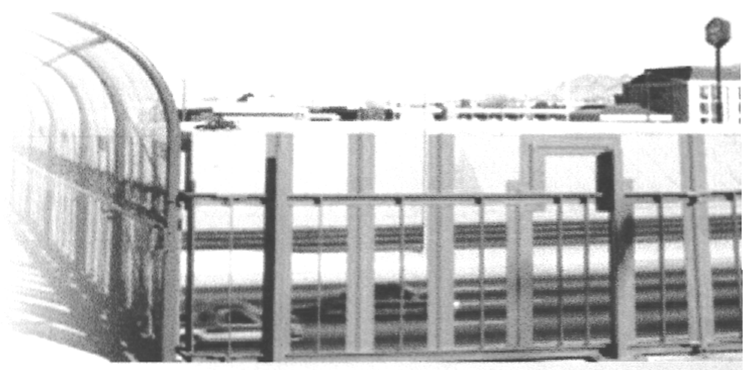
   c The discussion on the Ladera Dams continued relative to the new State Engineer requirements for dams. John Kelly indicated that AMAFCA will approve deferring the expansion of Ladera Dams 9 and 10 and not require their expansion with the Stormcloud Subdivision, provided Westland is taking steps towards developing a comprehensive drainage plan for the area.

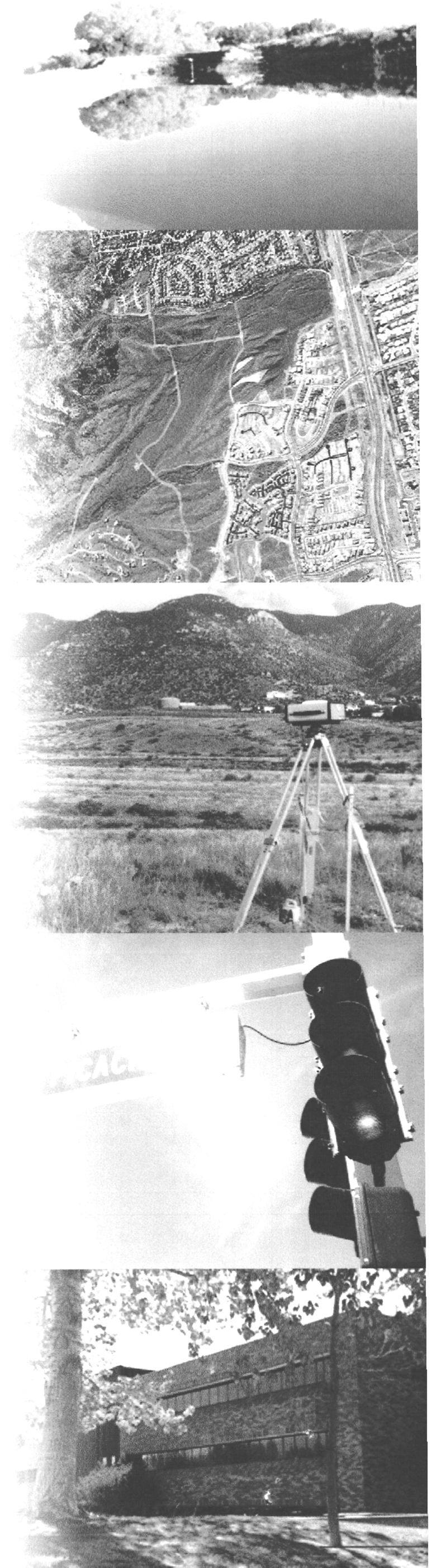
3. Upcoming Meetings

   a A meeting is scheduled for October 10, 2005 with Elaine Pacheco from the New Mexico State Engineer's Office Dam Safety Bureau to further discuss the new State Engineer requirements relative to the Ladera Dams and upcoming proposed developments by Westland Development Corporation.

   b. A meeting is scheduled for September 27 with the new New Mexico Department of Transportation (NMDOT) District 3 Engineer, Larry Velasquez to coordinate pond location and improvements relative to NMDOT right-of-way.

AMENDMENT NO. 1
STORMCLOUD SUBDIVISION
DRAINAGE REPORT





NOVEMBER 10, 2005

Prepared for:

Westland Development
401 Coors Boulevard NW
Albuquerque, New Mexico 87121

Bohannan Huston INC.

ENGINEERING
SPATIAL DATA
ADVANCED TECHNOLOGIES

AMENDMENT NO. 1
STORMCLOUD SUBDIVISION
DRAINAGE REPORT

November 10, 2005

PREPARED BY:
BOHANNAN HUSTON INC.
COURTYARD ONE
7500 JEFFERSON NE
ALBUQUERQUE, NM 87109

Craig W. Hoover 11/10/05

Craig W. Hoover, P.E. Date

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I. EXECUTIVE SUMMARY

This report will serve as Amendment No. 1 to the Drainage Report for Stormcloud Subdivision, Bohannan Huston Inc., May 2005, which was prepared for Westland Development. The Drainage Report described the drainage management plan for the Stormcloud Subdivision at Westland. The proposed development of the Stormcloud Subdivision consists of 520 single-family residential lots, which sit on approximately 106 acres. The project will be divided into three sequentially built units. The Drainage Report addressed the management of both the onsite drainage, which was analyzed for development within Stormcloud, as well as the drainage originating from the future development upstream of Stormcloud. The Drainage Report stated that because of the future development upstream of Stormcloud, the Ladera System of Dams #9, #10, and #11 lacked the capacity to effectively perform under their current design for the 100-yr event. Therefore, the Drainage Report recommended that Dams #9 and #10 required expansion of their storage pools, as well as installing orifice plates to their primary spillways. This recommendation allowed Dams #9, #10, and #11 to effectively perform as detention facilities while maintaining a minimum freeboard of one-foot as required by the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA).

Ongoing discussions with Westland Development Corporation, AMAFCA, and the Office of the State Engineer (OSE), regarding the Ladera System of Dams, have prompted a further analysis into the recommendations described in the Drainage Report for Dams #9 and #10. This analysis was performed to determine the post-construction conditions of Stormcloud and its effects on Dams #9, #10, and #11. The post-construction analysis includes: existing land treatment conditions west of Stormcloud, and fully developed land treatments within Stormcloud. Within this analysis Dams #9, #10, and #11 were also treated as existing structures with no modifications (i.e. without storage pool expansions or orifice plates installed). In summary, this analysis produced the following results:

- Dams #9 and #10 will not require storage pool expansions during the post-construction phases of Stormcloud
- Dams #9 and #10 will not require the installation of orifice plates during the post-construction phases of Stormcloud

These results indicated that Dams #9, #10, and #11 can remain "as-is" in their current condition with the construction of the Stormcloud Subdivision, without exceeding the capacity of the dam system. However, it should be re-stated that in order to accommodate the fully developed conditions upstream of

Stormcloud, the expansions and orifice plate designs for Dam #9 and #10 will need to be implemented, to accommodate the increase in flowrates.

II. ANALYSIS

For this analysis, it was assumed that the post-construction conditions will consist of existing land treatment conditions west of Stormcloud, and fully developed land treatments within Stormcloud. The modeled design storm for the watershed was the 100-yr, 24-hr event. Dams #9, #10, and #11 are located downstream (southeast) of the Stormcloud Subdivision. These dams can be seen in Figure 1. The hydrology used in this report, includes the hydrology from the approved West I-40 Diversion Drainage Management Plan (DMP) completed by BHI in June 2000. The existing conditions model of the West I-40 DMP was used as the initial AHYMO input file. The input file was then modified to include The Crossings Subdivision development, thus producing a base existing conditions model for this report that reflects the current conditions of the site. This model was then further modified to include the proposed construction of Tierra Pintada St. and the Stormcloud Subdivision, which results in the post-construction AHYMO model.

The stage-storage-outflow curves for Dams #9, #10, and #11 were modeled as existing structures. These curves were taken from the original West I-40 DMP existing conditions model. The AHYMO ROUTE RESERVOIR command was used to compute the maximum water surface elevation and maximum outflow from the Dams. The basin divisions, within the Stormcloud Subdivision, were based upon the proposed subdivision grading plan, and can be seen in Figure 1.

III. RESULTS

The summary output of the post-construction AHYMO model for this analysis can be found in Appendix A. Table 1 lists the flowrates into the Dams, the maximum WSEL, the emergency spillway crest elevations, and the computed freeboard for the post-construction analysis.

Table 1: Summary of Post-Construction Model Output

Ladera Dam No.	Post-Construction Computed Max. Q_{in} (cfs)	Post-Construction Computed Max. 100-yr WSEL (ft)	Emergency Spillway Invert (Crest) Elevation (ft)	Post-Construction Computed Freeboard (ft)
9	370.2	5271.6	5276.0	4.4
10	80.3	5249.3	5257.0	7.7
11	349.2	5231.6	5234.7	3.1

In summary the results of the AHYMO modeling have produced the following recommended modifications to the Drainage Report:

- The post-construction AHYMO model indicates an adequate amount of freeboard for Dams #9, #10, and #11. This demonstrates that the Dam emergency spillway elevations will not be exceeded in the event a 100-year storm occurs after the construction of the Stormcloud Subdivision.
- Dams #9 and #10 will not require storage pool expansions as part of the Stormcloud Subdivision.
- Dams #9 and #10 will not require the installation of orifice plates as part of the Stormcloud Subdivision.

IV. CONCLUSION

As previously stated, these results indicate that the Stormcloud Subdivision can be developed without needing to modify Ladera Dams #9, #10, and #11. However, it should be noted that in order to accommodate the fully developed conditions upstream of Stormcloud, the expansions and orifice plate designs for Dam #9 and #10 will need to be implemented, to accommodate the increase in flowrates.

Appendix

APPENDIX A

Hydrology Calculations

```
AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) -                          - VERSION:  1997.02c      RUN DATE (MON/DAY/YR) =11/08/2005
INPUT FILE = SUNPROP.HYM                                                                   USER NO.= AHYMO-S-9702c1BohanHu-AH
                                                                                                                   PAGE =   1
                                FROM  TO                    PEAK        RUNOFF                TIME TO    CFS
                   HYDROGRAPH    ID   ID        AREA     DISCHARGE     VOLUME      RUNOFF      PEAK     PER
COMMAND          IDENTIFICATION  NO.  NO.      (SQ MI)     (CFS)       (AC-FT)    (INCHES)   (HOURS)   ACRE      NOTATION

*S*                 PROJECT NAME:  STORMCLOUD SUBDIVISION, ALBUQUERQUE, NM
*S*                 JOB NO. 050316
*S*                 DATE: NOVEMBER 2005
*S*
*S*                 INPUT FILE NAME: SUNPROP.HYM
*S*                 OUTPUT FILE NAME:  SUNPROP.OUT
*S*                  P:\050316\WR\STUDY\PROGRAMS\AHYMO\SUNDORO\OSEAmafcaAnalysis
*S*
*S*     COMMENTS:
*S*     MODEL SHOWS POST CONSTRUCTION CONDITIONS.  IT INCLUDES THE
*S*     PROPOSED LADERA DEVELOPMENT AS DEVELOPED
*S*     AND THE UNAFFECTED AREAS AS EXISITING CONDITIONS FOR THE LADERA WATERSHE
*S*     THIS MODEL WAS MODIFIED FROM THE EXISTING AND PROPOSED
*S*     CONDITIONS MODELS, SUNEX.OUT AND SUN18.OUT RESPECTIVELY.
*S*
*S*     MODELS WERE MODIFIED TO ACCOUNT FOR THE PROPOSED STORMCLOUD DEVELOPMENT,
*S*     AND THE EXISTING CONDITIONS WEST OF THE DEVELOPMENT.
*S*
*S*     THIS MODEL COMPUTES THE WSEL OF LADERA DAMS #9, #10, AND #11,
*S*     AND THE FLOW THROUGH STR 1, 2, AND 3 - WHICH ARE THE PRIMARY SD OF STORM
*S*
*S*     THIS MODEL DOES NOT INCLUDE ENLARGED DAMS AND DOES NOT INCLUDE ORIFICE P
*S*
*S*     BASIN DIVISION SCHEME WAS TAKEN FROM THE "PROPOSED DEVELOPMENT" ANAYLSIS
*S*
*S*     EXISTING CONDITIONS WERE ASSUMED TO BE THE SAME AS IN THE I-40 DMP MODEL
*S*
*S*     TP'S WERE ASSUMED NOT TO CHANGE FOR THE EXISTING DELINEATED BASINS.
*S*     TP = 0.133 hours as a min.
*S*
*S*     THE FOLLOWING IS FROM THE ORIGINAL WEST I-40 DMP, BUT ONLY CONTAINS THE
*S*     ANALYSIS.
*S*     ____________________________________________________________________
*S*
*S   AHYMO FILE FOR WEST I-40 DIVERSION DMP
*S   EXISTING CONDITIONS, 24HR, 100YR.
*S   WITH SEDIMENT BULKING & WITHOUT SEDIMENT TRAPPING AT DAMS.
*S
*S   WITH CORRECTED LADERA DAMS 5/14/96                                                          TIME=        .00
START
*S*****************************************************************************
*S                            LADERA WATERSHED
*S*****************************************************************************
*S       CALCULATE RUNOFF FOR BASINS DRAINING TO PONDS 1 THROUGH 9
*S                                REGION B1
*S*****************************************************************************
*S  RAINFALL FOR LADERA BASINS ABOVE DAM #12                                                     RAIN24=    2.602
RAINFALL  TYPE= 2
*S*****************************************************************************
```

PR-1

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                                 FROM  TO                    PEAK        RUNOFF                  TIME TO   CFS      PAGE =    2
                   HYDROGRAPH     ID   ID        AREA     DISCHARGE     VOLUME     RUNOFF         PEAK    PER
COMMAND          IDENTIFICATION   NO.  NO.      (SQ MI)     (CFS)      (AC-FT)   (INCHES)      (HOURS)  ACRE     NOTATION
                                                                                                                PK BF =    1.23
SEDIMENT BULK
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L0.1
COMPUTE NM HYD     TO_DAMZERO   -     1        .33750       248.06      11.616      .64534      1.650   1.148 PER IMP=     .00
*S   ROUTE FLOW THROUGH POND #0.
ROUTE RESERVOIR      PONDZERO    1     2        .33750       232.66      11.616      .64534      1.750   1.077 AC-FT=     1.047
*S ROUTE OUTFLOW FROM DAM ZERO THROUGH  BASIN L1.2  EARTHEN CHANNEL
ROUTE MCUNGE          L0.1_1     2     9        .33750       232.46      11.603      .64462      1.850   1.076 CCODE =       .1
                                                                                                                PK BF =    1.07
SEDIMENT BULK
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L1.2
COMPUTE NM HYD          L1.2   -     1        .11880       112.20       3.601      .56839      1.550   1.476 PER IMP=     .00
*S  COMBINED FLOW (BASIN L0.1 AND L1.2)
ADD HYD               L1.2_1  1& 9    2        .45630       263.50      15.205      .62478      1.800    .902
*S  ROUTE THROUGH  BASIN L1.1
ROUTE MCUNGE          L1.1_1     2     9        .45630       262.96      15.209      .62495      1.850    .900 CCODE =       .2
*S  COMPUTE HYDROGRAPH FOR BASIN L1.1
COMPUTE NM HYD          L1.1   -     1        .54380       232.82      14.492      .49968      1.750    .669 PER IMP=     .00
*S  COMBINED FLOW (BASINS L0.1, L1.1 AND L1.2)
ADD HYD               TO_DAM1  9& 1    9       1.00010       490.87      29.701      .55683      1.800    .767
*S  ROUTE FLOW THROUGH POND #1
ROUTE RESERVOIR         POND1    9    10       1.00010       145.76      29.701      .55683      2.300    .228 AC-FT=    16.565
*S  ROUTE OVERLAND FLOW FROM BASINS L0.1,L1.1,L1.2 THROUGH  BASIN L4.1
ROUTE MCUNGE          L4.1_1    10     9       1.00010       145.73      29.697      .55675      2.450    .228 CCODE =       .1
                                                                                                                PK BF =    1.05
SEDIMENT BULK
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L4.1
COMPUTE NM HYD          L4.1   -     6        .25940       194.09       7.339      .53046      1.600   1.169 PER IMP=     .00
*S
*S  DIVIDE FLOW FROM BASIN L4.1 INTO 3 PIECES FOR ROUTE THROUGH PONDS 2, 3, & 4
DIVIDE HYD            L4.1_2     6     1        .08638        64.63       2.444      .53046      1.600   1.169
                      L4.1_3  and     3        .17302       129.46       4.895      .53046      1.600   1.169
*S  ADD THE 1ST THIRD OF RUNOFF FROM BASIN L4.1 TO COMBINED FLOW
ADD HYD               TO_DAM2  1& 9   10       1.08648       149.90      32.140      .55466      2.400    .216
*S
*S   ROUTE FLOW THROUGH POND #2
ROUTE RESERVOIR         POND2   10     9       1.08648        69.07      32.140      .55465      4.150    .099 AC-FT=    15.028
*S  ADD 2ND THIRD OF RUNOFF FROM BASIN L4.1 TO FLOW FROM POND #2
ADD HYD               TO_DAM3  1& 9   10       1.17286        69.36      34.584      .55287      4.100    .092
*S
*S   ROUTE FLOW THROUGH POND #3
ROUTE RESERVOIR         POND3   10     9       1.17286        32.57      34.296      .54828      7.600    .043 AC-FT=    16.722
*S  ADD FLOW FROM REMAINING THIRD OF BASIN L4.1 TO FLOW FROM POND #3
ADD HYD               TO_DAM4  1& 9   10       1.25924        66.67      36.740      .54705      1.600    .083
*S
*S  ROUTE FLOW THROUGH POND #4
ROUTE RESERVOIR         POND4   10     9       1.25924        25.86      36.185      .53879     12.050    .032 AC-FT=     8.964
*S
*S  ROUTE OVERLAND FLOW FROM BASINS L0.1-L4.1 THROUGH  BASIN L5.1
ROUTE MCUNGE          L5.1_1     9    10       1.25924        25.86      36.169      .53855     12.050    .032 CCODE =       .2
                                                                                                                PK BF =    1.12
SEDIMENT BULK
*S
*S COMPUTE HYDROGRAPH FOR BASIN L5.1
```

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                                 FROM  TO                    PEAK      RUNOFF                  TIME TO   CFS
                                 ID    ID        AREA      DISCHARGE   VOLUME    RUNOFF        PEAK      PER
                HYDROGRAPH       NO.   NO.      (SQ MI)      (CFS)     (AC-FT)   (INCHES)     (HOURS)    ACRE      NOTATION
COMMAND       IDENTIFICATION

COMPUTE NM HYD          L5.1     -     1        .90000       364.59     28.934     .60279      1.850     .633 PER IMP=     .00
*S  COMBINED FLOW (BASINS L0.1-L4.1 AND L5.1)
ADD HYD              TO_DAM5   1&10   11       2.15924       371.04     65.103     .56533      1.850     .268
*S
*S
*S   ROUTE FLOW THROUGH POND #5
ROUTE RESERVOIR         POND5    11    9        2.15924       141.03     64.438     .55955      2.500     .102 AC-FT=    14.866
*S
*S
*S  ROUTE OVERLAND FLOW FROM BASINS L0.1-L5.1 THROUGH  BASIN L7.2
ROUTE MCUNGE          L7.2_1     9    78       2.15924       141.04     64.390     .55913      2.550     .102 CCODE =      .2
                                                                                                               PK BF =    1.02
SEDIMENT BULK
*S BASIN L7.1A IS THE SAME AS L7.1 IN I-40 DMP, WITH AN INCREASE OF
*S 20% IN AREA
*S  COMPUTE HYDROGRAPH FOR BASIN L7.1A
COMPUTE NM HYD          L7.1A    -    99        .00940         7.28      .205     .40935      1.500    1.210 PER IMP=     .00
*S  COMPUTE HYDROGRAPH FOR BASIN L7.2
COMPUTE NM HYD           L7.2    -     2        .06880        52.93     1.604     .43707      1.550    1.202 PER IMP=     .00
*S  DIVIDE ID=2 INTO 3 THIRDS FOR PONDS 6, 7 AND 8
DIVIDE HYD            L7.2_4     2     1        .02291        17.62      .534     .43707      1.550    1.202
                      L7.2_5   and     3        .04589        35.30     1.070     .43707      1.550    1.202
*S  ADD 1ST THIRD TO ROUTED FLOW
ADD HYD              TO_DAM6   1&78   10       2.18215       141.65     64.924     .55785      2.550     .101
*S
*S
*S   ROUTE FLOW THROUGH POND #6
ROUTE RESERVOIR         POND6    10    9        2.18215        83.36     64.281     .55233      3.750     .060 AC-FT=     9.983
*S
*S
*S  ADD 2ND THIRD TO POND OUTFLOW
ADD HYD              TO_DAM7   1& 9   10       2.20506        83.42     64.815     .55113      3.750     .059
*S
*S
*S  ROUTE FLOW THROUGH POND #7
ROUTE RESERVOIR         POND7    10    9        2.20506        71.37     64.209     .54598      4.950     .051 AC-FT=     6.159
*S
*S
*S  ADD LAST THIRD TO POND OUTFLOW
ADD HYD              TO_DAM8   1& 9   10       2.22797        71.37     64.743     .54486      4.950     .050
*S
*S
*S  ROUTE FLOW THROUGH POND #8
ROUTE RESERVOIR         POND8    10    9        2.22797        46.90     61.844     .52046      7.500     .033 AC-FT=    11.668
*S
*S
*S  ROUTE OVERLAND FLOW FROM BASINS L0.1-L7.2 THROUGH  BASIN I-2.4
ROUTE MCUNGE          L9.2_1     9    10       2.22797        46.91     61.771     .51985      7.500     .033 CCODE =      .2
                                                                                                               PK BF =    1.10
SEDIMENT BULK
*S  COMPUTE HYDROGRAPH FOR BASIN L9.1
*S  COMPUTE HYDROGRAPH FOR BASIN L9.1A
COMPUTE NM HYD          L9.1A    -     1        .19770       143.48      5.159     .48929      1.550    1.134 PER IMP=     .00
*S  COMPUTE HYDROGRAPH FOR BASIN L9.1B
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                                FROM  TO                    PEAK        RUNOFF                  TIME TO    CFS
                  HYDROGRAPH    ID    ID        AREA      DISCHARGE    VOLUME     RUNOFF        PEAK      PER
COMMAND         IDENTIFICATION  NO.   NO.      (SQ MI)      (CFS)      (AC-FT)   (INCHES)     (HOURS)    ACRE      NOTATION

COMPUTE NM HYD          L9.1B    -     9        .06700       45.79       1.748     .48929      1.550     1.068 PER IMP=     .00
*S  ROUTE L9.1B THRU "DAM 9.1" ARROYO, LOCATED IN L9.2B
ROUTE MCUNGE     L9.1B_DAM9.1    9    50        .06700       45.78       1.748     .48907      1.600     1.068 CCODE =       .1
SEDIMENT BULK                                                                                                     PK BF =     1.02
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L9.2A
COMPUTE NM HYD          L9.2A    -     3        .00400        3.35        .094     .43895      1.500     1.308 PER IMP=     .00
*S  COMPUTE HYDROGRAPH FOR BASIN L9.2B
COMPUTE NM HYD          L9.2B    -     4        .01220       10.20        .286     .43895      1.500     1.306 PER IMP=     .00
*S
*S  STRUCTURE 2 INFLOW--STR 2
*S  STRUCT 2
*S  COMBINE ROUTED FLOW FROM DAM 9.1 aRROYO AND BASIN L9.2B
ADD HYD                  AP2 50& 4    5        .07920       53.77       2.033     .48134      1.600     1.061
*S                                                                                                                PK BF =     1.02
SEDIMENT BULK
*S  COMBINE L9.1A AND BASIN L9.2A
ADD HYD           DAM9.1L9.2A  1& 3   52        .20170      146.69       5.253     .48830      1.550     1.136
*S
*S  STRUCTURE 1 INFLOW--STR 1
*S  STRUCT 1
*S  COMBINE FLOW WITH BASIN L7.1A
ADD HYD                  AP1 52&99   96        .21110      153.69       5.458     .48478      1.550     1.138
*S
*S  THIS PORTION OF THE .HYM INCORPORTES AND ACCOUNTS FOR THE FLOW
*S  FROM BASIN I-2(STORMCLOUD) AS WELL ASTHROUGH STRUTURES 1 AND 2 (PRIMARY SD N
*S  COMPUTE HYDROGRAPH FOR BASIN I2.1
COMPUTE NM HYD          I2.1    -    92        .09750      206.26       8.422    1.61960      1.500     3.305 PER IMP=   50.00
*S  COMPUTE HYDROGRAPH FOR BASIN I2.4
COMPUTE NM HYD          I2.4    -    93        .01700       16.39        .454     .50031      1.500     1.507 PER IMP=     .00
*S  ROUTE FLOW FROM STR1 THRU I2 VIA 60"RCP
ROUTE MCUNGE          STR1SD1   96    53        .21110      153.47       5.451     .48417      1.600     1.136 CCODE =       .1
*S  ROUTE FLOW FROM STR2 THRU I2 VIA 42"RCP
ROUTE MCUNGE          STR2SD4    5    52        .07920       53.55       2.034     .48155      1.600     1.056 CCODE =       .2
*S  COMBINE ROUTE STR1 AND ROUTE STR2
ADD HYD                 STR1&2 52&53   54        .29030      207.02       7.485     .48345      1.600     1.114
*S  ROUTE FLOW STR 1 & 2  THRU I2 VIA 72"RCP
ROUTE MCUNGE         STR12SD2   54    55        .29030      205.45       7.490     .48378      1.600     1.106 CCODE =       .2
*S  COMBINE I2.1 AND FLOW FROM STRUC 1 & 2 VIA 72"RCP
ADD HYD              I2.2I2.1 55&92   60        .38780      354.29      15.912     .76934      1.550     1.427
*S  COMBINE ROUTED STR1 STR2 AND I2.4
ADD HYD                 SD1I2.4 93&60   56        .40480      369.94      16.366     .75804      1.550     1.428
*S  COMBINE I-2.1 AND I-2.4 AND OTHER UPSTREAM BASINS FLOWING INTO POND#9
ADD HYD           I2OTHERS2D9 56&10   61       2.63277      370.15      78.137     .55647      1.550      .220
*S  ROUTE FLOW THROUGH DAM #9
*S   CREST=5276.0, TOP=5279.0,  2-24" PIPES
ROUTE RESERVOIR         POND9   61    99       2.63277       63.53      77.137     .54935      2.100      .038 AC-FT=   10.164
*S  SKIP FROM DAM 10 UP TO TOP OF LADERA WATERSHED
*S*************************************************************************
*S*************************************************************************
*S    CALCULATE RUNOFF BEGINNING AT THE TOP OF LADERA L12 WATERSHED.
*S  UPPER LADERA BASINS START AT DOUBLE EAGLE II AIRPORT & DRAIN TO DAM12
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                                FROM  TO                    PEAK        RUNOFF                  TIME TO    CFS
                   HYDROGRAPH    ID   ID        AREA     DISCHARGE     VOLUME     RUNOFF        PEAK     PER
COMMAND          IDENTIFICATION  NO.  NO.      (SQ MI)     (CFS)       (AC-FT)   (INCHES)     (HOURS)   ACRE      NOTATION

*S                            REGION B2
*S*************************************************************************                                  PK BF =    1.02
SEDIMENT BULK
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L12.1  NON-CONTRIBUTING BASIN.
COMPUTE NM HYD          L12.1   -     1        .22190       95.70       6.764       .57157    1.750     .674 PER IMP=   5.00
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L12.2  NON-CONTRIBUTING BASIN.
COMPUTE NM HYD          L12.2   -     2       1.13590     1062.88      32.061       .52922    1.550    1.462 PER IMP=   4.00
*S  COMBINED FLOW FROM NON-CONTRIBUTING BASINS (BASIN L12.1 AND L12.2)
*S  NOTE:  THERE IS ON-SITE RETENTION BETWEEN THE RUNWAYS.  THIS WILL
*S  ATTENUATE FLOW.  ALSO, THE PLAYA IN L12.2 CAN HOLD ESTIMATED 70 ACRE-FT.
ADD HYD                L12.2_1  1& 2   4       1.35780     1116.71      38.825       .53614    1.550    1.285
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L12.3
COMPUTE NM HYD          L12.3   -     1        .33130      102.29       7.362       .41668    1.800     .482 PER IMP=    .00
*S  ROUTE L12.3 THROUGH L12.6
ROUTE MCUNGE           L12.3_1    1   49        .33130       97.49       7.260       .41087    2.300     .460 CCODE =      .1
ROUTE MCUNGE           L12.3_1   49   50        .33130       89.66       7.124       .40321    2.500     .423 CCODE =      .2
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L12.5
COMPUTE NM HYD          L12.5   -     1        .73130      208.76      15.966       .40935    1.850     .446 PER IMP=    .00
*S  ROUTE L12.5 THROUGH L12.4
ROUTE MCUNGE           L12.4_1    1   51        .73130      198.14      16.004       .41033    2.150     .423 CCODE =      .2
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L12.4
COMPUTE NM HYD          L12.4   -     1        .60160      198.12      14.018       .43688    1.800     .515 PER IMP=   1.00
*S  ADD L12.4 AND L12.5
ADD HYD                L12.4_2  1&51   2       1.33290      326.46      30.021       .42231    2.050     .383
*S  ROUTE COMBINED (L12.4 AND L12.5) THROUGH L12.6
ROUTE MCUNGE           L12.6_1    2   51       1.33290      320.23      29.942       .42120    2.550     .375 CCODE =      .2
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L12.6
COMPUTE NM HYD          L12.6   -     1        .94530      276.32      23.528       .46668    1.900     .457 PER IMP=   1.00
*S  ADD (L12.4-5) & L12.6
ADD HYD                L12.6_2  1&51   2       2.27820      439.45      53.470       .44007    2.400     .301
*S ADD (L12.4-6) & L12.3
ADD HYD                L12.6_3  2&50   4       2.60950      522.89      60.595       .43539    2.400     .313
*S  ROUTE COMBINED (L12.3, L12.4, L12.5, AND L12.6) THROUGH L12.7
ROUTE MCUNGE           L12.7_1    4   49       2.60950      468.63      59.660       .42867    2.550     .281 CCODE =      .2
ROUTE MCUNGE           L12.7_1   49   50       2.60950      467.18      59.653       .42862    2.600     .280 CCODE =      .2
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L12.7
COMPUTE NM HYD          L12.7   -     1       1.05630      257.19      24.199       .42955    1.950     .380 PER IMP=   1.00
*S  ADD (L12.3-6) & L12.7
ADD HYD                L12.7_2  1&50   3       3.66580      580.88      83.852       .42889    2.450     .248
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L12.8
COMPUTE NM HYD          L12.8   -     1        .42190       99.92       9.666       .42955    1.950     .370 PER IMP=   1.00
*S  ROUTE L12.8 THROUGH L12.7
ROUTE MCUNGE           L12.7_3    1   50        .42190       99.84       9.666       .42958    1.950     .370 CCODE =      .2
*S ADD (L12.3-7) & L12.8
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D.R.-5

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                                FROM  TO                    PEAK        RUNOFF                  TIME TO   CFS
                   HYDROGRAPH    ID   ID        AREA     DISCHARGE     VOLUME     RUNOFF        PEAK     PER
COMMAND          IDENTIFICATION  NO.  NO.     (SQ MI)      (CFS)       (AC-FT)   (INCHES)     (HOURS)   ACRE      NOTATION
ADD HYD                L12.7_4  3&50   3     4.08770      663.37       93.518     .42896       2.050    .254
*S  ROUTE COMBINED (L12.3-8) THROUGH L12.9 -- UPPER REACHES MIREHAVEN A ARROYO
ROUTE MCUNGE           L12.9_1    3   49     4.08770      661.69       93.556     .42914       2.100    .253  CCODE =      .1
ROUTE MCUNGE           L12.9_1   49   50     4.08770      658.87       93.473     .42876       2.350    .252  CCODE =      .1
SEDIMENT BULK                                                                                              PK BF =    1.07
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L12.9
COMPUTE NM HYD           L12.9    -    1      .65940      235.11       15.365     .43689       1.750    .557  PER IMP=     .00
*S  ADD (ROUTED L12.3-8) & L12.9
ADD HYD                L12.9_2  1&50   4     4.74710      728.07      108.838     .42989       2.350    .240
SEDIMENT BULK                                                                                              PK BF =    1.02
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L12.11
COMPUTE NM HYD          L12.11    -    1      .27340       67.21        6.210     .42591       1.900    .384  PER IMP=    1.00
*S  ROUTE L12.11 THROUGH L12.12
ROUTE MCUNGE          L12.12_1    1   49      .27340       67.21        6.212     .42606       2.000    .384  CCODE =      .2
ROUTE MCUNGE          L12.12_1   49   50      .27340       66.79        6.195     .42487       2.400    .382  CCODE =      .1
*S
*S  ADD ROUTED L12.11 & L12.3-9
ADD HYD               L12.12_2  4&50   2     5.02050      793.85      115.033     .42961       2.350    .247
*S
*S  ROUTE COMBINED (L12.3-9,11) THROUGH L12.12 -- UPPER REACHES OF MIREHAVEN "A"
ROUTE MCUNGE          L12.12_3    2   50     5.02050      790.74      115.033     .42961       2.400    .246  CCODE =      .2
SEDIMENT BULK                                                                                              PK BF =    1.07
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L12.12
COMPUTE NM HYD          L12.12    -    1      .35310      125.41        7.940     .42162       1.750    .555  PER IMP=     .00
*S  ADD ROUTED L12.3-9,11 & L12.12
ADD HYD               L12.12_4  1&50   3     5.37360      823.94      122.973     .42909       2.350    .240
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L12.10
COMPUTE NM HYD          L12.10    -    1      .22190      125.67        5.492     .46410       1.600    .885  PER IMP=     .00
*S ADD ROUTED L12.3-9,11,12 & L12.10
ADD HYD               L12.10_1  1& 3   4     5.59550      835.51      128.465     .43048       2.350    .233
*S  ROUTE COMBINED (L12.3-12) THROUGH L12.13 --
*S  MIREHAVEN "A" ROUTED FROM PLATEAU ABOVE ESCARPMENT TO BELOW ESCARPMENT
ROUTE MCUNGE          L12.13_1    4   49     5.59550      832.58      128.401     .43026       2.550    .232  CCODE =      .1
ROUTE MCUNGE          L12.13_1   49    4     5.59550      832.58      128.401     .43026       2.550    .232  CCODE =      .0
ROUTE MCUNGE          L12.13_1    4   50     5.59550      832.58      128.401     .43026       2.550    .232  CCODE =      .0
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L12.13
COMPUTE NM HYD          L12.13    -    1      .26090      146.13        6.133     .44074       1.600    .875  PER IMP=     .00
*S  ADD ROUTED L12.3-12 & L12.13
*S  TOTAL MIREHAVEN "A" ARROYO FLOW AT BASE OF ESCARPMENT
ADD HYD               L12.13_2  1&50   4     5.85640      842.30      134.533     .43073       2.550    .225
SEDIMENT BULK                                                                                              PK BF =    1.02
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L12.15
COMPUTE NM HYD          L12.15    -    1      .43910      120.80        9.974     .42591       1.850    .430  PER IMP=    1.00
*S  ROUTE L12.15 THROUGH L12.16  --  MIREHAVEN "C" ARROYO
ROUTE MCUNGE          L12.16_1    1   49      .43910      119.26        9.936     .42427       2.150    .424  CCODE =      .1
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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
ROUTE MCUNGE	L12.16_1	49	1	.43910	118.42	9.917	.42345	2.550	.421	CCODE = .1
ROUTE MCUNGE	L12.16_1	1	50	.43910	117.95	9.893	.42246	3.000	.420	CCODE = .1
SEDIMENT BULK										PK BF = 1.07
*S										
*S COMPUTE HYDROGRAPH FOR BASIN L12.16										
COMPUTE NM HYD	L12.16	-	1	.85470	252.77	21.605	.47397	1.900	.462	PER IMP= .00
*S ADD ROUTED L12.15 & L12.16										
ADD HYD	L12.16_2	1&50	2	1.29380	252.77	31.499	.45649	1.900	.305	
*S										
*S COMPUTE HYDROGRAPH FOR BASIN L12.14										
*S MIREHAVEN "B" ARROYO										
COMPUTE NM HYD	L12.14	-	1	.40160	126.88	10.607	.49520	1.900	.494	PER IMP= .00
*S ADD L12.15,16 & L12.14										
ADD HYD	L12.14_1	1& 2	3	1.69540	379.64	42.105	.46566	1.900	.350	
*S										
*S COMPUTE HYDROGRAPH FOR BASIN L12.17										
COMPUTE NM HYD	L12.17	-	1	.20310	125.15	5.340	.49296	1.600	.963	PER IMP= .00
*S ADD L12.14-16 & L12.17 -- FLOW AT LADERA TRAINING DIKE										
ADD HYD	DIKE	1& 3	2	1.89850	444.62	47.445	.46858	1.800	.366	
*S ROUTE COMBINED (L12.14-L12.17) IN MIREHAVEN ARROYO DNSTREAM FROM TRNG DIKE										
*S TO CONFLUENCE WITH MIREHAVEN "A" ARROYO BELOW ESCARPMENT										
ROUTE MCUNGE	L12.18_1	2	50	1.89850	444.04	47.405	.46818	2.050	.365	CCODE = .1
*S										
*S ADD L12.14-17 & L12.3-13										
*S TOTAL FLOW MIREHAVEN A, B, C ARROYOS BELOW ESCARPMT, DNSTRM FROM TR DIKE										
ADD HYD	L12.18_2	4&50	3	7.75490	1097.92	181.938	.43989	2.400	.221	
*S ROUTE L12.3-17 THROUGH MIREHAVEN ARROYO TO INTERSECTION W/FUTURE 98TH ST										
ROUTE MCUNGE	L12.18_3	3	50	7.75490	1095.77	181.799	.43956	2.650	.221	CCODE = .1
*S										
*S COMPUTE HYDROGRAPH FOR BASIN L12.18										
COMPUTE NM HYD	L12.18	-	1	.51410	243.36	12.350	.45042	1.650	.740	PER IMP= .00
*S										
*S ADD L12.3-17 & L12.18 -- TOTAL FLOW IN MIREHAVEN AT FUTURE 98TH STREET										
ADD HYD	L12.18_4	1&50	2	8.26900	1114.88	194.149	.44023	2.650	.211	
*S COMPUTE HYDROGRAPH FOR BASIN L14.5										
COMPUTE NM HYD	L14.5	-	1	.08280	74.23	2.058	.46607	1.500	1.401	PER IMP= .00
*S ADD L12.3-18 & L14.5										
ADD HYD	L12.18_5	1& 2	3	8.35180	1116.52	196.207	.44049	2.650	.209	
*S COMPUTE HYDROGRAPH FOR BASIN L12.19										
COMPUTE NM HYD	L12.19	-	1	.17600	146.94	4.338	.46214	1.550	1.304	PER IMP= .00
*S BASIN L12.20 DIVIDED INTO 12.20A, 12.20B, AND 12.20C										
*S COMPUTE HYDROGRAPH FOR BASIN L12.20A										
COMPUTE NM HYD	L12.20A	-	4	.01180	11.16	.310	.49296	1.500	1.477	PER IMP= .00
*S										
*S STRUCTURE #3 INFLOW--STR 3										
*S STRUCTURE 3										
ADD HYD	AP3	1& 4	5	.18780	157.62	4.648	.46407	1.550	1.311	
*S										
*S COMPUTE HYDROGRAPH FOR BASIN L12.20C										
COMPUTE NM HYD	L12.20C	-	6	.05900	55.77	1.551	.49296	1.500	1.477	PER IMP= .00
*S ADD L12.18-14.5A TO BASIN L12.20C										
*S FLOW GOES TO DAM 12										

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                                FROM  TO                      PEAK        RUNOFF                  TIME TO    CFS
                                ID    ID        AREA      DISCHARGE      VOLUME      RUNOFF        PEAK     PER
                   HYDROGRAPH   NO.   NO.      (SQ MI)      (CFS)        (AC-FT)    (INCHES)     (HOURS)   ACRE      NOTATION
COMMAND          IDENTIFICATION
ADD HYD          L12.18-14.5A  3& 6   7       8.41080      1117.73      197.758      .44086      2.650    .208
*S  ROUTE COMBINED (L12.13-L12.18) IN MIREHAVEN THRU L12.20 TO DAM#12
ROUTE MCUNGE        L12.20_1    7   51       8.41080      1117.38      197.719      .44077      2.750    .208 CCODE =      .1
SEDIMENT BULK                                                                                              PK BF =    1.03
*S  THE FLOW FROM THE 66"RCP WILL NOT BE ROUTED TO POND#10, IN THIS ANALYSIS
*S  INSTEAD IT WILL BE ROUTED TO POND#11
*S  ROUTE FLOW FROM STR3 THRU 1ST SEGMENT OF I2.2 VIA 66"RCP
ROUTE MCUNGE      STR3THRU66    5   55        .18780       154.56        4.626      .46189      1.550    1.286 CCODE =      .1
*S  COMPUTE HYDROGRAPH FOR BASIN D17
COMPUTE NM HYD           D17    -    7        .01400        29.76        1.213     1.62434      1.500    3.322 PER IMP=  50.00
ROUTE MCUNGE      D17THRU24"    7   10        .01400        29.76        1.213     1.62432      1.500    3.322 CCODE =      .0
*S COMBINE ROUTED FLOW FROM D17 AND OFFSITE STRUC#3 FLOW
ADD HYD           STR3ANDD17 10&55   2        .20180       180.95        5.839      .54253      1.550    1.401
ROUTE MCUNGE    STR3D17THRU6    2    1        .20180       178.54        5.840      .54265      1.550    1.382 CCODE =      .2
*S  COMPUTE HYDROGRAPH FOR BASIN I2.2
COMPUTE NM HYD          I2.2    -   95        .07200       152.95        6.237     1.62435      1.500    3.319 PER IMP=  50.00
*S  COMBINE ROUTED FLOW WITH BASIN I2.2 - THIS IS FLOW TO POND#11
ADD HYD              D17STR3 95& 1   2        .27380       314.18       12.078      .82710      1.550    1.793
*S ROUTE COMBINED FLOW THROUGH 3RD SEGMENT TO POND#11 VIA 66" RCP
*S THIS WILL BE THE TOTAL FLOW RE-ROUTED TO POND#11
*S  Note this flow has not been added to the flow from D17.4, and I2.3,
ROUTE MCUNGE    TOTALRE-ROUT    2   97        .27380       303.88       12.040      .82448      1.600    1.734 CCODE =      .1
*S  THESE BASINS WILL GO TO POND#10 - via sheet flow
*S  COMPUTE HYDROGRAPH FOR BASIN I2.3
COMPUTE NM HYD          I2.3    -   94        .02900        45.69        1.364     .88181      1.500    2.462 PER IMP=   7.00
*S BASIN D17.4 TAKEN FROM "THE CROSSINGS" DRAINAGE REPORT
*S TAKEN AS AREA LEFT FROM BASIN L12.20 MINUS D17 & I-2
*S  COMPUTE HYDROGRAPH FOR BASIN D17.4
COMPUTE NM HYD         D17.4    -    8        .00180         3.71         .159    1.65461      1.500    3.217 PER IMP=  57.00
ADD HYD              D17I2.3 94& 8   9        .03080        49.40        1.523     .92696      1.500    2.506
*S  ROUTE OUTFLOW FROM DAM 9 OVERLAND THROUGH SMALL PORTION OF BASIN I2.3
ROUTE MCUNGE    TO_DAM10FROM   99   10       2.63277        63.52       77.100     .54909      2.100     .038 CCODE =      .2
*S  ADD ALL COMBINED FLOW INTO DAM#10
*S  ADD HYD FOR D17.4, I2.3 AND OVERLAND FLOW
ADD HYD         TO_DAM10_ALL 10& 9  11       2.66357        80.32       78.622     .55346      1.550     .047
*S  ROUTE COMBINED THROUGH DAM #10
*S   CREST=5257.0, TOP=5260.0
ROUTE RESERVOIR       POND10   11    9       2.66357        35.16       68.544     .48251     14.800     .021 AC-FT=   18.848
*S  COMPUTE HYDROGRAPHS FOR BASINS IN THE CROSSINGS
*S  COMPUTE HYDROGRAPHS FOR BASINS 1-5
COMPUTE NM HYD          B1_5    -    2        .01600        33.73        1.377    1.61361      1.500    3.294 PER IMP=  50.00
*S  COMPUTE HYDROGRAPHS FOR BASIN D4
COMPUTE NM HYD            D4    -    1        .00120         2.54         .103    1.61361      1.500    3.311 PER IMP=  50.00
*S  ADD BASINS D4 AND 1-5
ADD HYD                 D41_5  2& 1   3        .01720        36.28        1.480    1.61357      1.500    3.295
*S
*S  COMPUTE HYDROGRAPHS FOR BASIN D9 AND D11
COMPUTE NM HYD          D911    -    1        .00600         7.99         .242     .75562      1.500    2.081 PER IMP=   7.00
*S  ADD BASINS D911 AND UPSTREAM
ADD HYD                 D41_5  3& 1   1        .02320        44.26        1.722    1.39168      1.500    2.981
*S
*S  COMPUTE HYDROGRAPHS FOR BASIN D10 AND D12
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PR-8

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
COMPUTE NM HYD	D1012	-	2	.00300	7.04	.311	1.94657	1.500	3.669	PER IMP= 70.00
*S ADD BASINS D1012 AND UPSTREAM										
ADD HYD	D41_5	2& 1	2	.02620	51.31	2.033	1.45520	1.500	3.060	
*S										
*S COMPUTE HYDROGRAPHS FOR BASIN D15										
COMPUTE NM HYD	D15	-	3	.00440	4.66	.128	.54608	1.500	1.653	PER IMP= .00
*S ADD BASINS D15 AND UPSTREAM										
ADD HYD	TO_DAM11	3& 2	1	.03060	55.96	2.162	1.32448	1.500	2.858	
*S										
*S ADD ALL FLOW INTO POND#11 PLUS POND#10 FLOW										
ADD HYD	TO_DAM11	1& 9	1	2.69417	57.12	70.706	.49208	1.500	.033	
*S										
*S THIS FLOW SHOULD BE COMBINATION OF ALL ROUTED TO POND #11										
*S WITH THE INCLUSION OF TOTAL OF SD3 FLOW										
*S ADD ALL FLOW FROM POND#10, CROSSINGS, AND TIERRA O, WITH SD3										
ADD HYD	TOTAL_INTO_D	1&97	2	2.96797	349.20	82.746	.52274	1.550	.184	
*S										
*S ROUTE TOTAL FLOW THROUGH DAM #11										
*S CREST=5234.7, TOP=5236.5, 1-24"										
ROUTE RESERVOIR	POND11	2	9	2.96797	34.09	69.757	.44069	20.050	.018	AC-FT= 15.695
ROUTE MCUNGE	L12.20_6	9	10	2.96797	34.09	69.433	.43864	20.150	.018	CCODE = .2
*S ADD SECOND HALF OF FLOW FROM L12.20 TO MIREHAVEN CHAN										
*S TOTAL FLOW IN MIREHAVEN CHANNEL NORTH OF DAM 12										
ADD HYD	L12.20_7	2&51	3	11.37877	1139.49	280.465	.46215	2.750	.156	
*S PLOT2 HYD=L12.20_7 TOTAL FLOW IN MIREHAVEN CHANNEL NORTH OF DAM 12										
*S										
*S COMBINED MIREHAVEN AND DAM #11 OUTFLOW -- TOTAL FLOW INTO DAM #12										
ADD HYD	TO_DAM12	3&10	9	14.34674	1163.08	349.898	.45729	2.750	.127	
FINISH										

DR-9

Bohannan △ Huston INC.

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87109-4335

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CITY OF ALBUQUERQUE

June 7, 2007

Kevin Patton, P.E.
Bohannan Huston, Inc.
7500 Jefferson NE-Courtyard 1
Albuquerque, NM 87109

RE: Stormcloud Subdivision (J-18/D001)
Engineers Certification for Release of Financial Guaranty
Engineers Stamp dated 7/25/05
Engineers Certification dated 6/07/07

Based upon the information provided in your Engineer's Certification Submittal dated 6/06/07, the above referenced plan is adequate to satisfy the Grading and Drainage Certification for Release of Financial Guaranty.

If you have any questions, you can contact me at 924-3982.

Sincerely,

Timothy Sims
Plan Checker-Hydrology
Development and Building Services

C: Marilyn Maldonado-W.O. #: 650278-80
File

P.O. Box 1293

Albuquerque

New Mexico 87103

www.cabq.gov

CITY OF ALBUQUERQUE

October 26, 2010

Craig Hoover, PE
Bohannan Huston, Inc
7500 Jefferson NE
Albuquerque, NM 87109

Re: Storm Cloud Subdivision Amendment # 2 Drainage Report
Engineer's Stamp dated 9-3-10, (J8/D1)

Dear Mr. Hoover,

Based upon the information provided in your submittal dated 9-3-10, the above referenced Amended Report is approved.

If you have any questions, you can contact me at 924-3986.

Sincerely,

Bradley L. Bingham, PE
Principal Engineer, Planning Dept.
Building and Development Services

C: Lynn Mazur, AMAFCA
file

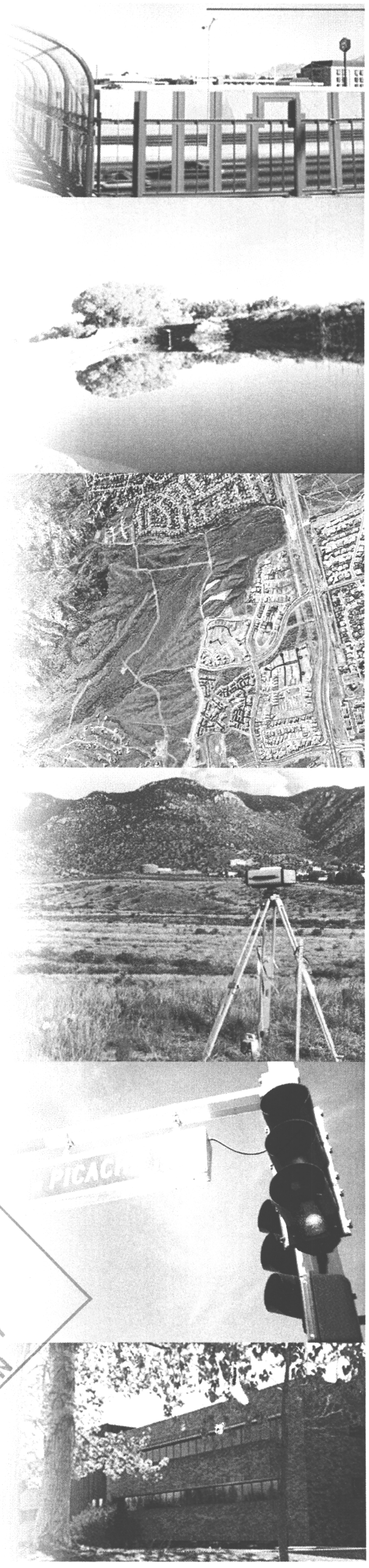
PO Box 1293

Albuquerque

NM 87103

www.cabq.gov

AMENDMENT NO. 2
STORMCLOUD SUBDIVISION
DRAINAGE REPORT



SEPTEMBER 3, 2010

Prepared for:

SunCal Companies
201 3rd St NW
Albuquerque, New Mexico 87102

RECEIVED
SEP 0 3 2010
HYDROLOGY SECTION

Bohannan ▲ Huston INC.

ENGINEERING ▲
SPATIAL DATA ▲
ADVANCED TECHNOLOGIES ▲

AMENDMENT NO. 2
STORMCLOUD SUBDIVISION
DRAINAGE REPORT

SEPTEMBER 3, 2010

PREPARED BY:

BOHANNAN HUSTON INC.

COURTYARD ONE

7500 JEFFERSON NE

ALBUQUERQUE, NM 87109

Craig W. Hoover 9/3/10

Craig W. Hoover, P.E. Date

CRAIG W. HOOVER
NEW MEXICO
11848
REGISTERED PROFESSIONAL ENGINEER

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Appendix A – Existing Conditions Hydrology Calculations

Appendix B – Fully Developed Conditions Hydrology Calculations

Appendix C – CD Containing AHYMO Input and Output Files

I. EXECUTIVE SUMMARY

This report will serve as Amendment No. 2 to the Drainage Report for Stormcloud Subdivision, Bohannan Huston Inc., May 2005, which was prepared for Westland Development. The Drainage Report described the drainage management plan for the Stormcloud Subdivision at Westland. The proposed development of the Stormcloud Subdivision consists of 520 single-family residential lots, which sit on approximately 106 acres. The project was divided into three sequentially built units. The Drainage Report addressed the management of both the onsite drainage, which was analyzed for development within Stormcloud, as well as the drainage originating from the future development upstream of Stormcloud. The Drainage Report stated that because of the future development upstream of Stormcloud, the Ladera System of Dams #9, #10, and #11 lacked the capacity to effectively perform under their current design for the 100-yr event. Therefore, the Drainage Report recommended that Dams #9 and #10 required expansion of their storage pools, as well as installing orifice plates to their primary spillways. This recommendation allowed Dams #9, #10, and #11 to effectively perform as detention facilities while maintaining a minimum freeboard of one-foot as required by the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA).

Ongoing discussions with Westland Development Corporation, AMAFCA, and the New Mexico Office of the State Engineer (OSE), regarding the Ladera System of Dams, prompted a further analysis into the recommendations described in the Drainage Report for Dams #9 and #10. The analysis described in Amendment No. 1 to the Drainage Report for Stormcloud Subdivision was performed to determine the post-construction conditions of Stormcloud and its effects on Dams #9, #10, and #11. The post-construction analysis included: existing land treatment conditions west of Stormcloud, and fully developed land treatments within Stormcloud. Within this analysis Dams #9, #10, and #11 were also treated as existing structures with no modifications (i.e. without storage pool expansions or orifice plates installed). In summary, the analysis for Amendment No. 1 produced the following results:

- Dams #9 and #10 will not require storage pool expansions during the post-construction phases of Stormcloud
- Dams #9 and #10 will not require the installation of orifice plates during the post-construction phases of Stormcloud

These results indicated that Dams #9, #10, and #11 can remain "as-is" in their current condition with the construction of the Stormcloud Subdivision, without exceeding the capacity of the dam system. Amendment No. 1 stated that in order to accommodate the fully developed conditions upstream of Stormcloud, the expansions and orifice plate designs for Dams #9 and #10 will need to be implemented, to accommodate the increase in flow rates.

In 2009 the New Mexico State Legislature and Governor approved House Bill 63 which changed the OSE criteria for jurisdictional status of dams. Specifically, the maximum height and storage volumes for non-jurisdictional dams were increased to 25 feet in height and 50 acre-feet (ac-ft) in volume. With this change it is advantageous to shift the proposed Ladera Dam system expansion from Dam #10 to other dams, as Ladera Dam #10 is still considered jurisdictional under the new criteria while other smaller dams, such as Dams #8 and #9 are not. This allows changes, more specifically expansions, to be made to these two dams without requiring approval by the OSE. However, a non-jurisdictional determination for both Dam #8 and Dam #9 from the OSE is required and is part of a separate submittal. Consequently, due to new jurisdictional thresholds of the OSE, the expansion of Dams #8 and #9 rather than Dam #10 is proposed in this Amendment No. 2 to the Drainage Report for Stormcloud Subdivision. In this analysis, the storage pools for both Dams #8 and #9 were expanded to meet hydrologic and hydraulic requirements resulting from the development of the Stormcloud Subdivision plus fully developed conditions in the contributing watershed. Additionally, under the Clean Water Act Section 404 Compensatory Mitigation Requirements, two acres of mitigation are required at the Stormcloud site. This is accounted for in the expansion of Dams #8 and #9.

II. ANALYSIS

In order to satisfy the 404 mitigation requirement of two acres at the Stormcloud site, three different options were considered: 1) Expanding the bottom of Dam #9 by two acres, 2) expanding the bottom of Dam #9 and designing a low-flow swale from the end of the park at Stormcloud Avenue NW and Summer Breeze Drive NW to the arroyo above Dam #9; and 3) expanding the bottoms of both Dams #8 and #9. Option 1 was ruled out due to the large amount of land and excavation that this option would require to achieve the necessary storage volume. Option 2 was ruled out due to the cost of construction of a swale around the hills upstream of Dam #9. It is recommended that both Dams #8 and #9 be expanded, as in Option 3. The proposed elevations of the pond bottoms will not change from the existing elevations. Currently, Dam #9 has a bottom

area of 2.42 acres and a storage volume of 27.5 ac-ft. This amendment No. 2 recommends the addition of 0.95 acres to this area and 10.2 ac-ft to this volume, for a total proposed area of 3.37 acres and a total proposed storage volume of 37.7 ac-ft. The current area of the bottom of Dam #8 is 2.87 acres and the current storage volume of this dam is 36.2 ac-ft. This amendment No. 2 recommends the addition of 2.19 acres to this area and 13.2 ac-ft to this volume, for a total proposed area of 5.06 acres and a total proposed storage volume of 49.4 ac-ft. Dams #8 and #9 are located downstream (southeast) of the Stormcloud Subdivision. These dams and the basin divisions can be seen in Figure 1. The grading plan for Dam #8 can be seen in Figure 2 and the grading plan for Dam #9 can be seen in Figure 3. The cross-section of Dams #8 and #9 can be seen in Figure 4.

For this amendment, two scenarios were analyzed. The first assumes that the existing conditions will consist of existing land treatments west (upstream) of Stormcloud, and fully developed land treatments within Stormcloud. This scenario was referred to as "post-construction" in Amendment No. 1. The second assumes that the fully developed conditions will consist of fully developed land treatments within Stormcloud as well as upstream of the development. The modeled design storm for the watershed was the 100-yr, 24-hr event. The hydrology used in this report includes the hydrology from the approved West I-40 Diversion Drainage Management Plan (DMP) completed by BHI in June 2000. AHYMO Version 1997.02c was used for this analysis. The post-construction model of the Stormcloud Subdivision (November 2005) was used as the initial AHYMO input file.

The expanded stage-storage-outflow curves for Dams #8 and #9 were modeled in this analysis for both existing and fully developed conditions. These curves were modified from the post-construction model of the Stormcloud Subdivision to include the larger bottom areas and storage volumes described above. The AHYMO ROUTE RESERVOIR command was used to compute the maximum water surface elevation and maximum outflow from the Dams.

III. RESULTS

The summary output of the AHYMO model for the existing conditions analysis can be found in Appendix A. Table 1 lists the flow rates into Dams #8 through #11, the runoff volume from the basins contributing to the dams (inflow volume), the flow rates out of Dams #8 through #11, the

maximum storage, the maximum water surface elevation (WSEL), the emergency spillway crest elevations, and the computed freeboard for the existing conditions analysis.

Table 1: Summary of Existing Conditions Model Output

Ladera Dam No.	Existing Conditions Computed Max. Q_{in} (cfs)	Existing Conditions Inflow Volume (ac-ft)	Existing Conditions Computed Max. Q_{out} (cfs)	Existing Conditions Maximum Storage (ac-ft)	Existing Conditions Computed Max. 100-yr WSEL (ft)	Emergency Spillway Invert (Crest) Elevation (ft)	Existing Conditions Computed Freeboard (ft)
8	71	64.7	37	15.1	5291.3	5297.0	5.7
9	378	77.0	50	11.3	5270.1	5276.0	5.9
10	58	73.9	32	15.6	5248.4	5257.0	8.6
11	349	77.0	31	14.4	5231.2	5234.7	3.5

With development of the upstream watershed the inflow into Dams #8 and #9 increases, with the inflow into Dam #8 essentially being double existing conditions and the inflow into Dam #9 increasing by slightly more than 50 %. Consequently, the dams need to be expanded and the impacts of the increased inflow and expansion need to be analyzed for both these dams and the next downstream dams in the Ladera system. In order to prevent overtopping of emergency spillway crest during the 100-year developed conditions event for both Dams #10 and #11, orifice plates were modeled at the outlets of Dams #8 and #9. Two 8-inch orifice plates, blocking the upper 8 inches of each 24" diameter pipe opening, are recommended at the outlet of Dam #8. Similarly, two 8.75-inch orifice plates, blocking the upper 8.75 inches of each 24" diameter pipe opening, are recommended at the outlet of Dam #9. This provides at least one foot of freeboard for Dams #8 through #10 and half a foot of freeboard at Dam #11. Through the combination of the expansions of Dams #8 and #9 and orifice plates at Dams #8 and #9 the impacts of the increased runoff are attenuated and by the time the flow is conveyed through the four subject dams and there is negligible impact downstream of Dam #11 (Dam #12). The summary output of the AHYMO model for the fully developed conditions analysis can be found in Appendix B. Table 2 lists the flow rates into Dams #8 through #11, the runoff volume from the basins contributing to the dams (inflow volume), the flow rates out of Dams #8 through #11, the maximum storage, the maximum WSEL,

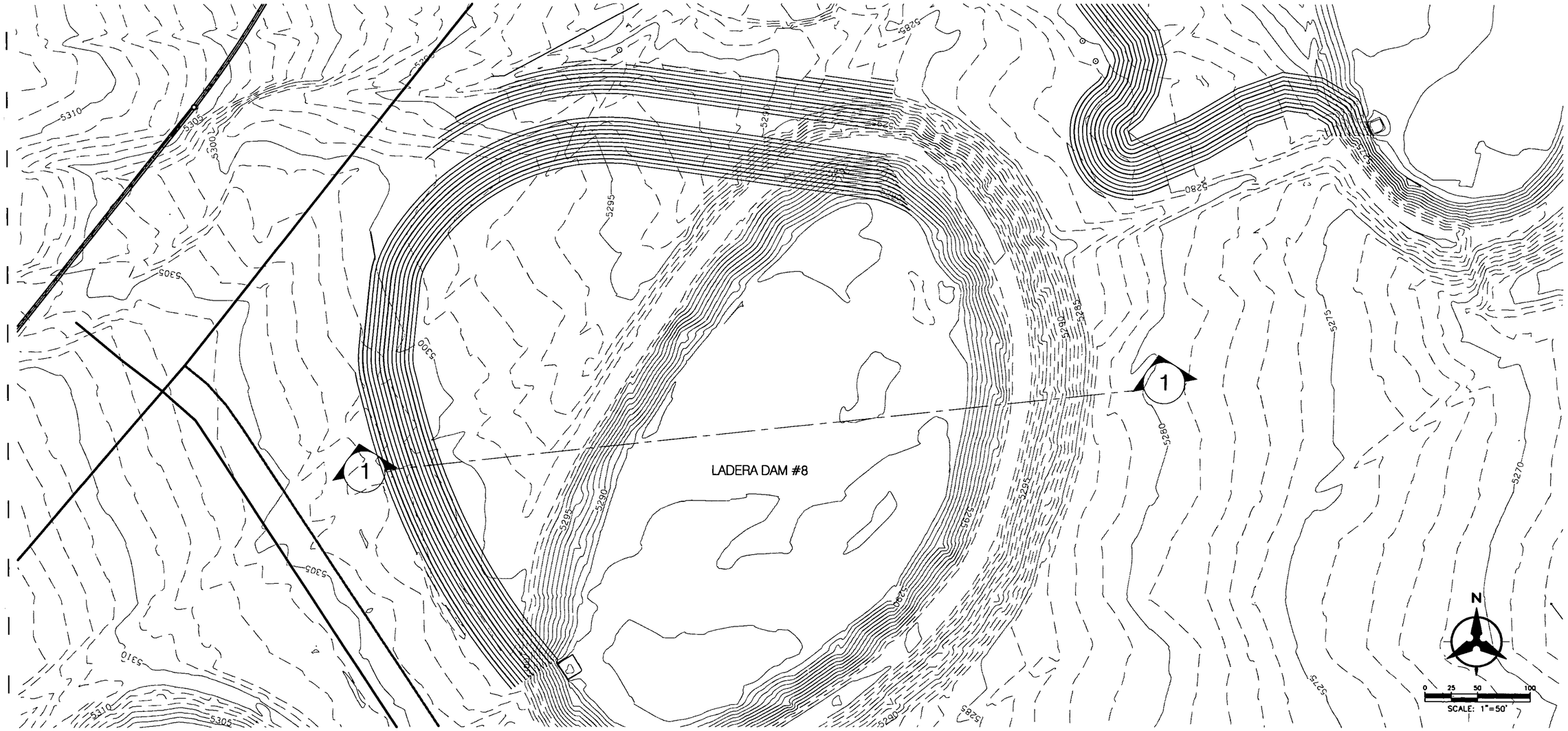
the emergency spillway crest elevations, and the computed freeboard for the fully developed conditions analysis.

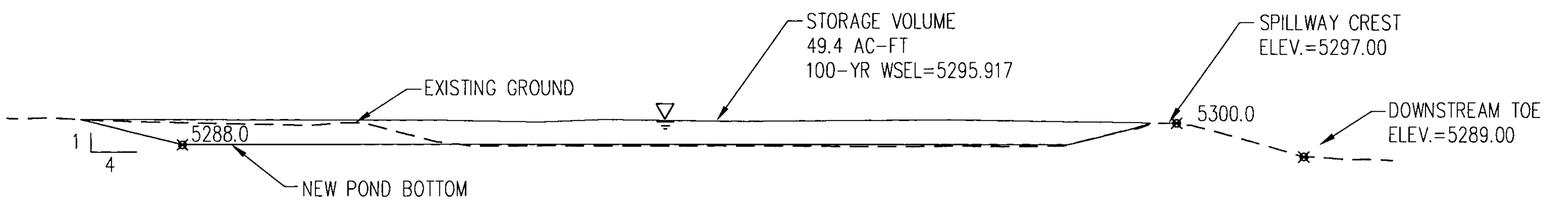
Table 2: Summary of Developed Conditions Model Output

Ladera Dam No.	Fully Developed Conditions Computed Max. Q_{in} (cfs)	Fully Developed Conditions Inflow Volume (ac-ft)	Fully Developed Conditions Computed Max. Q_{out} (cfs)	Fully Developed Conditions Maximum Storage (ac-ft)	Fully Developed Conditions Computed Max. 100-yr WSEL (ft)	Emergency Spillway Invert (Crest) Elevation (ft)	Fully Developed Conditions Computed Freeboard (ft)
8	142	155.6	64	42.5	5295.9	5297.0	1.1
9	577	158.0	60	31.6	5274.9	5276.0	1.1
10	60	130.1	52	39.1	5254.3	5257.0	2.8
11	573	116.6	45	26.9	5234.2	5234.7	0.5

IV. CONCLUSION

Expansion of Dams #8 and #9 plus the addition of orifice plates on the principal outlet pipes of Dams #8 and #9 will satisfy the mitigation requirements of the Clean Water Act, while also controlling flow rates and volumes in the Ladera system to ensure 1 foot of freeboard for the 100-year developed conditions storm event for Dams #8 through #10. Both of these dams will be able to accommodate the Stormcloud and upstream fully developed conditions 100-year runoff. Additionally, the expansion maintains the storage volume for each dam within the maximum 50 ac-ft volume allowing the dams to meet the new criteria as non-jurisdictional facilities.





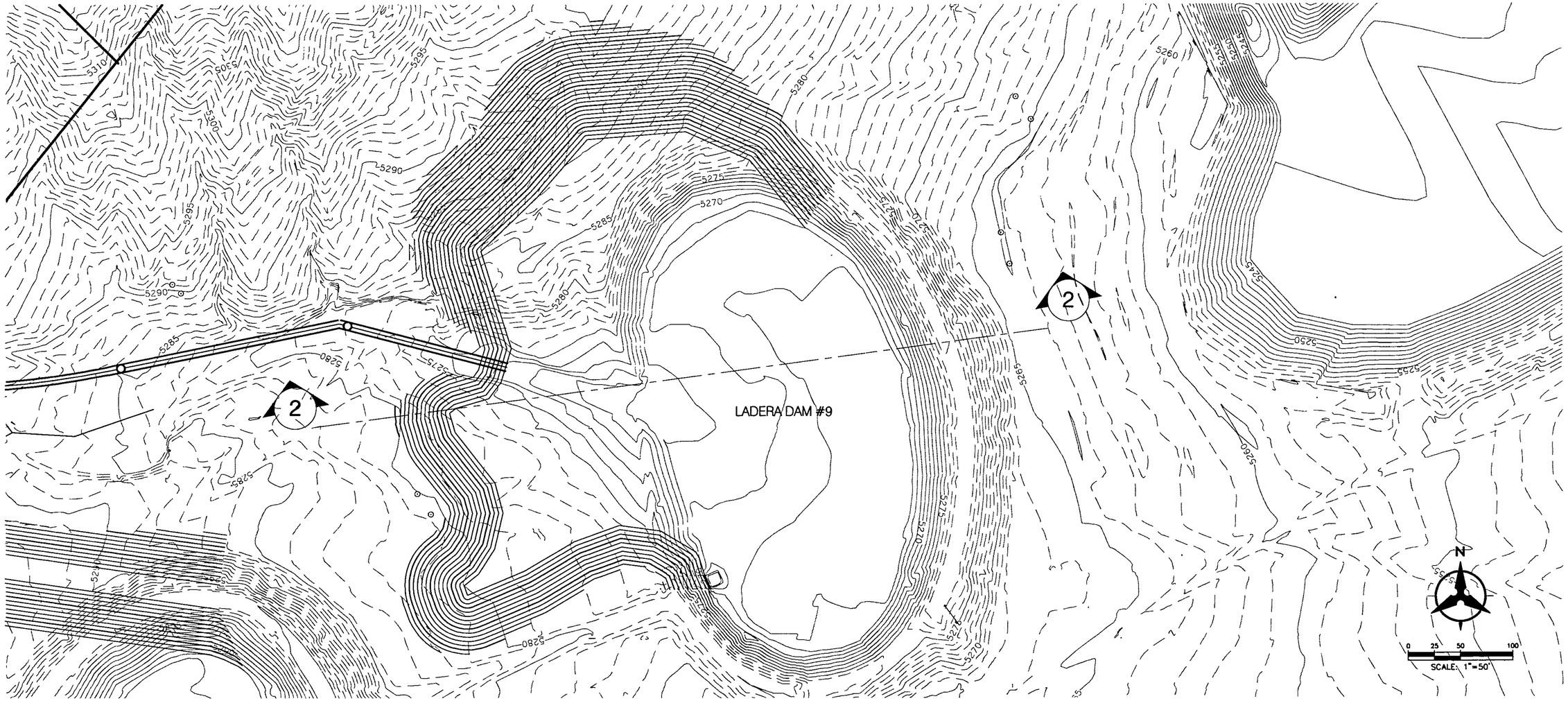
1 LADERA DAM #8 CROSS SECTION
SCALE: 1"=50'

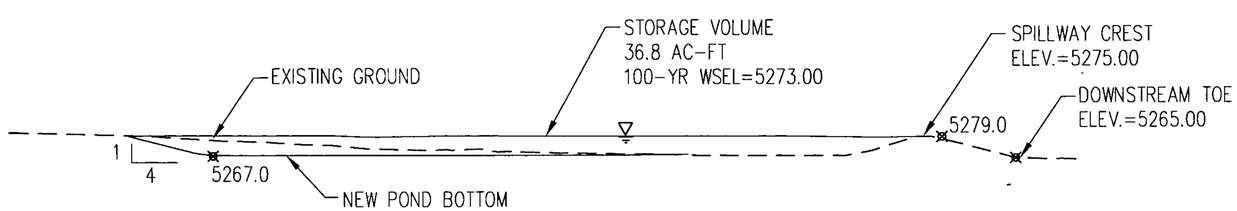
Bohannan ▲ Huston INC.
Courtyard I 7500 Jefferson St. NE Albuquerque, NM 87109-4335
ENGINEERING ▲ SPATIAL DATA ▲ ADVANCED TECHNOLOGIES

FIGURE 2
DETAILED GRADING PLAN FOR LADERA DAM #8

DRAWN BY	N.M.P.	DATE	04-29-10
CHECKED BY	X.X.X.	PROJECT NO	20100383

\050316\WR\reports\Figures\050316GP01-FIGURES.dwg
ed, 1-Sep-2010 - 1:40:pm, Plotted by: RBLUM





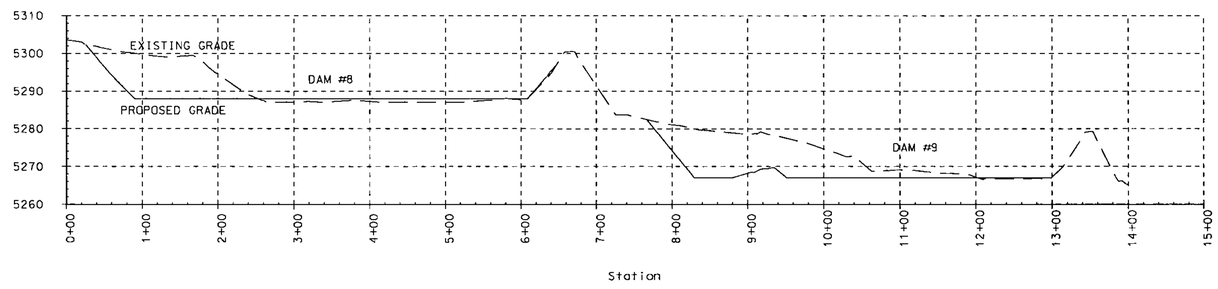
2 LADERA DAM #9 CROSS SECTION
SCALE: 1"-50'

Bohannan ▲ Huston INC.
Courtyard I 7500 Jefferson St. NE Albuquerque, NM 87109-4335
ENGINEERING ▲ SPATIAL DATA ▲ ADVANCED TECHNOLOGIES

FIGURE 3
DETAILED GRADING PLAN FOR LADERA DAM #9

DRAWN BY	N.M.P.	DATE	04-29-10
CHECKED BY	X.X.X	PROJECT NO	20100383

:\050316\MR\reports\Figures\050316GP01-FIGURES.dwg
ed, 1-Sep-2010 - 1:41:pm, Plotted by: RBLUM



Bohannan ▲ Huston

Courtyard I 7500 Jefferson St. NE Albuquerque, NM 87109-4335

ENGINEERING ▲ SPATIAL DATA ▲ ADVANCED TECHNOLOGIES

FIGURE 4

SECTION A-A

DRAWN BY	DATE
CHECKED BY	PROJECT NO

Appendix

APPENDIX A

EXISTING CONDITIONS HYDROLOGY CALCULATIONS

```
    AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) -                          - VERSION:  1997.02c      RUN DATE
(MON/DAY/YR) =09/03/2010
    INPUT FILE = P:\050316\WR\study\Programs\AHYMO\EXPANS~2\SUN89E.HYM                        USER NO.=
AHYMO-S-9702c1BohanHu-AH

                                  FROM  TO                      PEAK        RUNOFF                TIME TO
CFS      PAGE =   1
                     HYDROGRAPH   ID   ID         AREA     DISCHARGE      VOLUME      RUNOFF     PEAK
PER
    COMMAND        IDENTIFICATION   NO.  NO.      (SQ MI)      (CFS)        (AC-FT)    (INCHES)  (HOURS)
ACRE     NOTATION

    *S*                 PROJECT NAME:  STORMCLOUD SUBDIVISION, ALBUQUERQUE, NM
    *S*                 JOB NO. 050316
    *S*                 DATE: SEPTEMBER 2010
    *S*
    *S*                 INPUT FILE NAME: SUN89E.HYM
    *S*                 OUTPUT FILE NAME:  SUN89E.OUT
    *S*                 FILES LOCATION: P:\050316\WR\STUDY\PROGRAMS\AHYMO\Expansion
    *S*
    *S*     COMMENTS:
    *S*     MODEL SHOWS POST CONSTRUCTION CONDITIONS.  IT INCLUDES THE
    *S*     PROPOSED LADERA DEVELOPMENT AS DEVELOPED
    *S*     AND THE UNAFFECTED AREAS AS EXISITING CONDITIONS FOR THE LADERA WATERSHE
    *S*     THIS MODEL WAS MODIFIED FROM THE EXISTING AND PROPOSED
    *S*     CONDITIONS MODELS, SUNEX.OUT AND SUN18.OUT RESPECTIVELY.
    *S*
    *S*     MODELS WERE MODIFIED TO ACCOUNT FOR THE PROPOSED STORMCLOUD DEVELOPMENT,
    *S*     AND THE EXISTING CONDITIONS WEST OF THE DEVELOPMENT.
    *S*
    *S*     THIS MODEL COMPUTES THE WSEL OF LADERA DAMS #8, AND #9,
    *S*     AND THE FLOW THROUGH STR 1, 2, AND 3 - WHICH ARE THE PRIMARY SD OF STORM
    *S*
    *S*     THIS MODEL INCLUDEs ENLARGED DAMS AND DOES NOT INCLUDE ORIFICE PLATES.
    *S*
    *S*     BASIN DIVISION SCHEME WAS TAKEN FROM THE "PROPOSED DEVELOPMENT" ANAYLSIS
    *S*
    *S*     EXISTING CONDITIONS WERE ASSUMED TO BE THE SAME AS IN THE I-40 DMP MODEL
    *S*
    *S*     TP'S WERE ASSUMED NOT TO CHANGE FOR THE EXISTING DELINEATED BASINS.
    *S*     TP = 0.133 hours as a min.
    *S*
    *S*     THE FOLLOWING IS FROM THE ORIGINAL WEST I-40 DMP, BUT ONLY CONTAINS THE
    *S*     ANALYSIS.
    *S*     ____________________________________________________________________________
    *S*
    *S   AHYMO FILE FOR WEST I-40 DIVERSION DMP
    *S   EXISTING CONDITIONS, 24HR, 100YR.
```

```
*S   WITH SEDIMENT BULKING & WITHOUT SEDIMENT TRAPPING AT DAMS.
*S
*S   WITH CORRECTED LADERA DAMS 5/14/96
START
TIME=       .00
*S*************************************************************************
*S                          LADERA WATERSHED
*S*************************************************************************
*S       CALCULATE RUNOFF FOR BASINS DRAINING TO PONDS 1 THROUGH 9
*S                              REGION B1
*S*************************************************************************
*S  RAINFALL FOR LADERA BASINS ABOVE DAM #12
RAINFALL  TYPE= 2
RAIN24=   2.602
*S*************************************************************************
```

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
PAGE = 2									
NOTATION									
SEDIMENT BULK									
PK BF = 1.23									
*S									
*S COMPUTE HYDROGRAPH FOR BASIN L0.1									
COMPUTE NM HYD	TO_DAMZERO	-	1	.33750	248.06	11.616	.64534	1.650	1.148
PER IMP= .00									
*S ROUTE FLOW THROUGH POND #0.									
ROUTE RESERVOIR	PONDZERO	1	2	.33750	232.66	11.616	.64534	1.750	1.077
AC-FT= 1.047									
*S ROUTE OUTFLOW FROM DAM ZERO THROUGH BASIN L1.2 EARTHEN CHANNEL									
ROUTE MCUNGE	L0.1_1	2	9	.33750	232.46	11.603	.64462	1.850	1.076
CCODE = .1									
SEDIMENT BULK									
PK BF = 1.07									
*S									
*S COMPUTE HYDROGRAPH FOR BASIN L1.2									
COMPUTE NM HYD	L1.2	-	1	.11880	112.20	3.601	.56839	1.550	1.476
PER IMP= .00									
*S COMBINED FLOW (BASIN L0.1 AND L1.2)									
ADD HYD	L1.2_1	1& 9	2	.45630	263.50	15.205	.62478	1.800	.902
*S ROUTE THROUGH BASIN L1.1									
ROUTE MCUNGE	L1.1_1	2	9	.45630	262.96	15.209	.62495	1.850	.900
CCODE = .2									
*S COMPUTE HYDROGRAPH FOR BASIN L1.1									

```
   COMPUTE NM HYD          L1.1   -     1        .54380       232.82      14.492       .49968    1.750
.669 PER IMP=    .00
   *S  COMBINED FLOW (BASINS L0.1, L1.1 AND L1.2)
   ADD HYD              TO_DAM1  9& 1   9       1.00010       490.87      29.701       .55683    1.800
.767
   *S  ROUTE FLOW THROUGH POND #1
   ROUTE RESERVOIR        POND1    9   10       1.00010       145.76      29.701       .55683    2.300
.228 AC-FT=   16.565
   *S  ROUTE OVERLAND FLOW FROM BASINS L0.1,L1.1,L1.2 THROUGH  BASIN L4.1
   ROUTE MCUNGE          L4.1_1   10    9       1.00010       145.73      29.697       .55675    2.450
.228 CCODE =      .1
   SEDIMENT BULK
   PK BF =    1.05
   *S
   *S  COMPUTE HYDROGRAPH FOR BASIN L4.1
   COMPUTE NM HYD          L4.1   -     6        .25940       194.09       7.339       .53046    1.600
1.169 PER IMP=    .00
   *S
   *S  DIVIDE FLOW FROM BASIN L4.1 INTO 3 PIECES FOR ROUTE THROUGH PONDS 2, 3, & 4
   DIVIDE HYD            L4.1_2    6    1        .08638        64.63       2.444       .53046    1.600
1.169
                         L4.1_3  and    3        .17302       129.46       4.895       .53046    1.600
1.169
   *S  ADD THE 1ST THIRD OF RUNOFF FROM BASIN L4.1 TO COMBINED FLOW
   ADD HYD              TO_DAM2  1& 9  10       1.08648       149.90      32.140       .55466    2.400
.216
   *S
   *S   ROUTE FLOW THROUGH POND #2
   ROUTE RESERVOIR        POND2   10    9       1.08648        69.07      32.140       .55465    4.150
.099 AC-FT=   15.028
   *S  ADD 2ND THIRD OF RUNOFF FROM BASIN L4.1 TO FLOW FROM POND #2
   ADD HYD              TO_DAM3  1& 9  10       1.17286        69.36      34.584       .55287    4.100
.092
   *S
   *S   ROUTE FLOW THROUGH POND #3
   ROUTE RESERVOIR        POND3   10    9       1.17286        32.57      34.296       .54828    7.600
.043 AC-FT=   16.722
   *S  ADD FLOW FROM REMAINING THIRD OF BASIN L4.1 TO FLOW FROM POND #3
   ADD HYD              TO_DAM4  1& 9  10       1.25924        66.67      36.740       .54705    1.600
.083
   *S
   *S  ROUTE FLOW THROUGH POND #4
   ROUTE RESERVOIR        POND4   10    9       1.25924        25.86      36.185       .53879   12.050
.032 AC-FT=    8.964
   *S
   *S  ROUTE OVERLAND FLOW FROM BASINS L0.1-L4.1 THROUGH  BASIN L5.1
   ROUTE MCUNGE          L5.1_1    9   10       1.25924        25.86      36.169       .53855   12.050
.032 CCODE =      .2
```

```
    SEDIMENT BULK
    PK BF =    1.12
    *S
    *S COMPUTE HYDROGRAPH FOR BASIN L5.1
 
                                     FROM  TO                    PEAK        RUNOFF                TIME TO
CFS      PAGE =   3
                        HYDROGRAPH   ID   ID        AREA     DISCHARGE      VOLUME      RUNOFF     PEAK
PER
    COMMAND        IDENTIFICATION   NO.  NO.      (SQ MI)      (CFS)        (AC-FT)    (INCHES)  (HOURS)
ACRE     NOTATION

    COMPUTE NM HYD          L5.1   -     1        .90000       364.59       28.934       .60279    1.850
.633 PER IMP=    .00
    *S  COMBINED FLOW (BASINS L0.1-L4.1 AND L5.1)
    ADD HYD              TO_DAM5  1&10  11       2.15924       371.04       65.103       .56533    1.850
.268
    *S
    *S
    *S   ROUTE FLOW THROUGH POND #5
    ROUTE RESERVOIR        POND5   11    9       2.15924       141.03       64.438       .55955    2.500
.102 AC-FT=   14.866
    *S
    *S
    *S  ROUTE OVERLAND FLOW FROM BASINS L0.1-L5.1 THROUGH  BASIN L7.2
    ROUTE MCUNGE          L7.2_1    9   78       2.15924       141.04       64.390       .55913    2.550
.102 CCODE =      .2
    SEDIMENT BULK
    PK BF =    1.02
    *S BASIN L7.1A IS THE SAME AS L7.1 IN I-40 DMP, WITH AN INCREASE OF
    *S 20% IN AREA
    *S  COMPUTE HYDROGRAPH FOR BASIN L7.1A
    COMPUTE NM HYD         L7.1A   -    99        .00940         7.28        .205       .40935    1.500
1.210 PER IMP=    .00
    *S  COMPUTE HYDROGRAPH FOR BASIN L7.2
    COMPUTE NM HYD          L7.2   -     2        .06880        52.93       1.604       .43707    1.550
1.202 PER IMP=    .00
    *S  DIVIDE ID=2 INTO 3 THIRDS FOR PONDS 6, 7 AND 8
    DIVIDE HYD            L7.2_4    2    1        .02291        17.62        .534       .43707    1.550
1.202
                          L7.2_5  and    3        .04589        35.30       1.070       .43707    1.550
1.202
    *S  ADD 1ST THIRD TO ROUTED FLOW
    ADD HYD              TO_DAM6  1&78  10       2.18215       141.65       64.924       .55785    2.550
.101
    *S
    *S
    *S   ROUTE FLOW THROUGH POND #6
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    ROUTE RESERVOIR          POND6    10     9        2.18215        83.36       64.281        .55233     3.750
.060 AC-FT=     9.983
    *S
    *S
    *S  ADD 2ND THIRD TO POND OUTFLOW
    ADD HYD                TO_DAM7  1& 9  10        2.20506        83.42       64.815        .55113     3.750
.059
    *S
    *S
    *S  ROUTE FLOW THROUGH POND #7
    ROUTE RESERVOIR          POND7    10     9        2.20506        71.37       64.209        .54598     4.950
.051 AC-FT=     6.159
    *S
    *S
    *S  ADD LAST THIRD TO POND OUTFLOW
    ADD HYD                TO_DAM8  1& 9  10        2.22797        71.37       64.743        .54486     4.950
.050
    *S
    *S
    *S  ROUTE FLOW THROUGH POND #8
    ROUTE RESERVOIR          POND8    10     9        2.22797        36.75       60.493        .50909     8.600
.026 AC-FT=    15.145
    *S
    *S
    *S  ROUTE OVERLAND FLOW FROM BASINS L0.1-L7.2 THROUGH  BASIN I-2.4
    ROUTE MCUNGE           L9.2_1     9   10        2.22797        36.75       60.393        .50825     8.650
.026 CCODE =       .2
    SEDIMENT BULK
    PK BF =     1.10
    *S  COMPUTE HYDROGRAPH FOR BASIN L9.1
    *S  COMPUTE HYDROGRAPH FOR BASIN L9.1A
    COMPUTE NM HYD           L9.1A    -      1        .19770        143.48       5.159        .48929     1.550
1.134 PER IMP=     .00
    *S  COMPUTE HYDROGRAPH FOR BASIN L9.1B
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726 cc - 1.13 cfs

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                                        FROM   TO                    PEAK        RUNOFF                TIME TO
CFS       PAGE =    4
                       HYDROGRAPH       ID    ID        AREA     DISCHARGE     VOLUME      RUNOFF      PEAK
PER
    COMMAND        IDENTIFICATION      NO.   NO.      (SQ MI)     (CFS)       (AC-FT)    (INCHES)   (HOURS)
ACRE      NOTATION

    COMPUTE NM HYD           L9.1B    -      9        .06700        45.79       1.748        .48929     1.550
1.068 PER IMP=     .00
    *S  ROUTE L9.1B THRU "DAM 9.1" ARROYO, LOCATED IN L9.2B
    ROUTE MCUNGE     L9.1B_DAM9.1     9   50        .06700        45.78       1.748        .48907     1.600
1.068 CCODE =       .1
    SEDIMENT BULK
```

```
    PK BF =    1.02
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L9.2A
    COMPUTE NM HYD          L9.2A   -     3          .00400          3.35          .094        .43895    1.500
1.308 PER IMP=    .00
    *S  COMPUTE HYDROGRAPH FOR BASIN L9.2B
    COMPUTE NM HYD          L9.2B   -     4          .01220         10.20          .286        .43895    1.500
1.306 PER IMP=    .00
    *S
    *S  STRUCTURE 2 INFLOW--STR 2
    *S  STRUCT 2
    *S  COMBINE ROUTED FLOW FROM DAM 9.1 aRROYO AND BASIN L9.2B
    ADD HYD                  AP2 50& 4   5          .07920         53.77         2.033        .48134    1.600
1.061
    *S
    SEDIMENT BULK
    PK BF =    1.02
    *S  COMBINE L9.1A AND BASIN L9.2A
    ADD HYD          DAM9.1L9.2A  1& 3  52          .20170        146.69         5.253        .48830    1.550
1.136
    *S
    *S  STRUCTURE 1 INFLOW--STR 1
    *S  STRUCT 1
    *S  COMBINE FLOW WITH BASIN L7.1A
    ADD HYD                  AP1 52&99  96          .21110        153.69         5.458        .48478    1.550
1.138
    *S
    *s  THIS PORTION OF THE .HYM INCORPORTES AND ACCOUNTS FOR THE FLOW
    *s  FROM BASIN I-2(STORMCLOUD) AS WELL ASTHROUGH STRUTURES 1 AND 2 (PRIMARY SD N
    *S  COMPUTE HYDROGRAPH FOR BASIN I2.1
    COMPUTE NM HYD          I2.1    -    92          .09750        206.26         8.422       1.61960    1.500
3.305 PER IMP=  50.00
    *S  COMPUTE HYDROGRAPH FOR BASIN I2.4
    COMPUTE NM HYD          I2.4    -    93          .01700         25.31          .692        .76307    1.500
2.326 PER IMP=    .00
    *S  ROUTE FLOW FROM STR1 THRU I2 VIA 60"RCP
    ROUTE MCUNGE         STR1SD1   96   53          .21110        153.47         5.451        .48417    1.600
1.136 CCODE =      .1
    *S  ROUTE FLOW FROM STR2 THRU I2 VIA 42"RCP
    ROUTE MCUNGE         STR2SD4    5   52          .07920         53.55         2.034        .48155    1.600
1.056 CCODE =      .2
    *S  COMBINE ROUTE STR1 AND ROUTE STR2
    ADD HYD                STR1&2 52&53  54          .29030        207.02         7.485        .48345    1.600
1.114
    *S  ROUTE FLOW STR 1 & 2  THRU I2 VIA 72"RCP
    ROUTE MCUNGE        STR12SD2   54   55          .29030        205.45         7.490        .48378    1.600
1.106 CCODE =      .2
    *S  COMBINE I2.1 AND FLOW FROM STRUC 1 & 2 VIA 72"RCP
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    ADD HYD              I2.2I2.1 55&92  60        .38780       354.29      15.912       .76934    1.550
1.427
    *S  COMBINE ROUTED STR1 STR2 AND I2.4
    ADD HYD               SD1I2.4 93&60 , 56       .40480       377.62      16.604       .76908    1.550
1.458
    *S  COMBINE I-2.1 AND I-2.4 AND OTHER UPSTREAM BASINS FLOWING INTO POND#9
    ADD HYD           I2OTHERS2D9 56&10  61      2.63277       377.62      76.997       .54836    1.550
.224
    *S  ROUTE FLOW THROUGH DAM #9
    *S   CREST=5276.0, TOP=5279.0,  2-24" PIPES
    ROUTE RESERVOIR        POND9   61   99      2.63277        49.71      72.419       .51575    2.150
.030 AC-FT=   11.340
    *S  SKIP FROM DAM 10 UP TO TOP OF LADERA WATERSHED
    *S*****************************************************************************
    *S*****************************************************************************
    *S    CALCULATE RUNOFF BEGINNING AT THE TOP OF LADERA L12 WATERSHED.
    *S  UPPER LADERA BASINS START AT DOUBLE EAGLE II AIRPORT & DRAIN TO DAM12
 □
                                   FROM  TO                      PEAK        RUNOFF                TIME TO
CFS      PAGE =   5
                     HYDROGRAPH    ID   ID        AREA     DISCHARGE      VOLUME      RUNOFF      PEAK
PER
    COMMAND        IDENTIFICATION   NO.  NO.     (SQ MI)      (CFS)       (AC-FT)    (INCHES)  (HOURS)
ACRE     NOTATION

    *S                              REGION B2
    *S*****************************************************************************
    SEDIMENT BULK
    PK BF =    1.02
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.1  NON-CONTRIBUTING BASIN.
    COMPUTE NM HYD         L12.1   -     1       .22190        95.70       6.764       .57157    1.750
.674 PER IMP=   5.00
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.2  NON-CONTRIBUTING BASIN.
    COMPUTE NM HYD         L12.2   -     2      1.13590      1062.88      32.061       .52922    1.550
1.462 PER IMP=   4.00
    *S  COMBINED FLOW FROM NON-CONTRIBUTING BASINS (BASIN L12.1 AND L12.2)
    *S  NOTE:  THERE IS ON-SITE RETENTION BETWEEN THE RUNWAYS.  THIS WILL
    *S  ATTENUATE FLOW.  ALSO, THE PLAYA IN L12.2 CAN HOLD ESTIMATED 70 ACRE-FT.
    ADD HYD              L12.2_1  1& 2   4      1.35780      1116.71      38.825       .53614    1.550
1.285
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.3
    COMPUTE NM HYD         L12.3   -     1       .33130       102.29       7.362       .41668    1.800
.482 PER IMP=    .00
    *S  ROUTE L12.3 THROUGH L12.6
    ROUTE MCUNGE         L12.3_1    1   49       .33130        97.49       7.260       .41087    2.300
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.460 CCODE =      .1
   ROUTE MCUNGE          L12.3_1   49   50        .33130        89.66       7.124       .40321    2.500
.423 CCODE =      .2
   *S
   *S  COMPUTE HYDROGRAPH FOR BASIN L12.5
   COMPUTE NM HYD         L12.5   -     1        .73130       208.76      15.966       .40935    1.850
.446 PER IMP=    .00
   *S  ROUTE L12.5 THROUGH L12.4
   ROUTE MCUNGE          L12.4_1    1   51        .73130       198.14      16.004       .41033    2.150
.423 CCODE =      .2
   *S
   *S  COMPUTE HYDROGRAPH FOR BASIN L12.4
   COMPUTE NM HYD         L12.4   -     1        .60160       198.12      14.018       .43688    1.800
.515 PER IMP=   1.00
   *S  ADD L12.4 AND L12.5
   ADD HYD               L12.4_2  1&51   2       1.33290       326.46      30.021       .42231    2.050
.383
   *S  ROUTE COMBINED (L12.4 AND L12.5) THROUGH L12.6
   ROUTE MCUNGE          L12.6_1    2   51       1.33290       320.23      29.942       .42120    2.550
.375 CCODE =      .2
   *S
   *S  COMPUTE HYDROGRAPH FOR BASIN L12.6
   COMPUTE NM HYD         L12.6   -     1        .94530       276.32      23.528       .46668    1.900
.457 PER IMP=   1.00
   *S  ADD (L12.4-5) & L12.6
   ADD HYD               L12.6_2  1&51   2       2.27820       439.45      53.470       .44007    2.400
.301
   *S ADD (L12.4-6) & L12.3
   ADD HYD               L12.6_3  2&50   4       2.60950       522.89      60.595       .43539    2.400
.313
   *S  ROUTE COMBINED (L12.3, L12.4, L12.5, AND L12.6) THROUGH L12.7
   ROUTE MCUNGE          L12.7_1    4   49       2.60950       468.63      59.660       .42867    2.550
.281 CCODE =      .2
   ROUTE MCUNGE          L12.7_1   49   50       2.60950       467.18      59.653       .42862    2.600
.280 CCODE =      .2
   *S
   *S  COMPUTE HYDROGRAPH FOR BASIN L12.7
   COMPUTE NM HYD         L12.7   -     1       1.05630       257.19      24.199       .42955    1.950
.380 PER IMP=   1.00
   *S  ADD (L12.3-6) & L12.7
   ADD HYD               L12.7_2  1&50   3       3.66580       580.88      83.852       .42889    2.450
.248
   *S
   *S  COMPUTE HYDROGRAPH FOR BASIN L12.8
   COMPUTE NM HYD         L12.8   -     1        .42190        99.92       9.666       .42955    1.950
.370 PER IMP=   1.00
   *S  ROUTE L12.8 THROUGH L12.7
   ROUTE MCUNGE          L12.7_3    1   50        .42190        99.84       9.666       .42958    1.950
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.370 CCODE =       .2
    *S ADD (L12.3-7) & L12.8
 □
                                    FROM  TO                    PEAK        RUNOFF                TIME TO
CFS      PAGE =   6
                        HYDROGRAPH   ID   ID        AREA     DISCHARGE     VOLUME      RUNOFF      PEAK
PER
    COMMAND        IDENTIFICATION   NO.  NO.      (SQ MI)      (CFS)       (AC-FT)    (INCHES)   (HOURS)
ACRE     NOTATION

    ADD HYD              L12.7_4  3&50   3       4.08770       663.37       93.518       .42896     2.050
.254
    *S  ROUTE COMBINED (L12.3-8) THROUGH L12.9 -- UPPER REACHES MIREHAVEN A ARROYO
    ROUTE MCUNGE         L12.9_1    3   49       4.08770       661.69       93.556       .42914     2.100
.253 CCODE =       .1
    ROUTE MCUNGE         L12.9_1   49   50       4.08770       658.87       93.473       .42876     2.350
.252 CCODE =       .1
    SEDIMENT BULK
    PK BF =    1.07
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.9
    COMPUTE NM HYD         L12.9    -    1        .65940       235.11       15.365       .43689     1.750
.557 PER IMP=     .00
    *S  ADD (ROUTED L12.3-8) & L12.9
    ADD HYD              L12.9_2  1&50   4       4.74710       728.07      108.838       .42989     2.350
.240
    SEDIMENT BULK
    PK BF =    1.02
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.11
    COMPUTE NM HYD        L12.11    -    1        .27340        67.21        6.210       .42591     1.900
.384 PER IMP=   1.00
    *S  ROUTE L12.11 THROUGH L12.12
    ROUTE MCUNGE        L12.12_1    1   49        .27340        67.21        6.212       .42606     2.000
.384 CCODE =       .2
    ROUTE MCUNGE        L12.12_1   49   50        .27340        66.79        6.195       .42487     2.400
.382 CCODE =       .1
    *S
    *S  ADD ROUTED L12.11 & L12.3-9
    ADD HYD             L12.12_2  4&50   2       5.02050       793.85      115.033       .42961     2.350
.247
    *S
    *S  ROUTE COMBINED (L12.3-9,11) THROUGH L12.12 -- UPPER REACHES OF MIREHAVEN "A"
    ROUTE MCUNGE        L12.12_3    2   50       5.02050       790.74      115.033       .42961     2.400
.246 CCODE =       .2
    SEDIMENT BULK
    PK BF =    1.07
    *S
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    *S  COMPUTE HYDROGRAPH FOR BASIN L12.12
    COMPUTE NM HYD        L12.12   -     1        .35310       125.41       7.940       .42162    1.750
.555 PER IMP=    .00
    *S  ADD ROUTED L12.3-9,11 & L12.12
    ADD HYD             L12.12_4  1&50   3       5.37360       823.94     122.973       .42909    2.350
.240
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.10
    COMPUTE NM HYD        L12.10   -     1        .22190       125.67       5.492       .46410    1.600
.885 PER IMP=    .00
    *S ADD ROUTED L12.3-9,11,12 & L12.10
    ADD HYD             L12.10_1  1& 3   4       5.59550       835.51     128.465       .43048    2.350
.233
    *S  ROUTE COMBINED (L12.3-12) THROUGH L12.13 --
    *S  MIREHAVEN "A" ROUTED FROM PLATEAU ABOVE ESCARPMENT TO BELOW ESCARPMENT
    ROUTE MCUNGE        L12.13_1    4   49       5.59550       832.58     128.401       .43026    2.550
.232 CCODE =      .1
    ROUTE MCUNGE        L12.13_1   49    4       5.59550       832.58     128.401       .43026    2.550
.232 CCODE =      .0
    ROUTE MCUNGE        L12.13_1    4   50       5.59550       832.58     128.401       .43026    2.550
.232 CCODE =      .0
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.13
    COMPUTE NM HYD        L12.13   -     1        .26090       146.13       6.133       .44074    1.600
.875 PER IMP=    .00
    *S  ADD ROUTED L12.3-12 & L12.13
    *S  TOTAL MIREHAVEN "A" ARROYO FLOW AT BASE OF ESCARPMENT
    ADD HYD             L12.13_2  1&50   4       5.85640       842.30     134.533       .43073    2.550
.225
    SEDIMENT BULK
    PK BF =    1.02
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.15
    COMPUTE NM HYD        L12.15   -     1        .43910       120.80       9.974       .42591    1.850
.430 PER IMP=   1.00
    *S  ROUTE L12.15 THROUGH L12.16  --  MIREHAVEN "C" ARROYO
    ROUTE MCUNGE        L12.16_1    1   49        .43910       119.26       9.936       .42427    2.150
.424 CCODE =      .1
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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)	PER ACRE	NOTATION
ROUTE MCUNGE	L12.16_1	49	1	.43910	118.42	9.917	.42345	2.550	.421	CCODE = .1

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   ROUTE MCUNGE        L12.16_1    1   50        .43910       117.95       9.893       .42246    3.000
.420 CCODE =      .1
   SEDIMENT BULK
   PK BF =    1.07
   *S
   *S  COMPUTE HYDROGRAPH FOR BASIN L12.16
   COMPUTE NM HYD        L12.16   -     1        .85470       252.77      21.605       .47397    1.900
.462 PER IMP=    .00
   *S  ADD ROUTED L12.15 & L12.16
   ADD HYD             L12.16_2  1&50   2       1.29380       252.77      31.499       .45649    1.900
.305
   *S
   *S  COMPUTE HYDROGRAPH FOR BASIN L12.14
   *S        MIREHAVEN "B" ARROYO
   COMPUTE NM HYD        L12.14   -     1        .40160       126.88      10.607       .49520    1.900
.494 PER IMP=    .00
   *S  ADD  L12.15,16 & L12.14
   ADD HYD             L12.14_1  1& 2   3       1.69540       379.64      42.105       .46566    1.900
.350
   *S
   *S  COMPUTE HYDROGRAPH FOR BASIN L12.17
   COMPUTE NM HYD        L12.17   -     1        .20310       125.15       5.340       .49296    1.600
.963 PER IMP=    .00
   *S  ADD  L12.14-16 & L12.17  --  FLOW AT LADERA TRAINING DIKE
   ADD HYD                DIKE  1& 3   2       1.89850       444.62      47.445       .46858    1.800
.366
   *S  ROUTE COMBINED (L12.14-L12.17) IN MIREHAVEN ARROYO DNSTREAM FROM TRNG DIKE
   *S    TO CONFLUENCE WITH MIREHAVEN "A" ARROYO BELOW ESCARPMENT
   ROUTE MCUNGE        L12.18_1    2   50       1.89850       444.04      47.405       .46818    2.050
.365 CCODE =      .1
   *S
   *S ADD  L12.14-17 & L12.3-13
   *S TOTAL FLOW MIREHAVEN A, B, C ARROYOS BELOW ESCARPMT, DNSTRM FROM TR DIKE
   ADD HYD             L12.18_2  4&50   3       7.75490      1097.92     181.938       .43989    2.400
.221
   *S  ROUTE L12.3-17 THROUGH MIREHAVEN ARROYO TO INTERSECTION W/FUTURE 98TH ST
   ROUTE MCUNGE        L12.18_3    3   50       7.75490      1095.77     181.799       .43956    2.650
.221 CCODE =      .1
   *S
   *S  COMPUTE HYDROGRAPH FOR BASIN L12.18
   COMPUTE NM HYD        L12.18   -     1        .51410       243.36      12.350       .45042    1.650
.740 PER IMP=    .00
   *S
   *S  ADD  L12.3-17 & L12.18 --  TOTAL FLOW IN MIREHAVEN AT FUTURE 98TH STREET
   ADD HYD             L12.18_4  1&50   2       8.26900      1114.88     194.149       .44023    2.650
.211
   *S  COMPUTE HYDROGRAPH FOR BASIN L14.5
   COMPUTE NM HYD         L14.5   -     1        .08280        74.23       2.058       .46607    1.500
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1.401 PER IMP=    .00
    *S ADD  L12.3-18 & L14.5
    ADD HYD             L12.18_5  1& 2   3       8.35180      1116.52     196.207       .44049    2.650
.209
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.19
    COMPUTE NM HYD        L12.19   -     1        .17600       146.94       4.338       .46214    1.550
1.304 PER IMP=    .00
    *S  BASIN L12.20 DIVIDED INTO 12.20A, 12.20B, AND 12.20C
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.20A
    COMPUTE NM HYD       L12.20A   -     4        .01180        11.16        .310       .49296    1.500
1.477 PER IMP=    .00
    *S
    *S  STRUCTURE #3 INFLOW--STR 3
    *S  STRUCTURE 3
    ADD HYD                  AP3  1& 4   5        .18780       157.62       4.648       .46407    1.550
1.311
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.20C
    COMPUTE NM HYD       L12.20C   -     6        .05900        55.77       1.551       .49296    1.500
1.477 PER IMP=    .00
    *S  ADD L12.18-14.5A TO BASIN L12.20C
    *S  FLOW GOES TO DAM 12
 □
                                  FROM  TO                      PEAK         RUNOFF                TIME TO
CFS      PAGE =   8
                      HYDROGRAPH   ID   ID         AREA     DISCHARGE      VOLUME      RUNOFF     PEAK
PER
    COMMAND        IDENTIFICATION   NO.  NO.      (SQ MI)      (CFS)        (AC-FT)    (INCHES)  (HOURS)
ACRE     NOTATION

    ADD HYD          L12.18-14.5A  3& 6   7       8.41080      1117.73     197.758       .44086    2.650
.208
    *S  ROUTE COMBINED (L12.13-L12.18) IN MIREHAVEN THRU L12.20 TO DAM#12
    ROUTE MCUNGE         L12.20_1    7   51       8.41080      1117.38     197.719       .44077    2.750
.208 CCODE =      .1
    SEDIMENT BULK
    PK BF =    1.03
    *S  THE FLOW FROM THE 66"RCP WILL NOT BE ROUTED TO POND#10, IN THIS ANALYSIS
    *S  INSTEAD IT WILL BE ROUTED TO POND#11
    *S  ROUTE FLOW FROM STR3 THRU 1ST SEGMENT OF I2.2 VIA 66"RCP
    ROUTE MCUNGE       STR3THRU66    5   55        .18780       154.56       4.626       .46189    1.550
1.286 CCODE =      .1
    *S  COMPUTE HYDROGRAPH FOR BASIN D17
    COMPUTE NM HYD           D17   -     7        .01400        29.76       1.213      1.62434    1.500
3.322 PER IMP=  50.00
    ROUTE MCUNGE       D17THRU24"    7   10        .01400        29.76       1.213      1.62432    1.500
3.322 CCODE =      .0
    *S COMBINE ROUTED FLOW FROM D17 AND OFFSITE STRUC#3 FLOW
```

```
    ADD HYD            STR3ANDD17 10&55   2        .20180       180.95       5.839       .54253    1.550
1.401
    ROUTE MCUNGE    STR3D17THRU6    2    1        .20180       178.54       5.840       .54265    1.550
1.382 CCODE =      .2
    *S  COMPUTE HYDROGRAPH FOR BASIN I2.2
    COMPUTE NM HYD          I2.2   -    95        .07200       152.95       6.237      1.62435    1.500
3.319 PER IMP=  50.00
    *S  COMBINE ROUTED FLOW WITH BASIN I2.2 - THIS IS FLOW TO POND#11
    ADD HYD              D17STR3 95& 1   2        .27380       314.18      12.078       .82710    1.550
1.793
    *S ROUTE COMBINED FLOW THROUGH 3RD SEGMENT TO POND#11 VIA 66" RCP
    *S THIS WILL BE THE TOTAL FLOW RE-ROUTED TO POND#11
    *S  Note this flow has not been added to the flow from D17.4, and I2.3,
    ROUTE MCUNGE    TOTALRE-ROUT    2   97        .27380       303.88      12.040       .82448    1.600
1.734 CCODE =      .1
    *S  THESE BASINS WILL GO TO POND#10 - via sheet flow
    *S  COMPUTE HYDROGRAPH FOR BASIN I2.3
    COMPUTE NM HYD          I2.3   -    94        .02900        45.69       1.364       .88181    1.500
2.462 PER IMP=   7.00
    *S BASIN D17.4 TAKEN FROM "THE CROSSINGS" DRAINAGE REPORT
    *S TAKEN AS AREA LEFT FROM BASIN L12.20 MINUS D17 & I-2
    *S  COMPUTE HYDROGRAPH FOR BASIN D17.4
    COMPUTE NM HYD         D17.4   -     8        .00180         3.71        .159      1.65461    1.500
3.217 PER IMP=  57.00
    ADD HYD              D17I2.3 94& 8   9        .03080        49.40       1.523       .92696    1.500
2.506
    *S  ROUTE OUTFLOW FROM DAM 9 OVERLAND THROUGH SMALL PORTION OF BASIN I2.3
    ROUTE MCUNGE    TO_DAM10FROM   99   10       2.63277        49.70      72.375       .51544    2.150
.029 CCODE =      .2
    *S  ADD ALL COMBINED FLOW INTO DAM#10
    *S  ADD HYD FOR D17.4, I2.3 AND OVERLAND FLOW
    ADD HYD         TO_DAM10_ALL 10& 9  11       2.66357        57.55      73.898       .52020    1.700
.034
    *S  ROUTE COMBINED THROUGH DAM #10
    *S   CREST=5257.0, TOP=5260.0
    ROUTE RESERVOIR       POND10   11    9       2.66357        31.69      62.795       .44204   17.300
.019 AC-FT=   15.553
    *S  COMPUTE HYDROGRAPHS FOR BASINS IN THE CROSSINGS
    *S  COMPUTE HYDROGRAPHS FOR BASINS 1-5
    COMPUTE NM HYD          B1_5   -     2        .01600        33.73       1.377      1.61361    1.500
3.294 PER IMP=  50.00
    *S  COMPUTE HYDROGRAPHS FOR BASIN D4
    COMPUTE NM HYD            D4   -     1        .00120         2.54        .103      1.61361    1.500
3.311 PER IMP=  50.00
    *S  ADD BASINS D4 AND 1-5
    ADD HYD                D41_5  2& 1   3        .01720        36.28       1.480      1.61357    1.500
3.295
    *S
```

```
    *S  COMPUTE HYDROGRAPHS FOR BASIN D9 AND D11
    COMPUTE NM HYD          D911   -     1        .00600         7.99        .242       .75562    1.500
2.081 PER IMP=   7.00
    *S  ADD BASINS D911 AND UPSTREAM
    ADD HYD                D41_5  3& 1   1        .02320        44.26       1.722      1.39168    1.500
2.981
    *S
    *S  COMPUTE HYDROGRAPHS FOR BASIN D10 AND D12
 □
                                     FROM  TO                    PEAK        RUNOFF                TIME TO
CFS      PAGE =   9
                       HYDROGRAPH    ID   ID        AREA     DISCHARGE      VOLUME      RUNOFF     PEAK
PER
    COMMAND        IDENTIFICATION   NO.  NO.      (SQ MI)      (CFS)       (AC-FT)    (INCHES)  (HOURS)
ACRE     NOTATION

    COMPUTE NM HYD         D1012   -     2        .00300         7.04        .311      1.94657    1.500
3.669 PER IMP=  70.00
    *S  ADD BASINS D1012 AND UPSTREAM
    ADD HYD                D41_5  2& 1   2        .02620        51.31       2.033      1.45520    1.500
3.060
    *S
    *S  COMPUTE HYDROGRAPHS FOR BASIN D15
    COMPUTE NM HYD           D15   -     3        .00440         4.66        .128       .54608    1.500
1.653 PER IMP=    .00
    *S  ADD BASINS D15 AND UPSTREAM
    ADD HYD             TO_DAM11  3& 2   1        .03060        55.96       2.162      1.32448    1.500
2.858
    *S
    *S  ADD ALL FLOW INTO POND#11 PLUS POND#10 FLOW
    ADD HYD             TO_DAM11  1& 9   1       2.69417        56.88      64.956       .45206    1.500
.033
    *S
    *S THIS FLOW SHOULD BE COMBINATION OF ALL ROUTED TO POND #11
    *S WITH THE INCLUSION OF TOTAL OF SD3 FLOW
    *S ADD ALL FLOW FROM POND#10, CROSSINGS, AND TIERRA O, WITH SD3
    ADD HYD         TOTAL_INTO_D  1&97   2       2.96797       348.76      76.996       .48642    1.550
.184
    *S
    *S  ROUTE TOTAL FLOW THROUGH DAM #11
    *S  CREST=5234.7, TOP=5236.5, 1-24"
    ROUTE RESERVOIR       POND11    2    9       2.96797        31.24      63.906       .40372   23.300
.016 AC-FT=   14.418
    ROUTE MCUNGE        L12.20_6    9   10       2.96797        31.24      63.580       .40166   23.400
.016 CCODE =      .2
    *S  ADD SECOND HALF OF FLOW FROM L12.20 TO MIREHAVEN CHAN
    *S  TOTAL FLOW IN MIREHAVEN CHANNEL NORTH OF DAM 12
    ADD HYD             L12.20_7  2&51   3      11.37877      1136.61     274.715       .45268    2.750
```

```
.156
   *S PLOT2  HYD=L12.20_7   TOTAL FLOW IN MIREHAVEN CHANNEL NORTH OF DAM 12
   *S
   *S  COMBINED MIREHAVEN AND DAM #11 OUTFLOW -- TOTAL FLOW INTO DAM #12
   ADD HYD              TO_DAM12  3&10   9      14.34674      1159.87     338.295       .44212    2.750
.126
   FINISH
```

APPENDIX B

FULLY DEVELOPED CONDITIONS HYDROLOGY CALCULATIONS

```
    AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) -                          - VERSION:  1997.02c      RUN DATE
(MON/DAY/YR) =09/03/2010
    INPUT FILE = P:\050316\WR\study\Programs\AHYMO\EXPANS~2\SUN89D28.HYM                      USER NO.=
AHYMO-S-9702c1BohanHu-AH

                                  FROM  TO                      PEAK         RUNOFF                TIME TO
CFS      PAGE =   1
                     HYDROGRAPH   ID   ID         AREA     DISCHARGE      VOLUME      RUNOFF     PEAK
PER
    COMMAND        IDENTIFICATION   NO.  NO.      (SQ MI)      (CFS)        (AC-FT)    (INCHES)  (HOURS)
ACRE     NOTATION

    *S*                 PROJECT NAME:  STORMCLOUD SUBDIVISION, ALBUQUERQUE, NM
    *S*                 JOB NO. 050316
    *S*                 DATE: SEPTEMBER 2010
    *S*
    *S*                 INPUT FILE NAME: SUN8928.HYM
    *S*                 OUTPUT FILE NAME:  SUN89D28.OUT
    *S*                 FILES LOCATION: P:\050316\WR\STUDY\PROGRAMS\AHYMO\Expansion
    *S*
    *S*     COMMENTS:
    *S*     MODEL SHOWS POST CONSTRUCTION CONDITIONS.  IT INCLUDES THE
    *S*     PROPOSED LADERA DEVELOPMENT AS DEVELOPED
    *S*     AND THE UPSTREAM AREAS AS DEVELOPED CONDITIONS FOR THE LADERA WATERSHED.
    *S*     THIS MODEL WAS MODIFIED FROM THE EXISTING AND PROPOSED
    *S*     CONDITIONS MODELS, SUNEX.OUT AND SUN18.OUT RESPECTIVELY.
    *S*
    *S*     MODELS WERE MODIFIED TO ACCOUNT FOR THE PROPOSED STORMCLOUD DEVELOPMENT,
    *S*     AND THE DEVELOPED CONDITIONS WEST OF THE DEVELOPMENT.
    *S*
    *S*     THIS MODEL COMPUTES THE WSEL OF LADERA DAMS #8, AND #9,
    *S*     AND THE FLOW THROUGH STR 1, 2, AND 3 - WHICH ARE THE PRIMARY SD OF STORM
    *S*
    *S*     THIS MODEL INCLUDEs ENLARGED DAMS AND INCLUDES ORIFICE PLATES COVERING T
    *S*     OF BOTH OUTLET PIPES ON DAM #9, AND ORIFICE PLATES COVERING THE TOP 8" O
    *S*     OUTLET PIPES ON DAM #8
    *S*     BASIN DIVISION SCHEME WAS TAKEN FROM THE "PROPOSED DEVELOPMENT" ANAYLSIS
    *S*
    *S*     EXISTING CONDITIONS WERE ASSUMED TO BE THE SAME AS IN THE I-40 DMP MODEL
    *S*
    *S*     TP'S WERE ASSUMED NOT TO CHANGE FOR THE EXISTING DELINEATED BASINS.
    *S*     TP = 0.133 hours as a min.
    *S*
    *S*     THE FOLLOWING IS FROM THE ORIGINAL WEST I-40 DMP, BUT ONLY CONTAINS THE
    *S*     ANALYSIS.
    *S*     ____________________________________________________________________________
    *S*
    *S   AHYMO FILE FOR WEST I-40 DIVERSION DMP
```

```
*S   DEVELOPED CONDITIONS, 24HR, 100YR.
*S   WITH SEDIMENT BULKING & WITHOUT SEDIMENT TRAPPING AT DAMS.
*S
*S   WITH CORRECTED LADERA DAMS 5/14/96
START
TIME=       .00
*S*************************************************************************
*S                          LADERA WATERSHED
*S*************************************************************************
*S       CALCULATE RUNOFF FOR BASINS DRAINING TO PONDS 1 THROUGH 9
*S                              REGION B1
*S*************************************************************************
*S  RAINFALL FOR LADERA BASINS ABOVE DAM #12
RAINFALL  TYPE= 2
RAIN24=   2.602
*S*************************************************************************
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```
                                    FROM  TO                    PEAK        RUNOFF                TIME TO
CFS      PAGE =   2
                     HYDROGRAPH     ID    ID        AREA     DISCHARGE     VOLUME      RUNOFF      PEAK
PER
   COMMAND        IDENTIFICATION    NO.   NO.     (SQ MI)      (CFS)       (AC-FT)    (INCHES)   (HOURS)
ACRE     NOTATION

   SEDIMENT BULK
   PK BF =    1.23
   *S
   *S  COMPUTE HYDROGRAPH FOR BASIN L0.1
   COMPUTE NM HYD    TO_DAMZERO   -     1        .33750       433.44      25.097      1.39427    1.650
2.007 PER IMP=  27.00
   *S   ROUTE FLOW THROUGH POND #0.
   ROUTE RESERVOIR     PONDZERO    1    2        .33750       373.77      25.097      1.39427    1.750
1.730 AC-FT=    2.440
   *S ROUTE OUTFLOW FROM DAM ZERO THROUGH  BASIN L1.2  EARTHEN CHANNEL
   ROUTE MCUNGE          L0.1_1    2    9        .33750       373.04      25.109      1.39492    1.800
1.727 CCODE =      .2
   SEDIMENT BULK
   PK BF =    1.07
   *S
   *S  COMPUTE HYDROGRAPH FOR BASIN L1.2
   COMPUTE NM HYD          L1.2   -     1        .11880       208.27       9.396      1.48303    1.500
2.739 PER IMP=  45.00
   *S  COMBINED FLOW (BASIN L0.1 AND L1.2)
   ADD HYD               L1.2_1  1& 9   2        .45630       460.00      34.505      1.41786    1.750
1.575
   *S  ROUTE THROUGH  BASIN L1.1
   ROUTE MCUNGE          L1.1_1    2    9        .45630       457.66      34.507      1.41794    1.750
1.567 CCODE =      .2
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```
    *S  COMPUTE HYDROGRAPH FOR BASIN L1.1
    COMPUTE NM HYD          L1.1   -     1        .54380       770.94      41.305      1.42418    1.600
2.215 PER IMP=  39.00
    *S  COMBINED FLOW (BASINS L0.1, L1.1 AND L1.2)
    ADD HYD              TO_DAM1  9& 1   9       1.00010      1172.95      75.812      1.42133    1.600
1.833
    *S  ROUTE FLOW THROUGH POND #1
    ROUTE RESERVOIR        POND1    9   10       1.00010       655.22      75.809      1.42128    1.950
1.024 AC-FT=   32.749
    *S  ROUTE OVERLAND FLOW FROM BASINS L0.1,L1.1,L1.2 THROUGH  BASIN L4.1
    ROUTE MCUNGE          L4.1_1   10    9       1.00010       653.78      75.816      1.42140    1.950
1.021 CCODE =      .2
    SEDIMENT BULK
    PK BF =    1.05
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L4.1
    COMPUTE NM HYD          L4.1   -     6        .25940       520.78      25.704      1.85791    1.500
3.137 PER IMP=  65.00
    *S
    *S  DIVIDE FLOW FROM BASIN L4.1 INTO 3 PIECES FOR ROUTE THROUGH PONDS 2, 3, & 4
    DIVIDE HYD            L4.1_2    6    1        .08638       173.42       8.559      1.85791    1.500
3.137
                          L4.1_3  and    3        .17302       347.36      17.144      1.85791    1.500
3.137
    *S  ADD THE 1ST THIRD OF RUNOFF FROM BASIN L4.1 TO COMBINED FLOW
    ADD HYD              TO_DAM2  1& 9  10       1.08648       702.83      84.375      1.45611    1.950
1.011
    *S
    *S   ROUTE FLOW THROUGH POND #2
    ROUTE RESERVOIR        POND2   10    9       1.08648       175.71      84.189      1.45289    3.250
.253 AC-FT=   31.538
    *S  ADD 2ND THIRD OF RUNOFF FROM BASIN L4.1 TO FLOW FROM POND #2
    ADD HYD              TO_DAM3  1& 9  10       1.17286       185.90      92.748      1.48272    1.550
.248
    *S
    *S   ROUTE FLOW THROUGH POND #3
    ROUTE RESERVOIR        POND3   10    9       1.17286        69.95      89.585      1.43216   11.250
.093 AC-FT=   33.492
    *S  ADD FLOW FROM REMAINING THIRD OF BASIN L4.1 TO FLOW FROM POND #3
    ADD HYD              TO_DAM4  1& 9  10       1.25924       179.27      98.144      1.46136    1.550
.222
    *S
    *S  ROUTE FLOW THROUGH POND #4
    ROUTE RESERVOIR        POND4   10    9       1.25924        70.73      91.817      1.36715   11.300
.088 AC-FT=   19.425
    *S
    *S  ROUTE OVERLAND FLOW FROM BASINS L0.1-L4.1 THROUGH  BASIN L5.1
    ROUTE MCUNGE          L5.1_1    9   10       1.25924        70.73      91.755      1.36622   11.300
```

```
.088 CCODE =       .2
    SEDIMENT BULK
    PK BF =    1.12
    *S
 □
                                    FROM  TO                    PEAK        RUNOFF                TIME TO
CFS      PAGE =   3
                      HYDROGRAPH    ID    ID       AREA     DISCHARGE      VOLUME      RUNOFF      PEAK
PER
    COMMAND        IDENTIFICATION   NO.   NO.     (SQ MI)     (CFS)        (AC-FT)    (INCHES)   (HOURS)
ACRE     NOTATION

    *S COMPUTE HYDROGRAPH FOR BASIN L5.1                    =576 = 22%
    COMPUTE NM HYD          L5.1   -     1        .90000     1312.00      69.013      1.43777     1.600
2.278 PER IMP=  36.00
    *S  COMBINED FLOW (BASINS L0.1-L4.1 AND L5.1)
    ADD HYD               TO_DAM5  1&10  11      2.15924     1322.28     160.768      1.39604     1.600
.957
    *S
    *S
    *S   ROUTE FLOW THROUGH POND #5
    ROUTE RESERVOIR        POND5   11    9       2.15924      485.33     156.859      1.36210     1.950
.351 AC-FT=   33.569
    *S
    *S
    *S  ROUTE OVERLAND FLOW FROM BASINS L0.1-L5.1 THROUGH  BASIN L7.2
    ROUTE MCUNGE          L7.2_1    9   78       2.15924      484.36     156.481      1.35882     2.100
.350 CCODE =       .1
    SEDIMENT BULK
    PK BF =    1.02
    *S BASIN L7.1A IS THE SAME AS L7.1 IN I-40 DMP, WITH AN INCREASE OF
    *S 20% IN AREA
    *S  COMPUTE HYDROGRAPH FOR BASIN L7.1A
    COMPUTE NM HYD         L7.1A   -    99        .00940       19.93        .812      1.61961     1.500
3.313 PER IMP=  50.00
    *S  COMPUTE HYDROGRAPH FOR BASIN L7.2
    COMPUTE NM HYD          L7.2   -     2        .06880      115.85       4.649      1.26693     1.500
2.631 PER IMP=  38.00
    *S  DIVIDE ID=2 INTO 3 THIRDS FOR PONDS 6, 7 AND 8
    DIVIDE HYD            L7.2_4    2    1        .02291       38.58       1.548      1.26693     1.500
2.631
                          L7.2_5  and    3        .04589       77.27       3.101      1.26693     1.500
2.631
    *S  ADD 1ST THIRD TO ROUTED FLOW
    ADD HYD               TO_DAM6  1&78  10      2.18215      489.42     158.029      1.35785     2.100
.350
    *S
    *S
```

```
    *S   ROUTE FLOW THROUGH POND #6
    ROUTE RESERVOIR        POND6   10    9       2.18215       158.18     155.002      1.33185    3.850
.113 AC-FT=   23.776
    *S
    *S
    *S  ADD 2ND THIRD TO POND OUTFLOW
    ADD HYD              TO_DAM7  1& 9  10       2.20506       158.38     156.550      1.33117    3.850
.112
    *S
    *S
    *S  ROUTE FLOW THROUGH POND #7
    ROUTE RESERVOIR        POND7   10    9       2.20506       142.07     154.022      1.30967    5.100
.101 AC-FT=   12.291
    *S
    *S
    *S  ADD LAST THIRD TO POND OUTFLOW
    ADD HYD              TO_DAM8  1& 9  10       2.22797       142.26     155.570      1.30923    5.100
.100
    *S
    *S
    *S  ROUTE FLOW THROUGH POND #8
    *S   CREST=5276.0, TOP=5297.0,  2-24" PIPES WITH 8" ORIFICE PLATES
    ROUTE RESERVOIR        POND8   10    9       2.22797        63.85     128.889      1.08470   15.250
.045 AC-FT=   42.487
    *S
    *S
    *S  ROUTE OVERLAND FLOW FROM BASINS L0.1-L7.2 THROUGH  BASIN I-2.4
    ROUTE MCUNGE          L9.2_1    9   10       2.22797        63.85     128.671      1.08286   15.250
.045 CCODE =      .2
    SEDIMENT BULK
    PK BF =    1.10
    *S  COMPUTE HYDROGRAPH FOR BASIN L9.1
    *S  COMPUTE HYDROGRAPH FOR BASIN L9.1A
 □
                                   FROM  TO                          PEAK        RUNOFF                TIME TO
CFS      PAGE =   4
                     HYDROGRAPH    ID    ID          AREA     DISCHARGE      VOLUME      RUNOFF      PEAK
PER
    COMMAND        IDENTIFICATION   NO.   NO.       (SQ MI)      (CFS)      (AC-FT)    (INCHES)   (HOURS)
ACRE     NOTATION
    COMPUTE NM HYD         L9.1A    -     1        .19770       275.89      14.155      1.34249    1.600
2.180 PER IMP=  35.00
    *S  COMPUTE HYDROGRAPH FOR BASIN L9.1B
    COMPUTE NM HYD         L9.1B    -     9        .06700        92.83       3.893      1.08948    1.550
2.165 PER IMP=  24.98
    *S  ROUTE L9.1B THRU "DAM 9.1" ARROYO, LOCATED IN L9.2B
    ROUTE MCUNGE    L9.1B_DAM9.1    9   50        .06700        92.22       3.890      1.08873    1.600
```

input

12.6 u 2.2 cfs/u

```
2.151 CCODE =      .1
    SEDIMENT BULK
    PK BF =    1.02
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L9.2A
    COMPUTE NM HYD         L9.2A   -     3        .00400        8.49        .346      1.61961    1.500
3.316 PER IMP=  50.00
    *S  COMPUTE HYDROGRAPH FOR BASIN L9.2B
    COMPUTE NM HYD         L9.2B   -     4        .01220       25.86       1.054      1.61960    1.500
3.312 PER IMP=  50.00
    *S
    *S  STRUCTURE 2 INFLOW--STR 2
    *S  STRUCT 2
    *S  COMBINE ROUTED FLOW FROM DAM 9.1 aRROYO AND BASIN L9.2B
    ADD HYD                  AP2 50& 4   5        .07920      113.70       4.944      1.17050    1.550
2.243
    *S
    SEDIMENT BULK
    PK BF =    1.02
    *S  COMBINE L9.1A AND BASIN L9.2A
    ADD HYD          DAM9.1L9.2A  1& 3  52        .20170      281.78      14.501      1.34799    1.600
2.183
    *S
    *S  STRUCTURE 1 INFLOW--STR 1
    *S  STRUCT 1
    *S  COMBINE FLOW WITH BASIN L7.1A
    ADD HYD                  AP1 52&99  96        .21110      295.59      15.313      1.36008    1.600
2.188
    *S
    *s  THIS PORTION OF THE .HYM INCORPORTES AND ACCOUNTS FOR THE FLOW
    *s  FROM BASIN I-2(STORMCLOUD) AS WELL ASTHROUGH STRUTURES 1 AND 2 (PRIMARY SD N
    *S  COMPUTE HYDROGRAPH FOR BASIN I2.1
    COMPUTE NM HYD          I2.1   -    92        .09750      206.26       8.422      1.61960    1.500
3.305 PER IMP=  50.00
    *S  COMPUTE HYDROGRAPH FOR BASIN I2.4
    COMPUTE NM HYD          I2.4   -    93        .01700       25.31        .692       .76307    1.500
2.326 PER IMP=    .00
    *S  ROUTE FLOW FROM STR1 THRU I2 VIA 60"RCP
    ROUTE MCUNGE         STR1SD1   96   53        .21110      295.34      15.297      1.35868    1.600
2.186 CCODE =      .1
    *S  ROUTE FLOW FROM STR2 THRU I2 VIA 42"RCP
    ROUTE MCUNGE         STR2SD4    5   52        .07920      112.31       4.945      1.17059    1.600
2.216 CCODE =      .2
    *S  COMBINE ROUTE STR1 AND ROUTE STR2
    ADD HYD                STR1&2 52&53  54        .29030      407.64      20.241      1.30736    1.600
2.194
    *S  ROUTE FLOW STR 1 & 2  THRU I2 VIA 72"RCP
    ROUTE MCUNGE        STR12SD2   54   55        .29030      407.64      20.241      1.30736    1.600
```

```
2.194 CCODE =      .0
    *S  COMBINE I2.1 AND FLOW FROM STRUC 1 & 2 VIA 72"RCP
    ADD HYD             I2.2I2.1 55&92  60        .38780       553.01      28.663      1.38586    1.550
2.228
    *S  COMBINE ROUTED STR1 STR2 AND I2.4
    ADD HYD              SD1I2.4 93&60  56        .40480       576.34      29.355      1.35971    1.550
2.225
    *S  COMBINE I-2.1 AND I-2.4 AND OTHER UPSTREAM BASINS FLOWING INTO POND#9
    ADD HYD          I2OTHERS2D9 56&10  61       2.63277       577.17     158.026      1.12542    1.550
.343
    *S  ROUTE FLOW THROUGH DAM #9
    *S   CREST=5276.0, TOP=5279.0,  2-24" PIPES WITH 8.75" ORIFICE PLATES
    ROUTE RESERVOIR        POND9   61   99       2.63277        60.30     128.664       .91632   23.850
.036 AC-FT=   31.591
    *S  SKIP FROM DAM 10 UP TO TOP OF LADERA WATERSHED
    *S*****************************************************************************
    *S*****************************************************************************
 □
                                  FROM  TO                      PEAK         RUNOFF                TIME TO
CFS      PAGE =   5
                     HYDROGRAPH   ID   ID         AREA     DISCHARGE      VOLUME      RUNOFF      PEAK
PER
    COMMAND       IDENTIFICATION   NO.  NO.      (SQ MI)      (CFS)        (AC-FT)    (INCHES)  (HOURS)
ACRE     NOTATION
    *S    CALCULATE RUNOFF BEGINNING AT THE TOP OF LADERA L12 WATERSHED.
    *S  UPPER LADERA BASINS START AT DOUBLE EAGLE II AIRPORT & DRAIN TO DAM12
    *S                              REGION B2
    *S*****************************************************************************
    SEDIMENT BULK
    PK BF =    1.02
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.1  NON-CONTRIBUTING BASIN.
    COMPUTE NM HYD         L12.1   -     1        .22190       245.81      17.244      1.45704    1.750
1.731 PER IMP=  35.00
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.2  NON-CONTRIBUTING BASIN.
    COMPUTE NM HYD         L12.2   -     2       1.13590      1604.43      58.120       .95937    1.500
2.207 PER IMP=  19.00
    *S  COMBINED FLOW FROM NON-CONTRIBUTING BASINS (BASIN L12.1 AND L12.2)
    *S  NOTE:  THERE IS ON-SITE RETENTION BETWEEN THE RUNWAYS.  THIS WILL
    *S  ATTENUATE FLOW.  ALSO, THE PLAYA IN L12.2 CAN HOLD ESTIMATED 70 ACRE-FT.
    ADD HYD              L12.2_1  1& 2   4       1.35780      1708.10      75.363      1.04070    1.550
1.966
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.3
    COMPUTE NM HYD         L12.3   -     1        .33130       414.71      31.842      1.80213    1.750
1.956 PER IMP=  59.00
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```
    *S  ROUTE L12.3 THROUGH L12.6
    ROUTE MCUNGE          L12.3_1    1   49        .33130       376.33       31.841      1.80205     2.500
1.775 CCODE =      .1
    ROUTE MCUNGE          L12.3_1   49   50        .33130       332.08       31.295      1.77115     2.700
1.566 CCODE =      .2
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.5
    COMPUTE NM HYD         L12.5   -     1        .73130       548.65       36.150       .92687     1.750
1.172 PER IMP=  16.00
    *S  ROUTE L12.5 THROUGH L12.4
    ROUTE MCUNGE          L12.4_1    1   51        .73130       508.69       36.257       .92960     2.000
1.087 CCODE =      .2
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.4
    COMPUTE NM HYD         L12.4   -     1        .60160       734.19       49.908      1.55548     1.700
1.907 PER IMP=  46.00
    *S  ADD L12.4 AND L12.5
    ADD HYD               L12.4_2  1&51   2       1.33290       988.44       86.165      1.21209     1.900
1.159
    *S  ROUTE COMBINED (L12.4 AND L12.5) THROUGH L12.6
    ROUTE MCUNGE          L12.6_1    2   51       1.33290       969.26       86.215      1.21279     2.300
1.136 CCODE =      .2
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.6
    COMPUTE NM HYD         L12.6   -     1        .94530      1080.19       94.439      1.87320     1.800
1.785 PER IMP=  65.00
    *S  ADD (L12.4-5) & L12.6
    ADD HYD               L12.6_2  1&51   2       2.27820      1620.33      180.654      1.48682     2.100
1.111
    *S ADD (L12.4-6) & L12.3
    ADD HYD               L12.6_3  2&50   4       2.60950      1620.37      211.949      1.52291     2.100
.970
    *S  ROUTE COMBINED (L12.3, L12.4, L12.5, AND L12.6) THROUGH L12.7
    ROUTE MCUNGE          L12.7_1    4   49       2.60950      1471.64      211.142      1.51712     2.350
.881 CCODE =      .2
    ROUTE MCUNGE          L12.7_1   49   50       2.60950      1470.21      211.119      1.51695     2.400
.880 CCODE =      .2
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.7
    COMPUTE NM HYD         L12.7   -     1       1.05630       738.20       53.956       .95775     1.750
1.092 PER IMP=  21.00
    *S  ADD (L12.3-6) & L12.7
    ADD HYD               L12.7_2  1&50   3       3.66580      1736.65      265.075      1.35582     2.150
.740
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.8
    COMPUTE NM HYD         L12.8   -     1        .42190       459.15       41.750      1.85543     1.850
1.700 PER IMP=  66.00
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    *S  ROUTE L12.8 THROUGH L12.7
 □
                                        FROM  TO                    PEAK        RUNOFF                TIME TO
CFS      PAGE =   6
                        HYDROGRAPH      ID    ID        AREA     DISCHARGE     VOLUME      RUNOFF     PEAK
PER
    COMMAND         IDENTIFICATION      NO.   NO.     (SQ MI)      (CFS)       (AC-FT)    (INCHES)  (HOURS)
ACRE     NOTATION

    ROUTE MCUNGE          L12.7_3       1    50       .42190       459.15      41.750      1.85546    1.850
1.700 CCODE =      .2
    *S ADD (L12.3-7) & L12.8
    ADD HYD               L12.7_4     3&50    3      4.08770      2061.94     306.826      1.40739    1.850
.788
    *S  ROUTE COMBINED (L12.3-8) THROUGH L12.9 -- UPPER REACHES MIREHAVEN A ARROYO
    ROUTE MCUNGE          L12.9_1       3    49      4.08770      2061.78     306.829      1.40740    1.900
.788 CCODE =      .1
    ROUTE MCUNGE          L12.9_1      49    50      4.08770      2052.60     306.551      1.40613    2.100
.785 CCODE =      .1
    SEDIMENT BULK
    PK BF =    1.07
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.9
    COMPUTE NM HYD          L12.9       -     1       .65940       473.32      30.045       .85433    1.700
1.122 PER IMP=  15.00
    *S  ADD (ROUTED L12.3-8) & L12.9
    ADD HYD               L12.9_2     1&50    4      4.74710      2259.41     336.596      1.32948    2.100
.744
    SEDIMENT BULK
    PK BF =    1.02
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.11
    COMPUTE NM HYD         L12.11       -     1       .27340       292.11      27.318      1.87351    1.850
1.669 PER IMP=  67.00
    *S  ROUTE L12.11 THROUGH L12.12
    ROUTE MCUNGE         L12.12_1       1    49       .27340       292.01      27.309      1.87289    2.000
1.669 CCODE =      .2
    ROUTE MCUNGE         L12.12_1      49    50       .27340       290.60      27.274      1.87046    2.250
1.661 CCODE =      .1
    *S
    *S  ADD ROUTED L12.11 & L12.3-9
    ADD HYD              L12.12_2     4&50    2      5.02050      2502.55     363.870      1.35894    2.100
.779
    *S
    *S  ROUTE COMBINED (L12.3-9,11) THROUGH L12.12 -- UPPER REACHES OF MIREHAVEN "A"
    ROUTE MCUNGE         L12.12_3       2    50      5.02050      2501.81     363.869      1.35894    2.100
.779 CCODE =      .2
    SEDIMENT BULK
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    PK BF =    1.07
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.12
    COMPUTE NM HYD        L12.12   -     1        .35310       468.04      31.676      1.68205    1.700
2.071 PER IMP=  52.00
    *S  ADD ROUTED L12.3-9,11 & L12.12
    ADD HYD             L12.12_4  1&50   3       5.37360      2693.61     395.545      1.38017    2.100
.783
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.10
    COMPUTE NM HYD        L12.10   -     1        .22190       125.67       5.492       .46410    1.600
.885 PER IMP=    .00
    *S ADD ROUTED L12.3-9,11,12 & L12.10
    ADD HYD             L12.10_1  1& 3   4       5.59550      2719.66     401.038      1.34384    2.100
.759
    *S  ROUTE COMBINED (L12.3-12) THROUGH L12.13 --
    *S  MIREHAVEN "A" ROUTED FROM PLATEAU ABOVE ESCARPMENT TO BELOW ESCARPMENT
    ROUTE MCUNGE        L12.13_1    4   49       5.59550      2706.86     400.892      1.34335    2.250
.756 CCODE =      .1
    ROUTE MCUNGE        L12.13_1   49    4       5.59550      2706.86     400.892      1.34335    2.250
.756 CCODE =      .0
    ROUTE MCUNGE        L12.13_1    4   50       5.59550      2706.86     400.892      1.34335    2.250
.756 CCODE =      .0
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.13
    COMPUTE NM HYD        L12.13   -     1        .26090       146.13       6.133       .44074    1.600
.875 PER IMP=    .00
    *S  ADD ROUTED L12.3-12 & L12.13
    *S  TOTAL MIREHAVEN "A" ARROYO FLOW AT BASE OF ESCARPMENT
    ADD HYD             L12.13_2  1&50   4       5.85640      2722.92     407.025      1.30314    2.200
.726
    SEDIMENT BULK
    PK BF =    1.02
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.15
    COMPUTE NM HYD        L12.15   -     1        .43910       437.49      38.719      1.65332    1.850
1.557 PER IMP=  54.00
    *S  ROUTE L12.15 THROUGH L12.16  --  MIREHAVEN "C" ARROYO
 □
                                  FROM  TO                    PEAK        RUNOFF                TIME TO
CFS      PAGE =   7
                      HYDROGRAPH   ID   ID         AREA     DISCHARGE      VOLUME      RUNOFF     PEAK
PER
    COMMAND       IDENTIFICATION   NO.  NO.      (SQ MI)      (CFS)       (AC-FT)    (INCHES)  (HOURS)
ACRE     NOTATION

    ROUTE MCUNGE        L12.16_1    1   49        .43910       425.26      38.732      1.65391    2.300
1.513 CCODE =      .1
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    ROUTE MCUNGE        L12.16_1   49    1        .43910       422.49      38.695      1.65233    2.550
1.503 CCODE =      .1
    ROUTE MCUNGE        L12.16_1    1   50        .43910       421.32      38.667      1.65111    2.750
1.499 CCODE =      .1
    SEDIMENT BULK
    PK BF =    1.07
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.16
    COMPUTE NM HYD        L12.16   -     1        .85470      1200.68      78.394      1.71976    1.650
2.195 PER IMP=  54.00
    *S  ADD ROUTED L12.15 & L12.16
    ADD HYD             L12.16_2  1&50   2       1.29380      1200.68     117.061      1.69647    1.650
1.450
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.14
    *S        MIREHAVEN "B" ARROYO
    COMPUTE NM HYD        L12.14   -     1        .40160       253.18      19.010       .88756    1.800
.985 PER IMP=  16.00
    *S  ADD  L12.15,16 & L12.14
    ADD HYD             L12.14_1  1& 2   3       1.69540      1408.56     136.071      1.50485    1.700
1.298
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.17
    COMPUTE NM HYD        L12.17   -     1        .20310       210.77       8.790       .81149    1.550
1.622 PER IMP=  11.00
    *S  ADD  L12.14-16 & L12.17  --  FLOW AT LADERA TRAINING DIKE
    ADD HYD                 DIKE  1& 3   2       1.89850      1594.71     144.861      1.43068    1.650
1.312
    *S  ROUTE COMBINED (L12.14-L12.17) IN MIREHAVEN ARROYO DNSTREAM FROM TRNG DIKE
    *S    TO CONFLUENCE WITH MIREHAVEN "A" ARROYO BELOW ESCARPMENT
    ROUTE MCUNGE        L12.18_1    2   50       1.89850      1588.54     144.743      1.42952    1.800
1.307 CCODE =      .1
    *S
    *S ADD  L12.14-17 & L12.3-13
    *S TOTAL FLOW MIREHAVEN A, B, C ARROYOS BELOW ESCARPMT, DNSTRM FROM TR DIKE
    ADD HYD             L12.18_2  4&50   3       7.75490      3447.79     551.768      1.33408    2.150
.695
    *S  ROUTE L12.3-17 THROUGH MIREHAVEN ARROYO TO INTERSECTION W/FUTURE 98TH ST
    ROUTE MCUNGE        L12.18_3    3   50       7.75490      3441.28     551.863      1.33431    2.300
.693 CCODE =      .2
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.18
    COMPUTE NM HYD        L12.18   -     1        .51410       496.35      24.477       .89271    1.600
1.509 PER IMP=  16.00
    *S
    *S  ADD  L12.3-17 & L12.18 --  TOTAL FLOW IN MIREHAVEN AT FUTURE 98TH STREET
    ADD HYD             L12.18_4  1&50   2       8.26900      3509.42     576.340      1.30685    2.250
.663
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    *S  COMPUTE HYDROGRAPH FOR BASIN L14.5
    COMPUTE NM HYD          L14.5   -     1        .08280        74.23       2.058       .46607    1.500
1.401 PER IMP=    .00
    *S ADD  L12.3-18 & L14.5
    ADD HYD             L12.18_5  1& 2   3       8.35180      3513.28     578.398      1.29852    2.250
.657
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.19
    COMPUTE NM HYD        L12.19   -     1        .17600       363.90      15.248      1.62448    1.500
3.231 PER IMP=  47.50
    *S  BASIN L12.20 DIVIDED INTO 12.20A, 12.20B, AND 12.20C
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.20A
    COMPUTE NM HYD       L12.20A   -     4        .01180        26.11       1.064      1.69071    1.500
3.458 PER IMP=  50.00
    *S
    *S  STRUCTURE #3 INFLOW--STR 3
    *S  STRUCTURE 3
    ADD HYD                  AP3  1& 4   5        .18780       390.02      16.312      1.62864    1.500
3.245
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.20C
    COMPUTE NM HYD       L12.20C   -     6        .05900        55.77       1.551       .49296    1.500
1.477 PER IMP=    .00
    *S  ADD L12.18-14.5A TO BASIN L12.20C
 □
                                     FROM  TO                     PEAK        RUNOFF                TIME TO
CFS      PAGE =   8
                        HYDROGRAPH   ID   ID         AREA     DISCHARGE      VOLUME      RUNOFF      PEAK
PER
    COMMAND        IDENTIFICATION   NO.  NO.      (SQ MI)       (CFS)       (AC-FT)    (INCHES)   (HOURS)
ACRE     NOTATION

    *S  FLOW GOES TO DAM 12
    ADD HYD          L12.18-14.5A  3& 6   7       8.41080      3516.15     579.950      1.29287    2.250
.653
    *S  ROUTE COMBINED (L12.13-L12.18) IN MIREHAVEN THRU L12.20 TO DAM#12
    ROUTE MCUNGE         L12.20_1    7   51       8.41080      3515.67     579.903      1.29277    2.300
.653 CCODE =      .1
    SEDIMENT BULK
    PK BF =    1.03
    *S  THE FLOW FROM THE 66"RCP WILL NOT BE ROUTED TO POND#10, IN THIS ANALYSIS
    *S  INSTEAD IT WILL BE ROUTED TO POND#11
    *S  ROUTE FLOW FROM STR3 THRU 1ST SEGMENT OF I2.2 VIA 66"RCP
    ROUTE MCUNGE       STR3THRU66    5   55        .18780       381.54      16.312      1.62861    1.500
3.174 CCODE =      .2
    *S  COMPUTE HYDROGRAPH FOR BASIN D17
    COMPUTE NM HYD           D17   -     7        .01400        29.76       1.213      1.62434    1.500
3.322 PER IMP=  50.00
    ROUTE MCUNGE       D17THRU24"    7   10        .01400        29.76       1.213      1.62432    1.500
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3.322 CCODE =      .0
    *S COMBINE ROUTED FLOW FROM D17 AND OFFSITE STRUC#3 FLOW
    ADD HYD          STR3ANDD17 10&55   2        .20180      411.31      17.525      1.62831    1.500
3.185
    ROUTE MCUNGE    STR3D17THRU6    2    1        .20180      411.31      17.525      1.62831    1.500
3.185 CCODE =      .0
    *S  COMPUTE HYDROGRAPH FOR BASIN I2.2
    COMPUTE NM HYD          I2.2   -    95        .07200      152.95       6.237      1.62435    1.500
3.319 PER IMP=  50.00
    *S  COMBINE ROUTED FLOW WITH BASIN I2.2 - THIS IS FLOW TO POND#11
    ADD HYD              D17STR3 95& 1   2        .27380      564.25      23.762      1.62727    1.500
3.220
    *S ROUTE COMBINED FLOW THROUGH 3RD SEGMENT TO POND#11 VIA 66" RCP
    *S THIS WILL BE THE TOTAL FLOW RE-ROUTED TO POND#11
    *S  Note this flow has not been added to the flow from D17.4, and I2.3,
    ROUTE MCUNGE    TOTALRE-ROUT    2   97        .27380      521.23      23.440      1.60516    1.550
2.975 CCODE =      .2
    *S  THESE BASINS WILL GO TO POND#10 - via sheet flow
    *S  COMPUTE HYDROGRAPH FOR BASIN I2.3
    COMPUTE NM HYD          I2.3   -    94        .02900       45.69       1.364       .88181    1.500
2.462 PER IMP=   7.00
    *S BASIN D17.4 TAKEN FROM "THE CROSSINGS" DRAINAGE REPORT
    *S TAKEN AS AREA LEFT FROM BASIN L12.20 MINUS D17 & I-2
    *S  COMPUTE HYDROGRAPH FOR BASIN D17.4
    COMPUTE NM HYD         D17.4   -     8        .00180        3.71        .159      1.65461    1.500
3.217 PER IMP=  57.00
    ADD HYD              D17I2.3 94& 8   9        .03080       49.40       1.523       .92696    1.500
2.506
    *S  ROUTE OUTFLOW FROM DAM 9 OVERLAND THROUGH SMALL PORTION OF BASIN I2.3
    ROUTE MCUNGE    TO_DAM10FROM   99   10       2.63277       60.30     128.556       .91555   23.900
.036 CCODE =      .2
    *S  ADD ALL COMBINED FLOW INTO DAM#10
    *S  ADD HYD FOR D17.4, I2.3 AND OVERLAND FLOW
    ADD HYD         TO_DAM10_ALL 10& 9  11       2.66357       60.34     130.079       .91568   23.900
.035
    *S  ROUTE COMBINED THROUGH DAM #10
    *S   CREST=5257.0, TOP=5260.0
    ROUTE RESERVOIR       POND10   11    9       2.66357       52.08      90.953       .64025   29.950
.031 AC-FT=   39.113
    *S  COMPUTE HYDROGRAPHS FOR BASINS IN THE CROSSINGS
    *S  COMPUTE HYDROGRAPHS FOR BASINS 1-5
    COMPUTE NM HYD          B1_5   -     2        .01600       33.73       1.377      1.61361    1.500
3.294 PER IMP=  50.00
    *S  COMPUTE HYDROGRAPHS FOR BASIN D4
    COMPUTE NM HYD            D4   -     1        .00120        2.54        .103      1.61361    1.500
3.311 PER IMP=  50.00
    *S  ADD BASINS D4 AND 1-5
    ADD HYD                D41_5  2& 1   3        .01720       36.28       1.480      1.61357    1.500
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3.295
    *S
    *S  COMPUTE HYDROGRAPHS FOR BASIN D9 AND D11
    COMPUTE NM HYD          D911   -     1        .00600         7.99        .242       .75562    1.500
2.081 PER IMP=   7.00
    *S  ADD BASINS D911 AND UPSTREAM
    ADD HYD                D41_5  3& 1   1        .02320        44.26       1.722      1.39168    1.500
2.981
    *S
 □
                                   FROM  TO                     PEAK        RUNOFF                TIME TO
CFS      PAGE =   9
                      HYDROGRAPH   ID   ID        AREA     DISCHARGE      VOLUME      RUNOFF     PEAK
PER
    COMMAND       IDENTIFICATION   NO.  NO.      (SQ MI)      (CFS)       (AC-FT)    (INCHES)  (HOURS)
ACRE     NOTATION

    *S  COMPUTE HYDROGRAPHS FOR BASIN D10 AND D12
    COMPUTE NM HYD         D1012   -     2        .00300         7.04        .311      1.94657    1.500
3.669 PER IMP=  70.00
    *S  ADD BASINS D1012 AND UPSTREAM
    ADD HYD                D41_5  2& 1   2        .02620        51.31       2.033      1.45520    1.500
3.060
    *S
    *S  COMPUTE HYDROGRAPHS FOR BASIN D15
    COMPUTE NM HYD           D15   -     3        .00440         4.66        .128       .54608    1.500
1.653 PER IMP=    .00
    *S  ADD BASINS D15 AND UPSTREAM
    ADD HYD             TO_DAM11  3& 2   1        .03060        55.96       2.162      1.32448    1.500
2.858
    *S
    *S  ADD ALL FLOW INTO POND#11 PLUS POND#10 FLOW
    ADD HYD             TO_DAM11  1& 9   1       2.69417        57.11      93.114       .64803    1.500
.033
    *S
    *S THIS FLOW SHOULD BE COMBINATION OF ALL ROUTED TO POND #11
    *S WITH THE INCLUSION OF TOTAL OF SD3 FLOW
    *S ADD ALL FLOW FROM POND#10, CROSSINGS, AND TIERRA O, WITH SD3
    ADD HYD         TOTAL_INTO_D  1&97   2       2.96797       573.19     116.554       .73632    1.550
.302
    *S
    *S  ROUTE TOTAL FLOW THROUGH DAM #11
    *S  CREST=5234.7, TOP=5236.5, 1-24"
    ROUTE RESERVOIR       POND11    2    9       2.96797        45.21      89.685       .56658   29.950
.024 AC-FT=   26.854
    ROUTE MCUNGE        L12.20_6    9   10       2.96797        45.17      89.239       .56376   29.950
.024 CCODE =      .2
    *S  ADD SECOND HALF OF FLOW FROM L12.20 TO MIREHAVEN CHAN
```

```
*S  TOTAL FLOW IN MIREHAVEN CHANNEL NORTH OF DAM 12
ADD HYD             L12.20_7  2&51   3      11.37877      3561.51     696.457      1.14762    2.300
.489
*S PLOT2  HYD=L12.20_7   TOTAL FLOW IN MIREHAVEN CHANNEL NORTH OF DAM 12
*S
*S  COMBINED MIREHAVEN AND DAM #11 OUTFLOW -- TOTAL FLOW INTO DAM #12
ADD HYD             TO_DAM12  3&10   9      14.34674      3599.41     785.695      1.02684    2.300
.392
FINISH
```

APPENDIX C

CD CONTAINING AHYMO INPUT AND OUTPUT FILES

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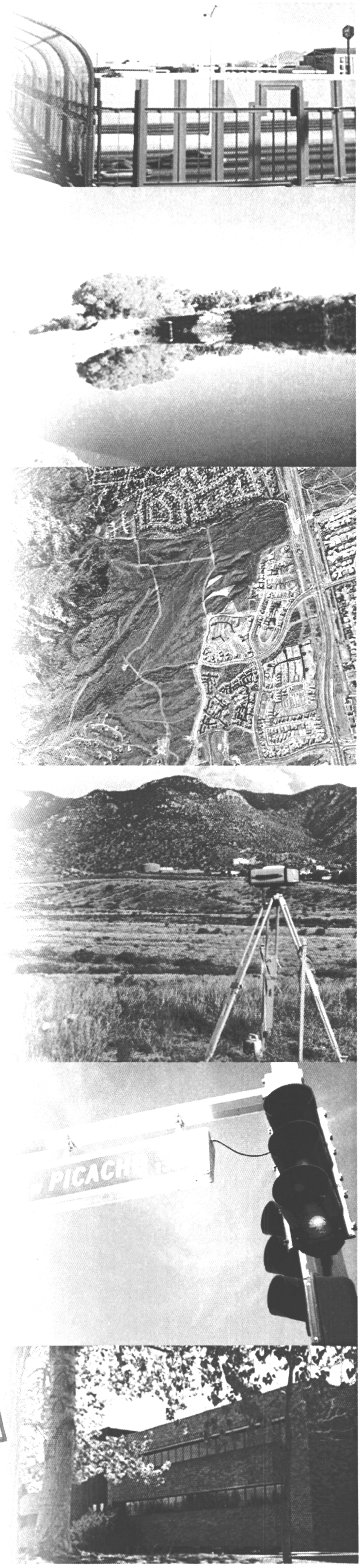
AMENDMENT NO. 2
STORMCLOUD SUBDIVISION
DRAINAGE REPORT



MAY 19, 2010

Prepared for:

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Albuquerque, New Mexico 87102

Bohannan ▲ Huston INC.

ENGINEERING ▲
SPATIAL DATA ▲
ADVANCED TECHNOLOGIES ▲

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HYDROLOGY
SECTION

AMENDMENT NO. 2
STORMCLOUD SUBDIVISION
DRAINAGE REPORT

MAY 19, 2010

PREPARED BY:

BOHANNAN HUSTON INC.

COURTYARD ONE

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ALBUQUERQUE, NM 87109

Craig W. Hoover, P.E. Date

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I. EXECUTIVE SUMMARY

This report will serve as Amendment No. 2 to the Drainage Report for Stormcloud Subdivision, Bohannan Huston Inc., May 2005, which was prepared for Westland Development. The Drainage Report described the drainage management plan for the Stormcloud Subdivision at Westland. The proposed development of the Stormcloud Subdivision consists of 520 single-family residential lots, which sit on approximately 106 acres. The project was divided into three sequentially built units. The Drainage Report addressed the management of both the onsite drainage, which was analyzed for development within Stormcloud, as well as the drainage originating from the future development upstream of Stormcloud. The Drainage Report stated that because of the future development upstream of Stormcloud, the Ladera System of Dams #9, #10, and #11 lacked the capacity to effectively perform under their current design for the 100-yr event. Therefore, the Drainage Report recommended that Dams #9 and #10 required expansion of their storage pools, as well as installing orifice plates to their primary spillways. This recommendation allowed Dams #9, #10, and #11 to effectively perform as detention facilities while maintaining a minimum freeboard of one-foot as required by the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA).

Ongoing discussions with Westland Development Corporation, AMAFCA, and the New Mexico Office of the State Engineer (OSE), regarding the Ladera System of Dams, prompted a further analysis into the recommendations described in the Drainage Report for Dams #9 and #10. The analysis described in Amendment No. 1 to the Drainage Report for Stormcloud Subdivision was performed to determine the post-construction conditions of Stormcloud and its effects on Dams #9, #10, and #11. The post-construction analysis included: existing land treatment conditions west of Stormcloud, and fully developed land treatments within Stormcloud. Within this analysis Dams #9, #10, and #11 were also treated as existing structures with no modifications (i.e. without storage pool expansions or orifice plates installed). In summary, the analysis for Amendment No. 1 produced the following results:

- Dams #9 and #10 will not require storage pool expansions during the post-construction phases of Stormcloud
- Dams #9 and #10 will not require the installation of orifice plates during the post-construction phases of Stormcloud

These results indicated that Dams #9, #10, and #11 can remain "as-is" in their current condition with the construction of the Stormcloud Subdivision, without exceeding the capacity of the dam system. Amendment No. 1 stated that in order to accommodate the fully developed conditions upstream of Stormcloud, the expansions and orifice plate designs for Dams #9 and #10 will need to be implemented, to accommodate the increase in flow rates.

In 2009 the New Mexico State Legislature and Governor approved House Bill 63 which changed the OSE criteria for jurisdictional status of dams. Specifically, the maximum height and storage volumes for non-jurisdictional dams were increased to 25 feet in height and 50 acre-feet (ac-ft) in volume. With this change it is advantageous to shift the proposed Ladera Dam system expansion from Dam #10 to other dams, as Ladera Dam #10 is still considered jurisdictional under the new criteria while other smaller dams, such as Dams #8 and #9 are not. This allows changes, more specifically expansions, to be made to these two dams without requiring approval by the OSE. However, a non-jurisdictional determination for both Dam #8 and Dam #9 from the OSE is required and is part of a separate submittal. Consequently, due to new jurisdictional thresholds of the OSE, the expansion of Dams #8 and #9 rather than Dam #10 is proposed in this Amendment No. 2 to the Drainage Report for Stormcloud Subdivision. In this analysis, the storage pools for both Dams #8 and #9 were expanded to meet hydrologic and hydraulic requirements resulting from the development of the Stormcloud Subdivision plus fully developed conditions in the contributing watershed. Additionally, under the Clean Water Act Section 404 Compensatory Mitigation Requirements, two acres of mitigation are required at the Stormcloud site. This is accounted for in the expansion of Dams #8 and #9.

II. ANALYSIS

In order to satisfy the 404 mitigation requirement of two acres at the Stormcloud site, three different options were considered: 1) Expanding the bottom of Dam #9 by two acres, 2) expanding the bottom of Dam #9 and designing a low-flow swale from the end of the park at Stormcloud Avenue NW and Summer Breeze Drive NW to the arroyo above Dam #9; and 3) expanding the bottoms of both Dams #8 and #9. Option 1 was ruled out due to the large amount of land and excavation that this option would require to achieve the necessary storage volume. Option 2 was ruled out due to the cost of construction of a swale around the hills upstream of Dam #9. It is recommended that both Dams #8 and #9 be expanded, as in Option 3. The proposed elevations of

the pond bottoms will not change from the existing elevations. Currently, Dam #9 has a bottom area of 2.42 acres and a storage volume of 27.5 ac-ft. This amendment No. 2 recommends the addition of 0.95 acres to this area and 10.2 ac-ft to this volume, for a total proposed area of 3.37 acres and a total proposed storage volume of 37.7 ac-ft. The current area of the bottom of Dam #8 is 2.87 acres and the current storage volume of this dam is 36.2 ac-ft. This amendment No. 2 recommends the addition of 1.05 acres to this area and 6.5 ac-ft to this volume, for a total proposed area of 3.93 acres and a total proposed storage volume of 42.7 ac-ft. Dams #8 and #9 are located downstream (southeast) of the Stormcloud Subdivision. These dams and the basin divisions can be seen in Figure 1. The cross-section of Dams #8 and #9 can be seen in Figure 2. The detailed grading plan for Dam #8 can be seen in Figure 3 and the detailed grading plan for Dam #9 can be seen in Figure 4.

For this amendment, two scenarios were analyzed. The first assumes that the existing conditions will consist of existing land treatments west (upstream) of Stormcloud, and fully developed land treatments within Stormcloud. This scenario was referred to as "post-construction" in Amendment No. 1. The second assumes that the fully developed conditions will consist of fully developed land treatments within Stormcloud as well as upstream of the development. The modeled design storm for the watershed was the 100-yr, 24-hr event. The hydrology used in this report includes the hydrology from the approved West I-40 Diversion Drainage Management Plan (DMP) completed by BHI in June 2000. The post-construction model of the Stormcloud Subdivision (November 2005) was used as the initial AHYMO input file.

The expanded stage-storage-outflow curves for Dams #8 and #9 were modeled in this analysis for both existing and fully developed conditions. These curves were modified from the post-construction model of the Stormcloud Subdivision to include the larger bottom areas and storage volumes described above. The AHYMO ROUTE RESERVOIR command was used to compute the maximum water surface elevation and maximum outflow from the Dams.

III. RESULTS

The summary output of the AHYMO model for the existing conditions analysis can be found in Appendix A. Table 1 lists the flow rates into Dams #8 and #9, the runoff volume from the basins contributing to the dams (inflow volume), the flow rates out of Dams #8 and #9, the maximum

storage, the maximum water surface elevation (WSEL), the emergency spillway crest elevations, and the computed freeboard for the existing conditions analysis.

Table 1: Summary of Existing Conditions Model Output

Ladera Dam No.	Existing Conditions Computed Max. Q_{in} (cfs)	Existing Conditions Inflow Volume (ac-ft)	Existing Conditions Computed Max. Q_{out} (cfs)	Existing Conditions Maximum Storage (ac-ft)	Existing Conditions Computed Max. 100-yr WSEL (ft)	Emergency Spillway Invert (Crest) Elevation (ft)	Existing Conditions Computed Freeboard (ft)
8	71	64.7	51	9.8	5290.3	5297.0	6.7
9	378	79.5	53	10.7	5270.5	5276.0	5.5

The summary output of the AHYMO model for the fully developed conditions analysis can be found in Appendix B. Table 2 lists the flow rates into Dams #8 and #9, the runoff volume from the basins contributing to the dams (inflow volume), the flow rates out of Dams #8 and #9, the maximum storage, the maximum WSEL, the emergency spillway crest elevations, and the computed freeboard for the fully developed conditions analysis.

Table 2: Summary of Developed Conditions Model Output

Ladera Dam No.	Fully Developed Conditions Computed Max. Q_{in} (cfs)	Fully Developed Conditions Inflow Volume (ac-ft)	Fully Developed Conditions Computed Max. Q_{out} (cfs)	Fully Developed Conditions Maximum Storage Volume (ac-ft)	Fully Developed Conditions Computed Max. 100-yr WSEL (ft)	Emergency Spillway Invert (Crest) Elevation (ft)	Fully Developed Conditions Computed Freeboard (ft)
8	142	155.6	85	28.5	5294.2	5297.0	2.8
9	578	178.0	78	23.0	5273.2	5276.0	2.8

52 75 1.8

IV. CONCLUSION

Expansion of Dams #8 and #9 will satisfy the mitigation requirements of the Clean Water Act. Both of these dams will be able to accommodate the Stormcloud and upstream fully developed conditions 100-year runoff. Additionally, the expansion maintains the storage volume for each dam within the maximum 50 ac-ft volume allowing the dams to meet the new criteria as non-jurisdictional facilities.

Appendix

APPENDIX A

EXISTING CONDITIONS HYDROLOGY CALCULATIONS

```
   AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) -                          - VERSION:  1997.02c      RUN DATE
(MON/DAY/YR) =04/01/2010
   INPUT FILE = P:\050316\WR\study\Programs\AHYMO\EXPANS~1\SUNPRO~1.HYM                      USER NO.=
AHYMO-S-9702c1BohanHu-AH

                                   FROM  TO                     PEAK         RUNOFF                TIME TO    CFS
 PAGE =   1
                     HYDROGRAPH    ID   ID        AREA     DISCHARGE      VOLUME      RUNOFF     PEAK      PER
   COMMAND        IDENTIFICATION   NO.  NO.      (SQ MI)     (CFS)        (AC-FT)    (INCHES)  (HOURS)    ACRE
 NOTATION

   *S*                 PROJECT NAME:  STORMCLOUD SUBDIVISION, ALBUQUERQUE, NM
   *S*                 JOB NO. 050316
   *S*                 DATE: MARCH 2010
   *S*
   *S*                 INPUT FILE NAME: SUNPROP89Existing.HYM
   *S*                 OUTPUT FILE NAME:  SUNPROP89Existing.OUT
   *S*                 FILES LOCATION: P:\050316\WR\STUDY\PROGRAMS\AHYMO\Expansion
   *S*
   *S*     COMMENTS:
   *S*     MODEL SHOWS POST CONSTRUCTION CONDITIONS.  IT INCLUDES THE
   *S*     PROPOSED LADERA DEVELOPMENT AS DEVELOPED
   *S*     AND THE UNAFFECTED AREAS AS EXISITING CONDITIONS FOR THE LADERA WATERSHE
   *S*     THIS MODEL WAS MODIFIED FROM THE EXISTING AND PROPOSED
   *S*     CONDITIONS MODELS, SUNEX.OUT AND SUN18.OUT RESPECTIVELY.
   *S*
   *S*     MODELS WERE MODIFIED TO ACCOUNT FOR THE PROPOSED STORMCLOUD DEVELOPMENT,
   *S*     AND THE EXISTING CONDITIONS WEST OF THE DEVELOPMENT.
   *S*
   *S*     THIS MODEL COMPUTES THE WSEL OF LADERA DAMS #8, AND #9,
   *S*     AND THE FLOW THROUGH STR 1, 2, AND 3 - WHICH ARE THE PRIMARY SD OF STORM
   *S*
   *S*     THIS MODEL INCLUDEs ENLARGED DAMS AND DOES NOT INCLUDE ORIFICE PLATES.
   *S*
   *S*     BASIN DIVISION SCHEME WAS TAKEN FROM THE "PROPOSED DEVELOPMENT" ANAYLSIS
   *S*
   *S*     EXISTING CONDITIONS WERE ASSUMED TO BE THE SAME AS IN THE I-40 DMP MODEL
   *S*
   *S*     TP'S WERE ASSUMED NOT TO CHANGE FOR THE EXISTING DELINEATED BASINS.
   *S*     TP = 0.133 hours as a min.
   *S*
   *S*     THE FOLLOWING IS FROM THE ORIGINAL WEST I-40 DMP, BUT ONLY CONTAINS THE
   *S*     ANALYSIS.
   *S*     ____________________________________________________________________________
```

```
    *S*
    *S   AHYMO FILE FOR WEST I-40 DIVERSION DMP
    *S   EXISTING CONDITIONS, 24HR, 100YR.
    *S   WITH SEDIMENT BULKING & WITHOUT SEDIMENT TRAPPING AT DAMS.
    *S
    *S   WITH CORRECTED LADERA DAMS 5/14/96
    START
TIME=        .00
    *S*****************************************************************************
    *S                          LADERA WATERSHED
    *S*****************************************************************************
    *S       CALCULATE RUNOFF FOR BASINS DRAINING TO PONDS 1 THROUGH 9
    *S                              REGION B1
    *S*****************************************************************************
    *S  RAINFALL FOR LADERA BASINS ABOVE DAM #12
    RAINFALL  TYPE= 2
RAIN24=    2.602
    *S*****************************************************************************
 □
                                  FROM  TO                    PEAK        RUNOFF                TIME TO    CFS
 PAGE =    2
                      HYDROGRAPH   ID   ID        AREA     DISCHARGE     VOLUME      RUNOFF     PEAK      PER
    COMMAND         IDENTIFICATION  NO.  NO.     (SQ MI)     (CFS)       (AC-FT)    (INCHES)  (HOURS)    ACRE
 NOTATION

    SEDIMENT BULK
PK BF =     1.23
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L0.1
    COMPUTE NM HYD    TO_DAMZERO   -     1        .33750       248.06      11.616       .64534    1.650    1.148
PER IMP=     .00
    *S   ROUTE FLOW THROUGH POND #0.
    ROUTE RESERVOIR     PONDZERO    1    2        .33750       232.66      11.616       .64534    1.750    1.077
AC-FT=     1.047
    *S ROUTE OUTFLOW FROM DAM ZERO THROUGH  BASIN L1.2  EARTHEN CHANNEL
    ROUTE MCUNGE          L0.1_1    2    9        .33750       232.46      11.603       .64462    1.850    1.076
CCODE =       .1
    SEDIMENT BULK
PK BF =     1.07
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L1.2
    COMPUTE NM HYD          L1.2   -     1        .11880       112.20       3.601       .56839    1.550    1.476
PER IMP=     .00
    *S  COMBINED FLOW (BASIN L0.1 AND L1.2)
```

```
    ADD HYD              L1.2_1  1& 9   2        .45630       263.50      15.205       .62478    1.800     .902
    *S  ROUTE THROUGH  BASIN L1.1
    ROUTE MCUNGE         L1.1_1    2    9        .45630       262.96      15.209       .62495    1.850     .900
CCODE =      .2
    *S  COMPUTE HYDROGRAPH FOR BASIN L1.1
    COMPUTE NM HYD         L1.1   -     1        .54380       232.82      14.492       .49968    1.750     .669
PER IMP=    .00
    *S  COMBINED FLOW (BASINS L0.1, L1.1 AND L1.2)
    ADD HYD              TO_DAM1  9& 1   9       1.00010       490.87      29.701       .55683    1.800     .767
    *S  ROUTE FLOW THROUGH POND #1
    ROUTE RESERVOIR        POND1    9   10       1.00010       145.76      29.701       .55683    2.300     .228
AC-FT=   16.565
    *S  ROUTE OVERLAND FLOW FROM BASINS L0.1,L1.1,L1.2 THROUGH  BASIN L4.1
    ROUTE MCUNGE         L4.1_1   10    9       1.00010       145.73      29.697       .55675    2.450     .228
CCODE =      .1
    SEDIMENT BULK
PK BF =    1.05
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L4.1
    COMPUTE NM HYD         L4.1   -     6        .25940       194.09       7.339       .53046    1.600    1.169
PER IMP=    .00
    *S
    *S  DIVIDE FLOW FROM BASIN L4.1 INTO 3 PIECES FOR ROUTE THROUGH PONDS 2, 3, & 4
    DIVIDE HYD           L4.1_2    6    1        .08638        64.63       2.444       .53046    1.600    1.169
                         L4.1_3  and    3        .17302       129.46       4.895       .53046    1.600    1.169
    *S  ADD THE 1ST THIRD OF RUNOFF FROM BASIN L4.1 TO COMBINED FLOW
    ADD HYD              TO_DAM2  1& 9  10       1.08648       149.90      32.140       .55466    2.400     .216
    *S
    *S   ROUTE FLOW THROUGH POND #2
    ROUTE RESERVOIR        POND2   10    9       1.08648        69.07      32.140       .55465    4.150     .099
AC-FT=   15.028
    *S  ADD 2ND THIRD OF RUNOFF FROM BASIN L4.1 TO FLOW FROM POND #2
    ADD HYD              TO_DAM3  1& 9  10       1.17286        69.36      34.584       .55287    4.100     .092
    *S
    *S   ROUTE FLOW THROUGH POND #3
    ROUTE RESERVOIR        POND3   10    9       1.17286        32.57      34.296       .54828    7.600     .043
AC-FT=   16.722
    *S  ADD FLOW FROM REMAINING THIRD OF BASIN L4.1 TO FLOW FROM POND #3
    ADD HYD              TO_DAM4  1& 9  10       1.25924        66.67      36.740       .54705    1.600     .083
    *S
    *S  ROUTE FLOW THROUGH POND #4
    ROUTE RESERVOIR        POND4   10    9       1.25924        25.86      36.185       .53879   12.050     .032
AC-FT=    8.964
    *S
```

```
    *S  ROUTE OVERLAND FLOW FROM BASINS L0.1-L4.1 THROUGH  BASIN L5.1
    ROUTE MCUNGE          L5.1_1    9   10       1.25924        25.86      36.169       .53855   12.050     .032
CCODE =      .2
    SEDIMENT BULK
PK BF =    1.12
    *S
    *S COMPUTE HYDROGRAPH FOR BASIN L5.1
 □
                                  FROM  TO                      PEAK        RUNOFF                TIME TO    CFS
 PAGE =   3
                     HYDROGRAPH   ID   ID        AREA     DISCHARGE      VOLUME      RUNOFF     PEAK      PER
    COMMAND        IDENTIFICATION  NO.  NO.      (SQ MI)     (CFS)       (AC-FT)    (INCHES)  (HOURS)    ACRE
 NOTATION

    COMPUTE NM HYD          L5.1   -     1.       .90000      364.59      28.934       .60279    1.850     .633
PER IMP=     .00
    *S  COMBINED FLOW (BASINS L0.1-L4.1 AND L5.1)
    ADD HYD              TO_DAM5  1&10  11       2.15924      371.04      65.103       .56533    1.850     .268
    *S
    *S
    *S   ROUTE FLOW THROUGH POND #5
    ROUTE RESERVOIR        POND5   11    9       2.15924      141.03      64.438       .55955    2.500     .102
AC-FT=   14.866
    *S
    *S
    *S  ROUTE OVERLAND FLOW FROM BASINS L0.1-L5.1 THROUGH  BASIN L7.2
    ROUTE MCUNGE          L7.2_1    9   78       2.15924      141.04      64.390       .55913    2.550     .102
CCODE =      .2
    SEDIMENT BULK
PK BF =    1.02
    *S BASIN L7.1A IS THE SAME AS L7.1 IN I-40 DMP, WITH AN INCREASE OF
    *S 20% IN AREA
    *S  COMPUTE HYDROGRAPH FOR BASIN L7.1A
    COMPUTE NM HYD         L7.1A   -    99        .00940        7.28        .205       .40935    1.500    1.210
PER IMP=     .00
    *S  COMPUTE HYDROGRAPH FOR BASIN L7.2
    COMPUTE NM HYD          L7.2   -     2        .06880       52.93       1.604       .43707    1.550    1.202
PER IMP=     .00
    *S  DIVIDE ID=2 INTO 3 THIRDS FOR PONDS 6, 7 AND 8
    DIVIDE HYD            L7.2_4    2    1        .02291       17.62        .534       .43707    1.550    1.202
                          L7.2_5  and    3        .04589       35.30       1.070       .43707    1.550    1.202
    *S  ADD 1ST THIRD TO ROUTED FLOW
    ADD HYD              TO_DAM6  1&78  10       2.18215      141.65      64.924       .55785    2.550     .101
    *S
```

```
    *S
    *S   ROUTE FLOW THROUGH POND #6
    ROUTE RESERVOIR        POND6   10    9       2.18215        83.36      64.281       .55233    3.750     .060
AC-FT=    9.983
    *S
    *S
    *S  ADD 2ND THIRD TO POND OUTFLOW
    ADD HYD              TO_DAM7  1& 9  10       2.20506        83.42      64.815       .55113    3.750     .059
    *S
    *S
    *S  ROUTE FLOW THROUGH POND #7
    ROUTE RESERVOIR        POND7   10    9       2.20506        71.37      64.209       .54598    4.950     .051
AC-FT=    6.159
    *S
    *S
    *S  ADD LAST THIRD TO POND OUTFLOW
    ADD HYD              TO_DAM8  1& 9  10       2.22797        71.37      64.743       .54486    4.950     .050
    *S
    *S
    *S  ROUTE FLOW THROUGH POND #8
    ROUTE RESERVOIR        POND8   10    9       2.22797        50.59      62.927       .52958    7.150     .035
AC-FT=    9.839
    *S
    *S
    *S  ROUTE OVERLAND FLOW FROM BASINS L0.1-L7.2 THROUGH  BASIN I-2.4
    ROUTE MCUNGE          L9.2_1    9   10       2.22797        50.59      62.860       .52901    7.200     .035
CCODE =      .2
    SEDIMENT BULK
PK BF =    1.10
    *S  COMPUTE HYDROGRAPH FOR BASIN L9.1
    *S  COMPUTE HYDROGRAPH FOR BASIN L9.1A
    COMPUTE NM HYD         L9.1A   -     1        .19770       143.48       5.159       .48929    1.550    1.134
PER IMP=    .00
    *S  COMPUTE HYDROGRAPH FOR BASIN L9.1B
 □
                                   FROM  TO                    PEAK        RUNOFF                TIME TO    CFS
 PAGE =   4
                      HYDROGRAPH   ID   ID        AREA     DISCHARGE      VOLUME      RUNOFF     PEAK      PER
    COMMAND        IDENTIFICATION  NO.  NO.     (SQ MI)      (CFS)       (AC-FT)    (INCHES)  (HOURS)    ACRE
 NOTATION

    COMPUTE NM HYD         L9.1B   -     9        .06700        45.79       1.748       .48929    1.550    1.068
PER IMP=    .00
    *S  ROUTE L9.1B THRU "DAM 9.1" ARROYO, LOCATED IN L9.2B
```

```
    ROUTE MCUNGE    L9.1B_DAM9.1    9   50        .06700        45.78        1.748        .48907    1.600    1.068
CCODE =      .1
    SEDIMENT BULK
PK BF =    1.02
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L9.2A
    COMPUTE NM HYD         L9.2A   -     3        .00400         3.35         .094        .43895    1.500    1.308
PER IMP=    .00
    *S  COMPUTE HYDROGRAPH FOR BASIN L9.2B
    COMPUTE NM HYD         L9.2B   -     4        .01220        10.20         .286        .43895    1.500    1.306
PER IMP=    .00
    *S
    *S  STRUCTURE 2 INFLOW--STR 2
    *S  STRUCT 2
    *S  COMBINE ROUTED FLOW FROM DAM 9.1 aRROYO AND BASIN L9.2B
    ADD HYD                 AP2 50& 4   5        .07920        53.77        2.033        .48134    1.600    1.061
    *S
    SEDIMENT BULK
PK BF =    1.02
    *S  COMBINE L9.1A AND BASIN L9.2A
    ADD HYD          DAM9.1L9.2A  1& 3  52        .20170       146.69        5.253        .48830    1.550    1.136
    *S
    *S  STRUCTURE 1 INFLOW--STR 1
    *S  STRUCT 1
    *S  COMBINE FLOW WITH BASIN L7.1A
    ADD HYD                 AP1 52&99  96        .21110       153.69        5.458        .48478    1.550    1.138
    *S
    *s  THIS PORTION OF THE .HYM INCORPORTES AND ACCOUNTS FOR THE FLOW
    *s  FROM BASIN I-2(STORMCLOUD) AS WELL ASTHROUGH STRUTURES 1 AND 2 (PRIMARY SD N
    *S  COMPUTE HYDROGRAPH FOR BASIN I2.1
    COMPUTE NM HYD          I2.1   -    92        .09750       206.26        8.422      1.61960    1.500    3.305
PER IMP=  50.00
    *S  COMPUTE HYDROGRAPH FOR BASIN I2.4
    COMPUTE NM HYD          I2.4   -    93        .01700        25.31         .692       .76307    1.500    2.326
PER IMP=    .00
    *S  ROUTE FLOW FROM STR1 THRU I2 VIA 60"RCP
    ROUTE MCUNGE         STR1SD1   96   53        .21110       153.47        5.451        .48417    1.600    1.136
CCODE =      .1
    *S  ROUTE FLOW FROM STR2 THRU I2 VIA 42"RCP
    ROUTE MCUNGE         STR2SD4    5   52        .07920        53.55        2.034        .48155    1.600    1.056
CCODE =      .2
    *S  COMBINE ROUTE STR1 AND ROUTE STR2
    ADD HYD               STR1&2 52&53  54        .29030       207.02        7.485        .48345    1.600    1.114
    *S  ROUTE FLOW STR 1 & 2  THRU I2 VIA 72"RCP
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    ROUTE MCUNGE        STR12SD2   54   55        .29030       205.45       7.490       .48378    1.600    1.106
CCODE =      .2
    *S  COMBINE I2.1 AND FLOW FROM STRUC 1 & 2 VIA 72"RCP
    ADD HYD             I2.2I2.1 55&92  60        .38780       354.29      15.912       .76934    1.550    1.427
    *S  COMBINE ROUTED STR1 STR2 AND I2.4
    ADD HYD              SD1I2.4 93&60  56        .40480       377.62      16.604       .76908    1.550    1.458
    *S  COMBINE I-2.1 AND I-2.4 AND OTHER UPSTREAM BASINS FLOWING INTO POND#9
    ADD HYD          I2OTHERS2D9 56&10  61       2.63277       377.92      79.463       .56592    1.550     .224
    *S  ROUTE FLOW THROUGH DAM #9
    *S   CREST=5276.0, TOP=5279.0,  2-24" PIPES
    ROUTE RESERVOIR        POND9   61   99       2.63277        53.14      78.675       .56031    2.150     .032
AC-FT=   10.738
    *S  SKIP FROM DAM 10 UP TO TOP OF LADERA WATERSHED
    *S*****************************************************************************
    *S*****************************************************************************
    *S    CALCULATE RUNOFF BEGINNING AT THE TOP OF LADERA L12 WATERSHED.
    *S  UPPER LADERA BASINS START AT DOUBLE EAGLE II AIRPORT & DRAIN TO DAM12
 □
                                   FROM  TO                    PEAK        RUNOFF                TIME TO    CFS
 PAGE =   5
                      HYDROGRAPH   ID   ID        AREA     DISCHARGE      VOLUME      RUNOFF     PEAK      PER
    COMMAND        IDENTIFICATION  NO.  NO.      (SQ MI)     (CFS)        (AC-FT)    (INCHES)  (HOURS)    ACRE
 NOTATION

    *S                            REGION B2
    *S*****************************************************************************
    SEDIMENT BULK
PK BF =    1.02
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.1  NON-CONTRIBUTING BASIN.
    COMPUTE NM HYD         L12.1   -     1        .22190        95.70       6.764       .57157    1.750     .674
PER IMP=   5.00
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.2  NON-CONTRIBUTING BASIN.
    COMPUTE NM HYD         L12.2   -     2       1.13590      1062.88      32.061       .52922    1.550    1.462
PER IMP=   4.00
    *S  COMBINED FLOW FROM NON-CONTRIBUTING BASINS (BASIN L12.1 AND L12.2)
    *S  NOTE:  THERE IS ON-SITE RETENTION BETWEEN THE RUNWAYS.  THIS WILL
    *S  ATTENUATE FLOW.  ALSO, THE PLAYA IN L12.2 CAN HOLD ESTIMATED 70 ACRE-FT.
    ADD HYD              L12.2_1  1& 2   4       1.35780      1116.71      38.825       .53614    1.550    1.285
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.3
    COMPUTE NM HYD         L12.3   -     1        .33130       102.29       7.362       .41668    1.800     .482
PER IMP=    .00
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    *S  ROUTE L12.3 THROUGH L12.6
    ROUTE MCUNGE          L12.3_1    1   49        .33130        97.49       7.260       .41087    2.300     .460
CCODE =      .1
    ROUTE MCUNGE          L12.3_1   49   50        .33130        89.66       7.124       .40321    2.500     .423
CCODE =      .2
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.5
    COMPUTE NM HYD          L12.5   -     1        .73130       208.76      15.966       .40935    1.850     .446
PER IMP=    .00
    *S  ROUTE L12.5 THROUGH L12.4
    ROUTE MCUNGE          L12.4_1    1   51        .73130       198.14      16.004       .41033    2.150     .423
CCODE =      .2
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.4
    COMPUTE NM HYD          L12.4   -     1        .60160       198.12      14.018       .43688    1.800     .515
PER IMP=   1.00
    *S  ADD L12.4 AND L12.5
    ADD HYD               L12.4_2  1&51   2       1.33290       326.46      30.021       .42231    2.050     .383
    *S  ROUTE COMBINED (L12.4 AND L12.5) THROUGH L12.6
    ROUTE MCUNGE          L12.6_1    2   51       1.33290       320.23      29.942       .42120    2.550     .375
CCODE =      .2
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.6
    COMPUTE NM HYD          L12.6   -     1        .94530       276.32      23.528       .46668    1.900     .457
PER IMP=   1.00
    *S  ADD (L12.4-5) & L12.6
    ADD HYD               L12.6_2  1&51   2       2.27820       439.45      53.470       .44007    2.400     .301
    *S ADD (L12.4-6) & L12.3
    ADD HYD               L12.6_3  2&50   4       2.60950       522.89      60.595       .43539    2.400     .313
    *S  ROUTE COMBINED (L12.3, L12.4, L12.5, AND L12.6) THROUGH L12.7
    ROUTE MCUNGE          L12.7_1    4   49       2.60950       468.63      59.660       .42867    2.550     .281
CCODE =      .2
    ROUTE MCUNGE          L12.7_1   49   50       2.60950       467.18      59.653       .42862    2.600     .280
CCODE =      .2
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.7
    COMPUTE NM HYD          L12.7   -     1       1.05630       257.19      24.199       .42955    1.950     .380
PER IMP=   1.00
    *S  ADD (L12.3-6) & L12.7
    ADD HYD               L12.7_2  1&50   3       3.66580       580.88      83.852       .42889    2.450     .248
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.8
    COMPUTE NM HYD          L12.8   -     1        .42190        99.92       9.666       .42955    1.950     .370
PER IMP=   1.00
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    *S  ROUTE L12.8 THROUGH L12.7
    ROUTE MCUNGE          L12.7_3    1   50        .42190        99.84       9.666       .42958    1.950      .370
CCODE =       .2
    *S ADD (L12.3-7) & L12.8
 □
                                   FROM  TO                    PEAK         RUNOFF                TIME TO    CFS
 PAGE =   6
                       HYDROGRAPH   ID   ID        AREA     DISCHARGE      VOLUME      RUNOFF     PEAK     PER
    COMMAND        IDENTIFICATION   NO.  NO.      (SQ MI)     (CFS)        (AC-FT)    (INCHES)  (HOURS)   ACRE
 NOTATION

    ADD HYD               L12.7_4  3&50   3       4.08770      663.37       93.518       .42896    2.050      .254
    *S  ROUTE COMBINED (L12.3-8) THROUGH L12.9 -- UPPER REACHES MIREHAVEN A ARROYO
    ROUTE MCUNGE          L12.9_1    3   49       4.08770      661.69       93.556       .42914    2.100      .253
CCODE =       .1
    ROUTE MCUNGE          L12.9_1   49   50       4.08770      658.87       93.473       .42876    2.350      .252
CCODE =       .1
    SEDIMENT BULK
PK BF =     1.07
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.9
    COMPUTE NM HYD          L12.9    -     1        .65940      235.11       15.365       .43689    1.750      .557
PER IMP=     .00
    *S  ADD (ROUTED L12.3-8) & L12.9
    ADD HYD               L12.9_2  1&50   4       4.74710      728.07      108.838       .42989    2.350      .240
    SEDIMENT BULK
PK BF =     1.02
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.11
    COMPUTE NM HYD         L12.11    -     1        .27340       67.21        6.210       .42591    1.900      .384
PER IMP=    1.00
    *S  ROUTE L12.11 THROUGH L12.12
    ROUTE MCUNGE         L12.12_1    1   49        .27340       67.21        6.212       .42606    2.000      .384
CCODE =       .2
    ROUTE MCUNGE         L12.12_1   49   50        .27340       66.79        6.195       .42487    2.400      .382
CCODE =       .1
    *S
    *S  ADD ROUTED L12.11 & L12.3-9
    ADD HYD              L12.12_2  4&50   2       5.02050      793.85      115.033       .42961    2.350      .247
    *S
    *S  ROUTE COMBINED (L12.3-9,11) THROUGH L12.12 -- UPPER REACHES OF MIREHAVEN "A"
    ROUTE MCUNGE         L12.12_3    2   50       5.02050      790.74      115.033       .42961    2.400      .246
CCODE =       .2
    SEDIMENT BULK
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PK BF =    1.07
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.12
    COMPUTE NM HYD        L12.12   -     1        .35310       125.41       7.940       .42162    1.750     .555
PER IMP=    .00
    *S  ADD ROUTED L12.3-9,11 & L12.12
    ADD HYD             L12.12_4  1&50   3       5.37360       823.94     122.973       .42909    2.350     .240
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.10
    COMPUTE NM HYD        L12.10   -     1        .22190       125.67       5.492       .46410    1.600     .885
PER IMP=    .00
    *S ADD ROUTED L12.3-9,11,12 & L12.10
    ADD HYD             L12.10_1  1& 3   4       5.59550       835.51     128.465       .43048    2.350     .233
    *S  ROUTE COMBINED (L12.3-12) THROUGH L12.13 --
    *S  MIREHAVEN "A" ROUTED FROM PLATEAU ABOVE ESCARPMENT TO BELOW ESCARPMENT
    ROUTE MCUNGE        L12.13_1    4   49       5.59550       832.58     128.401       .43026    2.550     .232
CCODE =      .1
    ROUTE MCUNGE        L12.13_1   49    4       5.59550       832.58     128.401       .43026    2.550     .232
CCODE =      .0
    ROUTE MCUNGE        L12.13_1    4   50       5.59550       832.58     128.401       .43026    2.550     .232
CCODE =      .0
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.13
    COMPUTE NM HYD        L12.13   -     1        .26090       146.13       6.133       .44074    1.600     .875
PER IMP=    .00
    *S  ADD ROUTED L12.3-12 & L12.13
    *S  TOTAL MIREHAVEN "A" ARROYO FLOW AT BASE OF ESCARPMENT
    ADD HYD             L12.13_2  1&50   4       5.85640       842.30     134.533       .43073    2.550     .225
    SEDIMENT BULK
PK BF =    1.02
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.15
    COMPUTE NM HYD        L12.15   -     1        .43910       120.80       9.974       .42591    1.850     .430
PER IMP=   1.00
    *S  ROUTE L12.15 THROUGH L12.16  --  MIREHAVEN "C" ARROYO
    ROUTE MCUNGE        L12.16_1    1   49        .43910       119.26       9.936       .42427    2.150     .424
CCODE =      .1
 □
                                  FROM  TO                    PEAK        RUNOFF                TIME TO    CFS
 PAGE =   7
                     HYDROGRAPH   ID   ID        AREA     DISCHARGE     VOLUME     RUNOFF     PEAK      PER
    COMMAND        IDENTIFICATION  NO.  NO.     (SQ MI)     (CFS)       (AC-FT)   (INCHES)  (HOURS)    ACRE
 NOTATION
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    ROUTE MCUNGE        L12.16_1   49    1        .43910       118.42       9.917       .42345    2.550     .421
CCODE =      .1
    ROUTE MCUNGE        L12.16_1    1   50        .43910       117.95       9.893       .42246    3.000     .420
CCODE =      .1
    SEDIMENT BULK
PK BF =    1.07
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.16
    COMPUTE NM HYD        L12.16   -     1        .85470       252.77      21.605       .47397    1.900     .462
PER IMP=    .00
    *S  ADD ROUTED L12.15 & L12.16
    ADD HYD             L12.16_2  1&50   2       1.29380       252.77      31.499       .45649    1.900     .305
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.14
    *S        MIREHAVEN "B" ARROYO
    COMPUTE NM HYD        L12.14   -     1        .40160       126.88      10.607       .49520    1.900     .494
PER IMP=    .00
    *S  ADD  L12.15,16 & L12.14
    ADD HYD             L12.14_1  1& 2   3       1.69540       379.64      42.105       .46566    1.900     .350
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.17
    COMPUTE NM HYD        L12.17   -     1        .20310       125.15       5.340       .49296    1.600     .963
PER IMP=    .00
    *S  ADD  L12.14-16 & L12.17  --  FLOW AT LADERA TRAINING DIKE
    ADD HYD                 DIKE  1& 3   2       1.89850       444.62      47.445       .46858    1.800     .366
    *S  ROUTE COMBINED (L12.14-L12.17) IN MIREHAVEN ARROYO DNSTREAM FROM TRNG DIKE
    *S    TO CONFLUENCE WITH MIREHAVEN "A" ARROYO BELOW ESCARPMENT
    ROUTE MCUNGE        L12.18_1    2   50       1.89850       444.04      47.405       .46818    2.050     .365
CCODE =      .1
    *S
    *S ADD  L12.14-17 & L12.3-13
    *S TOTAL FLOW MIREHAVEN A, B, C ARROYOS BELOW ESCARPMT, DNSTRM FROM TR DIKE
    ADD HYD             L12.18_2  4&50   3       7.75490      1097.92     181.938       .43989    2.400     .221
    *S  ROUTE L12.3-17 THROUGH MIREHAVEN ARROYO TO INTERSECTION W/FUTURE 98TH ST
    ROUTE MCUNGE        L12.18_3    3   50       7.75490      1095.77     181.799       .43956    2.650     .221
CCODE =      .1
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.18
    COMPUTE NM HYD        L12.18   -     1        .51410       243.36      12.350       .45042    1.650     .740
PER IMP=    .00
    *S
    *S  ADD  L12.3-17 & L12.18 --  TOTAL FLOW IN MIREHAVEN AT FUTURE 98TH STREET
    ADD HYD             L12.18_4  1&50   2       8.26900      1114.88     194.149       .44023    2.650     .211
    *S  COMPUTE HYDROGRAPH FOR BASIN L14.5
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    COMPUTE NM HYD          L14.5   -     1        .08280        74.23       2.058       .46607    1.500    1.401
PER IMP=     .00
    *S ADD  L12.3-18 & L14.5
    ADD HYD              L12.18_5  1& 2   3       8.35180      1116.52     196.207       .44049    2.650     .209
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.19
    COMPUTE NM HYD         L12.19   -     1        .17600       146.94       4.338       .46214    1.550    1.304
PER IMP=     .00
    *S  BASIN L12.20 DIVIDED INTO 12.20A, 12.20B, AND 12.20C
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.20A
    COMPUTE NM HYD        L12.20A   -     4        .01180        11.16        .310       .49296    1.500    1.477
PER IMP=     .00
    *S
    *S  STRUCTURE #3 INFLOW--STR 3
    *S  STRUCTURE 3
    ADD HYD                   AP3  1& 4   5        .18780       157.62       4.648       .46407    1.550    1.311
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.20C
    COMPUTE NM HYD        L12.20C   -     6        .05900        55.77       1.551       .49296    1.500    1.477
PER IMP=     .00
    *S  ADD L12.18-14.5A TO BASIN L12.20C
    *S  FLOW GOES TO DAM 12
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COMMAND NOTATION	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
ADD HYD	L12.18-14.5A	3& 6	7	8.41080	1117.73	197.758	.44086	2.650	.208
*S ROUTE COMBINED (L12.13-L12.18) IN MIREHAVEN THRU L12.20 TO DAM#12									
ROUTE MCUNGE	L12.20_1	7	51	8.41080	1117.38	197.719	.44077	2.750	.208
CCODE = .1									
SEDIMENT BULK									
PK BF = 1.03									
*S THE FLOW FROM THE 66"RCP WILL NOT BE ROUTED TO POND#10, IN THIS ANALYSIS									
*S INSTEAD IT WILL BE ROUTED TO POND#11									
*S ROUTE FLOW FROM STR3 THRU 1ST SEGMENT OF I2.2 VIA 66"RCP									
ROUTE MCUNGE	STR3THRU66	5	55	.18780	154.56	4.626	.46189	1.550	1.286
CCODE = .1									
*S COMPUTE HYDROGRAPH FOR BASIN D17									
COMPUTE NM HYD	D17	-	7	.01400	29.76	1.213	1.62434	1.500	3.322
PER IMP= 50.00									
ROUTE MCUNGE	D17THRU24"	7	10	.01400	29.76	1.213	1.62432	1.500	3.322
CCODE = .0									

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    *S COMBINE ROUTED FLOW FROM D17 AND OFFSITE STRUC#3 FLOW
    ADD HYD          STR3ANDD17 10&55   2        .20180       180.95       5.839       .54253    1.550    1.401
    ROUTE MCUNGE    STR3D17THRU6    2    1        .20180       178.54       5.840       .54265    1.550    1.382
CCODE =      .2
    *S  COMPUTE HYDROGRAPH FOR BASIN I2.2
    COMPUTE NM HYD          I2.2   -    95        .07200       152.95       6.237      1.62435    1.500    3.319
PER IMP=  50.00
    *S  COMBINE ROUTED FLOW WITH BASIN I2.2 - THIS IS FLOW TO POND#11
    ADD HYD              D17STR3 95& 1   2        .27380       314.18      12.078       .82710    1.550    1.793
    *S ROUTE COMBINED FLOW THROUGH 3RD SEGMENT TO POND#11 VIA 66" RCP
    *S THIS WILL BE THE TOTAL FLOW RE-ROUTED TO POND#11
    *S  Note this flow has not been added to the flow from D17.4, and I2.3,
    ROUTE MCUNGE    TOTALRE-ROUT    2   97        .27380       303.88      12.040       .82448    1.600    1.734
CCODE =      .1
    *S  THESE BASINS WILL GO TO POND#10 - via sheet flow
    *S  COMPUTE HYDROGRAPH FOR BASIN I2.3
    COMPUTE NM HYD          I2.3   -    94        .02900        45.69       1.364       .88181    1.500    2.462
PER IMP=   7.00
    *S BASIN D17.4 TAKEN FROM "THE CROSSINGS" DRAINAGE REPORT
    *S TAKEN AS AREA LEFT FROM BASIN L12.20 MINUS D17 & I-2
    *S  COMPUTE HYDROGRAPH FOR BASIN D17.4
    COMPUTE NM HYD         D17.4   -     8        .00180         3.71        .159      1.65461    1.500    3.217
PER IMP=  57.00
    ADD HYD              D17I2.3 94& 8   9        .03080        49.40       1.523       .92696    1.500    2.506
    *S  ROUTE OUTFLOW FROM DAM 9 OVERLAND THROUGH SMALL PORTION OF BASIN I2.3
    ROUTE MCUNGE    TO_DAM10FROM   99   10       2.63277        53.15      78.637       .56003    2.150     .032
CCODE =      .2
    *S  ADD ALL COMBINED FLOW INTO DAM#10
    *S  ADD HYD FOR D17.4, I2.3 AND OVERLAND FLOW
    ADD HYD         TO_DAM10_ALL 10& 9  11       2.66357        73.73      80.159       .56428    1.550     .043
    *S  ROUTE COMBINED THROUGH DAM #10
    *S   CREST=5257.0, TOP=5260.0
    ROUTE RESERVOIR       POND10   11    9       2.66357        36.03      69.613       .49004   15.250     .021
AC-FT=   19.672
    *S  COMPUTE HYDROGRAPHS FOR BASINS IN THE CROSSINGS
    *S  COMPUTE HYDROGRAPHS FOR BASINS 1-5
    COMPUTE NM HYD          B1_5   -     2        .01600        33.73       1.377      1.61361    1.500    3.294
PER IMP=  50.00
    *S  COMPUTE HYDROGRAPHS FOR BASIN D4
    COMPUTE NM HYD            D4   -     1        .00120         2.54        .103      1.61361    1.500    3.311
PER IMP=  50.00
    *S  ADD BASINS D4 AND 1-5
    ADD HYD                D41_5  2& 1   3        .01720        36.28       1.480      1.61357    1.500    3.295
    *S
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    *S  COMPUTE HYDROGRAPHS FOR BASIN D9 AND D11
    COMPUTE NM HYD          D911   -     1        .00600        7.99        .242       .75562    1.500    2.081
PER IMP=   7.00
    *S  ADD BASINS D911 AND UPSTREAM
    ADD HYD                D41_5  3& 1   1        .02320       44.26       1.722      1.39168    1.500    2.981
    *S
    *S  COMPUTE HYDROGRAPHS FOR BASIN D10 AND D12
 □
                                   FROM  TO                    PEAK        RUNOFF                TIME TO    CFS
 PAGE =   9
                      HYDROGRAPH   ID   ID        AREA     DISCHARGE      VOLUME      RUNOFF      PEAK     PER
    COMMAND        IDENTIFICATION  NO.  NO.      (SQ MI)     (CFS)       (AC-FT)    (INCHES)   (HOURS)   ACRE
 NOTATION

    COMPUTE NM HYD         D1012   -     2        .00300        7.04        .311      1.94657    1.500    3.669
PER IMP=  70.00
    *S  ADD BASINS D1012 AND UPSTREAM
    ADD HYD                D41_5  2& 1   2        .02620       51.31       2.033      1.45520    1.500    3.060
    *S
    *S  COMPUTE HYDROGRAPHS FOR BASIN D15
    COMPUTE NM HYD           D15   -     3        .00440        4.66        .128       .54608    1.500    1.653
PER IMP=    .00
    *S  ADD BASINS D15 AND UPSTREAM
    ADD HYD             TO_DAM11  3& 2   1        .03060       55.96       2.162      1.32448    1.500    2.858
    *S
    *S  ADD ALL FLOW INTO POND#11 PLUS POND#10 FLOW
    ADD HYD             TO_DAM11  1& 9   1       2.69417       57.37      71.775       .49952    1.500     .033
    *S
    *S THIS FLOW SHOULD BE COMBINATION OF ALL ROUTED TO POND #11
    *S WITH THE INCLUSION OF TOTAL OF SD3 FLOW
    *S ADD ALL FLOW FROM POND#10, CROSSINGS, AND TIERRA O, WITH SD3
    ADD HYD         TOTAL_INTO_D  1&97   2       2.96797      349.41      83.815       .52949    1.550     .184
    *S
    *S  ROUTE TOTAL FLOW THROUGH DAM #11
    *S  CREST=5234.7, TOP=5236.5, 1-24"
    ROUTE RESERVOIR       POND11    2    9       2.96797       34.76      70.373       .44458   20.250     .018
AC-FT=   15.998
    ROUTE MCUNGE        L12.20_6    9   10       2.96797       34.76      70.041       .44248   20.350     .018
CCODE =      .2
    *S  ADD SECOND HALF OF FLOW FROM L12.20 TO MIREHAVEN CHAN
    *S  TOTAL FLOW IN MIREHAVEN CHANNEL NORTH OF DAM 12
    ADD HYD             L12.20_7  2&51   3      11.37877     1138.05     281.534       .46391    2.750     .156
    *S PLOT2  HYD=L12.20_7   TOTAL FLOW IN MIREHAVEN CHANNEL NORTH OF DAM 12
    *S
```

```
*S  COMBINED MIREHAVEN AND DAM #11 OUTFLOW -- TOTAL FLOW INTO DAM #12
ADD HYD             TO_DAM12  3&10   9      14.34674      1161.54     351.574       .45948    2.750     .127
FINISH
```

APPENDIX B

FULLY DEVELOPED CONDITIONS HYDROLOGY CALCULATIONS

```
    AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) -                          - VERSION:  1997.02c      RUN DATE
(MON/DAY/YR) =04/01/2010
    INPUT FILE = P:\050316\WR\study\Programs\AHYMO\EXPANS~1\SUNPRO~2.HYM                    USER NO.=
AHYMO-S-9702c1BohanHu-AH

                                  FROM  TO                  PEAK        RUNOFF                TIME TO
CFS      PAGE =   1
                      HYDROGRAPH   ID   ID        AREA     DISCHARGE     VOLUME      RUNOFF     PEAK
PER
    COMMAND       IDENTIFICATION   NO.  NO.     (SQ MI)      (CFS)       (AC-FT)    (INCHES)  (HOURS)
ACRE     NOTATION

    *S*                 PROJECT NAME:  STORMCLOUD SUBDIVISION, ALBUQUERQUE, NM
    *S*                 JOB NO. 050316
    *S*                 DATE: MARCH 2010
    *S*
    *S*                 INPUT FILE NAME: SUNPROP89FullDev.HYM
    *S*                 OUTPUT FILE NAME:  SUNPROP89FullDev.OUT
    *S*                 FILES LOCATION: P:\050316\WR\STUDY\PROGRAMS\AHYMO\Expansion
    *S*
    *S*     COMMENTS:
    *S*     MODEL SHOWS POST CONSTRUCTION CONDITIONS.  IT INCLUDES THE
    *S*     PROPOSED LADERA DEVELOPMENT AS DEVELOPED
    *S*     AND THE UPSTREAM AREAS AS DEVELOPED CONDITIONS FOR THE LADERA WATERSHED.
    *S*     THIS MODEL WAS MODIFIED FROM THE EXISTING AND PROPOSED
    *S*     CONDITIONS MODELS, SUNEX.OUT AND SUN18.OUT RESPECTIVELY.
    *S*
    *S*     MODELS WERE MODIFIED TO ACCOUNT FOR THE PROPOSED STORMCLOUD DEVELOPMENT,
    *S*     AND THE DEVELOPED CONDITIONS WEST OF THE DEVELOPMENT.
    *S*
    *S*     THIS MODEL COMPUTES THE WSEL OF LADERA DAMS #8, AND #9,
    *S*     AND THE FLOW THROUGH STR 1, 2, AND 3 - WHICH ARE THE PRIMARY SD OF STORM
    *S*
    *S*     THIS MODEL INCLUDEs ENLARGED DAMS AND DOES NOT INCLUDE ORIFICE PLATES.
    *S*
    *S*     BASIN DIVISION SCHEME WAS TAKEN FROM THE "PROPOSED DEVELOPMENT" ANAYLSIS
    *S*
    *S*     EXISTING CONDITIONS WERE ASSUMED TO BE THE SAME AS IN THE I-40 DMP MODEL
    *S*
    *S*     TP'S WERE ASSUMED NOT TO CHANGE FOR THE EXISTING DELINEATED BASINS.
    *S*     TP = 0.133 hours as a min.
    *S*
    *S*     THE FOLLOWING IS FROM THE ORIGINAL WEST I-40 DMP, BUT ONLY CONTAINS THE
    *S*     ANALYSIS.
    *S*     ____________________________________________________________________
    *S*
    *S   AHYMO FILE FOR WEST I-40 DIVERSION DMP
    *S   DEVELOPED CONDITIONS, 24HR, 100YR.
```

```
*S   WITH SEDIMENT BULKING & WITHOUT SEDIMENT TRAPPING AT DAMS.
*S
*S   WITH CORRECTED LADERA DAMS 5/14/96
START
TIME=        .00
*S*****************************************************************************
*S                              LADERA WATERSHED
*S*****************************************************************************
*S       CALCULATE RUNOFF FOR BASINS DRAINING TO PONDS 1 THROUGH 9
*S                                REGION B1
*S*****************************************************************************
*S  RAINFALL FOR LADERA BASINS ABOVE DAM #12
RAINFALL  TYPE= 2
RAIN24=   2.602
*S*****************************************************************************
```

```
                                    FROM  TO                    PEAK        RUNOFF                TIME TO
CFS      PAGE =   2
                     HYDROGRAPH     ID    ID        AREA     DISCHARGE     VOLUME      RUNOFF      PEAK
PER
   COMMAND        IDENTIFICATION    NO.   NO.     (SQ MI)      (CFS)       (AC-FT)    (INCHES)   (HOURS)
ACRE     NOTATION

   SEDIMENT BULK
   PK BF =    1.23
   *S
   *S  COMPUTE HYDROGRAPH FOR BASIN L0.1
   COMPUTE NM HYD    TO_DAMZERO   -     1        .33750       433.44      25.097      1.39427    1.650
2.007 PER IMP=  27.00
   *S   ROUTE FLOW THROUGH POND #0.
   ROUTE RESERVOIR     PONDZERO    1    2        .33750       373.77      25.097      1.39427    1.750
1.730 AC-FT=    2.440
   *S ROUTE OUTFLOW FROM DAM ZERO THROUGH  BASIN L1.2  EARTHEN CHANNEL
   ROUTE MCUNGE          L0.1_1    2    9        .33750       373.04      25.109      1.39492    1.800
1.727 CCODE =      .2
   SEDIMENT BULK
   PK BF =    1.07
   *S
   *S  COMPUTE HYDROGRAPH FOR BASIN L1.2
   COMPUTE NM HYD          L1.2   -     1        .11880       208.27       9.396      1.48303    1.500
2.739 PER IMP=  45.00
   *S  COMBINED FLOW (BASIN L0.1 AND L1.2)
   ADD HYD               L1.2_1  1& 9   2        .45630       460.00      34.505      1.41786    1.750
1.575
   *S  ROUTE THROUGH  BASIN L1.1
   ROUTE MCUNGE          L1.1_1    2    9        .45630       457.66      34.507      1.41794    1.750
1.567 CCODE =      .2
   *S  COMPUTE HYDROGRAPH FOR BASIN L1.1
```

```
    COMPUTE NM HYD          L1.1   -     1        .54380       770.94      41.305      1.42418    1.600
2.215 PER IMP=  39.00
    *S  COMBINED FLOW (BASINS L0.1, L1.1 AND L1.2)
    ADD HYD              TO_DAM1  9& 1   9       1.00010      1172.95      75.812      1.42133    1.600
1.833
    *S  ROUTE FLOW THROUGH POND #1
    ROUTE RESERVOIR        POND1    9   10       1.00010       655.22      75.809      1.42128    1.950
1.024 AC-FT=   32.749
    *S  ROUTE OVERLAND FLOW FROM BASINS L0.1,L1.1,L1.2 THROUGH  BASIN L4.1
    ROUTE MCUNGE          L4.1_1   10    9       1.00010       653.78      75.816      1.42140    1.950
1.021 CCODE =      .2
    SEDIMENT BULK
    PK BF =    1.05
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L4.1
    COMPUTE NM HYD          L4.1   -     6        .25940       520.78      25.704      1.85791    1.500
3.137 PER IMP=  65.00
    *S
    *S  DIVIDE FLOW FROM BASIN L4.1 INTO 3 PIECES FOR ROUTE THROUGH PONDS 2, 3, & 4
    DIVIDE HYD            L4.1_2    6    1        .08638       173.42       8.559      1.85791    1.500
3.137
                          L4.1_3  and    3        .17302       347.36      17.144      1.85791    1.500
3.137
    *S  ADD THE 1ST THIRD OF RUNOFF FROM BASIN L4.1 TO COMBINED FLOW
    ADD HYD              TO_DAM2  1& 9  10       1.08648       702.83      84.375      1.45611    1.950
1.011
    *S
    *S   ROUTE FLOW THROUGH POND #2
    ROUTE RESERVOIR        POND2   10    9       1.08648       175.71      84.189      1.45289    3.250
.253 AC-FT=   31.538
    *S  ADD 2ND THIRD OF RUNOFF FROM BASIN L4.1 TO FLOW FROM POND #2
    ADD HYD              TO_DAM3  1& 9  10       1.17286       185.90      92.748      1.48272    1.550
.248
    *S
    *S   ROUTE FLOW THROUGH POND #3
    ROUTE RESERVOIR        POND3   10    9       1.17286        69.95      89.585      1.43216   11.250
.093 AC-FT=   33.492
    *S  ADD FLOW FROM REMAINING THIRD OF BASIN L4.1 TO FLOW FROM POND #3
    ADD HYD              TO_DAM4  1& 9  10       1.25924       179.27      98.144      1.46136    1.550
.222
    *S
    *S  ROUTE FLOW THROUGH POND #4
    ROUTE RESERVOIR        POND4   10    9       1.25924        70.73      91.817      1.36715   11.300
.088 AC-FT=   19.425
    *S
    *S  ROUTE OVERLAND FLOW FROM BASINS L0.1-L4.1 THROUGH  BASIN L5.1
    ROUTE MCUNGE          L5.1_1    9   10       1.25924        70.73      91.755      1.36622   11.300
.088 CCODE =      .2
```

```
    SEDIMENT BULK
    PK BF =    1.12
    *S
    *S COMPUTE HYDROGRAPH FOR BASIN L5.1
 □
                                    FROM  TO                    PEAK        RUNOFF                TIME TO
CFS      PAGE =   3
                        HYDROGRAPH   ID   ID        AREA     DISCHARGE     VOLUME      RUNOFF     PEAK
PER
    COMMAND        IDENTIFICATION   NO.  NO.      (SQ MI)      (CFS)       (AC-FT)    (INCHES)  (HOURS)
ACRE     NOTATION

    COMPUTE NM HYD          L5.1   -     1        .90000      1312.00      69.013      1.43777    1.600
2.278 PER IMP=  36.00
    *S  COMBINED FLOW (BASINS L0.1-L4.1 AND L5.1)
    ADD HYD               TO_DAM5  1&10  11       2.15924      1322.28     160.768      1.39604    1.600
.957
    *S
    *S
    *S   ROUTE FLOW THROUGH POND #5
    ROUTE RESERVOIR        POND5   11    9       2.15924       485.33     156.859      1.36210    1.950
.351 AC-FT=   33.569
    *S
    *S
    *S  ROUTE OVERLAND FLOW FROM BASINS L0.1-L5.1 THROUGH  BASIN L7.2
    ROUTE MCUNGE          L7.2_1    9   78       2.15924       484.36     156.481      1.35882    2.100
.350 CCODE =      .1
    SEDIMENT BULK
    PK BF =    1.02
    *S BASIN L7.1A IS THE SAME AS L7.1 IN I-40 DMP, WITH AN INCREASE OF
    *S 20% IN AREA
    *S  COMPUTE HYDROGRAPH FOR BASIN L7.1A
    COMPUTE NM HYD         L7.1A   -    99        .00940        19.93        .812      1.61961    1.500
3.313 PER IMP=  50.00
    *S  COMPUTE HYDROGRAPH FOR BASIN L7.2
    COMPUTE NM HYD          L7.2   -     2        .06880       115.85       4.649      1.26693    1.500
2.631 PER IMP=  38.00
    *S  DIVIDE ID=2 INTO 3 THIRDS FOR PONDS 6, 7 AND 8
    DIVIDE HYD            L7.2_4    2    1        .02291        38.58       1.548      1.26693    1.500
2.631
                          L7.2_5  and    3        .04589        77.27       3.101      1.26693    1.500
2.631
    *S  ADD 1ST THIRD TO ROUTED FLOW
    ADD HYD               TO_DAM6  1&78  10       2.18215       489.42     158.029      1.35785    2.100
.350
    *S
    *S
    *S   ROUTE FLOW THROUGH POND #6
```

```
    ROUTE RESERVOIR        POND6   10    9       2.18215       158.18     155.002      1.33185    3.850
.113 AC-FT=   23.776
    *S
    *S
    *S  ADD 2ND THIRD TO POND OUTFLOW
    ADD HYD              TO_DAM7  1& 9  10       2.20506       158.38     156.550      1.33117    3.850
.112
    *S
    *S
    *S  ROUTE FLOW THROUGH POND #7
    ROUTE RESERVOIR        POND7   10    9       2.20506       142.07     154.022      1.30967    5.100
.101 AC-FT=   12.291
    *S
    *S
    *S  ADD LAST THIRD TO POND OUTFLOW
    ADD HYD              TO_DAM8  1& 9  10       2.22797       142.26     155.570      1.30923    5.100
.100
    *S
    *S
    *S  ROUTE FLOW THROUGH POND #8
    ROUTE RESERVOIR        POND8   10    9       2.22797        85.39     148.851      1.25269    8.300
.060 AC-FT=   28.473
    *S
    *S
    *S  ROUTE OVERLAND FLOW FROM BASINS L0.1-L7.2 THROUGH  BASIN I-2.4
    ROUTE MCUNGE          L9.2_1    9   10       2.22797        85.39     148.673      1.25119    8.350
.060 CCODE =      .2
    SEDIMENT BULK
    PK BF =    1.10
    *S  COMPUTE HYDROGRAPH FOR BASIN L9.1
    *S  COMPUTE HYDROGRAPH FOR BASIN L9.1A
    COMPUTE NM HYD         L9.1A   -     1        .19770       275.89      14.155      1.34249    1.600
2.180 PER IMP=  35.00
    *S  COMPUTE HYDROGRAPH FOR BASIN L9.1B
 □
                                   FROM  TO                    PEAK        RUNOFF                TIME TO
CFS      PAGE =   4
                      HYDROGRAPH   ID   ID        AREA     DISCHARGE      VOLUME      RUNOFF     PEAK
PER
    COMMAND       IDENTIFICATION   NO.  NO.     (SQ MI)      (CFS)        (AC-FT)    (INCHES)  (HOURS)
ACRE     NOTATION

    COMPUTE NM HYD         L9.1B   -     9        .06700        92.83       3.893      1.08948    1.550
2.165 PER IMP=  24.98
    *S  ROUTE L9.1B THRU "DAM 9.1" ARROYO, LOCATED IN L9.2B
    ROUTE MCUNGE    L9.1B_DAM9.1    9   50        .06700        92.22       3.890      1.08873    1.600
2.151 CCODE =      .1
    SEDIMENT BULK
```

```
    PK BF =    1.02
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L9.2A
    COMPUTE NM HYD          L9.2A   -     3        .00400        8.49        .346      1.61961    1.500
3.316 PER IMP=  50.00
    *S  COMPUTE HYDROGRAPH FOR BASIN L9.2B
    COMPUTE NM HYD          L9.2B   -     4        .01220       25.86       1.054      1.61960    1.500
3.312 PER IMP=  50.00
    *S
    *S  STRUCTURE 2 INFLOW--STR 2
    *S  STRUCT 2
    *S  COMBINE ROUTED FLOW FROM DAM 9.1 aRROYO AND BASIN L9.2B
    ADD HYD                  AP2 50& 4   5        .07920      113.70       4.944      1.17050    1.550
2.243
    *S
    SEDIMENT BULK
    PK BF =    1.02
    *S  COMBINE L9.1A AND BASIN L9.2A
    ADD HYD           DAM9.1L9.2A  1& 3  52        .20170      281.78      14.501      1.34799    1.600
2.183
    *S
    *S  STRUCTURE 1 INFLOW--STR 1
    *S  STRUCT 1
    *S  COMBINE FLOW WITH BASIN L7.1A
    ADD HYD                  AP1 52&99  96        .21110      295.59      15.313      1.36008    1.600
2.188
    *S
    *s  THIS PORTION OF THE .HYM INCORPORTES AND ACCOUNTS FOR THE FLOW
    *s  FROM BASIN I-2(STORMCLOUD) AS WELL ASTHROUGH STRUTURES 1 AND 2 (PRIMARY SD N
    *S  COMPUTE HYDROGRAPH FOR BASIN I2.1
    COMPUTE NM HYD          I2.1    -    92        .09750      206.26       8.422      1.61960    1.500
3.305 PER IMP=  50.00
    *S  COMPUTE HYDROGRAPH FOR BASIN I2.4
    COMPUTE NM HYD          I2.4    -    93        .01700       25.31        .692       .76307    1.500
2.326 PER IMP=    .00
    *S  ROUTE FLOW FROM STR1 THRU I2 VIA 60"RCP
    ROUTE MCUNGE          STR1SD1   96   53        .21110      295.34      15.297      1.35868    1.600
2.186 CCODE =      .1
    *S  ROUTE FLOW FROM STR2 THRU I2 VIA 42"RCP
    ROUTE MCUNGE          STR2SD4    5   52        .07920      112.31       4.945      1.17059    1.600
2.216 CCODE =      .2
    *S  COMBINE ROUTE STR1 AND ROUTE STR2
    ADD HYD                 STR1&2 52&53  54        .29030      407.64      20.241      1.30736    1.600
2.194
    *S  ROUTE FLOW STR 1 & 2  THRU I2 VIA 72"RCP
    ROUTE MCUNGE         STR12SD2   54   55        .29030      407.64      20.241      1.30736    1.600
2.194 CCODE =      .0
    *S  COMBINE I2.1 AND FLOW FROM STRUC 1 & 2 VIA 72"RCP
```

```
    ADD HYD              I2.2I2.1 55&92  60        .38780       553.01      28.663      1.38586    1.550
2.228
    *S  COMBINE ROUTED STR1 STR2 AND I2.4
    ADD HYD               SD1I2.4 93&60  56        .40480       576.34      29.355      1.35971    1.550
2.225
    *S  COMBINE I-2.1 AND I-2.4 AND OTHER UPSTREAM BASINS FLOWING INTO POND#9
    ADD HYD           I2OTHERS2D9 56&10  61       2.63277       577.84     178.028      1.26787    1.550
.343
    *S  ROUTE FLOW THROUGH DAM #9
    *S   CREST=5276.0, TOP=5279.0,  2-24" PIPES
    ROUTE RESERVOIR        POND9   61   99       2.63277        78.17     167.066      1.18981   14.850
.046 AC-FT=   23.038
    *S  SKIP FROM DAM 10 UP TO TOP OF LADERA WATERSHED
    *S*****************************************************************************
    *S*****************************************************************************
    *S    CALCULATE RUNOFF BEGINNING AT THE TOP OF LADERA L12 WATERSHED.
    *S  UPPER LADERA BASINS START AT DOUBLE EAGLE II AIRPORT & DRAIN TO DAM12
 □
                                  FROM  TO                      PEAK        RUNOFF                TIME TO
CFS      PAGE =   5
                      HYDROGRAPH   ID   ID         AREA     DISCHARGE      VOLUME      RUNOFF      PEAK
PER
    COMMAND       IDENTIFICATION   NO.  NO.      (SQ MI)      (CFS)        (AC-FT)    (INCHES)  (HOURS)
ACRE     NOTATION

    *S                            REGION B2
    *S*****************************************************************************
    SEDIMENT BULK
    PK BF =    1.02
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.1  NON-CONTRIBUTING BASIN.
    COMPUTE NM HYD         L12.1   -     1        .22190       245.81      17.244      1.45704    1.750
1.731 PER IMP=  35.00
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.2  NON-CONTRIBUTING BASIN.
    COMPUTE NM HYD         L12.2   -     2       1.13590      1604.43      58.120       .95937    1.500
2.207 PER IMP=  19.00
    *S  COMBINED FLOW FROM NON-CONTRIBUTING BASINS (BASIN L12.1 AND L12.2)
    *S  NOTE:  THERE IS ON-SITE RETENTION BETWEEN THE RUNWAYS.  THIS WILL
    *S  ATTENUATE FLOW.  ALSO, THE PLAYA IN L12.2 CAN HOLD ESTIMATED 70 ACRE-FT.
    ADD HYD              L12.2_1  1& 2   4       1.35780      1708.10      75.363      1.04070    1.550
1.966
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.3
    COMPUTE NM HYD         L12.3   -     1        .33130       414.71      31.842      1.80213    1.750
1.956 PER IMP=  59.00
    *S  ROUTE L12.3 THROUGH L12.6
    ROUTE MCUNGE         L12.3_1    1   49        .33130       376.33      31.841      1.80205    2.500
```

```
1.775 CCODE =      .1
    ROUTE MCUNGE          L12.3_1   49   50        .33130       332.08      31.295      1.77115    2.700
1.566 CCODE =      .2
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.5
    COMPUTE NM HYD        L12.5   -     1         .73130       548.65      36.150       .92687    1.750
1.172 PER IMP=  16.00
    *S  ROUTE L12.5 THROUGH L12.4
    ROUTE MCUNGE          L12.4_1    1   51        .73130       508.69      36.257       .92960    2.000
1.087 CCODE =      .2
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.4
    COMPUTE NM HYD        L12.4   -     1         .60160       734.19      49.908      1.55548    1.700
1.907 PER IMP=  46.00
    *S  ADD L12.4 AND L12.5
    ADD HYD               L12.4_2  1&51   2       1.33290       988.44      86.165      1.21209    1.900
1.159
    *S  ROUTE COMBINED (L12.4 AND L12.5) THROUGH L12.6
    ROUTE MCUNGE          L12.6_1    2   51       1.33290       969.26      86.215      1.21279    2.300
1.136 CCODE =      .2
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.6
    COMPUTE NM HYD        L12.6   -     1         .94530      1080.19      94.439      1.87320    1.800
1.785 PER IMP=  65.00
    *S  ADD (L12.4-5) & L12.6
    ADD HYD               L12.6_2  1&51   2       2.27820      1620.33     180.654      1.48682    2.100
1.111
    *S ADD (L12.4-6) & L12.3
    ADD HYD               L12.6_3  2&50   4       2.60950      1620.37     211.949      1.52291    2.100
.970
    *S  ROUTE COMBINED (L12.3, L12.4, L12.5, AND L12.6) THROUGH L12.7
    ROUTE MCUNGE          L12.7_1    4   49       2.60950      1471.64     211.142      1.51712    2.350
.881 CCODE =      .2
    ROUTE MCUNGE          L12.7_1   49   50       2.60950      1470.21     211.119      1.51695    2.400
.880 CCODE =      .2
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.7
    COMPUTE NM HYD        L12.7   -     1       1.05630       738.20      53.956       .95775    1.750
1.092 PER IMP=  21.00
    *S  ADD (L12.3-6) & L12.7
    ADD HYD               L12.7_2  1&50   3       3.66580      1736.65     265.075      1.35582    2.150
.740
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.8
    COMPUTE NM HYD        L12.8   -     1         .42190       459.15      41.750      1.85543    1.850
1.700 PER IMP=  66.00
    *S  ROUTE L12.8 THROUGH L12.7
    ROUTE MCUNGE          L12.7_3    1   50        .42190       459.15      41.750      1.85546    1.850
```

```
1.700 CCODE =       .2
    *S ADD (L12.3-7) & L12.8
 □
                                    FROM  TO                    PEAK        RUNOFF                TIME TO
CFS      PAGE =   6
                        HYDROGRAPH   ID   ID        AREA     DISCHARGE      VOLUME      RUNOFF     PEAK
PER
    COMMAND        IDENTIFICATION   NO.  NO.      (SQ MI)      (CFS)        (AC-FT)    (INCHES)  (HOURS)
ACRE     NOTATION

    ADD HYD              L12.7_4  3&50   3       4.08770      2061.94     306.826      1.40739    1.850
.788
    *S  ROUTE COMBINED (L12.3-8) THROUGH L12.9 -- UPPER REACHES MIREHAVEN A ARROYO
    ROUTE MCUNGE         L12.9_1    3   49       4.08770      2061.78     306.829      1.40740    1.900
.788 CCODE =       .1
    ROUTE MCUNGE         L12.9_1   49   50       4.08770      2052.60     306.551      1.40613    2.100
.785 CCODE =       .1
    SEDIMENT BULK
    PK BF =    1.07
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.9
    COMPUTE NM HYD         L12.9    -     1        .65940       473.32      30.045       .85433    1.700
1.122 PER IMP=  15.00
    *S  ADD (ROUTED L12.3-8) & L12.9
    ADD HYD              L12.9_2  1&50   4       4.74710      2259.41     336.596      1.32948    2.100
.744
    SEDIMENT BULK
    PK BF =    1.02
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.11
    COMPUTE NM HYD        L12.11    -     1        .27340       292.11      27.318      1.87351    1.850
1.669 PER IMP=  67.00
    *S  ROUTE L12.11 THROUGH L12.12
    ROUTE MCUNGE        L12.12_1    1   49        .27340       292.01      27.309      1.87289    2.000
1.669 CCODE =       .2
    ROUTE MCUNGE        L12.12_1   49   50        .27340       290.60      27.274      1.87046    2.250
1.661 CCODE =       .1
    *S
    *S  ADD ROUTED L12.11 & L12.3-9
    ADD HYD             L12.12_2  4&50   2       5.02050      2502.55     363.870      1.35894    2.100
.779
    *S
    *S  ROUTE COMBINED (L12.3-9,11) THROUGH L12.12 -- UPPER REACHES OF MIREHAVEN "A"
    ROUTE MCUNGE        L12.12_3    2   50       5.02050      2501.81     363.869      1.35894    2.100
.779 CCODE =       .2
    SEDIMENT BULK
    PK BF =    1.07
    *S
```

```
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.12
    COMPUTE NM HYD        L12.12   -     1        .35310       468.04      31.676      1.68205    1.700
2.071 PER IMP=  52.00
    *S  ADD ROUTED L12.3-9,11 & L12.12
    ADD HYD             L12.12_4  1&50   3       5.37360      2693.61     395.545      1.38017    2.100
.783
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.10
    COMPUTE NM HYD        L12.10   -     1        .22190       125.67       5.492       .46410    1.600
.885 PER IMP=    .00
    *S ADD ROUTED L12.3-9,11,12 & L12.10
    ADD HYD             L12.10_1  1& 3   4       5.59550      2719.66     401.038      1.34384    2.100
.759
    *S  ROUTE COMBINED (L12.3-12) THROUGH L12.13 --
    *S  MIREHAVEN "A" ROUTED FROM PLATEAU ABOVE ESCARPMENT TO BELOW ESCARPMENT
    ROUTE MCUNGE        L12.13_1    4   49       5.59550      2706.86     400.892      1.34335    2.250
.756 CCODE =      .1
    ROUTE MCUNGE        L12.13_1   49    4       5.59550      2706.86     400.892      1.34335    2.250
.756 CCODE =      .0
    ROUTE MCUNGE        L12.13_1    4   50       5.59550      2706.86     400.892      1.34335    2.250
.756 CCODE =      .0
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.13
    COMPUTE NM HYD        L12.13   -     1        .26090       146.13       6.133       .44074    1.600
.875 PER IMP=    .00
    *S  ADD ROUTED L12.3-12 & L12.13
    *S  TOTAL MIREHAVEN "A" ARROYO FLOW AT BASE OF ESCARPMENT
    ADD HYD             L12.13_2  1&50   4       5.85640      2722.92     407.025      1.30314    2.200
.726
    SEDIMENT BULK
    PK BF =    1.02
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.15
    COMPUTE NM HYD        L12.15   -     1        .43910       437.49      38.719      1.65332    1.850
1.557 PER IMP=  54.00
    *S  ROUTE L12.15 THROUGH L12.16  --  MIREHAVEN "C" ARROYO
    ROUTE MCUNGE        L12.16_1    1   49        .43910       425.26      38.732      1.65391    2.300
1.513 CCODE =      .1
 □
                                   FROM  TO                    PEAK        RUNOFF                TIME TO
CFS      PAGE =   7
                      HYDROGRAPH   ID   ID         AREA     DISCHARGE      VOLUME      RUNOFF     PEAK
PER
    COMMAND       IDENTIFICATION   NO.  NO.      (SQ MI)      (CFS)        (AC-FT)    (INCHES)  (HOURS)
ACRE     NOTATION

    ROUTE MCUNGE        L12.16_1   49    1        .43910       422.49      38.695      1.65233    2.550
1.503 CCODE =      .1
```

```
    ROUTE MCUNGE        L12.16_1    1   50        .43910       421.32      38.667      1.65111    2.750
1.499 CCODE =      .1
    SEDIMENT BULK
    PK BF =    1.07
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.16
    COMPUTE NM HYD        L12.16   -     1        .85470      1200.68      78.394      1.71976    1.650
2.195 PER IMP=  54.00
    *S  ADD ROUTED L12.15 & L12.16
    ADD HYD             L12.16_2  1&50   2       1.29380      1200.68     117.061      1.69647    1.650
1.450
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.14
    *S        MIREHAVEN "B" ARROYO
    COMPUTE NM HYD        L12.14   -     1        .40160       253.18      19.010       .88756    1.800
.985 PER IMP=  16.00
    *S  ADD  L12.15,16 & L12.14
    ADD HYD             L12.14_1  1& 2   3       1.69540      1408.56     136.071      1.50485    1.700
1.298
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.17
    COMPUTE NM HYD        L12.17   -     1        .20310       210.77       8.790       .81149    1.550
1.622 PER IMP=  11.00
    *S  ADD  L12.14-16 & L12.17  --  FLOW AT LADERA TRAINING DIKE
    ADD HYD                DIKE  1& 3   2       1.89850      1594.71     144.861      1.43068    1.650
1.312
    *S  ROUTE COMBINED (L12.14-L12.17) IN MIREHAVEN ARROYO DNSTREAM FROM TRNG DIKE
    *S    TO CONFLUENCE WITH MIREHAVEN "A" ARROYO BELOW ESCARPMENT
    ROUTE MCUNGE        L12.18_1    2   50       1.89850      1588.54     144.743      1.42952    1.800
1.307 CCODE =      .1
    *S
    *S ADD  L12.14-17 & L12.3-13
    *S TOTAL FLOW MIREHAVEN A, B, C ARROYOS BELOW ESCARPMT, DNSTRM FROM TR DIKE
    ADD HYD             L12.18_2  4&50   3       7.75490      3447.79     551.768      1.33408    2.150
.695
    *S  ROUTE L12.3-17 THROUGH MIREHAVEN ARROYO TO INTERSECTION W/FUTURE 98TH ST
    ROUTE MCUNGE        L12.18_3    3   50       7.75490      3441.28     551.863      1.33431    2.300
.693 CCODE =      .2
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.18
    COMPUTE NM HYD        L12.18   -     1        .51410       496.35      24.477       .89271    1.600
1.509 PER IMP=  16.00
    *S
    *S  ADD  L12.3-17 & L12.18 --  TOTAL FLOW IN MIREHAVEN AT FUTURE 98TH STREET
    ADD HYD             L12.18_4  1&50   2       8.26900      3509.42     576.340      1.30685    2.250
.663
    *S  COMPUTE HYDROGRAPH FOR BASIN L14.5
    COMPUTE NM HYD         L14.5   -     1        .08280        74.23       2.058       .46607    1.500
```

```
1.401 PER IMP=     .00
    *S ADD  L12.3-18 & L14.5
    ADD HYD              L12.18_5  1& 2   3        8.35180      3513.28      578.398      1.29852    2.250
.657
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.19
    COMPUTE NM HYD         L12.19   -     1         .17600       363.90       15.248      1.62448    1.500
3.231 PER IMP=  47.50
    *S  BASIN L12.20 DIVIDED INTO 12.20A, 12.20B, AND 12.20C
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.20A
    COMPUTE NM HYD        L12.20A   -     4         .01180        26.11        1.064      1.69071    1.500
3.458 PER IMP=  50.00
    *S
    *S  STRUCTURE #3 INFLOW--STR 3
    *S  STRUCTURE 3
    ADD HYD                   AP3  1& 4   5         .18780       390.02       16.312      1.62864    1.500
3.245
    *S
    *S  COMPUTE HYDROGRAPH FOR BASIN L12.20C
    COMPUTE NM HYD        L12.20C   -     6         .05900        55.77        1.551       .49296    1.500
1.477 PER IMP=     .00
    *S  ADD L12.18-14.5A TO BASIN L12.20C
    *S  FLOW GOES TO DAM 12
 □
                                     FROM  TO                      PEAK         RUNOFF                TIME TO
CFS       PAGE =    8
                        HYDROGRAPH   ID   ID         AREA     DISCHARGE      VOLUME      RUNOFF     PEAK
PER
    COMMAND        IDENTIFICATION   NO.  NO.       (SQ MI)      (CFS)        (AC-FT)    (INCHES)  (HOURS)
ACRE     NOTATION

    ADD HYD          L12.18-14.5A  3& 6   7        8.41080      3516.15      579.950      1.29287    2.250
.653
    *S  ROUTE COMBINED (L12.13-L12.18) IN MIREHAVEN THRU L12.20 TO DAM#12
    ROUTE MCUNGE         L12.20_1    7   51        8.41080      3515.67      579.903      1.29277    2.300
.653 CCODE =      .1
    SEDIMENT BULK
    PK BF =    1.03
    *S  THE FLOW FROM THE 66"RCP WILL NOT BE ROUTED TO POND#10, IN THIS ANALYSIS
    *S  INSTEAD IT WILL BE ROUTED TO POND#11
    *S  ROUTE FLOW FROM STR3 THRU 1ST SEGMENT OF I2.2 VIA 66"RCP
    ROUTE MCUNGE       STR3THRU66    5   55         .18780       381.54       16.312      1.62861    1.500
3.174 CCODE =      .2
    *S  COMPUTE HYDROGRAPH FOR BASIN D17
    COMPUTE NM HYD           D17   -     7         .01400        29.76        1.213      1.62434    1.500
3.322 PER IMP=  50.00
    ROUTE MCUNGE       D17THRU24"    7   10         .01400        29.76        1.213      1.62432    1.500
3.322 CCODE =      .0
    *S COMBINE ROUTED FLOW FROM D17 AND OFFSITE STRUC#3 FLOW
```

```
    ADD HYD            STR3ANDD17 10&55   2        .20180       411.31      17.525      1.62831    1.500
3.185
    ROUTE MCUNGE    STR3D17THRU6    2    1        .20180       411.31      17.525      1.62831    1.500
3.185 CCODE =      .0
    *S  COMPUTE HYDROGRAPH FOR BASIN I2.2
    COMPUTE NM HYD          I2.2   -    95        .07200       152.95       6.237      1.62435    1.500
3.319 PER IMP=  50.00
    *S  COMBINE ROUTED FLOW WITH BASIN I2.2 - THIS IS FLOW TO POND#11
    ADD HYD              D17STR3 95& 1   2        .27380       564.25      23.762      1.62727    1.500
3.220
    *S ROUTE COMBINED FLOW THROUGH 3RD SEGMENT TO POND#11 VIA 66" RCP
    *S THIS WILL BE THE TOTAL FLOW RE-ROUTED TO POND#11
    *S  Note this flow has not been added to the flow from D17.4, and I2.3,
    ROUTE MCUNGE    TOTALRE-ROUT    2   97        .27380       521.23      23.440      1.60516    1.550
2.975 CCODE =      .2
    *S  THESE BASINS WILL GO TO POND#10 - via sheet flow
    *S  COMPUTE HYDROGRAPH FOR BASIN I2.3
    COMPUTE NM HYD          I2.3   -    94        .02900        45.69       1.364       .88181    1.500
2.462 PER IMP=   7.00
    *S BASIN D17.4 TAKEN FROM "THE CROSSINGS" DRAINAGE REPORT
    *S TAKEN AS AREA LEFT FROM BASIN L12.20 MINUS D17 & I-2
    *S  COMPUTE HYDROGRAPH FOR BASIN D17.4
    COMPUTE NM HYD         D17.4   -     8        .00180         3.71        .159      1.65461    1.500
3.217 PER IMP=  57.00
    ADD HYD              D17I2.3 94& 8   9        .03080        49.40       1.523       .92696    1.500
2.506
    *S  ROUTE OUTFLOW FROM DAM 9 OVERLAND THROUGH SMALL PORTION OF BASIN I2.3
    ROUTE MCUNGE    TO_DAM10FROM   99   10       2.63277        78.17     166.964      1.18908   14.850
.046 CCODE =      .2
    *S  ADD ALL COMBINED FLOW INTO DAM#10
    *S  ADD HYD FOR D17.4, I2.3 AND OVERLAND FLOW
    ADD HYD         TO_DAM10_ALL 10& 9  11       2.66357        83.15     168.486      1.18605    1.550
.049
    *S  ROUTE COMBINED THROUGH DAM #10
    *S   CREST=5257.0, TOP=5260.0
    ROUTE RESERVOIR       POND10   11    9       2.66357        66.22     117.913       .83004   25.500
.039 AC-FT=   51.602
    *S  COMPUTE HYDROGRAPHS FOR BASINS IN THE CROSSINGS
    *S  COMPUTE HYDROGRAPHS FOR BASINS 1-5
    COMPUTE NM HYD          B1_5   -     2        .01600        33.73       1.377      1.61361    1.500
3.294 PER IMP=  50.00
    *S  COMPUTE HYDROGRAPHS FOR BASIN D4
    COMPUTE NM HYD            D4   -     1        .00120         2.54        .103      1.61361    1.500
3.311 PER IMP=  50.00
    *S  ADD BASINS D4 AND 1-5
    ADD HYD                D41_5  2& 1   3        .01720        36.28       1.480      1.61357    1.500
3.295
    *S
```

```
    *S  COMPUTE HYDROGRAPHS FOR BASIN D9 AND D11
    COMPUTE NM HYD          D911   -     1        .00600         7.99        .242       .75562    1.500
2.081 PER IMP=   7.00
    *S  ADD BASINS D911 AND UPSTREAM
    ADD HYD                D41_5  3& 1   1        .02320        44.26       1.722      1.39168    1.500
2.981
    *S
    *S  COMPUTE HYDROGRAPHS FOR BASIN D10 AND D12
 □
                                  FROM  TO                      PEAK        RUNOFF                TIME TO
CFS      PAGE =   9
                      HYDROGRAPH   ID   ID         AREA     DISCHARGE      VOLUME      RUNOFF     PEAK
PER
    COMMAND       IDENTIFICATION   NO.  NO.      (SQ MI)      (CFS)        (AC-FT)    (INCHES)  (HOURS)
ACRE     NOTATION

    COMPUTE NM HYD         D1012   -     2        .00300         7.04        .311      1.94657    1.500
3.669 PER IMP=  70.00
    *S  ADD BASINS D1012 AND UPSTREAM
    ADD HYD                D41_5  2& 1   2        .02620        51.31       2.033      1.45520    1.500
3.060
    *S
    *S  COMPUTE HYDROGRAPHS FOR BASIN D15
    COMPUTE NM HYD           D15   -     3        .00440         4.66        .128       .54608    1.500
1.653 PER IMP=    .00
    *S  ADD BASINS D15 AND UPSTREAM
    ADD HYD             TO_DAM11  3& 2   1        .03060        55.96       2.162      1.32448    1.500
2.858
    *S
    *S  ADD ALL FLOW INTO POND#11 PLUS POND#10 FLOW
    ADD HYD             TO_DAM11  1& 9   1       2.69417        66.22     120.074       .83565   25.500
.038
    *S
    *S THIS FLOW SHOULD BE COMBINATION OF ALL ROUTED TO POND #11
    *S WITH THE INCLUSION OF TOTAL OF SD3 FLOW
    *S ADD ALL FLOW FROM POND#10, CROSSINGS, AND TIERRA O, WITH SD3
    ADD HYD         TOTAL_INTO_D  1&97   2       2.96797       573.65     143.514       .90664    1.550
.302
    *S
    *S  ROUTE TOTAL FLOW THROUGH DAM #11
    *S  CREST=5234.7, TOP=5236.5, 1-24"
    ROUTE RESERVOIR       POND11    2    9       2.96797        65.31     113.772       .71875   26.050
.034 AC-FT=   29.872
    ROUTE MCUNGE        L12.20_6    9   10       2.96797        65.31     113.217       .71524   26.150
.034 CCODE =      .2
    *S  ADD SECOND HALF OF FLOW FROM L12.20 TO MIREHAVEN CHAN
    *S  TOTAL FLOW IN MIREHAVEN CHANNEL NORTH OF DAM 12
    ADD HYD             L12.20_7  2&51   3      11.37877      3563.35     723.416      1.19205    2.300
```

```
.489
    *S PLOT2  HYD=L12.20_7   TOTAL FLOW IN MIREHAVEN CHANNEL NORTH OF DAM 12
    *S
    *S  COMBINED MIREHAVEN AND DAM #11 OUTFLOW -- TOTAL FLOW INTO DAM #12
    ADD HYD              TO_DAM12  3&10   9      14.34674      3601.30     836.633      1.09341    2.300
.392
    FINISH
```

Bohannan △ Huston INC.

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J-8/D1

April 18, 2006

Mr. Fred Salls
Salls Brothers Construction, Inc.
P O Box 66239
Albuquerque, NM 87193-6239

Re: Stormcloud Subdivision Final Grading Plan
CPN 650278, 650279, 650280, 650289

Dear Fred:

The purpose of this letter is to provide you with a design revision to the approved grading plan. The revision incorporates sheet 13A into the Final Grading Plan which is associated with the public storm drain, which will be constructed with Unit 2, City Project #650279, and the existing earthen channel. The design revision does not fill in most of the earthen channel. The existing earthen channel will be filled in by others at a later date. Please incorporate this design revision into the approved set of plans and provide as-built data to support the approval of the drainage certification.

Please feel free to contact us if you have any questions or concerns.

Sincerely,

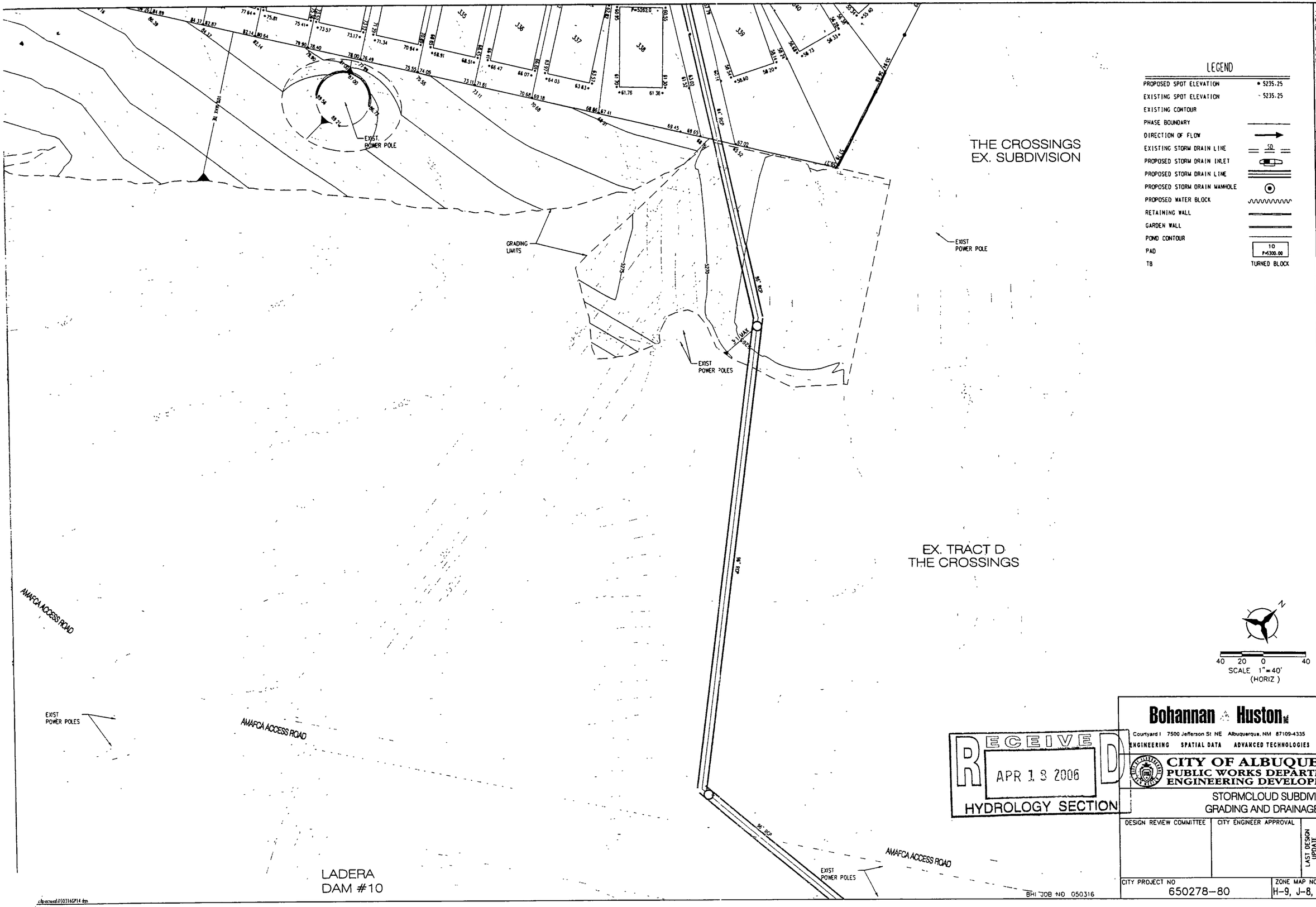
Jared M. Lee, E.I.
Design Engineer
Community Development and Planning

JML/am
Enclosure: Sheet 13A

cc: Fred Ambrogi, Westland Development Corp (w/encl)
Brad Bingham, COA Hydrology Division (w/encl)
Kevin Patton, BHI (w/out encl)

RECEIVED
APR 18 2006
HYDROLOGY SECTION

ENGINEERING
SPATIAL DATA
ADVANCED TECHNOLOGIES



RECEIVED
APR 13 2006
HYDROLOGY SECTION

Bohannan Huston INC.
Courtyard I 7500 Jefferson St NE Albuquerque, NM 87109-4335
ENGINEERING SPATIAL DATA ADVANCED TECHNOLOGIES

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING DEVELOPMENT GROUP

STORMCLOUD SUBDIVISION
GRADING AND DRAINAGE PLAN

DESIGN REVIEW COMMITTEE	CITY ENGINEER APPROVAL	LAST DESIGN UPDATE	MO./DAY/YR	MO./DAY/YR

CITY PROJECT NO	ZONE MAP NO	SHEET	OF
650278-80	H-9, J-8, J-9	13A	13

BHI JOB NO 050316

AS-BUILT INFORMATION
CONTRACTOR
WORK STAKED BY
INSPECTOR'S ACCEPTANCE BY DATE
FIELD VERIFICATION BY DATE
DRAWINGS CORRECTED BY DATE
MICRO-FILM INFORMATION
RECORDED BY DATE
NO

BENCH MARKS
ACS STATION NAMED 4 - K6. 3 -1/4" ALUM. CAP
HV18 = 4 - K6 GEOGRAPHIC POSITION (1927)
N.M. STATE PLANE COORDINATES (CENTRAL ZONE)
X=336,918.47,Y=1,483,515.05
GROUND-TO-GRID FACTOR .999656356
NGVD 1929 ELEVATION = 5732.892
ON PASEO DEL VULCAN, 0.91 MI. NORTH
OF I-40, 0.74 MI SOUTH OF PUNERLINES, 39.6'
NW OF CENTERLINE OF PASEO DEL VULCAN

SURVEY INFORMATION
FIELD NOTES

NO.	BY	DATE

ENGINEER'S SEAL
KEVIN G. PATTON NEW MEXICO 13655 REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	REMARKS	BY
3	4/05/06	DESIGN REVISION NO. 3. ADDED THIS SHEET	JML

REVISIONS
DESIGN

		DATE
DESIGNED BY	KM/JML	05/05
DRAWN BY	AR	05/05
CHECKED BY	KGP	05/05

!TY OF ALBUQUERQUE

THREE HUNDRED YEARS
1706 • 2006
ALBUQUERQUE
Making History

August 31, 2005

Kevin G. Patton, P.E.
Bohannan Huston Inc.
7500 Jefferson St. NE – Courtyard I
Albuquerque, NM 87109

Re: Stormcloud Subdivision, Tract I-2, Sundoro Unit 1, Grading Plan Engineer's Stamp dated 7-25-05 (J8-D1)

Dear Mr. Patton,

Based upon information provided in your submittal dated 8-29-05, the above referenced plan is approved as amended. This will be the plan that must be certified for Release of Financial Guaranty.

If you have any questions, you can contact me at 924-3990.

Sincerely,

Phillip J. Lovato, E.I., C.F.M.
Engineering Associate, Hydrology,
Development and Building Services,
Planning Department

cc: file

P.O. Box 1293

Albuquerque

New Mexico 87103

www.cabq.gov

DRAINAGE AND TRANSPORTATION INFORMATION SHEET

(REV. 1/28/2003rd)

J-8/D1

PROJECT TITLE: Stormcloud Subdivision ZONE MAP/DRG. FILE # H-8/9,J8
DRB # 1004233 EPC#: WORK ORDER#:

LEGAL DESCRIPTION: Tract I-2, Sundodro Unit 1

CITY ADDRESS: SE Corner Arroyo Vista Blvd. and Tierra Pintada Blvd.

ENGINEERING FIRM: Bohannan Huston, Inc. CONTACT: Kevin Murtagh
ADDRESS: Courtyard I – 7500 Jefferson NE PHONE: (505) 823-1000
CITY, STATE: Albuquerque, NM ZIP CODE: 87109

OWNER: Westland Development Co. Inc. CONTACT: Fred Ambrogi
ADDRESS: 401 Coors Boulevard NW PHONE: (505) 831-9600
CITY, STATE: Albuquerque, NM ZIP CODE: 87121

ARCHITECT: CONTACT:
ADDRESS: PHONE:
CITY, STATE: ZIP CODE:

SURVEYOR: CONTACT:
ADDRESS: PHONE:
CITY, STATE: ZIP CODE:

CONTRACTOR: CONTACT:
ADDRESS: PHONE:
CITY, STATE: ZIP CODE:

CHECK TYPE OF SUBMITTAL:

x DRAINAGE REPORT
___ DRAINAGE PLAN 1st SUBMITTAL, ***REQUIRES TCL or equal***
___ DRAINAGE PLAN RESUBMITTAL
___ CONCEPTUAL GRADING & DRAINAGE PLAN
x GRADING PLAN
___ EROSION CONTROL PLAN
___ ENGINEER'S CERTIFICATION (HYDROLOGY)
___ CLOMR/LOMR
___ TRAFFIC CIRCULATION LAYOUT (TCL)
___ ENGINEERS CERTIFICATION (TCL)
___ ENGINEERS CERTIFICATION (DRB APPR. SITE PLAN)
___ OTHER

CHECK TYPE OF APPROVAL SOUGHT:

___ SIA / FINANCIAL GUARANTEE RELEASE
___ PRELIMINARY PLAT APPROVAL
___ S. DEV. PLAN FOR SUB'D. APPROVAL
___ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
___ SECTOR PLAN APPROVAL
___ FINAL PLAT APPROVAL
___ FOUNDATION PERMIT APPROVAL
___ BUILDING PERMIT APPROVAL
___ CERTIFICATE OF OCCUPANCY (PERM.)
___ CERTIFICATE OF OCCUPANCY (TEMP.)
x GRADING PERMIT APPROVAL
___ PAVING PERMIT APPROVAL
___ WORK ORDER APPROVAL
___ OTHER (SPECIFY)

WAS A PRE-DESIGN CONFERENCE ATTENDED:
___ YES
___ NO
___ COPY PROVIDED

RECEIVED AUG 29 2005 HYDROLOGY SECTION

RECEIVED AUG 01 2005 HYDROLOGY SECTION

DATE SUBMITTED: August 1, 2005 BY: Kevin J. Murtagh

Requests for approvals of Site Development Plans and/or Subdivision Plats shall be accompanied by a drainage submittal. The particular nature , location and scope of the proposed development defines the degree of drainage detail. One or more of the following levels of submittal may be required based on the following:

1. Conceptual Grading and Drainage Plan: Required for approval of Site Development Plans greater than five (5) acres and Sector Plans.

2. Drainage Plans: Required for building permits, grading permits, paving permits and site plans less than five (5) acres.

3. Drainage Report: Required for subdivisions containing more than ten (10) lots or constituting five (5) acres or more.

CITY OF ALBUQUERQUE

THREE HUNDRED YEARS 1706 • 2006
ALBUQUERQUE
Making History

June 28, 2005

Kevin G. Patton, P.E.
Bohannan Huston Inc.
7500 Jefferson St. NE – Courtyard I
Albuquerque, NM 87109

Re: Stormcloud Subdivision, Tract I-2, Sundoro Unit 1, Drainage Report Engineer's Stamp dated 5-27-05 (J8-D1)

Dear Mr. Patton,

Based upon the information provided in your submittal dated 5-27-05, the above referenced plan is approved for Preliminary Plat action by the DRB. Once that board has approved the plan, please submit a mylar copy of the grading plan for my signature in order to obtain a Grading Permit.

This project requires a National Pollutant Discharge Elimination System (NPDES) permit. Refer to the attachment that is provided with this letter for details. If you have any questions please feel free to call the Municipal Development Department Hydrology section at 768-3654 (Charles Caruso).

If you have any questions, you can contact me at 924-3990.

Sincerely,

Phillip J. Lovato, E.I., C.F.M.
Engineering Associate, Hydrology,
Development and Building Services,
Planning Department

cc: Charles Caruso, DMD
file

P.O. Box 1293
Albuquerque
New Mexico 87103
www.cabq.gov

DRAINAGE AND TRANSPORTATION INFORMATION SHEET

(REV. 1/28/2003rd)

J-08/D1

PROJECT TITLE: Stormcloud Subdivision ZONE MAP/DRG. FILE # J-8/9,H8

DRB # _____ EPC#: _____ WORK ORDER#: _____

LEGAL DESCRIPTION: Tract I-2, Sundodro Unit 1

CITY ADDRESS: SE Corner Arroyo Vista Blvd. and Tierra Pintada Blvd.

ENGINEERING FIRM: Bohannan Huston, Inc. CONTACT: Kevin Murtagh
ADDRESS: Courtyard I – 7500 Jefferson NE PHONE: (505) 823-1000
CITY, STATE: Albuquerque, NM ZIP CODE: 87109

OWNER: Westland Development Co. Inc. CONTACT: Fred Ambrogi
ADDRESS: 401 Coors Boulevard NW PHONE: (505) 831-9600
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CONTRACTOR: _____ CONTACT: _____
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___ DRAINAGE PLAN 1st SUBMITTAL, ***REQUIRES TCL or equal***
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___ ENGINEER'S CERTIFICATION (HYDROLOGY)
___ CLOMR/LOMR
___ TRAFFIC CIRCULATION LAYOUT (TCL)
___ ENGINEERS CERTIFICATION (TCL)
___ ENGINEERS CERTIFICATION (DRB APPR. SITE PLAN)
___ OTHER

fees paid

CHECK TYPE OF APPROVAL SOUGHT:

___ SIA / FINANCIAL GUARANTEE RELEASE
x PRELIMINARY PLAT APPROVAL
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___ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
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___ CERTIFICATE OF OCCUPANCY (PERM.)
___ CERTIFICATE OF OCCUPANCY (TEMP.)
x GRADING PERMIT APPROVAL
___ PAVING PERMIT APPROVAL
x WORK ORDER APPROVAL
___ OTHER (SPECIFY)

WAS A PRE-DESIGN CONFERENCE ATTENDED:

___ YES
___ NO
___ COPY PROVIDED

RECEIVED MAY 27 2005 HYDROLOGY SECTION

RECEIVED MAY 27 2005 HYDROLOGY SECTION

DATE SUBMITTED: May 27, 2005 BY: [signature]

Requests for approvals of Site Development Plans and/or Subdivision Plats shall be accompanied by a drainage submittal. The particular nature , location and scope of the proposed development defines the degree of drainage detail. One or more of the following levels of submittal may be required based on the following:

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2. **Drainage Plans:** Required for building permits, grading permits, paving permits and site plans less than five (5) acres.
3. **Drainage Report:** Required for subdivisions containing more than ten (10) lots or constituting five (5) acres or more.

DRAINAGE REPORT
FOR
STORMCLOUD
SUBDIVISION

MAY 27, 2005

Prepared for:

Westland Development
401 Coors Boulevard NW
Albuquerque, New Mexico 87121

RECEIVED
JUN 14 2005
HYDROLOGY SECTION

Bohannan ▲ Huston INC

ENGINEERING ▲
SPATIAL DATA ▲
ADVANCED TECHNOLOGIES ▲

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DRAINAGE REPORT
FOR
STORMCLOUD SUBDIVISION

MAY 27, 2005

Prepared for:

WESTLAND DEVELOPMENT
401 COORS BOULEVARD NW
ALBUQUERQUE, NM 87121

Prepared by:

BOHANNAN HUSTON, INC.
COURTYARD I
7500 JEFFERSON STREET NE
ALBUQUERQUE, NM 87109

PREPARED BY:

5/27/05
Kevin J. Murtagh, E.I. **Date**

5/27/05
Jared M. Lee, E.I. **Date**

UNDER THE SUPERVISION OF:

5/27/05
Kevin Patton, P.E. **Date**

KEVIN G. PATTON
NEW MEXICO
13685
REGISTERED PROFESSIONAL ENGINEER

Bohannan-Huston INC.

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I. PURPOSE

The purpose of this report is to present the drainage management plan for Stormcloud Subdivision at Westland and to obtain approval of the preliminary/final plat and grading plan by the City of Albuquerque. The proposed development of Stormcloud Subdivision at Westland consists of 520 single family residential lots on approximately 106 acres. The project will be divided into three (3) units. Units 1 through 3 will be built sequentially in order to provide a drainage outfall for each phase.

This report will address both the onsite drainage analyzed for the development of Stormcloud and drainage analyzed for future development upstream of Stormcloud. The latter will be referred to the Storm Drain Trunkline to Ladera Dams #9 and #11.

II. METHODOLOGIES

The offsite hydrologic modeling, for the Storm Drain Trunkline to Ladera Dams #9 and #11, as well as modeling flow through the Stormcloud Subdivision into the Ladera Storm Drainage System of Dams, was performed using the Arid Lands Hydrologic Model (AHYMO) computer program version 1997, in accordance with the City of Albuquerque Development Process Manual Section 22.2, Hydrology, 1997 Revision. The AHYMO model, developed as part of the West I-40 DMP was modified to reflect proposed future conditions within the project area, including routing of developed flow within the main storm drains, discharging into Dam #9 and #11. The fully developed conditions flows within the Drainage Report for Petroglyph Golf Course, are no longer valid, the report assumed a constructed golf course, with low density subdivision housing. The analysis used in this report, replaces the golf course and associated housing with 5 du / acre residential development. This results in approximately 50% impervious land treatment (Type D). The output of this modeling has been included in Appendix E. The Bentley InRoads Storm and Sanitary 2004 Edition, Drainage Network Designer was used to model the Hydraulic Grade Line (HGL) of the two main, storm drain trunkline systems, to Dam #9 and Dam #11. The 100-year maximum water surface elevations within Dam #9 and #11, were used as the starting water surface elevations for the HGL calculations.

Onsite conditions will be analyzed for a 10-year and 100-year, 6-hour storm event in accordance with the City of Albuquerque Drainage Ordinance and the Development Process Manual (DPM) Volume 2, Design Criteria, Section 22.2, Hydrology, for the City of Albuquerque, January 1993.

The site, as described in the 'Site Location and Characteristics' section below, is approximately 106 acres. The site has divided into two major basins, which in turn are divided into sub-basins for analysis purposes. Part A of the DPM, Section 22.2, which provides a simplified procedure for projects with sub-basins smaller than 40 acres, was used.

This report will reference the following reports:

1) *West Interstate 40 Diversion Drainage Management Plan* dated March 2000, which was prepared for AMAFCA by Bohannan Huston, Inc. The West I-40 DMP addresses the drainage issues covering approximately 40 square miles of the West Side. The DMP boundaries are: the Rio Puerco escarpment on the west, Double Eagle II Airport and Vulcan Volcano on the north, Coors Boulevard and the Rio Grande Bluff on the east, and Bluewater Road and I-40 on the south. That report was prepared to support future drainage plans submitted for the development of individual land parcels within the study area, and to provide design guidance for the installation of major drainage infrastructure to be constructed in advance of, or simultaneously with individual parcel development. In addition, it states that Dam #0 through Dam #14 of the AMAFCA Ladera Dam System located north of the site are designed to fully contain the 100-year storm event. The spillways for these dams are designed to operate when a storm larger than the 100-year event occurs.

2) *The Crossings Unit 1&2*, dated October 1996
   This report was prepared by Bohannan Huston Inc. to support the construction of The Crossings, including but not limited to evaluating Ladera Dams #10, #11 and #12 for capacities of developed upstream conditions.

3) *Design Analysis Report 98th Street, Ladera Blvd. and Petroglyph Parkway* dated revised October 2000

This report was prepared by Bohannan Huston Inc. to support the construction of the above-mentioned roadways currently referred to as Tierra Pintada Street, Ladera Boulevard, and Arroyo Vista Boulevard. This report is also being prepared to support the design of a waterline as it relates to the ultimate developed construction, being designed by Leedshill-Herkenhoff, Inc., located within Tierra Pintada Street, Arroyo Vista Boulevard and Reservoir Drive.

4) *Drainage Report for Petroglyph Golf Course*, dated May 1999

This report was prepared by Bohannon Huston, Inc, and summarized the results of the drainage analysis for the future development of the Westland North Property as related to the Conceptual Drainage Plan for the Petroglyph Golf Club. This report provided existing flow data used in the sizing of the crossing culverts located under Tierra Pintada Street. As previously mentioned developed conditions for the Petroglyph Golf Club no longer applies.

III. SITE LOCATION AND CHARACTERISTICS

Stormcloud Subdivision at Westland is located near the 98th Street exit of Interstate 40. More specifically, Stormcloud Subdivision is bordered by Tierra Pintada St. to the northwest, Arroyo Vista Bld. to the southwest, the Ladera System of Dams to the southeast and The Crossings subdivision to the east. The site will be accessible from Tierra Pintada Street.

IV. EXISTING HYDRAULIC AND HYDROLOGIC CONDITIONS

For additional assistance throughout this portion of the report, please refer to the Existing Drainage Basin Map, Exhibit 3. In its existing condition, the site consists of mainly undeveloped land that is currently used for the grazing of cattle. It is covered with native vegetation. The land drains, in general, from west to east at slopes ranging from 3.5% to 12%. The majority of the site slopes uniformly at an average of 5.5%. The site consists of mainly undeveloped land.

The site consists of 106 acres of developable land and 58 of undevelopable land which contains the Ladera Dam system, numerous PNM power poles, a drainage swale/pond and numerous pertinent easements. Drainage patterns for the undevelopable land will remain virtually unchanged. Tokachi Rd. is designed to allow minor historical flows into the road ~~and~~ to drain to an inlet and storm drain which will connect to an existing culvert between Dams 7 and 8. The existing drainage swale/pond was constructed to divert existing flow around upstream development and will no longer be needed with the construction of Stormcloud Subdivision. Excess soil generated by earthwork may be used to fill in the swale/pond.

As part of the College Trunk 36-Inch Transmission Line project, a 25 foot wide gravel road was constructed in Tierra Pintada Street to provide cover and access to the waterline. In addition culverts were constructed to divert existing upstream flows under the road and waterline, see Exhibit 4 for locations. These existing culverts will be removed and replaced by the Storm Drain Trunkline sized to accommodate increased flows generated by future upstream development. Further discussion can be found the Storm Drain Trunkline to Ladera Dams #9 and #11 section of this report.

The existing drainage basins and patterns for developed flows are shown graphically on the Existing Drainage Conditions Map (Exhibit 3, which was taken from the West 1-40 DMP) located in the Exhibits section of this report. There are a number of drainage facilities currently in this development area. A major one that impacts our analysis area is the Ladera Dam System. The Ladera watershed flows are routed in the series of dams numbered from Zero to 15 (Dam 15 is the Ladera Golf Course). Basins L7, L9, and L12 are located northwest of the site. Flows generated by these basins enter the site along the north and west boundaries and drain through the site toward the southeast. For additional information regarding the existing drainage conditions, please refer to the West 1-40 DMP (March 2000).

The natural soils consist of slightly silty to silty sands. Vegetation on the site consists of weeds, grass and some cacti. A FEMA flood plain exists in the southwest portion of the site (see proposed basin map) and will be removed by LOMR. Further discussion of the floodplain can be found in the FEMA Floodplain section of this report.

V. PROPOSED HYDRAULIC AND HYDROLOGIC CONDITIONS

For additional assistance throughout this portion of the report, please refer to the Proposed Drainage Basin Map, Exhibit 4, and the Grading and Drainage Plan, Exhibit 5 enclosed in the Exhibit section of this report.

Discharge generated by Basins A and B will flow in the internal streets and will be captured respectively in the Storm Drain Trunkline. A more detailed description of the onsite runoff is presented in the Onsite Basins section of this report.

A. Storm Drain Trunkline To Ladera Dams #9 And #11

FEMA Floodplains

A FEMA Zone AO floodplain exists within the southern half of the Stormcloud Subdivision. This floodplain originates at an upstream arroyo west of Tierra Pintada St, then transverses the subdivision, before terminating into Dam #6. This project will confine the current floodplain into a storm drain system, which will ultimately discharge into Dam #9.

Other smaller Zone AE floodplains exist within the pools of the Ladera Storm Drainage System of Dams. Those directly impacted by this project include, Dam #9, #10, and #11, in which the 100-year maximum water surface elevations will decrease, while the actual maximum storage areas of the ponds will increase, except for Dam #11. The increase in storage area will be discussed later in this report. A Conditional Letter of Map Revision (CLOMR) will be submitted concurrently with this construction project, addressing the alterations to the floodplains within the dams, and the Dam #6 arroyo. See Exhibit 6 for a general location of this floodplain. Following construction of the project a Letter of Map Revision (LOMR) will be prepared and submitted to FEMA for review and approval.

Culvert Crossings

Three culvert crossings will be located along Tierra Pintada Street. See Exhibit 3, for the general locations of these structures. The future culverts were sized to convey the 100-year existing flows resulting from an interim condition, as well as developed flows within the upstream drainage basins. This interim condition is the duration of time after the construction of the Stormcloud Subdivision, and before any future development upstream. It is assumed that the upstream parcels of land will not see any development in the interim condition. Therefore the crossing culverts are designed considering inlet control to accept the existing conditions flow rates, for the 100-year storm event. With future development upstream of these crossing culverts, it is assumed that the culverts will be extended as part of the upstream subdivisions storm drain system. Therefore an HGL analysis was completed for developed conditions flow, to ensure the HGL would remain below the roadway elevations of the upstream end of the culvert. The existing conditions flows listed below were taken from the Drainage Report for Petroglyph Golf Course. Under existing conditions, these flows ultimately discharge primarily to Dams #6 through #10, of the Ladera Storm Drainage System of Dams. With development of the Stormcloud Subdivision, these flows will continue, to these dams however, they will be conveyed in two main storm drain trunkline systems within the Stormcloud Subdivision rather than the existing unimproved earthen arroyos. This storm drain trunkline will be discussed in detail, later in this report.

The first culvert section (CS1) is located approximately 850 feet northwest of the intersection of Tierra Pintada St and Petroglyph Parkway. CS1 will consist of one 60" RCP with an end section. The culvert slopes at 0.5% and has a capacity of 184 cfs, based on inlet control. The culvert will receive 150 cfs of existing conditions flow from the contributing basins of L9.1A, L9.2A, and L7.1A. See Exhibit 3. The flow will continue to Dam #9 via the storm drain system. The second culvert section (CS2) is located at approximately 750 feet northwest of CS1. This culvert section will consist of one 48" RCP with an end section. The culvert slopes at 2.48% and has a capacity of 226 cfs, based on inlet control. This structure will receive 50 cfs of existing conditions flow from the

contributing basins of L9.1B, and L9.2B. This flow will combine with that of CS1, in the storm drain trunkline and continue to Dam #9. The third culvert section (CS3) is located at approximately 150 feet southwest of the northern edge of the Stormcloud subdivision. CS3 will consist of one 66" RCP with an end section. The culvert slopes at 0.5% and has a capacity of 237 cfs, based on inlet control. This structure will receive 155 cfs of existing conditions flow from the contributing basins of L12.19, and L12.20A. The flow will continue to Dam #11 via the storm drain system. See Appendix ~~X~~ D for the culvert analysis calculation summaries.

Table 1. Flows at Tierra Pintada St. Crossing Culverts

Location	Size	Existing Q100 cfs
CS1	1 - 60" RCP	150
CS2	1 - 48" RCP	50
CS3	1 - 66" RCP	155

A temporary drainage swale will be constructed on the west side of Tierra Pintada St, as stated in the Design Analysis Report Basalt View St, Ladera Blvd & Prieta Vista Blvd, prepared by Bohannan Huston Inc. This will need to be constructed because the existing offsite basins, located directly west of the proposed Tierra Pintada St, do not directly drain into the proposed culvert sections CS1, CS2, and CS3. This swale will divert the offsite interim drainage into the culverts. The swale will be a trapezoidal channel, and have a bottom width of 8 feet, with 3:1 side slopes, and approximately 4 feet deep. The ditch will contain both unlined and lined sections, in order to limit erosional impacts to the roadway embankment.

Subdivision Storm Drain Trunkline

Two main storm drain trunkline systems will be constructed within the Stormcloud Subdivision. These two systems will be constructed from RCP pipe sections, ranging in diameter from 48" to 84", with both standard and Tee type manholes, located at the end of

major bends, and pipe to pipe intersections. The trunklines will be the main conveyance of all offsite and onsite runoff that is generated from Tierra Pintada St and the Stormcloud subdivision. These storm drain trunklines will contain the previously mentioned crossing culvert structures as their primary inlets. The inlets to the crossing culverts were sized to accept both the existing conditions and fully developed flows. In general, for the three crossing culverts, it is assumed that as future development west of Tierra Pintada St. occurs, the inlet end sections of the crossing culverts will be removed, and the pipe extended into the new developments.

The Dam #9 storm drain trunkline is located within the southern half of the subdivision. The Dam #9 main system has been designed to accept the fully developed 100-year flow from both the upstream basins, as well as that of Basin A, within the Stormcloud subdivision, computed as Q100 = 206 cfs. See Exhibit 4. The storm drain collects flow from the west side of Tierra Pintada St., via the CS1 and CS2 crossing culverts. The computed fully developed 100-year flows entering CS1 and CS2 were calculated at 328 cfs and 109 cfs respectively, using the before mentioned AHYMO analysis and methodology. CS1 and CS2 form two branches of the main storm drain as they enter the subdivision, at Storm Cloud Ave. and Gale Ct. respectively. The CS1 branch consists of 60" and 66" RCP sections, while the CS2 branch is entirely comprised of 48" RCP. The confluence of the two branches, located at the intersection of Storm Cloud Ave. and Gale Ct., consists of a 48" by 72" RCP Wye section. The trunkline then continues through the subdivision along Storm Cloud Ave., using 72" RCP to collect all onsite runoff through lateral RCP sections. The lateral connections occur at various analysis points within the system, which can be seen in Exhibit 4. The storm drain then exits the eastern subdivision boundary, and uses 84" RCP to collect the remainder of the onsite subdivision flows before finally discharging into Dam #9.

The Dam #11 storm drain trunkline is located within the northern half of the subdivision. The Dam #11 main system has been designed to accept the fully developed 100-year flow from both the upstream basins, as well as that of Basin B, within the

Stormcloud subdivision, computed as Q100 = 146 cfs. See Exhibit 4. The storm drain collects flow from the west side of Tierra Pintada St., via the CS3 crossing culvert. The computed fully developed 100-year flow entering CS3 was calculated at 375 cfs, using the before mentioned AHYMO analysis and methodology. CS3 enters the subdivision at Zephyr Pl, and consists of 66" RCP sections. The storm drain then proceeds along Zephyr Pl and intersects a future storm drain connection, at Summer Breeze Dr. At this junction, a 66" by 72" RCP Wye section is used to direct the storm drain down Summer Breeze Dr. The trunkline then continues through the subdivision along Summer Breeze Dr, using 72" and 84" RCP to collect all onsite runoff through lateral RCP sections. The lateral connections occur at various analysis points within the system, which can be seen in Exhibit 4. The storm drain then exits the eastern subdivision boundary, heading southwest until it intersects Dam #10. The storm drain cannot discharge into Dam #10 due to a limiting maximum water surface elevation of 5257 feet. Instead, storm drain will cross under Casa Verde Dr, and discharge into Dam #11. Energy dissipating structures, such as ring dissipaters or riprap plunge pools, will be utilized at the outfall of the two individual storm drain trunklines.

Ladera Dams

The Ladera Storm Drainage System of Dams, are owned and maintained by AMAFCA. This project will directly impact Dams #9, #10, and #11. As previously stated, the existing drainage patterns within the undeveloped portions of the project area naturally drain to Dams #6, #7, #8, #9, and #10 as either sheet flow or through well defined arroyos. This project will connect to the existing subdivision, The Crossing's, located at the northern border of the Stormcloud subdivision, along Summer Breeze Dr. This connection is through a roadway section that is limited to an average existing roadway elevation of 5254'. The existing roadway section is from The Crossing's subdivision, and it has been determined that this roadway connection to Stormcloud will not be raised. Due to the fact that the Dam #11 storm drain system runs along Summer Breeze Dr., the storm drain cannot discharge into Dam #10, because the HGL analysis will need to start at the computed maximum water surface elevation (WSEL) of 5257'. This starting WSEL

is greater than the proposed roadway elevations, which will cause a surcharge within the system. Taking the runoff that once was planned to go to Dam #10, into Dam #11 requires some modification of the Ladera Dam System. Based on the AHYMO hydrologic model, it was determined that the computed maximum water surface elevation within Dam #9 and Dam #11 would exceed the invert of each dam's emergency spillway. In order to limit the computed maximum water surface from discharging over the emergency spillway, several iterations utilizing the Route Reservoir command within AHYMO were performed. These iterations involved limiting the flow exiting Dam #9, and #10, along with possible expansions to the same dams. Dam #11 was not considered a good candidate for future expansion, due to the limited available land area surrounding the dam. Through these computations, it was determined that the storage capacity of Dam #9 will need to be expanded by approximately 25%, with an 21.5" orifice plate connected to the primary spillway. The storage capacity of Dam #10 will need to expand by approximately 25%, with a 23" orifice plate applied. These AHYMO computations resulted in all dams computed maximum water surface elevations to fall below the inverts of their respective emergency spillways, providing at least 1' of freeboard as required by AMAFCA.

Table 2. Computed Water Surface Elevations

DAM	Emergency Spillway Invert (Crest) Elevation ft	Resultant 100-year Maximum WSEL ft	Resultant Freeboard ft
Dam #9	5276.0	5274.6	1.4
Dam #10	5257.0	5255.8	1.2
Dam #11	5234.7	5232.9	1.8

B. On-Site Basins

The proposed site is broken into two (2) major basins. The basins have been divided into sub-basins for the purpose of analysis. Major basins are described below. For sub-basin data, see Appendix A at the back of this report; refer to Appendices B and C for street capacity and inlet capacity calculations.

Basin A

Basin A1 encompasses Summer Shower Place, a portion of Summer Breeze Dr. and 61 lots. Flow generated by this basin, Q100=46.20cfs will be conveyed in the street. At Analysis Point 1 (AP1) two single grate Type "A" inlets on grade will capture 16.68cfs, a total of 29.52cfs residual flow will bypass the inlets

Basin A2 encompasses a portion of Rain Place and 2 lots. Flow generated by this basin, Q100=2.30cfs, and the residual flow from AP1 (29.52cfs) will be conveyed in the street. At AP2 two single grate Type "A" inlets on grade will capture 14.62cfs and a total of 17.20cfs residual flow will bypass these inlets and continue in Summer Breeze Dr. to a type "A" inlet located at a low point at AP8. A discussion of AP8 will follow later in this section.

Basin A3 is divided into 2 sub basins, which contains the park, a portion of Stormcloud Ave., Cirrus St, a portion of Wind Ridge Dr. and 31 lots. Flow generated by this basin, Q100=32.39cfs, will be conveyed in the streets. At AP3 two single grate Type "A" inlets on grade will capture 15.00cfs, a total of 18.42cfs residual flow will bypass these inlets and continue in Wind Ridge Dr. to AP5. A discussion of AP5 will follow later in this section.

Basin A4 is divided into 2 sub basins, which encompasses Thunder Road, a portion of Rain Place and 27 lots. Flow generated by this basin, Q100=20.12cfs, will be conveyed in the streets. At AP4 two single grate Type "A" inlets on grade will capture 12.20cfs and a total of 7.92cfs residual flow will bypass these inlets and continue in Wind Ridge Dr. to AP5.

Basin A5 encompasses a portion of Wind Ridge Dr. and 13 lots. Flow from this basin, Q100=9.00cfs, is combined with residual flows from AP 3 and AP4 generating a total flow of 35.34cfs, which will be conveyed in Wind Ridge Dr. At AP5 a double grate Type "A" inlets and a single Type "C" in series on each side of the street will capture

28.29cfs and a total of 7.05cfs residual flow will bypass these inlets and continue east in Stormcloud Ave. to AP8. A discussion of AP8 will follow later in this section.

Basin A6 is divided into 2 sub basins which encompass Gale Ct., a portion of Stormcloud Ave and 18 lots. Flow generated by this basin, Q100=16.10cfs, will be conveyed in the streets. At AP6 a double grate Type "A" inlet and a double grate Type "C" inlet in series on the north side of Stormcloud Ave. will capture 16.76cfs and a total of 8.50cfs residual flow will bypass these inlets and continue in Stormcloud Ave. to AP8.

Basin A7 encompasses a portion of Stormcloud Ave and 21 lots. Flow generated by this basin, Q100=15.8cfs, will be conveyed in the southern half of Stormcloud. At AP7 a double grate Type "A" inlet on the south side of Stormcloud Ave. at Wind Ridge Dr. will capture 8.70cfs and a total of 6.95cfs residual flow will bypass these inlets and continue in Stormcloud Ave. to AP8.

Basin A8 is divided into 8 sub basins for the purpose of street capacity analysis. Basin A8 encompasses Cumulus Pl., a portion of Wind Ridge Dr., a portion of Stormcloud Ave., a portion of Summer Breeze Dr., portion of Tokachi Dr. and 96 lots. Flow generated by this basin, Q100=75.14cfs, will combine with the residual flows from AP's 2,5,6 and 7 for a total flow of 106.69cfs conveyed in the streets to AP8. AP8 is located in a sump with two (2) double grate Type "A" inlets that will capture the flow and drain to the Dam #9 Storm Drain Trunkline. The inlet will be designed for the 100 year storm event (106.69cfs), in the event of the flow can spill over into Tract H and into Dam #9.

Basin B

Basin B9 is divided into 2 sub basins, which encompass Tempest Dr., a portion of Cloudburst Ave. and 28 lots. Flow generated by this basin, Q100=19.07cfs, will be conveyed in the streets. At AP9 two single grate Type "A" inlets on grade will capture 10.84cfs and a total of 8.24cfs residual flow will bypass these inlets and continue in Cloudburst Dr. to AP10.

Basin B10 is divided into 3 sub basins for the purpose of street capacity analysis. Basin B10 encompasses Sunny Morning Rd., Cloudy Ct., a portion of Cloudburst Ave. and 40 lots. Flow generated by this basin, Q100=26.20cfs, along with the residual flow from AP9, will be conveyed in the streets. At AP10 two single grate Type "A" inlets on grade will capture 15.04cfs and a total of 19.36cfs residual flow will bypass these inlets and continue in Cloudburst Dr. to AP11.

Basin B11 encompasses the remaining portion of Cloudburst Ave. and 7 lots. Flow generated by this basin, Q100=5.35cfs, will combine with the residual flow from AP10 for a total flow of 24.71cfs, which will be conveyed in the streets. At AP11 two single grate Type "A" inlets on grade will capture 12.64cfs and a total of 12.08cfs residual flow will bypass these inlets and continue in Arkansas Rd. to AP12.

Basin B12 is divided into 2 sub basins, which encompass a park, Arkansas Dr., Virga St. Ave. and 40 lots. Flow generated by this basin, Q100=21.02cfs, will combine with the residual flow from AP11 for a total flow of 33.10cfs which will be conveyed in the streets. At AP12 two single grate Type "A" inlets and two single grate Type "C" inlets on each side of the street will capture 26.2cfs and a total of 6.90cfs residual flow will bypass these inlets and continue to AP14. A discussion of AP14 will follow later in this section.

Basin B13 is divided into 2 sub basins, which encompass Breezy Ct., a portion of Summer Breeze and 48 lots. Flow generated by this basin, Q100=25.24cfs, will be conveyed in the streets. At AP13 two single grate Type "A" inlets on grade will capture 13.34cfs and a total of 11.90cfs residual flow will bypass these inlets and continue in Summer Breeze Dr. to AP14.

Basin B14 is divided into 3 sub basins, which encompass Warm Wind Pl., Zephyr Pl., a portion of Summer Breeze and 65 lots. Flow generated by this basin, Q100=44.31cfs, will combine with the residual flows from AP's 12 and 13 for a total flow of

70.13cfs, which will be conveyed in the streets to AP14. AP14 is located in a sump with a two double grate Type "A" inlets that will capture the flow and drain to the Dam #11 Storm Drain Trunkline. The inlets will be designed for the 100 year storm event (70.13cfs), Arkansas Rd. will act as an "emergency spillway" in the event of clogging.

Basin B15 is a small portion of Arkansas Road (Q=0.5cfs). This small amount of flow will drain west on Arkansas Rd. and be captured in the storm drain system in The Crossings subdivision.

In summary, all of the flow captured by the proposed inlets will be carried via storm drain and tie to either a 60" or 66" storm drain built with the offsite infrastructure plans and drain to Dam#9 or Dam#11, respectively. See Appendix C, Inlet Analysis, for flow distributions and Appendix D, Storm Drain Analysis, for pipe sizes.

C. Off-Site Basins

Offsite basins include Tierra Pintada, Arroyo Vista and an area of undeveloped land slated for future development along the northeast boundary.

Tierra Pintada and Arroyo Vista will be constructed as half streets and the drainage patterns will not vary from the approved *Design Analysis Report 98th Street, Ladera Blvd. and Petroglyph Parkway* dated revised October 2000. The flows from Tierra Pintada will be captured by inlets and drain to the Dam 9 and Dam 11 storm drain systems discussed earlier in this report.

An area of undeveloped land, Basin Off1A, on the northeast boundary will generate 11.50cfs, along with undeveloped runoff from Tierra Pintada, and will be detained offsite and drain through a stub provided with this project (see Exhibit 4 for location). At the time of development approximately 30cfs will be generated in this basin. A storm drain connection will be provided for the future development of Basin Off1A to collect runoff.

Approximately 7.0 cfs of residual runoff was accounted for in the proposed design. Future development should take necessary measures as not to exceed this.

VI. CONCLUSION

This report has provided hydrologic and hydraulic considerations of the proposed development of Stormcloud Subdivision at Westland. This report is in conformance with *the West Interstate 40 Diversion Drainage Management Plan* as well as the *Drainage Report for The Crossings Subdivision* which addresses offsite flows generated by this project. This information provides adequate supporting documentation and guidance for approval of this report and to guide future development and phasing of the properties previously mentioned. These flows can be safely conveyed by the improvements proposed in this drainage plan to the existing AMAFCA Ladera Dam System, which has adequate capacity to accept such runoff. Erosion and dust control, consisting of erosion control berms, silt fencing and sedimentation basins, are proposed to prevent soil washing or blowing into paved streets, storm drains, and existing development areas. Therefore, we believe this report supports the preliminary/final plat and grading plan submittals and should be approved as requested.

Appendix

APPENDICES

APPENDIX A: BASIN CALCULATIONS

APPENDIX B: STREET HYDRAULICS

APPENDIX C: INLET ANALYSIS

APPENDIX D: STORM DRAIN ANALYSIS

APPENDIX E: AHYMO OUTPUT

APPENDIX A

BASIN CALCULATIONS

Stormcloud at Westland

BASIN I.D.		AREA (AC)	UNITS #		% LAND TREATMENT A	B	C	D[1]		DISCHARGE (CFS) 10 YR	100YR
HYRDOLOGICAL VOLUMETRIC & DISCHARGE DATA (EXISTING CALCULATED)											
7		49			50.0%	50.0%	0.0%	0.0%		24.6	80.6
9		254			50.0%	50.0%	0.0%	0.0%		127.6	417.8
12		6498			50.0%	50.0%	0.0%	0.0%		3264.6	10689.2
TOTAL		**6801**								**3416.8**	**11187.6**
HYRDOLOGICAL VOLUMETRIC & DISCHARGE DATA (DEVELOPED)											
ONSITE											
Phases 1 thru 3											
POND 9											
A1	AP1	13.65	61		0.0%	25.6%	25.6%	48.8%		27.0	46.2
A2	AP2	0.68	2		0.0%	25.6%	25.6%	48.8%		1.3	2.3
A3-a	AP3	2.17	0		0.0%	25.6%	25.6%	48.8%		4.3	7.3
A3-b		7.40	31		0.0%	25.6%	25.6%	48.8%		14.7	25.1
A4-a	AP4	4.05	19		0.0%	25.6%	25.6%	48.8%		8.0	13.7
A4-b		1.89	8		0.0%	25.6%	25.6%	48.8%		3.7	6.4
A5	AP5	2.66	13		0.0%	25.6%	25.6%	48.8%		5.3	9.0
A6-a	AP6	1.58	7		0.0%	25.6%	25.6%	48.8%		3.1	5.3
A6-b		3.19	11		0.0%	25.6%	25.6%	48.8%		6.3	10.8
A7	AP7	4.66	21		0.0%	25.6%	25.6%	48.8%		9.2	15.8
A8-a	AP8	2.25	11		0.0%	25.6%	25.6%	48.8%		4.4	7.6
A8-b		3.30	16		0.0%	25.6%	25.6%	48.8%		6.5	11.2
A8-c		0.95	6		0.0%	25.6%	25.6%	48.8%		1.9	3.2
A8-d		2.64	11		0.0%	25.6%	25.6%	48.8%		5.2	8.9
A8-e		2.33	7		0.0%	25.6%	25.6%	48.8%		4.6	7.9
A8-f		3.14	16		0.0%	25.6%	25.6%	48.8%		6.2	10.6
A8-g		1.98	8		0.0%	25.6%	25.6%	48.8%		3.9	6.7
A8-h		4.07	21		0.0%	25.6%	25.6%	48.8%		8.1	13.8
A8-i		1.55	0		0.0%	25.6%	25.6%	48.8%		3.1	5.2
SUBTOTAL		**64.1**	**269**							**127.0**	**217.1**
POND 11											
B9-a	AP9	3.27	18		0.0%	25.6%	25.6%	48.8%		6.5	11.08
B9-b		2.36	9		0.0%	25.6%	25.6%	48.8%		4.7	7.99
B10-a	AP10	4.66	26		0.0%	25.6%	25.6%	48.8%		9.2	15.77
B10-b		2.70	12		0.0%	25.6%	25.6%	48.8%		5.4	9.15
B10-c		0.38	2		0.0%	25.6%	25.6%	48.8%		0.7	1.28
B11	AP11	1.58	7		0.0%	25.6%	25.6%	48.8%		3.1	5.35
B12-a	AP12	0.23	0		0.0%	5.0%	5.0%	90.0%		0.6	0.96
B12-b		5.93	40		0.0%	25.6%	25.6%	48.8%		11.7	20.06
B13-a	AP13	1.45	6		0.0%	25.6%	25.6%	48.8%		2.9	4.91
B13-b		6.01	34		0.0%	25.6%	25.6%	48.8%		11.9	20.33
B14-a	AP14	4.42	37		0.0%	25.6%	25.6%	48.8%		8.7	14.94
B14-b		4.34	38		0.0%	25.6%	25.6%	48.8%		8.6	14.70
B14-c		2.38	15		0.0%	25.6%	25.6%	48.8%		4.7	8.05
B14-d		1.96	7		0.0%	25.6%	25.6%	48.8%		3.9	6.62
B15		0.12	0		0.0%	5.0%	5.0%	90.0%		0.3	0.50
SUBTOTAL		**41.8**	**251**							**83.0**	**141.7**
TOTAL		**105.9**	**520**							**210.0**	**358.7**
OFFSITE											
OFF 1A		8.79	0		0.0%	25.6%	25.6%	48.8%		17.4	29.76
SUBTOTAL		**8.79**	**0**							**17.4**	**29.8**

NOTES: 1) Impervious percentages for developed flows were calculated from the DPM equation a-4. The remaining percentages were distributed evenly between land treatment types B and C, except for Basin D which were taken from Table A-5 and the rest placed in land treatment type B.

N=UNITS/ACRES = 6.0

%D= 7*SQRT((N*N)+(5*N)) = 48.8%

APPENDIX B

STREET HYDRAULICS

SUMMER SHOWER - ROLL

MANNING'S N = 0.017 SLOPE = 0.012

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.5	5	11.0	0.1	9	41.2	0.3
2	8.4	0.3	6	25.0	0.4	10	41.6	0.3
3	8.8	0.3	7	39.0	0.1	11	50.0	0.5
4	9.0	0.0	8	41.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.040	0.032	1.654	0.797	2.510	0.060
0.100	0.100	0.159	0.201	3.308	1.266	4.100	0.125
0.150	0.150	0.372	0.537	6.346	1.444	7.075	0.182
0.200	0.200	0.806	1.314	11.460	1.631	12.126	0.241
0.250	0.250	1.492	2.870	16.573	1.924	17.178	0.308
0.300	0.300	2.431	5.413	21.687	2.226	22.229	0.377
0.350	0.350	3.643	8.804	28.725	2.417	29.229	0.441
0.400	0.400	5.371	13.581	39.571	2.529	39.153	0.499
0.450	0.450	7.496	21.574	45.495	2.878	45.076	0.579
0.500	0.500	9.873	31.880	50.420	3.229	50.000	0.662

Q: 8.78 cfs

SUMMER SHOWER - STD

MANNING'S N = 0.017 SLOPE = 0.025

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	41.2	0.7
2	8.4	0.7	6	25.0	0.4	10	41.6	0.7
3	8.8	0.7	7	39.0	0.1	11	50.0	0.9
4	9.0	0.0	8	41.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.045	1.645	1.152	2.484	0.071
0.100	0.100	0.156	0.286	3.290	1.828	4.048	0.152
0.150	0.150	0.366	0.762	6.318	2.085	6.996	0.218
0.200	0.200	0.795	1.875	11.423	2.357	12.021	0.286
0.250	0.250	1.476	4.108	16.527	2.783	17.047	0.370
0.300	0.300	2.408	7.762	21.631	3.224	22.072	0.462
0.350	0.350	3.591	13.121	26.735	3.654	27.098	0.558
0.400	0.400	5.026	20.448	31.839	4.069	32.123	0.658
0.450	0.450	6.631	31.731	32.943	4.785	33.148	0.806
0.500	0.500	8.243	45.508	33.046	5.521	33.174	0.974
0.550	0.550	9.857	61.174	33.149	6.206	33.199	1.149
0.600	0.600	11.471	78.608	33.252	6.853	33.224	1.330
0.650	0.650	13.087	97.714	33.355	7.466	33.250	1.517
0.700	0.700	14.774	111.384	37.107	7.539	36.050	1.584
0.750	0.750	16.692	126.188	41.758	7.560	40.700	1.639
0.800	0.800	18.844	143.942	46.409	7.639	45.350	1.708

Q = 22.96 cfs

SUMMER SHOWER - STD

MANNING'S N = 0.017 SLOPE = 0.035

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	41.2	0.7
2	8.4	0.7	6	25.0	0.4	10	41.6	0.7
3	8.8	0.7	7	39.0	0.1	11	50.0	0.9
4	9.0	0.0	8	41.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.053	1.645	1.352	2.484	0.078
0.100	0.100	0.156	0.336	3.290	2.146	4.048	0.172
0.150	0.150	0.366	0.895	6.318	2.447	6.996	0.243
0.200	0.200	0.795	2.200	11.423	2.767	12.021	0.319
0.250	0.250	1.476	4.822	16.527	3.267	17.047	0.416
0.300	0.300	2.408	9.112	21.631	3.784	22.072	0.523
0.350	0.350	3.591	15.403	26.735	4.289	27.098	0.636
0.400	0.400	5.026	24.004	31.839	4.776	32.123	0.755
0.450	0.450	6.631	37.248	32.943	5.617	33.148	0.941
0.500	0.500	8.243	53.420	33.046	6.480	33.174	1.153
0.550	0.550	9.857	71.809	33.149	7.285	33.199	1.376
0.600	0.600	11.471	92.275	33.252	8.044	33.224	1.606
0.650	0.650	13.087	114.702	33.355	8.764	33.250	1.845
0.700	0.700	14.774	130.750	37.107	8.850	36.050	1.918
0.750	0.750	16.692	148.128	41.758	8.874	40.700	1.975
0.800	0.800	18.844	168.968	46.409	8.967	45.350	2.051

Q = 27.8 cfs

SUMMER BREEZE - STD

MANNING'S N = 0.017 SLOPE = 0.007

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	41.2	0.7
2	8.4	0.7	6	25.0	0.4	10	41.6	0.7
3	8.8	0.7	7	39.0	0.1	11	50.0	0.9
4	9.0	0.0	8	41.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.024	1.645	0.605	2.484	0.056
0.100	0.100	0.156	0.150	3.290	0.960	4.048	0.114
0.150	0.150	0.366	0.400	6.318	1.094	6.996	0.169
0.200	0.200	0.795	0.984	11.423	1.238	12.021	0.224
0.250	0.250	1.476	2.156	16.527	1.461	17.047	0.283
0.300	0.300	2.408	4.075	21.631	1.692	22.072	0.345
0.350	0.350	3.591	6.888	26.735	1.918	27.098	0.407
0.400	0.400	5.026	10.735	31.839	2.136	32.123	0.471
0.450	0.450	6.631	16.658	32.943	2.512	33.148	0.548
0.500	0.500	8.243	23.890	33.046	2.898	33.174	0.631
0.550	0.550	9.857	32.114	33.149	3.258	33.199	0.715
0.600	0.600	11.471	41.266	33.252	3.597	33.224	0.801
0.650	0.650	13.087	51.296	33.355	3.920	33.250	0.889
0.700	0.700	14.774	58.473	37.107	3.958	36.050	0.944
0.750	0.750	16.692	66.245	41.758	3.969	40.700	0.995
0.800	0.800	18.844	75.565	46.409	4.010	45.350	1.050

Q = 34.26 cfs

SUMMER BREEZE - STD

MANNING'S N = 0.017 SLOPE = 0.018

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	41.2	0.7
2	8.4	0.7	6	25.0	0.4	10	41.6	0.7
3	8.8	0.7	7	39.0	0.1	11	50.0	0.9
4	9.0	0.0	8	41.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.038	1.645	0.978	2.484	0.065
0.100	0.100	0.156	0.243	3.290	1.552	4.048	0.137
0.150	0.150	0.366	0.647	6.318	1.769	6.996	0.199
0.200	0.200	0.795	1.591	11.423	2.001	12.021	0.262
0.250	0.250	1.476	3.487	16.527	2.362	17.047	0.337
0.300	0.300	2.408	6.589	21.631	2.736	22.072	0.416
0.350	0.350	3.591	11.137	26.735	3.101	27.098	0.500
0.400	0.400	5.026	17.357	31.839	3.454	32.123	0.586
0.450	0.450	6.631	26.934	32.943	4.062	33.148	0.707
0.500	0.500	8.243	38.628	33.046	4.686	33.174	0.842
0.550	0.550	9.857	51.925	33.149	5.268	33.199	0.982
0.600	0.600	11.471	66.723	33.252	5.816	33.224	1.126
0.650	0.650	13.087	82.940	33.355	6.337	33.250	1.275
0.700	0.700	14.774	94.544	37.107	6.400	36.050	1.337
0.750	0.750	16.692	107.109	41.758	6.417	40.700	1.390
0.800	0.800	18.844	122.179	46.409	6.484	45.350	1.454

AP1

Q = A1 = 46.2

d = 0.53

@ 0.2%, Q = 4.7 cfs

@ 3.0%, Q = 8.8 cfs

so @ 1.8%, Q = 8.34 cfs / inlet

Q_{req} = 29.51 cfs

SUMMER BREEZE - STD

MANNING'S N = 0.017 SLOPE = 0.033

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	41.2	0.7
2	8.4	0.7	6	25.0	0.4	10	41.6	0.7
3	8.8	0.7	7	39.0	0.1	11	50.0	0.9
4	9.0	0.0	8	41.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.051	1.645	1.313	2.484	0.077
0.100	0.100	0.156	0.326	3.290	2.084	4.048	0.168
0.150	0.150	0.366	0.869	6.318	2.376	6.996	0.238
0.200	0.200	0.795	2.137	11.423	2.687	12.021	0.312
0.250	0.250	1.476	4.682	16.527	3.172	17.047	0.407
0.300	0.300	2.408	8.848	21.631	3.674	22.072	0.510
0.350	0.350	3.591	14.956	26.735	4.165	27.098	0.620
0.400	0.400	5.026	23.308	31.839	4.638	32.123	0.735
0.450	0.450	6.631	36.168	32.943	5.454	33.148	0.913
0.500	0.500	8.243	51.872	33.046	6.292	33.174	1.116
0.550	0.550	9.857	69.727	33.149	7.074	33.199	1.328
0.600	0.600	11.471	89.599	33.252	7.811	33.224	1.549
0.650	0.650	13.087	111.377	33.355	8.510	33.250	1.777
0.700	0.700	14.774	126.959	37.107	8.594	36.050	1.849
0.750	0.750	16.692	143.833	41.758	8.617	40.700	1.905
0.800	0.800	18.844	164.070	46.409	8.707	45.350	1.979

1.72

$Q = A1_{res} + A2$

$= 29.51 + 2.30 = 31.8$

$d = 0.41$

@ 2.0%, $Q_{in} = 6.4$ cfs

@ 5.0%, $Q_{in} = 8.5$ cfs

so @ 3.3%, $Q_{in} = 7.31$ cfs/inlet

$Q_{res} = 17.18$ cfs

$Q = \overset{A2_{res}}{17.18} + 8.0 = 25.2$ cfs OK

SUMMER BREEZE - STD

MANNING'S N = 0.017 SLOPE = 0.022

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	41.2	0.7
2	8.4	0.7	6	25.0	0.4	10	41.6	0.7
3	8.8	0.7	7	39.0	0.1	11	50.0	0.9
4	9.0	0.0	8	41.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.042	1.645	1.081	2.484	0.068
0.100	0.100	0.156	0.268	3.290	1.717	4.048	0.146
0.150	0.150	0.366	0.716	6.318	1.958	6.996	0.210
0.200	0.200	0.795	1.760	11.423	2.214	12.021	0.276
0.250	0.250	1.476	3.858	16.527	2.614	17.047	0.356
0.300	0.300	2.408	7.289	21.631	3.027	22.072	0.443
0.350	0.350	3.591	12.322	26.735	3.431	27.098	0.533
0.400	0.400	5.026	19.203	31.839	3.821	32.123	0.627
0.450	0.450	6.631	29.799	32.943	4.494	33.148	0.764
0.500	0.500	8.243	42.736	33.046	5.184	33.174	0.918
0.550	0.550	9.857	57.447	33.149	5.828	33.199	1.078
0.600	0.600	11.471	73.820	33.252	6.435	33.224	1.244
0.650	0.650	13.087	91.762	33.355	7.012	33.250	1.415
0.700	0.700	14.774	104.600	37.107	7.080	36.050	1.480
0.750	0.750	16.692	118.502	41.758	7.099	40.700	1.534
0.800	0.800	18.844	135.175	46.409	7.174	45.350	1.600

$Q = A_{2res} + A_{8h}$

$= 17.18 + 12.76 = 29.94$ cfs OK

WIND RIDGE - 28F-F STD

MANNING'S N = 0.017 SLOPE = 0.026

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	37.2	0.7
2	8.4	0.7	6	23.0	0.4	10	37.6	0.7
3	8.8	0.7	7	35.0	0.1	11	46.0	0.9
4	9.0	0.0	8	37.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.045	1.645	1.154	2.484	0.071
0.100	0.100	0.156	0.286	3.290	1.832	4.048	0.152
0.150	0.150	0.366	0.764	6.318	2.089	6.996	0.218
0.200	0.200	0.795	1.878	11.423	2.362	12.021	0.287
0.250	0.250	1.476	4.116	16.527	2.789	17.047	0.371
0.300	0.300	2.408	7.777	21.631	3.230	22.072	0.462
0.350	0.350	3.591	13.147	26.735	3.661	27.098	0.558
0.400	0.400	4.981	21.561	28.839	4.329	29.123	0.691
0.450	0.450	6.391	32.595	28.942	5.100	29.148	0.855
0.500	0.500	7.803	45.353	29.045	5.812	29.174	1.025
0.550	0.550	9.217	59.712	29.148	6.479	29.199	1.203
0.600	0.600	10.631	75.577	29.251	7.109	29.224	1.386
0.650	0.650	12.047	92.868	29.354	7.709	29.250	1.574
0.700	0.700	13.534	104.052	33.106	7.688	32.050	1.619
0.750	0.750	15.252	116.340	37.757	7.628	36.700	1.655
0.800	0.800	17.204	131.594	42.408	7.649	41.350	1.710

Q = 15.49 cfs

WIND RIDGE - 28F-F STD

MANNING'S N = 0.017 SLOPE = 0.006

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	37.2	0.7
2	8.4	0.7	6	23.0	0.4	10	37.6	0.7
3	8.8	0.7	7	35.0	0.1	11	46.0	0.9
4	9.0	0.0	8	37.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.022	1.645	0.560	2.484	0.055
0.100	0.100	0.156	0.139	3.290	0.889	4.048	0.112
0.150	0.150	0.366	0.371	6.318	1.013	6.996	0.166
0.200	0.200	0.795	0.911	11.423	1.146	12.021	0.220
0.250	0.250	1.476	1.996	16.527	1.353	17.047	0.278
0.300	0.300	2.408	3.773	21.631	1.567	22.072	0.338
0.350	0.350	3.591	6.377	26.735	1.776	27.098	0.399
0.400	0.400	4.981	10.458	28.839	2.100	29.123	0.469
0.450	0.450	6.391	15.811	28.942	2.474	29.148	0.545
0.500	0.500	7.803	21.999	29.045	2.819	29.174	0.624
0.550	0.550	9.217	28.965	29.148	3.143	29.199	0.704
0.600	0.600	10.631	36.660	29.251	3.448	29.224	0.785
0.650	0.650	12.047	45.048	29.354	3.739	29.250	0.867
0.700	0.700	13.534	50.473	33.106	3.729	32.050	0.916
0.750	0.750	15.252	56.433	37.757	3.700	36.700	0.963
0.800	0.800	17.204	63.832	42.408	3.710	41.350	1.014

Q = 21.87 cfs OK

WIND RIDGE - 28F-F STD

MANNING'S N = 0.017 SLOPE = 0.028

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	37.2	0.7
2	8.4	0.7	6	23.0	0.4	10	37.6	0.7
3	8.8	0.7	7	35.0	0.1	11	46.0	0.9
4	9.0	0.0	8	37.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.048	1.645	1.216	2.484	0.073
0.100	0.100	0.156	0.302	3.290	1.930	4.048	0.158
0.150	0.150	0.366	0.805	6.318	2.200	6.996	0.225
0.200	0.200	0.795	1.979	11.423	2.488	12.021	0.296
0.250	0.250	1.476	4.336	16.527	2.938	17.047	0.384
0.300	0.300	2.408	8.193	21.631	3.403	22.072	0.480
0.350	0.350	3.591	13.850	26.735	3.857	27.098	0.581
0.400	0.400	4.981	22.713	28.839	4.560	29.123	0.723
0.450	0.450	6.391	34.338	28.942	5.372	29.148	0.899
0.500	0.500	7.803	47.778	29.045	6.123	29.174	1.083
0.550	0.550	9.217	62.905	29.148	6.825	29.199	1.275
0.600	0.600	10.631	79.618	29.251	7.489	29.224	1.472
0.650	0.650	12.047	97.834	29.354	8.121	29.250	1.676
0.700	0.700	13.534	109.616	33.106	8.100	32.050	1.720
0.750	0.750	15.252	122.561	37.757	8.036	36.700	1.754
0.800	0.800	17.204	138.630	42.408	8.058	41.350	1.810

AP:

$Q = A3a + A3b$

$= 32.39$ cfs

$d = 0.44$

@ 2.0%, $Q_m = 6.4$ cfs

@ 5.0%, $Q_m = 8.6$ cfs

@ 2.6%, $Q_m = 6.99$ cfs

$Q_{res} = 18.42$ cfs

THUNDER RD - 28F-F STD

MANNING'S N = 0.017 SLOPE = 0.006

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	37.2	0.7
2	8.4	0.7	6	23.0	0.4	10	37.6	0.7
3	8.8	0.7	7	35.0	0.1	11	46.0	0.9
4	9.0	0.0	8	37.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.022	1.645	0.560	2.484	0.055
0.100	0.100	0.156	0.139	3.290	0.889	4.048	0.112
0.150	0.150	0.366	0.371	6.318	1.013	6.996	0.166
0.200	0.200	0.795	0.911	11.423	1.146	12.021	0.220
0.250	0.250	1.476	1.996	16.527	1.353	17.047	0.278
0.300	0.300	2.408	3.773	21.631	1.567	22.072	0.338
0.350	0.350	3.591	6.377	26.735	1.776	27.098	0.399
0.400	0.400	4.981	10.458	28.839	2.100	29.123	0.469
0.450	0.450	6.391	15.811	28.942	2.474	29.148	0.545
0.500	0.500	7.803	21.999	29.045	2.819	29.174	0.624
0.550	0.550	9.217	28.965	29.148	3.143	29.199	0.704
0.600	0.600	10.631	36.660	29.251	3.448	29.224	0.785
0.650	0.650	12.047	45.048	29.354	3.739	29.250	0.867
0.700	0.700	13.534	50.473	33.106	3.729	32.050	0.916
0.750	0.750	15.252	56.433	37.757	3.700	36.700	0.963
0.800	0.800	17.204	63.832	42.408	3.710	41.350	1.014

Q = 6.44 cfs ok

THUNDER RD - 28F-F STD

MANNING'S N = 0.017 SLOPE = 0.035

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	37.2	0.7
2	8.4	0.7	6	23.0	0.4	10	37.6	0.7
3	8.8	0.7	7	35.0	0.1	11	46.0	0.9
4	9.0	0.0	8	37.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.053	1.645	1.352	2.484	0.078
0.100	0.100	0.156	0.336	3.290	2.146	4.048	0.172
0.150	0.150	0.366	0.895	6.318	2.447	6.996	0.243
0.200	0.200	0.795	2.200	11.423	2.767	12.021	0.319
0.250	0.250	1.476	4.822	16.527	3.267	17.047	0.416
0.300	0.300	2.408	9.112	21.631	3.784	22.072	0.523
0.350	0.350	3.591	15.403	26.735	4.289	27.098	0.636
0.400	0.400	4.981	25.259	28.839	5.072	29.123	0.800
0.450	0.450	6.391	38.187	28.942	5.975	29.148	1.005
0.500	0.500	7.803	53.133	29.045	6.809	29.174	1.221
0.550	0.550	9.217	69.956	29.148	7.590	29.199	1.446
0.600	0.600	10.631	88.543	29.251	8.328	29.224	1.679
0.650	0.650	12.047	108.801	29.354	9.031	29.250	1.919
0.700	0.700	13.534	121.903	33.106	9.007	32.050	1.962
0.750	0.750	15.252	136.300	37.757	8.936	36.700	1.992
0.800	0.800	17.204	154.170	42.408	8.961	41.350	2.049

$Q = A V_a$

$= 13.71$ cfs OK

RAIN PL. - 32F-F STD

MANNING'S N = 0.017 SLOPE = 0.015

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	37.2	0.7
2	8.4	0.7	6	23.0	0.4	10	37.6	0.7
3	8.8	0.7	7	35.0	0.1	11	46.0	0.9
4	9.0	0.0	8	37.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.035	1.645	0.885	2.484	0.062
0.100	0.100	0.156	0.220	3.290	1.405	4.048	0.131
0.150	0.150	0.366	0.586	6.318	1.602	6.996	0.190
0.200	0.200	0.795	1.441	11.423	1.812	12.021	0.251
0.250	0.250	1.476	3.157	16.527	2.139	17.047	0.321
0.300	0.300	2.408	5.965	21.631	2.477	22.072	0.395
0.350	0.350	3.591	10.083	26.735	2.808	27.098	0.473
0.400	0.400	4.981	16.536	28.839	3.320	29.123	0.571
0.450	0.450	6.391	24.999	28.942	3.911	29.148	0.688
0.500	0.500	7.803	34.784	29.045	4.458	29.174	0.809
0.550	0.550	9.217	45.797	29.148	4.969	29.199	0.934
0.600	0.600	10.631	57.965	29.251	5.452	29.224	1.062
0.650	0.650	12.047	71.227	29.354	5.912	29.250	1.194
0.700	0.700	13.534	79.805	33.106	5.897	32.050	1.241
0.750	0.750	15.252	89.229	37.757	5.850	36.700	1.282
0.800	0.800	17.204	100.928	42.408	5.867	41.350	1.335

Q: 17.71 OK

RAIN PL. - 32F-F STD

MANNING'S N = 0.017 SLOPE = 0.040

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	41.2	0.7
2	8.4	0.7	6	25.0	0.4	10	41.6	0.7
3	8.8	0.7	7	39.0	0.1	11	50.0	0.9
4	9.0	0.0	8	41.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.057	1.645	1.445	2.484	0.082
0.100	0.100	0.156	0.359	3.290	2.294	4.048	0.182
0.150	0.150	0.366	0.957	6.318	2.616	6.996	0.256
0.200	0.200	0.795	2.352	11.423	2.958	12.021	0.336
0.250	0.250	1.476	5.155	16.527	3.493	17.047	0.440
0.300	0.300	2.408	9.741	21.631	4.045	22.072	0.555
0.350	0.350	3.591	16.466	26.735	4.585	27.098	0.677
0.400	0.400	5.026	25.661	31.839	5.106	32.123	0.806
0.450	0.450	6.631	39.820	32.943	6.005	33.148	1.011
0.500	0.500	8.243	57.109	33.046	6.928	33.174	1.247
0.550	0.550	9.857	76.767	33.149	7.788	33.199	1.493
0.600	0.600	11.471	98.646	33.252	8.599	33.224	1.750
0.650	0.650	13.087	122.622	33.355	9.370	33.250	2.015
0.700	0.700	14.774	139.777	37.107	9.461	36.050	2.092
0.750	0.750	16.692	158.355	41.758	9.487	40.700	2.150
0.800	0.800	18.844	180.635	46.409	9.586	45.350	2.229

AP4

$Q = A4a + A4b$

$= 20.12$ cfs OK

$d = 0.37$

@ 2.0%, $Q_m = 4.5$ cfs

@ 5.0%, $Q_m = 6.9$ cfs

@ 4.0%, $Q_m = 6.1$ cfs

$Q_{res} = 7.92$ cfs

WIND RIDGE - 32F-F STD

MANNING'S N = 0.017 SLOPE = 0.028

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	41.2	0.7
2	8.4	0.7	6	25.0	0.4	10	41.6	0.7
3	8.8	0.7	7	39.0	0.1	11	50.0	0.9
4	9.0	0.0	8	41.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.048	1.645	1.216	2.484	0.073
0.100	0.100	0.156	0.302	3.290	1.930	4.048	0.158
0.150	0.150	0.366	0.805	6.318	2.200	6.996	0.225
0.200	0.200	0.795	1.979	11.423	2.488	12.021	0.296
0.250	0.250	1.476	4.336	16.527	2.938	17.047	0.384
0.300	0.300	2.408	8.193	21.631	3.403	22.072	0.480
0.350	0.350	3.591	13.850	26.735	3.857	27.098	0.581
0.400	0.400	5.026	21.584	31.839	4.295	32.123	0.687
0.450	0.450	6.631	33.494	32.943	5.051	33.148	0.847
0.500	0.500	8.243	48.036	33.046	5.827	33.174	1.028
0.550	0.550	9.857	64.571	33.149	6.551	33.199	1.218
0.600	0.600	11.471	82.974	33.252	7.233	33.224	1.414
0.650	0.650	13.087	103.141	33.355	7.881	33.250	1.616
0.700	0.700	14.774	117.571	37.107	7.958	36.050	1.685
0.750	0.750	16.692	133.197	41.758	7.980	40.700	1.740
0.800	0.800	18.844	151.937	46.409	8.063	45.350	1.811

Q = 18.42 + 7.92 + 2.62 = 28.96 cfs OK
(A-3 res) (A-4 res)

WIND RIDGE - 32F-F STD

MANNING'S N = 0.017 SLOPE = 0.016

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	41.2	0.7
2	8.4	0.7	6	25.0	0.4	10	41.6	0.7
3	8.8	0.7	7	39.0	0.1	11	50.0	0.9
4	9.0	0.0	8	41.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.036	1.645	0.914	2.484	0.063
0.100	0.100	0.156	0.227	3.290	1.451	4.048	0.133
0.150	0.150	0.366	0.605	6.318	1.654	6.996	0.193
0.200	0.200	0.795	1.488	11.423	1.871	12.021	0.254
0.250	0.250	1.476	3.260	16.527	2.209	17.047	0.326
0.300	0.300	2.408	6.161	21.631	2.559	22.072	0.402
0.350	0.350	3.591	10.414	26.735	2.900	27.098	0.481
0.400	0.400	5.026	16.229	31.839	3.229	32.123	0.562
0.450	0.450	6.631	25.184	32.943	3.798	33.148	0.674
0.500	0.500	8.243	36.119	33.046	4.382	33.174	0.799
0.550	0.550	9.857	48.552	33.149	4.926	33.199	0.927
0.600	0.600	11.471	62.389	33.252	5.439	33.224	1.060
0.650	0.650	13.087	77.553	33.355	5.926	33.250	1.196
0.700	0.700	14.774	88.403	37.107	5.984	36.050	1.257
0.750	0.750	16.692	100.153	41.758	6.000	40.700	1.310
0.800	0.800	18.844	114.243	46.409	6.063	45.350	1.372

AP5

$Q = A3_{res} + A4_{res} + A5$

$= 18.42 + 7.92 + 8.99$

$\doteq 35.33$ cfs

$d = 0.50$

Double "A"

@ 0.2%, Q_{in}: 4.75 cfs

@ 2.0%, Q_{in}: 9.6 cfs

so @ 1.6%, Q_{in}: 8.52 cfs/side

Q_{res}: 18.29 cfs

$Q = 18.29$ cfs

$d = 0.41$

Double "C"

@ 0.2%, Q_{in} = 2.9

@ 2.0%, Q_{in} : 6.4

so @ 1.6%, Q_{in} = 5.62

Q_{res}: 7.045 cfs

STORMCLOUD - 50F-F STD - half

MANNING'S N = 0.017 SLOPE = 0.011

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	4	9.0	0.0	7	29.2	0.8
2	8.4	0.7	5	11.0	0.1			
3	8.8	0.7	6	29.0	0.5			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.020	0.015	0.822	0.758	1.242	0.059
0.100	0.100	0.078	0.094	1.645	1.203	2.024	0.123
0.150	0.150	0.183	0.251	3.159	1.372	3.498	0.179
0.200	0.200	0.398	0.617	5.711	1.551	6.011	0.237
0.250	0.250	0.738	1.352	8.263	1.832	8.523	0.302
0.300	0.300	1.204	2.554	10.815	2.121	11.036	0.370
0.350	0.350	1.796	4.317	13.368	2.405	13.549	0.440
0.400	0.400	2.513	6.728	15.920	2.678	16.061	0.512
0.450	0.450	3.356	9.868	18.472	2.941	18.574	0.585
0.500	0.500	4.322	14.019	20.535	3.244	20.592	0.664
0.550	0.550	5.329	19.809	20.643	3.717	20.630	0.765
0.600	0.600	6.339	26.359	20.751	4.158	20.669	0.869
0.650	0.650	7.350	33.618	20.858	4.574	20.707	0.975
0.700	0.700	8.398	39.573	22.791	4.712	22.133	1.045
0.750	0.750	9.564	45.992	25.172	4.809	24.484	1.110
0.800	0.800	10.847	53.410	27.554	4.924	26.835	1.177

left

Q = 9.41 cfs ok

right

Q = 6.55 cfs ok

GALE - 32F-F ROLL

MANNING'S N = 0.017 SLOPE = 0.024

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.5	5	11.0	0.1	9	41.2	0.3
2	8.4	0.3	6	25.0	0.4	10	41.6	0.3
3	8.8	0.3	7	39.0	0.1	11	50.0	0.5
4	9.0	0.0	8	41.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.040	0.045	1.654	1.123	2.510	0.070
0.100	0.100	0.159	0.283	3.308	1.783	4.100	0.149
0.150	0.150	0.372	0.756	6.346	2.033	7.075	0.214
0.200	0.200	0.806	1.850	11.460	2.297	12.126	0.282
0.250	0.250	1.492	4.042	16.573	2.709	17.178	0.364
0.300	0.300	2.431	7.623	21.687	3.135	22.229	0.453
0.350	0.350	3.643	12.398	28.725	3.404	29.229	0.530
0.400	0.400	5.371	19.127	39.571	3.561	39.153	0.597
0.450	0.450	7.496	30.383	45.495	4.053	45.076	0.706
0.500	0.500	9.873	44.897	50.420	4.547	50.000	0.822

Q = 5.35 cfs ok

STORMCLOUD - 50F-F STD - half

MANNING'S N = 0.017 SLOPE = 0.049

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	4	9.0	0.0	7	29.2	0.8
2	8.4	0.7	5	11.0	0.1			
3	8.8	0.7	6	29.0	0.5			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.020	0.031	0.822	1.591	1.242	0.089
0.100	0.100	0.078	0.198	1.645	2.526	2.024	0.199
0.150	0.150	0.183	0.527	3.159	2.880	3.498	0.279
0.200	0.200	0.398	1.295	5.711	3.258	6.011	0.365
0.250	0.250	0.738	2.838	8.263	3.846	8.523	0.480
0.300	0.300	1.204	5.363	10.815	4.455	11.036	0.609
0.350	0.350	1.796	9.066	13.368	5.049	13.549	0.747
0.400	0.400	2.513	14.128	15.920	5.622	16.061	0.892
0.450	0.450	3.356	20.721	18.472	6.175	18.574	1.043
0.500	0.500	4.322	29.436	20.535	6.811	20.592	1.222
0.550	0.550	5.329	41.596	20.643	7.805	20.630	1.498
0.600	0.600	6.339	55.347	20.751	8.732	20.669	1.786
0.650	0.650	7.350	70.591	20.858	9.604	20.707	2.085
0.700	0.700	8.398	83.095	22.791	9.894	22.133	2.223
0.750	0.750	9.564	96.573	25.172	10.098	24.484	2.336
0.800	0.800	10.847	112.150	27.554	10.340	26.835	2.463

HP6

$Q = A6a + A6b$

$= 10.79 + 5.35 = 16.14$

$d = 0.42$

Double "A"

@ 2.0%, $Q_m = 6.8$

@ 5.0%, Q 9.1

so @ 4.9% $Q_m = 9.02$

$Q_{res} = 7.11$ cfs

Double "C"

@ 2.0%, 4

@ 5.0%, $Q_m = 5.8$

so @ 4.9%, $Q_m = 5.74$

$Q_{res} = 1.37$ cfs

$Q = 7.11$ cfs

$d = 0.23$

left

$Q = \underset{A6res}{1.37} + 7.60 + 2.03 = 11.0$ cfs ok

right

$Q = 12.24$ cfs ok

STORMCLOUD - 50F-F STD - half

MANNING'S N = 0.017 SLOPE = 0.035

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	4	9.0	0.0	7	29.2	0.8
2	8.4	0.7	5	11.0	0.1			
3	8.8	0.7	6	29.0	0.5			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.020	0.026	0.822	1.352	1.242	0.078
0.100	0.100	0.078	0.168	1.645	2.146	2.024	0.172
0.150	0.150	0.183	0.447	3.159	2.447	3.498	0.243
0.200	0.200	0.398	1.100	5.711	2.767	6.011	0.319
0.250	0.250	0.738	2.411	8.263	3.267	8.523	0.416
0.300	0.300	1.204	4.556	10.815	3.784	11.036	0.523
0.350	0.350	1.796	7.701	13.368	4.289	13.549	0.636
0.400	0.400	2.513	12.002	15.920	4.776	16.061	0.755
0.450	0.450	3.356	17.602	18.472	5.246	18.574	0.878
0.500	0.500	4.322	25.006	20.535	5.786	20.592	1.021
0.550	0.550	5.329	35.335	20.643	6.630	20.630	1.234
0.600	0.600	6.339	47.018	20.751	7.417	20.669	1.456
0.650	0.650	7.350	59.967	20.858	8.159	20.707	1.685
0.700	0.700	8.398	70.589	22.791	8.405	22.133	1.799
0.750	0.750	9.564	82.039	25.172	8.578	24.484	1.895
0.800	0.800	10.847	95.272	27.554	8.784	26.835	2.000

AP7

Q = A7 = 15.65 cfs

d = 0.44

@ 2.0%, Qin = 7.6

@ 5.0%, Qin = 9.8

@ 7.5%, Qin = 8.7

Qres = 6.95 cfs

RAIN - 28F-F STD

MANNING'S N = 0.017 SLOPE = 0.022

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	37.2	0.7
2	8.4	0.7	6	23.0	0.4	10	37.6	0.7
3	8.8	0.7	7	35.0	0.1	11	46.0	0.9
4	9.0	0.0	8	37.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.042	1.645	1.077	2.484	0.068
0.100	0.100	0.156	0.267	3.290	1.709	4.048	0.145
0.150	0.150	0.366	0.713	6.318	1.949	6.996	0.209
0.200	0.200	0.795	1.752	11.423	2.204	12.021	0.276
0.250	0.250	1.476	3.840	16.527	2.602	17.047	0.355
0.300	0.300	2.408	7.257	21.631	3.014	22.072	0.441
0.350	0.350	3.591	12.267	26.735	3.416	27.098	0.531
0.400	0.400	4.981	20.117	28.839	4.039	29.123	0.654
0.450	0.450	6.391	30.413	28.942	4.758	29.148	0.802
0.500	0.500	7.803	42.316	29.045	5.423	29.174	0.957
0.550	0.550	9.217	55.715	29.148	6.045	29.199	1.118
0.600	0.600	10.631	70.517	29.251	6.633	29.224	1.284
0.650	0.650	12.047	86.651	29.354	7.193	29.250	1.455
0.700	0.700	13.534	97.086	33.106	7.174	32.050	1.500
0.750	0.750	15.252	108.552	37.757	7.117	36.700	1.538
0.800	0.800	17.204	122.784	42.408	7.137	41.350	1.592

Q = 7.60 cfs ok

STORMCLOUD - 50F-F STD - full

MANNING'S N = 0.017 SLOPE = 0.035

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	6	29.0	0.5	11	59.0	0.0
2	8.4	0.7	7	29.2	0.8	12	59.2	0.7
3	8.8	0.7	8	38.8	0.8	13	59.6	0.7
4	9.0	0.0	9	39.0	0.5	14	68.0	0.9
5	11.0	0.1	10	57.0	0.1			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.053	1.645	1.352	12.144	0.078
0.100	0.100	0.156	0.336	3.290	2.146	13.708	0.172
0.150	0.150	0.366	0.895	6.318	2.447	16.656	0.243
0.200	0.200	0.795	2.200	11.423	2.767	21.681	0.319
0.250	0.250	1.476	4.822	16.527	3.267	26.707	0.416
0.300	0.300	2.408	9.112	21.631	3.784	31.732	0.523
0.350	0.350	3.591	15.403	26.735	4.289	36.758	0.636
0.400	0.400	5.026	24.004	31.839	4.776	41.783	0.755
0.450	0.450	6.711	35.205	36.943	5.246	46.808	0.878
0.500	0.500	8.643	50.012	41.070	5.786	50.844	1.021
0.550	0.550	10.659	70.671	41.285	6.630	50.919	1.234
0.600	0.600	12.677	94.035	41.500	7.418	50.994	1.456
0.650	0.650	14.700	119.934	41.715	8.159	51.070	1.685
0.700	0.700	16.796	141.175	45.578	8.405	53.920	1.799
0.750	0.750	19.126	164.071	50.341	8.578	58.620	1.895
0.800	0.800	21.692	190.532	55.104	8.784	63.320	2.000

$Q = A7_{res} + A6_{res} + A5_{res} + A8_a + A8_b + A8_c =$

$6.95 + 1.33 + 7.06 + 7.6 + 11.17 + 3.22 = 37.3$ cfs ok

CUMULUS - 28F-F STD

MANNING'S N = 0.017 SLOPE = 0.030

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	37.2	0.7
2	8.4	0.7	6	23.0	0.4	10	37.6	0.7
3	8.8	0.7	7	35.0	0.1	11	46.0	0.9
4	9.0	0.0	8	37.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.049	1.645	1.252	2.484	0.074
0.100	0.100	0.156	0.311	3.290	1.987	4.048	0.161
0.150	0.150	0.366	0.828	6.318	2.265	6.996	0.230
0.200	0.200	0.795	2.037	11.423	2.562	12.021	0.302
0.250	0.250	1.476	4.464	16.527	3.025	17.047	0.392
0.300	0.300	2.408	8.436	21.631	3.503	22.072	0.491
0.350	0.350	3.591	14.260	26.735	3.971	27.098	0.595
0.400	0.400	4.981	23.386	28.839	4.695	29.123	0.743
0.450	0.450	6.391	35.354	28.942	5.532	29.148	0.926
0.500	0.500	7.803	49.192	29.045	6.304	29.174	1.118
0.550	0.550	9.217	64.767	29.148	7.027	29.199	1.318
0.600	0.600	10.631	81.975	29.251	7.711	29.224	1.525
0.650	0.650	12.047	100.730	29.354	8.361	29.250	1.737
0.700	0.700	13.534	112.861	33.106	8.339	32.050	1.782
0.750	0.750	15.252	126.189	37.757	8.273	36.700	1.815
0.800	0.800	17.204	142.733	42.408	8.297	41.350	1.871

Q = A8d = 8.93 cfs OK

WIND RIDGE - 32F-F STD - 2% CROSS-SLOP

MANNING'S N = 0.017 SLOPE = 0.006

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	1.4	5	11.0	0.7	9	41.2	0.7
2	8.4	1.2	6	25.0	0.4	10	41.6	0.7
3	8.8	1.2	7	39.0	0.1	11	50.0	0.9
4	9.0	0.6	8	41.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.020	0.011	0.822	0.560	1.702	0.055
0.100	0.100	0.078	0.069	1.645	0.889	2.484	0.112
0.150	0.150	0.183	0.185	3.159	1.013	3.958	0.166
0.200	0.200	0.398	0.456	5.711	1.146	6.471	0.220
0.250	0.250	0.738	0.998	8.263	1.353	8.983	0.278
0.300	0.300	1.204	1.886	10.815	1.567	11.496	0.338
0.350	0.350	1.796	3.189	13.368	1.776	14.009	0.399
0.400	0.400	2.513	4.969	15.920	1.978	16.521	0.461
0.450	0.450	3.356	7.288	18.472	2.172	19.034	0.523
0.500	0.500	4.324	10.202	21.024	2.359	21.547	0.587
0.550	0.550	5.418	13.765	23.576	2.540	24.060	0.650
0.600	0.600	6.646	17.823	26.660	2.682	27.080	0.712
0.650	0.650	8.038	22.569	30.098	2.808	30.439	0.773
0.700	0.700	9.629	27.740	34.694	2.881	34.518	0.829
0.750	0.750	11.390	35.117	37.071	3.083	36.856	0.898
0.800	0.800	13.269	43.451	39.449	3.275	39.194	0.967

$Q = A\theta e$

$= 7.39$ cfs ok

CUMUCLUS - 32F-F STD

MANNING'S N = 0.017 SLOPE = 0.036

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	41.2	0.7
2	8.4	0.7	6	25.0	0.4	10	41.6	0.7
3	8.8	0.7	7	39.0	0.1	11	50.0	0.9
4	9.0	0.0	8	41.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.054	1.645	1.371	2.484	0.079
0.100	0.100	0.156	0.340	3.290	2.176	4.048	0.174
0.150	0.150	0.366	0.908	6.318	2.482	6.996	0.246
0.200	0.200	0.795	2.232	11.423	2.807	12.021	0.323
0.250	0.250	1.476	4.890	16.527	3.314	17.047	0.421
0.300	0.300	2.408	9.241	21.631	3.838	22.072	0.529
0.350	0.350	3.591	15.621	26.735	4.350	27.098	0.644
0.400	0.400	5.026	24.344	31.839	4.844	32.123	0.765
0.450	0.450	6.631	37.777	32.943	5.697	33.148	0.955
0.500	0.500	8.243	54.178	33.046	6.572	33.174	1.172
0.550	0.550	9.857	72.828	33.149	7.389	33.199	1.399
0.600	0.600	11.471	93.583	33.252	8.158	33.224	1.635
0.650	0.650	13.087	116.329	33.355	8.889	33.250	1.879
0.700	0.700	14.774	132.604	37.107	8.976	36.050	1.953
0.750	0.750	16.692	150.229	41.758	9.000	40.700	2.010
0.800	0.800	18.844	171.365	46.409	9.094	45.350	2.086

Q = 22.28 cfs OK

CUMUCLUS - 32F-F STD

MANNING'S N = 0.017 SLOPE = 0.013

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	41.2	0.7
2	8.4	0.7	6	25.0	0.4	10	41.6	0.7
3	8.8	0.7	7	39.0	0.1	11	50.0	0.9
4	9.0	0.0	8	41.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.032	1.645	0.824	2.484	0.061
0.100	0.100	0.156	0.205	3.290	1.308	4.048	0.127
0.150	0.150	0.366	0.545	6.318	1.491	6.996	0.185
0.200	0.200	0.795	1.341	11.423	1.687	12.021	0.244
0.250	0.250	1.476	2.939	16.527	1.991	17.047	0.312
0.300	0.300	2.408	5.553	21.631	2.306	22.072	0.383
0.350	0.350	3.591	9.387	26.735	2.614	27.098	0.456
0.400	0.400	5.026	14.629	31.839	2.911	32.123	0.532
0.450	0.450	6.631	22.701	32.943	3.423	33.148	0.632
0.500	0.500	8.243	32.557	33.046	3.949	33.174	0.743
0.550	0.550	9.857	43.764	33.149	4.440	33.199	0.857
0.600	0.600	11.471	56.237	33.252	4.902	33.224	0.974
0.650	0.650	13.087	69.905	33.355	5.342	33.250	1.094
0.700	0.700	14.774	79.685	37.107	5.394	36.050	1.153
0.750	0.750	16.692	90.276	41.758	5.408	40.700	1.205
0.800	0.800	18.844	102.978	46.409	5.465	45.350	1.265

$Q = A8d + A8e + A8f$

$= 27.45\ cfs$ OK

SUMMER BREEZE - STD

MANNING'S N = 0.017 SLOPE = 0.007

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	41.2	0.7
2	8.4	0.7	6	25.0	0.4	10	41.6	0.7
3	8.8	0.7	7	39.0	0.1	11	50.0	0.9
4	9.0	0.0	8	41.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.024	1.645	0.605	2.484	0.056
0.100	0.100	0.156	0.150	3.290	0.960	4.048	0.114
0.150	0.150	0.366	0.400	6.318	1.094	6.996	0.169
0.200	0.200	0.795	0.984	11.423	1.238	12.021	0.224
0.250	0.250	1.476	2.156	16.527	1.461	17.047	0.283
0.300	0.300	2.408	4.075	21.631	1.692	22.072	0.345
0.350	0.350	3.591	6.888	26.735	1.918	27.098	0.407
0.400	0.400	5.026	10.735	31.839	2.136	32.123	0.471
0.450	0.450	6.631	16.658	32.943	2.512	33.148	0.548
0.500	0.500	8.243	23.890	33.046	2.898	33.174	0.631
0.550	0.550	9.857	32.114	33.149	3.258	33.199	0.715
0.600	0.600	11.471	41.266	33.252	3.597	33.224	0.801
0.650	0.650	13.087	51.296	33.355	3.920	33.250	0.889
0.700	0.700	14.774	58.473	37.107	3.958	36.050	0.944
0.750	0.750	16.692	66.245	41.758	3.969	40.700	0.995
0.800	0.800	18.844	75.565	46.409	4.010	45.350	1.050

$Q = A8d + A8e + A8f + A8g$

$= 34.15$ cfs ok

TEMPEST - 32F-F STD

MANNING'S N = 0.017 SLOPE = 0.030

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	41.2	0.7
2	8.4	0.7	6	25.0	0.4	10	41.6	0.7
3	8.8	0.7	7	39.0	0.1	11	50.0	0.9
4	9.0	0.0	8	41.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.049	1.645	1.252	2.484	0.074
0.100	0.100	0.156	0.311	3.290	1.987	4.048	0.161
0.150	0.150	0.366	0.828	6.318	2.265	6.996	0.230
0.200	0.200	0.795	2.037	11.423	2.562	12.021	0.302
0.250	0.250	1.476	4.464	16.527	3.025	17.047	0.392
0.300	0.300	2.408	8.436	21.631	3.503	22.072	0.491
0.350	0.350	3.591	14.260	26.735	3.971	27.098	0.595
0.400	0.400	5.026	22.223	31.839	4.422	32.123	0.704
0.450	0.450	6.631	34.485	32.943	5.200	33.148	0.871
0.500	0.500	8.243	49.458	33.046	6.000	33.174	1.060
0.550	0.550	9.857	66.483	33.149	6.745	33.199	1.258
0.600	0.600	11.471	85.430	33.252	7.447	33.224	1.463
0.650	0.650	13.087	106.194	33.355	8.114	33.250	1.674
0.700	0.700	14.774	121.051	37.107	8.194	36.050	1.744
0.750	0.750	16.692	137.140	41.758	8.216	40.700	1.800
0.800	0.800	18.844	156.434	46.409	8.302	45.350	1.872

Q = 39a = 11.08 cfs OK

CLOUDY - 32F-F STD

MANNING'S N = 0.017 SLOPE = 0.022

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	41.2	0.7
2	8.4	0.7	6	25.0	0.4	10	41.6	0.7
3	8.8	0.7	7	39.0	0.1	11	50.0	0.9
4	9.0	0.0	8	41.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.042	1.645	1.072	2.484	0.068
0.100	0.100	0.156	0.266	3.290	1.701	4.048	0.145
0.150	0.150	0.366	0.709	6.318	1.940	6.996	0.209
0.200	0.200	0.795	1.745	11.423	2.194	12.021	0.275
0.250	0.250	1.476	3.823	16.527	2.590	17.047	0.354
0.300	0.300	2.408	7.224	21.631	3.000	22.072	0.440
0.350	0.350	3.591	12.212	26.735	3.401	27.098	0.530
0.400	0.400	5.026	19.031	31.839	3.787	32.123	0.623
0.450	0.450	6.631	29.531	32.943	4.453	33.148	0.758
0.500	0.500	8.243	42.353	33.046	5.138	33.174	0.911
0.550	0.550	9.857	56.932	33.149	5.776	33.199	1.069
0.600	0.600	11.471	73.158	33.252	6.377	33.224	1.233
0.650	0.650	13.087	90.939	33.355	6.949	33.250	1.401
0.700	0.700	14.774	103.662	37.107	7.017	36.050	1.466
0.750	0.750	16.692	117.439	41.758	7.036	40.700	1.520
0.800	0.800	18.844	133.962	46.409	7.109	45.350	1.586

Q = BIDa = 15.77 cfs OK

SUNNY MORNING - 32F-F STD

MANNING'S N = 0.017 SLOPE = 0.038

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	41.2	0.7
2	8.4	0.7	6	25.0	0.4	10	41.6	0.7
3	8.8	0.7	7	39.0	0.1	11	50.0	0.9
4	9.0	0.0	8	41.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.055	1.645	1.409	2.484	0.081
0.100	0.100	0.156	0.350	3.290	2.236	4.048	0.178
0.150	0.150	0.366	0.932	6.318	2.550	6.996	0.251
0.200	0.200	0.795	2.293	11.423	2.883	12.021	0.329
0.250	0.250	1.476	5.024	16.527	3.404	17.047	0.430
0.300	0.300	2.408	9.494	21.631	3.943	22.072	0.542
0.350	0.350	3.591	16.049	26.735	4.469	27.098	0.661
0.400	0.400	5.026	25.011	31.839	4.977	32.123	0.785
0.450	0.450	6.631	38.812	32.943	5.853	33.148	0.983
0.500	0.500	8.243	55.663	33.046	6.752	33.174	1.209
0.550	0.550	9.857	74.824	33.149	7.591	33.199	1.446
0.600	0.600	11.471	96.148	33.252	8.382	33.224	1.693
0.650	0.650	13.087	119.517	33.355	9.132	33.250	1.947
0.700	0.700	14.774	136.238	37.107	9.222	36.050	2.023
0.750	0.750	16.692	154.346	41.758	9.247	40.700	2.080
0.800	0.800	18.844	176.061	46.409	9.343	45.350	2.158

$Q = B10a + B10b$

$= 15.77 + 9.15 = 24.92$ cfs

CLOUDBURST - 32F-F STD

MANNING'S N = 0.017 SLOPE = 0.026

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	41.2	0.7
2	8.4	0.7	6	25.0	0.4	10	41.6	0.7
3	8.8	0.7	7	39.0	0.1	11	50.0	0.9
4	9.0	0.0	8	41.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.046	1.645	1.174	2.484	0.071
0.100	0.100	0.156	0.291	3.290	1.864	4.048	0.154
0.150	0.150	0.366	0.777	6.318	2.125	6.996	0.220
0.200	0.200	0.795	1.911	11.423	2.403	12.021	0.290
0.250	0.250	1.476	4.188	16.527	2.838	17.047	0.375
0.300	0.300	2.408	7.913	21.631	3.287	22.072	0.468
0.350	0.350	3.591	13.377	26.735	3.725	27.098	0.566
0.400	0.400	5.026	20.847	31.839	4.148	32.123	0.668
0.450	0.450	6.631	32.350	32.943	4.878	33.148	0.820
0.500	0.500	8.243	46.395	33.046	5.628	33.174	0.993
0.550	0.550	9.857	62.366	33.149	6.327	33.199	1.173
0.600	0.600	11.471	80.140	33.252	6.986	33.224	1.359
0.650	0.650	13.087	99.619	33.355	7.612	33.250	1.551
0.700	0.700	14.774	113.556	37.107	7.686	36.050	1.619
0.750	0.750	16.692	128.648	41.758	7.707	40.700	1.674
0.800	0.800	18.844	146.748	46.409	7.788	45.350	1.743

AP9:

$Q = B9_a + B9_b =$

$11.08 + 7.99 = 19.07$ cfs

$d = 0.39$

@ 2.0%, $Q_{in} = 5.0$ cfs

@ 5.0%, $Q_{in} = 7.1$ cfs

so @ 2.6%, $Q_{in} = 5.42$ cfs

$Q_{res} = 8.23$ cfs

AP10:

$Q = B9_{res} + B10$

$= 8.23 + 26.2 = 34.4$ cfs

$d = 0.46$

@ 2.0%, $Q_{in} = 7.1$

@ 5.0%, $Q_{in} = 9.2$

so @ 2.6%, $Q_{in} = 7.52$ cfs

$Q_{res} = 19.36$

AP11:

$Q = B10_{res} + B11$

$= 19.36 + 5.35 = 24.71$

$d = 0.42$

@ 2.0%, $Q_{in} = 5.9$

@ 5.0%, $Q_{in} = 8.0$

so @ 2.6%, $Q_{in} = 6.32$ cfs

$Q_{res} = 17.97$ cfs

ARKANSAS - 32F-F STD

MANNING'S N = 0.017 SLOPE = 0.035

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	41.2	0.7
2	8.4	0.7	6	25.0	0.4	10	41.6	0.7
3	8.8	0.7	7	39.0	0.1	11	50.0	0.9
4	9.0	0.0	8	41.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.053	1.645	1.352	2.484	0.078
0.100	0.100	0.156	0.336	3.290	2.146	4.048	0.172
0.150	0.150	0.366	0.895	6.318	2.447	6.996	0.243
0.200	0.200	0.795	2.200	11.423	2.767	12.021	0.319
0.250	0.250	1.476	4.822	16.527	3.267	17.047	0.416
0.300	0.300	2.408	9.112	21.631	3.784	22.072	0.523
0.350	0.350	3.591	15.403	26.735	4.289	27.098	0.636
0.400	0.400	5.026	24.004	31.839	4.776	32.123	0.755
0.450	0.450	6.631	37.248	32.943	5.617	33.148	0.941
0.500	0.500	8.243	53.420	33.046	6.480	33.174	1.153
0.550	0.550	9.857	71.809	33.149	7.285	33.199	1.376
0.600	0.600	11.471	92.275	33.252	8.044	33.224	1.606
0.650	0.650	13.087	114.702	33.355	8.764	33.250	1.845
0.700	0.700	14.774	130.750	37.107	8.850	36.050	1.918
0.750	0.750	16.692	148.128	41.758	8.874	40.700	1.975
0.800	0.800	18.844	168.968	46.409	8.967	45.350	2.051

+P12

$Q = 1311_{res} + 1312$

$= 12.07 + 21.02 = 33.09$

$d = 0.44$

@ 2.0%, $Q_{in} = 6.4$

@ 5.0%, $Q_{in} = 8.6$

so @ 3.5%, $Q_{in} = 7.5$ cfs

$Q_{res} = 18.09$

$Q = 18.09$ cfs

$d = 0.37$

@ 2.0%, $Q_{in} = 7.5$

@ 3.0%, $Q_{in} = 6.7$

so @ 3.5%, $Q_{in} = 5.6$ cfs

$Q_{res} = 6.80$ cfs

BREEZY - 28F-F STD

MANNING'S N = 0.017 SLOPE = 0.016

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	37.2	0.7
2	8.4	0.7	6	23.0	0.4	10	37.6	0.7
3	8.8	0.7	7	35.0	0.1	11	46.0	0.9
4	9.0	0.0	8	37.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.036	1.645	0.914	2.484	0.063
0.100	0.100	0.156	0.227	3.290	1.451	4.048	0.133
0.150	0.150	0.366	0.605	6.318	1.654	6.996	0.193
0.200	0.200	0.795	1.488	11.423	1.871	12.021	0.254
0.250	0.250	1.476	3.260	16.527	2.209	17.047	0.326
0.300	0.300	2.408	6.161	21.631	2.559	22.072	0.402
0.350	0.350	3.591	10.414	26.735	2.900	27.098	0.481
0.400	0.400	4.981	17.078	28.839	3.429	29.123	0.583
0.450	0.450	6.391	25.819	28.942	4.040	29.148	0.704
0.500	0.500	7.803	35.925	29.045	4.604	29.174	0.830
0.550	0.550	9.217	47.299	29.148	5.132	29.199	0.960
0.600	0.600	10.631	59.866	29.251	5.631	29.224	1.093
0.650	0.650	12.047	73.563	29.354	6.106	29.250	1.230
0.700	0.700	13.534	82.422	33.106	6.090	32.050	1.277
0.750	0.750	15.252	92.155	37.757	6.042	36.700	1.318
0.800	0.800	17.204	104.238	42.408	6.059	41.350	1.371

Q = B13a = 4.91 ok

SUMMER BREEZE - 32F-F STD

MANNING'S N = 0.017 SLOPE = 0.035

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	41.2	0.7
2	8.4	0.7	6	25.0	0.4	10	41.6	0.7
3	8.8	0.7	7	39.0	0.1	11	50.0	0.9
4	9.0	0.0	8	41.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.053	1.645	1.352	2.484	0.078
0.100	0.100	0.156	0.336	3.290	2.146	4.048	0.172
0.150	0.150	0.366	0.895	6.318	2.447	6.996	0.243
0.200	0.200	0.795	2.200	11.423	2.767	12.021	0.319
0.250	0.250	1.476	4.822	16.527	3.267	17.047	0.416
0.300	0.300	2.408	9.112	21.631	3.784	22.072	0.523
0.350	0.350	3.591	15.403	26.735	4.289	27.098	0.636
0.400	0.400	5.026	24.004	31.839	4.776	32.123	0.755
0.450	0.450	6.631	37.248	32.943	5.617	33.148	0.941
0.500	0.500	8.243	53.420	33.046	6.480	33.174	1.153
0.550	0.550	9.857	71.809	33.149	7.285	33.199	1.376
0.600	0.600	11.471	92.275	33.252	8.044	33.224	1.606
0.650	0.650	13.087	114.702	33.355	8.764	33.250	1.845
0.700	0.700	14.774	130.750	37.107	8.850	36.050	1.918
0.750	0.750	16.692	148.128	41.758	8.874	40.700	1.975
0.800	0.800	18.844	168.968	46.409	8.967	45.350	2.051

Q = 22.7 cfs OK

SUMMER BREEZE - STD

MANNING'S N = 0.017 SLOPE = 0.045

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	41.2	0.7
2	8.4	0.7	6	25.0	0.4	10	41.6	0.7
3	8.8	0.7	7	39.0	0.1	11	50.0	0.9
4	9.0	0.0	8	41.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.060	1.645	1.533	2.484	0.087
0.100	0.100	0.156	0.381	3.290	2.433	4.048	0.192
0.150	0.150	0.366	1.015	6.318	2.775	6.996	0.270
0.200	0.200	0.795	2.495	11.423	3.138	12.021	0.353
0.250	0.250	1.476	5.468	16.527	3.705	17.047	0.463
0.300	0.300	2.408	10.332	21.631	4.291	22.072	0.586
0.350	0.350	3.591	17.465	26.735	4.863	27.098	0.718
0.400	0.400	5.026	27.217	31.839	5.416	32.123	0.856
0.450	0.450	6.631	42.236	32.943	6.369	33.148	1.081
0.500	0.500	8.243	60.573	33.046	7.348	33.174	1.340
0.550	0.550	9.857	81.424	33.149	8.261	33.199	1.611
0.600	0.600	11.471	104.630	33.252	9.121	33.224	1.894
0.650	0.650	13.087	130.060	33.355	9.938	33.250	2.186
0.700	0.700	14.774	148.256	37.107	10.035	36.050	2.266
0.750	0.750	16.692	167.961	41.758	10.062	40.700	2.325
0.800	0.800	18.844	191.592	46.409	10.168	45.350	2.408

P13

Q = B13 = 25.24

d = 0.39

@ 20%, Q_n = 5

@ 5.0%, Q_n = 7

so @ 4.5%, Q_n = 6.67 cfs

Q_{res} = 11.90

$Q = B13_{res} + B14d$

$= 11.90 + 6.62 = 18.52$ cfs ok

ZEPHYR - 32F-F STD

MANNING'S N = 0.017 SLOPE = 0.045

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	41.2	0.7
2	8.4	0.7	6	25.0	0.4	10	41.6	0.7
3	8.8	0.7	7	39.0	0.1	11	50.0	0.9
4	9.0	0.0	8	41.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.060	1.645	1.533	2.484	0.087
0.100	0.100	0.156	0.381	3.290	2.433	4.048	0.192
0.150	0.150	0.366	1.015	6.318	2.775	6.996	0.270
0.200	0.200	0.795	2.495	11.423	3.138	12.021	0.353
0.250	0.250	1.476	5.468	16.527	3.705	17.047	0.463
0.300	0.300	2.408	10.332	21.631	4.291	22.072	0.586
0.350	0.350	3.591	17.465	26.735	4.863	27.098	0.718
0.400	0.400	5.026	27.217	31.839	5.416	32.123	0.856
0.450	0.450	6.631	42.236	32.943	6.369	33.148	1.081
0.500	0.500	8.243	60.573	33.046	7.348	33.174	1.340
0.550	0.550	9.857	81.424	33.149	8.261	33.199	1.611
0.600	0.600	11.471	104.630	33.252	9.121	33.224	1.894
0.650	0.650	13.087	130.060	33.355	9.938	33.250	2.186
0.700	0.700	14.774	148.256	37.107	10.035	36.050	2.266
0.750	0.750	16.692	167.961	41.758	10.062	40.700	2.325
0.800	0.800	18.844	191.592	46.409	10.168	45.350	2.408

Q = B14a = 14.94 cfs <u>ok</u>

WARM WIND - 32F-F STD

MANNING'S N = 0.017 SLOPE = 0.040

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	41.2	0.7
2	8.4	0.7	6	25.0	0.4	10	41.6	0.7
3	8.8	0.7	7	39.0	0.1	11	50.0	0.9
4	9.0	0.0	8	41.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.057	1.645	1.445	2.484	0.082
0.100	0.100	0.156	0.359	3.290	2.294	4.048	0.182
0.150	0.150	0.366	0.957	6.318	2.616	6.996	0.256
0.200	0.200	0.795	2.352	11.423	2.958	12.021	0.336
0.250	0.250	1.476	5.155	16.527	3.493	17.047	0.440
0.300	0.300	2.408	9.741	21.631	4.045	22.072	0.555
0.350	0.350	3.591	16.466	26.735	4.585	27.098	0.677
0.400	0.400	5.026	25.661	31.839	5.106	32.123	0.806
0.450	0.450	6.631	39.820	32.943	6.005	33.148	1.011
0.500	0.500	8.243	57.109	33.046	6.928	33.174	1.247
0.550	0.550	9.857	76.767	33.149	7.788	33.199	1.493
0.600	0.600	11.471	98.646	33.252	8.599	33.224	1.750
0.650	0.650	13.087	122.622	33.355	9.370	33.250	2.015
0.700	0.700	14.774	139.777	37.107	9.461	36.050	2.092
0.750	0.750	16.692	158.355	41.758	9.487	40.700	2.150
0.800	0.800	18.844	180.635	46.409	9.586	45.350	2.229

Q = 1314b = 14.70 OK

SUMMER BREEZE - 32F-F STD

MANNING'S N = 0.017 SLOPE = 0.016

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	41.2	0.7
2	8.4	0.7	6	25.0	0.4	10	41.6	0.7
3	8.8	0.7	7	39.0	0.1	11	50.0	0.9
4	9.0	0.0	8	41.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.036	1.645	0.914	2.484	0.063
0.100	0.100	0.156	0.227	3.290	1.451	4.048	0.133
0.150	0.150	0.366	0.605	6.318	1.654	6.996	0.193
0.200	0.200	0.795	1.488	11.423	1.871	12.021	0.254
0.250	0.250	1.476	3.260	16.527	2.209	17.047	0.326
0.300	0.300	2.408	6.161	21.631	2.559	22.072	0.402
0.350	0.350	3.591	10.414	26.735	2.900	27.098	0.481
0.400	0.400	5.026	16.229	31.839	3.229	32.123	0.562
0.450	0.450	6.631	25.184	32.943	3.798	33.148	0.674
0.500	0.500	8.243	36.119	33.046	4.382	33.174	0.799
0.550	0.550	9.857	48.552	33.149	4.926	33.199	0.927
0.600	0.600	11.471	62.389	33.252	5.439	33.224	1.060
0.650	0.650	13.087	77.553	33.355	5.926	33.250	1.196
0.700	0.700	14.774	88.403	37.107	5.984	36.050	1.257
0.750	0.750	16.692	100.153	41.758	6.000	40.700	1.310
0.800	0.800	18.844	114.243	46.409	6.063	45.350	1.372

Q = Offsite IA = 29.76 cfs
d = 0.47

@ 0.2%, Q_{in} = 3.4
@ 2.0%, Q_{in} = 7.2
so @ 1.6%, Q_{in} = 6.36 cfs
Q_{res} = 17.05 cfs

Q = 17.05
d = 0.41

@ 0.2%, Q_{in} = 2.6
@ 2.0%, Q_{in} = 5.7
so @ 1.6%, Q_{in} = 5.01
Q_{res} = 7.03

Q = 17.37 + Off IA$_{res}$
= 17.37 + 7.03 = 24.4 cfs

SUMMER BREEZE - 32F-F STD

MANNING'S N = 0.017 SLOPE = 0.006

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	41.2	0.7
2	8.4	0.7	6	25.0	0.4	10	41.6	0.7
3	8.8	0.7	7	39.0	0.1	11	50.0	0.9
4	9.0	0.0	8	41.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.022	1.645	0.560	2.484	0.055
0.100	0.100	0.156	0.139	3.290	0.889	4.048	0.112
0.150	0.150	0.366	0.371	6.318	1.013	6.996	0.166
0.200	0.200	0.795	0.911	11.423	1.146	12.021	0.220
0.250	0.250	1.476	1.996	16.527	1.353	17.047	0.278
0.300	0.300	2.408	3.773	21.631	1.567	22.072	0.338
0.350	0.350	3.591	6.377	26.735	1.776	27.098	0.399
0.400	0.400	5.026	9.938	31.839	1.978	32.123	0.461
0.450	0.450	6.631	15.422	32.943	2.326	33.148	0.534
0.500	0.500	8.243	22.118	33.046	2.683	33.174	0.612
0.550	0.550	9.857	29.732	33.149	3.016	33.199	0.692
0.600	0.600	11.471	38.205	33.252	3.330	33.224	0.773
0.650	0.650	13.087	47.491	33.355	3.629	33.250	0.855
0.700	0.700	14.774	54.135	37.107	3.664	36.050	0.909
0.750	0.750	16.692	61.331	41.758	3.674	40.700	0.960
0.800	0.800	18.844	69.960	46.409	3.713	45.350	1.014

$Q = B14 + Off\ IA_{res}$

$= 36.53 + 7.03 = 43.56$ OK

$Q = B14 + offsite_{res} + B12_{res}$

$= 37.69 + 7.03 + 6.89 = 51.61$ OK

APPENDIX C

INLET ANALYSIS

DEVELOPED CONDITIONS FOR INLETS IN STORMCLOUD AT WESTLAND

AP	INLET	CONDITION	TYPE	CONTRIBUTING BASIN AND RESIDUAL INLET	FLOW TO INLET 100-YR	STREET DEPTH	GRATE CAP. (cfs)	RESIDUAL FLOW (cfs)
1	1	ON 1.8% GRADE	"A"	BASIN A1	23.10	0.53	8.34	14.76
	2	ON 1.8% GRADE	"A"	BASIN A1	23.10	0.53	8.34	14.76
2	3	ON 3.3% GRADE	"A"	BASIN A2	15.90	0.44	7.31	8.59
	4	ON 3.3% GRADE	"C"	BASIN A2	15.90	0.44	7.31	8.59
3	5	ON 2.8% GRADE	"A"	BASIN A3	16.20	0.44	6.99	9.21
	6	ON 2.8% GRADE	"A"	BASIN A3	16.20	0.44	6.99	9.21
4	7	ON 4.0% GRADE	"A"	BASIN A4	10.06	0.37	6.10	3.96
	8	ON 4.0% GRADE	"A"	BASIN A4	10.06	0.37	6.10	3.96
5	9	ON 1.6% GRADE	Double "A"	BASIN A5	17.67	0.50	8.52	9.15
	10	ON 1.6% GRADE	Double "A"	BASIN A5	17.67	0.50	8.52	9.15
	11	ON 1.6% GRADE	Double "C"	BASIN A5	9.15	0.41	5.62	3.53
	12	ON 1.6% GRADE	Double "C"	BASIN A5	9.15	0.41	5.62	3.53
6	13	ON 4.9% GRADE	Double "A"	BASIN A6	16.14	0.42	9.02	7.12
	14	ON 4.9% GRADE	Double "C"	BASIN A6	7.12	0.33	5.74	1.38
7	15	ON 3.5% GRADE	Double "A"	BASIN A7	15.65	0.44	8.70	6.95
8	16	INLET IN SUMP CONDITION; SEE NEXT PAGE FOR ANALYSIS						
9	17	ON 2.6% GRADE	"A"	BASIN B9	9.54	0.39	5.42	4.12
	18	ON 2.6% GRADE	"A"	BASIN B9	9.54	0.39	5.42	4.12
10	19	ON 2.6% GRADE	"A"	BASIN B10	17.20	0.46	7.52	9.68
	20	ON 2.6% GRADE	"C"	BASIN B10	17.20	0.46	7.52	9.68
11	21	ON 2.6% GRADE	"A"	BASIN B11	12.36	0.42	6.32	6.04
	22	ON 2.6% GRADE	"A"	BASIN B11	12.36	0.42	6.32	6.04
12	23	ON 3.5% GRADE	"A"	BASIN B12	16.55	0.44	7.50	9.05
	24	ON 3.5% GRADE	"A"	BASIN B12	16.55	0.44	7.50	9.05
	25	ON 3.5% GRADE	"C"	BASIN B12	9.05	0.37	5.60	3.45
	26	ON 3.5% GRADE	"C"	BASIN B12	9.05	0.37	5.60	3.45
13	27	ON 4.5% GRADE	"A"	BASIN B13	12.62	0.39	6.67	5.95
	28	ON 4.5% GRADE	"A"	BASIN B13	12.62	0.39	6.67	5.95
14	29	INLET IN SUMP CONDITION; SEE NEXT PAGE FOR ANALYSIS						

ANALYSIS OF AN INLET IN A SUMP CONDITION - **AP8 - Summer Breeze/Stormcloud Ave. Roundabout**

INLET TYPE: Double Grate Type "A" with curb opening wings on both sides on inlet.

WEIR: Q=C*L*H^1.5

Wing opening
C= 3.0
L= 4.0 ft
Q=3.0(4.0')H**1.5= 12.0H**1.5

Grate opeining
C=3.0
L(double grate)=[2(2.67')+2(1.8')]=8.94 ft
Q=3.0(8.94)H^1.5=26.82*H^1.5

ORIFICE: Q=C*A*(2*G*H)**0.5

Grate opening
C=0.6
A(double grate)=8.19 sf
Q=4.194*(64.4*H)^0.5

Wing opening
C=0.6
A=2.0 sf
Q=1.2*(64.4*H)^0.5

	WS ELEVATION	HEIGHT ABOVE INLET	Q (CFS) WEIR "A" OPENING	Q (CFS) WEIR DOUBLE GRATE	Q (CFS) ORIFICE DOUBLE GRATE	TOTAL Q (CFS)	COMMENTS:
~FL @ INLET	0.00	0.00	0.00	0.00	0.00	0.00	Flow at double "A" inlet w/ two wing openings
	0.10	0.10	0.38	0.85	12.47	1.61	Weir controls on grate analysis
	0.20	0.20	1.07	2.40	17.64	4.55	
	0.30	0.30	1.97	4.41	21.60	8.35	
	0.40	0.40	3.04	6.78	24.94	12.86	
	0.50	0.50	4.24	9.48	27.88	17.97	
	0.60	0.60	5.58	12.46	30.55	23.62	
TOP OF CURB	0.70	0.70	7.03	15.71	32.99	29.76	
	0.80	0.80	8.59	19.19	35.27	36.36	
	0.90	0.90	10.25	22.90	37.41	43.39	
ROW LIMIT	1.00	1.00	12.00	26.82	39.43	50.82	Q(100 yr) = 53.35 cfs is provided at this depth

NOTE: The total runoff intercepted by the inlet at the low point in the road is:
Qr(100) = 2*[(runoff of the wing opening) + (the lesser of the weir or orifice amount taken by the double grate)].
THE 100 YR STORM EVENT =53.35 cfs at the sump condition
THE 2 x 100 YR STORM EVENT = 106.65 cfs at the sump condition

ANALYSIS OF AN INLET IN A SUMP CONDITION - **AP14 - Summer Breeze/ Arkansas Dr.**

INLET TYPE: Double Grate Type "A" with curb opening wings on both sides on inlet.

WEIR: Q=C*L*H^1.5

Wing opening
C= 3.0
L= 4.0 ft
Q=3.0(4.0')H**1.5= 12.0H**1.5

Grate opeining
C=3.0
L(double grate)=[2(2.67')+2(1.8')]=8.94 ft
Q=3.0(8.94)H^1.5=26.82*H^1.5

ORIFICE: Q=C*A*(2*G*H)**0.5

Grate opening
C=0.6
A(double grate)=8.19 sf
Q=4.194*(64.4*H)^0.5

Wing opening
C=0.6
A=2.0 sf
Q=1.2*(64.4*H)^0.5

	WS ELEVATION	HEIGHT ABOVE INLET	Q (CFS) WEIR "A" OPENING	Q (CFS) WEIR DOUBLE GRATE	Q (CFS) ORIFICE DOUBLE GRATE	TOTAL Q (CFS)	COMMENTS:
~FL @ INLET	0.00	0.00	0.00	0.00	0.00	0.00	Flow at double "A" inlet w/ two wing openings
	0.10	0.10	0.38	0.85	12.47	1.61	Weir controls on grate analysis
	0.20	0.20	1.07	2.40	17.64	4.55	
	0.30	0.30	1.97	4.41	21.60	8.35	
	0.40	0.40	3.04	6.78	24.94	12.86	
	0.50	0.50	4.24	9.48	27.88	17.97	
	0.60	0.60	5.58	12.46	30.55	23.62	
TOP OF CURB	0.70	0.70	7.03	15.71	32.99	29.76	
	0.80	0.80	8.59	19.19	35.27	36.36	Q(100 yr) = 35.1 cfs is provided at this depth
	0.90	0.90	10.25	22.90	37.41	43.39	
ROW LIMIT	1.00	1.00	12.00	26.82	39.43	50.82	

NOTE: The total runoff intercepted by the inlet at the low point in the road is:
Qr(100) = 2*[(runoff of the wing opening) + (the lesser of the weir or orifice amount taken by the double grate)].
THE 100 YR STORM EVENT =35.1 cfs at the sump condition
THE 2 x 100 YR STORM EVENT = 70.2 cfs at the sump condition

APPENDIX D

STORM DRAIN ANALYSIS

STORM DRAIN ANALYSIS FOR STORMCLOUD AT WESTLAND

PIPE LOCATION	SIZE/TYPE	LENGTH (ft.)	SLOPE (%)	PROPOSED Q (100-YR, cfs)	PIPE CAPACITY (100-YR, CFS)
AP1	18" RCP	16.00	1.00	8.34	10.50
AP1 TO AP2	24" RCP	100.00	3.30	16.68	41.00
AP2	18" RCP	16.00	1.00	7.31	10.50
AP2 TO AP8	24" RCP	680.00	2.40	31.30	35.40
AP3	18" RCP	16.00	1.00	6.99	10.50
AP3 TO AP4	24" RCP	64.00	2.30	13.98	34.30
AP4	18" RCP	32.00	1.00	6.10	10.50
AP4 TO AP3	24" RCP	46.00	4.00	12.20	45.00
AP3/AP4 TO AP5	24" RCP	503.00	1.60	26.18	28.60
AP5	18" RCP	42.00	1.00	8.52	10.50
AP5	24" RCP	16.00	1.00	14.14	22.60
AP5 TO AP7	30" RCP	30.00	1.60	54.46	51.88
AP6	18" RCP	42.00	4.00	9.02	21.70
AP6 TO TRUNKLINE	24" RCP	36.00	4.00	14.76	45.20
AP7	18" RCP	46.00	3.50	8.70	19.50
AP7/AP5 TO TRUNKLINE	36" RCP	33.00	1.00	63.16	66.69
AP8 TO TRUNKLINE	48" RCP	46.00	1.00	138.30	143.00
AP9	18" RCP	16.00	1.00	5.42	10.50
AP9 TO AP10	24" RCP	96.00	2.64	10.84	36.30
AP10	18" RCP	16.00	1.00	7.52	10.50
AP10 TO AP11	24" RCP	362.00	2.64	25.88	36.30
AP11	18" RCP	16.00	1.00	6.32	10.50
AP11 TO AP12	30" RCP	360.00	2.50	38.52	64.80
AP12	18" RCP	16.00	1.00	7.50	10.50
AP12	18" RCP	16.00	1.00	5.60	10.50
AP12 TO AP14	36" RCP	106.00	1.00	64.72	66.70
AP13	18" RCP	16.00	1.00	6.67	10.50
AP 13 TO TRUNKLINE	24" RCP	170.00	4.50	13.34	47.98
AP14 TO TRUNKLINE	48" RCP	16.00	1.00	135.42	143.80

DAM #9 STORM DRAIN

Table A:

Struct_ID	D (in)	Q (cfs)	L (ft)	V (ft/s)	d (ft)	dc (ft)	V^2/2g (ft)	Sf (ft/ft)	Dn_Soffit (ft)	EGLdn (ft)	HGLdn (ft)	Tot_Loss (ft)	EGLup (ft)	HGLup (ft)	Rim_Elev. (ft)
Outfall	-	-	-	-	-	-	-	-	-	-	-	-	-	5276.00	-
SDP-1-0	84	666.89	88.23	17.33	-	-	4.67	0.0109	5275.88	5280.67	5276.00	0.96	5281.63	5276.96	-
SDMH-1-6	-	-	-	-	-	-	-	-	-	5281.63	5276.96	0.29	5281.91	5277.25	5277.91
SDP-1-5	84	666.89	4.00	17.33	-	-	4.67	0.0109	5276.09	5281.91	5277.25	0.04	5281.96	5277.29	-
Junction	-	-	-	-	-	-	-	-	-	5281.96	5277.29	-	5281.96	5277.29	-
SDP-1-6	84	666.89	4.00	17.33	-	-	4.67	0.0109	5276.09	5281.96	5277.29	0.04	5282.00	5277.33	-
Junction	-	-	-	-	-	-	-	-	-	5282.00	5277.33	0.41	5282.41	5277.74	-
SDP-1-7	84	666.89	4.00	17.33	-	-	4.67	0.0109	5276.10	5282.41	5277.74	0.04	5282.45	5277.79	-
Junction	-	-	-	-	-	-	-	-	-	5282.45	5277.79	0.00	5282.45	5277.79	-
SDP-1-8	84	666.89	210.88	17.33	-	-	4.67	0.0109	5276.11	5282.45	5277.79	2.30	5284.75	5280.08	-
SDMH-1-7	-	-	-	-	-	-	-	-	-	5284.75	5280.08	0.34	5285.09	5280.42	5285.17
SDP-1-9	84	666.89	4.00	17.33	-	-	4.67	0.0109	5276.63	5285.09	5280.42	0.04	5285.13	5280.47	-
Junction	-	-	-	-	-	-	-	-	-	5285.13	5280.47	0.00	5285.13	5280.47	-
SDP-1-10	84	666.89	4.00	17.33	-	-	4.67	0.0109	5276.63	5285.13	5280.47	0.04	5285.18	5280.51	-
Junction	-	-	-	-	-	-	-	-	-	5285.18	5280.51	0.00	5285.18	5280.51	-
SDP-1-11	84	666.89	4.00	17.33	-	-	4.67	0.0109	5276.64	5285.18	5280.51	0.04	5285.22	5280.56	-
Junction	-	-	-	-	-	-	-	-	-	5285.22	5280.56	3.57	5288.80	5284.13	-
SDP-1-12	72	666.89	361.85	23.59	-	-	8.65	0.0248	5275.79	5288.80	5284.13	9.39	5298.19	5289.54	-
SDMH-1-8	-	-	-	-	-	-	-	-	-	5298.19	5289.54	0.46	5298.65	5290.00	5297.60
SDP-1-13	72	666.89	4.00	23.59	-	-	8.65	0.0248	5289.21	5298.65	5290.00	0.10	5298.75	5290.10	-
Junction	-	-	-	-	-	-	-	-	-	5298.75	5290.10	0.01	5298.75	5290.11	-
SDP-1-14	72	666.89	4.00	23.59	-	-	8.65	0.0248	5289.35	5298.75	5290.11	0.10	5298.85	5290.21	-
Junction	-	-	-	-	-	-	-	-	-	5298.85	5290.21	0.00	5298.86	5290.21	-
SDP-1-15	72	666.89	1.08	23.59	-	-	8.65	0.0248	5289.50	5298.86	5290.21	0.03	5298.89	5290.24	-
Junction	-	-	-	-	-	-	-	-	-	5298.89	5290.24	2.54	5301.43	5292.78	-
SDP-1-22	72	528.59	6.92	18.70	-	-	5.43	0.0156	5289.54	5301.43	5292.78	0.11	5301.54	5296.10	-
Junction	-	-	-	-	-	-	-	-	-	5301.54	5296.10	0.01	5301.54	5296.11	-
SDP-1-23	72	528.59	4.00	18.70	-	-	5.43	0.0156	5289.80	5301.54	5296.11	0.06	5301.61	5296.17	-
Junction	-	-	-	-	-	-	-	-	-	5301.61	5296.17	0.00	5301.61	5296.18	-
SDP-1-24	72	528.59	152.58	18.70	-	-	5.43	0.0156	5289.95	5301.61	5296.18	2.49	5304.10	5298.66	-
Junction	-	-	-	-	-	-	-	-	-	5304.10	5298.66	0.00	5304.10	5298.66	-
SDP-1-25	72	528.59	12.74	18.70	-	-	5.43	0.0156	5295.68	5304.10	5298.66	0.20	5304.29	5298.86	-
SDMH-1-9	-	-	-	-	-	-	-	-	-	5304.29	5298.86	0.34	5304.64	5299.21	5302.68
SDP-1-26	72	528.59	4.00	18.70	-	-	5.43	0.0156	5296.15	5304.64	5299.21	0.06	5304.70	5299.27	-
Junction	-	-	-	-	-	-	-	-	-	5304.70	5299.27	-	5304.70	5299.27	-
SDP-1-27	72	528.59	4.00	18.70	-	-	5.43	0.0156	5296.19	5304.70	5299.27	0.06	5304.76	5299.33	-
Junction	-	-	-	-	-	-	-	-	-	5304.76	5299.33	0.19	5304.96	5299.52	-
SDP-1-28	72	528.59	4.00	18.70	-	-	5.43	0.0156	5296.34	5304.96	5299.52	0.06	5305.02	5299.59	-
Junction	-	-	-	-	-	-	-	-	-	5305.02	5299.59	0.00	5305.02	5299.59	-
SDP-1-29	72	528.59	90.06	18.70	-	-	5.43	0.0156	5296.49	5305.02	5299.59	1.40	5306.42	5300.99	-
SDMH-1-10	-	-	-	-	-	-	-	-	-	5306.42	5300.99	0.30	5306.73	5301.29	5306.27
SDP-1-30	72	528.59	4.00	18.70	-	-	5.43	0.0156	5299.86	5306.73	5301.29	0.06	5306.79	5301.36	-
Junction	-	-	-	-	-	-	-	-	-	5306.79	5301.36	-	5306.79	5301.36	-
SDP-1-31	72	528.59	4.00	18.70	-	-	5.43	0.0156	5299.90	5306.79	5301.36	0.06	5306.85	5301.42	-
Junction	-	-	-	-	-	-	-	-	-	5306.85	5301.42	0.26	5307.11	5301.67	-
SDP-1-32	72	528.59	4.00	18.70	-	-	5.43	0.0156	5300.05	5307.11	5301.67	0.06	5307.17	5301.74	-
Junction	-	-	-	-	-	-	-	-	-	5307.17	5301.74	0.00	5307.17	5301.74	-
SDP-1-33	72	528.59	160.77	18.70	-	-	5.43	0.0156	5300.20	5307.17	5301.74	2.50	5309.67	5304.24	-
SDMH-1-11	-	-	-	-	-	-	-	-	-	5309.67	5304.24	0.22	5309.89	5304.46	5312.34
(Alternate HGL and EGL Used)													5311.54	5306.10	
SDP-1-34	72	528.59	4.00	18.70	-	-	5.43	0.0156	5306.24	5311.54	5306.10	0.06	5311.60	5306.17	-
Junction	-	-	-	-	-	-	-	-	-	5311.60	5306.17	0.00	5311.60	5306.17	-
SDP-1-35	72	528.59	4.00	18.70	-	-	5.43	0.0156	5306.28	5311.60	5306.17	0.06	5311.66	5306.23	-
Junction	-	-	-	-	-	-	-	-	-	5311.66	5306.23	0.00	5311.66	5306.23	-

													5311.72	5306.29		
(Alternate HGL and EGL Used)																
SDP-1-36	72	528.59	0.50	18.70	-	-	5.43	0.0156	5306.43	5311.72	5306.29	0.01	5311.73	5306.30	-	
Junction	-	-	-	-	-	-	-	-	-	5311.73	5306.30	0.00	5311.73	5306.30	-	
													5311.74	5306.31		
(Alternate HGL and EGL Used)																
SDP-1-37	72	528.59	7.76	18.70	-	-	5.43	0.0156	5306.45	5311.74	5306.31	0.12	5311.86	5306.43	-	
Junction	-	-	-	-	-	-	-	-	-	5311.86	5306.43	0.00	5311.87	5306.44	-	
													5312.03	5306.60		
(Alternate HGL and EGL Used)																
SDP-1-38	72	528.59	0.50	18.70	-	-	5.43	0.0156	5306.74	5312.03	5306.60	0.01	5312.04	5306.61	-	
Junction	-	-	-	-	-	-	-	-	-	5312.04	5306.61	2.90	5314.94	5309.51	-	
SDP-1-41	72	465.43	7.51	16.46	-	-	4.21	0.0121	5306.76	5314.94	5309.51	0.09	5315.03	5310.82	-	
Junction	-	-	-	-	-	-	-	-	-	5315.03	5310.82	0.00	5315.03	5310.82	-	
SDP-1-43	72	465.43	151.84	16.46	-	-	4.21	0.0121	5307.04	5315.03	5310.82	1.83	5316.87	5312.65	-	
SDMH-1-15	-	-	-	-	-	-	-	-	-	5316.87	5312.65	0.22	5317.09	5312.88	5318.50	
SDP-1-45	72	465.43	4.00	16.46	-	-	4.21	0.0121	5312.20	5317.09	5312.88	0.05	5317.14	5312.92	-	
Junction	-	-	-	-	-	-	-	-	-	5317.14	5312.92	-	5317.14	5312.92	-	
SDP-1-48	72	465.43	4.00	16.46	-	-	4.21	0.0121	5312.23	5317.14	5312.92	0.05	5317.18	5312.97	-	
Junction	-	-	-	-	-	-	-	-	-	5317.18	5312.97	0.12	5317.30	5313.09	-	
SDP-1-50	72	465.43	4.00	16.46	-	-	4.21	0.0121	5312.37	5317.30	5313.09	0.05	5317.35	5313.14	-	
Junction	-	-	-	-	-	-	-	-	-	5317.35	5313.14	0.00	5317.35	5313.14	-	
SDP-1-53	72	465.43	161.05	28.82	-	-	12.91	0.0121	5312.51	5317.35	5313.14	-	5319.42	5315.21	-	
SDMH-1-17	-	-	-	-	-	-	-	-	-	5319.42	5315.21	-	5319.42	5315.21	5324.56	
SDP-1-54	72	465.43	4.00	28.82	3.33	5.58	12.91	-	5317.98	5328.22	5315.31	-	5328.26	5315.35	-	
Junction	-	-	-	28.82	-	-	12.91	-	-	-	-	-	5328.26	5315.35	-	
SDP-1-55	72	465.43	4.00	28.82	3.33	5.58	12.91	-	5318.01	5328.26	5315.35	-	5328.39	5315.48	-	
Junction	-	-	-	33.23	-	-	17.16	-	-	-	-	-	5332.29	5315.12	-	
SDP-1-58	72	465.43	3.04	33.23	2.98	5.58	17.16	-	5318.15	5332.29	5315.12	-	5332.44	5315.28	-	
Junction	-	-	-	32.96	-	-	16.88	-	-	-	-	-	5332.10	5315.22	-	
SDP-1-60	72	450.67	435.35	32.96	2.92	5.53	16.88	-	5318.30	5332.10	5315.22	-	5353.64	5336.76	-	
Junction	-	-	-	32.96	-	-	16.88	-	-	-	-	-	5353.64	5336.76	-	
SDP-1-61	72	450.67	4.00	32.96	2.92	5.53	16.88	-	5339.84	5353.64	5336.76	-	5353.84	5336.96	-	
Junction	-	-	-	32.44	-	-	16.36	-	-	-	-	-	5353.35	5336.99	-	
SDP-1-66	72	450.67	4.00	32.44	2.96	5.53	16.36	-	5340.04	5353.35	5336.99	-	5353.54	5337.18	-	
Junction	-	-	-	32.44	-	-	16.36	-	-	-	-	-	5353.54	5337.18	-	
SDP-1-67	72	450.67	4.00	32.44	2.96	5.53	16.36	-	5340.23	5353.54	5337.18	-	5353.59	5337.23	-	
SDMH-1-18	-	-	-	-	-	-	-	-	-	5353.59	5337.23	-	5353.59	5337.23	5346.28	
SDP-1-68	72	450.67	4.00	32.44	2.96	5.53	16.36	-	5340.37	5353.69	5337.33	-	5353.74	5337.38	-	
Junction	-	-	-	32.44	-	-	16.36	-	-	-	-	-	5353.74	5337.38	-	
SDP-1-69	72	450.67	1.37	32.44	2.96	5.53	16.36	-	5340.42	5353.74	5337.38	-	5353.80	5337.44	-	
Junction	-	-	-	30.19	-	-	14.17	-	-	-	-	-	5351.18	5337.01	-	
SDP-1-74	72	341.68	6.64	30.19	2.53	5.01	14.17	-	5340.49	5351.18	5337.01	-	5351.49	5337.33	-	
Junction	-	-	-	30.19	-	-	14.17	-	-	-	-	-	5351.49	5337.33	-	
SDP-1-75	72	341.68	4.22	30.19	2.53	5.01	14.17	-	5340.80	5351.49	5337.33	-	5351.69	5337.53	-	
Junction	-	-	-	30.26	-	-	14.23	-	-	-	-	-	5351.87	5337.64	-	
SDP-1-76	66	341.68	93.07	30.26	2.64	4.98	14.23	-	5340.50	5351.87	5337.64	-	5356.15	5341.91	-	
SDMH-1-21	-	-	-	-	-	-	-	-	-	5356.15	5341.91	-	5356.15	5341.91	5351.11	
SDP-1-77	66	341.68	4.00	30.26	2.64	4.98	14.23	-	5344.87	5356.25	5342.01	-	5356.29	5342.06	-	
Junction	-	-	-	30.26	-	-	14.23	-	-	-	-	-	5356.29	5342.06	-	
SDP-1-78	66	341.68	4.00	30.26	2.64	4.98	14.23	-	5344.92	5356.29	5342.06	-	5356.48	5342.25	-	
Junction	-	-	-	17.50	-	-	4.76	-	-	-	-	-	5348.58	5343.82	-	
SDP-1-79	66	341.68	4.00	17.50	4.21	4.98	4.76	-	5345.11	5348.58	5343.82	-	5348.63	5343.87	-	
Junction	-	-	-	17.49	-	-	4.76	-	-	-	-	-	5348.63	5343.87	-	
SDP-1-80	66	341.68	254.07	17.49	4.21	4.98	4.76	-	5345.16	5348.63	5343.87	-	5351.64	5346.88	-	
Junction	-	-	-	17.50	-	-	4.76	-	-	-	-	-	5351.64	5346.88	-	
SDP-1-81	66	341.68	30.27	17.50	4.21	4.98	4.76	-	5348.17	5351.64	5346.88	-	5351.97	5347.21	-	
SDMH-1-22	-	-	-	-	-	-	-	-	-	5351.97	5347.21	-	5351.97	5347.21	5354.77	
SDP-1-82	66	341.68	4.00	18.07	4.08	4.98	5.07	-	5348.50	5352.15	5347.08	-	5352.16	5347.09	-	
Junction	-	-	-	18.07	-	-	5.07	-	-	-	-	-	5352.16	5347.09	-	
SDP-1-83	66	341.68	4.00	18.07	4.08	4.98	5.07	-	5348.51	5352.16	5347.09	-	5352.22	5347.14	-	
Junction	-	-	-	18.07	-	-	5.07	-	-	-	-	-	5352.22	5347.14	-	
SDP-1-84	66	341.68	4.00	18.07	4.08	4.98	5.07	-	5348.56	5352.22	5347.14	-	5352.27	5347.19	-	

Junction	-	-	-	18.07	-	-	5.07	-	-	-	-	-	5352.27	5347.19	-
SDP-1-85	66	341.68	188.23	18.07	4.08	4.98	5.07	-	5348.61	5352.27	5347.19	-	5354.63	5349.56	-
SDMH-1-23	-	-	-	-	-	-	-	-	-	5354.63	5349.56	-	5354.63	5349.56	5356.89
SDP-1-86	66	341.68	4.00	18.07	4.08	4.98	5.07	-	5351.08	5354.73	5349.66	-	5354.74	5349.67	-
Junction	-	-	-	18.07	-	-	5.07	-	-	-	-	-	5354.74	5349.67	-
SDP-1-87	66	341.68	4.00	18.07	4.08	4.98	5.07	-	5351.09	5354.74	5349.67	-	5354.79	5349.72	-
Junction	-	-	-	27.80	-	-	12.01	-	-	-	-	-	5360.47	5348.46	-
SDP-1-88	66	341.68	4.00	27.80	2.82	4.98	12.01	-	5351.14	5360.47	5348.46	-	5360.62	5348.61	-
Junction	-	-	-	27.80	-	-	12.01	-	-	-	-	-	5360.62	5348.61	-
SDP-1-89	66	341.68	82.07	27.80	2.82	4.98	12.01	-	5351.29	5360.62	5348.61	-	5363.61	5351.60	-
SDMH-1-24	-	-	-	-	-	-	-	-	-	5363.61	5351.60	-	5363.61	5351.60	5359.80
SDP-1-90	66	341.68	4.00	27.80	2.82	4.98	12.01	-	5354.38	5363.71	5351.70	-	5363.75	5351.74	-
Junction	-	-	-	27.80	-	-	12.01	-	-	-	-	-	5363.75	5351.74	-
SDP-1-91	66	341.68	4.00	27.80	2.82	4.98	12.01	-	5354.42	5363.75	5351.74	-	5363.90	5351.89	-
Junction	-	-	-	33.68	-	-	17.63	-	-	-	-	-	5369.13	5351.50	-
SDP-1-92	66	341.68	4.01	33.68	2.43	4.98	17.63	-	5354.57	5369.13	5351.50	-	5369.38	5351.76	-
Junction	-	-	-	33.68	-	-	17.63	-	-	-	-	-	5369.38	5351.76	-
SDP-1-93	66	341.68	121.06	33.68	2.43	4.98	17.63	-	5354.82	5369.38	5351.76	-	5376.84	5359.22	-
SDMH-1-25	-	-	-	-	-	-	-	-	-	5376.84	5359.22	-	5376.84	5359.22	5366.75
SDP-1-94	66	341.68	4.01	33.68	2.43	4.98	17.63	-	5362.38	5376.94	5359.32	-	5377.01	5359.38	-
Junction	-	-	-	33.68	-	-	17.63	-	-	-	-	-	5377.01	5359.38	-
SDP-1-95	66	341.68	4.01	33.68	2.43	4.98	17.63	-	5362.45	5377.01	5359.38	-	5377.26	5359.63	-
Junction	-	-	-	14.38	-	-	3.21	-	-	-	-	-	5365.91	5362.70	-
SDP-1-96	66	341.68	4.00	14.38	-	-	3.21	0.0104	5362.70	5365.91	5362.70	0.04	5365.96	5362.74	-
Junction	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
(Alternate HGL and EGL Used)													5366.93	5362.22	
SDP-1-101	60	341.68	4.00	17.40	-	-	4.71	0.0172	5362.22	5366.93	5362.22	0.07	5366.99	5362.29	-
Junction	-	-	-	-	-	-	-	-	-	5366.99	5362.29	0.00	5366.99	5362.29	-
SDP-1-150	60	341.68	132.05	17.40	-	-	4.71	0.0172	5362.24	5366.99	5362.29	2.27	5369.27	5364.56	-
SDMH-1-33	-	-	-	-	-	-	-	-	-	5369.27	5364.56	0.49	5369.76	5365.05	5366.78
SDP-1-151	60	327.53	70.13	16.68	-	-	4.32	0.0158	5362.96	5369.76	5365.05	1.11	5370.87	5366.54	-
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	5298.89	5290.24	-
SDP-1-21	36	138.30	8.00	19.57	-	-	5.95	0.0430	5288.50	5298.89	5290.24	0.34	5299.23	5293.28	-
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	5312.04	5306.61	-
SDP-1-39	36	63.16	8.01	8.94	-	-	1.24	0.0090	5305.26	5312.04	5306.61	0.07	5312.11	5310.87	-
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	-	5313.99	-
dummy	24	14.76	19.36	11.59	0.85	1.38	2.09	-	5314.30	5315.23	5313.15	-	5315.82	5313.73	-
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	5352.09	5339.06	-
SDP-1-70	48	108.99	24.93	8.67	-	-	1.17	0.0058	5339.49	5352.09	5339.06	0.14	5352.24	5351.07	-
SDMH-1-19	-	-	-	-	-	-	-	-	-	5352.24	5351.07	1.11	5353.35	5352.18	
5346.87*** Surcharged ***															
SDP-1-71	48	108.99	62.25	8.67	-	-	1.17	0.0058	5341.63	5353.35	5352.18	0.36	5353.70	5352.54	-
SDMH-1-20	-	-	-	-	-	-	-	-	-	5353.70	5352.54	0.62	5354.33	5353.16	
5347.55*** Surcharged ***															
SDP-1-72	48	108.99	207.47	8.67	-	-	1.17	0.0058	5341.99	5354.33	5353.16	1.19	5355.52	5354.35	-
Junction	-	-	-	-	-	-	-	-	-	5355.52	5354.35	0.00	5355.52	5354.35	-
SDP-1-73	48	108.99	198.59	8.67	-	-	1.17	0.0058	5344.52	5355.52	5354.35	1.14	5356.67	5355.50	-
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	5369.27	5364.56	-
SDMH-1-33	-	-	-	-	-	-	-	-	-	5369.27	5364.56	0.13	5369.40	5364.69	5366.78
SDP-1-152	24	14.15	132.52	4.50	-	-	0.32	0.0039	5360.15	5369.40	5364.69	0.52	5369.92	5369.60	-

D.4

DAM #~~10~~ 11 STORM DRAIN

Table A:

Struct_ID	D (in)	Q (cfs)	L (ft)	V (ft/s)	d (ft)	dc (ft)	V^2/2g (ft)	Sf (ft/ft)	Dn_Soffit (ft)	EGLdn (ft)	HGLdn (ft)	Tot_Loss (ft)	EGLup (ft)	HGLup (ft)	Rim_Elev. (ft)
Outfall	-	-	-	-	-	-	-	-	-	-	-	-	-	5234.70	-
SDP-3-0	78	550.98	194.19	16.60	-	-	4.28	0.0110	5230.59	5238.98	5234.70	2.14	5241.13	5236.84	-
SDMH-3-2	-	-	-	-	-	-	-	-	-	5241.13	5236.84	0.38	5241.51	5237.23	5240.65
SDP-3-17	84	550.98	4.00	14.32	-	-	3.19	0.0074	5231.75	5241.51	5237.23	0.03	5241.54	5238.36	-
Junction	-	-	-	-	-	-	-	-	-	5241.54	5238.36	0.00	5241.54	5238.36	-
SDP-3-18	84	550.98	4.00	14.32	-	-	3.19	0.0074	5231.75	5241.54	5238.36	0.03	5241.57	5238.39	-
Junction	-	-	-	-	-	-	-	-	-	5241.57	5238.39	0.00	5241.57	5238.39	-
SDP-3-19	84	550.98	233.29	14.32	-	-	3.19	0.0074	5231.80	5241.57	5238.39	1.74	5243.31	5240.12	-
Junction	-	-	-	-	-	-	-	-	-	5243.31	5240.12	0.00	5243.31	5240.12	-
SDP-3-20	84	550.98	4.00	14.32	-	-	3.19	0.0074	5234.56	5243.31	5240.12	0.03	5243.34	5240.15	-
Junction	-	-	-	-	-	-	-	-	-	5243.34	5240.15	0.67	5244.00	5240.82	-
SDP-3-21	84	550.98	4.00	14.32	-	-	3.19	0.0074	5234.60	5244.00	5240.82	0.03	5244.03	5240.85	-
Junction	-	-	-	-	-	-	-	-	-	5244.03	5240.85	0.00	5244.03	5240.85	-
SDP-3-22	84	550.98	286.41	14.32	-	-	3.19	0.0074	5234.65	5244.03	5240.85	2.13	5246.16	5242.98	-
SDMH-3-3	-	-	-	-	-	-	-	-	-	5246.16	5242.98	0.25	5246.42	5243.23	5251.48
SDP-3-23	84	550.98	4.00	14.32	-	-	3.19	0.0074	5237.99	5246.42	5243.23	0.03	5246.45	5243.26	-
Junction	-	-	-	-	-	-	-	-	-	5246.45	5243.26	0.00	5246.45	5243.26	-
SDP-3-24	84	550.98	4.00	14.32	-	-	3.19	0.0074	5237.99	5246.45	5243.26	0.03	5246.48	5243.29	-
Junction	-	-	-	-	-	-	-	-	-	5246.48	5243.29	0.26	5246.74	5243.55	-
SDP-3-25	84	550.98	4.00	14.32	-	-	3.19	0.0074	5238.04	5246.74	5243.55	0.03	5246.77	5243.58	-
Junction	-	-	-	-	-	-	-	-	-	5246.77	5243.58	0.00	5246.77	5243.58	-
SDP-3-26	84	550.98	484.65	14.32	-	-	3.19	0.0074	5238.09	5246.77	5243.58	3.61	5250.37	5247.19	-
Junction	-	-	-	-	-	-	-	-	-	5250.37	5247.19	0.00	5250.37	5247.19	-
SDP-3-27	84	550.98	4.00	14.32	-	-	3.19	0.0074	5243.82	5250.37	5247.19	0.03	5250.40	5247.22	-
SDMH-3-4	-	-	-	-	-	-	-	-	-	5250.40	5247.22	0.23	5250.63	5247.45	5258.56
SDP-3-28	84	550.98	4.00	14.32	-	-	3.19	0.0074	5243.82	5250.63	5247.45	0.03	5250.66	5247.48	-
Junction	-	-	-	-	-	-	-	-	-	5250.66	5247.48	0.00	5250.66	5247.48	-
SDP-3-31	84	550.98	0.50	14.32	-	-	3.19	0.0074	5243.82	5250.66	5247.48	0.00	5250.67	5247.48	-
Junction	-	-	-	-	-	-	-	-	-	5250.67	5247.48	0.62	5251.28	5248.10	-
SDP-3-33	84	520.40	3.50	13.52	-	-	2.84	0.0066	5243.82	5251.28	5248.10	0.02	5251.31	5248.47	-
Junction	-	-	-	-	-	-	-	-	-	5251.31	5248.47	0.00	5251.31	5248.47	-
SDP-3-34	84	520.40	3.99	13.52	-	-	2.84	0.0066	5243.87	5251.31	5248.47	0.03	5251.33	5248.49	-
Junction	-	-	-	-	-	-	-	-	-	5251.33	5248.49	0.00	5251.34	5248.49	-
SDP-3-35	84	520.40	4.01	13.52	-	-	2.84	0.0066	5243.91	5251.34	5248.49	0.03	5251.36	5248.52	-
Junction	-	-	-	-	-	-	-	-	-	5251.36	5248.52	0.67	5252.03	5249.19	-
SDP-3-36	84	520.40	4.00	13.52	-	-	2.84	0.0066	5243.96	5252.03	5249.19	0.03	5252.05	5249.21	-
Junction	-	-	-	-	-	-	-	-	-	5252.05	5249.21	0.00	5252.05	5249.21	-
SDP-3-37	84	520.40	127.66	13.52	-	-	2.84	0.0066	5244.01	5252.05	5249.21	0.85	5252.90	5250.06	-
SDMH-3-5	-	-	-	-	-	-	-	-	-	5252.90	5250.06	0.08	5252.98	5250.14	5253.56
SDP-3-38	84	520.40	4.00	13.52	-	-	2.84	0.0066	5245.50	5252.98	5250.14	0.03	5253.01	5250.17	-
Junction	-	-	-	-	-	-	-	-	-	5253.01	5250.17	0.00	5253.01	5250.17	-
SDP-3-39	84	520.40	1.08	13.52	-	-	2.84	0.0066	5245.53	5253.01	5250.17	0.01	5253.02	5250.18	-
Junction	-	-	-	-	-	-	-	-	-	5253.02	5250.18	0.65	5253.67	5250.83	-
SDP-3-41	84	459.40	6.92	11.94	-	-	2.21	0.0052	5245.54	5253.67	5250.83	0.04	5253.71	5251.49	-
Junction	-	-	-	-	-	-	-	-	-	5253.71	5251.49	0.00	5253.71	5251.49	-
SDP-3-42	84	459.40	4.00	11.94	-	-	2.21	0.0052	5245.62	5253.71	5251.49	0.02	5253.73	5251.51	-
Junction	-	-	-	-	-	-	-	-	-	5253.73	5251.51	0.23	5253.95	5251.74	-
SDP-3-43	84	459.40	4.00	11.94	-	-	2.21	0.0052	5245.67	5253.95	5251.74	0.02	5253.97	5251.76	-
Junction	-	-	-	-	-	-	-	-	-	5253.97	5251.76	0.00	5253.97	5251.76	-
SDP-3-44	84	459.40	105.73	11.94	-	-	2.21	0.0052	5245.72	5253.97	5251.76	0.55	5254.52	5252.31	-
Junction	-	-	-	-	-	-	-	-	-	5254.52	5252.31	0.37	5254.89	5252.67	-
SDP-3-45	72	459.40	170.73	16.25	-	-	4.10	0.0118	5245.97	5254.89	5252.67	2.08	5256.97	5252.86	-
SDMH-3-9	-	-	-	-	-	-	-	-	-	5256.97	5252.86	0.10	5257.07	5252.96	5255.22
SDP-3-46	72	459.40	4.00	16.25	-	-	4.10	0.0118	5247.99	5257.07	5252.96	0.05	5257.11	5253.01	-
Junction	-	-	-	-	-	-	-	-	-	5257.11	5253.01	0.00	5257.12	5253.01	-

D.5

SDP-3-47	72	459.40	4.00	16.25	-	-	4.10	0.0118	5248.00	5257.12	5253.01	0.05	5257.16	5253.06	-	
Junction	-	-	-	-	-	-	-	-	-	5257.16	5253.06	0.00	5257.17	5253.06	-	
SDP-3-48	72	459.40	4.00	16.25	-	-	4.10	0.0118	5248.05	5257.17	5253.06	0.05	5257.21	5253.11	-	
Junction	-	-	-	-	-	-	-	-	-	5257.21	5253.11	0.00	5257.22	5253.11	-	
SDP-3-50	72	459.40	4.00	16.25	-	-	4.10	0.0118	5248.10	5257.22	5253.11	0.05	5257.26	5253.16	-	
Junction	-	-	-	-	-	-	-	-	-	5257.26	5253.16	0.00	5257.26	5253.16	-	
SDP-3-51	72	459.40	238.12	16.25	-	-	4.10	0.0118	5248.15	5257.26	5253.16	2.90	5260.16	5256.06	-	
SDMH-3-11	-	-	-	-	-	-	-	-	-	5260.16	5256.06	0.30	5260.46	5256.36	5257.51	✓
SDP-3-52	72	459.40	4.00	16.25	-	-	4.10	0.0118	5251.07	5260.46	5256.36	0.05	5260.51	5256.41	-	
Junction	-	-	-	-	-	-	-	-	-	5260.51	5256.41	0.00	5260.51	5256.41	-	
SDP-3-53	72	459.40	4.96	16.25	-	-	4.10	0.0118	5251.09	5260.51	5256.41	0.06	5260.57	5256.47	-	
Junction	-	-	-	-	-	-	-	-	-	5260.57	5256.47	1.66	5262.23	5258.13	-	
SDP-3-73	66	429.64	7.98	18.08	-	-	5.08	0.0164	5250.65	5262.23	5258.13	0.13	5262.36	5257.28	-	
Junction	-	-	-	-	-	-	-	-	-	5262.36	5257.28	0.00	5262.36	5257.28	-	
SDP-3-74	66	429.64	8.78	18.08	-	-	5.08	0.0164	5250.75	5262.36	5257.28	0.14	5262.51	5257.42	-	
Junction	-	-	-	-	-	-	-	-	-	5262.51	5257.42	0.00	5262.51	5257.42	-	
SDP-3-75	66	429.64	4.00	18.08	-	-	5.08	0.0164	5250.86	5262.51	5257.42	0.07	5262.57	5257.49	-	
Junction	-	-	-	-	-	-	-	-	-	5262.57	5257.49	0.41	5262.98	5257.90	-	
SDP-3-76	66	429.64	4.00	18.08	-	-	5.08	0.0164	5250.91	5262.98	5257.90	0.07	5263.04	5257.96	-	
Junction	-	-	-	-	-	-	-	-	-	5263.04	5257.96	0.00	5263.04	5257.96	-	
SDP-3-77	66	429.64	4.00	18.08	-	-	5.08	0.0164	5251.09	5263.04	5257.96	0.07	5263.11	5258.03	-	
SDMH-3-12	-	-	-	-	-	-	-	-	-	5263.11	5258.03	0.45	5263.56	5258.48		
5258.13*** Surcharged ***																
SDP-3-80	66	429.64	279.76	18.08	-	-	5.08	0.0164	5251.14	5263.56	5258.48	4.58	5268.14	5263.06	-	
SDMH-3-16	-	-	-	-	-	-	-	-	-	5268.14	5263.06	-	5268.14	5263.06	5270.59	✓
(Alternate HGL and EGL Used)													5268.91	5263.83		
SDP-3-84	66	429.64	48.70	18.08	-	-	5.08	0.0164	5263.95	5268.91	5263.83	0.80	5269.70	5264.62	-	
Junction	-	-	-	-	-	-	-	-	-	5269.70	5264.62	0.00	5269.70	5264.62	-	
(Alternate HGL and EGL Used)													5271.03	5265.95		
SDP-3-85	66	429.64	183.47	31.76	-	-	15.68	0.0164	5266.07	5271.03	5265.95	-	5277.21	5272.13	-	
Junction	-	-	-	31.76	-	-	15.68	-	-	-	-	-	5287.81	5272.13	-	
SDP-3-86	66	429.64	58.27	31.76	3.05	5.26	15.68	-	5274.58	5287.81	5272.13	-	5290.38	5274.70	-	
SDMH-3-17	-	-	-	-	-	-	-	-	-	5290.38	5274.70	-	5290.38	5274.70	5283.66	✓
SDP-3-87	66	429.64	4.00	31.76	3.05	5.26	15.68	-	5277.20	5290.43	5274.75	-	5290.48	5274.80	-	
Junction	-	-	-	31.76	-	-	15.68	-	-	-	-	-	5290.48	5274.80	-	
SDP-3-88	66	429.64	4.00	31.76	3.05	5.26	15.68	-	5277.25	5290.48	5274.80	-	5290.66	5274.98	-	
Junction	-	-	-	36.68	-	-	20.91	-	-	-	-	-	5295.56	5274.65	-	
SDP-3-89	66	429.64	4.01	36.68	2.72	5.26	20.91	-	5277.43	5295.56	5274.65	-	5295.83	5274.92	-	
Junction	-	-	-	36.68	-	-	20.91	-	-	-	-	-	5295.83	5274.92	-	
SDP-3-90	66	429.64	112.35	36.68	2.72	5.26	20.91	-	5277.70	5295.83	5274.92	-	5303.46	5282.55	-	
Junction	-	-	-	36.68	-	-	20.91	-	-	-	-	-	5303.46	5282.55	-	
SDP-3-91	66	429.64	4.01	36.68	2.72	5.26	20.91	-	5285.33	5303.46	5282.55	-	5303.73	5282.82	-	
Junction	-	-	-	18.08	-	-	5.08	-	-	-	-	-	5290.69	5285.60	-	
SDP-3-92	66	429.64	4.00	18.08	-	-	5.08	0.0164	5285.60	5290.69	5285.60	0.07	5290.75	5285.67	-	
Junction	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
(Alternate HGL and EGL Used)													5290.71	5285.62		
SDP-3-93	66	429.64	102.58	18.08	-	-	5.08	0.0164	5285.62	5290.71	5285.62	1.68	5292.38	5287.30	-	
SDMH-3-18	-	-	-	-	-	-	-	-	-	5292.38	5287.30	0.71	5293.10	5288.01	5290.25	✓
SDP-3-106	66	374.70✓	63.46	15.77	-	-	3.87	0.0125	5286.41	5293.10	5288.01	0.79	5293.89	5290.02	-	
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	5250.67	5247.48	-	
SDP-3-32	36	30.58	8.00	4.33	-	-	0.29	0.0021	5241.57	5250.67	5247.48	0.02	5250.68	5250.39	-	
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	5253.02	5250.18	-	
SDP-3-40	36	61.00	8.00	8.63	-	-	1.16	0.0084	5243.54	5253.02	5250.18	0.07	5253.08	5251.93	-	
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	5260.57	5256.47	-	
SDP-3-54	72	29.76	9.05	1.05	-	-	0.02	0.0000	5251.15	5260.57	5256.47	0.00	5260.57	5260.55	-	
Junction	-	-	-	-	-	-	-	-	-	5260.57	5260.55	0.15	5260.72	5260.71	-	
SDP-3-70	36	29.76	8.00	4.21	-	-	0.28	0.0020	5248.42	5260.72	5260.71	0.02	5260.74	5260.46	-	

New Branch	-	-	-	-	-	-	-	-	-	-	-	-	5292.38	5285.62	-
SDMH-3-18	-	-	-	-	-	-	-	-	-	5292.38	5285.62	0.43	5292.82	5287.73	5290.25
SDP-3-107	36	54.94	115.20	7.77	-	-	0.94	0.0068	5284.15	5292.82	5287.73	0.78	5293.60	5292.66	-

ıalyzer Report

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:ainage Structure Analyzer

Culvert Hydraulic Analysis

ate: Thursday, May 26, 2005 6:20:55 PM

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'nput Data

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hape	Circular
Material	RC C76-A
Roughness	0.013000
ntrance Edge	Square edge w/ headwall
umber of Barrels	1
ıength	66.1300 ft
Slope	0.5000%
'ailwater	4.0000 ft
nlet Control Equation	Entrance Loss
ɔize (W x T):	60.00 x 5.0000
Flow Rate	150.0000 cfs

CS1

HW: 5.67'

)utput Results

Flow Rate	150.0000 cfs
:ontrol	Inlet
:apacity	184.1607 cfs
ſanning's Velocity	10.4506 ft/s
Headwater	5.6718 ft
:ritical Depth	3.5100 ft
Jormal Depth	3.4280 ft
ɜize (W x T):	60.00 x 5.0000

ıalyzer Report

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:ainage Structure Analyzer

Culvert Hydraulic Analysis

ıte: Tuesday, May 24, 2005 12:47:12 PM

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CS2

HW: 2.98'

Input Data

ıape	Circular
..aterial	RC C76-A
Roughness	0.013000
ıtrance Edge	Groove end projecting
ımber of Barrels	1
ength	198.0000 ft
Slope	2.4800%
ailwater	5.0000 ft
nlet Control Equation	Entrance Loss
ize (W x T):	48.00 x 4.0000
Flow Rate	50.0000 cfs

ıutput Results

Flow Rate	50.0000 cfs
Control	Inlet
:apacity	226.2097 cfs
Ianning's Velocity	14.4542 ft/s
Headwater	2.9812 ft
Critical Depth	2.1200 ft
Jormal Depth	1.2770 ft
Size (W x T):	48.00 x 4.0000

ıalyzer Report

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ɾainage Structure Analyzer

Culvert Hydraulic Analysis

ate: Thursday, May 26, 2005 6:24:07 PM

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Input Data

CS 3

HW: 5.36'

ıape	Circular
..aterial	RC C76-A
Roughness	0.013000
ntrance Edge	Square edge w/ headwall
umber of Barrels	1
ength	63.0000 ft
Slope	0.5000%
ailwater	4.0000 ft
nlet Control Equation	Entrance Loss
ize (W x T):	66.00 x 5.5000
Flow Rate	155.0000 cfs

ıutput Results

Flow Rate	155.0000 cfs
Control	Inlet
Capacity	237.4529 cfs
Manning's Velocity	10.6497 ft/s
Headwater	5.3602 ft
Critical Depth	3.4700 ft
Normal Depth	3.2380 ft
Size (W x T):	66.00 x 5.5000

APPENDIX E

AHYMO OUTPUT

```
AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) -                          - VERSION:  1997.02c      RUN DATE (MON/DAY/YR) =06/14/2005
 INPUT FILE = SUN42.HYM                                                                      USER NO.= AHYMO-S-9702c1BohanHu-AH
                                                                                                                          PAGE =   1
                                FROM  TO                    PEAK        RUNOFF                TIME TO   CFS
                   HYDROGRAPH   ID    ID        AREA     DISCHARGE     VOLUME      RUNOFF      PEAK     PER
 COMMAND         IDENTIFICATION  NO.  NO.     (SQ MI)      (CFS)      (AC-FT)    (INCHES)   (HOURS)   ACRE      NOTATION

 *S*                 PROJECT NAME:  SUNDORO, ALBUQUERQUE, NM
 *S*                 JOB NO. 050316
 *S*                 DATE: JUNE 2005
 *S*
 *S*                 INPUT FILE NAME: SUN42.HYM
 *S*                 OUTPUT FILE NAME:  SUN42.OUT
 *S*                 ION: P:\050316\WR\STUDY\PROGRAMS\AHYMO\SUNDORO\DevelopedCond
 *S*     COMMENTS:
 *S*
 *S*                 NALYSIS FOR FLOWS FROM PROPOSED STRUTURES 1,2,AND 3, FOR THE
 *S*                 OPMENT SITE.  THIS MODEL WAS MODIFIED FROM THE WEST I-40 DMP
 *S*                 MODEL BELOW.  SEE HAND CALCS FOR BASINS MODIFIED.
 *S*
 *S*                 ACRE WERE USED IN THE DEVELOPED CONDITIONS.  SEE HAND CALCS.
 *S*
 *S*                 ITIONS WERE ASSUMED TO BE THE SAME AS IN THE I-40 DMP MODEL.
 *S*
 *S*                 RE ASSUMED NOT TO CHANGE FOR THE EXISTING DELINEATED BASINS.
 *S*                 TP = 0.133 hours as a min.
 *S*
 *S*
 *S*     THIS MODEL PRIMARILY COMPUTED THE RESULTING WSEL OF DAMS#9, 10 AND 11.
 *S*     THE MODEL ASSUMED THAT THE SUNDORO SUBD. DRAINED TO DAMS#9 AND #11.
 *S*     THE STORAGE OF DAMS #9 AND 10 WERE INCREASED ACCORDINGLY, ALONG WITH ORI
 *S*     APPLIED TO DAM #9 AND DAM #10.
 *S*
 *S*     THE FOLLOWING IS FROM THE ORGINAL WEST I-40 DMP, BUT ONLY CONTAINS THE L
 *S*     ANALYSIS.
 *S*     ____________________________________________________________________________
 *S*
 *S*  AHYMO FILE FOR WEST I-40 DIVERSION DMP
 *S*   DEVELOPED CONDITIONS, 24HR, 100YR.
 *S*   WITH SEDIMENT BULKING & WITHOUT SEDIMENT REDUCTION AT PONDS.
 *S*
 *S*  FILE: 2D_U.HYM
 *S*  MODIFIED 6/15/00 TO ROUTE DAM 12 DIVERSION AND PARKWAY SD THROUGH UNSER POND
 *S*                  EXISTING DAM 5, BIG DAM 5 DIVERSION TO I-40
 *S*                                  98TH ST & UNSER BLVD PONDS PER JASON N. AUG 96
 *S*                                  REVISED WEST MESA DIVERSION, 790 CFS TO I-40
 *S*
 *S*  removed-->DIVERT 500 CFS FROM L12.15S & L12.16SW TO AMOLE BASIN 507.
 *S*  PROPOSED PDV DAM AT UPSTREAM END OF PROPOSED PETROGLYPH DIVERSION.
 *S*  DIVERT PDV DAM OUTFLOW TO DAM 5 ARROYO VIA PROPOSED PETROGLYPH DIVERSION.
 *S*  DAM 5 ARROYO DAM AT DOWNSTREAM END OF PROPOSED PETROGLYPH DIVERSION.
 *S*  PROPOSED DAM 5 DIVERSION FROM DAM 5 TO W I40 DIVERSION.
 *S*  DIVERT AMOLE EAST DAM OUTFLOW [300 CFS ] TO I-40 DIVERSION.
 *S*  TRICKLE FLOWS TO DAM 12 DIVERSION FROM LADERA DAM 12 TO W I40 DIVERSION.
 *S*
 *S*****************************************************************************
 *S                           LADERA WATERSHED
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E.1

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                                FROM  TO                    PEAK        RUNOFF                  TIME TO   CFS
                   HYDROGRAPH    ID   ID        AREA     DISCHARGE     VOLUME     RUNOFF         PEAK    PER
COMMAND          IDENTIFICATION  NO.  NO.     (SQ MI)      (CFS)      (AC-FT)   (INCHES)      (HOURS)  ACRE      NOTATION

*S*************************************************************************
*S        CALCULATE RUNOFF FOR BASINS DRAINING TO PONDS 1 THROUGH 9
*S                              REGION B1
*S*************************************************************************                                          RAIN24=   2.602
RAINFALL  TYPE= 2                                                                                                  PK BF =    1.11
SEDIMENT BULK
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L0.1
COMPUTE NM HYD     TO_DAMZERO    -     1        .33750       458.51      22.587      1.25485     1.600    2.123 PER IMP=  27.00
*S  ROUTE FLOW THROUGH POND #0.
ROUTE RESERVOIR      PONDZERO    1     2        .33750       380.52      22.587      1.25485     1.700    1.762 AC-FT=    2.545
*S  ROUTE OUTFLOW FROM DAM ZERO THROUGH  BASIN L1.2  EARTHEN CHANNEL
ROUTE MCUNGE           L0.1_1    2     9        .33750       379.21      22.559      1.25328     1.850    1.756 CCODE =      .1
SEDIMENT BULK                                                                                                      PK BF =    1.02
*S  COMPUTE HYDROGRAPH FOR BASIN L1.2
COMPUTE NM HYD           L1.2    -     1        .11880       199.51       9.001      1.42066     1.500    2.624 PER IMP=  45.00
*S  COMBINED FLOW (BASIN L0.1 AND L1.2)
ADD HYD                L1.2_1  1& 9    2        .45630       447.20      31.560      1.29686     1.800    1.531
*S  ROUTE THROUGH  BASIN L1.1
ROUTE MCUNGE           L1.1_1    2     9        .45630       446.51      31.542      1.29610     1.850    1.529 CCODE =      .1
SEDIMENT BULK                                                                                                      PK BF =    1.03
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L1.1
COMPUTE NM HYD           L1.1    -     1        .54380       744.28      39.877      1.37493     1.600    2.139 PER IMP=  39.00
*S  COMBINED FLOW (BASINS L0.1, L1.1 AND L1.2)
ADD HYD               TO_DAM1  9& 1    9       1.00010      1017.38      71.419      1.33896     1.650    1.589
*S  ROUTE FLOW THROUGH POND #1
ROUTE RESERVOIR         POND1    9    10       1.00010       263.81      71.406      1.33873     2.250     .412 AC-FT=   40.940
*S  ROUTE OVERLAND FLOW FROM BASINS L0.1,L1.1,L1.2 THROUGH  BASIN L4.1
ROUTE MCUNGE           L4.1_1   10     9       1.00010       262.44      71.394      1.33850     2.400     .410 CCODE =      .1
SEDIMENT BULK                                                                                                      PK BF =    1.02
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L4.1
COMPUTE NM HYD           L4.1    -     6        .25940       508.38      25.092      1.81368     1.500    3.062 PER IMP=  65.00
*S  DIVIDE FLOW FROM BASIN L4.1 INTO 3 THIRDS FOR ROUTE THROUGH PONDS 2, 3, & 4
DIVIDE HYD             L4.1_2    6     1        .08638       169.29       8.356      1.81368     1.500    3.062
                       L4.1_3  and     3        .17302       339.09      16.736      1.81368     1.500    3.062
*S  ADD THE 1ST THIRD OF RUNOFF FROM BASIN L4.1 TO COMBINED FLOW
ADD HYD               TO_DAM2  1& 9   10       1.08648       272.35      79.749      1.37628     2.400     .392
*S
*S  ROUTE FLOW THROUGH POND #2
ROUTE RESERVOIR         POND2   10     9       1.08648       114.92      79.530      1.37249     5.000     .165 AC-FT=   30.018
*S  ADD 2ND THIRD OF RUNOFF FROM BASIN L4.1 TO FLOW FROM POND #2
ADD HYD               TO_DAM3  1& 9   10       1.17286       180.54      87.885      1.40498     1.550     .241
*S
*S  ROUTE FLOW THROUGH POND #3
ROUTE RESERVOIR         POND3   10     9       1.17286        43.05      76.531      1.22347    11.050     .057 AC-FT=   45.435
*S  ADD FLOW FROM REMAINING THIRD OF BASIN L4.1 TO FLOW FROM POND #3
ADD HYD               TO_DAM4  1& 9   10       1.25924       172.61      84.887      1.26396     1.550     .214
*S   ROUTE FLOW THROUGH POND #4
ROUTE RESERVOIR         POND4   10     9       1.25924        38.93      75.454      1.12351    17.350     .048 AC-FT=   15.466
*S  ROUTE OVERLAND FLOW FROM BASINS L0.1-L4.1 THROUGH  BASIN L5.1
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                                FROM  TO                    PEAK        RUNOFF                  TIME TO   CFS
                   HYDROGRAPH   ID    ID        AREA     DISCHARGE     VOLUME      RUNOFF        PEAK    PER
COMMAND          IDENTIFICATION NO.   NO.     (SQ MI)     (CFS)       (AC-FT)    (INCHES)     (HOURS)  ACRE     NOTATION
ROUTE MCUNGE          L5.1_1     9    70      1.25924      38.93       75.374      1.12232     17.350   .048 CCODE =      .2
*S
*S  SKIP FROM DAM 4 UP TO TOP OF LADERA WATERSHED
*S*****************************************************************
*S    CALCULATE RUNOFF BEGINNING AT THE TOP OF LADERA L12 WATERSHED.
*S  UPPER LADERA BASINS START AT DOUBLE EAGLE II AIRPORT & DRAIN TO DAM12
*S                              REGION B2
*S*****************************************************************
RAINFALL  TYPE= 2                                                                                  RAIN24=   2.602
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L12.1
COMPUTE NM HYD        L12.1   -     1       .22190     245.81       17.244      1.45704      1.750    1.731 PER IMP=  35.00
                                                                                                            PK BF =   1.04
SEDIMENT BULK
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L12.2
COMPUTE NM HYD        L12.2   -     2      1.13590    1627.91       58.970       .97341      1.500    2.239 PER IMP=  19.00
*S  COMBINED FLOW FROM BASINS L12.1 AND L12.2 IN DE II AIRPORT AREA.  THERE ARE
*S  PONDS W/COMBINED VOLUME OF ALMOST 30 ACRE-FT IN THESE BASINS.  THESE
*S  PONDS ULTIMATELY DISCHARGE TO A 70 ACRE-FT PLAYA THAT IS BISECTED BY
*S  PASEO DEL VOLCAN.  IF PLAYA DOES NOT OVERFLOW, THEN THE BASINS CAN BE
*S  CONSIDERED TO BE NON-CONTRIBUTING.  PONDS AND PLAYA NOT IN MODEL.
ADD HYD               L12.2_1  1& 2   4      1.35780    1731.06       76.214      1.05244      1.550    1.992
                                                                                                            PK BF =   1.02
SEDIMENT BULK
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L12.3
COMPUTE NM HYD        L12.3   -     1       .33130     414.71       31.842      1.80213      1.750    1.956 PER IMP=  59.00
*S  ROUTE L12.3 THROUGH L12.6
ROUTE MCUNGE          L12.3_1    1   49      .33130     376.33       31.841      1.80205      2.500    1.775 CCODE =      .1
ROUTE MCUNGE          L12.3_1   49   50      .33130     332.08       31.295      1.77115      2.700    1.566 CCODE =      .2
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L12.5
COMPUTE NM HYD        L12.5   -     1       .73130     548.65       36.150       .92687      1.750    1.172 PER IMP=  16.00
*S  ROUTE L12.5 THROUGH L12.4
ROUTE MCUNGE          L12.4_1    1   51      .73130     508.69       36.257       .92960      2.000    1.087 CCODE =      .2
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L12.4
COMPUTE NM HYD        L12.4   -     1       .60160     734.19       49.908      1.55548      1.700    1.907 PER IMP=  46.00
*S  ADD L12.4 AND L12.5
ADD HYD               L12.4_2  1&51   2     1.33290     988.44       86.165      1.21209      1.900    1.159
*S  ROUTE COMBINED (L12.4 AND L12.5) THROUGH L12.6
ROUTE MCUNGE          L12.6_1    2   51     1.33290     969.26       86.215      1.21279      2.300    1.136 CCODE =      .2
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L12.6
COMPUTE NM HYD        L12.6   -     1       .94530    1080.19       94.439      1.87320      1.800    1.785 PER IMP=  65.00
*S  ADD (L12.4-5) & L12.6
ADD HYD               L12.6_2  1&51   2     2.27820    1620.33      180.654      1.48682      2.100    1.111
*S  ADD (L12.4-6) & L12.3
ADD HYD               L12.6_3  2&50   4     2.60950    1620.37      211.949      1.52291      2.100     .970
*S  ROUTE COMBINED (L12.3, L12.4, L12.5, AND L12.6) THROUGH L12.7
ROUTE MCUNGE          L12.7_1    4   49     2.60950    1471.64      211.142      1.51712      2.350     .881 CCODE =      .2
ROUTE MCUNGE          L12.7_1   49   50     2.60950    1470.21      211.119      1.51695      2.400     .880 CCODE =      .2
*S
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                                FROM   TO                    PEAK        RUNOFF                    TIME TO   CFS
                   HYDROGRAPH    ID    ID        AREA     DISCHARGE     VOLUME      RUNOFF     PEAK    PER
COMMAND          IDENTIFICATION  NO.   NO.      (SQ MI)     (CFS)      (AC-FT)    (INCHES)   (HOURS)  ACRE      NOTATION

*S  COMPUTE HYDROGRAPH FOR BASIN L12.7
COMPUTE NM HYD          L12.7    -     1       1.05630      738.20      53.956      .95775    1.750   1.092 PER IMP=  21.00
*S  ADD (L12.3-6) & L12.7
ADD HYD                L12.7_2  1&50   3       3.66580     1736.65     265.075     1.35582    2.150    .740
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L12.8
COMPUTE NM HYD          L12.8    -     1        .42190      459.15      41.750     1.85543    1.850   1.700 PER IMP=  66.00
*S  ROUTE L12.8 THROUGH L12.7
ROUTE MCUNGE           L12.7_3    1    50        .42190      459.15      41.750     1.85546    1.850   1.700 CCODE =      .2
*S  ADD (L12.3-7) & L12.8
ADD HYD                L12.7_4  3&50   3       4.08770     2061.94     306.826     1.40739    1.850    .788
*S ROUTE FLOW THROUGH PROPOSED POND AT PASEO DEL VULCAN (PDV)
*S  INCREASE POND SIZE BY 1.5 TIMES.  PRINCIPAL SPILLWAY= 60" RCP
ROUTE RESERVOIR        PDVPOND    3    50       4.08770      302.16     294.711     1.35182    3.700    .115 AC-FT=  198.864
*S
*S*************************************************************************
*S    DIVERSION TO DAM 5 ARROYO BEGINS
*S*************************************************************************
*S  ROUTE PDV POND OUTFLOW SOUTH IN PROPOSED PETROGLYPH DIVERSION
ROUTE MCUNGE             DIV1    50    5       4.08770      302.16     294.473     1.35073    3.750    .115 CCODE =      .2
                                                                                                             PK BF =    1.02
SEDIMENT BULK
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L12.9W
COMPUTE NM HYD         L12.9W    -     2        .10160      214.38       8.910     1.64425    1.500   3.297 PER IMP=  53.00
*S  FLOW IN PROPOSED PETROGLYPH DIVERSION AT SOUTH END BASIN L12.9W
ADD HYD                  DIV2  2& 5    4       4.18930      303.40     303.383     1.35785    3.750    .113
*S  ROUTE IN PROPOSED PETROGLYPH DIVERSION
ROUTE MCUNGE             DIV3     4    5       4.18930      303.40     303.230     1.35716    3.750    .113 CCODE =      .2
                                                                                                             PK BF =    1.02
SEDIMENT BULK
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L12.11
COMPUTE NM HYD         L12.11    -     1        .27340      292.11      27.318     1.87351    1.850   1.669 PER IMP=  67.00
*S  ROUTE L12.11 THROUGH L12.12W TO PROPOSED PETROGLYPH DIVERSION
ROUTE MCUNGE          L12.12_1    1    49        .27340      291.50      27.296     1.87197    1.950   1.666 CCODE =      .1
                                                                                                             PK BF =    1.02
SEDIMENT BULK
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L12.12W
COMPUTE NM HYD        L12.12W    -     2        .14150      181.29      12.160     1.61131    1.700   2.002 PER IMP=  52.00
ADD HYD                  DIV4  2& 5    3       4.33080      349.44     315.390     1.36547    1.600    .126
*S  FLOW IN PROPOSED PETROGLYPH DIVERSION AT SOUTH END BASIN L12.12W
ADD HYD                  DIV5  3&49    2       4.60420      517.37     342.686     1.39554    2.000    .176
*S ROUTE FLOW THROUGH PROPOSED MIREHAVEN A2 DAM
*S   PRINCIPAL SPILLWAY 1-36" RCP
*S for FINAL2D.HYM increase storage by 3.4x.
*S   PRINCIPAL SPILLWAY 1-54" RCP
ROUTE RESERVOIR       MA2POND    2    30       4.60420      265.69     342.074     1.39305    6.950    .090 AC-FT=   46.405
*S  ROUTE IN PROPOSED PETROGLYPH DIVERSION THRU BASIN L12.14W
ROUTE MCUNGE             DIV6    30    5       4.60420      265.69     341.915     1.39241    6.950    .090 CCODE =      .2
*S                                                                                                           PK BF =    1.02
SEDIMENT BULK
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L12.14W
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                                FROM  TO                    PEAK        RUNOFF                 TIME TO    CFS
                                                                                                PER
                   HYDROGRAPH   ID    ID        AREA     DISCHARGE     VOLUME     RUNOFF       PEAK       ACRE      NOTATION
COMMAND          IDENTIFICATION NO.  NO.      (SQ MI)     (CFS)       (AC-FT)   (INCHES)    (HOURS)
COMPUTE NM HYD       L12.14W    -     2        .08690       98.03       6.347    1.36949      1.650     1.763 PER IMP=  41.00
*S  FLOW IN PROPOSED PETROGLYPH DIVERSION AT SOUTH END BASIN L12.14W
ADD HYD                 DIV7  2& 5   3       4.69110      266.59     348.262    1.39198      6.900      .089
*S  ROUTE IN PROPOSED PETROGLYPH DIVERSION THRU L12.16NW
ROUTE MCUNGE            DIV8    3    5       4.69110      266.59     348.104    1.39135      6.950      .089 CCODE =      .2
SEDIMENT BULK                                                                                                PK BF =    1.02
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L12.15
COMPUTE NM HYD       L12.15    -     1        .43910      437.49      38.719    1.65332      1.850     1.557 PER IMP=  54.00
*S  ROUTE L12.15 THRU L12.16W TO PROPOSED PETROGLYPH DIV VIA MIREHAVEN "C"
ROUTE MCUNGE       L12.16_1    1    50        .43910      436.03      38.723    1.65350      1.850     1.552 CCODE =      .2
SEDIMENT BULK                                                                                                PK BF =    1.02
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L12.16W
COMPUTE NM HYD       L12.16W   -     4        .44680      601.28      39.257    1.64744      1.650     2.103 PER IMP=  54.00
*S  ADD L12.16W TO ROUTED L12.15
ADD HYD            L12.16W_1  4&50   3        .88590      925.86      77.980    1.65045      1.750     1.633
*S  ADD L12.15 TO PROPOSED PETROGLYPH DIVERSION
ADD HYD                 DIV9  3& 5   2       5.57700     1121.76     426.083    1.43250      1.750      .314
*s  route flow through new cdam for option 2d_cdam.hym through 60" RCP
ROUTE RESERVOIR     cdamPOND    2   30       5.57700      334.56     425.736    1.43133      2.850      .094 AC-FT=   46.695
*S  ROUTE IN PROPOSED PETROGLYPH DIVERSION TO DAM 5 ARROYO IN BASIN L5.1
ROUTE MCUNGE           DIV10   30    5       5.57700      334.55     425.463    1.43041      2.900      .094 CCODE =      .2
SEDIMENT BULK                                                                                                PK BF =    1.02
*S  COMPUTE HYDROGRAPH FOR BASIN L5.1W
COMPUTE NM HYD         L5.1W   -     1        .06130      103.68       5.376    1.64424      1.550     2.643 PER IMP=  53.00
*S  INFLOW TO PROPOSED DAM 5 ARROYO DAM
ADD HYD              TO_D5DAM  1& 5   2       5.63830      338.20     430.838    1.43274      2.650      .094
*S*************************************************************************
*S    DIVERSION TO DAM 5 ARROYO EDITION ENDS
*S*************************************************************************
*S ROUTE FLOW THROUGH PROPOSED DAM 5 ARROYO DAM
ROUTE RESERVOIR       D5POND    2    3       5.63830      268.19     420.027    1.39679     12.550      .074 AC-FT=   84.666
*S  ROUTE IN CHANNEL TO DAM 5
ROUTE MCUNGE        D5ARROYO    3   71       5.63830      268.19     419.070    1.39360     12.650      .074 CCODE =      .2
*S                                                                                                           PK BF =    1.04
SEDIMENT BULK
*S  COMPUTE HYDROGRAPH FOR BASIN L5.1E
COMPUTE NM HYD         L5.1E   -     1        .83870     1134.22      59.661    1.33379      1.600     2.113 PER IMP=  36.00
*S  COMBINED FLOW (L5.1 & DAM5 ARROYO)
ADD HYD            D5ARROYTOT  1&71  10       6.47700     1134.25     478.731    1.38586      1.600      .274
*S  COMBINED FLOW (BASINS L0.1-L4.1 AND L5.1)
ADD HYD              TO_DAM5 10&70  11       7.73624     1144.63     554.105    1.34296      1.600      .231
*S  ROUTE FLOW THROUGH POND #5
ROUTE RESERVOIR         POND5   11    9       7.73624      321.10     531.236    1.28753      2.100      .065 AC-FT=   33.193
*S  PROPOSED DAM5 DIVERSION
*S  DIVIDE 65 CFS FROM DAM 5 TO DAM 6; REMAINING TO I-40
DIVIDE HYD             TO_DAM6    9    9       2.22315       65.00     152.660    1.28753      1.700      .046
                       DAM5DIV  and   71       5.51309      256.10     378.576    1.28753      2.100      .073
*S  PLOT  HYDS OUT OF DAM 5
*S  ROUTE DAM5 SPILLWAY FLOWS SOUTH IN PROPOSED DAM 5 DIVERSION
*S  (THIS FLOW PATH CONTINUES IN REGION C)
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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
ROUTE MCUNGE	D5DIV1	71	73	5.51309	256.03	378.582	1.28756	2.150	.073	CCODE = .2
*S ROUTE OVERLAND FLOW FROM BASINS L0.1-L5.1 THROUGH BASIN L7.2										
ROUTE MCUNGE	L7.2_1	9	10	2.22315	65.00	151.622	1.27878	1.900	.046	CCODE = .1
SEDIMENT BULK										PK BF = 1.02
*S										
*S COMPUTE HYDROGRAPH FOR BASIN L7.1										
*S COMPUTE HYDROGRAPH FOR BASIN L7.1A										
COMPUTE NM HYD	L7.1A	-	99	.00940	19.93	.812	1.61961	1.500	3.313	PER IMP= 50.00
*S										
*S COMPUTE HYDROGRAPH FOR BASIN L7.2										
COMPUTE NM HYD	L7.2	-	2	.04060	68.34	2.743	1.26693	1.500	2.630	PER IMP= 38.00
*S DIVIDE ID=2 INTO 3 THIRDS FOR PONDS 6, 7 AND 8										
DIVIDE HYD	L7.2_4	2	1	.01352	22.76	.914	1.26693	1.500	2.630	
	L7.2_5	and	3	.02708	45.58	1.830	1.26693	1.500	2.630	
*S ADD 1ST THIRD TO ROUTED FLOW										
ADD HYD	TO_DAM6	1&10	10	2.23667	70.13	152.536	1.27871	1.900	.049	
*S ROUTE FLOW THROUGH POND #6										
ROUTE RESERVOIR	POND6	10	9	2.23667	65.08	145.026	1.21576	15.850	.045	AC-FT= 7.520
*S ADD 2ND THIRD TO POND OUTFLOW										
ADD HYD	TO_DAM7	1& 9	10	2.25019	65.16	145.940	1.21606	14.950	.045	
*S ROUTE FLOW THROUGH POND #7										
ROUTE RESERVOIR	POND7	10	9	2.25019	65.16	140.289	1.16898	16.250	.045	AC-FT= 5.663
*S ADD LAST THIRD TO POND OUTFLOW										
ADD HYD	TO_DAM8	1& 9	10	2.26371	65.24	141.203	1.16956	15.550	.045	
*S ROUTE FLOW THROUGH POND #8										
ROUTE RESERVOIR	POND8	10	9	2.26371	64.64	121.951	1.01010	29.950	.045	AC-FT= 19.251
*S ROUTE OVERLAND FLOW FROM BASINS L0.1-L7.2 THROUGH BASIN L9.2										
ROUTE MCUNGE	L9.2_1	9	10	2.26371	64.64	121.693	1.00796	29.950	.045	CCODE = .2
SEDIMENT BULK										PK BF = 1.04
*S										
*S COMPUTE HYDROGRAPH FOR BASIN L9.1										
*S COMPUTE HYDROGRAPH FOR BASIN L9.1A										
COMPUTE NM HYD	L9.1A	-	1	.19770	261.60	13.422	1.27293	1.600	2.068	PER IMP= 35.00
*S COMPUTE HYDROGRAPH FOR BASIN L9.1B										
COMPUTE NM HYD	L9.1B	-	9	.06700	88.02	3.691	1.03303	1.550	2.053	PER IMP= 24.98
*S ROUTE L9.1B THRU "DAM 9.1" ARROYO, LOCATED IN L9.2B										
ROUTE MCUNGE	L9.1B_DAM9.1	9	50	.06700	87.47	3.689	1.03235	1.600	2.040	CCODE = .1
SEDIMENT BULK										PK BF = 1.02
*S										
*S COMPUTE HYDROGRAPH FOR BASIN L9.2A										
COMPUTE NM HYD	L9.2A	-	3	.00440	9.34	.380	1.61960	1.500	3.316	PER IMP= 50.00
*S COMPUTE HYDROGRAPH FOR BASIN L9.2B										
COMPUTE NM HYD	L9.2B	-	4	.01220	25.86	1.054	1.61960	1.500	3.312	PER IMP= 50.00
*S COMBINE ROUTED FLOW FROM DAM 9.1 aRROYO AND BASIN L9.2B----AP1 STRUCT 2 INFL										
ADD HYD	DAM9.1L9.2B	50& 4	5	.07920	108.99	4.743	1.12279	1.550	2.150	
SEDIMENT BULK										PK BF = 1.02
*S COMBINE L9.1A AND BASIN L9.2A----AP2										
ADD HYD	DAM9.1L9.2B	1& 3	52	.20210	268.07	13.802	1.28047	1.600	2.073	
*S COMPUTE HYDROGRAPH FOR BASIN L5.1A										
COMPUTE NM HYD	L9.2A	-	97	.02420	51.29	2.090	1.61960	1.500	3.312	PER IMP= 50.00
*S COMBINE FLOWS FROM AP2 AND BASIN L5.1A--AP3										

E.6.93

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                                FROM  TO                    PEAK        RUNOFF                 TIME TO    CFS
                   HYDROGRAPH    ID   ID        AREA     DISCHARGE     VOLUME     RUNOFF        PEAK     PER
COMMAND          IDENTIFICATION  NO.  NO.      (SQ MI)     (CFS)       (AC-FT)   (INCHES)     (HOURS)   ACRE      NOTATION

ADD HYD              AP2L4.1A 52&97  98        .22630      309.86       15.892    1.31674       1.550   2.139
*S  COMBINE FLOWS FROM AP3 AND BASIN L7.1A--STRUCTURE 1 INFLOW
ADD HYD              AP2L7.1A 98&99  96        .23570      327.53       16.704    1.32881       1.550   2.171
*S
*S  THIS PORTION OF THE .HYM INCORPORTES AND ACCOUNTS FOR THE FLOW
*S  FROM BASIN I-2.  AND FLOW FROM STRUTURES 1 AND 2
*S  COMPUTE HYDROGRAPH FOR BASIN I2.1
COMPUTE NM HYD          I2.1   -    92        .09750      206.26        8.422    1.61960       1.500   3.305 PER IMP=  50.00
*S  COMPUTE HYDROGRAPH FOR BASIN I2.4
COMPUTE NM HYD          I2.4   -    93        .01700       16.39         .454     .50031       1.500   1.507 PER IMP=    .00
*S  ROUTE FLOW FROM STR1 THRU I2 VIA 66"RCP
ROUTE MCUNGE          STR1SD1   96   53        .23570      324.46       16.706    1.32894       1.550   2.151 CCODE =      .2
*S  ROUTE FLOW FROM STR2 THRU I2 VIA 42"RCP
ROUTE MCUNGE          STR2SD4    5   52        .07920      107.55        4.743    1.12289       1.550   2.122 CCODE =      .2
*S  COMBINE ROUTE STR1 AND ROUTE STR2
ADD HYD               STR1&2 52&53  54        .31490      432.01       21.449    1.27711       1.550   2.144
*S  ROUTE FLOW STR 1 & 2  THRU I2 VIA 72"RCP
ROUTE MCUNGE         STR12SD2   54   55        .31490      432.01       21.449    1.27711       1.550   2.144 CCODE =      .0
*S  COMBINE I2.1 AND FLOW FROM STRUC 1 & 2 VIA 72"RCP
ADD HYD             I2.2I2.1 55&92  60        .41240      615.04       29.871    1.35808       1.550   2.330
*S  COMBINE ROUTED STR1 STR2 AND I2.4
ADD HYD              SD1I2.4 93&60  56        .42940      630.69       30.324    1.32412       1.550   2.295
*S  COMBINE I-2.1 AND I-2.4 AND OTHER UPSTREAM BASINS FLOWING INTO POND#9
ADD HYD          I2OTHERS2D9 56&10  61       2.69311      631.28      152.017    1.05837       1.550    .366
*S  ROUTE FLOW THROUGH DAM #9
ROUTE RESERVOIR        POND9   61   99       2.69311       62.80      129.707     .90305      29.950    .036 AC-FT=   22.306
*S  ROUTE COMBINED THROUGH DAM #10 - NOTE: THIS DAM WAS USED LATER IN MODEL.....
*S  ROUTED OUTFLOW FROM DAM #9 IS ID. NO. 99
*S
*S  SKIP FROM DAM 10 UP TO TOP OF LADERA WATERSHED
*S*******************************************************************************
*S   RETURN TO UPPER LADERA L12 WATERSHED BELOW PROPOSED PETROGLYPH DIVERSION.
*S                                                                                                          PK BF =    1.04
SEDIMENT BULK
*S  COMPUTE HYDROGRAPH FOR BASIN L12.9E
COMPUTE NM HYD        L12.9E   -     1        .55780      391.04       24.822     .83437       1.700   1.095 PER IMP=  15.00
*S
*S  ROUTE L12.9E FLOW IN MIREHAVEN A ARROYO THROUGH BASIN L12.12E
ROUTE MCUNGE        L12.12_3    1   50        .55780      382.54       24.715     .83078       1.800   1.072 CCODE =      .1
*S                                                                                                          PK BF =    1.05
SEDIMENT BULK
*S  COMPUTE HYDROGRAPH FOR BASIN L12.12E
COMPUTE NM HYD       L12.12E   -     1        .21160      226.13        9.929     .87985       1.550   1.670 PER IMP=  20.00
*S
*S  ADD DIVIDED L12.12E & L12.9E
ADD HYD             L12.12_4  1&50   3        .76940      480.87       34.644     .84427       1.800    .977
*S                                                                                                          PK BF =    1.07
SEDIMENT BULK
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L12.10
COMPUTE NM HYD        L12.10   -     1        .22190      124.51        5.492     .46410       1.600    .877 PER IMP=    .00
*S  ADD L12.10 TO MIREHAVEN ROUTED FLOWS
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E.1

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                                FROM  TO                    PEAK        RUNOFF                  TIME TO   CFS
                   HYDROGRAPH    ID   ID        AREA     DISCHARGE     VOLUME     RUNOFF        PEAK     PER
COMMAND          IDENTIFICATION  NO.  NO.     (SQ MI)     (CFS)       (AC-FT)   (INCHES)     (HOURS)   ACRE      NOTATION

ADD HYD              L12.10_1  1& 3   4       .99130      577.35       40.137     .75917       1.750    .910
*S  ROUTE COMBINED THROUGH L12.13 --
*S  MIREHAVEN "A" ROUTED FROM PLATEAU ABOVE ESCARPMENT TO BELOW ESCARPMENT
ROUTE MCUNGE         L12.13_1    4  49       .99130      577.06       40.156     .75954       1.850    .910  CCODE =      .2
ROUTE MCUNGE         L12.13_1   49   4       .99130      577.06       40.156     .75954       1.850    .910  CCODE =      .0
ROUTE MCUNGE         L12.13_1    4  50       .99130      577.06       40.156     .75954       1.850    .910  CCODE =      .0
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L12.13
COMPUTE NM HYD         L12.13    -   1       .26090      146.13        6.133     .44074       1.600    .875  PER IMP=    .00
*S  ADD ROUTED L12.3-12 & L12.13
*S  TOTAL MIREHAVEN "A" ARROYO FLOW AT BASE OF ESCARPMENT
ADD HYD              L12.13_2  1&50   4      1.25220      662.08       46.289     .69312       1.800    .826
*S                                                                                                        PK BF =    1.06
SEDIMENT BULK
*S  COMPUTE HYDROGRAPH FOR BASIN L12.14E
COMPUTE NM HYD        L12.14E    -   1       .31470      195.80       14.702     .87595       1.800    .972  PER IMP=  16.00
*S                                                                                                        PK BF =    1.03
SEDIMENT BULK
*S  COMPUTE HYDROGRAPH FOR BASIN L12.16E
COMPUTE NM HYD        L12.16E    -   2       .40790      382.23       24.141    1.10970       1.700   1.464  PER IMP=  28.00
*S  ADD L12.14E & L12.16E
ADD HYD              L12.14_1  1& 2   3       .72260      564.13       38.843    1.00790       1.700   1.220
*S                                                                                                        PK BF =    1.07
SEDIMENT BULK
*S  COMPUTE HYDROGRAPH FOR BASIN L12.17
COMPUTE NM HYD         L12.17    -   1       .20310      209.79        8.749     .80770       1.550   1.614  PER IMP=  11.00
*S  ADD  L12.14-16 & L12.17  --  FLOW AT LADERA TRAINING DIKE
ADD HYD                  DIKE  1& 3   2       .92570      726.22       47.592     .96397       1.650   1.226
*S  ROUTE COMBINED (L12.14E,L12.16E,L12.17) IN MIREHAVEN DNSTREAM FROM TRNG DIKE
*S    TO CONFLUENCE WITH MIREHAVEN "A" ARROYO BELOW ESCARPMENT
ROUTE MCUNGE         L12.18_1    2  50       .92570      721.80       47.476     .96162       1.900   1.218  CCODE =      .1
*S  ADD  L12.9E,L12.10,L12.12E,L12.13  & L12.14E,L12.16E,L12.17
*S  TOTAL FLOW MIREHAVEN A, B, C ARROYOS BELOW ESCARPMT, DNSTRM FROM TR DIKE
ADD HYD              L12.18_2  4&50   3      2.17790     1350.76       93.765     .80724       1.850    .969
*S  ROUTE L12.3-17 THROUGH MIREHAVEN ARROYO TO INTERSECTN W/FUTURE 98TH ST
*S  LTOT=4625 FT.  1ST 1300' IN PETROG NM, NAT CHAN.  LAST PART IS CONC CHAN.
ROUTE MCUNGE         L12.18_3    3   4      2.17790     1346.53       93.638     .80615       1.950    .966  CCODE =      .1
ROUTE MCUNGE         L12.18_3    4  50      2.17790     1345.28       93.662     .80635       2.000    .965  CCODE =      .2
                                                                                                          PK BF =    1.05
SEDIMENT BULK
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L12.18
COMPUTE NM HYD        L12.18    -   1       .51410      487.07       24.019     .87602       1.600   1.480  PER IMP=  16.00
*S
*S  ADD  L12.3-17 & L12.18 --  TOTAL FLOW IN MIREHAVEN AT FUTURE 98TH STREET
ADD HYD              L12.18_4  1&50   2      2.69200     1506.69      117.681     .81966       1.950    .875
*S
*S  ROUTE COMBINED (L12.13-L12.18) IN MIREHAVEN THRU L12.20 TO DAM#12
ROUTE MCUNGE         L12.20_1    2  51      2.69200     1504.34      117.607     .81914       2.050    .873  CCODE =      .1
                                                                                                          PK BF =    1.03
SEDIMENT BULK
*S
*S  COMPUTE HYDROGRAPH FOR BASIN L12.19
COMPUTE NM HYD        L12.19    -   1       .17600      349.62       14.650    1.56072       1.500   3.104  PER IMP=  47.50
*S  COMPUTE HYDROGRAPH FOR BASIN L12.20A
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                                FROM  TO                    PEAK        RUNOFF                 TIME TO    CFS
                   HYDROGRAPH    ID   ID        AREA     DISCHARGE     VOLUME      RUNOFF       PEAK     PER
COMMAND          IDENTIFICATION  NO.  NO.     (SQ MI)      (CFS)       (AC-FT)    (INCHES)    (HOURS)   ACRE      NOTATION
COMPUTE NM HYD        L12.20A    -    4       .01180       25.09        1.022     1.62435     1.500    3.322 PER IMP=  50.00
ADD HYD             L12.1920A  1& 4   5       .18780      374.71       15.672     1.56471     1.500    3.118
*S THE FLOW FROM THE 66"RCP WILL NOT BE ROUTED TO POND#10, IN THIS ANALYSIS
*S INSTEAD IT WILL BE ROUTED TO POND#11
*S  ROUTE FLOW FROM STR3 THRU 1ST SEGMENT OF I2.2 VIA 66"RCP
ROUTE MCUNGE       STR3THRU66   5   55       .18780      367.15       15.672     1.56471     1.500    3.055 CCODE =     .2
*S  COMPUTE HYDROGRAPH FOR BASIN D17
COMPUTE NM HYD           D17    -    7       .01400       29.76        1.213     1.62434     1.500    3.322 PER IMP=  50.00
ROUTE MCUNGE      D17THRU24"    7   10       .01400       29.76        1.213     1.62432     1.500    3.322 CCODE =     .0
*S COMBINE ROUTED FLOW FROM D17 AND OFFSITE STRUC#3 FLOW
ADD HYD            STR3ANDD17 10&55   2       .20180      396.92       16.885     1.56884     1.500    3.073
ROUTE MCUNGE     STR3D17THRU6    2    1       .20180      396.92       16.885     1.56884     1.500    3.073 CCODE =     .0
*S  COMPUTE HYDROGRAPH FOR BASIN I2.2
COMPUTE NM HYD          I2.2    -   95       .07200      152.95        6.237     1.62435     1.500    3.319 PER IMP=  50.00
*S  COMBINE ROUTED FLOW WITH BASIN I2.2 - THIS IS FLOW TO POND#11
ADD HYD               D17STR3 95& 1   2       .27380      549.86       23.122     1.58343     1.500    3.138
*S THIS WILL BE THE TOTAL FLOW RE-ROUTED TO POND#10
*S  Note this flow has not been added to the flow from D17.4, and I2.3,
*S  Routed through pipe to merely determine the flow at end of network to Dam#10
ROUTE MCUNGE     TOTALRE-ROUT    2   97       .27380      507.55       22.810     1.56202     1.550    2.896 CCODE =     .2
*S THESE BASINS WILL GO TO POND#10 - via sheet flow
*S  COMPUTE HYDROGRAPH FOR BASIN I2.3
COMPUTE NM HYD          I2.3    -   94       .02900       45.69        1.364      .88181     1.500    2.462 PER IMP=   7.00
*S BASIN D17.4 TAKEN FROM "THE CROSSINGS" DRAINAGE REPORT
*S TAKEN AS AREA LEFT FROM BASIN L12.20 MINUS D17 & I-2
*S  COMPUTE HYDROGRAPH FOR BASIN D17.4
COMPUTE NM HYD         D17.4    -    8       .00180        3.71         .159     1.65461     1.500    3.217 PER IMP=  57.00
ADD HYD             D17I2.3 94& 8   9       .03080       49.40        1.523      .92696     1.500    2.506
*S  ROUTE OUTFLOW FROM DAM 9 OVERLAND THROUGH SMALL PORTION OF BASIN L12.20
ROUTE MCUNGE     TO_DAM10FROM   99   10      2.69311       62.80      129.593      .90226    29.950     .036 CCODE =     .2
*S  ADD ALL COMBINED FLOW INTO DAM#10
*S  ADD HYD FOR D17.4, I2.3 AND OVERLAND FLOW
ADD HYD          TO_DAM10_ALL 10& 9  11      2.72391       78.50      131.116      .90254     1.550     .045
*S  ROUTE COMBINED THROUGH DAM #10
ROUTE RESERVOIR        POND10   11    9      2.72391       45.68       78.735      .54197    29.950     .026 AC-FT=  54.236
*S  COMPUTE HYDROGRAPHS FOR BASINS IN THE CROSSINGS
*S  COMPUTE HYDROGRAPHS FOR BASINS 1-5
COMPUTE NM HYD           B1_5    -    2       .01600       33.73        1.377     1.61361     1.500    3.294 PER IMP=  50.00
*S  COMPUTE HYDROGRAPHS FOR BASIN D4
COMPUTE NM HYD             D4    -    1       .00120        2.54         .103     1.61361     1.500    3.311 PER IMP=  50.00
*S  ADD BASINS D4 AND 1-5
ADD HYD                 D41_5  2& 1   3       .01720       36.28        1.480     1.61357     1.500    3.295
*S
*S  COMPUTE HYDROGRAPHS FOR BASIN D9 AND D11
COMPUTE NM HYD           D911    -    1       .00600        7.99         .242      .75562     1.500    2.081 PER IMP=   7.00
*S  ADD BASINS D911 AND UPSTREAM
ADD HYD                 D41_5  3& 1   1       .02320       44.26        1.722     1.39168     1.500    2.981
*S
*S  COMPUTE HYDROGRAPHS FOR BASIN D10 AND D12
COMPUTE NM HYD          D1012    -    2       .00300        7.04         .311     1.94657     1.500    3.669 PER IMP=  70.00
*S  ADD BASINS D1012 AND UPSTREAM
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E.9

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                                FROM  TO                    PEAK        RUNOFF                  TIME TO   CFS
                                                                                                                PAGE =  10
                                                                                                                
                                                                                                                
                                                                                                                
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EXHIBITS

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EXHIBIT 2: PRELIMINARY PLAT

EXHIBIT 3: EXISTING DRAINAGE BASIN MAP

EXHIBIT 4: PROPOSED DRAINAGE BASIN MAP

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EXHIBIT 1

FINAL PLAT SUNDORO UNIT 1

EXHIBIT 2

PRELIMINARY PLAT

EXHIBIT 3

EXISTING DRAINAGE BASIN MAP

EXHIBIT 4

PROPOSED DRAINAGE BASIN MAP

EXHIBIT 5

GRADING AND DRAINAGE PLAN

EXHIBIT 6

FEMA FLOODPLAIN MAP

NOTE:

Drainage submittal to Curtis Cherne

DRAINAGE REPORT
FOR

STORM CLOUD SUBDIVISION UNITS 4 & 5

Prepared by:

ADVANCED ENGINEERING and CONSULTING, LLC

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September, 2006

SHAHAB BIAZAR
NEW MEXICO
13479
REGISTERED PROFESSIONAL ENGINEER
9/5/06

Shahab Biazar
PE NO. 13479

RECEIVED
SEP 11 2006
HYDROLOGY SECTION

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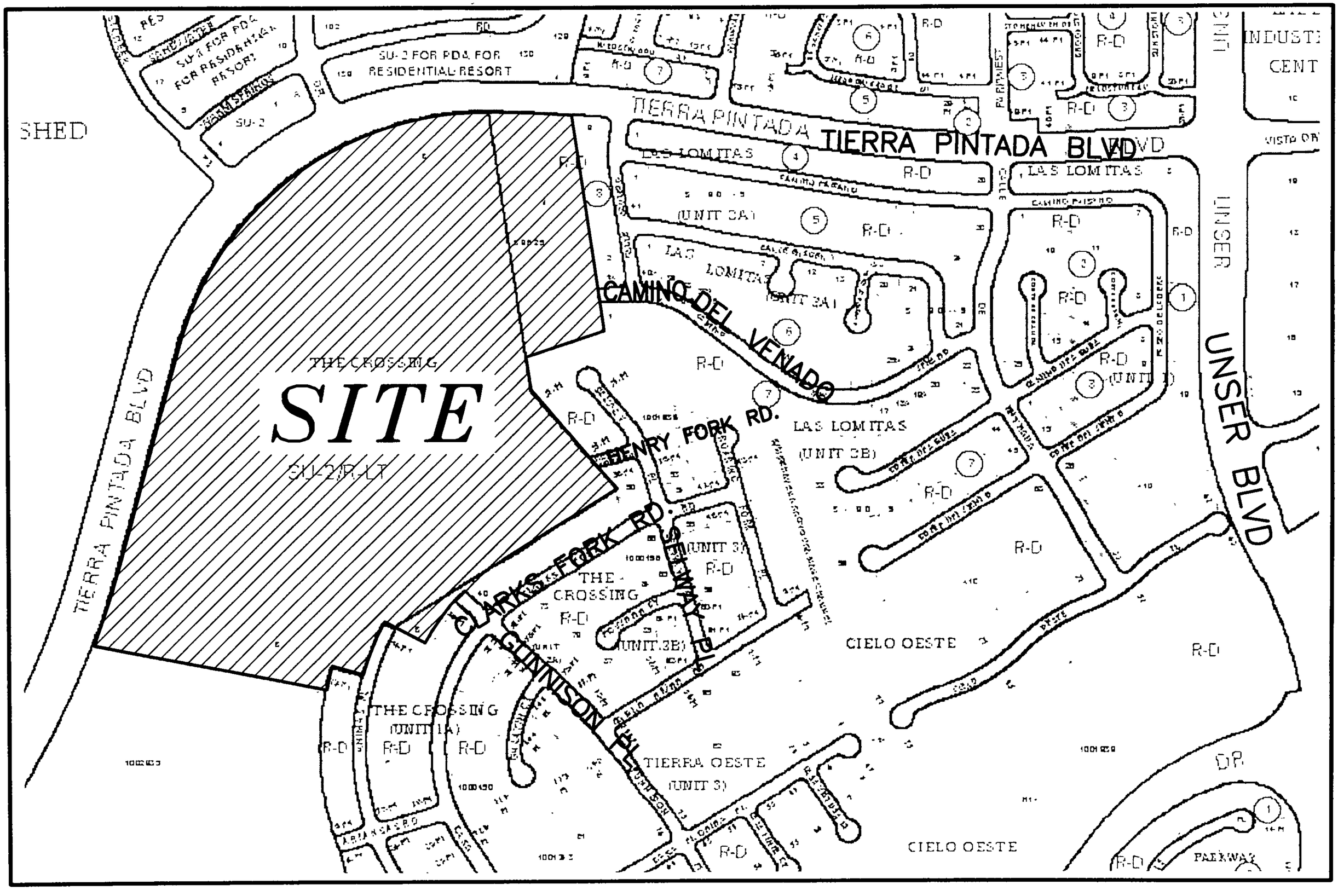
Construction Plans For Mirehaven Arroyo (Prepared by Wilson and Company

Section I

Report



VICINITY MAP:

H–9–Z

Location

Strom Cloud Subdivision Units 4 and 5 is located on the east side of Tierra Pintada Boulevard at the west end of Camino Del Venado, Henry Fork Road, & Gunnison Place. See attached portion of Zone Atlas page number H-9-Z for exact location.

Purpose

The purpose of this drainage report is to present a grading and drainage solution for the proposed subdivision. We are requesting rough grading approval, Preliminary Plat approval, and Final Plat approval.

Existing Drainage Conditions

The overall site drains from east to west. There is an existing arroyo (Mirehaven Arroyo) that runs through the site. Based on the channel design for Mirehaven Arroyo by Wilson and Company the arroyo runs at a flow rate of 1677 cfs. Copies of the construction plans prepared by Wilson and Company for Mirehaven Arroyo are located in Section VIII of this report.

Portion of the subdivision located to the north of the Mirehaven Arroyo drains west to an existing detention pond, and then from there the runoff discharges into Las Lomitas

Subdivision (Camino Del Venado) at a flow rate of 4 cfs. This information was obtained from page 4 of Las Lomitas Subdivision drainage report (City Drainage Number H9/D1E). See attached copy of this page (Exhibit A).

Section of the Storm Cloud subdivision located on the south side of Mirehaven Arroyo falls within drainage Basins D17 and D1 through D6 of the Crossing Subdivision and drainage Basin Off-1A of the Storm Cloud units 1 & 2. See attached copies of the basin maps for The Crossing Subdivision under the City drainage Number H9/D1A7 (Exhibit B) and Storm Could Subdivision under the City drainage Number J8/D1 (Exhibit C).

Flood Plain

The site is located on FIRM Map No. 35001C 0326 E, as shown on the attached excerpt portion of the map. The map shows that the site does fall within 100 year flood plains (Zone AO / Depth 1'). See attached portions of the FIRM Map (Exhibits D & E)

Proposed Conditions and On-Site Drainage Management Plan

The northern section of the subdivision (north of Mirehaven Arroyo) is analyzed under sub-basins F1 through F12 and G (Exhibit F). Sub-basins F1 Through F12 drain to Mirehaven Arroyo via surface and then inlets and storm sewer pipes at total developed flow rate of 67.00 cfs. Basin G drains to Camino Del Venado (Las Lomitas Subdivision) at a

~~WHERE IS THE REST?~~

The area encompassed by proposed Unit IIB is currently undeveloped. It is located as shown (as Phase III) on the phasing plan included as Figure II. The street and lot layout of Unit IIB is shown in Figure III. The area drains to the pond constructed during Unit I, in accordance with the approved plan.

The Mirehaven Arroyo tributary, located adjacent to and immediately southwest of Unit IIB, has migrated to the north, and the arroyo bank is adjacent to the property line. The area is outside the prudent line established by an earlier engineering study, and this condition makes it clear that some improvements will be required to allow development and occupancy of the lots immediately adjacent to the arroyo.

All other existing drainage conditions are described in the approved drainage plans for Las Lomitas.

DESCRIPTION OF PROPOSED CHANGES TO THE APPROVED DRAINAGE PLAN

DRAINAGE WITHIN THE SUBDIVISION

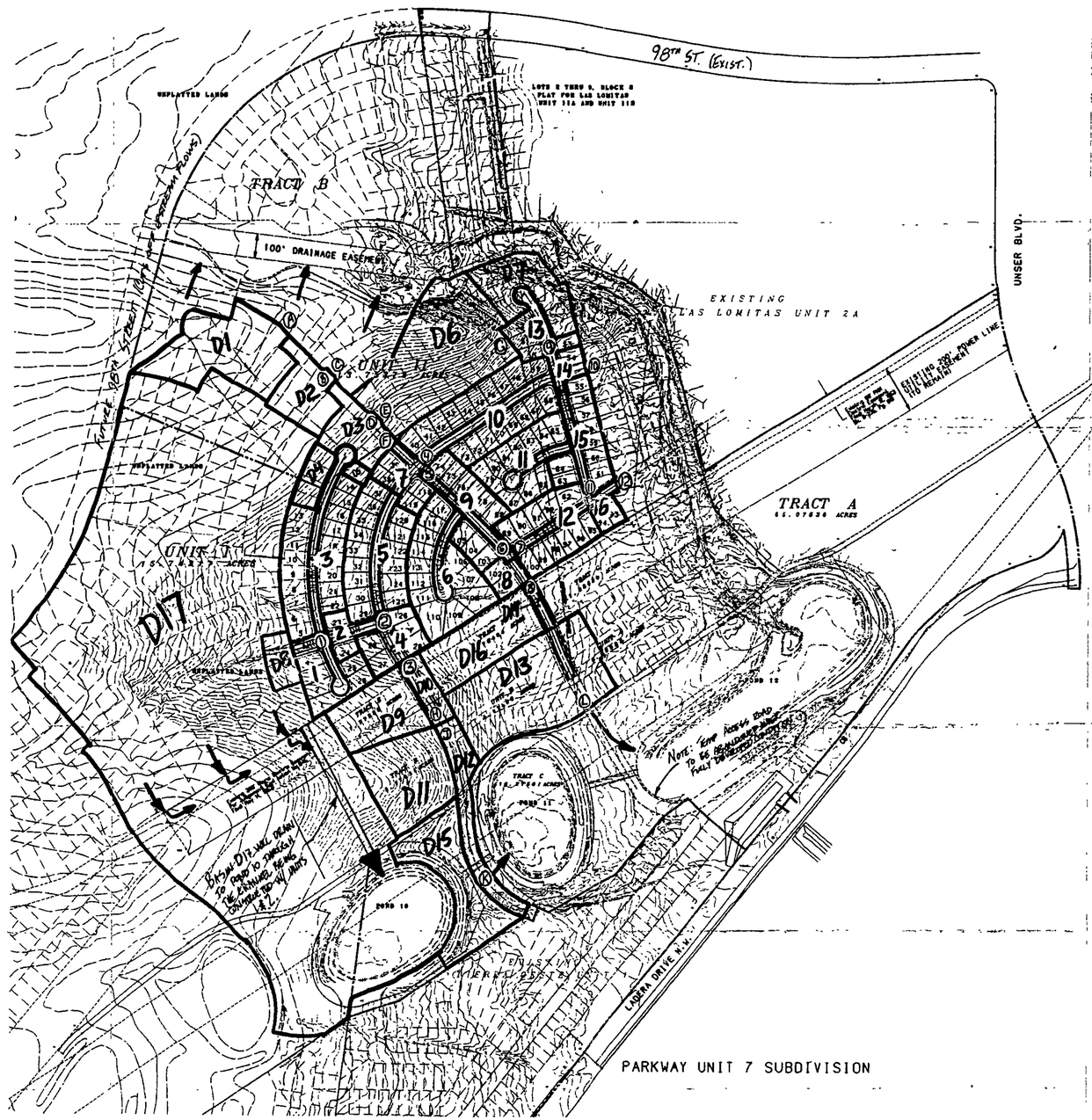
Figure III shows the proposed third phase of the development (Unit IIB). Under the original drainage plan, all three streets in Unit IIB ultimately discharged directly to Calle de Entrada, which was constructed as part of Unit I. No underground storm drain was required. The offsite flows from the property to the west (Westland Development Company property) are detained by an earthen detention pond constructed in an easement dedicated by Westland. These flows are attenuated to 4 cfs discharge to Camino del Venado.

Subsequent to the approval of the original report, new hydrologic analysis methods and hydraulic design standards have been implemented by the City of Albuquerque, and all new developments are subject to the standards, including Unit IIB. This necessitated a reanalysis of the downstream capacity of the flows reaching Calle de Entrada and the downstream pond. The new methodology produced slightly higher flow rates and significantly higher volumes than the previously applied method. Calle de Entrada was at capacity using the previous methods, so the higher flows bring it beyond current standards. This will require construction of underground storm drains in Calle de Entrada to support the proposed subdivision.

Peak flow rates and volumes were developed using current hydrologic methods presented in the Development Process Manual. Table I shows peak flow rates and volumes at analysis points for both the previous reports and the new analysis. Exhibit I included in the back of this report is the original basin map and drainage plan from the "Brasher" drainage report. It shows the locations of basins and analysis points used in the table.

From Las Lomitas Subdivision, City Drainage # H9/D1E

EXHIBIT A



Onsite Developed Basins

BASIN	Area (SQ. FT)	Area (AC)	Land Treatment Percentages A	B	C	D	Q(100) (cfs/ac)	Q(100) (CFS)
1	68278	1.57	0.0%	27.0%	27.0%	46.0%	3.6032	5.65
2	29747	0.68	0.0%	27.0%	27.0%	46.0%	3.6032	2.46
3	165603	3.80	0.0%	27.0%	27.0%	46.0%	3.6032	13.70
4	53105	1.22	0.0%	27.0%	27.0%	46.0%	3.6032	4.39
5	137454	3.16	0.0%	27.0%	27.0%	46.0%	3.6032	11.37
6	107607	2.47	0.0%	27.0%	27.0%	46.0%	3.6032	8.92
7	40428	0.93	0.0%	27.0%	27.0%	46.0%	3.6032	3.34
8	25554	0.59	0.0%	27.0%	27.0%	46.0%	3.6032	2.11
9	91935	2.11	0.0%	27.0%	27.0%	46.0%	3.6032	7.60
10	161511	3.71	0.0%	27.0%	27.0%	46.0%	3.6032	13.36
11	110202	2.53	0.0%	27.0%	27.0%	46.0%	3.6032	9.12
12	104313	2.39	0.0%	27.0%	27.0%	46.0%	3.6032	8.63
13	50410	1.16	0.0%	27.0%	27.0%	46.0%	3.6032	4.17
14	19168	0.44	0.0%	27.0%	27.0%	46.0%	3.6032	1.59
15	91835	2.11	0.0%	27.0%	27.0%	46.0%	3.6032	7.60
16	27451	0.63	0.0%	27.0%	27.0%	46.0%	3.6032	2.27

Developed off "Site" Basins

BASIN	Area (SQ. FT)	Area (AC)	Land Treatment Percentages A	B	C	D	Q(100) (cfs/ac.)	Q(100) (CFS)
D1	138600	3.18	0.0%	27.0%	27.0%	46.0%	3.6032	11.46
D2	54000	1.24	0.0%	27.0%	27.0%	46.0%	3.6032	4.47
D3	51300	1.18	0.0%	27.0%	27.0%	46.0%	3.6032	4.24
D4	36200	0.81	0.0%	27.0%	27.0%	46.0%	3.6032	2.91
D5	6800	0.16	0.0%	27.0%	27.0%	46.0%	3.6032	0.58
D6	230300	5.29	0.0%	27.0%	27.0%	46.0%	3.6032	19.05
D7	91000	2.09	0.0%	27.0%	27.0%	46.0%	3.6032	7.53
D8	33800	0.77	0.0%	27.0%	27.0%	46.0%	3.6032	2.78
D9	90500	2.08	30.0%	30.0%	33.0%	7.0%	2.579	5.36
D10	35100	0.81	0.0%	10.0%	20.0%	70.0%	4.036	3.25
D11	101500	2.33	30.0%	30.0%	33.0%	7.0%	2.579	6.01
D12	66500	1.53	0.0%	10.0%	20.0%	70.0%	4.036	6.18
D13	233500	5.36	0.0%	20.0%	20.0%	60.0%	3.802	20.38
D14	10100	0.23	0.0%	0.0%	25.0%	75.0%	4.245	0.98
D15	122100	2.80	60.0%	10.0%	30.0%	0.0%	2.138	5.99
D16	109700	2.52	60.0%	0.0%	40.0%	0.0%	2.322	5.85
D17	182000	4.18	60.0%	10.0%	30.0%	0.0%	2.138	8.93
D18	28500	0.65	0.0%	10.0%	20.0%	70.0%	4.036	2.64

Analysis Points for Fully Developed Conditions Basin Map

AP	Upstream AP	Q	Contributing Onsite Basins	Q	Contributing Offsite Basins	Q	Total Q
A					40% of D1	4.6	4.6
B					80% of D1,D2	11.3	11.3
C	10% of B	1.1					1.1
D	90% of B	10.2			D3	4.2	14.5
E	10% of D	1.4					1.4
F	90% of D	13.0					13.0
G	E	1.4			D6	19.0	20.5
1			1,3	19.3	D8, D4, D5	6.3	25.6
2	1	25.6	2,5	13.8			39.4
3	2	39.4	4	4.4			43.8
4	10% of F	1.3	40% of 7	1.3			2.6
5	90% of F	11.7	60% of 7	2.0			13.7
6	5	13.7	6,9	16.5			30.2
7	10% of 6	3.0					3.0
8	90% of 6	27.2	8	2.1			29.3
9	G	20.5	13	4.2	D7	7.5	32.2
10	4,9	34.8	10,14	14.9			49.8
11			11,15	16.7			16.7
12	7,11	19.7	12,16	10.9			30.6
H	3	43.8			D9, D10	8.6	52.4
J*	H - 19cfs	33.4					33.4
K	J	33.4			D11, D12, D15	18.2	51.6
L	8	29.3			D13, D14, D16	27.2	56.5
M							0.0
N							0.0

*Note: 2 Single 'A' inlets between AP H and AP J accept 9.5cfs each

Note: Developed Offsite AP's are labeled with letters, while developed onsite AP's are labeled with numbers. Onsite fully developed AP labels correspond to the onsite AP labels for the Proposed Condition. Developed offsite basins are labeled with numbers preceded by the letter 'D'.

N

200 100 0 200

SCALE: 1" = 200'

BOHANNAN-HUSTON INC.
ENGINEERS • PLANNERS • PHOTOGRAMMETRISTS • SURVEYORS • LANDSCAPE ARCHITECTS
ALBUQUERQUE LAS CRUCES SANTA FE

THE CROSSING

UNITS I & II

FULLY DEVELOPED CONDITIONS PLAN

Project No.
Seal
Drawn By: Date: Job No.
Checked By: Scale: Sheet Of

No. Revision

USERNAME=(C9533540)PREPLAT-200.DWF

EXHIBIT B

HYRDOLOGICAL VOLUMETRIC & DISCHARGE DATA (DEVELOPED)										
BASIN I.D.		AREA (AC)	UNITS #	% LAND TREATMENT A	B	C	D		DISCHARGE (CFS) 10 YR	100YR
ONSITE										
Phases 1 thru 3										
POND 9										
A1	AP1	13.65	61	0.0%	25.6%	25.6%	48.8%		27.0	46.2
A2	AP2	0.68	2	0.0%	25.6%	25.6%	48.8%		1.3	2.3
A3-a	AP3	2.17	0	0.0%	25.6%	25.6%	48.8%		4.3	7.3
A3-b		7.40	31	0.0%	25.6%	25.6%	48.8%		14.7	25.1
A4-a	AP4	4.05	19	0.0%	25.6%	25.6%	48.8%		8.0	13.7
A4-b		1.89	8	0.0%	25.6%	25.6%	48.8%		3.7	6.4
A5	AP5	2.68	13	0.0%	25.6%	25.6%	48.8%		5.3	9.0
A6-a	AP6	1.58	7	0.0%	25.6%	25.6%	48.8%		3.1	5.3
A6-b		3.19	11	0.0%	25.6%	25.6%	48.8%		6.3	10.8
A7	AP7	4.66	21	0.0%	25.6%	25.6%	48.8%		9.2	15.8
A8-a	AP8	2.25	11	0.0%	25.6%	25.6%	48.8%		4.4	7.6
A8-b		3.30	16	0.0%	25.6%	25.6%	48.8%		6.5	11.2
A8-c		0.95	6	0.0%	25.6%	25.6%	48.8%		1.9	3.2
A8-d		2.64	11	0.0%	25.6%	25.6%	48.8%		5.2	8.9
A8-e		2.33	7	0.0%	25.6%	25.6%	48.8%		4.6	7.9
A8-f		3.14	16	0.0%	25.6%	25.6%	48.8%		6.2	10.6
A8-g		1.98	8	0.0%	25.6%	25.6%	48.8%		3.9	6.7
A8-h		4.07	21	0.0%	25.6%	25.6%	48.8%		8.1	13.8
A8-i		1.55	0	0.0%	25.6%	25.6%	48.8%		3.1	5.2
SUBTOTAL		64.1	250.0						127.0	217.1
POND 11										
B9-a	AP9	3.27	18	0.0%	25.6%	25.6%	48.8%		6.5	11.06
B9-b		2.38	9	0.0%	25.6%	25.6%	48.8%		4.7	7.99
B10-a	AP10	4.66	28	0.0%	25.6%	25.6%	48.8%		9.2	15.77
B10-b		2.70	12	0.0%	25.6%	25.6%	48.8%		5.4	9.15
B10-c		0.38	2	0.0%	25.6%	25.6%	48.8%		0.7	1.28
B11	AP11	1.58	7	0.0%	25.6%	25.6%	48.8%		3.1	5.35
B12-a	AP12	0.23	0	0.0%	5.0%	5.0%	90.0%		0.6	0.96
B12-b		5.93	40	0.0%	25.6%	25.6%	48.8%		11.7	20.06
B13-a	AP13	1.45	6	0.0%	25.6%	25.6%	48.8%		2.9	4.91
B13-b		6.01	34	0.0%	25.6%	25.6%	48.8%		11.9	20.33
B14-a	AP14	4.42	37	0.0%	25.6%	25.6%	48.8%		8.7	14.94
B14-b		4.34	38	0.0%	25.6%	25.6%	48.8%		8.6	14.70
B14-c		2.38	15	0.0%	25.6%	25.6%	48.8%		4.7	8.05
B14-d		1.96	7	0.0%	25.6%	25.6%	48.8%		3.9	6.62
B15		0.12	0	0.0%	5.0%	5.0%	90.0%		0.3	0.50
SUBTOTAL		41.8	251						83.0	141.7
TOTAL		105.9	520						210.0	358.7
OFFSITE										
OFF 1A		8.79	0	0.0%	25.6%	25.6%	48.8%		17.4	29.76
C1		0.62	0	0.0%	5.0%	5.0%	90.0%		1.7	2.59
SUBTOTAL		9.41	0	0.0%	0.0%	0.0%	0.0%		19.1	32.3

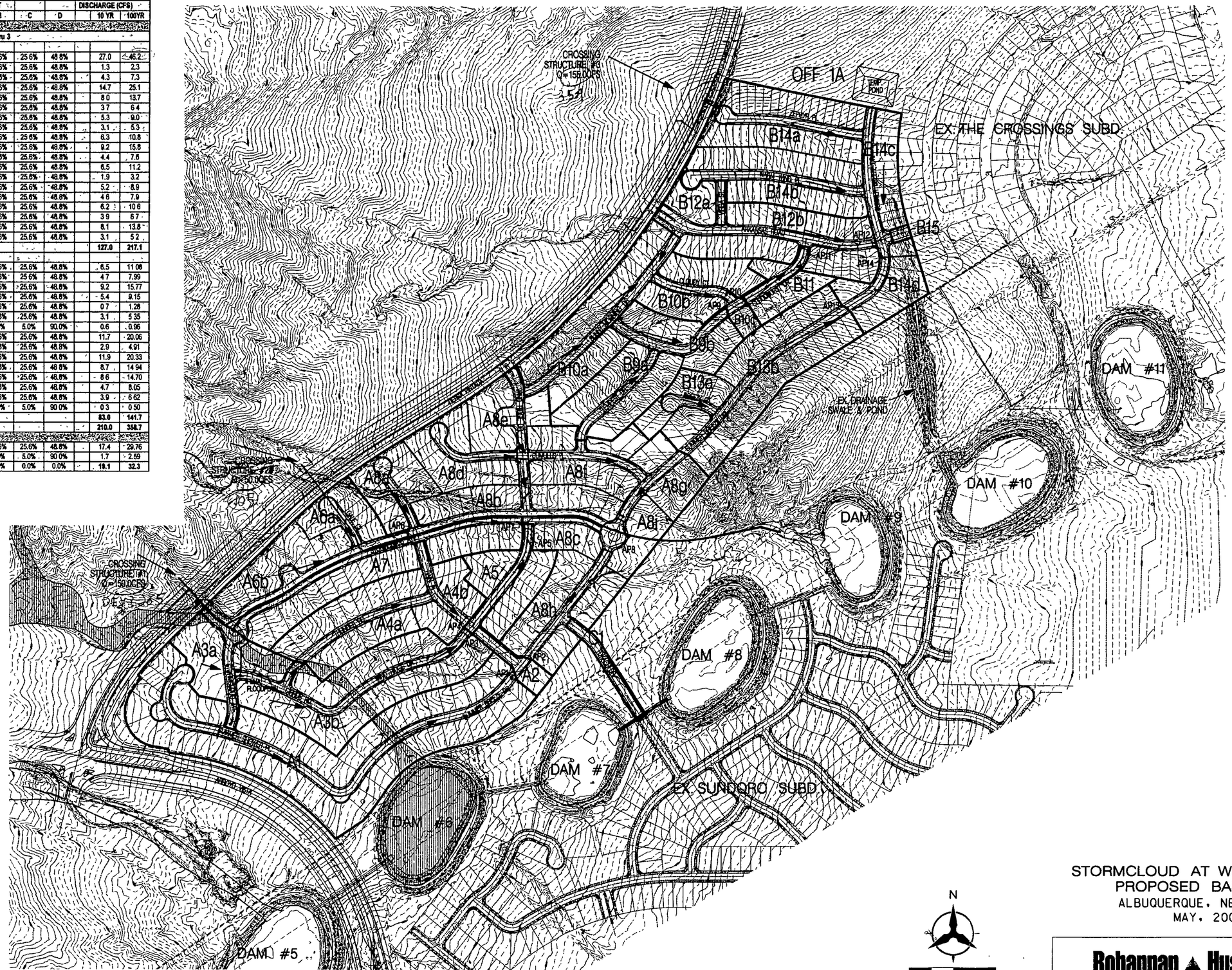
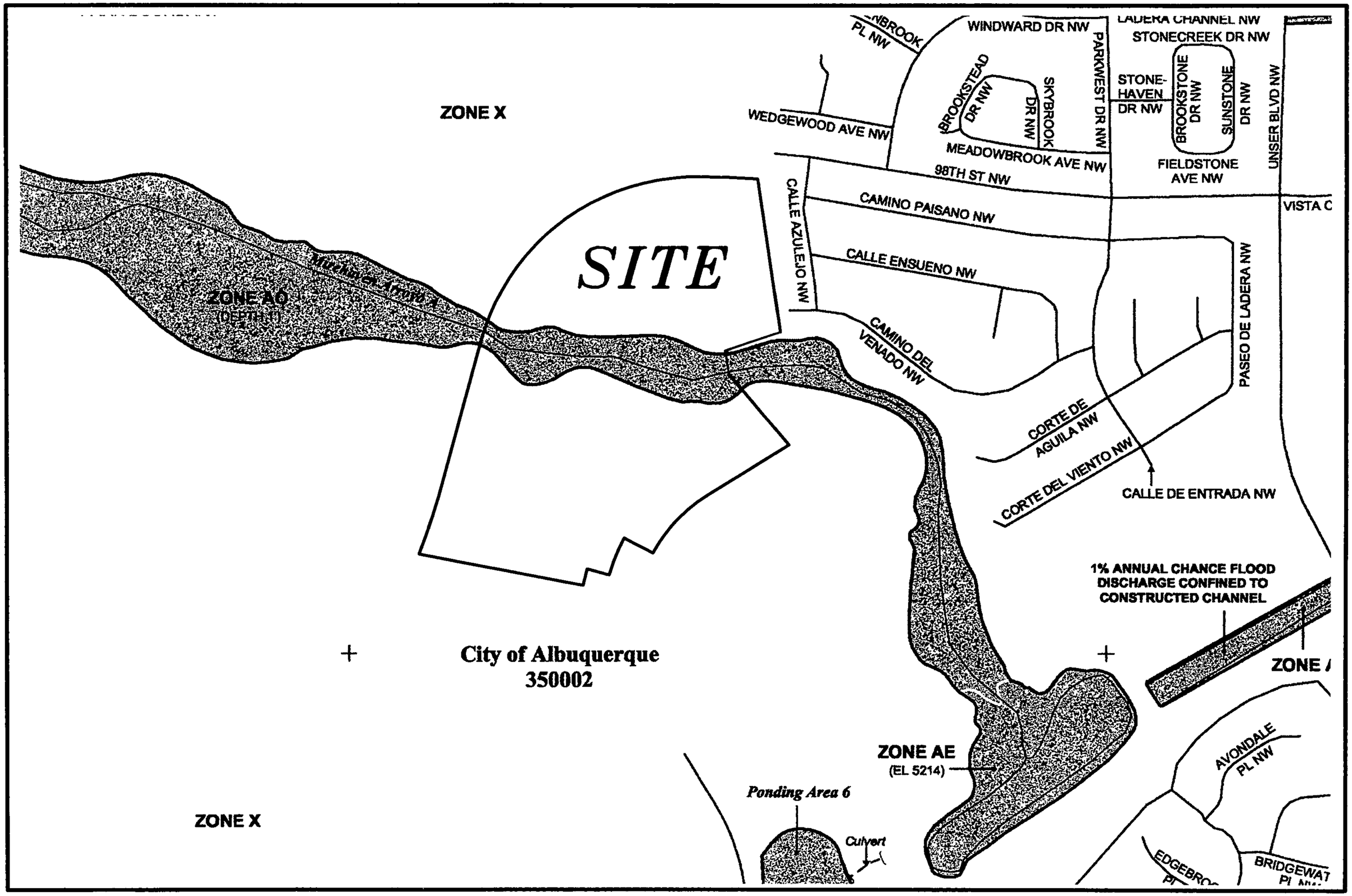


EXHIBIT C

STORMCLOUD AT WESTLAND
PROPOSED BASIN MAP
ALBUQUERQUE, NEW MEXICO
MAY, 2005

Bohannan Huston

Courtyard I, 7500 Jefferson St. NE, Albuquerque, NM 87109-4335



FIRM MAP: 35001C0326 E

EXHIBIT D

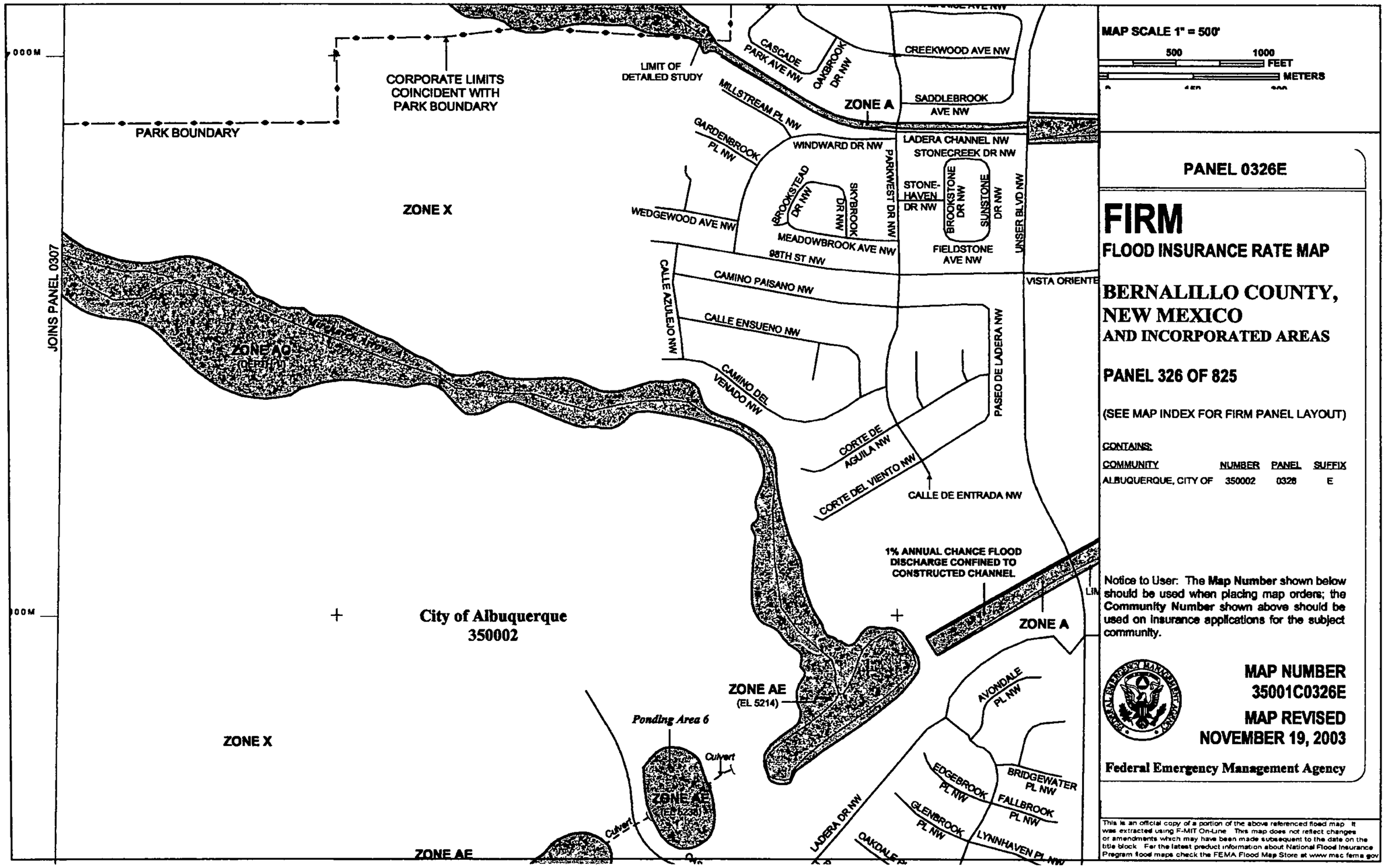

MAP SCALE 1" = 500'
500
1000
FEET
METERS
PANEL 0326E
FIRM
FLOOD INSURANCE RATE MAP
BERNALILLO COUNTY, NEW MEXICO
AND INCORPORATED AREAS
PANEL 326 OF 825
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
ALBUQUERQUE, CITY OF 350002 0326 E
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.
MAP NUMBER
35001C0326E
MAP REVISED
NOVEMBER 19, 2003
Federal Emergency Management Agency
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov
000M
JOINS PANEL 0307
PARK BOUNDARY
CORPORATE LIMITS COINCIDENT WITH PARK BOUNDARY
LIMIT OF DETAILED STUDY
ZONE X
ZONE A
ZONE AO
City of Albuquerque
350002
ZONE AE
(EL 5214)
Ponding Area 6
Culvert
ZONE AE
(EL 5238)
1% ANNUAL CHANCE FLOOD DISCHARGE CONFINED TO CONSTRUCTED CHANNEL
CASCADE PARK AVE NW
OAKBROOK DR NW
CREEKWOOD AVE NW
SADDLEBROOK AVE NW
MILLSTREAM PL NW
GARDENBROOK PL NW
WINDWARD DR NW
LADERA CHANNEL NW
STONECREEK DR NW
PARKWEST DR NW
STONE-HAVEN DR NW
BROOKSTONE DR NW
SUNSTONE DR NW
BROOKSTEAD DR NW
SKYBROOK DR NW
UNSER BLVD NW
WEDGEWOOD AVE NW
MEADOWBROOK AVE NW
FIELDSTONE AVE NW
98TH ST NW
VISTA ORIENTE
CALLE AZULEJO NW
CAMINO PAISANO NW
CALLE ENSUENO NW
CAMINO DEL VENADO NW
PASEO DE LADERA NW
CORTE DE AGUILA NW
CORTE DEL VIENTO NW
CALLE DE ENTRADA NW
AVONDALE PL NW
EDGEBROOK PL NW
BRIDGEWATER PL NW
FALLBROOK PL NW
GLENBROOK PL NW
LYNNHAVEN PL NW
LADERA DR NW
OAKDALE PL

EXHIBIT E

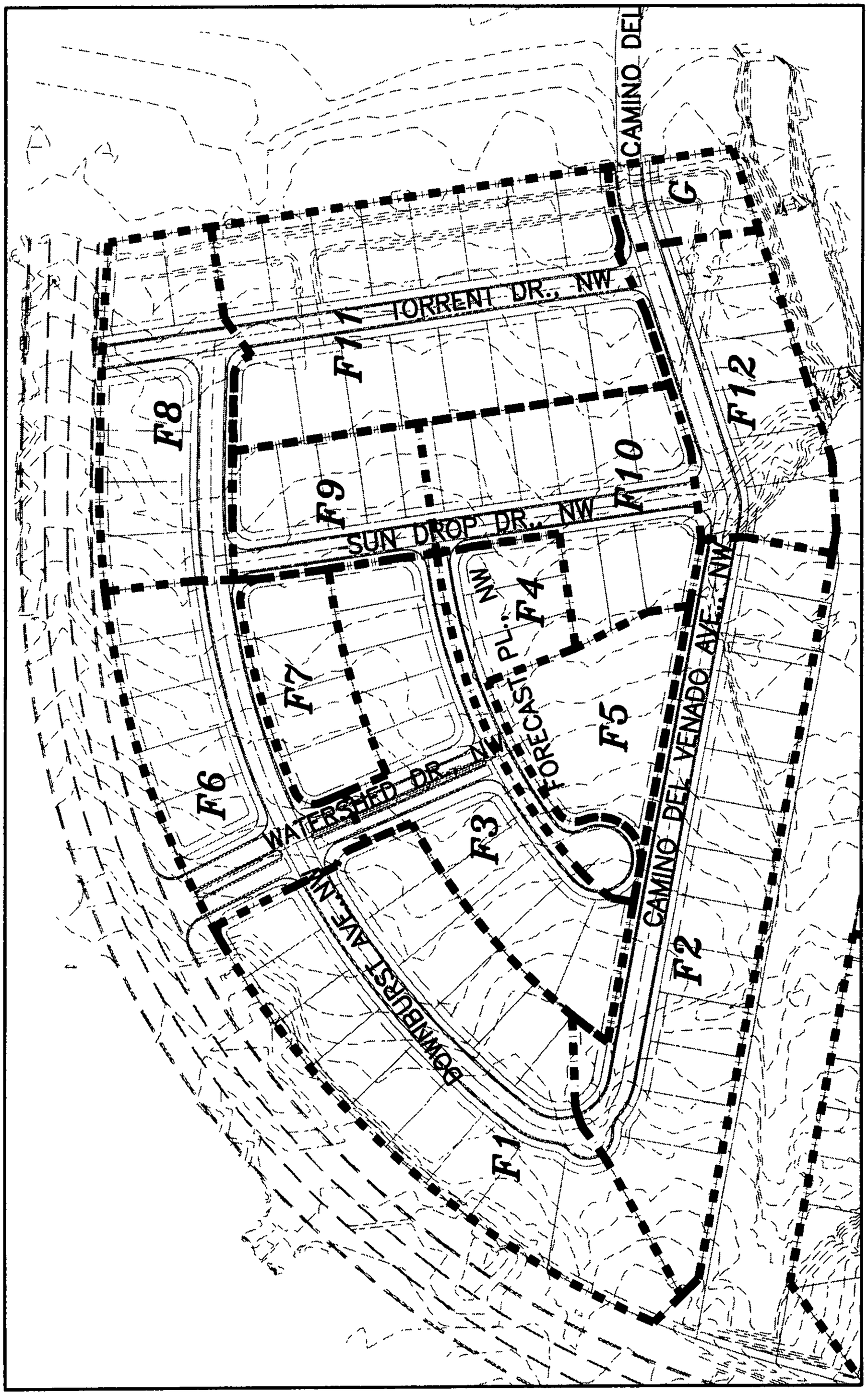

CAMINO DEL
TORRENT DR., NW
SUN DROP DR., NW
WATERSHED DR., NW
FORECAST PL., NW
CAMINO DEL VENADO AVE., NW
BOWNBURST AVE., NW
F1
F2
F3
F4
F5
F6
F7
F8
F9
F10
F11
F12
G

EXHIBIT F

developed flow rate of 1.25 cfs. The flow of 1.25 cfs is less than 4 cfs as it was indicated in the drainage report for Las Lomitas Subdivision Drainage report.

The souther portion of the subdivision (south of Mirehaven Arroyo) is analyzed under the sub-basins A1 through A3, B, C, D, & E (Exhibit G). Basins A1 through A3 fall within Basin Off-1A under the Storm Cloud Units 1 and 2 (which was designed for a future developed runoff of 29.76 cfs). Sub-basins A1 through A3 drain to a series of inlets within sub-basin A3 and then discharge to a proposed 24" sd pipe at a total developed flow rate of 26.88 cfs (which is less than allowable flow rate of 29.76 cfs). Sub-basin B with a developed runoff of 3.23 cfs drains to Animas Place NW (The Crossing Subdivision). Sub-basin B fall withing Basins D4 (2.91 cfs developed runoff) and D5 (0.56 developed runoff) under the Crossing Subdivision. Therefore, the discharge from our sub-basin B (3.23 cfs) is slightly lower than the allowed total discharge for Basins D4 and D5 (3.47 cfs). Sub-basin C with developed runoff rate of 12.80 cfs drains to Gunnison Place. Based on the Analysis Point F under the basin map for the Crossing Subdivision 13.00 cfs is designed to enter Gunnison Place. Sub-basins D1 through D5 drain to a series of inlets and then discharges to Mirehaven Arroyo via 30" Storm sewer pipe at a flow rate of 40.88 cfs. Sub-basin E with a developed flow rate of 19.22 cfs discharge into Henry Fork Road. Sub-basin E drains to Discharge Point G under the Crossing Subdivision basin map with allowable discharge rate of 20.50 cfs. Mirahaven Arroyo will be chanalized per Wilson and Company Design (see Section VIII for copies of the construction plans). Box culverts will be placed at the Tierra Pintada Street at the arroyo crossing. Box culvert would be built with a total opening width of 36' by a

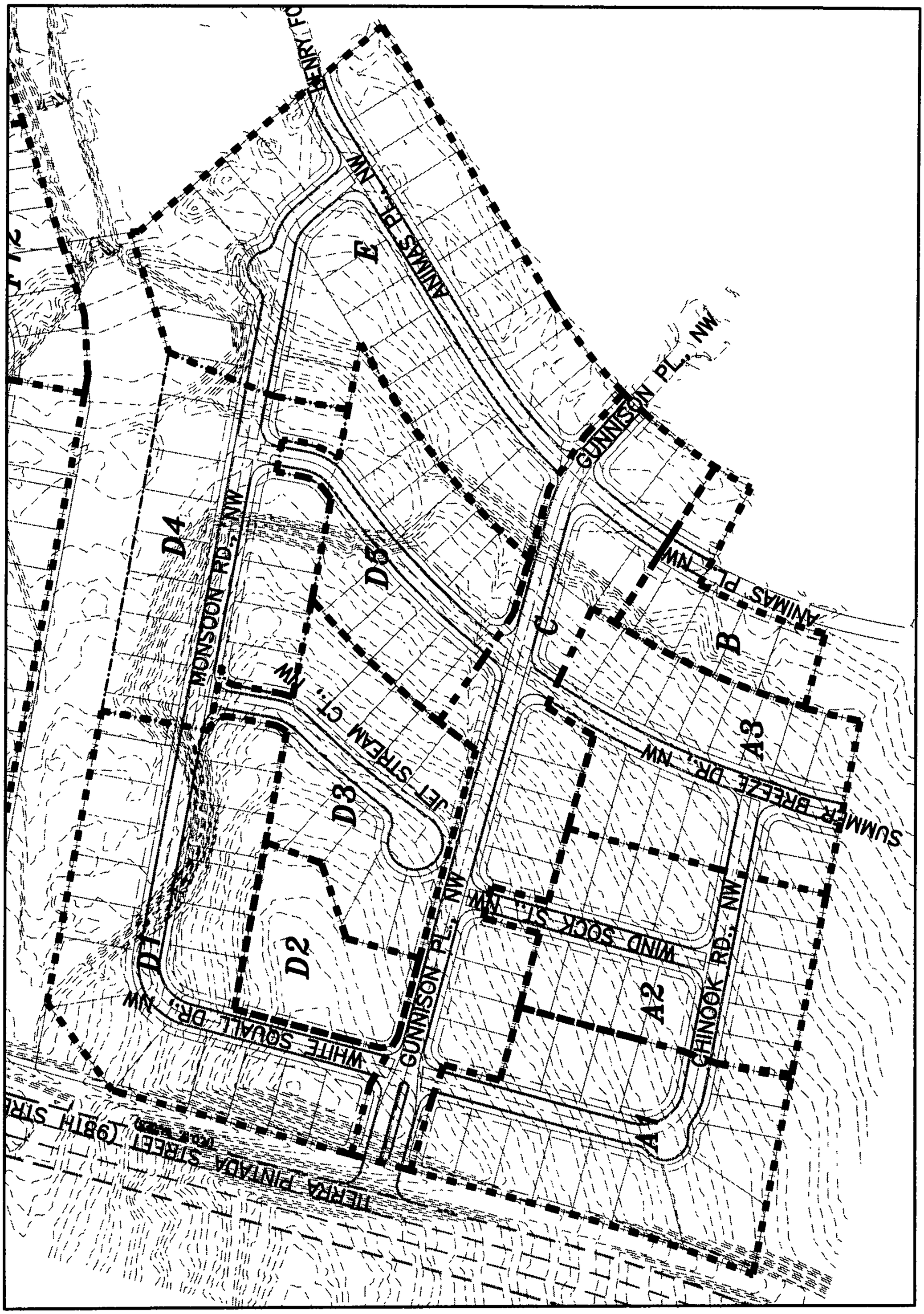

HENRY FO
ANIMAS PL., NW
E
GUNNISON PL., NW
ANIMAS PL., NW
D4
D5
C
B
MONSOON RD., NW
JET STREAM CT., NW
A3
SUMMER BREEZE DR., NW
D3
WIND SOCK ST., NW
D2
GUNNISON PL., NW
A2
CHINOOK RD., NW
D1
WHITE SQUALL DR., NW
A1
SIERRA PINTADA STREET (98TH STRE

EXHIBIT G

height of 5' (a combination of 2-10x5 and 2-8x5 culverts). Tierra Pintada Street is designed by BHI under City Project Number 650281.

Calculations

City of Albuquerque, Development Process Manuel, Section 22.2, Hydrology Section, was used for runoff calculations. See this report for Summary Table for runoff results. See also this report for AHYMO input and output files for runoff calculations as well as other calculations.

Section II

Basin Table
Runoff Calculations Result Tables
AHYMO Input & Output Files

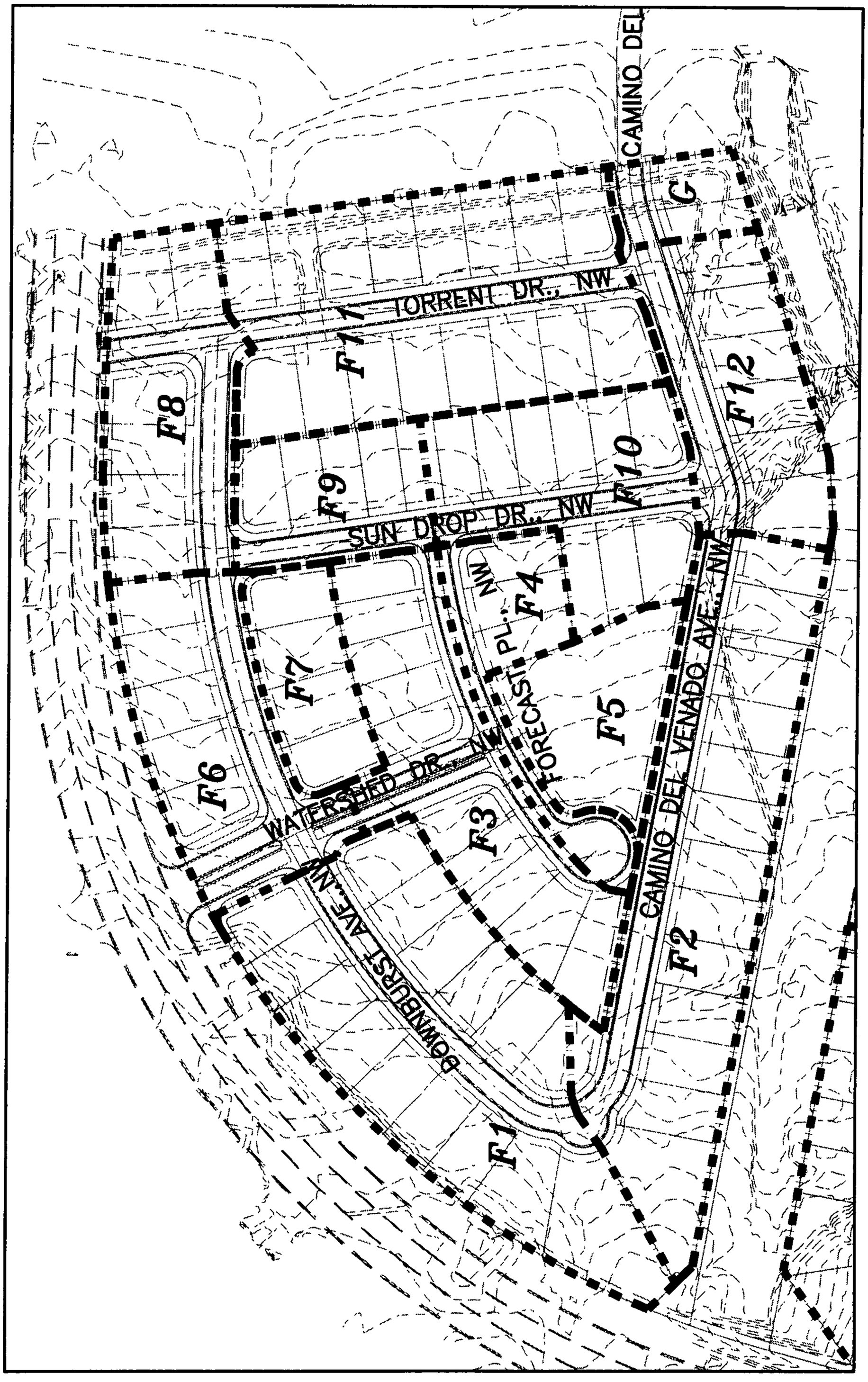

CAMINO DEL
G
TORRENT DR., NW
F11
F8
F12
F10
F9
SUN DROP DR., NW
NW
F4
PL.,
F7
FORECAST
F5
F6
WATERSHED DR., NW
F3
BOWNHURST AVE., NW
CAMINO DEL VENADO AVE., NW
F2
F1

EXHIBIT F

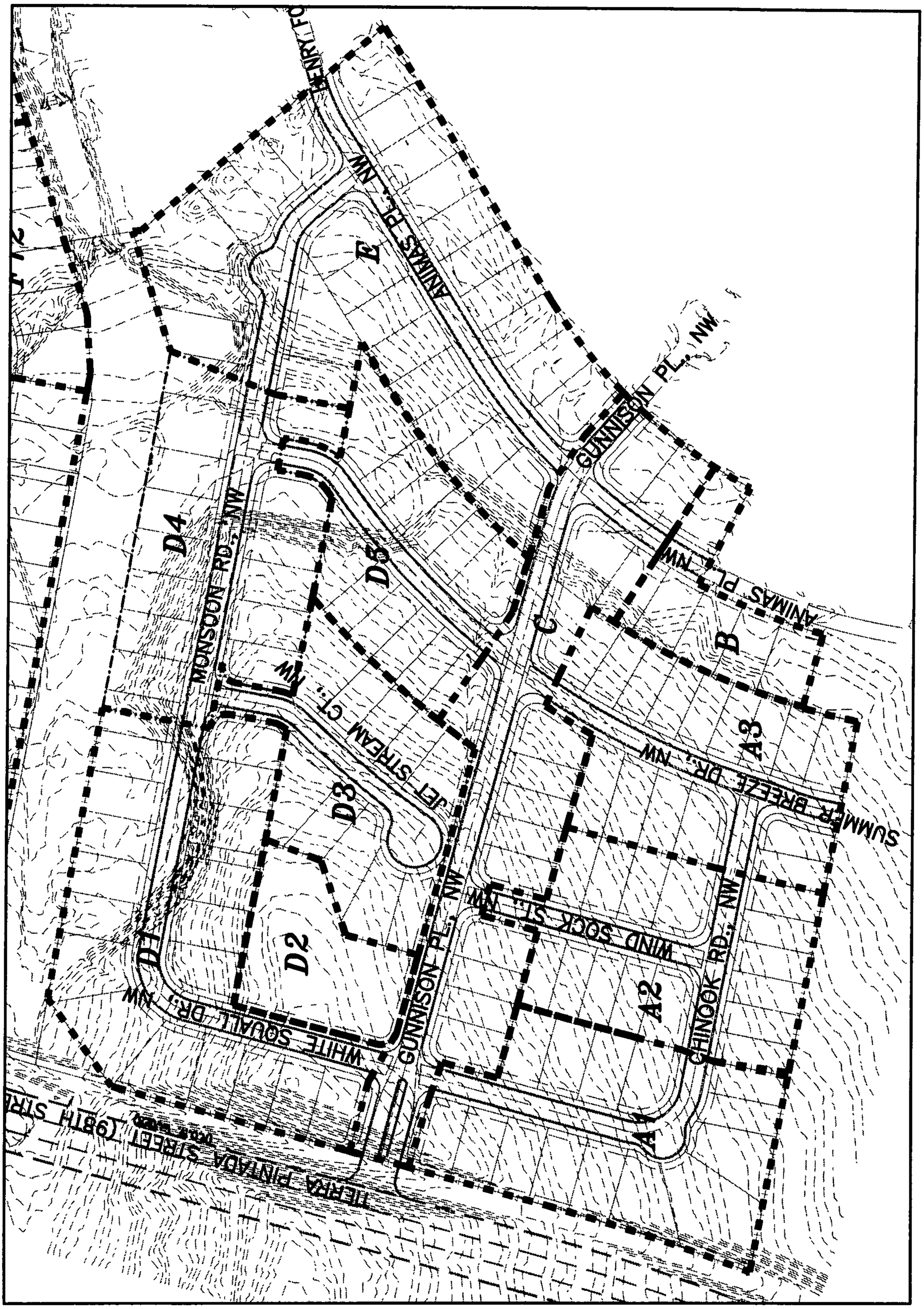

HENRY LE FO
ANIMAS PL., NW
GUNNISON PL., NW
ANIMAS PL., NW
MONSOON RD., NW
JET STREAM CT., NW
SUMMER BREEZE DR., NW
WIND SOCK ST., NW
CHINOOK RD., NW
WHITE SQUALL DR., NW
GUNNISON PL., NW
SIERRA PINTADA STREET (98TH STRE
D4
D3
D2
D1
C
B
A3
A2
A1

EXHIBIT G

BASIN TABLE

BASIN	AREA (SF)	AREA (AC)	AREA (MI^2)
BASIN A1	128376.71	2.9471	0.004605
BASIN A2	110396.21	2.5343	0.003960
BASIN A3	112577.34	2.5844	0.004038
BASIN B	42134.42	0.9673	0.001511
BASIN C	167434.99	3.8438	0.006006
BASIN D1	176512.10	4.0522	0.006332
BASIN D2	45211.07	1.0379	0.001622
BASIN D3	95115.78	2.1836	0.003412
BASIN D4	123995.55	2.8465	0.004448
BASIN D5	93501.48	2.1465	0.003354
BASIN E	251422.35	5.7719	0.009019
BASIN F1	142818.08	3.2787	0.005123
BASIN F2	137248.42	3.1508	0.004923
BASIN F3	84484.49	1.9395	0.003030
BASIN F4	34720.79	0.7971	0.001245
BASIN F5	40248.33	0.9240	0.001444
BASIN F6	68287.29	1.5677	0.002449
BASIN F7	30025.89	0.6893	0.001077
BASIN F8	65061.93	1.4936	0.002334
BASIN F9	37478.57	0.8604	0.001344
BASIN F10	68879.03	1.5812	0.002471
BASIN F11	133939.47	3.0748	0.004804
BASIN F12	61888.76	1.4208	0.002220
BASIN G	16134.52	0.3704	0.000579

RUNOFF CALCULATION RESULTS TABLE

HISTORICAL

BASIN	Q-100 CFS	Q-10 CFS	TREATMENT A, B, C, D
BASIN A1	3.83	0.73	100%, 0%, 0%, 0%
BASIN A2	3.29	0.62	100%, 0%, 0%, 0%
BASIN A3	3.36	0.64	100%, 0%, 0%, 0%
BASIN B	1.26	0.24	100%, 0%, 0%, 0%
BASIN C	4.99	0.95	100%, 0%, 0%, 0%
BASIN D1	5.26	1.00	100%, 0%, 0%, 0%
BASIN D2	1.35	0.26	100%, 0%, 0%, 0%
BASIN D3	2.84	0.54	100%, 0%, 0%, 0%
BASIN D4	3.70	0.70	100%, 0%, 0%, 0%
BASIN D5	2.79	0.53	100%, 0%, 0%, 0%
BASIN E	7.49	1.42	100%, 0%, 0%, 0%
BASIN F1	4.26	0.81	100%, 0%, 0%, 0%
BASIN F2	4.09	0.78	100%, 0%, 0%, 0%
BASIN F3	2.52	0.48	100%, 0%, 0%, 0%
BASIN F4	1.04	0.20	100%, 0%, 0%, 0%
BASIN F5	1.20	0.23	100%, 0%, 0%, 0%
BASIN F6	2.04	0.39	100%, 0%, 0%, 0%
BASIN F7	0.90	0.17	100%, 0%, 0%, 0%
BASIN F8	1.94	0.37	100%, 0%, 0%, 0%
BASIN F9	1.12	0.21	100%, 0%, 0%, 0%
BASIN F10	2.06	0.39	100%, 0%, 0%, 0%
BASIN F11	3.99	0.76	100%, 0%, 0%, 0%
BASIN F12	1.85	0.35	100%, 0%, 0%, 0%
BASIN G	0.49	0.09	100%, 0%, 0%, 0%

RUNOFF CALCULATION RESULTS TABLE

PROPOSED

BASIN	Q-100 CFS	Q-10 CFS	TREATMENT A,	B,	C,	D
BASIN A1	9.82	5.65	0%,	27%,	27%,	46%
BASIN A2	8.45	4.86	0%,	27%,	27%,	46%
BASIN A3	8.61	4.96	0%,	27%,	27%,	46%
BASIN B	3.23	1.86	0%,	27%,	27%,	46%
BASIN C	12.80	7.37	0%,	27%,	27%,	46%
BASIN D1	13.50	7.76	0%,	27%,	27%,	46%
BASIN D2	3.47	2.00	0%,	27%,	27%,	46%
BASIN D3	7.28	4.19	0%,	27%,	27%,	46%
BASIN D4	9.48	5.46	0%,	27%,	27%,	46%
BASIN D5	7.15	4.12	0%,	27%,	27%,	46%
BASIN E	19.22	11.06	0%,	27%,	27%,	46%
BASIN F1	10.92	6.28	0%,	27%,	27%,	46%
BASIN F2	10.50	6.04	0%,	27%,	27%,	46%
BASIN F3	6.47	3.72	0%,	27%,	27%,	46%
BASIN F4	2.67	1.53	0%,	27%,	27%,	46%
BASIN F5	3.09	1.78	0%,	27%,	27%,	46%
BASIN F6	5.23	3.01	0%,	27%,	27%,	46%
BASIN F7	2.31	1.33	0%,	27%,	27%,	46%
BASIN F8	4.98	2.87	0%,	27%,	27%,	46%
BASIN F9	2.88	1.66	0%,	27%,	27%,	46%
BASIN F10	5.28	3.04	0%,	27%,	27%,	46%
BASIN F11	10.24	5.89	0%,	27%,	27%,	46%
BASIN F12	4.74	2.73	0%,	27%,	27%,	46%
BASIN G	1.25	0.72	0%,	27%,	27%,	46%

AHYMO INPUT FILE

```
*
* ZONE 1
*
*****************************************************************
*        100-YEAR,  6-HR STORM (UNDER EXISTING CONDITIONS)      *
*****************************************************************
START                   TIME=0.0
RAINFALL                TYPE=1 RAIN QUARTER=0.0 IN
                        RAIN ONE=1.87 IN RAIN SIX=2.20 IN
                        RAIN DAY=2.66 IN DT=0.03333 HR
* BASIN A1
COMPUTE NM HYD          ID=1 HYD NO=100.1 AREA=0.004605 SQ MI
                        PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                        TP=0.1333 HR MASS RAINFALL=-1
* BASIN A2
COMPUTE NM HYD          ID=1 HYD NO=100.2 AREA=0.003960 SQ MI
                        PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                        TP=0.1333 HR MASS RAINFALL=-1
* BASIN A3
COMPUTE NM HYD          ID=1 HYD NO=100.3 AREA=0.004038 SQ MI
                        PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                        TP=0.1333 HR MASS RAINFALL=-1
* BASIN B
COMPUTE NM HYD          ID=1 HYD NO=100.4 AREA=0.001511 SQ MI
                        PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                        TP=0.1333 HR MASS RAINFALL=-1
* BASIN C
COMPUTE NM HYD          ID=1 HYD NO=100.5 AREA=0.006006 SQ MI
                        PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                        TP=0.1333 HR MASS RAINFALL=-1
* BASIN D1
COMPUTE NM HYD          ID=1 HYD NO=100.6 AREA=0.006332 SQ MI
                        PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                        TP=0.1333 HR MASS RAINFALL=-1
* BASIN D2
COMPUTE NM HYD          ID=1 HYD NO=100.7 AREA=0.001622 SQ MI
                        PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                        TP=0.1333 HR MASS RAINFALL=-1
* BASIN D3
COMPUTE NM HYD          ID=1 HYD NO=100.8 AREA=0.003412 SQ MI
                        PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                        TP=0.1333 HR MASS RAINFALL=-1
* BASIN D4
COMPUTE NM HYD          ID=1 HYD NO=100.9 AREA=0.004448 SQ MI
                        PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                        TP=0.1333 HR MASS RAINFALL=-1
* BASIN D5
COMPUTE NM HYD          ID=1 HYD NO=100.10 AREA=0.003354 SQ MI
                        PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                        TP=0.1333 HR MASS RAINFALL=-1
* BASIN E
COMPUTE NM HYD          ID=1 HYD NO=100.11 AREA=0.009019 SQ MI
                        PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                        TP=0.1333 HR MASS RAINFALL=-1
* BASIN F1
COMPUTE NM HYD          ID=1 HYD NO=100.12 AREA=0.005123 SQ MI
                        PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                        TP=0.1333 HR MASS RAINFALL=-1
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* BASIN F2
COMPUTE NM HYD        ID=1 HYD NO=100.13 AREA=0.004923 SQ MI
                      PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                      TP=0.1333 HR MASS RAINFALL=-1
* BASIN F3
COMPUTE NM HYD        ID=1 HYD NO=100.14 AREA=0.003030 SQ MI
                      PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                      TP=0.1333 HR MASS RAINFALL=-1
* BASIN F4
COMPUTE NM HYD        ID=1 HYD NO=100.15 AREA=0.001245 SQ MI
                      PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                      TP=0.1333 HR MASS RAINFALL=-1
* BASIN F5
COMPUTE NM HYD        ID=1 HYD NO=100.16 AREA=0.001444 SQ MI
                      PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                      TP=0.1333 HR MASS RAINFALL=-1
* BASIN F6
COMPUTE NM HYD        ID=1 HYD NO=100.17 AREA=0.002449 SQ MI
                      PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                      TP=0.1333 HR MASS RAINFALL=-1
* BASIN F7
COMPUTE NM HYD        ID=1 HYD NO=100.18 AREA=0.001077 SQ MI
                      PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                      TP=0.1333 HR MASS RAINFALL=-1
* BASIN F8
COMPUTE NM HYD        ID=1 HYD NO=100.19 AREA=0.002334 SQ MI
                      PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                      TP=0.1333 HR MASS RAINFALL=-1
* BASIN F9
COMPUTE NM HYD        ID=1 HYD NO=100.20 AREA=0.001344 SQ MI
                      PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                      TP=0.1333 HR MASS RAINFALL=-1
* BASIN F10
COMPUTE NM HYD        ID=1 HYD NO=100.21 AREA=0.002471 SQ MI
                      PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                      TP=0.1333 HR MASS RAINFALL=-1
* BASIN F11
COMPUTE NM HYD        ID=1 HYD NO=100.22 AREA=0.004804 SQ MI
                      PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                      TP=0.1333 HR MASS RAINFALL=-1
* BASIN F12
COMPUTE NM HYD        ID=1 HYD NO=100.23 AREA=0.002220 SQ MI
                      PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                      TP=0.1333 HR MASS RAINFALL=-1
* BASIN G
COMPUTE NM HYD        ID=1 HYD NO=100.24 AREA=0.000579 SQ MI
                      PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                      TP=0.1333 HR MASS RAINFALL=-1
*************************************************************
*         10-YEAR,  6-HR STORM (UNDER EXISTING CONDITIONS)  *
*************************************************************
START                 TIME=0.0
RAINFALL              TYPE=1 RAIN QUARTER=0.0 IN
                      RAIN ONE=1.25 IN RAIN SIX=1.47 IN
                      RAIN DAY=1.77 IN DT=0.03333 HR
* BASIN A1
COMPUTE NM HYD        ID=1 HYD NO=110.1 AREA=0.004605 SQ MI
                      PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                      TP=0.1333 HR MASS RAINFALL=-1
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* BASIN A2
COMPUTE NM HYD      ID=1 HYD NO=110.2 AREA=0.003960 SQ MI
                    PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                    TP=0.1333 HR MASS RAINFALL=-1
* BASIN A3
COMPUTE NM HYD      ID=1 HYD NO=110.3 AREA=0.004038 SQ MI
                    PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                    TP=0.1333 HR MASS RAINFALL=-1
* BASIN B
COMPUTE NM HYD      ID=1 HYD NO=110.4 AREA=0.001511 SQ MI
                    PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                    TP=0.1333 HR MASS RAINFALL=-1
* BASIN C
COMPUTE NM HYD      ID=1 HYD NO=110.5 AREA=0.006006 SQ MI
                    PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                    TP=0.1333 HR MASS RAINFALL=-1
* BASIN D1
COMPUTE NM HYD      ID=1 HYD NO=110.6 AREA=0.006332 SQ MI
                    PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                    TP=0.1333 HR MASS RAINFALL=-1
* BASIN D2
COMPUTE NM HYD      ID=1 HYD NO=110.7 AREA=0.001622 SQ MI
                    PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                    TP=0.1333 HR MASS RAINFALL=-1
* BASIN D3
COMPUTE NM HYD      ID=1 HYD NO=110.8 AREA=0.003412 SQ MI
                    PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                    TP=0.1333 HR MASS RAINFALL=-1
* BASIN D4
COMPUTE NM HYD      ID=1 HYD NO=110.9 AREA=0.004448 SQ MI
                    PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                    TP=0.1333 HR MASS RAINFALL=-1
* BASIN D5
COMPUTE NM HYD      ID=1 HYD NO=110.10 AREA=0.003354 SQ MI
                    PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                    TP=0.1333 HR MASS RAINFALL=-1
* BASIN E
COMPUTE NM HYD      ID=1 HYD NO=110.11 AREA=0.009019 SQ MI
                    PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                    TP=0.1333 HR MASS RAINFALL=-1
* BASIN F1
COMPUTE NM HYD      ID=1 HYD NO=110.12 AREA=0.005123 SQ MI
                    PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                    TP=0.1333 HR MASS RAINFALL=-1
* BASIN F2
COMPUTE NM HYD      ID=1 HYD NO=110.13 AREA=0.004923 SQ MI
                    PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                    TP=0.1333 HR MASS RAINFALL=-1
* BASIN F3
COMPUTE NM HYD      ID=1 HYD NO=110.14 AREA=0.003030 SQ MI
                    PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                    TP=0.1333 HR MASS RAINFALL=-1
* BASIN F4
COMPUTE NM HYD      ID=1 HYD NO=110.15 AREA=0.001245 SQ MI
                    PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                    TP=0.1333 HR MASS RAINFALL=-1
* BASIN F5
COMPUTE NM HYD      ID=1 HYD NO=110.16 AREA=0.001444 SQ MI
                    PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                    TP=0.1333 HR MASS RAINFALL=-1
```

```
* BASIN F6
COMPUTE NM HYD        ID=1 HYD NO=110.17 AREA=0.002449 SQ MI
                      PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                      TP=0.1333 HR MASS RAINFALL=-1
* BASIN F7
COMPUTE NM HYD        ID=1 HYD NO=110.18 AREA=0.001077 SQ MI
                      PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                      TP=0.1333 HR MASS RAINFALL=-1
* BASIN F8
COMPUTE NM HYD        ID=1 HYD NO=110.19 AREA=0.002334 SQ MI
                      PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                      TP=0.1333 HR MASS RAINFALL=-1
* BASIN F9
COMPUTE NM HYD        ID=1 HYD NO=110.20 AREA=0.001344 SQ MI
                      PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                      TP=0.1333 HR MASS RAINFALL=-1
* BASIN F10
COMPUTE NM HYD        ID=1 HYD NO=110.21 AREA=0.002471 SQ MI
                      PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                      TP=0.1333 HR MASS RAINFALL=-1
* BASIN F11
COMPUTE NM HYD        ID=1 HYD NO=110.22 AREA=0.004804 SQ MI
                      PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                      TP=0.1333 HR MASS RAINFALL=-1
* BASIN F12
COMPUTE NM HYD        ID=1 HYD NO=110.23 AREA=0.002220 SQ MI
                      PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                      TP=0.1333 HR MASS RAINFALL=-1
* BASIN G
COMPUTE NM HYD        ID=1 HYD NO=110.24 AREA=0.000579 SQ MI
                      PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                      TP=0.1333 HR MASS RAINFALL=-1
*************************************************************
*        100-YEAR,  6-HR STORM (UNDER PROPOSED CONDITIONS)  *
*************************************************************
START                 TIME=0.0
RAINFALL              TYPE=1 RAIN QUARTER=0.0 IN
                      RAIN ONE=1.87 IN RAIN SIX=2.20 IN
                      RAIN DAY=2.66 IN DT=0.03333 HR
* BASIN A1
COMPUTE NM HYD        ID=1 HYD NO=200.1 AREA=0.004605 SQ MI
                      PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                      TP=0.1333 HR MASS RAINFALL=-1
* BASIN A2
COMPUTE NM HYD        ID=1 HYD NO=200.2 AREA=0.003960 SQ MI
                      PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                      TP=0.1333 HR MASS RAINFALL=-1
* BASIN A3
COMPUTE NM HYD        ID=1 HYD NO=200.3 AREA=0.004038 SQ MI
                      PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                      TP=0.1333 HR MASS RAINFALL=-1
* BASIN B
COMPUTE NM HYD        ID=1 HYD NO=200.4 AREA=0.001511 SQ MI
                      PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                      TP=0.1333 HR MASS RAINFALL=-1
* BASIN C
COMPUTE NM HYD        ID=1 HYD NO=200.5 AREA=0.006006 SQ MI
                      PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                      TP=0.1333 HR MASS RAINFALL=-1
```

```
* BASIN D1
COMPUTE NM HYD       ID=1 HYD NO=200.6 AREA=0.006332 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN D2
COMPUTE NM HYD       ID=1 HYD NO=200.7 AREA=0.001622 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN D3
COMPUTE NM HYD       ID=1 HYD NO=200.8 AREA=0.003412 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN D4
COMPUTE NM HYD       ID=1 HYD NO=200.9 AREA=0.004448 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN D5
COMPUTE NM HYD       ID=1 HYD NO=200.10 AREA=0.003354 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN E
COMPUTE NM HYD       ID=1 HYD NO=200.11 AREA=0.009019 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN F1
COMPUTE NM HYD       ID=1 HYD NO=200.12 AREA=0.005123 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN F2
COMPUTE NM HYD       ID=1 HYD NO=200.13 AREA=0.004923 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN F3
COMPUTE NM HYD       ID=1 HYD NO=200.14 AREA=0.003030 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN F4
COMPUTE NM HYD       ID=1 HYD NO=200.15 AREA=0.001245 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN F5
COMPUTE NM HYD       ID=1 HYD NO=200.16 AREA=0.001444 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN F6
COMPUTE NM HYD       ID=1 HYD NO=200.17 AREA=0.002449 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN F7
COMPUTE NM HYD       ID=1 HYD NO=200.18 AREA=0.001077 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN F8
COMPUTE NM HYD       ID=1 HYD NO=200.19 AREA=0.002334 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN F9
COMPUTE NM HYD       ID=1 HYD NO=200.20 AREA=0.001344 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
```

```
* BASIN F10
COMPUTE NM HYD       ID=1 HYD NO=200.21 AREA=0.002471 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN F11
COMPUTE NM HYD       ID=1 HYD NO=200.22 AREA=0.004804 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN F12
COMPUTE NM HYD       ID=1 HYD NO=200.23 AREA=0.002220 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN G
COMPUTE NM HYD       ID=1 HYD NO=200.24 AREA=0.000579 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
*************************************************************
*         10-YEAR,  6-HR STORM (UNDER PROPOSED CONDITIONS)  *
*************************************************************
START                TIME=0.0
RAINFALL             TYPE=1 RAIN QUARTER=0.0 IN
                     RAIN ONE=1.25 IN RAIN SIX=1.47 IN
                     RAIN DAY=1.77 IN DT=0.03333 HR
* BASIN A1
COMPUTE NM HYD       ID=1 HYD NO=210.1 AREA=0.004605 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN A2
COMPUTE NM HYD       ID=1 HYD NO=210.2 AREA=0.003960 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN A3
COMPUTE NM HYD       ID=1 HYD NO=210.3 AREA=0.004038 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN B
COMPUTE NM HYD       ID=1 HYD NO=210.4 AREA=0.001511 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN C
COMPUTE NM HYD       ID=1 HYD NO=210.5 AREA=0.006006 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN D1
COMPUTE NM HYD       ID=1 HYD NO=210.6 AREA=0.006332 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN D2
COMPUTE NM HYD       ID=1 HYD NO=210.7 AREA=0.001622 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN D3
COMPUTE NM HYD       ID=1 HYD NO=210.8 AREA=0.003412 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN D4
COMPUTE NM HYD       ID=1 HYD NO=210.9 AREA=0.004448 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
```

```
* BASIN D5
COMPUTE NM HYD       ID=1 HYD NO=210.10 AREA=0.003354 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN E
COMPUTE NM HYD       ID=1 HYD NO=210.11 AREA=0.009019 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN F1
COMPUTE NM HYD       ID=1 HYD NO=210.12 AREA=0.005123 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN F2
COMPUTE NM HYD       ID=1 HYD NO=210.13 AREA=0.004923 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN F3
COMPUTE NM HYD       ID=1 HYD NO=210.14 AREA=0.003030 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN F4
COMPUTE NM HYD       ID=1 HYD NO=210.15 AREA=0.001245 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN F5
COMPUTE NM HYD       ID=1 HYD NO=210.16 AREA=0.001444 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN F6
COMPUTE NM HYD       ID=1 HYD NO=210.17 AREA=0.002449 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN F7
COMPUTE NM HYD       ID=1 HYD NO=210.18 AREA=0.001077 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN F8
COMPUTE NM HYD       ID=1 HYD NO=210.19 AREA=0.002334 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN F9
COMPUTE NM HYD       ID=1 HYD NO=210.20 AREA=0.001344 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN F10
COMPUTE NM HYD       ID=1 HYD NO=210.21 AREA=0.002471 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN F11
COMPUTE NM HYD       ID=1 HYD NO=210.22 AREA=0.004804 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN F12
COMPUTE NM HYD       ID=1 HYD NO=210.23 AREA=0.002220 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
* BASIN G
COMPUTE NM HYD       ID=1 HYD NO=210.24 AREA=0.000579 SQ MI
                     PER A=0.00 PER B=27.00 PER C=27.00 PER D=46.00
                     TP=0.1333 HR MASS RAINFALL=-1
*********************************************************************
FINISH
```

SUMMARY OUTPUT FILE

AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) - - VERSION: 1997.02d RUN DATE (MON/DAY/YR) =08/18/2006
INPUT FILE = 639 USER NO.= AHYMO-I-9702c01000R31-AH

PAGE = 1

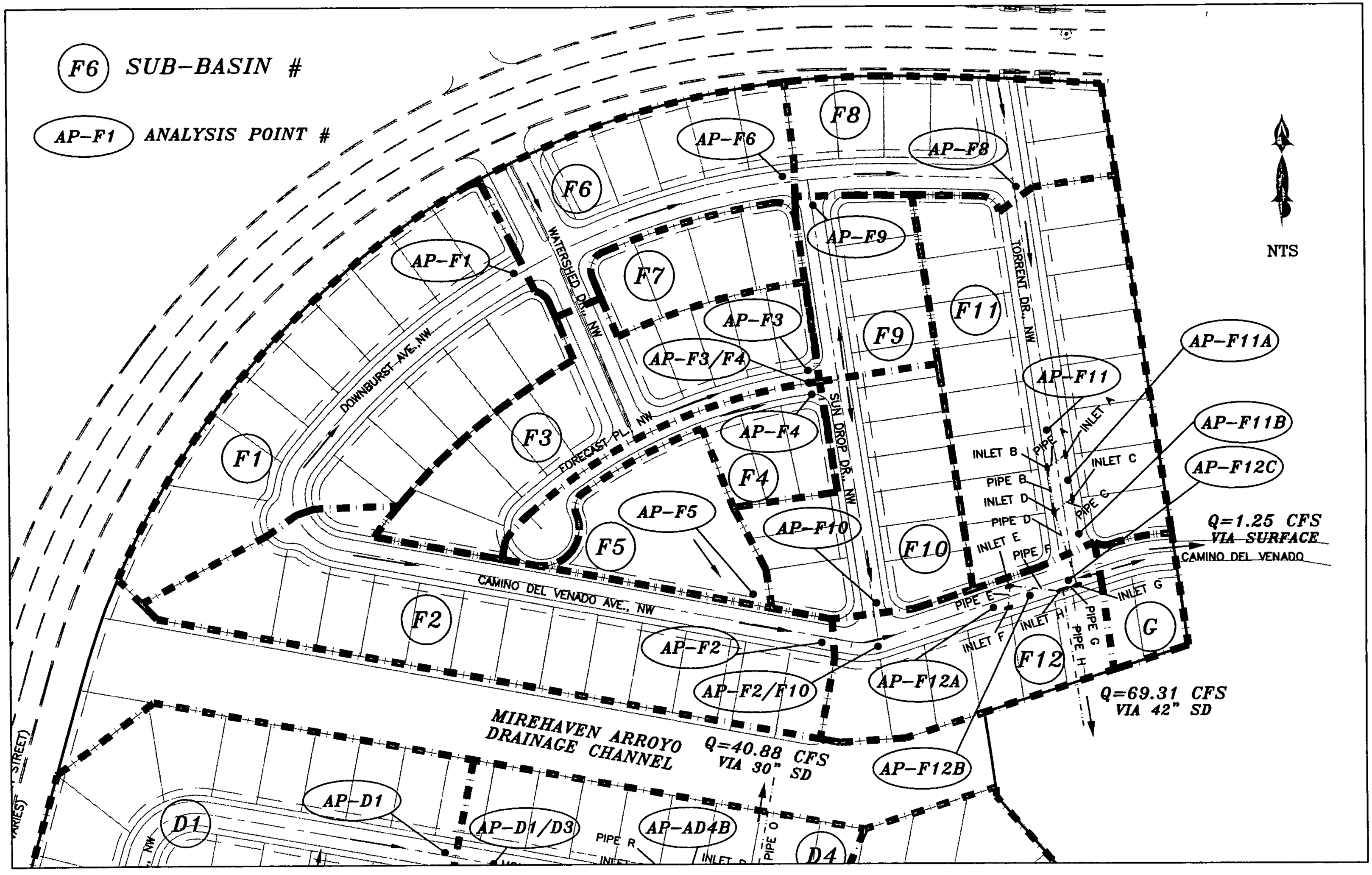
COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
START										TIME= .00
RAINFALL TYPE= 1										RAIN6= 2.200
COMPUTE NM HYD	100.10	-	1	.00461	3.83	.108	.43925	1.533	1.299	PER IMP= .00
COMPUTE NM HYD	100.20	-	1	.00396	3.29	.093	.43925	1.533	1.299	PER IMP= .00
COMPUTE NM HYD	100.30	-	1	.00404	3.36	.095	.43925	1.533	1.299	PER IMP= .00
COMPUTE NM HYD	100.40	-	1	.00151	1.26	.035	.43925	1.533	1.303	PER IMP= .00
COMPUTE NM HYD	100.50	-	1	.00601	4.99	.141	.43925	1.533	1.298	PER IMP= .00
COMPUTE NM HYD	100.60	-	1	.00633	5.26	.148	.43925	1.533	1.298	PER IMP= .00
COMPUTE NM HYD	100.70	-	1	.00162	1.35	.038	.43925	1.533	1.303	PER IMP= .00
COMPUTE NM HYD	100.80	-	1	.00341	2.84	.080	.43925	1.533	1.300	PER IMP= .00
COMPUTE NM HYD	100.90	-	1	.00445	3.70	.104	.43925	1.533	1.299	PER IMP= .00
COMPUTE NM HYD	100.10	-	1	.00335	2.79	.079	.43925	1.533	1.300	PER IMP= .00
COMPUTE NM HYD	100.11	-	1	.00902	7.49	.211	.43925	1.533	1.298	PER IMP= .00
COMPUTE NM HYD	100.12	-	1	.00512	4.26	.120	.43925	1.533	1.299	PER IMP= .00
COMPUTE NM HYD	100.13	-	1	.00492	4.09	.115	.43925	1.533	1.299	PER IMP= .00
COMPUTE NM HYD	100.14	-	1	.00303	2.52	.071	.43925	1.533	1.300	PER IMP= .00
COMPUTE NM HYD	100.15	-	1	.00125	1.04	.029	.43925	1.533	1.305	PER IMP= .00
COMPUTE NM HYD	100.16	-	1	.00144	1.20	.034	.43925	1.533	1.303	PER IMP= .00
COMPUTE NM HYD	100.17	-	1	.00245	2.04	.057	.43925	1.533	1.301	PER IMP= .00
COMPUTE NM HYD	100.18	-	1	.00108	.90	.025	.43925	1.533	1.306	PER IMP= .00
COMPUTE NM HYD	100.19	-	1	.00233	1.94	.055	.43925	1.533	1.301	PER IMP= .00
COMPUTE NM HYD	100.20	-	1	.00134	1.12	.031	.43925	1.533	1.304	PER IMP= .00
COMPUTE NM HYD	100.21	-	1	.00247	2.06	.058	.43925	1.533	1.301	PER IMP= .00
COMPUTE NM HYD	100.22	-	1	.00480	3.99	.113	.43925	1.533	1.299	PER IMP= .00
COMPUTE NM HYD	100.23	-	1	.00222	1.85	.052	.43925	1.533	1.301	PER IMP= .00
COMPUTE NM HYD	100.24	-	1	.00058	.49	.014	.43925	1.533	1.313	PER IMP= .00
START										TIME= .00
RAINFALL TYPE= 1										RAIN6= 1.470
COMPUTE NM HYD	110.10	-	1	.00461	.73	.020	.08264	1.533	.246	PER IMP= .00
COMPUTE NM HYD	110.20	-	1	.00396	.62	.017	.08264	1.533	.247	PER IMP= .00
COMPUTE NM HYD	110.30	-	1	.00404	.64	.018	.08264	1.533	.247	PER IMP= .00
COMPUTE NM HYD	110.40	-	1	.00151	.24	.007	.08264	1.533	.247	PER IMP= .00
COMPUTE NM HYD	110.50	-	1	.00601	.95	.026	.08264	1.533	.246	PER IMP= .00

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
COMPUTE NM HYD	110.60	-	1	.00633	1.00	.028	.08264	1.533	.246	PER IMP= .00
COMPUTE NM HYD	110.70	-	1	.00162	.26	.007	.08264	1.533	.247	PER IMP= .00
COMPUTE NM HYD	110.80	-	1	.00341	.54	.015	.08264	1.533	.247	PER IMP= .00
COMPUTE NM HYD	110.90	-	1	.00445	.70	.020	.08264	1.533	.247	PER IMP= .00
COMPUTE NM HYD	110.10	-	1	.00335	.53	.015	.08264	1.533	.247	PER IMP= .00
COMPUTE NM HYD	110.11	-	1	.00902	1.42	.040	.08264	1.533	.246	PER IMP= .00
COMPUTE NM HYD	110.12	-	1	.00512	.81	.023	.08264	1.533	.246	PER IMP= .00
COMPUTE NM HYD	110.13	-	1	.00492	.78	.022	.08264	1.533	.246	PER IMP= .00
COMPUTE NM HYD	110.14	-	1	.00303	.48	.013	.08264	1.533	.247	PER IMP= .00
COMPUTE NM HYD	110.15	-	1	.00125	.20	.005	.08264	1.533	.248	PER IMP= .00
COMPUTE NM HYD	110.16	-	1	.00144	.23	.006	.08264	1.533	.247	PER IMP= .00
COMPUTE NM HYD	110.17	-	1	.00245	.39	.011	.08264	1.533	.247	PER IMP= .00
COMPUTE NM HYD	110.18	-	1	.00108	.17	.005	.08264	1.533	.248	PER IMP= .00
COMPUTE NM HYD	110.19	-	1	.00233	.37	.010	.08264	1.533	.247	PER IMP= .00
COMPUTE NM HYD	110.20	-	1	.00134	.21	.006	.08264	1.533	.248	PER IMP= .00
COMPUTE NM HYD	110.21	-	1	.00247	.39	.011	.08264	1.533	.247	PER IMP= .00
COMPUTE NM HYD	110.22	-	1	.00480	.76	.021	.08264	1.533	.246	PER IMP= .00
COMPUTE NM HYD	110.23	-	1	.00222	.35	.010	.08264	1.533	.247	PER IMP= .00
COMPUTE NM HYD	110.24	-	1	.00058	.09	.003	.08264	1.533	.249	PER IMP= .00
START										TIME= .00
RAINFALL TYPE= 1										RAIN6= 2.200
COMPUTE NM HYD	200.10	-	1	.00461	9.82	.330	1.34459	1.500	3.331	PER IMP= 46.00
COMPUTE NM HYD	200.20	-	1	.00396	8.45	.284	1.34459	1.500	3.332	PER IMP= 46.00
COMPUTE NM HYD	200.30	-	1	.00404	8.61	.290	1.34459	1.500	3.332	PER IMP= 46.00
COMPUTE NM HYD	200.40	-	1	.00151	3.23	.108	1.34459	1.500	3.342	PER IMP= 46.00
COMPUTE NM HYD	200.50	-	1	.00601	12.80	.431	1.34459	1.500	3.330	PER IMP= 46.00
COMPUTE NM HYD	200.60	-	1	.00633	13.50	.454	1.34459	1.500	3.330	PER IMP= 46.00
COMPUTE NM HYD	200.70	-	1	.00162	3.47	.116	1.34459	1.500	3.341	PER IMP= 46.00
COMPUTE NM HYD	200.80	-	1	.00341	7.28	.245	1.34459	1.500	3.333	PER IMP= 46.00
COMPUTE NM HYD	200.90	-	1	.00445	9.48	.319	1.34459	1.500	3.331	PER IMP= 46.00
COMPUTE NM HYD	200.10	-	1	.00335	7.15	.241	1.34459	1.500	3.333	PER IMP= 46.00
COMPUTE NM HYD	200.11	-	1	.00902	19.22	.647	1.34459	1.500	3.329	PER IMP= 46.00
COMPUTE NM HYD	200.12	-	1	.00512	10.92	.367	1.34459	1.500	3.331	PER IMP= 46.00
COMPUTE NM HYD	200.13	-	1	.00492	10.50	.353	1.34459	1.500	3.331	PER IMP= 46.00
COMPUTE NM HYD	200.14	-	1	.00303	6.47	.217	1.34459	1.500	3.335	PER IMP= 46.00
COMPUTE NM HYD	200.15	-	1	.00125	2.67	.089	1.34459	1.500	3.347	PER IMP= 46.00
COMPUTE NM HYD	200.16	-	1	.00144	3.09	.104	1.34459	1.500	3.343	PER IMP= 46.00
COMPUTE NM HYD	200.17	-	1	.00245	5.23	.176	1.34459	1.500	3.336	PER IMP= 46.00
COMPUTE NM HYD	200.18	-	1	.00108	2.31	.077	1.34459	1.500	3.350	PER IMP= 46.00

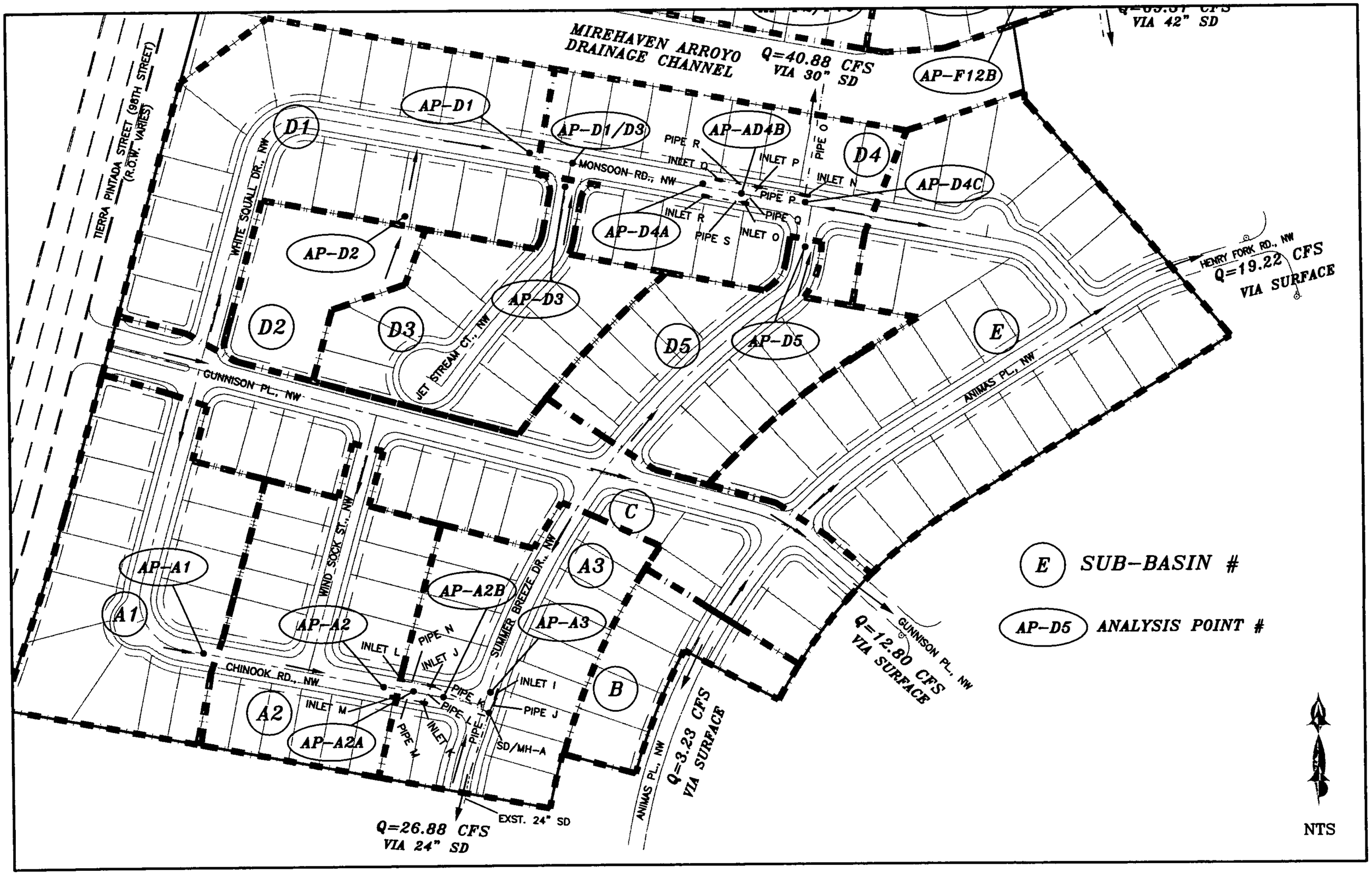
COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
COMPUTE NM HYD	200.19	-	1	.00233	4.98	.167	1.34459	1.500	3.337	PER IMP= 46.00
COMPUTE NM HYD	200.20	-	1	.00134	2.88	.096	1.34459	1.500	3.344	PER IMP= 46.00
COMPUTE NM HYD	200.21	-	1	.00247	5.28	.177	1.34459	1.500	3.336	PER IMP= 46.00
COMPUTE NM HYD	200.22	-	1	.00480	10.24	.345	1.34459	1.500	3.331	PER IMP= 46.00
COMPUTE NM HYD	200.23	-	1	.00222	4.74	.159	1.34459	1.500	3.337	PER IMP= 46.00
COMPUTE NM HYD	200.24	-	1	.00058	1.25	.042	1.34459	1.500	3.370	PER IMP= 46.00
START										TIME= .00
RAINFALL TYPE= 1										RAIN6= 1.470
COMPUTE NM HYD	210.10	-	1	.00461	5.65	.182	.74103	1.500	1.917	PER IMP= 46.00
COMPUTE NM HYD	210.20	-	1	.00396	4.86	.157	.74104	1.500	1.917	PER IMP= 46.00
COMPUTE NM HYD	210.30	-	1	.00404	4.96	.160	.74104	1.500	1.917	PER IMP= 46.00
COMPUTE NM HYD	210.40	-	1	.00151	1.86	.060	.74103	1.500	1.923	PER IMP= 46.00
COMPUTE NM HYD	210.50	-	1	.00601	7.37	.237	.74104	1.500	1.916	PER IMP= 46.00
COMPUTE NM HYD	210.60	-	1	.00633	7.76	.250	.74103	1.500	1.916	PER IMP= 46.00
COMPUTE NM HYD	210.70	-	1	.00162	2.00	.064	.74103	1.500	1.923	PER IMP= 46.00
COMPUTE NM HYD	210.80	-	1	.00341	4.19	.135	.74103	1.500	1.918	PER IMP= 46.00
COMPUTE NM HYD	210.90	-	1	.00445	5.46	.176	.74104	1.500	1.917	PER IMP= 46.00
COMPUTE NM HYD	210.10	-	1	.00335	4.12	.133	.74103	1.500	1.918	PER IMP= 46.00
COMPUTE NM HYD	210.11	-	1	.00902	11.06	.356	.74103	1.500	1.915	PER IMP= 46.00
COMPUTE NM HYD	210.12	-	1	.00512	6.28	.202	.74103	1.500	1.916	PER IMP= 46.00
COMPUTE NM HYD	210.13	-	1	.00492	6.04	.195	.74103	1.500	1.917	PER IMP= 46.00
COMPUTE NM HYD	210.14	-	1	.00303	3.72	.120	.74104	1.500	1.919	PER IMP= 46.00
COMPUTE NM HYD	210.15	-	1	.00125	1.53	.049	.74103	1.500	1.925	PER IMP= 46.00
COMPUTE NM HYD	210.16	-	1	.00144	1.78	.057	.74103	1.500	1.924	PER IMP= 46.00
COMPUTE NM HYD	210.17	-	1	.00245	3.01	.097	.74103	1.500	1.920	PER IMP= 46.00
COMPUTE NM HYD	210.18	-	1	.00108	1.33	.043	.74103	1.500	1.928	PER IMP= 46.00
COMPUTE NM HYD	210.19	-	1	.00233	2.87	.092	.74103	1.500	1.920	PER IMP= 46.00
COMPUTE NM HYD	210.20	-	1	.00134	1.66	.053	.74104	1.500	1.924	PER IMP= 46.00
COMPUTE NM HYD	210.21	-	1	.00247	3.04	.098	.74104	1.500	1.920	PER IMP= 46.00
COMPUTE NM HYD	210.22	-	1	.00480	5.89	.190	.74103	1.500	1.917	PER IMP= 46.00
COMPUTE NM HYD	210.23	-	1	.00222	2.73	.088	.74103	1.500	1.920	PER IMP= 46.00
COMPUTE NM HYD	210.24	-	1	.00058	.72	.023	.74103	1.500	1.939	PER IMP= 46.00
FINISH										

Section III

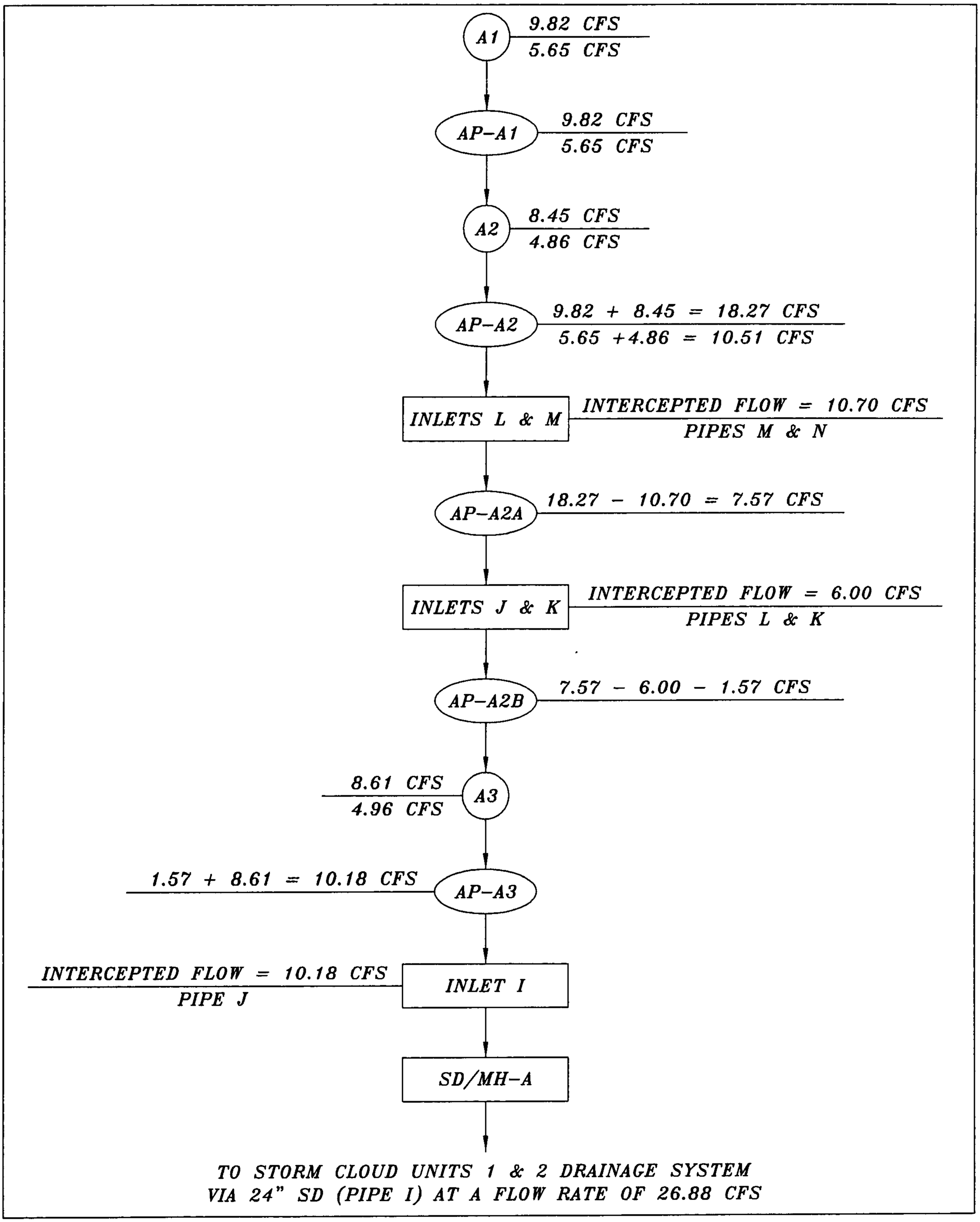
Flow Charts



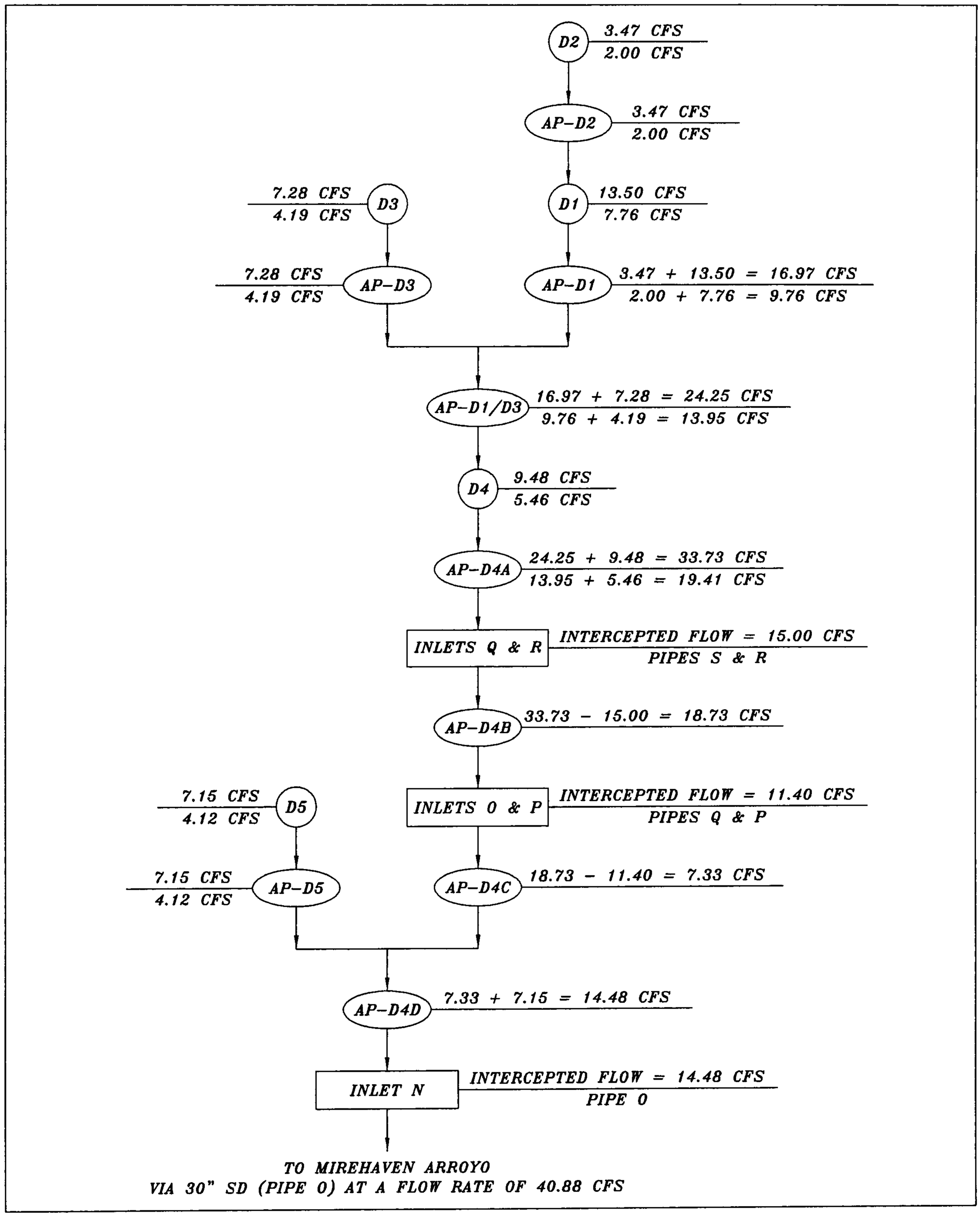
ANALYSIS POINTS – SHEET A



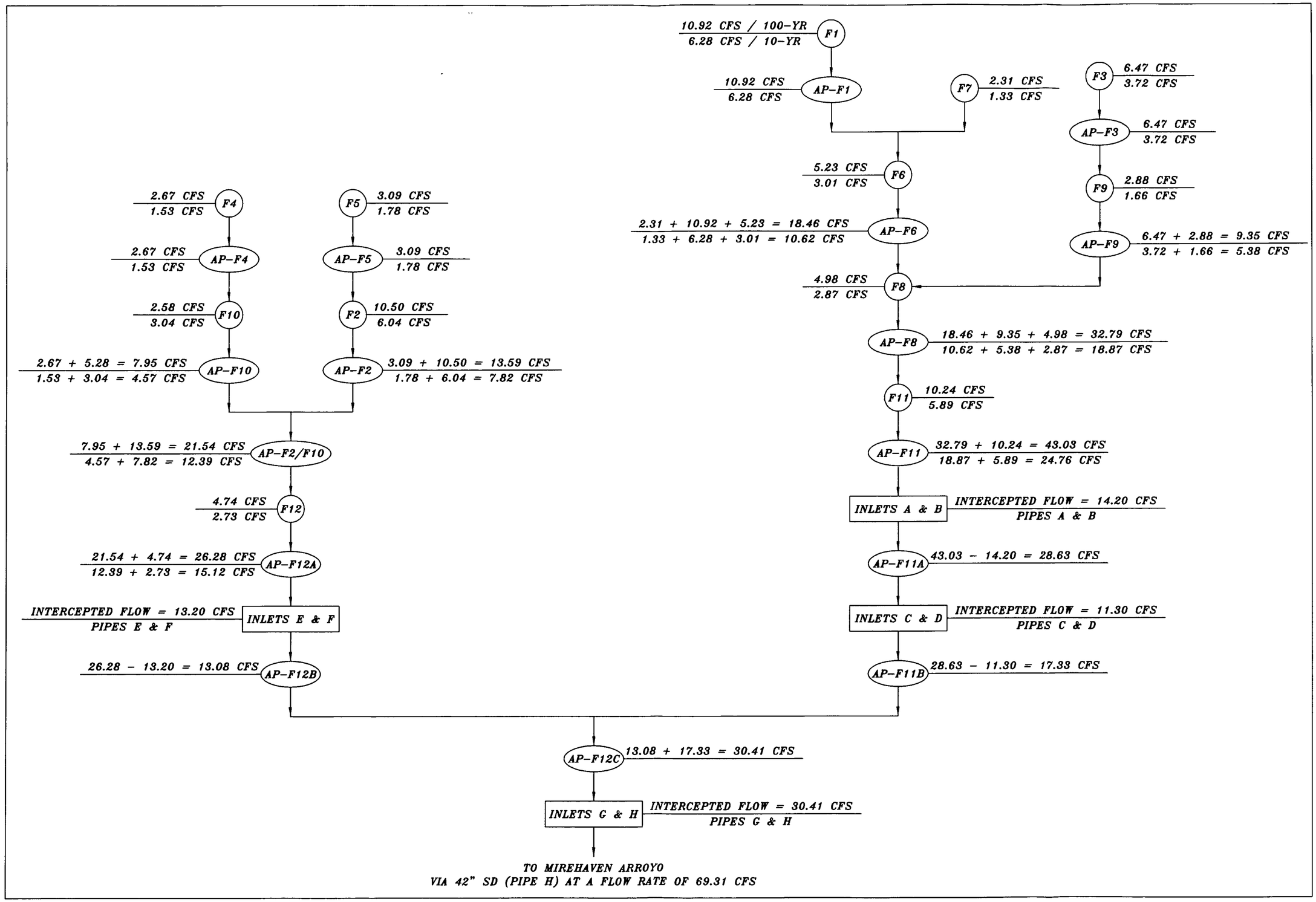
ANALYSIS POINTS – SHEET B



SUB-BASINS A1 THROUGH A3 FLOW PATH ANALYSIS



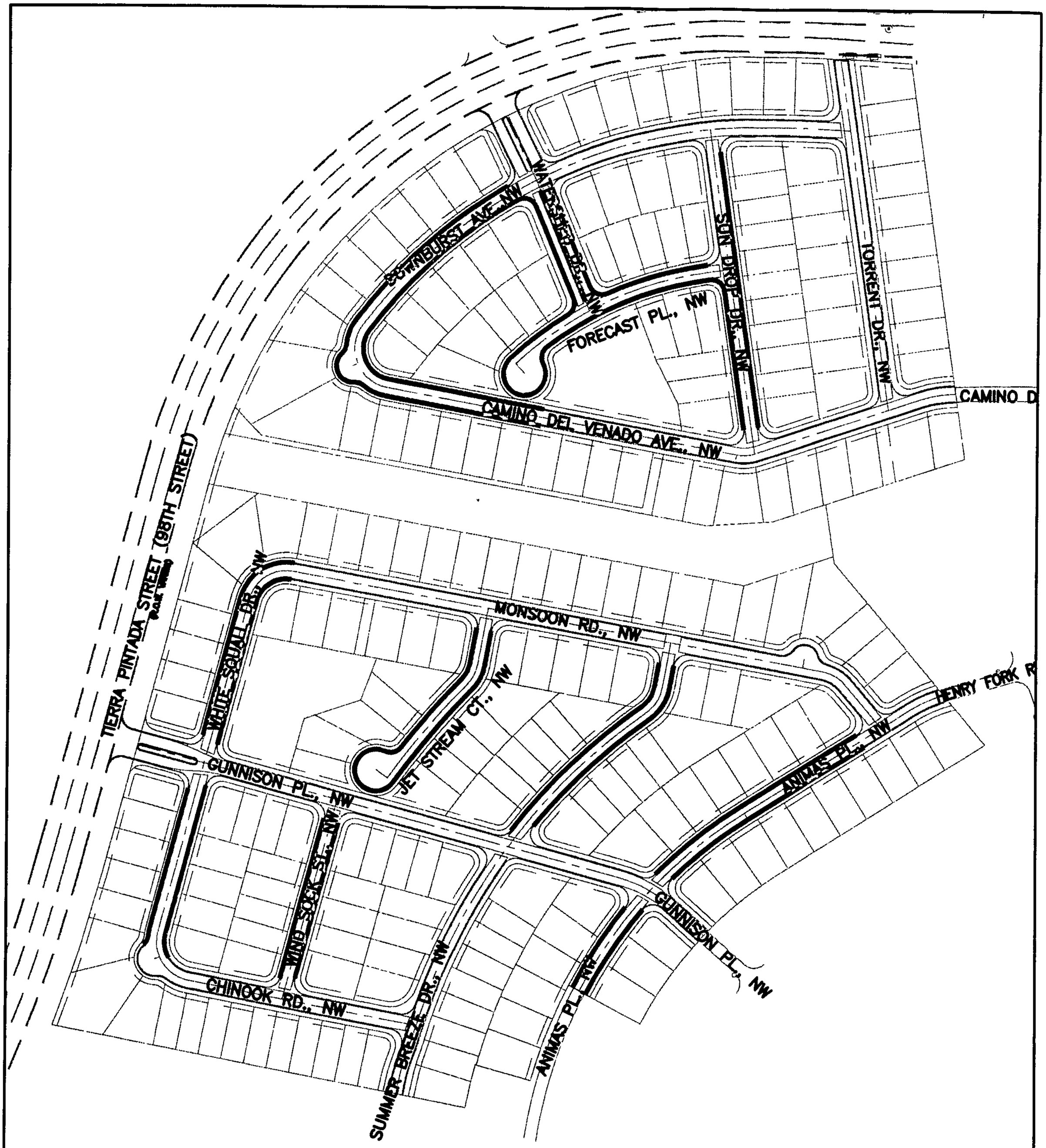
SUB-BASINS D1 THROUGH D5 FLOW PATH ANALYSIS



SUB-BASINS F1 THROUGH F12 FLOW PATH ANALYSIS

Section IV

Street Flow Analysis
(Before Placement Of Inlets
&
After Placement Of Inlets)



STDANDARD & MOUNTABLE CURB & GUTTER LAYOUT

STREET FLOW CAPACITY CALCULATIONS

The followings sheets are the input and output files for street flow capacity using the Manning's equation in order to calculate street flow capacity. We have run both the 100-Year & 10-year runoff for 4" and 8" curb at all the analysis points. Where runoff exceeded the top of the four inch curb the curb on-site was changed to an eight curb. Where runoff was going to exceed the eight inch curb inlet were placed to intercept the runoff. Street flow capacity calculations were preformed passed each inlet to double check the flow depth in the street to analyzed the next inlet downstream of the last inlet.

Sample Files and Details

---------- INPUT FILE ----------

100 9.85 0.0598
10 5.65 0.0598

---------- END OF THE INPUT FILE ----------

999 0.00 0.00

100 = 100-YEAR STORM
10 = 10-YEAR STORM
9.85 = FLOW FOR 100-YEAR STORM
5.65 = FLOW FOR 10-YEAR STORM
0.0598 = SLOPE OF THE STREET
999 = INDICATES THE END OF THE INPUT FILE

---------- OUTPUT FILE ----------

Q (CFS)	S (FT/FT)	Dn (FT)	Vn (FT/S)	D*V (FT^2/S)	Fr	E (FT)	D2 (FT)
---	---	---	---	---	---	---	---

---------- END OF THE OUTPUT FILE ----------

Q = Flow
S = Slope of the street
Dn = Water normal depth
Vn = Velocity based on the water normal depth
D*V = (Water normal depth) x (Velocity based on the water normal depth)
Fr = Froude number
E = Energy Grade Line
D2 = Hydraulic Jump

FINDING STREET CAPACITY - 28 F-F CROSS-SECTION FOR 4" CURB

Q = 1.49/n A R^(2/3) S^½
n = 0.017
SLOPE = STREET SLOPE
R^2/3 = (A/P)^2/3
D2 = HYDRAULIC DEPTH AFTER HYDRAULIC JUMP = D1/2 [SQRT (1 + 8Fr²) - 1]
E = V² / 2g

HALF STREET CALCULATIONS

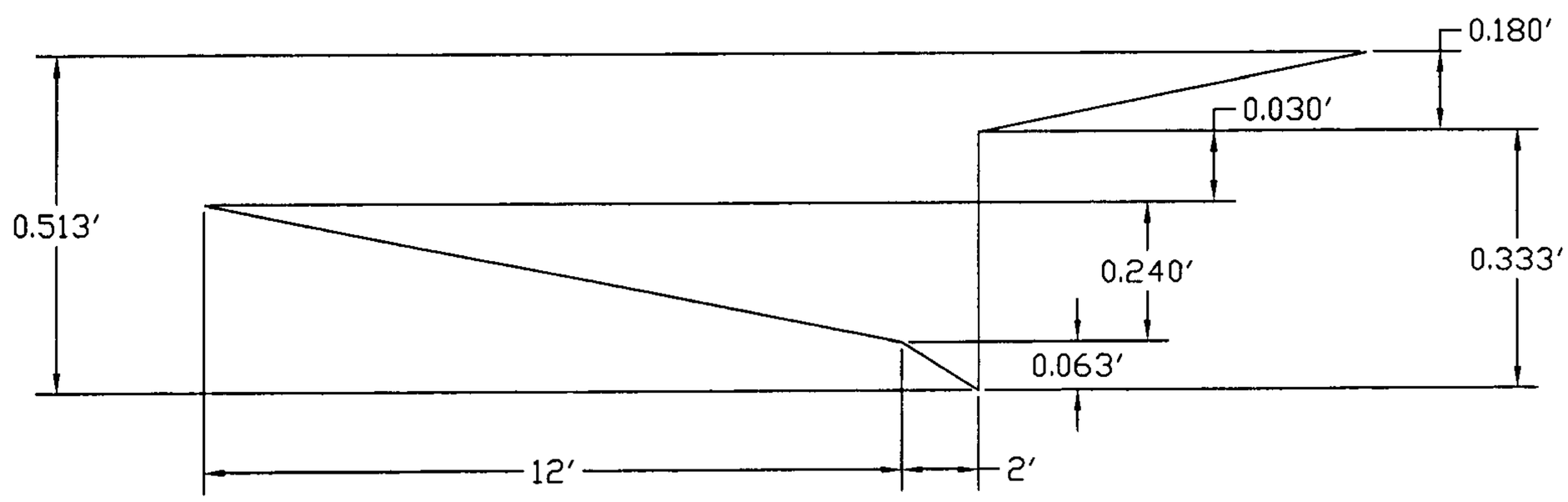
@Y ≤ 0.0625
A1 = ½ Y (Y/0.03125) = 16Y²
P1 = SQRT[Y² + (Y/0.03125)²] + Y = SQRT(1025 Y²) + Y

@ 0.0625 < Y ≤ 0.3025 & Y1 = Y - 0.0625
A2 = A1 + ½Y1 (Y1/0.02) + 2Y1 = A1 + 25Y1² + 2Y1
P2 = P1 + SQRT[Y1² + (Y1/0.02)²] + Y1 = P1 + SQRT(2501 Y²) + Y1

@ 0.3025 < Y ≤ 0.333 & Y2 = Y - 0.3025
A3 = A2 + 14Y2
P3 = P2 + Y2

@ 0.333 < Y ≤ 0.513 & Y3 = Y - 0.333
A4 = A3 + 14Y3 + ½Y3[Y3/(0.02)] = A3 + 14 Y3 + 25 Y3²
P4 = P3 + SQRT(Y3² + [Y3/(0.02)]²) = P3 + SQRT(2501 Y3²)

SEE THE FOLLOWING SHEET FOR INPUT AND OUTPUT FILE FOR CALCULAITON RESULTS FROM COMPUTER PROGRAM USING THE EQUATION SHWON ABOVE



FINDING STREET CAPACITY - 28 F-F CROSS-SECTION FOR 8" CURB

Q = 1.49/n A R^(2/3) S^½
n = 0.017
SLOPE = STREET SLOPE
R^2/3 = (A/P)^2/3
D2 = WATER DEPTH AFTER HYDRAULIC JUMP = D1/2 [SQRT (1 + 8Fr²) - 1]
E = V² / 2g

HALF STREET CALCULATIONS

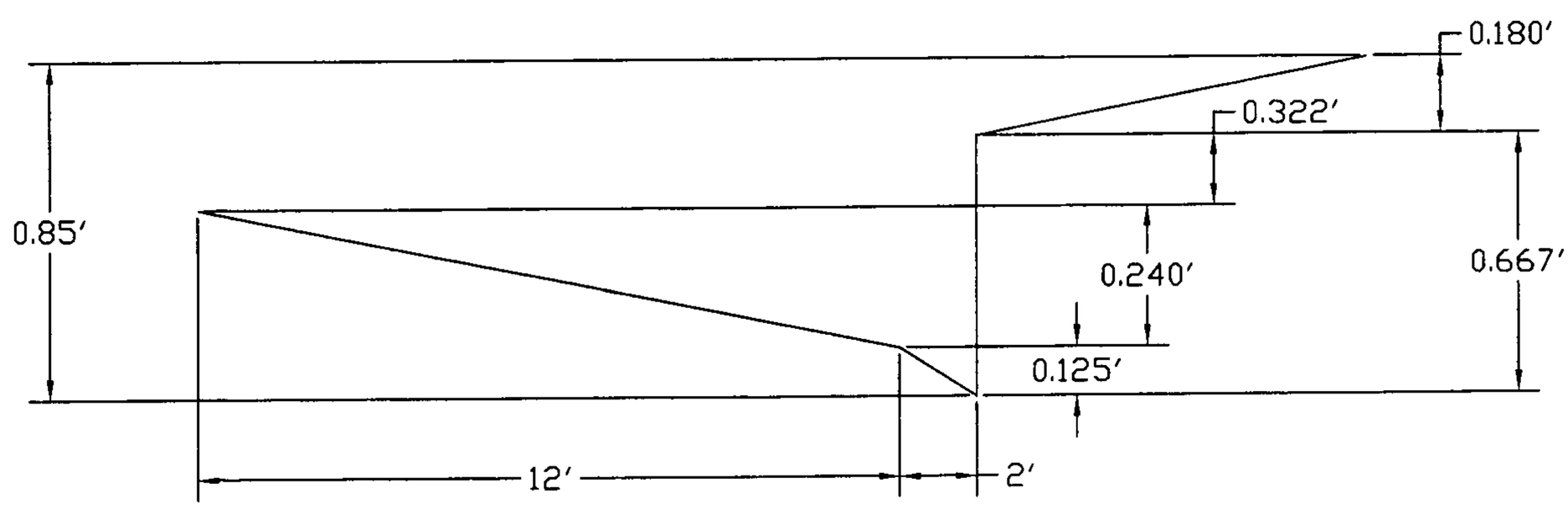
@Y ≤ 0.125
A1 = ½ Y (Y/0.0625) = 8Y²
P1 = SQRT[Y² + (Y/0.0625)²] + Y = SQRT(257 Y²) + Y

@ 0.125 < Y ≤ 0.365 & Y1 = Y - 0.125
A2 = A1 + ½Y1 (Y1/0.02) + 2Y1 = A1 + 25Y1² + 2Y1
P2 = P1 + SQRT[Y1² + (Y1/0.02)²] + Y1 = P1 + SQRT(2501 Y1²) + Y1

@ 0.365 < Y ≤ 0.667 & Y2 = Y - 0.365
A3 = A2 + 14Y2 + ½Y2[Y2/(0.02)] = A2 + 14 Y2
P3 = P2 + SQRT(Y2² + [Y2/(0.02)]²) = P2 + Y2

@ 0.667 < Y ≤ 0.847 & Y3 = Y - 0.667
A4 = A3 + 14Y3 + ½Y3[Y3/(0.02)] = A3 + 14 Y3 + 25 Y3²
P4 = P3 + SQRT(Y3² + [Y3/(0.02)]²) = P3 + SQRT(2501 Y3²)

SEE THE FOLLOWING SHEET FOR INPUT AND OUTPUT FILE FOR CALCULAITON RESULTS FROM COMPUTER PROGRAM USING THE EQUATION SHWON ABOVE



STREET FLOW CAPACITY INPUT FILE

28'-FF STREET SECTION (MOUNTABLE & STD CURB)

```
* 100 = 100 YEAR STORM
* 10 = 10 YEAR STORM
* 1ST # IS STROM YEAR (100 OR 10), 2ND # IS FLOW, & 3RD # IS SLOPE OF THE STREET
*
* LOCATION: AP-D3
100 7.28 0.01948
10 4.19 0.01948
*
* LOCATION: AP-D5
100 7.15 0.01478
10 4.12 0.01478
*
* LOCATION: AP-E
100 19.22 0.0180
10 11.06 0.0180
*
* LOCATION: AP-F3/F4 (BASIN F3+F4)
100 9.14 0.01583
10 5.25 0.01583
*
* LOCATION: AP-F9
100 9.35 0.01223
10 5.38 0.01223
*
* LOCATION: AP-F10
100 7.95 0.02247
10 4.57 0.02247
*
* END OF THE INPUT FILE *
*
999 0.00 0.00
```

STREET FLOW CAPACITY OUTPUT FILE

28'-FF STREET SECTION (MOUNTABLE & STD CURB)

28-FT F-F, 4" CURB STREET SECTION
STREET CAPACITY BASED ON 100-YR STORM

LOCATION	FLOW CFS	SLOPE FT/FT	Dn FT	Vn FT/S	D*V FT^2/S	Fr	E FT	D2 FT
AP-D3	7.28	.01948	.247	2.838	.701	1.006	.372	.249
AP-D5	7.15	.01478	.258	2.547	.656	.884	.358	----
AP-E	19.22	.01800	.348	3.666	1.275	1.096	.556	.392
AP-F3/F4	9.14	.01583	.277	2.777	.770	.929	.397	----
AP-F9	9.35	.01223	.292	2.535	.741	.826	.392	----
AP-F10	7.95	.02247	.248	3.061	.760	1.082	.394	.276

28-FT F-F, 4" CURB STREET SECTION
STREET CAPACITY BASED ON 10-YR STORM

LOCATION	FLOW CFS	SLOPE FT/FT	Dn FT	Vn FT/S	D*V FT^2/S	Fr	E FT	D2 FT
AP-D3	4.19	.01948	.204	2.477	.505	.967	.299	----
AP-D5	4.12	.01478	.213	2.223	.473	.850	.289	----
AP-E	11.06	.01800	.290	3.056	.886	1.000	.435	.290
AP-F3/F4	5.25	.01583	.229	2.422	.553	.893	.320	----
AP-F9	5.38	.01223	.241	2.211	.533	.793	.317	----
AP-F10	4.57	.02247	.205	2.671	.548	1.039	.316	.216

28-FT F-F, 8" CURB STREET SECTION
STREET CAPACITY BASED ON 100-YR STORM

LOCATION	FLOW CFS	SLOPE FT/FT	Dn FT	Vn FT/S	D*V FT^2/S	Fr	E FT	D2 FT
AP-D3	7.28	.01948	.303	2.867	08689	.918	.430	----
AP-D5	7.15	.01478	.314	2.570	.806	.809	.416	----
AP-E	19.22	.01800	.403	3.731	1.503	1.036	.619	.422
AP-F3/F4	9.14	.01583	.334	2.798	.934	.853	.455	----
AP-F9	9.35	.01223	.349	2.551	.891	.761	.450	----
AP-F10	7.95	.02247	.304	3.091	.940	.988	.453	----

28-FT F-F, 8" CURB STREET SECTION
STREET CAPACITY BASED ON 10-YR STORM

LOCATION	FLOW CFS	SLOPE FT/FT	Dn FT	Vn FT/S	D*V FT^2/S	Fr	E FT	D2 FT
AP-D3	4.19	.01948	.258	2.518	.649	.874	.356	----
AP-D5	4.12	.01478	.267	2.256	.602	.769	.346	----
AP-E	11.06	.01800	.347	3.076	1.067	.921	.494	----
AP-F3/F4	5.25	.01583	.284	2.451	.695	.811	.377	----
AP-F9	5.38	.01223	.297	2.234	.663	.723	.374	----
AP-F10	4.57	.02247	.259	2.715	.703	.940	.373	----

FINDING STREET CAPACITY - 32 F-F CROSS-SECTION FOR 4" CURB

$Q = 1.49/n\ A\ R^{(2/3)}\ S^{1/2}$
n = 0.017
SLOPE = STREET SLOPE
$R^{2/3} = (A/P)^{2/3}$
D2 = HYDRAULIC DEPTH AFTER HYDRAULIC JUMP = $D1/2\ [SQRT\ (1 + 8Fr^2) - 1]$
$E = V^2 / 2g$

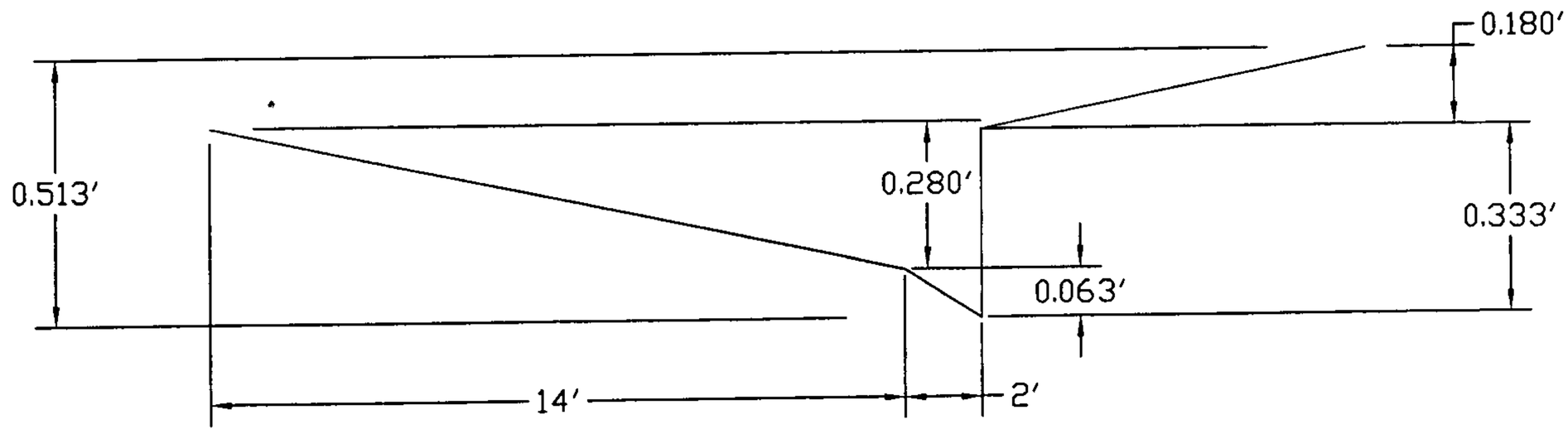
HALF STREET CALCULATIONS

@$Y \leq 0.0625$
$A1 = \frac{1}{2} Y\ (Y/0.03125) = 16Y^2$
$P1 = SQRT[Y^2 + (Y/0.03125)^2] + Y = SQRT(1025\ Y^2) + Y$

@ $0.0625 < Y \leq 0.333$ & $Y1 = Y - 0.0625$
$A2 = A1 + \frac{1}{2}Y1\ (Y1/0.02) + 2Y1 = A1 + 25Y1^2 + 2Y1$
$P2 = P1 + SQRT[Y1^2 + (Y1/0.02)^2] + Y1 = P1 + SQRT(2501\ Y^2) + Y1$

@ $0.333 < Y \leq 0.513$ & $Y2 = Y - 0.333$
$A3 = A2 + 16Y2 + \frac{1}{2}Y2[Y2/(0.02)] = A2 + 16\ Y2 + 25\ Y2^2$
$P3 = P2 + SQRT(Y2^2 + [Y2/(0.02)]^2) = P2 + SQRT(2501\ Y2^2)$

SEE THE FOLLOWING SHEET FOR INPUT AND OUTPUT FILE FOR CALCULAITON RESULTS FROM COMPUTER PROGRAM USING THE EQUATION SHWON ABOVE



FINDING STREET CAPACITY - 32 F-F CROSS-SECTION FOR 8" CURB

Q = 1.49/n A R^(2/3) S^½
n = 0.017
SLOPE = STREET SLOPE
R^2/3 = (A/P)^2/3
D2 = WATER DEPTH AFTER HYDRAULIC JUMP = D1/2 [SQRT (1 + 8Fr²) - 1]
E = V² / 2g

HALF STREET CALCULATIONS

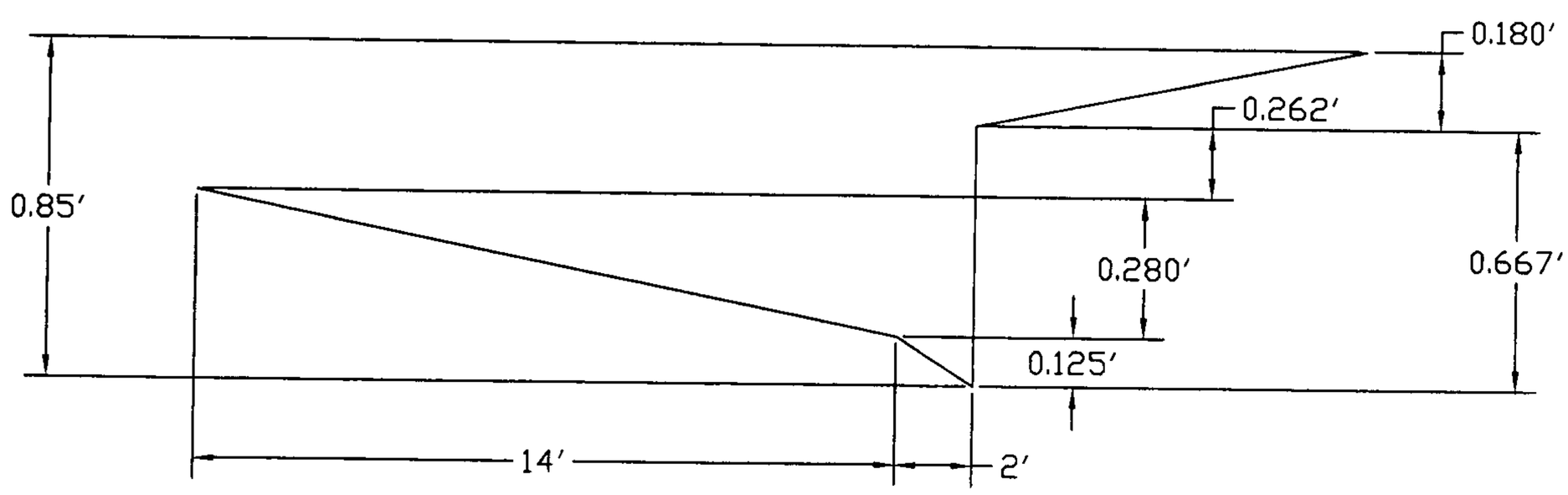
@Y ≤ 0.125
A1 = ½ Y (Y/0.0625) = 8Y²
P1 = SQRT[Y² + (Y/0.0625)²] + Y = SQRT(257 Y²) + Y

@ 0.125 < Y ≤ 0.405 & Y1 = Y - 0.125
A2 = A1 + ½Y1 (Y1/0.02) + 2Y1 = A1 + 25Y1² + 2Y1
P2 = P1 + SQRT[Y1² + (Y1/0.02)²] + Y1 = P1 + SQRT(2501 Y1²) + Y1

@ 0.405 < Y ≤ 0.667 & Y2 = Y - 0.405
A3 = A2 + 16Y2 + ½Y2[Y2/(0.02)] = A2 + 16 Y2
P3 = P2 + SQRT(Y2² + [Y2/(0.02)]²) = P2 + Y2

@ 0.667 < Y ≤ 0.847 & Y3 = Y - 0.667
A4 = A3 + 16Y3 + ½Y3[Y3/(0.02)] = A3 + 16 Y3 + 25 Y3²
P4 = P3 + SQRT(Y3² + [Y3/(0.02)]²) = P3 + SQRT(2501 Y3²)

SEE THE FOLLOWING SHEET FOR INPUT AND OUTPUT FILE FOR CALCULAITON RESULTS FROM COMPUTER PROGRAM USING THE EQUATION SHWON ABOVE



STREET FLOW CAPACITY INPUT FILE

32'-FF STREET SECTION (MOUNTABLE & STD CURB)

```
* 100 = 100 YEAR STORM
* 10 = 10 YEAR STORM
* 1ST # IS STROM YEAR (100 OR 10), 2ND # IS FLOW, & 3RD # IS SLOPE OF THE STREET
*
* LOCATION: AP-A1
100 9.85 0.0598
10 5.65 0.0598
*
* LOCATION: AP-A2
100 18.27 0.0310
10 10.51 0.0310
*
* LOCATION: AP-C
100 12.80 0.0450
10 7.37 0.0450
*
* LOCATION: AP-D1
100 16.97 0.03497
10 9.76 0.03497
*
* LOCATION: AP-D1/D3
100 24.95 0.03497
10 13.95 0.03497
*
* LOCATION: AP-D4A
100 33.73 0.03497
10 19.41 0.03497
*
* LOCATION: AP-F1
100 10.92 0.01863
10 6.28 0.01863
*
* LOCATION: AP-F2
100 13.59 0.02885
10 7.82 0.02885
*
* LOCATION: AP-F6
100 18.46 0.02683
10 10.62 0.02683
*
* LOCATION: AP-F8
100 32.79 0.02667
10 18.87 0.02667
*
* LOCATION: AP-F11
100 43.03 0.00733
10 24.76 0.00733
*
* LOCATION: AP-F12A
100 26.28 0.02491
10 15.12 0.02491
*
* END OF THE INPUT FILE *
*
999 0.00 0.00
```

STREET FLOW CAPACITY OUTPUT FILE

32'-FF STREET SECTION (MOUNTABLE & STD CURB)

32-FT F-F, 4" CURB STREET SECTION

STREET CAPACITY BASED ON 100-YR STORM

LOCATION	FLOW CFS	SLOPE FT/FT	Dn FT	Vn FT/S	D*V FT^2/S	Fr	E FT	D2 FT
AP-A1	9.85	.05980	.226	4.666	1.053	1.730	.564	.451
AP-A2	18.27	.03100	.314	4.246	1.335	1.335	.594	.457
AP-C	12.80	.04500	.260	4.472	1.162	1.546	.570	.453
AP-D1	16.97	.03497	.300	4.362	1.308	1.404	.595	.464
AP-D1/D3	24.25	.03497	.340	4.769	1.620	1.442	.693	.543
AP-D4A	33.73	.03497	.381	5.190	1.975	1.483	.799	.630
AP-F1	10.92	.01863	.287	3.086	.885	1.015	.435	.293
AP-F2	13.59	.02885	.287	3.840	1.102	1.264	.516	.389
AP-F6	18.46	.02683	.324	4.032	1.305	1.249	.576	.432
AP-F8	32.79	.02683	.395	4.668	1.842	1.310	.733	.560
AP-F11	43.03	.00733	.546	3.082	1.683	.735	.694	----
AP-F12A	26.28	.02491	.370	4.291	1.589	1.243	.656	.491

32-FT F-F, 4" CURB STREET SECTION

STREET CAPACITY BASED ON 10-YR STORM

LOCATION	FLOW CFS	SLOPE FT/FT	Dn FT	Vn FT/S	D*V FT^2/S	Fr	E FT	D2 FT
AP-A1	5.65	.05980	.186	4.071	.759	1.662	.444	.355
AP-A2	10.51	.03100	.259	3.702	.958	1.282	.472	.358
AP-C	7.37	.04500	.215	3.903	.837	1.485	.451	.356
AP-D1	9.76	.03497	.247	3.804	.940	1.349	.472	.364
AP-D1/D3	13.95	.03497	.280	4.155	1.163	1.384	.548	.425
AP-D4A	19.41	.03497	.314	4.510	1.418	1.418	.630	.492
AP-F1	6.28	.01863	.236	2.691	.636	.975	.349	----
AP-F2	7.82	.02885	.237	3.349	.792	1.214	.411	.305
AP-F6	10.62	.02683	.266	3.515	.937	1.200	.458	.338
AP-F8	18.87	.02683	.326	4.054	1.322	1.251	.581	.437
AP-F11	24.76	.00733	.449	2.680	1.203	.705	.560	----
AP-F12A	15.12	.02491	.306	3.731	1.140	1.189	.522	.384

32-FT F-F, 8" CURB STREET SECTION

STREET CAPACITY BASED ON 100-YR STORM

LOCATION	FLOW CFS	SLOPE FT/FT	Dn FT	Vn FT/S	D*V FT^2/S	Fr	E FT	D2 FT
AP-A1	9.85	.05980	.281	4.725	1.326	1.572	.627	.499
AP-A2	18.27	.03100	.372	4.268	1.587	1.234	.655	.489
AP-C	12.80	.04500	.316	4.511	1.425	1.414	.632	.493
AP-D1	16.97	.03497	.357	4.388	1.566	1.294	.656	.499
AP-D1/D3	24.25	.03497	.398	4.787	1.905	1.337	.754	.579
AP-D4A	33.73	.03497	.435	5.410	2.351	1.446	.889	.698
AP-F1	10.92	.01863	.344	3.106	1.068	.934	.494	----
AP-F2	13.59	.02885	.344	3.866	1.329	1.162	.576	.419
AP-F6	18.46	.02683	.381	4.051	1.544	1.157	.636	.461
AP-F8	32.79	.02683	.447	4.939	2.208	1.302	.826	.629
AP-F11	43.03	.00733	.601	3.717	2.235	.845	.816	----
AP-F12A	26.28	.02491	.425	4.423	1.881	1.195	.729	.537

32-FT F-F, 8" CURB STREET SECTION

STREET CAPACITY BASED ON 10-YR STORM

LOCATION	FLOW CFS	SLOPE FT/FT	Dn FT	Vn FT/S	D*V FT^2/S	Fr	E FT	D2 FT
AP-A1	5.65	.05980	.239	4.157	.994	1.498	.508	.401
AP-A2	10.51	.03100	.315	3.735	1.176	1.173	.532	.388
AP-C	7.37	.04500	.269	3.960	1.065	1.346	.512	.395
AP-D1	9.76	.03497	.303	3.842	1.163	1.230	.532	.397
AP-D1/D3	13.95	.03497	.337	4.185	1.408	1.271	.608	.460
AP-D4A	19.41	.03497	.372	4.534	1.685	1.310	.691	.528
AP-F1	6.28	.01863	.292	2.721	.794	.888	.407	----
AP-F2	7.82	.02885	.292	3.387	.988	1.105	.470	.333
AP-F6	10.62	.02683	.323	3.544	1.144	1.099	.518	.366
AP-F8	18.87	.02683	.384	4.073	1.563	1.159	.641	.466
AP-F11	24.76	.00733	.499	2.987	1.490	.745	.637	----
AP-F12A	15.12	.02491	.363	3.752	1.362	1.098	.581	.410

STREET FLOW CAPACITY INPUT FILE

32'-FF STREET SECTION (STD CURB), RUNOFF PASSED INLETS

```
* 100 = 100 YEAR STORM
* 1ST # IS STROM YEAR (100 OR 10), 2ND # IS FLOW, & 3RD # IS SLOPE OF THE STREET
*
* LOCATION: AP-F11A
100 28.63 0.00733
*
* LOCATION: AP-A2A
100 7.57 0.0310
*
* LOCATION: AP-D4B
100 18.73 0.03497
*
* END OF THE INPUT FILE *
*
999 0.00 0.00
```

STREET FLOW CAPACITY OUTPUT FILE

32'-FF STREET SECTION (STD CURB), RUNOFF PASSED INLETS

32-FT F-F, 8" CURB STREET SECTION

STREET CAPACITY BASED ON 100-YR STORM

LOCATION	FLOW CFS	SLOPE FT/FT	Dn FT	Vn FT/S	D*V FTý/S	Fr	E FT	D2 FT
AP-F11A	28.63	.00733	.522	3.164	1.653	.771	.678	----
AP-A2A	7.57	.03100	.286	3.455	.988	1.138	.471	.339
AP-D4B	18.73	.03497	.368	4.494	1.653	1.306	.681	.520

Section V

Inlet Analysis & Calculations

INLET TABLE

INLET	TYPE	FLOW (CFS)	INLET LOCATION *
A	SGL-A	7.20	ON SLOPE
B	SGL-A	7.20	ON SLOPE
C	SGL-C	5.65	ON SLOPE
D	SGL-C	5.65	ON SLOPE
E	SGL-A	6.60	ON SLOPE
F	SGL-A	6.60	ON SLOPE
G	SGL-A	11.25 (24.98**)	PONDING CONDITION
H	DBL-A	19.16 (42.56**)	PONDING CONDITION
I	DBL-A	10.18 (26.88**)	PONDING CONDITION
J	SGL-A	3.00	ON SLOPE
K	SGL-A	3.00	ON SLOPE
L	SGL-C	5.35	ON SLOPE
M	SGL-C	5.35	ON SLOPE
N	DBL-A	14.48 (40.88**)	PONDING CONDITION
O	SGL-A	5.70	ON SLOPE
P	SGL-A	5.70	ON SLOPE
Q	SGL-C	7.50	ON SLOPE
R	SGL-C	7.50	ON SLOPE

* INLETS ARE EITHER PLACED ON SLOPE WHERE 22.3 D-5 PLATE WAS USED TO DETERMINE THE FLOW INTERCEPTED BY THE INLET OR IN PONDING CONDITION WHERE FLOW INTERCEPTED IS DETERMINED BY ORIFICE EQUATION

** IF SOME OF THE INLETS FAILED UPSTREAM

STORM DROP INLET G DRAINAGE CAPACITY

Single 'A' (in ponding conditions)

<u>Area at the grate:</u>

L = 44 3/8" - 2(6"$_{ends}$) - 7(½ $_{middle\ bars}$)
= 28 7/8"
= 2.41'

W = 25 ½" - 13(½"$_{middle\ bars}$)
= 19"
= 1.58'

Area = 2.41' x 1.58'
= 3.81 ft^2

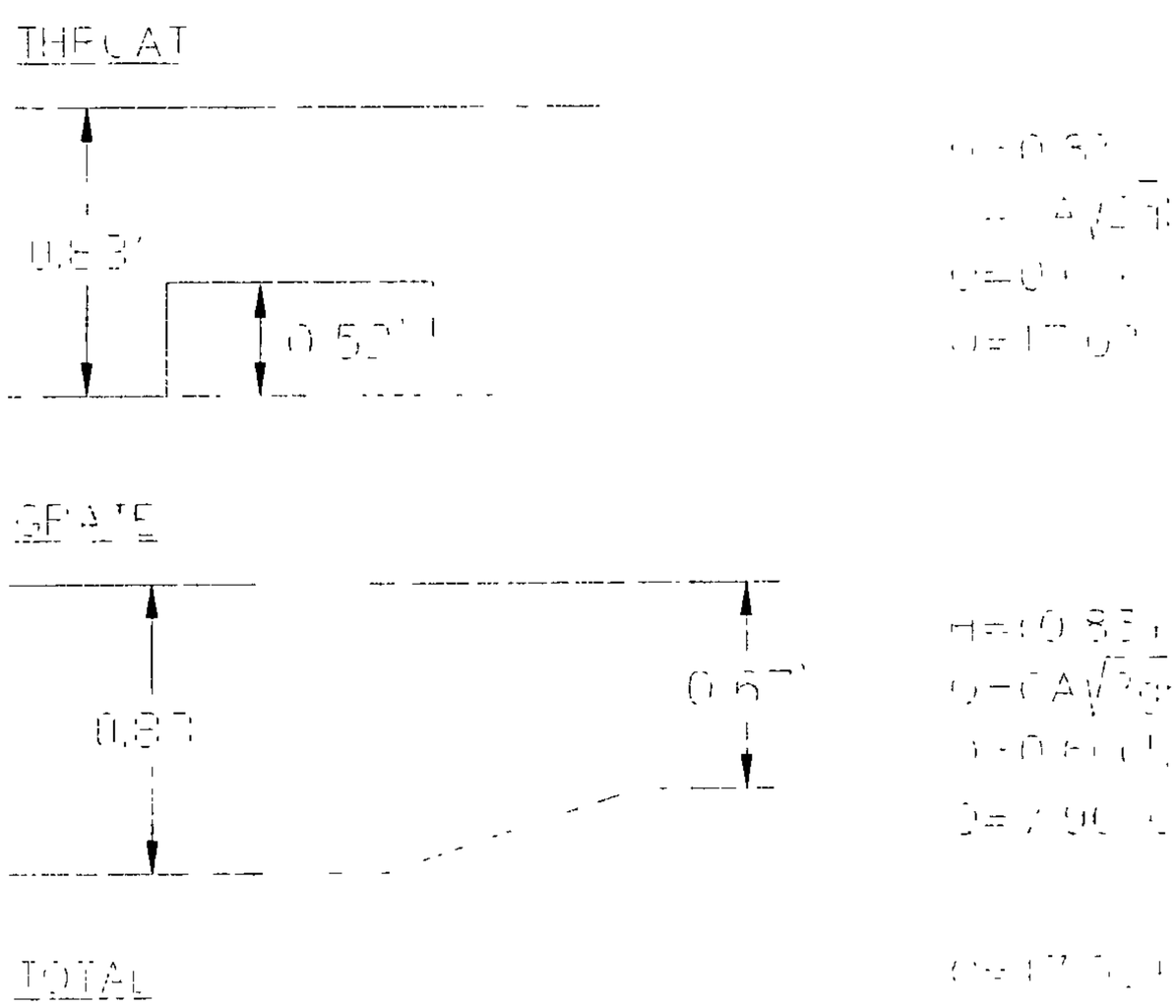
Effective Area = 3.81- 3.81 (0.5 $_{clogging\ factor}$)
= 1.91 ft^2 at the grate

<u>Area at the throat:</u>

L = 7.45'

H = 10 ¾" - 4 ½"
= 6 ¼"
= 0.5208'

Area = 7.45' x 0.5208'
= 3.88 ft^2 at the throat



STORM DROP INLETS H, I & N DRAINAGE CAPACITY

Double 'A' (in ponding conditions)

<u>Area at the grate:</u>

L = 88 ¾" - 2(6"$_{ends}$) - 6"$_{center\ piece}$ - 14(½ $_{middle\ bars}$)
= 63 ¾"
= 5.3125'

W = 25 ½" - 13(½"$_{middle\ bars}$)
= 19"
= 1.5833'

Area = 5.3125' x 1.5833'
= 8.41 ft^2

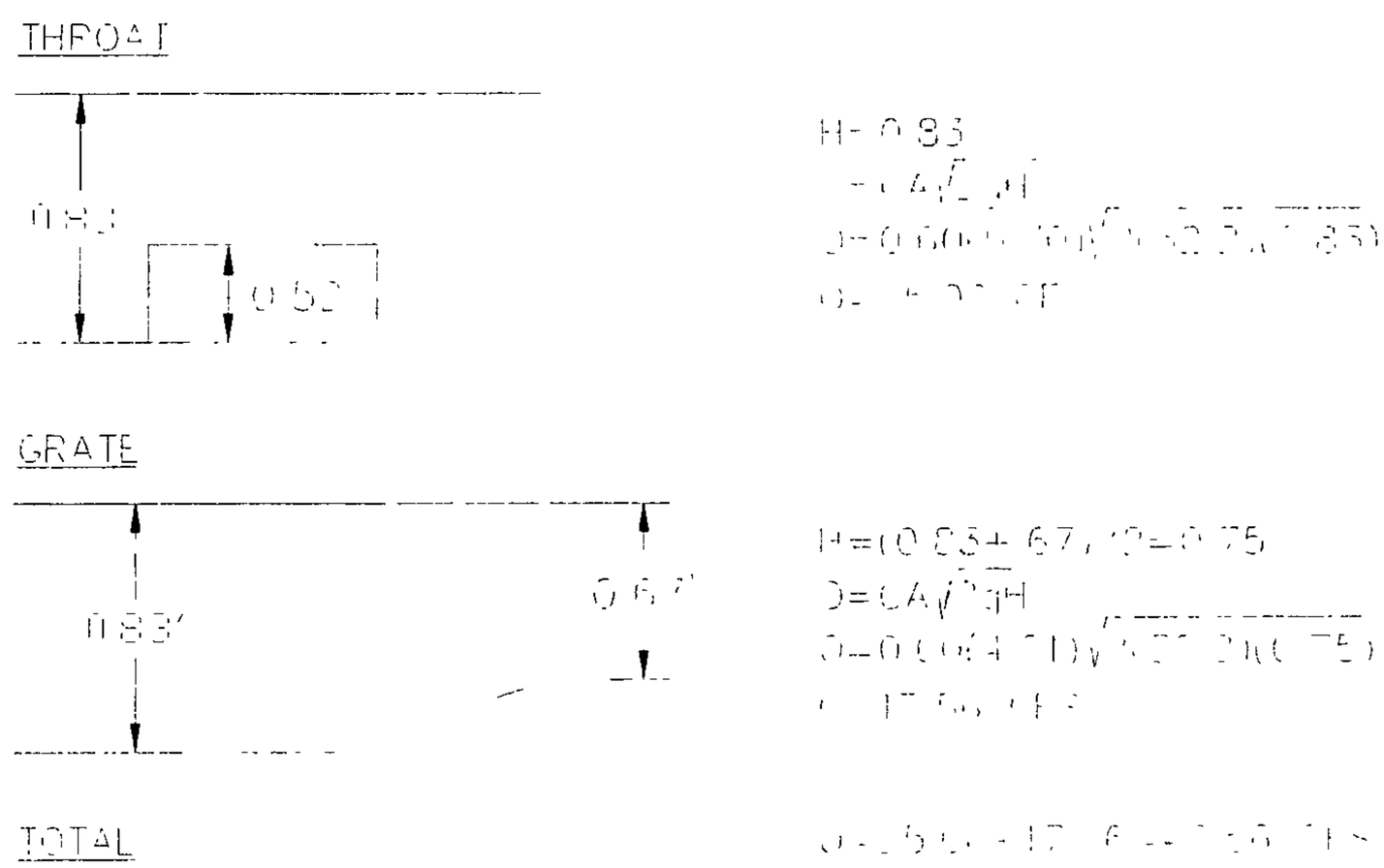
Effective Area = 8.41- 8.41 (0.5 $_{clogging\ factor}$)
= 4.21 ft^2 at the grate

<u>Area at the throat:</u>

L = 10.95'

H = 10 ¾" - 4 ½"
= 6 ¼"
= 0.5208'

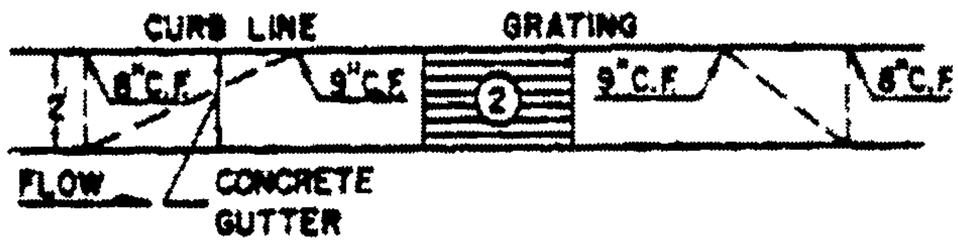
Area = 10.95' x 0.5208'
= 5.70 ft^2 at the throat



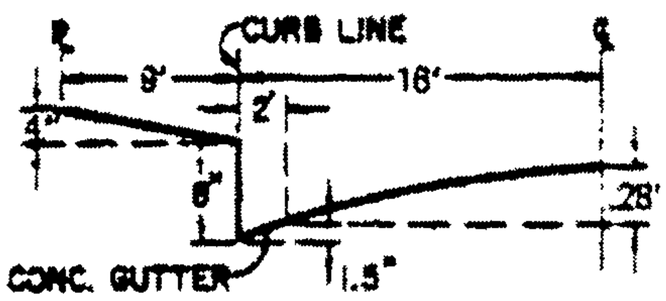
Flow intercepted by Inlet H = 42.56 cfs, Inlet I = 10.18 cfs, & Inlet N = 14.48 cfs

ANALYSIS POINTS AP–F12A, AP–F11A & AP–F11B
INLETS A TO F

GRATING CAPACITIES FOR TYPE 'A' , 'C' and 'D'



GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION
(ABOVE BASIN)

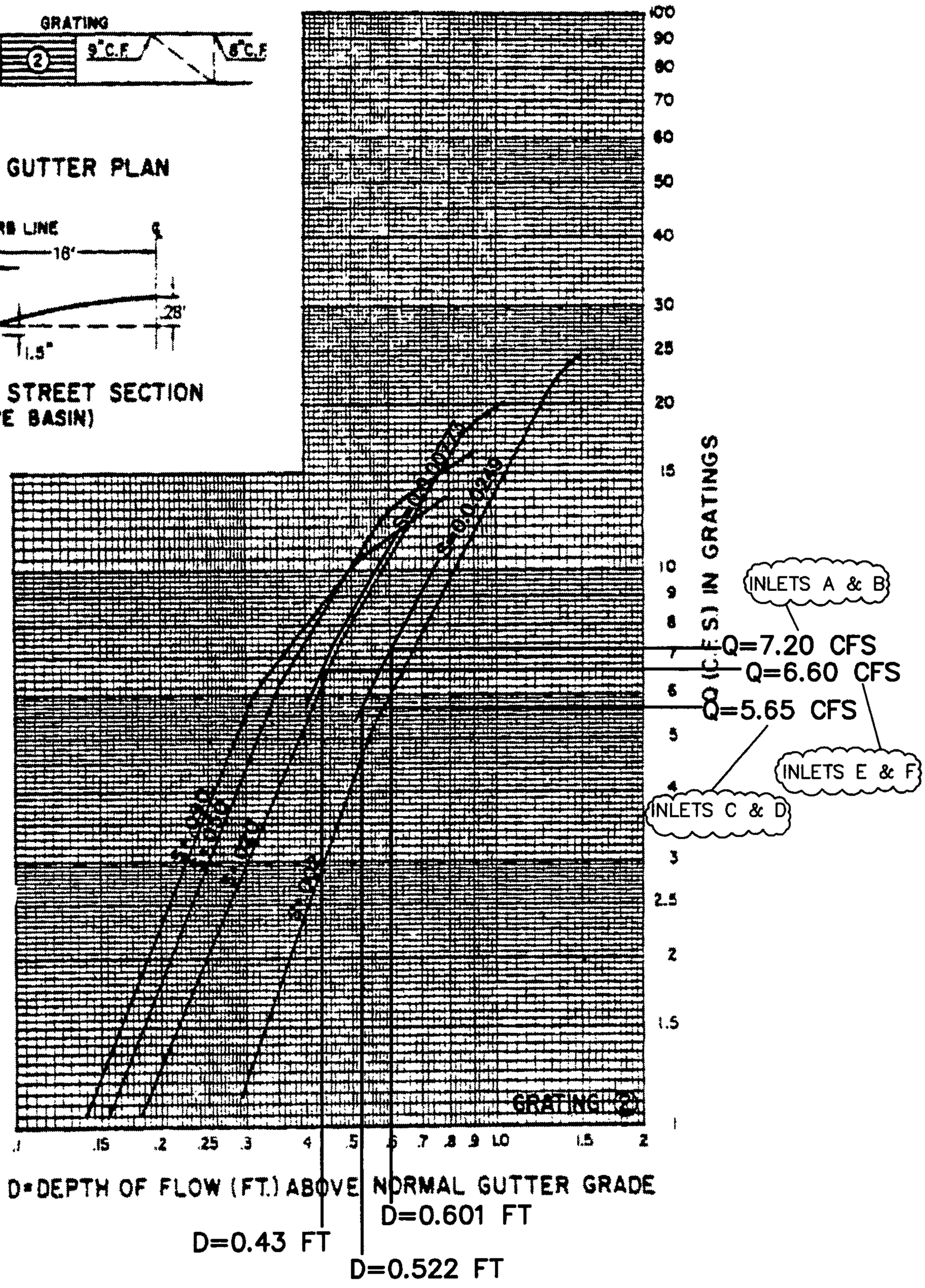
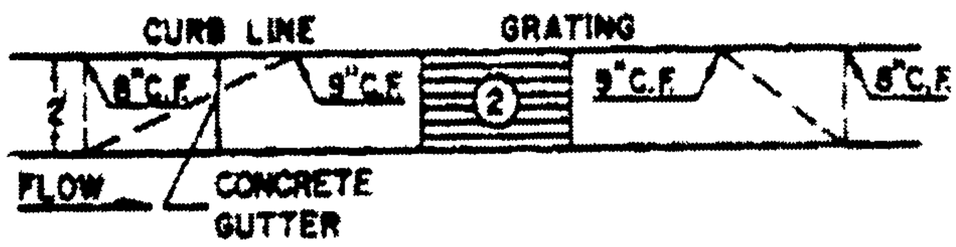


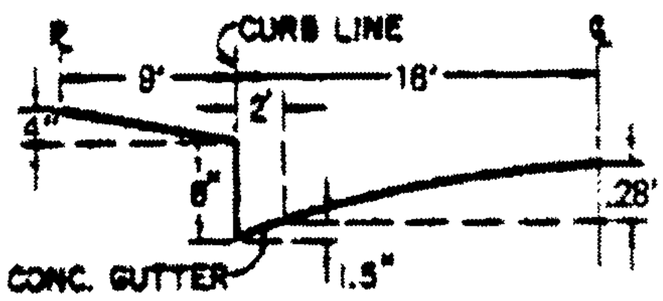
PLATE 22.3 D-5

ANALYSIS POINTS AP–A2 & AP–A2A
INLETS L TO M

GRATING CAPACITIES FOR TYPE 'A' , 'C' and 'D'



GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION
(ABOVE BASIN)

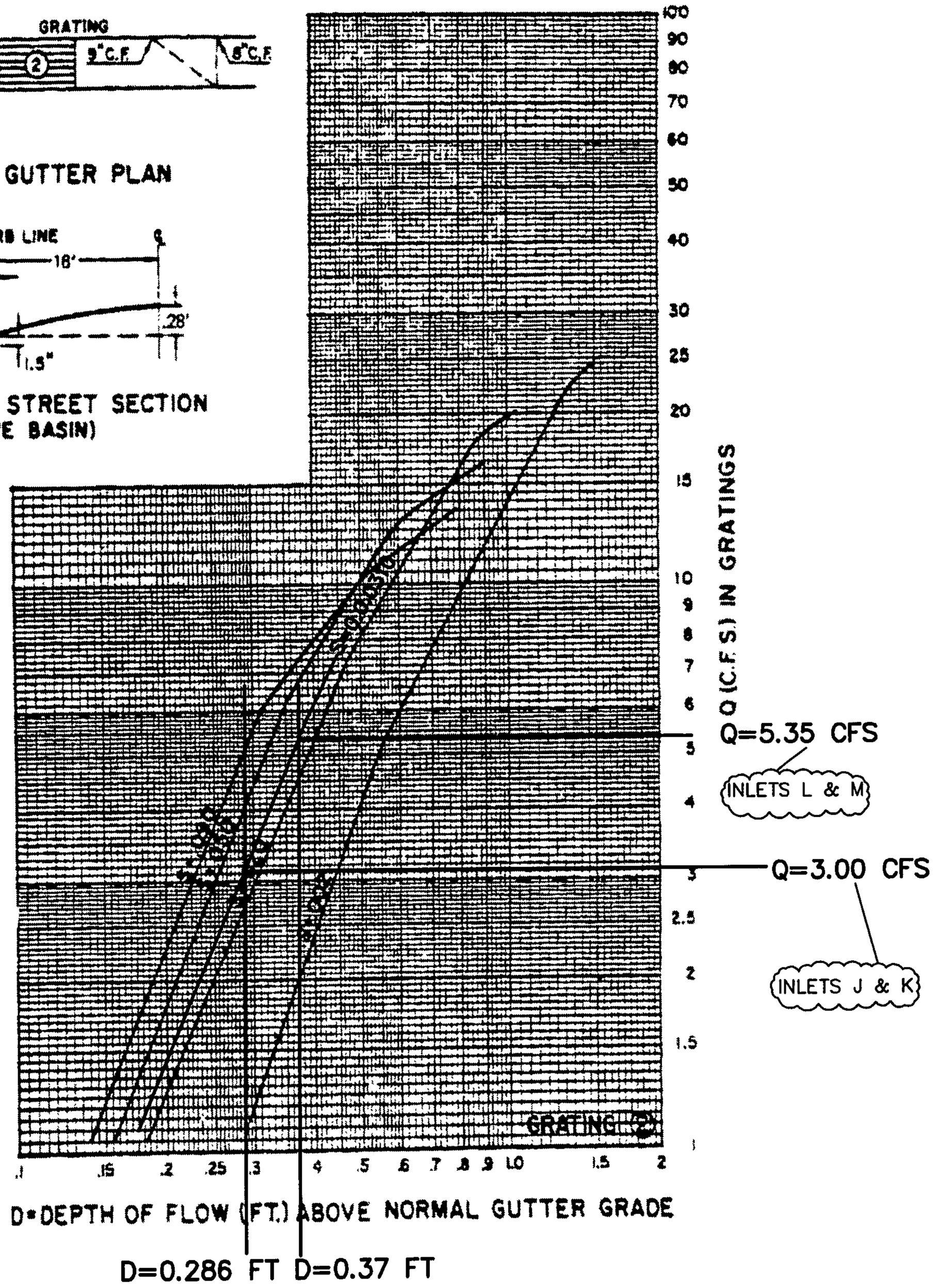
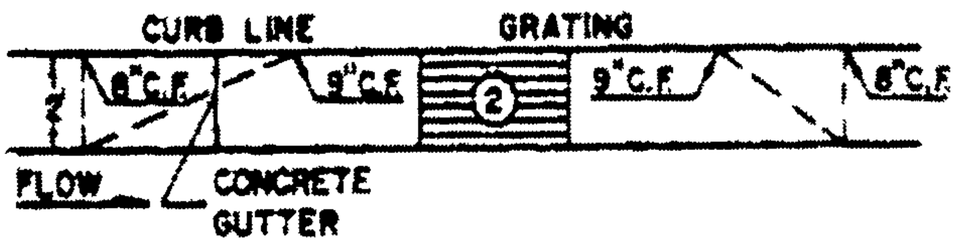


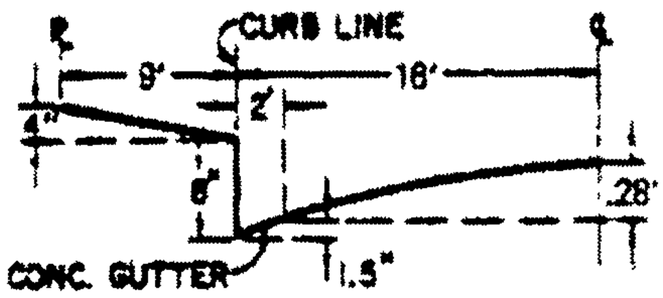
PLATE 22.3 D-5

ANALYSIS POINTS AP–D4A & AP–D4B
INLETS O TO R

GRATING CAPACITIES FOR TYPE 'A' , 'C' and 'D'



GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION
(ABOVE BASIN)

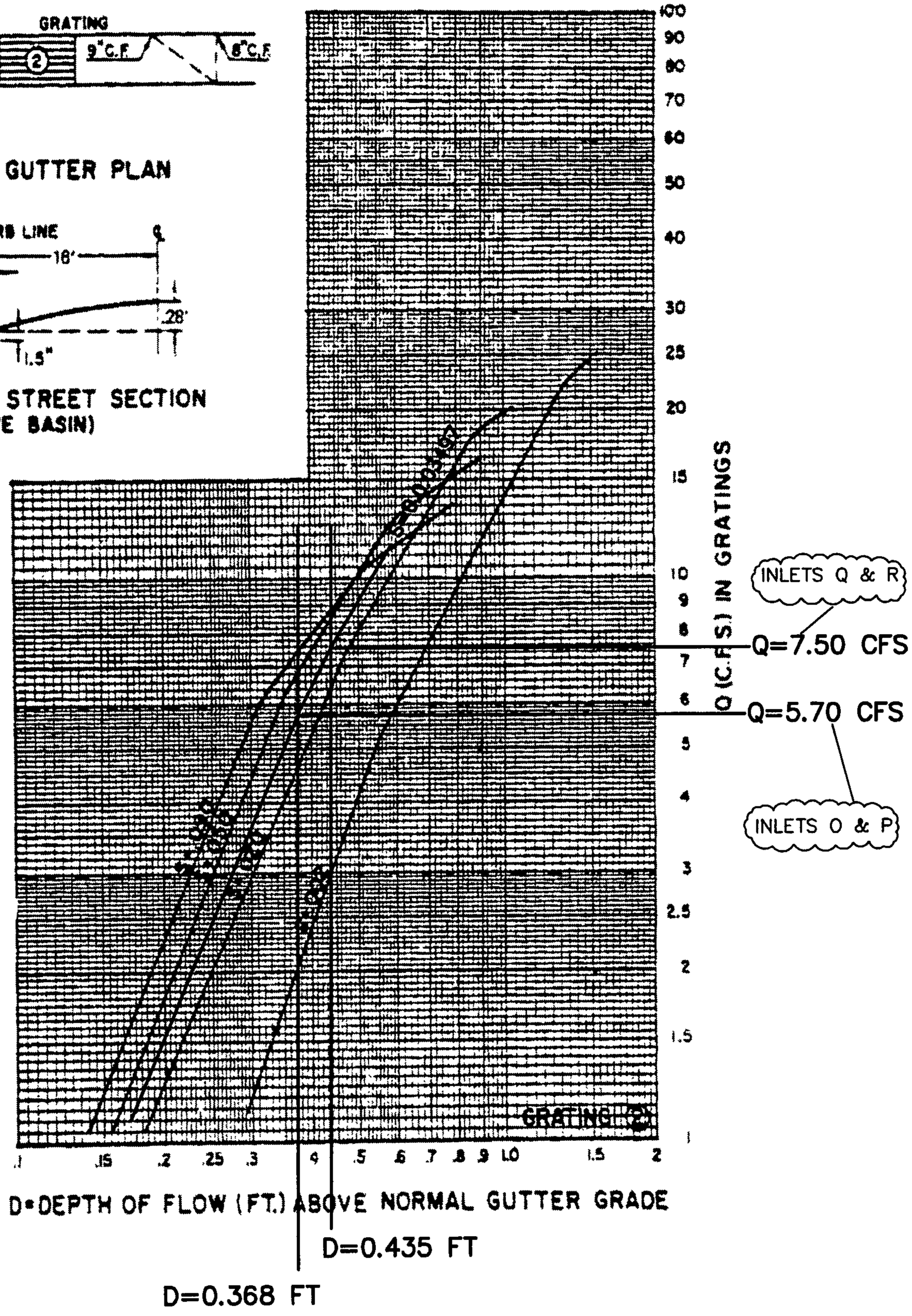
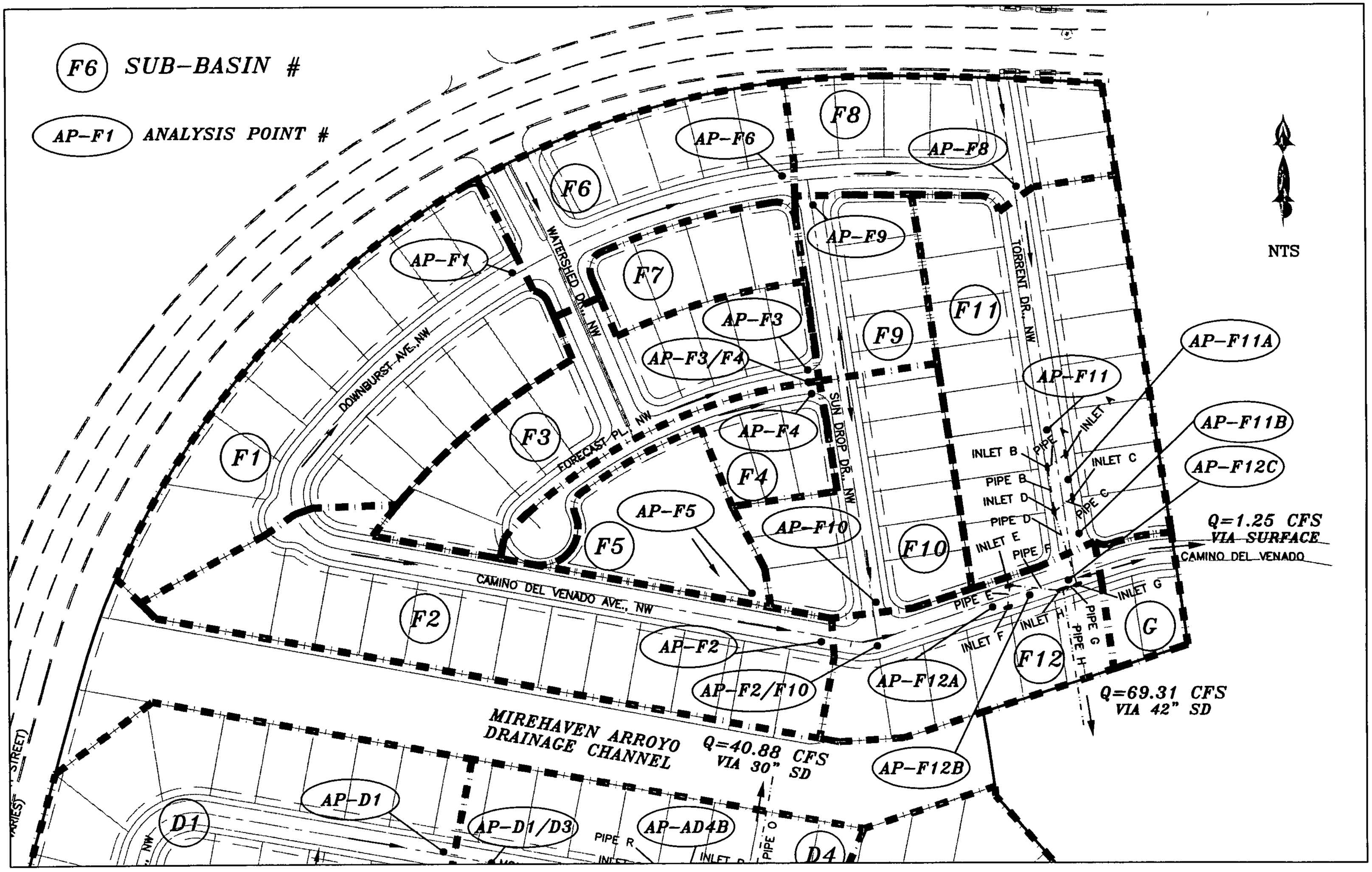
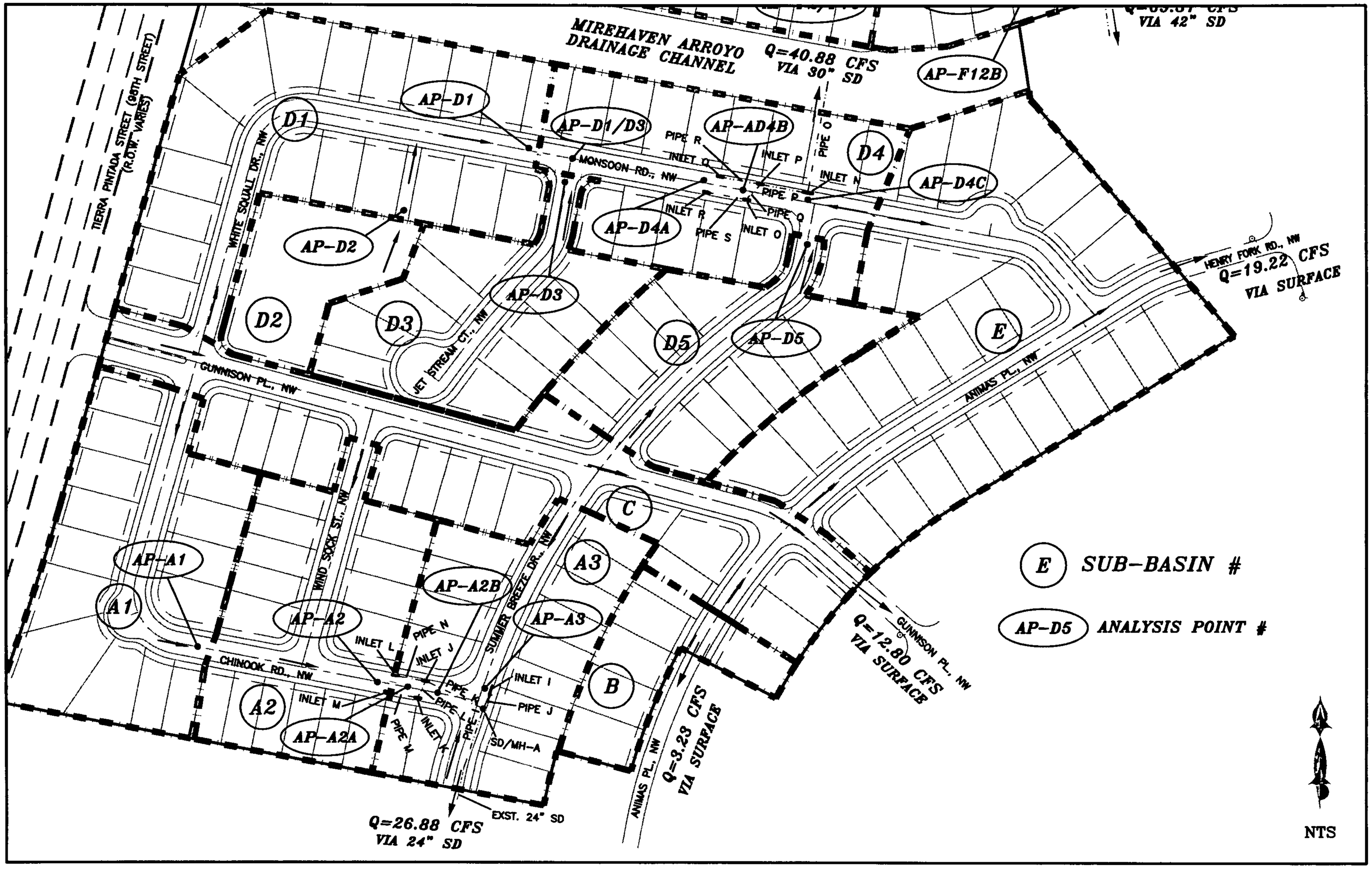


PLATE 22.3 D-5



ANALYSIS POINTS – SHEET A



ANALYSIS POINTS – SHEET B

Section VI

Pipe Flow Calculations

PIPE FLOW CALCULATIONS

PIPE	SIZE (IN)	FLOW (CFS)	REQUIRED HEAD (h) * (FT)
A	18	7.20	1.47
B	18	14.40	3.61
C	18	5.65	1.19
D	24	25.70	3.89
E	18	6.60	1.35
F	18	13.20	3.16
G	24	24.98	3.73
H	42	69.31	3.99
I	24	26.88	4.16
J	24	10.18	1.45
K	24	16.70	2.22
L	18	8.35	1.71
M	18	5.35	1.15
N	18	5.35	1.15
O	30	40.88	4.24
P	24	26.40	4.05
Q	18	5.70	1.20
R	24	15.00	1.98
S	18	7.50	1.53

* HEAD FROM THE INVERT OF THE PIPE

PIPE FLOW CAPACITY CALCULATIONS

Pipe flow capacity calculations were done using the orifice equation.

SAMPLE CALCULATION

18" Pipe (Pipe A) Flow Capacity Calculation Using Orifice Equation

Orifice Equation: $Q=CA\sqrt{2gh}$

h (head) = $(Q/CA)^2 / 2g$
A = 1.77 sf
g = 32.20
Q = 7.00 cfs

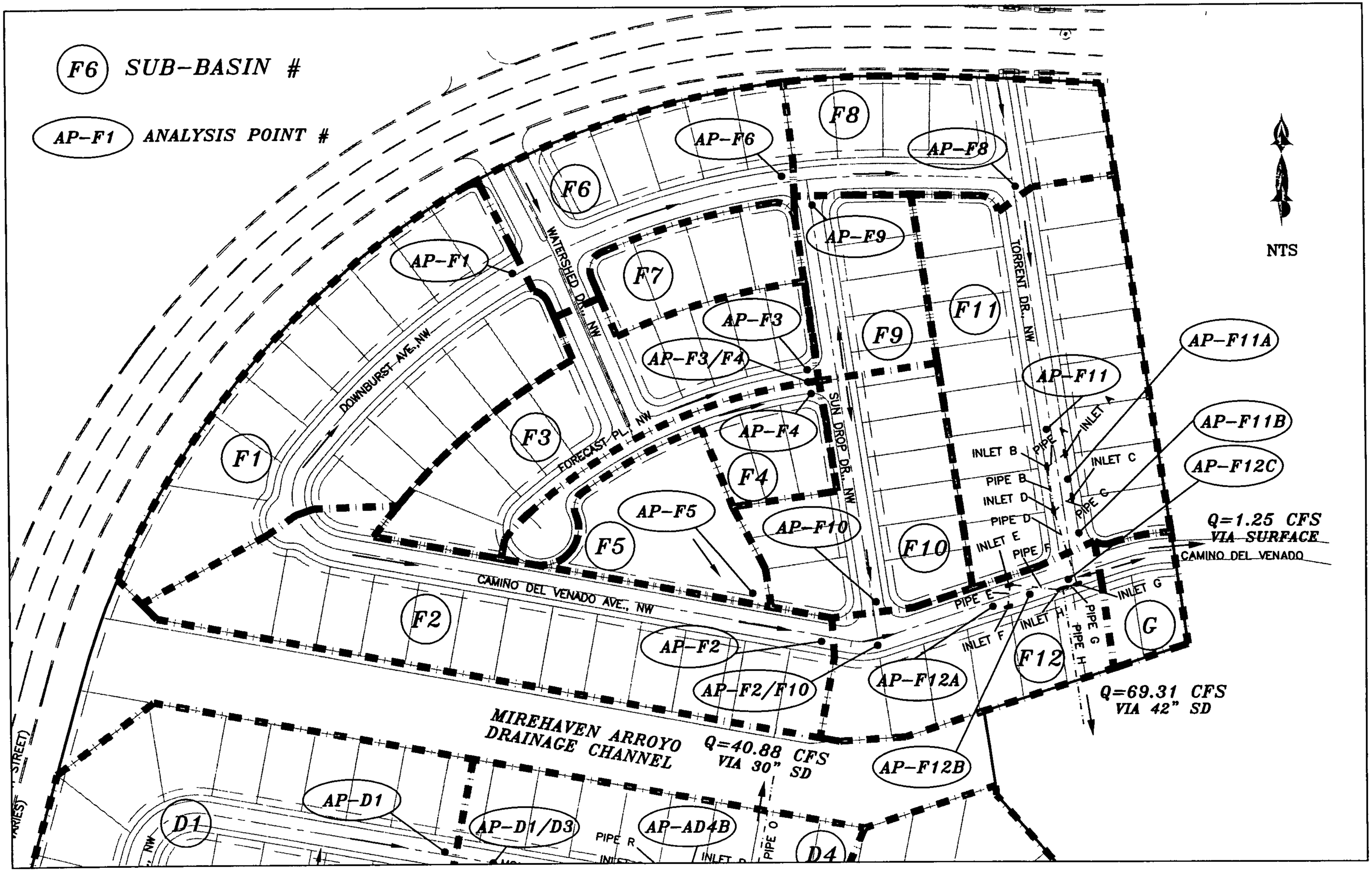
Minimum head required for the pipe (measured from the center pipe)

h = $(7.00 / 0.60 \times 1.77)^2 / 2 \times 32.2$
= 0.67' (head required from the center of pipe)

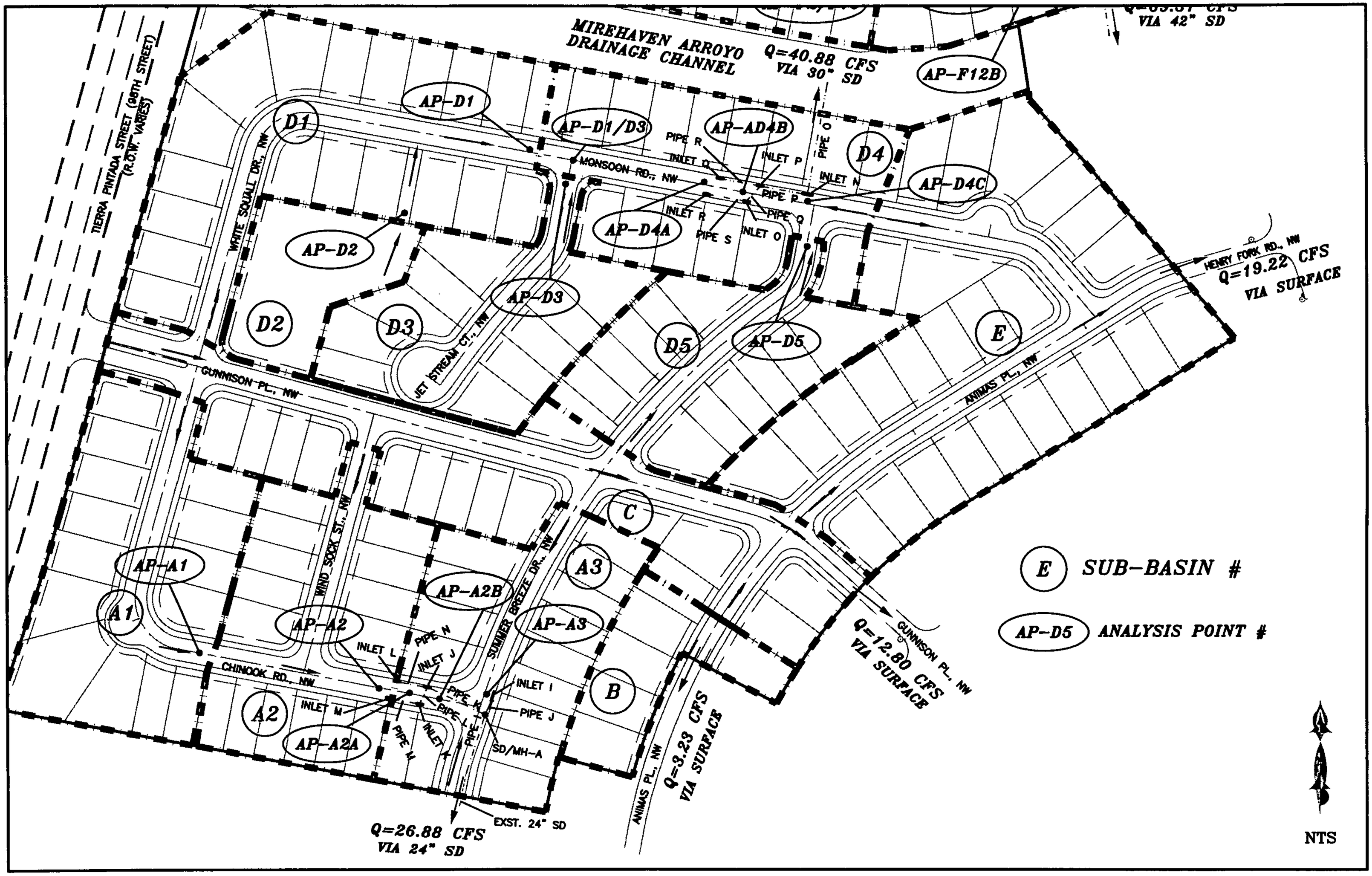
Therefore, head required from the invert of the pipe = 0.67'+0.75' = 1.42'

Invert of all pipes will be place a minimum of 2.50' from grate. Therefore, total minimum head provided for pipe would 2.50+0.90 = 3.40' (0.90' is the distance from grate to top of curb)

See the table for pipe flow capacity.



ANALYSIS POINTS – SHEET A



ANALYSIS POINTS – SHEET B

Section VII

Culvert Crossing Calculations
&
Channel Calculations

Rectangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: 639D

Comment: BOX CULVERT AT TIERRA PINTADA STREET

Solve For Depth

Given Input Data:

Bottom Width.....	36.00 ft
Manning's n.....	0.013
Channel Slope....	0.0020 ft/ft
Discharge.....	1677.00 cfs

Computed Results:

Depth.....	4.09 ft
Velocity.....	11.40 fps
Flow Area.....	147.10 sf
Flow Top Width...	36.00 ft
Wetted Perimeter.	44.17 ft
Critical Depth...	4.07 ft
Critical Slope...	0.0020 ft/ft
Froude Number....	0.99 (flow is Subcritical)

Open Channel Flow Module, Version 3.12 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Rectangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name:

Comment: EMERGENCY OVERLOW CHANNEL AT AP-12C

Solve For Depth

Given Input Data:

Bottom Width.....	10.00 ft
Manning's n.....	0.013
Channel Slope....	0.0100 ft/ft
Discharge.....	69.31 cfs

Computed Results:

Depth.....	0.79 ft
Velocity.....	8.83 fps
Flow Area.....	7.85 sf
Flow Top Width...	10.00 ft
Wetted Perimeter.	11.57 ft
Critical Depth...	1.14 ft
Critical Slope...	0.0031 ft/ft
Froude Number....	1.76 (flow is Supercritical)

Open Channel Flow Module, Version 3.12 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Rectangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name:

Comment: EMERGENCY OVERLFOW CHANNEL AT AP-D4D

Solve For Depth

Given Input Data:

Bottom Width.....	10.00 ft
Manning's n.....	0.013
Channel Slope....	0.0100 ft/ft
Discharge.....	40.88 cfs

Computed Results:

Depth.....	0.56 ft
Velocity.....	7.26 fps
Flow Area.....	5.63 sf
Flow Top Width...	10.00 ft
Wetted Perimeter.	11.13 ft
Critical Depth...	0.80 ft
Critical Slope...	0.0032 ft/ft
Froude Number....	1.70 (flow is Supercritical)

Rectangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name:

Comment: CHANNEL AT AP-D2

Solve For Depth

Given Input Data:

Bottom Width.....	2.00 ft
Manning's n.....	0.013
Channel Slope....	0.0100 ft/ft
Discharge.....	3.47 cfs

Computed Results:

Depth.....	0.37 ft
Velocity.....	4.75 fps
Flow Area.....	0.73 sf
Flow Top Width...	2.00 ft
Wetted Perimeter.	2.73 ft
Critical Depth...	0.45 ft
Critical Slope...	0.0053 ft/ft
Froude Number....	1.38 (flow is Supercritical)

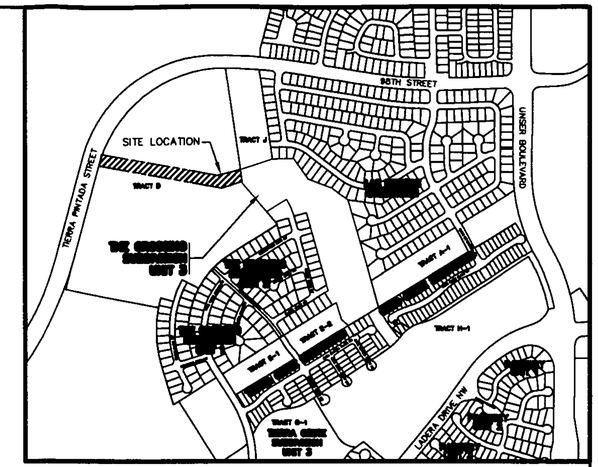
Open Channel Flow Module, Version 3.12 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Section VIII

Construction Plans For Mirehaven Arroyo
Prepared By
Wilson & Company

CITY OF ALBUQUERQUE, NEW MEXICO
PUBLIC WORKS DEPARTMENT

CONSTRUCTION PLANS
FOR
THE CROSSING SUBDIVISION UNIT 3
MIREHAVEN ARROYO
STATION 23+00 TO STATION 33+30
PUBLIC
INFRASTRUCTURE IMPROVEMENTS



VICINITY MAP
ZONE ATLAS MAP NO. H-9-Z

NOTES

ALL WORK DETAILED ON THESE PLANS TO BE PERFORMED UNDER CONTRACT SHALL EXCEPT ASS OTHERWISE STATED OR PROVIDED FOR HEREON, BE CONSTRUCTED IN ACCORDANCE WITH THE CITY OF ALBUQUERQUE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, 1986 EDITION, AS AMENDED THROUGH UPDATE #7.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE EXECUTION OF THE WATER VALVE SHUT-OFF PLAN WITH THE WATER SYSTEMS DIVISION (857-8200) FIVE (5) WORKING DAYS IN ADVANCE OF ANY WORK THAT MAY AFFECT EXISTING PUBLIC WATER UTILITIES.

TWO (2) WORKING DAY PRIOR TO ANY EXCAVATION, THE CONTRACTOR MUST CONTACT NEW MEXICO ONE CALLS SYSTEM (260-1990) FOR LOCATION OF EXISTING UTILITIES.

PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL EXCAVATE AND VERIFY THE HORIZONTAL AND VERTICAL LOCATIONS OF ALL OBSTRUCTIONS. SHOULD A CONFLICT EXIST, THE CONTRACTOR SHALL NOTIFY THE ENGINEER OR SURVEYOR IMMEDIATELY SO THAT THE CONFLICT CAN BE RESOLVED WITH A MINIMUM AMOUNT OF DELAY.

THREE (3) WORKING DAYS PRIOR TO BEGINNING CONSTRUCTION, THE CONTRACTOR SHALL SUBMIT TO CONSTRUCTION COORDINATION DIVISION A DETAILED CONSTRUCTION SCHEDULE. TWO (2) WORKING DAYS PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL OBTAIN A BARRICADE PERMIT FROM THE CONST. COORDINATION DIVISION. CONTRACTOR SHALL NOTIFY BARRICADE ENGINEER (924-3400) PRIOR TO OCCUPYING AN INTERSECTION. REFER TO SECTION 19 OF THE GENERAL CONDITIONS OF THE STANDARD SPECIFICATIONS.

ALL STREET STRIPING ALTERED OR DESTROYED SHALL BE REPLACED WITH PLASTIC REFLECTORIZED PAVEMENT MARKINGS BY CONTRACTOR TO LOCATION AS EXISTING OR AS INDICATED BY THIS PLAN SET.

CONTRACTOR SHALL NOTIFY THE ENGINEER NOT LESS THAN SEVEN (7) DAYS PRIOR TO STARTING WORK IN ORDER THAT THE ENGINEER MAY TAKE NECESSARY MEASURES TO INSURE THE PRESERVATION OF SURVEY MONUMENTS. CONTRACTOR SHALL NOT DISTURB PERMANENT SURVEY MONUMENTS WITHOUT THE CONSENT OF THE ENGINEER AND SHALL NOTIFY THE ENGINEER AND BEAR THE EXPENSE OF REPLACING ANY THAT MAY BE DISTURBED WITHOUT PERMISSION. REPLACEMENT SHALL BE DONE ONLY BY THE CITY SURVEYOR. WHEN A CHANGE IS MADE IN THE FINISHED ELEVATIONS OF THE PAVEMENT OF ANY ROADWAY IN WHICH A PERMANENT SURVEY MONUMENT IS LOCATED, CONTRACTOR SHALL, AT HIS OWN EXPENSE, ADJUST THE MONUMENT COVER TO THE NEW GRADE UNLESS OTHERWISE SPECIFIED. REFER TO SECTION 4.4 OF THE GENERAL CONDITIONS OF THE STANDARD SPECIFICATIONS.

ANY WORK AFFECTING AN ARTERIAL ROADWAY REQUIRES TWENTY-FOUR (24) CONSTRUCTION.

THE FOLLOWING NOTES ALSO APPLY WHEN CHECKED:

- ☐ ALL UTILITIES AND UTILITY SERVICE LINES SHALL BE INSTALLED PRIOR TO PAVING.
- ☐ BACKFILL COMPACTION SHALL BE ACCORDING TO SPECIFIED STREET USE.
- ☐ TACK COAT REQUIREMENTS SHALL BE DETERMINED BY THE ENGINEER.
- ☐ SIDEWALKS AND WHEELCHAIR RAMPS WITHIN THE CURB RETURNS SHALL BE CONSTRUCTED WHEREVER A NEW CURB RETURN IS CONSTRUCTED.
- ☐ IF CURB IS DEPRESSED FOR A DRIVEPAD, THE DRIVEPAD SHALL BE CONSTRUCTED PRIOR TO ACCEPTANCE OF CURB AND GUTTER.
- ☐ ALL STORM DRAINAGE FACILITIES SHALL BE COMPLETED PRIOR TO FINAL ACCEPTANCE.

LEGEND

EXISTING

- PROPERTY LINE
- ADJACENT PROPERTY LINE
- RIGHT OF WAY LINE
- EASEMENT
- 5200 INDEX CONTOUR
- 5199 INTERMEDIATE CONTOUR
- SAS SANITARY SEWER LINE
- WL WATER LINE
- SD STORM DRAIN
- CURB & GUTTER
- FIRE HYDRANT
- WATER VALVE
- REDUCER
- SANITARY SEWER MANHOLE
- SAS SERVICE W/ CAP
- UTILITY POLE
- LIGHT

PROPOSED

- CENTER LINE
- RIGHT OF WAY LINE
- EASEMENT
- 5200 INDEX CONTOUR
- INTERMEDIATE CONTOUR
- SAS SANITARY SEWER
- WATER LINE
- FOC / EOP FACE OF CURB / EDGE OF PAVEMENT
- FIRE HYDRANT
- WATER VALVE
- REDUCER
- SINGLE WATER SERVICE
- DOUBLE WATER SERVICE
- SAS OR SD MANHOLE
- CLEAN OUT
- SAS SERVICE W/ CAP
- STREET LIGHT
- WHEELCHAIR RAMP
- SIDEWALK

INDEX

DESCRIPTION	SHEET NO.
COVER SHEET	1
MIREHAVEN ARROYO PLAN & PROFILE STATION 23+00 TO 33+30	2
MIREHAVEN ARROYO TYPICAL SECTION AND DETAILS	3
DROP STRUCTURE DETAILS AND GENERAL NOTES	4

WILSON & COMPANY
2600 THE AMERICAN ROAD S.E.
SUITE 100
RIO RANCHO, NEW MEXICO
87124
(505) 898-8021

APPROVED FOR CONSTRUCTION WITHIN AMAFCA RIGHT OF WAY OR EASEMENT:

(AMAFCA) (DATE)

REV	SHEETS	CITY ENGINEER	DATE	USER DEPARTMENT	DATE	USER DEPARTMENT	DATE

ENGINEERS STAMP & SIGNATURE	APPROVALS	ENGINEER	DATE
	DRC Chairman		
	Transportation		
	Water/Wastewater		
	Hydrology		
	Parks		
	Constr. Mngmt.		
	Constr. Coord.		

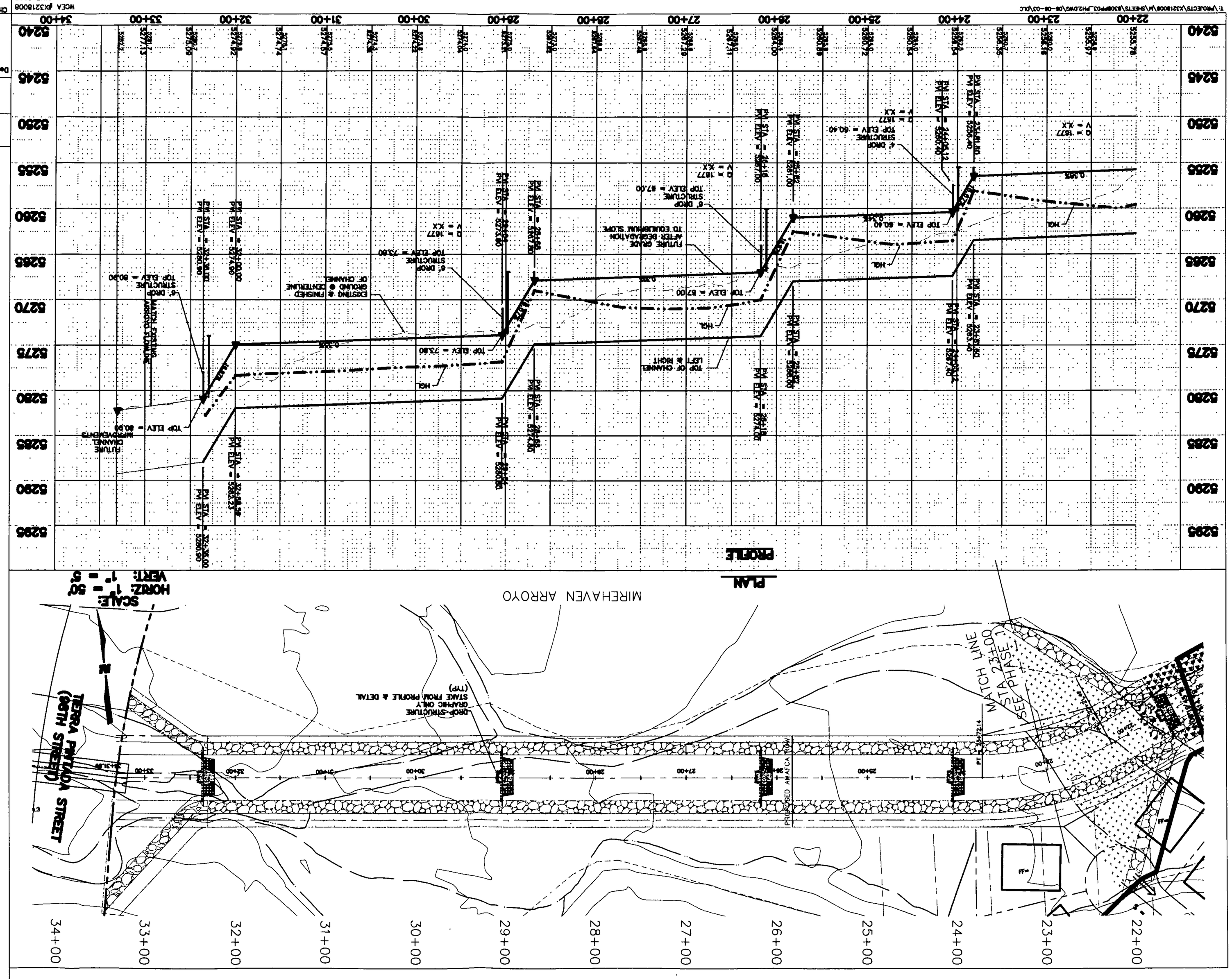
APPROVED FOR CONSTRUCTION

City Engineer Date

City Project No. XXXXXX

Sheet 1 Of 4

WCEA #X3218008
AUGUST 2004



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WCEA JX21800B
JUNE 2003

City Project No. XXXXXX | Zone Map No. H-9-Z | Sheet 2 Of 4

Design Review Committee | City Engineer Approval | Last Design Update | Mo./Day/Yr. | Mo./Day/Yr.

THE CROSSING SUBDIVISION UNIT 3
MIREHAVEN ARROYO–STA 22+00 TO STA 33+36.31
PLAN & PROFILE

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING GROUP

NO.	DATE	REMARKS	BY

REVISIONS

WILSON & COMPANY, ENGINEERS & ARCHITECTS

		DATE
DESIGNED BY	JMT	APRIL 2003
DRAWN BY	DLC	APRIL 2003
CHECKED BY	BMS	APRIL 2003

ENGINEER'S SEAL

SURVEY INFORMATION

FIELD NOTES

NO.	BY	DATE

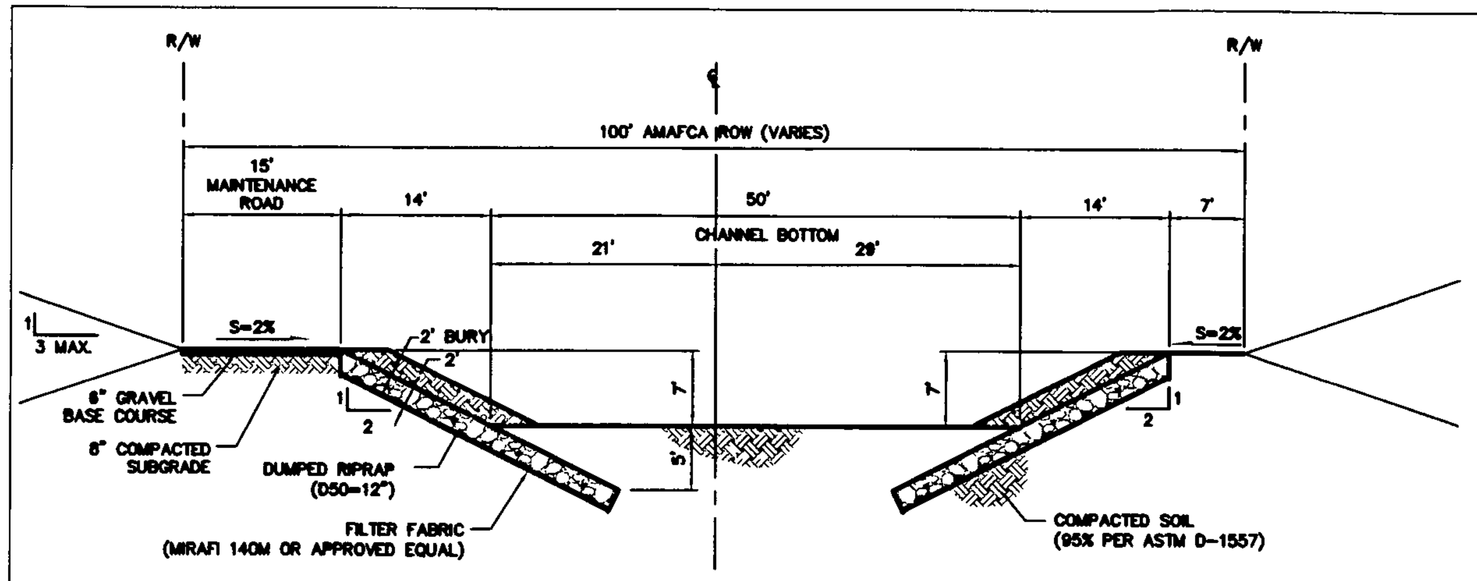
BENCH MARKS

A.C.S. Aluminum Tablet Stamped "BH-40" Delta:
New Mexico State Plane Grid Coordinates (Central Zone)
NAD 1927 X=352,790.68 Y=1,492,346.53
Ground to grid factor = 0.9996105
Delta Alpha = (-)00°16'58" ELEV = 5305.43

A.C.S. Aluminum Tablet Stamped "BH-41" Delta:
New Mexico State Plane Grid Coordinates (Central Zone)
NAD 1927 X=351,435.58 Y=1,498,546.13
Ground to grid factor = 0.9996104
Delta Alpha = (-)00°17'06" ELEV = 5306.63

AS-BUILT INFORMATION

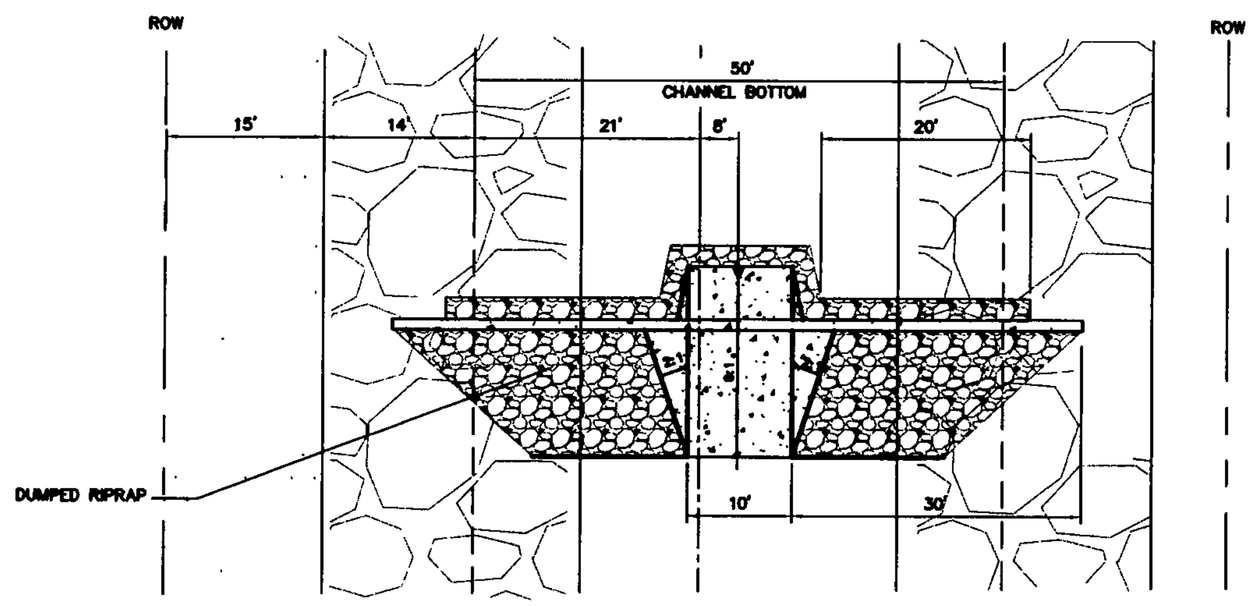
CONTRACTOR
WORK STAKED BY | DATE
WORK INSPECTED BY | DATE
FIELD REVISIONS BY | DATE
CORRECTIONS CORRECTED BY | DATE
MICRO-FILM INFORMATION
RECORDED BY | DATE
INK



TRAPEZOIDAL ARROYO SECTION

SCALE 1" = 10'

MIREHAVEN ARROYO

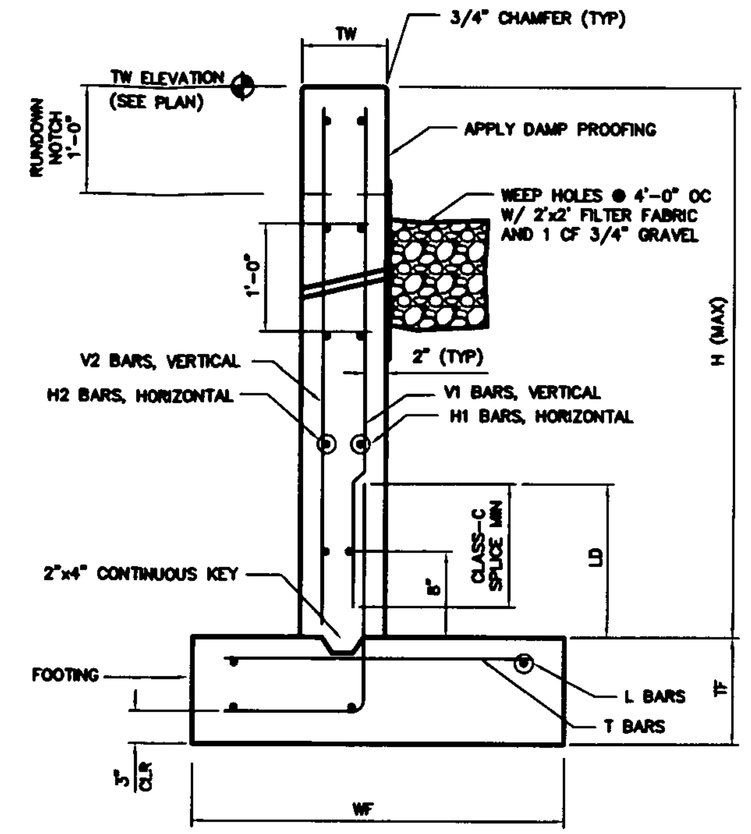


DROP STRUCTURE PLAN (TYP)

SCALE 1"=10'

NOTE

DUMPED RIPRAP SUBGRADE SHALL BE COMPACTED SOIL (95% PER ASTM D-1557).



TYPICAL DROP STRUCTURE RETAINING WALL DETAIL

SCALE: 1' = 1'

DIMENSIONS									
ELEV. DROP	WALL TYPE	H (MAX) (FT)	TF (IN)	TW (IN)	TOE (IN)	HEEL (IN)	WF (IN)	LD (IN)
2'	B1	4	12	8	18	27	45	28
4'	B2	6	12	8	24	36	60	32
5'	B3	7	12	8	30	42	72	32
6'	B4	8	12	8	30	42	72	32

REINFORCING																
WALL	D		V1		H1		V2		H2		L		T	
TYPE	SIZE	SPACE	SIZE	SPACE	SIZE	SPACE	SIZE	SPACE	SIZE	SPACE	SIZE	NO. REQ'D	SIZE	SPACE
B1	5	12	4	12	4	12	4	12	4	12	4	5	4	18
B2	6	12	4	12	4	12	4	12	4	12	4	7	4	18
B3	6	12	4	12	4	12	4	12	4	12	4	7	4	18
B4	6	12	4	12	4	12	4	12	4	12	4	7	4	18

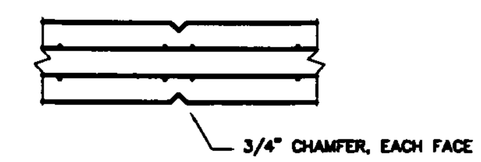
RETAINING WALL TABLES

NOTES FOR CAST-IN-PLACE RETAINING WALL

1. WORKMANSHIP AND MATERIALS SHALL CONFORM TO THE STANDARD SPECIFICATIONS.
2. ALL CONCRETE SHALL BE CLASS A, 3000 PSI., TINTED, SAN DIEGO BUFF, 1#/SACK CEMENT FOR RAMP SURFACE.
3. REINFORCING BARS SHALL CONFORM TO AASHTO SPECIFICATION M31, GRADE 60. ALL DIMENSIONS ARE TO CENTERLINE OF THE BAR UNLESS NOTED OTHERWISE.
4. CAST-IN-PLACE WALL SHALL RECEIVE A FINISH OF THORO-COAT, SAN DIEGO BUFF.
5. REBAR LAP SPLICES SHALL BE CLASS "B" (ACI).
6. HORIZONTAL REBAR SHALL BE LAPPED AND CONTINUOUS EXCEPT WHERE NOTED.
7. DAMP PROOFING SHALL CONSIST OF ONE APPLICATION OF AN EMULSIFIED ASPHALT COMPOUND, HYDROCIDE 7008 OR APPROVED EQUAL.
8. WHERE NO V1 BARS OR DIMENSION LD IS SPECIFIED, THE D BARS SHALL EXTEND TO THE TOP OF THE WALL.

LOADS

COULOMB EARTH PRESSURE FOR ø	=40°
SOIL UNIT WEIGHT	=120 PCF
ALLOWABLE BEARING PRESSURE	=3000 PSF
COEFFIECIENT OF FRICTION FOR SLIDING	=0.40



VERTICAL CONTRACTION JOINT PLAN DETAIL @ 15' O.C.

SCALE: 1' = 2'

AS-BUILT INFORMATION
CONTRACTOR
WORK STAKED BY — DATE
INSPECTOR'S ACCEPTANCE BY — DATE
REVISION BY — DATE
CORRECTED BY

BENCH MARKS
A.C.S. Aluminum Tablet Stamped "B9-40" Data:
New Mexico State Plane Grid Coordinates (Central Zone)
NAD 1927 X=332,790.88 Y=1,482,346.53
Ground to grid factor = 0.99996105
Delta Alpha = (-)00°16'59" ELEV = 5305.43
A.C.S. Aluminum Tablet Stamped "B9-41" Data:
New Mexico State Plane Grid Coordinates (Central Zone)
NAD 1927 X=331,435.56 Y=1,486,546.13
Ground to grid factor = 0.99986704
Delta Alpha = (-)00°17'08" ELEV = 5398.63

MICRO-FILM INFORMATION
REQUESTED BY — DATE
NO.

SURVEY INFORMATION
FIELD NOTES

NO.	BY	DATE

ENGINEER'S SEAL

NO.	DATE	REMARKS REVISIONS	BY

WILSON & COMPANY, ENGINEERS & ARCHITECTS

DESIGNED BY	JMT	DATE APRIL 2003
DRAWN BY	DLC	DATE APRIL 2003
CHECKED BY	BMS	DATE APRIL 2003

WILSON & COMPANY
2600 THE AMERICAN ROAD S.E.
SUITE 100
RIO RANCHO, NEW MEXICO
87124
(505) 896-8021

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING GROUP

THE CROSSING SUBDIVISION UNIT 3
MIREHAVEN ARROYO – STA 23+00 TO 33+30
TYPICAL SECTION & DETAILS

Design Review Committee | City Engineer Approval | Last Design Update | Mo./Day/Yr. | Mo./Day/Yr.

City Project No. XXXXXX | Zone Map No. H-9-Z | Sheet 3 Of 4

WCEA #X3218008
AUGUST 2004

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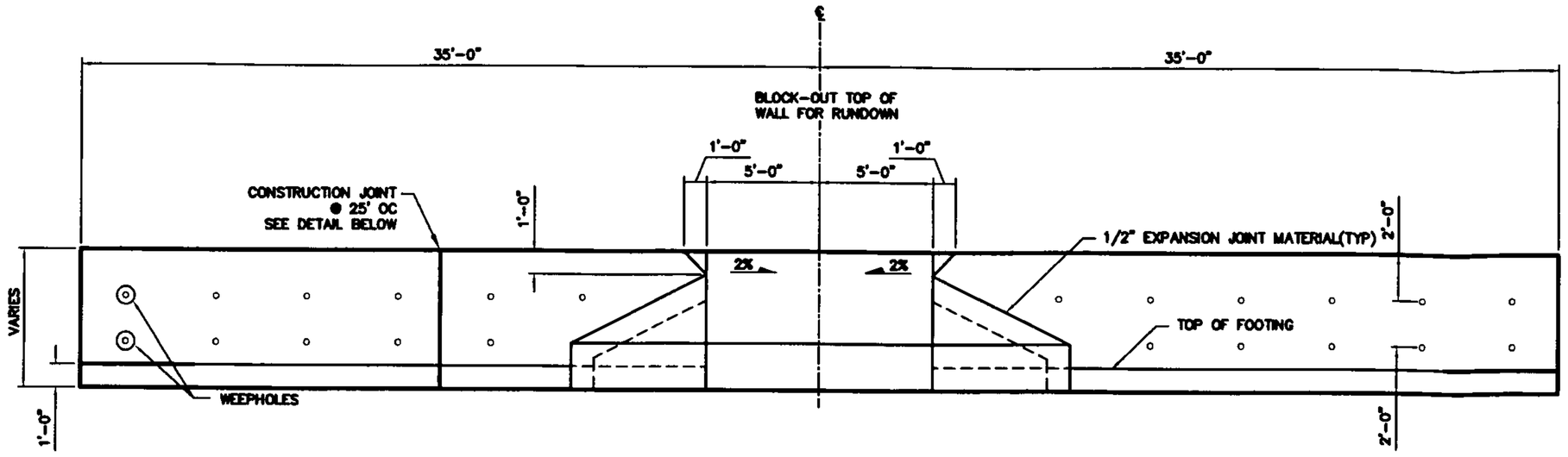
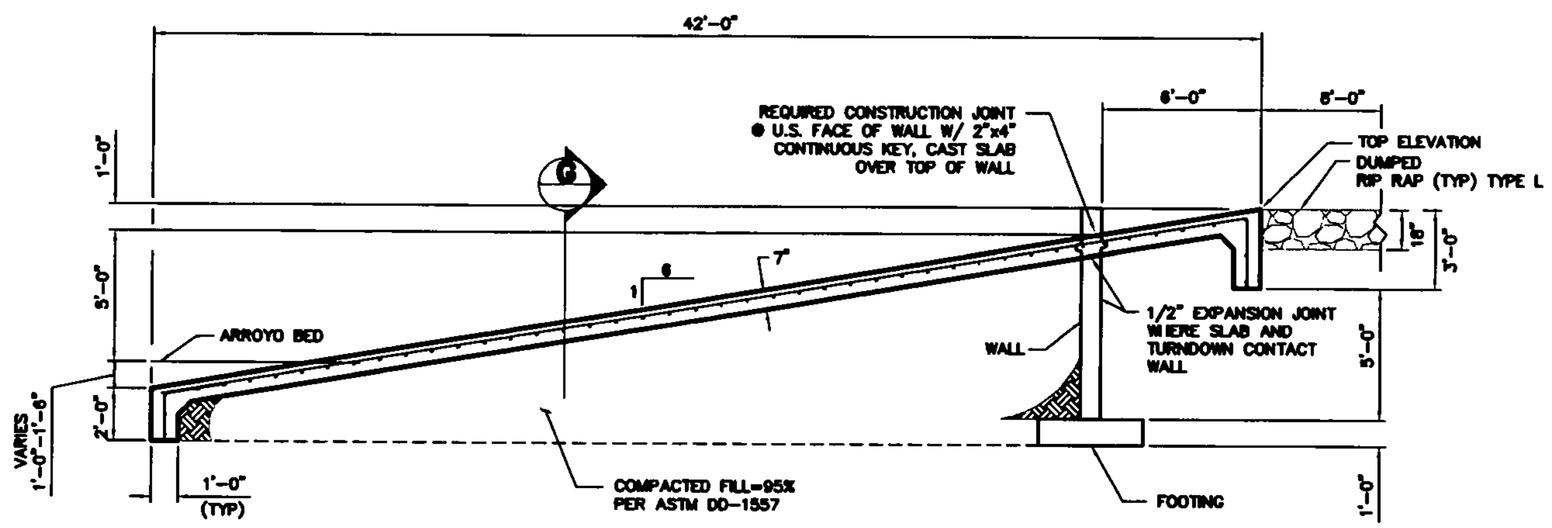
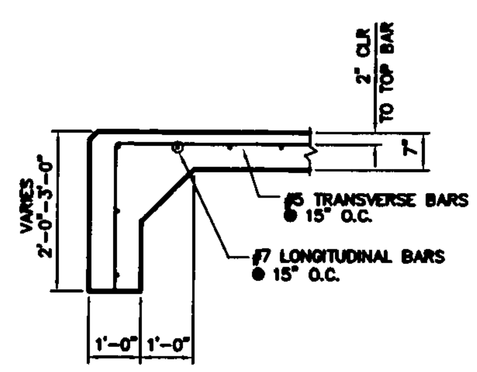


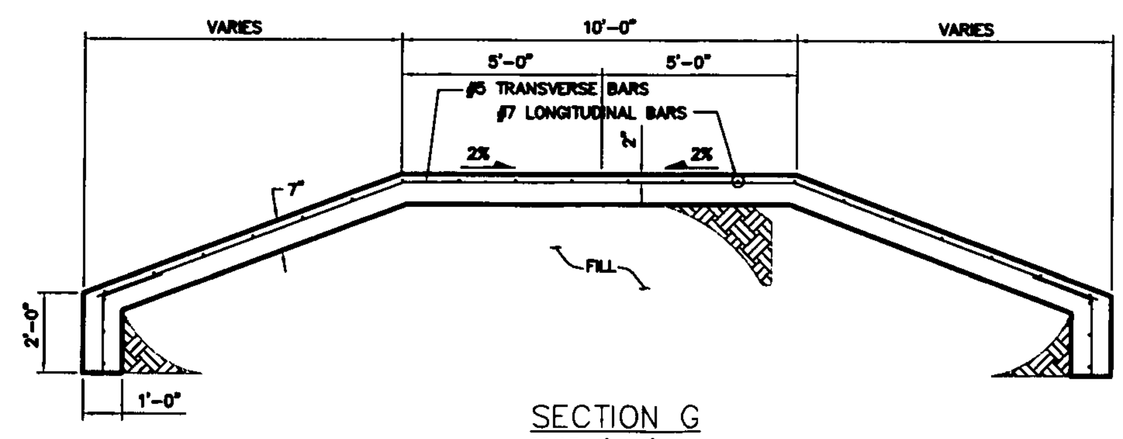
ELEVATION–GRADE CONTROL DROP STRUCTURE
SCALE: 1' = 4'



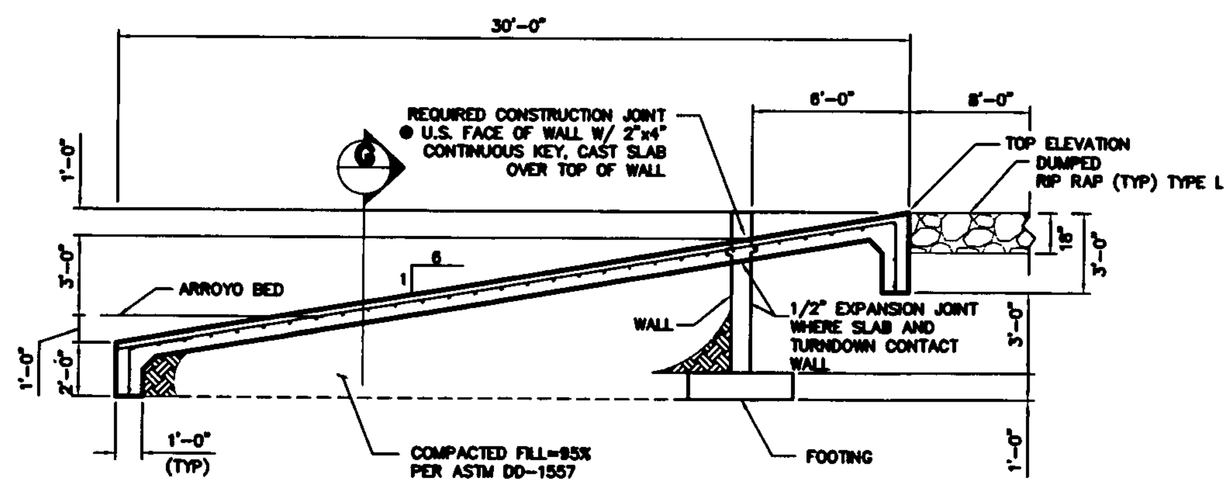
SECTION– 6' DROP STRUCTURE
SCALE: 1' = 4'



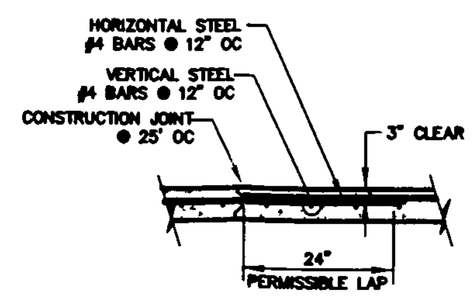
TYPICAL TURNDOWN
SCALE: 1' = 2'



SECTION G
SCALE: 1' = 3'



SECTION– 4' DROP STRUCTURE
SCALE: 1' = 4'



TYPICAL CONSTRUCTION JOINT
NTS

GENERAL NOTES:

1. THE CONTRACTOR WILL BE REQUIRED TO CONFINE HIS WORK WITHIN THE CONSTRUCTION LIMITS AND/OR R.O.W. TO PRESERVE EXISTING VEGETATION AND PRIVATE PROPERTY. OVERNIGHT PARKING OF CONSTRUCTION EQUIPMENT SHALL NOT OBSTRUCT DRIVEWAY OPENINGS OR DESIGNATED TRAFFIC LANES.

2. A DISPOSAL SITE, COMPLYING WITH ALL CITY ORDINANCES, SHALL BE OBTAINED BY THE CONTRACTOR FOR THE DISPOSAL OF ALL EXCESS EXCAVATION MATERIAL. ASPHALTIC PAVEMENT (EXCEPT MILLED BITUMINOUS CONCRETE PAVEMENT) AND OTHER WASTE MATERIALS. THE CONTRACTOR SHALL NOTIFY THE CITY OF ALBUQUERQUE OF THE LOCATION OF THE DISPOSAL SITE PRIOR TO THE REMOVAL AND ACTUAL DISPOSAL OF THE MATERIAL. ALL COSTS IN OBTAINING A DISPOSAL SITE AND HAUL THERETO SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION AND NO DIRECT PAYMENT WILL BE MADE THEREFOR.

3. CONTRACTOR TO CAREFULLY FIELD REVIEW SITE TO ASSESS EXTENT OF TRASH REMOVAL.

4. CONTRACTOR IS TO EXERCISE DUE CARE TO AVOID DISTURBING ANY EXISTING UTILITIES. IT SHALL BE HIS RESPONSIBILITY TO COORDINATE WITH THE UTILITY COMPANIES IN ORDER TO PREVENT ANY SERVICE DISRUPTION THAT MIGHT RESULT FROM PROJECT CONSTRUCTION. IT SHALL BE HIS RESPONSIBILITY TO PROTECT AND PRESERVE UTILITY EQUIPMENT AFFECTED BY PROJECT CONSTRUCTION. SHOULD HE BREAK AN EXISTING UTILITY LINE DURING CONSTRUCTION ACTIVITIES HE SHALL BE RESPONSIBLE FOR UTILITY REPAIR COSTS.

5. ALL EXISTING UTILITIES SHOWN HEREIN WERE TAKEN FROM RECORD DRAWINGS, FIELD SURVEYS, C.O.A. SYSTEMS UTILITIES MAPS AND INFORMATION PROVIDED BY THE UTILITY OWNERS AND ARE APPROXIMATE. IT WILL BE THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THEIR HORIZONTAL AND VERTICAL LOCATIONS AND PROVIDE PROTECTION FOR ALL UTILITIES WITHIN THE CONSTRUCTION AREA.

6. THE CONTRACTOR SHALL NOTIFY THE LOCAL FIRE DEPARTMENT AT LEAST TWO (2) WORKING DAYS IN ADVANCE OF WHEN FIRE HYDRANTS WILL BE TAKEN OUT OF SERVICE AND RETURNED TO SERVICE.

7. FIFTY (50) TON ROLLER OPERATION SHALL NOT BE USED IN THIS PROJECT WHERE UNDERGROUND UTILITIES ARE PRESENT. THE REQUIRED COMPACTION AT THESE LOCATIONS SHALL BE EFFECTED BY OTHER MEANS.

8. ALL EXCAVATIONS FOR STORM DRAINS, AND OTHER EXCAVATIONS AS NECESSARY, SHALL BE GOVERNED BY THE CURRENT CONSTRUCTION SAFETY AND HEALTH STANDARDS.

9. EXCAVATION, TRENCHING AND SHORING ACTIVITIES MUST BE CARRIED OUT IN IN ACCORDANCE WITH OSHA 29 CFR 1926.650 SUBPART P. THE CONTRACTOR SHALL BE RESPONSIBLE FOR HIS EMPLOYEES SAFTY.

EROSION NOTES:

1. ENTIRE AREA MUST BE STABILIZED AS A PART OF THE PROJECT. ONLY AREAS WITH CONSTRUCTION ACTUALLY UNDER WAY MAY BE EXCEPTED.

2. TEMPORARY EROSION FENCING (OR PERMANENT WALLS OR FENCING) SHALL BE USED TO PROTECT EXISTING RESIDENTIAL PROPERTY, STREETS LANDSCAPING AND THE DRAINAGE SYSTEMS FOR THE DEPOSITION OF ERODED MATERIAL.

3. CONSTRUCTION AREA SHALL BE CONTROLLED TO PREVENT TRESPASS USE BY 4WD'S, RV'S AND MOTORCYCLES TO MINIMIZE NOISE, DUST, DESTRUCTION OF VEGETATION, WIND AND WATER EROSION.

AS-BUILT INFORMATION
CONTRACTOR — DATE
WORK DONE BY — DATE
INSPECTOR'S ACCEPTANCE — DATE
VERIFICATION BY — DATE
CORRECTED BY — DATE
MICRO-FILM INFORMATION
RECORDED BY — DATE
NO. — DATE

BENCH MARKS
A.C.S. Aluminum Tablet Stamped "BM-40" Data:
New Mexico State Plane Grid Coordinates (Central Zone)
NAD 1927 X=352,790.66 Y=1,482,346.53
Ground to grid factor = 0.9999105
Delta Alpha = (-)00°16'39" ELEV = 5,305.43
A.C.S. Aluminum Tablet Stamped "BM-41" Data:
New Mexico State Plane Grid Coordinates (Central Zone)
NAD 1927 X=351,453.58 Y=1,496,546.13
Ground to grid factor = 0.9998704
Delta Alpha = (-)00°17'08" ELEV = 5,386.63

SURVEY INFORMATION
FIELD NOTES

NO.	BY	DATE

ENGINEER'S SEAL

NO.	DATE	REMARKS REVISIONS	BY

WILSON & COMPANY, ENGINEERS & ARCHITECTS
DESIGNED BY JMT DATE APRIL 2003
DRAWN BY DLC DATE APRIL 2003
CHECKED BY BMS DATE APRIL 2003

WILSON & COMPANY
2800 THE AMERICAN ROAD S.E.
SUITE 100
RIO RANCHO, NEW MEXICO
87124
(505) 896-8021

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING GROUP

THE CROSSING SUBDIVISION UNIT 3
MIREHAVEN ARROYO – STA 23+00 TO 33+30
DROP STRUCTURE DETAILS AND GENERAL NOTES

Design Review Committee | City Engineer Approval | Last Design Update | Mo./Day/Yr. | Mo./Day/Yr.

WCEA #X3218008
AUGUST 2004

City Project No. XXXXXX | Zone Map No. H-9-Z | Sheet 4 Of 4

T:\PROJECTS\X3218008\H\UPPERCHANNEL\PLANSET\B308DTL02.DWG\07-29-04\kle

Bohannan Huston

Courtyard I
7500 Jefferson St. NE
Albuquerque, NM
87109-4335

www.bhinc.com

voice: 505.823.1000
facsimile: 505.798.7988
toll free: 800.877.5332

J-08/D001

December 5, 2005

Mr. Fred Salls
Salls Brothers Construction, Inc.
P O Box 66239
Albuquerque, NM 87193-6239

Re: Stormcloud Subdivision Final Grading Plan
CPN 650278, 650279, 650280, 650289

Dear Fred:

AMAFCA has requested that we not expand Ladera Dams #9 and 10 at this time. Therefore, the following changes have been made to the approved grading plan. Sheet 13 has been removed in its entirety. Please incorporate these changes into your plans.

Please let me know if you have questions

Sincerely,

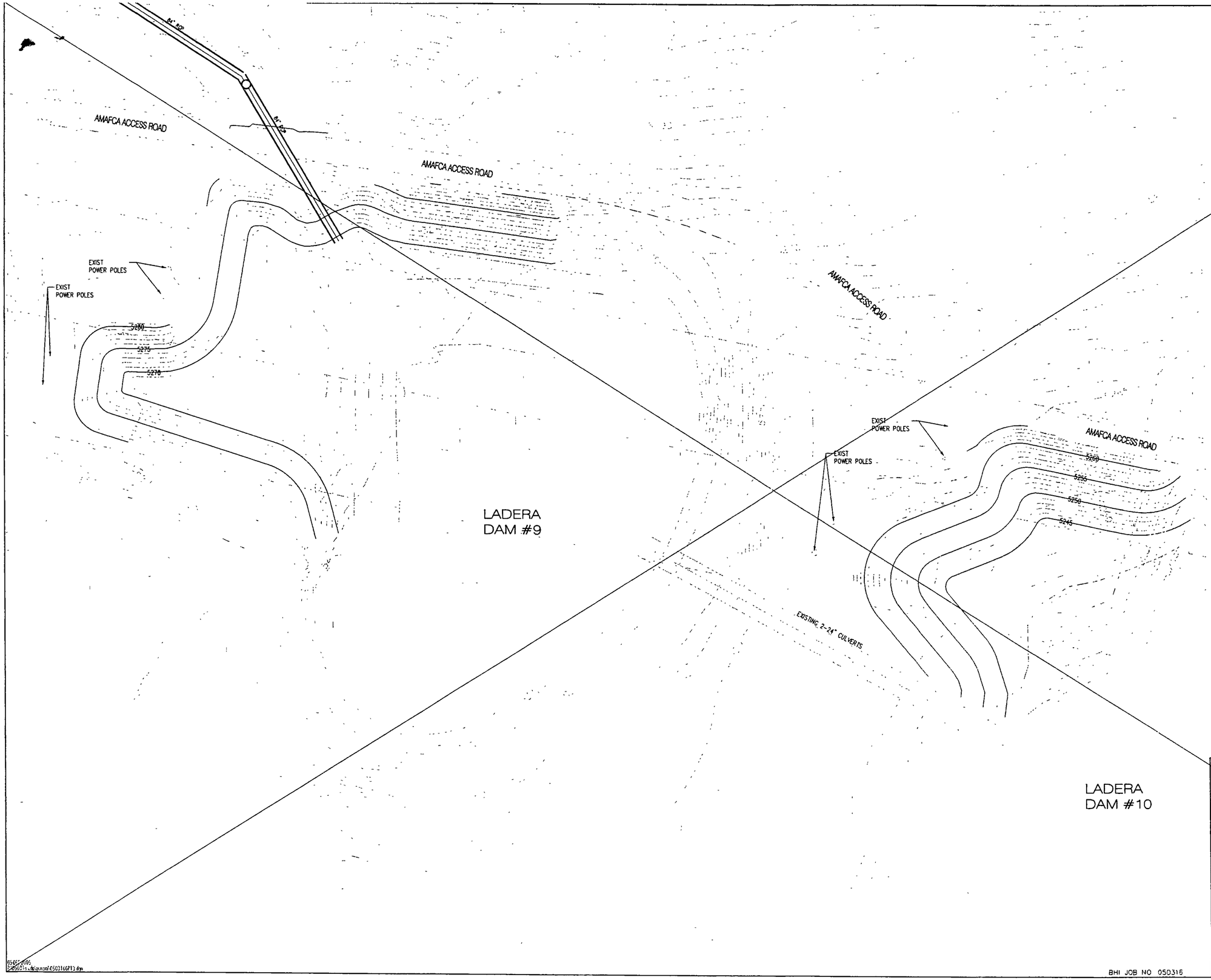
Jared M. Lee, E.I.
Design Engineer
Community Development and Planning

JML/am
Enclosure: Sheet 13

cc: Fred Ambrogi, Westland Development Corp (w/encl)
Brad Bingham, COA Hydrology Division (w/encl)
Kevin Patton, BHI (w/out encl)

RECEIVED
DEC 0 6 2005
LAND DEVELOPMENT SECTION

ENGINEERING
SPATIAL DATA
ADVANCED TECHNOLOGIES



LEGEND

PROPOSED SPOT ELEVATION	• 5235.25
EXISTING SPOT ELEVATION	× 5235.25
EXISTING CONTOUR	
PHASE BOUNDARY	
DIRECTION OF FLOW	
EXISTING STORM DRAIN LINE	SD
PROPOSED STORM DRAIN INLET	
PROPOSED STORM DRAIN LINE	
PROPOSED STORM DRAIN MANHOLE	
PROPOSED WATER BLOCK	
RETAINING WALL	
GARDEN WALL	
POND CONTOUR	
PAD	10 P=5300.00
TB	TURNED BLOCK

RECEIVED
DEC 0 6 2005
HYDROLOGY SECTION

40 20 0 40
SCALE. 1"=40'
(HORIZ.)

Bohannan Huston INC
Courtyard I 7500 Jefferson St NE Albuquerque, NM 87109-4335
ENGINEERING SPATIAL DATA ADVANCED TECHNOLOGIES

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING DEVELOPMENT GROUP

STORMCLOUD SUBDIVISION
GRADING AND DRAINAGE PLAN

DESIGN REVIEW COMMITTEE	CITY ENGINEER APPROVAL	LAST DESIGN UPDATE	MO /DAY/YR	MO /DAY/YR

CITY PROJECT NO	ZONE MAP NO	SHEET	OF
650278-80	H-9, J-8, J-9	13	13

BHI JOB NO 050316

AS-BUILT INFORMATION

CONTRACTOR	
WORK STAKED BY	
INSPECTOR'S ACCEPTANCE BY	DATE
FIELD VERIFICATION BY	DATE
DRAWINGS CORRECTED BY	DATE

MICRO-FILM INFORMATION

RECORDED BY	DATE
NO	

BENCH MARKS

ACS STATION NAMED 4 - K6, 3 -1/4" ALUM. CAP
HV18 = 4 - K6 GEOGRAPHIC POSITION (1927)
N.M. STATE PLANE COORDINATES (CENTRAL ZONE)
X=136,918.47, Y=1,483,515.05
GROUND-TO-GRID FACTOR .0999656356
NGVD 1929 ELEVATION = 5732.892
ON PASEO DEL VULCAN, 0.91 MI NORTH
OF I-40, 0.74 MI SOUTH OF POWERLINES, 39.6'
NW OF CENTERLINE IN PASEO DEL VULCAN

SURVEY INFORMATION
FIELD NOTES

NO.	BY	DATE

ENGINEER'S SEAL
KEVIN G. PATTON
NEW MEXICO
13008
REGISTERED PROFESSIONAL ENGINEER

NO	DATE	REMARKS	BY
		REVISIONS	
		DESIGN	

DESIGNED BY	KM/AML	DATE 05/05
DRAWN BY	AR	DATE 05/05
	VPD	DATE 05/05

05652-0095
D:\050316.dgn\cmd\050316GP13.dgn

Bohannan ▲ Huston INC.

Courtyard I
7500 Jefferson St. NE
Albuquerque, NM
87109-4335
www.bhinc.com
voice: 505.823.1000
facsimile: 505.798.7988
toll free: 800.877.5332

CLIENT/COURIER TRANSMITTAL

To: Brad Bingham, P.E., Senior Engineer
Planning Dept / Hydrology Dev Section
City of Albuquerque
600 Second Street NW - 2nd Floor West

Requested by: Jared Lee - am

Date: December 5, 2005

Time Due:
- ☐ **This A.M.**
- ☐ **This P.M.**
- ☐ **Rush**
- ☒ **Tomorrow morning**

Phone: 924-3986

Job No.: 05 0316 006

Job Name: Stormcloud Subdivision

DELIVERY VIA

- ☒ **Courier**
- ☐ **Federal Express**
- ☐ **Mail**
- ☐ **UPS**
- ☐ **Other**

PICK UP

Item: _____

ITEM NO.	QUANTITY	DESCRIPTION
1	1	Copy of letter to Fred Salls/Salls Brothers Construction dated 12/05/05 re: Stormcloud Subdivision Final Grading Plan.

COMMENTS / INSTRUCTIONS

RECEIVED
DEC 0 6 2005
LAND DEVELOPMENT SECTION

REC'D BY: Sandy Handley **DATE:** 12/06/05 **TIME:** 9:25

ENGINEERING ▲
SPATIAL DATA ▲
ADVANCED TECHNOLOGIES ▲

Hydro

Figure 6: Notice of DRC Session Processing Date: **10/13/2016**

Project#: **787485** **Zone Atlas:** **K-17** **DRB#:** **1010763**

Project Name: **Copper Ave Town house Condos**

[●] Scheduled with DRC on **October 19, 2016 (Wednesday)** at **1:30 P.M.**

[ ] No DRC Meeting Scheduled. Please return at comments by: _____

Project Location: **3821 Copper Avenue NE**

TYPE OF PROJECT: [●] AHBA [ ] CIP [ ] SAD/PID [ ] ABCWUA

PROJECT COORDINATOR: _____ Phone: _____

Company: _____

Design Engineer: **Richard Dourte** Phone: **505-288-1621**

Company: **RHD Engineering, LLC**

The Project is Scheduled for the following DRC Session:

[ ] Pre-Design Review [●] Final Plan Review [ ] _____

[ ] Preliminary Plan Review [ ] Signature Review [ ] Route for Signature

The Project Relates to City Infrastructure Systems:

[●] Water [ ] San Sewer [●] Paving [ ] Storm Drainage [ ] _____

The Attached Package Includes:

Indicated below are the Departments/Divisions that have received project documents and/or are invited to attend. (It will be the Project Coordinator's responsibility to notify consulting engineering froms of dates and time of scheduled DRC meetings).

D- Drawings **MU**- Markups **M**- Memo Only **E**- Estimate **R**- Report

			D	MU	M	E	R
DRC Chair	Jeanne	Design Review Section	●	●			
Trans. Dev.	Logan/Racquel	Transportation Development	●	●			
Utility Dev.	Tim/David G.	Utility Development	●	●			
Utility Dev.	(CIP)Tim/Damian L.	Utility Design					
Hydr. Dev.	Rita/Abiel	Hydrology Development	●	●			
Hydr. Dev.	(CIP)	Hydrology Design					
Const. Mgmnt		Construction Division					
Const. Div.	(CIP) Dave Harrison	Construction Division					
Ben Brokaw.Matt Yannoni/Manh Tran		Traffic Operations Division					
Brett Frauenglass		Risk Management	●				
Stephen James		City Architect					
Parks & Rec.		Parks & Recreation Department					
Project Manager							
Solid Waste							
	Muhanned Adeeb		●	●			

Notified _____ of DRC meeting date & time on _____ at _____ via _____

Courtyard I
7500 Jefferson St. NE
Albuquerque, NM
87109-4335

www.bhinc.com

voice: 505 823.1000
facsimile: 505.798.7988
toll free: 800.877.5332

June 5, 2007

Brad Bingham, P.E.
Hydrology Development Division
City of Albuquerque Planning Department
P. O. Box 1293
Albuquerque, NM 87103

Re: Stormcloud Subdivision, Tract I-2, Sundoro Unit 1 – Grading and Drainage Certification
DRB Case No 1004233; COA Drainage File # (J8-D1)

Dear Brad:

The purpose of this letter is to request your concurrence with the enclosed grading and drainage certification for the above referenced subdivision.

The enclosed certified plan is the grading plan (Engineers Stamp dated 7/25/05) approved by DRB. I am also enclosing a copy of your letter of approval for this grading plan. The enclosed certification is a copy of a new plan that incorporates the approved grading plan with the as-built information we received from the earthwork contractor's surveyor. The enclosed certified plan is in substantial compliance w/ the approved grading plan.

As indicated in the approved infrastructure lists, a grading and drainage certification is required prior to the release of financial guarantees. Please provide us with an approval letter of our certification should you concur with the enclosed plan. If you have any questions, please give me a call at 823-1000.

Sincerely,

Kevin G. Patton, P.E.
Senior Vice President and Managing Principal
Community Development and Planning

KGP/am
Enclosures

cc: Fred Ambrogi, SunCal Co. (w/encl)

RECEIVED
JUN 06 2007
HYDROLOGY SECTION

P \050316\cdp\corres\007-drng_cert\Grading Cert ltr doc

CITY OF ALBUQUERQUE

REC'D SEP 02 2005

FILE 050316
005

THREE HUNDRED YEARS
1706 * 2006
ALBUQUERQUE
Making History

August 31, 2005

Kevin G. Patton, P.E.
Bohannan Huston Inc.
7500 Jefferson St. NE – Courtyard I
Albuquerque, NM 87109

Re: Stormcloud Subdivision, Tract I-2, Sundoro Unit 1, Grading Plan Engineer's Stamp dated 7-25-05 (J8-D1)

Dear Mr. Patton,

Based upon information provided in your submittal dated 8-29-05, the above referenced plan is approved as amended. This will be the plan that must be certified for Release of Financial Guaranty.

If you have any questions, you can contact me at 924-3990.

Sincerely,

Phillip J. Lovato, E.I., C.F.M.
Engineering Associate, Hydrology,
Development and Building Services,
Planning Department

cc: file

P.O. Box 1293

Albuquerque

New Mexico 87103

www.cabq.gov

DRAINAGE AND TRANSPORTATION INFORMATION SHEET

(REV. 1/28/2003rd)

PROJECT TITLE: Stormcloud Subdivision ZONE MAP/DRG. FILE # J8-D1
DRB #: 1004233 EPC#: WORK ORDER#: 650278-80

LEGAL DESCRIPTION: Tract I-2, Sundoro Unit 1
CITY ADDRESS: Tierra Pintada St and Arroyo Vista Blvd.

ENGINEERING FIRM: Bohannan Huston, Inc. CONTACT: Kevin Patton
ADDRESS: 7500 Jefferson NE – Courtyard I PHONE: (505) 823-1000
CITY, STATE: Albuquerque, NM ZIP CODE: 87109

OWNER: SunCal Co. CONTACT: Fred Ambrogi
ADDRESS: 401 Coors Boulevard NW PHONE: 831-9600
CITY, STATE: Albuquerque, NM ZIP CODE: 87121

ARCHITECT: CONTACT:
ADDRESS: PHONE:
CITY, STATE: ZIP CODE:

SURVEYOR: CONTACT:
ADDRESS: PHONE:
CITY, STATE: ZIP CODE:

CONTRACTOR: CONTACT:
ADDRESS: PHONE:
CITY, STATE: ZIP CODE:

CHECK TYPE OF SUBMITTAL:

- ____ DRAINAGE REPORT
- ____ DRAINAGE PLAN 1st SUBMITTAL, ***REQUIRES TCL or equal***
- ____ DRAINAGE PLAN RESUBMITTAL
- ____ CONCEPTUAL GRADING & DRAINAGE PLAN
- ____ GRADING PLAN
- ____ EROSION CONTROL PLAN
- X ENGINEER'S CERTIFICATION (HYDROLOGY)
- ____ CLOMR/LOMR
- ____ TRAFFIC CIRCULATION LAYOUT (TCL)
- ____ ENGINEERS CERTIFICATION (TCL)
- ____ ENGINEERS CERTIFICATION (DRB APPR. SITE PLAN)
- ____ OTHER

CHECK TYPE OF APPROVAL SOUGHT:

- X SIA / FINANCIAL GUARANTEE RELEASE
- ____ PRELIMINARY PLAT APPROVAL
- ____ S. DEV. PLAN FOR SUB'D. APPROVAL
- ____ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- ____ SECTOR PLAN APPROVAL
- ____ FINAL PLAT APPROVAL
- ____ FOUNDATION PERMIT APPROVAL
- ____ BUILDING PERMIT APPROVAL
- ____ CERTIFICATE OF OCCUPANCY (PERM.)
- ____ CERTIFICATE OF OCCUPANCY (TEMP.)
- ____ GRADING PERMIT APPROVAL
- ____ PAVING PERMIT APPROVAL
- ____ WORK ORDER APPROVAL
- ____ OTHER (SPECIFY)

AS A PRE-DESIGN CONFERENCE ATTENDED:

- ___ YES
- ___ NO
- ___ COPY PROVIDED

RECEIVED
JUN 06 2007
HYDROLOGY SECTION

TTED: 6/6/07 BY:

pprovals of Site Development Plans and/or Subdivision Plats shall be accompanied by a drainage submittal. re , location and scope of the proposed development defines the degree of drainage detail. One or levels of submittal may be required based on the following:

l Grading and Drainage Plan: Required for approval of Site Development Plans greater than five ctor Plans.

Required for building permits, grading permits, paving permits and site plans less than five (5)

equired for subdivisions containing more than ten (10) lots or constituting five (5) acres or

Bohannan ▲ Huston INC.

Courtyard I
7500 Jefferson St. NE
Albuquerque, NM
87109-4335
www.bhinc.com
voice: 505.823.1000
facsimile: 505.798.7988
toll free: 800.877.5332

CLIENT/COURIER TRANSMITTAL

To: Brad Bingham, P.E., Senior Engineer
Planning Dept / Hydrology Dev Section
City of Albuquerque
600 Second Street NW - 2nd Floor West

Requested by: Kevin Patton - am

Date: June 5, 2007

Time Due:
- ☐ **This A.M.**
- ☐ **This P.M.**
- ☐ **Rush** _____
- ☒ **Tomorrow A.M.**

Phone: 924-3986

Job No.: 05 0316 007 JRT

Job Name: Stormcloud Subdivision

DELIVERY VIA

- ☒ **Courier**
- ☐ **Federal Express**
- ☐ **Mail**
- ☐ **UPS**
- ☐ **Other**

PICK UP

Item: _____

ITEM NO.	QUANTITY	DESCRIPTION
1	1	Letter with enclosures dated 6/5/2007 re: Stormcloud Subdivision, Tract I-2, Sundoro Unit 1 – Grading and Drainage Certification. DRB Case No 1004233; COA Drainage File # (J8-D1)
2	1	Drainage Information Sheet.

COMMENTS / INSTRUCTIONS

RECEIVED
JUN 06 2007
HYDROLOGY SECTION

REC'D BY: _____ ***DATE:*** _____ ***TIME:*** _____

ENGINEERING ▲
SPATIAL DATA ▲
ADVANCED TECHNOLOGIES ▲

MOLZEN-CORBIN & Associates
ENGINEERS/PLANNERS/CONSULTANTS

LETTER OF TRANSMITTAL

☒ 2701 Miles Road Southeast, Albuquerque, NM 87106
505-242-5700

☐ 205 West Boutz Number 4, Suite Number 5, P.O. Box 1360, Las Cruces, NM 88004
505-525-2397

DATE July 3, 1996	JOB NO.
ATTENTION Floodplain Administration	
RE:	
Drainage Reviews	

TO City/County Building
5th and Marquette, Room 301
(505) 768-2650

GENTLEMEN:
WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via _____ the following items:

COPIES	DATE	NO.	DESCRIPTION
1			DRD-96-106 - Insert these plans
			are stamped, signed and dated.
			& Drainage info. sheet included.

THESE ARE TRANSMITTED as checked below:

☐ For approval ☒ For your use ☐ As requested ☐ For review and comment

☐ Other _____

REMARKS _____

COPY TO _____

SIGNED: _____

If enclosures are not as noted, kindly notify us at once.

CASE # C

PWD - 96 - 106

J-8 Atrisco Land Grant

DRAN- ____

DRE - X

INSP - X

PLAN - X

CTA: FPA: 6-25-96 6-25-96

DUE DATE

12 - JUL - 96

Bohannan ▲ Huston INC.

file

Courtyard I
7500 Jefferson St. NE
Albuquerque, NM
87109-4335
www.bhinc.com
voice: 505.823.1000
facsimile: 505.798.7988
toll free: 800.877.5332

CLIENT/COURIER TRANSMITTAL

To: Brad Bingham, P.E., Senior Engineer
Planning Dept / Hydrology Dev Section
City of Albuquerque
600 Second Street NW - 2nd Floor West

Requested by: Jared Lee - am

Date: April 18, 2006

Time Due:
- ☐ This A.M.
- ☒ This P.M.
- ☐ Rush _____
- ☐ By Tomorrow

Phone: 924-3986

Job No.: 05 0316 011

Job Name: Stormcloud Subdivision

DELIVERY VIA

- ☒ Courier
- ☐ Federal Express
- ☐ Mail
- ☐ UPS
- ☐ Other

PICK UP

Item: _____

ITEM NO.	QUANTITY	DESCRIPTION
1	1	Copy of letter to Fred Salls/Salls Brothers Construction dated 4/18/06 re: Stormcloud Subdivision Final Grading Plan.

COMMENTS / INSTRUCTIONS

RECEIVED
APR 18 2006
HYDROLOGY SECTION

REC'D BY: Sandy Handley DATE: 04/18/06 TIME: 3:05

ENGINEERING ▲
SPATIAL DATA ▲
ADVANCED TECHNOLOGIES ▲

Bohannan ▲ Huston INC.

Courtyard I
7500 Jefferson St. NE
Albuquerque, NM
87109-4335
www.bhinc.com
voice: 505.823.1000
facsimile: 505.798.7988
toll free: 800.877.5332

CLIENT/COURIER TRANSMITTAL

To: Brad Bingham, P.E., Senior Engineer
Planning Dept / Hydrology Dev Section
City of Albuquerque
600 Second Street NW - 2nd Floor West

Requested by: Jared Lee - am

Date: April 12, 2006

File
J8/D1

Time Due:
- ☒ **This A.M.**
- ☐ **This P.M.**
- ☐ **Rush** _____
- ☐ **By Tomorrow**

Phone: 924-3986

Job No.: 05 0316 011

Job Name: Stormcloud Subdivision

DELIVERY VIA

- ☒ **Courier**
- ☐ **Federal Express**
- ☐ **Mail**
- ☐ **UPS**
- ☐ **Other**

PICK UP

Item: _____

ITEM NO.	QUANTITY	DESCRIPTION
1	1	Copy of letter to Hector Perez/Universal Constructors dated 4/12/06 re: Design Revision #7: Stormcloud Subdivision Offsite – COA Project #650289.

COMMENTS / INSTRUCTIONS

RECEIVED
APR 12 2006
HYDROLOGY SECTION

*REC'D BY:*_____ *DATE:*_____ *TIME:*_____

ENGINEERING ▲
SPATIAL DATA ▲
ADVANCED TECHNOLOGIES ▲

Bohannan ▲ Huston INC.

Courtyard I
7500 Jefferson St. NE
Albuquerque, NM
87109-4335

www.bhinc.com

voice: 505.823.1000
facsimile: 505.798.7988
toll free: 800.877.5332

April 12, 2006

Mr. Hector Perez
Universal Constructors, Inc.
3825 Academy Parkway North N E
Albuquerque, NM 87109

Re: Design Revision #7: Stormcloud Subdivision Offsite - COA Project #650289

Dear Hector:

Enclosed is Design Revision #7 to the above referenced project. This revision requires changes on Sheets 5 and 9-11. We have revised the curb along Arroyo Vista Blvd. from station 82+37.10 to 97+00.00 from standard curb and gutter to depressed curb and gutter. Also, we have corrected the flowline elevations right along Tierra Pintada St. from station 46+43.29 to 49+00.00.

Please incorporate these revisions into your work order set of construction plans and the as-built plans submitted with the close-out package.

If I can provide additional information or answer any questions regarding this revision, please contact me at 823-1000.

Sincerely,

Jared M. Lee, E.I.
Design Engineer
Community Development and Planning

JML/am
Enclosure: Sheet 5, 9-11
Profile

cc: Fred Ambrogi, Westland Development Co. (w/encl)
Rick White, Jeff Mortensen & Associates (w/encl)
Jim Spinello, Smith Engineering (w/encl)
Brad Bingham, COA (w/encl)
Wilfred Gallegos, COA (w/encl)
Jim Pung, COA (w/encl)
Kevin Patton, BHI (w/out encl)

RECEIVED
APR 12 2006
HYDROLOGY SECTION

ENGINEERING
SPATIAL DATA
ADVANCED TECHNOLOGIES

Ⓐ FLOWLINE DATA FOR CURB RETURN

PC	65.37
1	65.62
2	65.87
3	66.11
PT	66.36
PI	65.80

D = 90°00'00"
R = 30.00'
T = 30.00'
L = 47.12'
C = 42.43'

PC STA 52+28.21, 44.00' RT.
PT STA 52+58.21, 74.00' RT.
PI STA 52+58.21, 44.00' RT.
RAD STA. 52+28.21, 74.00' RT.

Ⓑ FLOWLINE DATA FOR CURB RETURN

PC	67.16
1	67.10
2	67.05
3	66.99
PT	66.93
PI	66.59

D = 90°00'00"
R = 30.00'
T = 30.00'
L = 47.12'
C = 42.43'

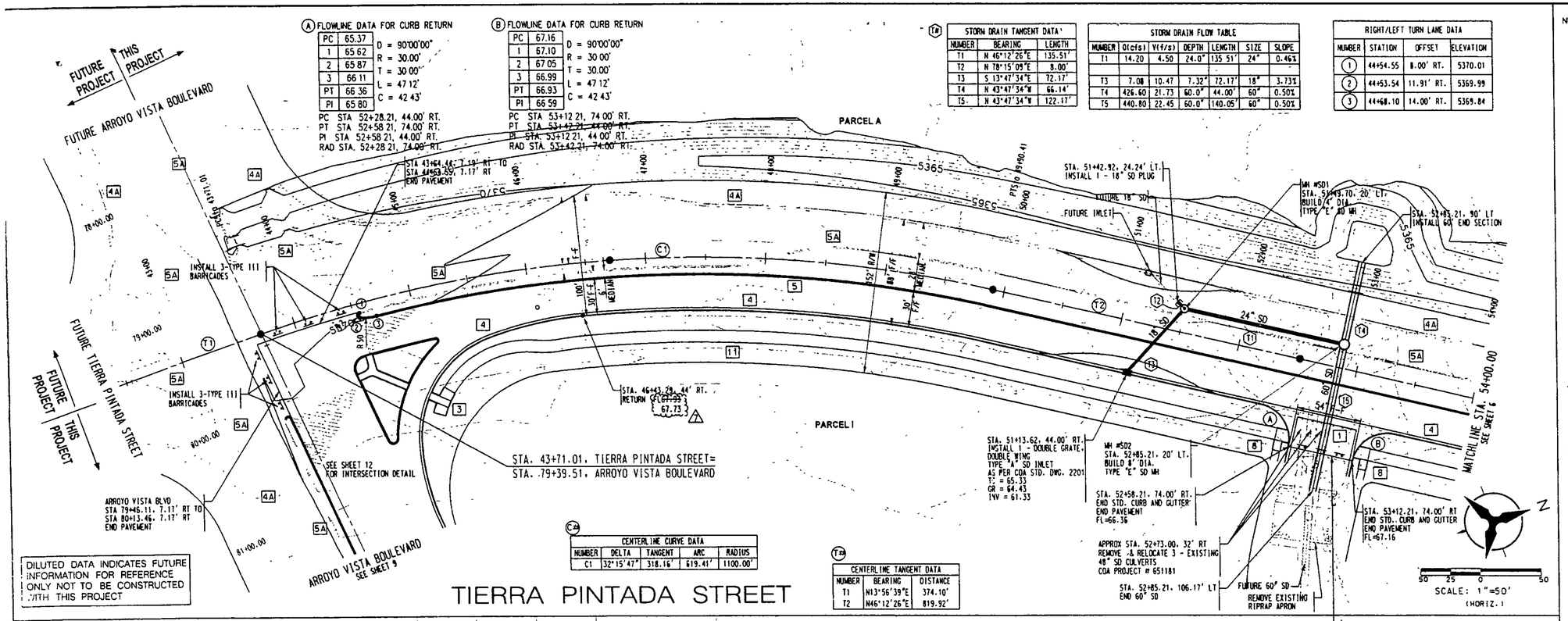
PC STA 53+12.21, 74.00' RT.
PT STA 53+42.21, 44.00' RT.
PI STA 53+12.21, 44.00' RT.
RAD STA. 53+42.21, 74.00' RT.

Ⓣ#

STORM DRAIN TANGENT DATA		
NUMBER	BEARING	LENGTH
T1	N 46°12'26"E	135.51'
T2	N 78°15'09"E	8.00'
T3	S 13°47'34"E	72.17'
T4	N 43°47'34"W	66.14'
T5	N 43°47'34"W	122.17'

STORM DRAIN FLOW TABLE							
NUMBER	Q(cfs)	V(ft/s)	DEPTH	LENGTH	SIZE	SLOPE
T1	14.20	4.50	24.0"	135.51'	24"	0.46%
T3	7.08	10.47	7.32"	72.17'	18"	3.73%
T4	426.60	21.73	60.0"	44.00'	60"	0.50%
T5	440.80	22.45	60.0"	140.05'	60"	0.50%

RIGHT/LEFT TURN LANE DATA			
NUMBER	STATION	OFFSET	ELEVATION
1	44+54.55	8.00' RT.	5370.01
2	44+53.54	11.91' RT.	5369.99
3	44+68.10	14.00' RT.	5369.84



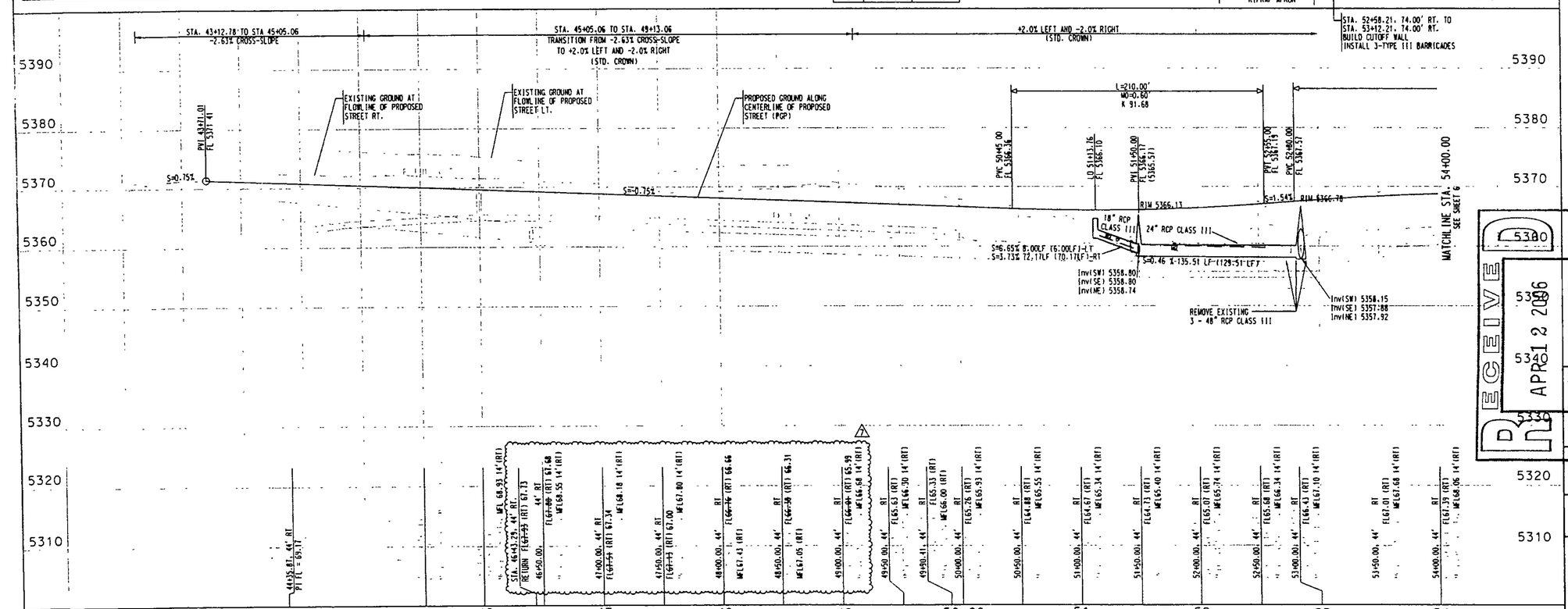
Ⓒ#

CENTERLINE CURVE DATA				
NUMBER	DELTA	TANGENT	ARC	RADIUS
C1	32°15'47"	318.16'	619.41'	1100.00'

Ⓣ#

CENTERLINE TANGENT DATA		
NUMBER	BEARING	DISTANCE
T1	N13°56'39"E	374.10'
T2	N46°12'26"E	819.92'

TIERRA PINTADA STREET



SCALE 1" = 50' (HORIZ)
1" = 10' (VERT)

BHI JOB NO 050316

12-APR-2006 -
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NOTES

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2. ALL CURB RETURN RADII SHALL BE 25' UNLESS OTHERWISE SPECIFIED.
3. ALL CURVE DATA AND DIMENSIONS REFER TO FACE OF CURB UNLESS OTHERWISE SPECIFIED.
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5. CONTRACTOR IS TO INSTALL A 4" X 4" X 5' POST AND END AT THE END OF EACH SANITARY SEWER SERVICE.
6. CONTRACTOR IS RESPONSIBLE FOR REPAIR AND/OR REPLACEMENT OF ALL UTILITY CONDUITS AND EXISTING LINES.
7. ANY ADDITIONAL GRADING REQUIRED TO MATCH PROPOSED STREET GRADES SHALL BE INCIDENTAL TO PAVING ITEMS.
8. CONTRACTOR SHALL PROVIDE THE INSPECTORS, (CITY AND PRIVATE) WITH THE PROPOSED HYDROSTATIC TESTING PLAN. THE PLAN MUST BE APPROVED BEFORE TESTING OPERATIONS BEGIN.
9. CONTRACTOR SHALL PARK EQUIPMENT AND VEHICLES AS NOT TO INTERFERE WITH NORMAL ACTIVITIES OF RESIDENTS OR OTHER CONTRACTORS ON SITE.
10. ANY DAMAGE TO THE EXISTING FACILITIES (CURB & GUTTER), PAVEMENT, CONDUITS, LANDSCAPING, UTILITY LINES, ETC.) DURING CONSTRUCTION SHALL BE REPLACED AT THE CONTRACTORS' EXPENSE.
11. REMOVAL OF THE EXISTING CURB AND GUTTER SHALL BE AS PER COA STD. DWG. 2415 (SAWCUT ONLY).
12. WHEELCHAIR RAMPS SHALL BE CONSTRUCTED PRIOR TO ACCEPTANCE OF CURB & GUTTER.
13. FOR STORM DRAIN CONSTRUCTION, RCP PIPE JOINTS SHALL NOT BE GROUTED PRIOR TO FINAL INSPECTION. FINAL INSPECTION WILL DETERMINE JOINTS TO BE GROUTED FOR FINAL ACCEPTANCE OF THE CONSTRUCTION.

KEYED GENERAL NOTES

1. INSTALL 6' CONCRETE VALLEY GUTTER AS PER STD. DWG. 2420
2. INSTALL CONCRETE VALLEY GUTTER AS PER STD. DWG. 2421
3. INSTALL WHEELCHAIR RAMP AS PER DETAIL "A" SHEET 12
4. STD. CURB & GUTTER AS PER STD. DWG. 2415A
4A. FUTURE STD. CURB & GUTTER
5. MEDIAN CURB & GUTTER AS PER STD. DWG. 2415B
5A. FUTURE MEDIAN CURB & GUTTER
6. EXISTING 6' SIDEWALK
7. BUILD 6' SIDEWALK
8. INSTALL WHEELCHAIR RAMP AS PER DETAIL "B" SHEET 4
9. ASPHALT CURB AS PER STD. DWG. 2415
10. CONCRETE MEDIAN PAVING SECTION AS PER STD. DWG. 2408
11. TRAIL/BIKE PATH TO BE DESIGNED WITH LANDSCAPE PLANS
12. BUILD 4" TEXTURED MEDIAN PAVEMENT FROM MEDIAN NOSE TO 10' FROM NOSE (BAJA RED) MEDIAN NOSES SHALL BE PAINTED YELLOW TO APPROX. 6' BEHIND PC/PT. PER COA STD DWG 2408
13. DEPRESSED CURB & GUTTER AS PER STD. DWG. 2415A

RECEIVED APR 12 2006 HYDROLOGY SECTION

Bohannan Huston INC.
Courtyard I 7500 Jefferson St. NE Albuquerque NM 87109-4335
ENGINEERING · SPATIAL DATA · ADVANCED TECHNOLOGIES

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING DEVELOPMENT GROUP

STORMCLOUD OFFSITE
PAVING PLAN & PROFILE
TIERRA PINTADA ST. STA. 43+00 - 54+00

DESIGN REVIEW COMMITTEE	CITY ENGINEER APPROVAL	LAST DESIGN UPDATE	MO /DAY/YR	MO /DAY/YR

CITY PROJECT NO	ZONE MAP NO.	SHEET	OF
650289	H9/J8/J9	5	21

BENCH MARKS
AGS STATION NAMED 4 - K6, 3 -1/4" ALUM. CAP HV18 = 4 - K6 GEOGRAPHIC POSITION (1927)
N.M. STATE PLANE COORDINATES (CENTRAL ZONE)
X=536,918.47, Y=1,483,515.05
GROUND-TO-GRID FACTOR .0999656356
NGVD 1929 ELEVATION = 5732.892
ON PASEO DEL VULCAN, 0.91 MI NORTH OF I-40, 0.74 MI SOUTH OF POWERLINES, 39.6' NW OF CENTERLINE OF PASEO DEL VULCAN

AS-BUILT INFORMATION
CONTRACTOR
STAKED BY
INSPECTOR'S ACCEPTANCE BY
FIELD VERIFICATION BY
DRAWINGS CORRECTED BY
MICRO-FILM INFORMATION
RECORDED BY
DATE
NO

SURVEY INFORMATION
FIELD NOTES

NO.	BY	DATE

ENGINEER'S SEAL
KEVIN G. PATTON NEW MEXICO 13668 REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	REMARKS	BY
1	04/11/06	REVISED FLOWLINE ELEVATIONS RT FROM STA. 46+43.29 TO 49+00.00	JML

REVISIONS
DESIGN

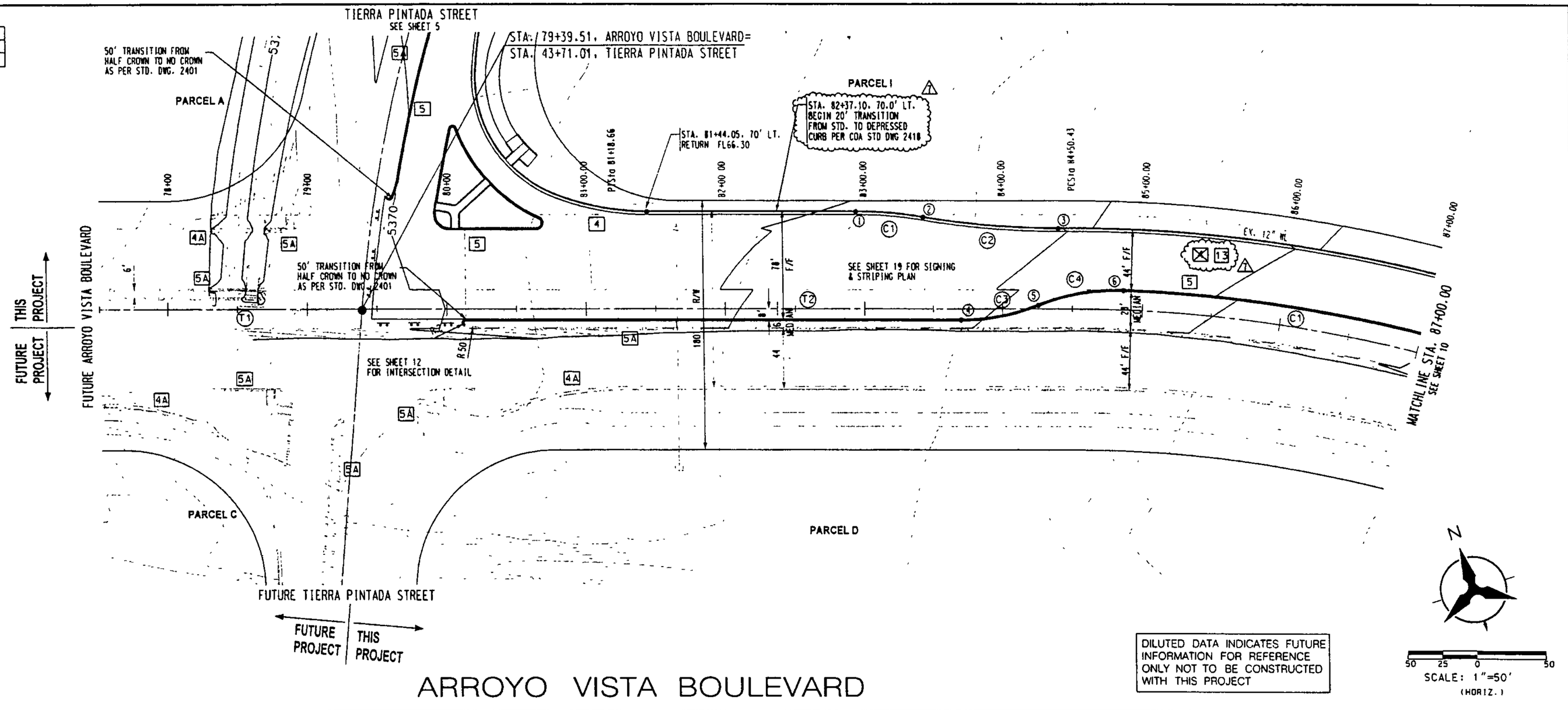
DESIGNED BY KW/JML DATE 05/05
DRAWN BY AR DATE 05/05
REVIEWED BY DATE 05/06

CENTERLINE CURVE DATA				
NUMBER	DELTA	TANGENT	ARC	RADIUS
C1	66°04'29"	658.14'	1167.06'	1012.00'

CENTERLINE TANGENT DATA		
NUMBER	BEARING	DISTANCE
T1	S81°03'21"E	284.71'
T2	S81°03'21"E	510.91'

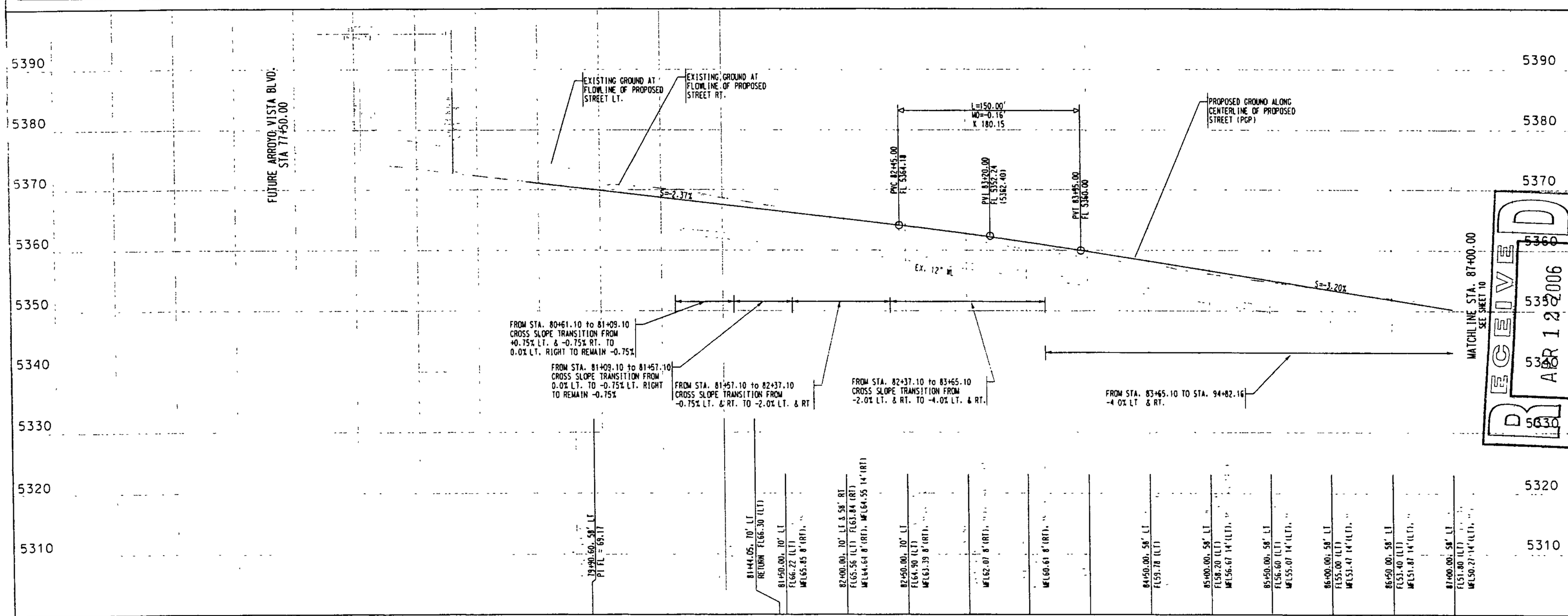
LEFT/RIGHT TURN LANE DATA			
NUMBER	STATION	OFFSET	ELEVATION
1	82+94.05	70.00' LT.	5364.25
2	83+42.88	66.00' LT.	5363.25
3	84+40.53	58.00' LT.	5360.10
4	83+70.06	8.00' RT.	5359.99
5	84+25.76	2.73' LT.	5358.60
6	84+86.28	14.00' LT.	5357.11

LEFT/RIGHT TURN LANE CURVE DATA				
NUMBER	ARC	RADIUS	DELTA	TANGENT
C1	49.04'	300.00'	09°22'01"	24.58'
C2	98.09'	600.00'	09°22'00"	49.15'
C3	57.07'	150.00'	21°47'54"	28.88'
C4	62.38'	150.00'	23°49'40"	31.65'



DILUTED DATA INDICATES FUTURE INFORMATION FOR REFERENCE ONLY NOT TO BE CONSTRUCTED WITH THIS PROJECT

ARROYO VISTA BOULEVARD



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KEYED GENERAL NOTES

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Bohannan Huston INC
Courtyard I 7500 Jefferson St NE Albuquerque, NM 87109-4335
ENGINEERING - SPATIAL DATA - ADVANCED TECHNOLOGIES

AS-BUILT INFORMATION
CONTRACTOR
WORK STAKED BY | DATE
WORK INSPECTED ACCEPTANCE BY | DATE
FIELD VERIFICATION BY | DATE
DRAWINGS CORRECTED BY | DATE
MICRO-FILM INFORMATION
RECORDED BY | DATE
NO. | NO.

BENCH MARKS
ACS STATION NAMED 4 - K6. 3 -1/4" ALUM. CAP
HVIS = 4 - K6 GEOGRAPHIC POSITION (1927)
N.M. STATE PLANE COORDINATES (CENTRAL ZONE)
X=336,918.47, Y=1,483,515.05
GROUND-TO-GRID FACTOR .0999656356
NGVD 1929 ELEVATION = 5732.892
ON PASEO DEL VULCAN, 0.91 MI NORTH OF I-40, 0.74 MI SOUTH OF POWERLINES, 39.6' NW OF CENTERLINE OF PASEO DEL VULCAN

SURVEY INFORMATION
FIELD NOTES
NO. | BY | DATE

ENGINEER'S SEAL
KEVIN G. PATTON NEW MEXICO 10888 REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	REMARKS	BY
1	04/11/06	REVISED STD CURB TO DEPRESSED CURB THROUGH SUPERELEVATION	JML

REVISIONS

DESIGN
DESIGNED BY KW/JML DATE 05/05
DRAWN BY AR DATE 05/05
CHECKED BY VCD DATE 05/05

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING DEVELOPMENT GROUP

STORMCLOUD OFFSITE
PAVING PLAN & PROFILE
ARROYO VISTA BLVD. STA. 77+00 - 87+00

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650289	H9/J8/J9	9	21

12-APR-2006 -
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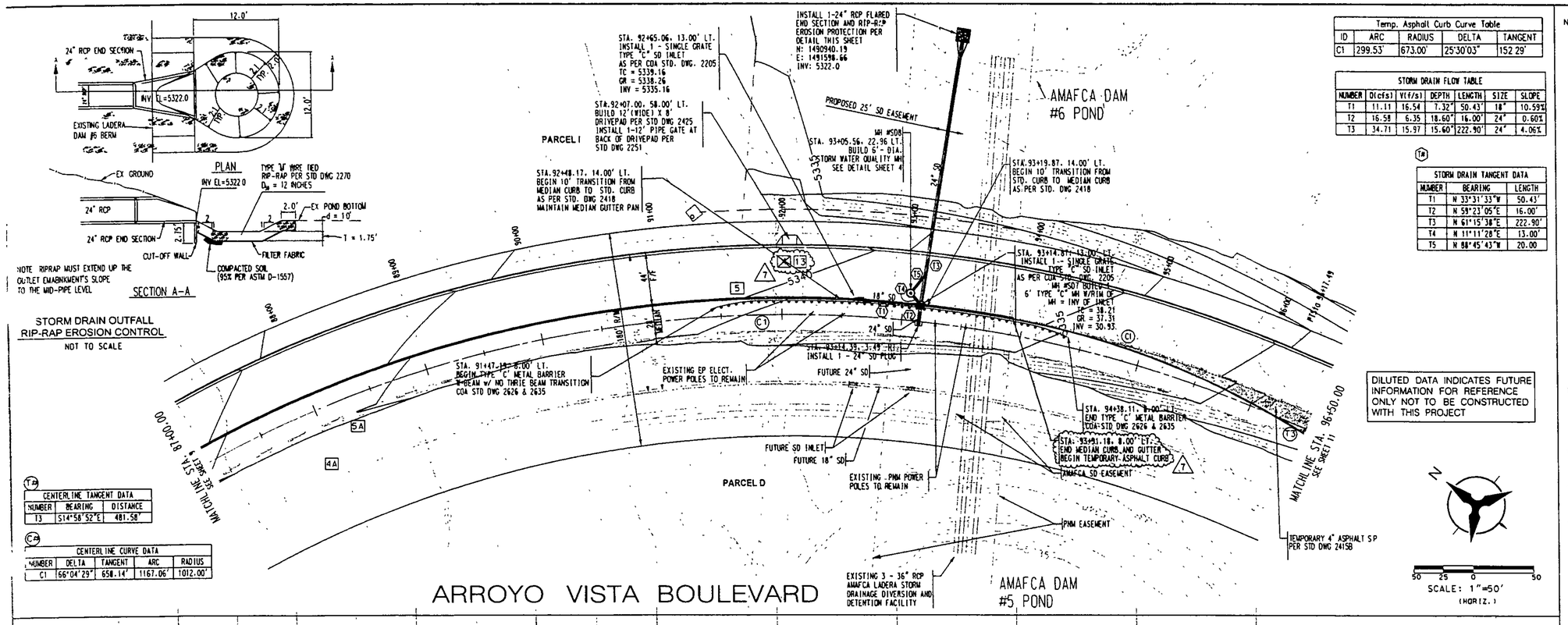
BHI JOB NO 050316

SCALE 1" = 50' (HORIZ.)
1" = 10' (VERT.)



DILUTED DATA INDICATES FUTURE INFORMATION FOR REFERENCE ONLY NOT TO BE CONSTRUCTED WITH THIS PROJECT

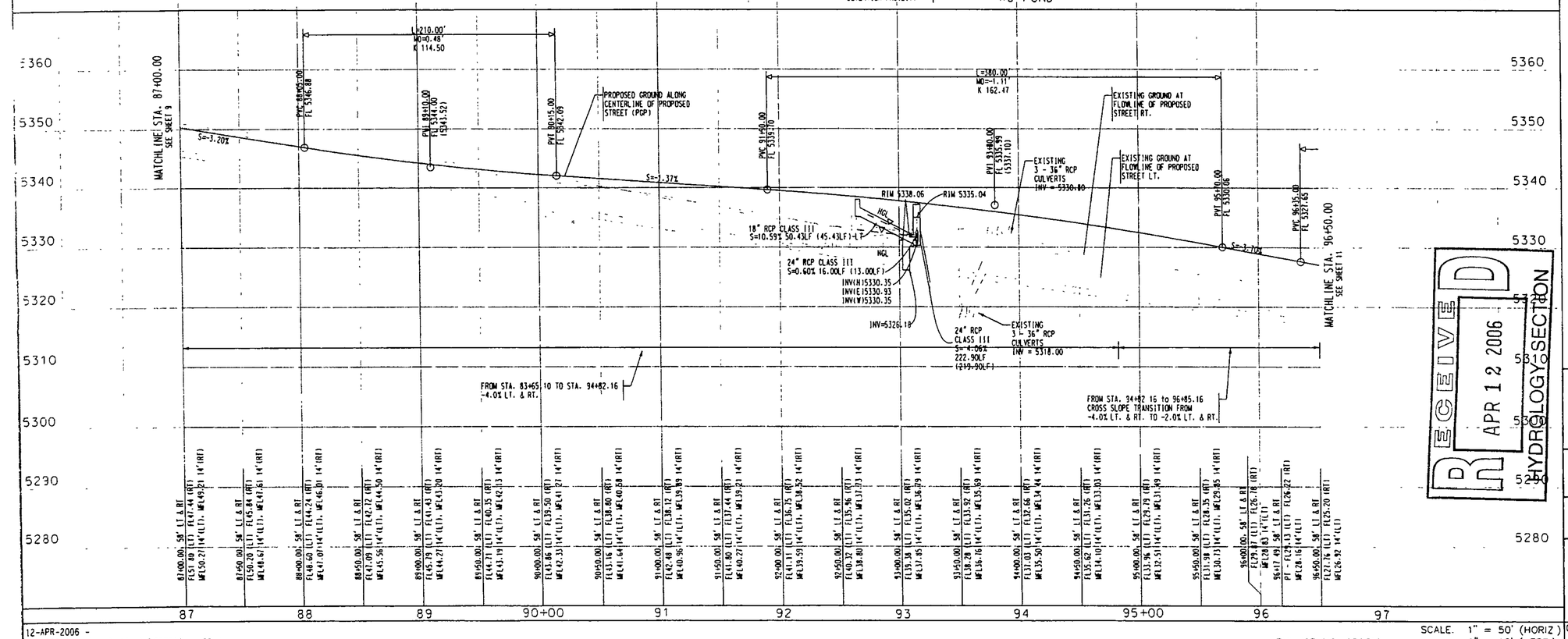
Temp. Asphalt Curb Curve Table				
ID	ARC	RADIUS	DELTA	TANGENT
C1	299.53'	673.00'	25°30'03"	152.29'

STORM DRAIN FLOW TABLE						
NUMBER	Q(cfs)	V(ft/s)	DEPTH	LENGTH	SIZE	SLOPE
T1	11.11	16.54	7.32"	50.43'	18"	10.59%
T2	16.58	6.35	18.60"	16.00'	24"	0.60%
T3	34.71	15.97	15.60"	222.90'	24"	4.06%

STORM DRAIN TANGENT DATA		
NUMBER	BEARING	LENGTH
T1	N 33°31'33"W	50.43'
T2	N 59°23'05"E	16.00'
T3	N 61°15'38"E	222.90'
T4	N 11°11'28"E	13.00'
T5	N 88°45'43"W	20.00

CENTERLINE TANGENT DATA		
NUMBER	BEARING	DISTANCE
T3	S14°58'52"E	481.58'

CENTERLINE CURVE DATA				
NUMBER	DELTA	TANGENT	ARC	RADIUS
C1	66°04'29"	658.14'	1167.06'	1012.00'



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ENGINEERING - SPATIAL DATA - ADVANCED TECHNOLOGIES

AS-BUILT INFORMATION
CONTRACTOR WORK STAKED BY
WORK STAKED BY DATE
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FIELD VERIFICATION BY DATE
DRAWINGS CORRECTED BY DATE

BENCH MARKS
ACS STATION NAMED 4 - K6. 3 -1/4" ALUM. CAP
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MICRO-FILM INFORMATION
RECORDED BY DATE
NO

SURVEY INFORMATION
FIELD NOTES

NO.	BY	DATE	REMARKS	BY
			REVISIONS	
			DESIGN	
1		04/11/06	REVISED STD CURB TO DEPRESSED CURB THROUGH SUPERELEVATION	JML

DESIGNED BY KM/JML DATE 05/05
DRAWN BY AR DATE 05/05
REVIEWED BY VPD DATE 05/05

SEAL
ENGINEER'S SEAL
KEVIN G. PATTON NEW MEXICO 13008 REGISTERED PROFESSIONAL ENGINEER

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING DEVELOPMENT GROUP

STORMCLOUD OFFSITE
PAVING PLAN & PROFILE
ARROYO VISTA BLVD. STA. 87+00 - 96+50

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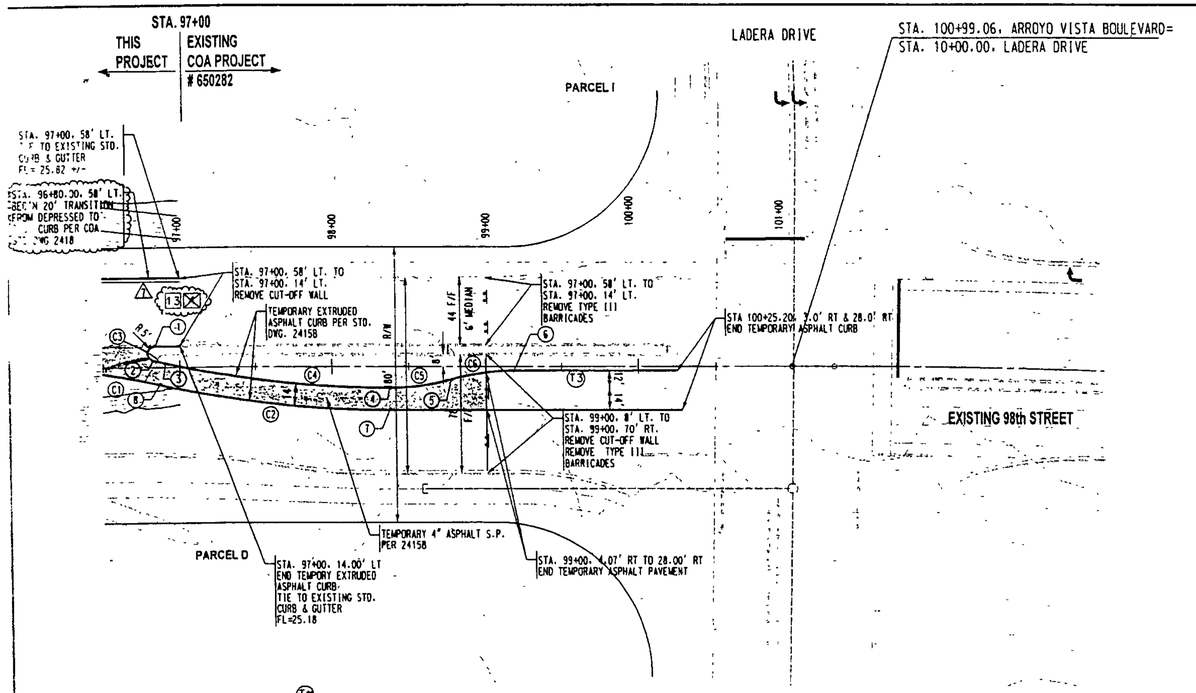


CENTERLINE TANGENT DATA		
NUMBER	BEARING	DISTANCE
T3	S14°58'52"E	481.58'

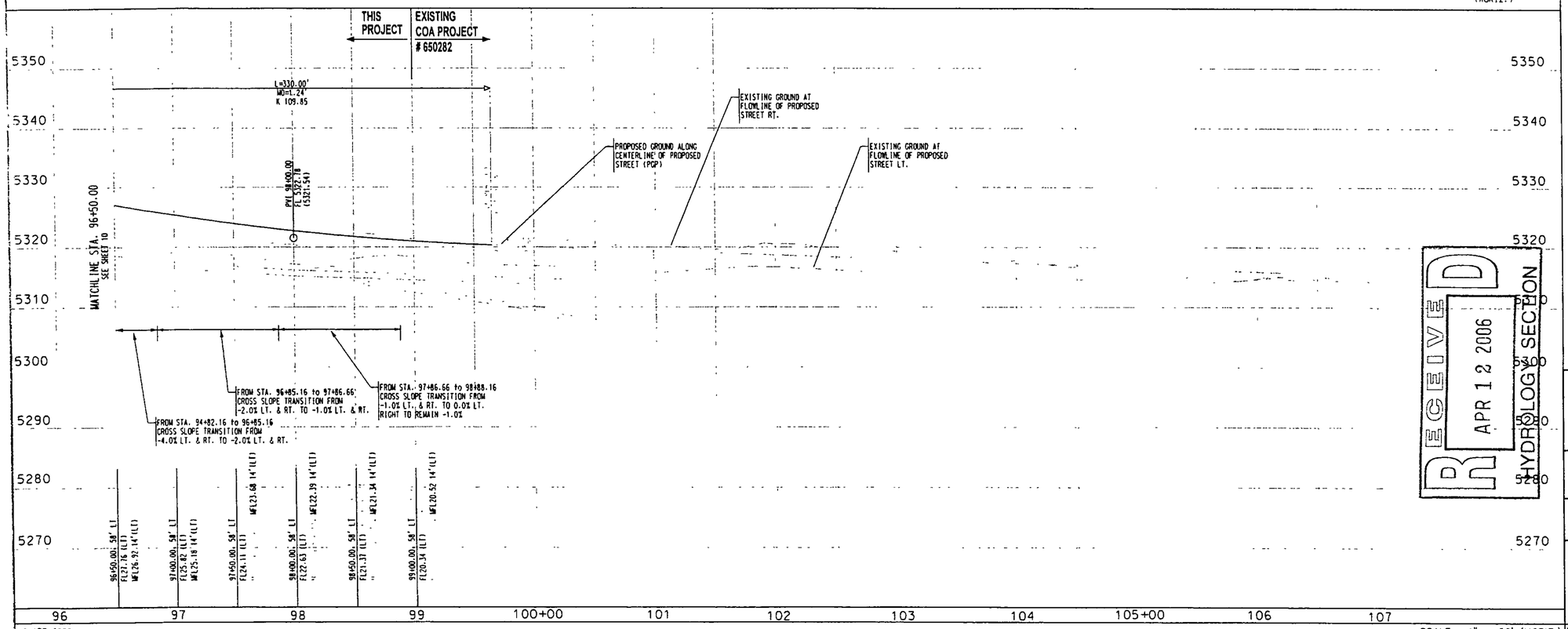
Temp. Asphalt Curb Curve Table				
ID	ARC	RADIUS	DELTA	TANGENT
C1	299.53'	673.00'	25°30'03"	152.29'
C2	152.13'	687.00'	12°41'17"	76.38'
C3	7.83'	687.00'	00°39'10"	3.91'
C4	149.03'	673.00'	12°41'17"	74.82'
C5	40.75'	150.00'	15°33'49"	20.50'
C6	40.75'	150.00'	15°33'49"	20.50'

Temp. Asphalt Curb Point Table			
	STATION	OFFSET	ELEVATION
1	96+83.49	14.00' LT.	5325.73
2	96+82.45	4.11' LT.	5326.08
3	96+90.10	2.43' LT.	5325.80
4	98+37.92	14.00' RT.	5321.38
5	98+78.16	8.50' RT.	5321.25
6	99+18.41	3.00' RT.	5320.78
7	98+37.92	28.00' RT.	5321.24
8	96+87.02	11.22' RT.	5325.63

DILUTED DATA INDICATES FUTURE INFORMATION FOR REFERENCE ONLY NOT TO BE CONSTRUCTED WITH THIS PROJECT

SCALE: 1"=50' (HORIZ.)

ARROYO VISTA BOULEVARD



RECEIVED APR 12 2006 HYDROLOGY SECTION

NOTES

1. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING UTILITY LOCATIONS AND NOTIFY THE ENGINEER IMMEDIATELY OF OF ANY DISCREPANCIES.
2. ALL CURB RETURN RADII SHALL BE 25' UNLESS OTHERWISE SPECIFIED.
3. ALL CURVE DATA AND DIMENSIONS REFER TO FACE OF CURB UNLESS OTHERWISE SPECIFIED.
4. GRADE ELEVATIONS, WHERE NOTED, ARE ALONG FLOWLINE OF CURB UNLESS OTHERWISE SPECIFIED.
5. CONTRACTOR IS TO INSTALL A 4" X 4" X 5' POST AND EMD AT THE END OF EACH SANITARY SEWER SERVICE.
6. CONTRACTOR IS RESPONSIBLE FOR REPAIR AND/OR REPLACEMENT OF ALL UTILITY CONDUITS AND EXISTING LINES.
7. ANY ADDITIONAL GRADING REQUIRED TO MATCH PROPOSED STREET GRADES SHALL BE INCIDENTAL TO PAVING ITEMS.
8. CONTRACTOR SHALL PROVIDE THE INSPECTORS, (CITY AND PRIVATE) WITH THE PROPOSED HYDROSTATIC TESTING PLAN. THE PLAN MUST BE APPROVED BEFORE TESTING OPERATIONS BEGIN.
9. CONTRACTOR SHALL PARK EQUIPMENT AND VEHICLES AS NOT TO INTERFERE WITH NORMAL ACTIVITIES OF RESIDENTS OR OTHER CONTRACTORS ON SITE.
10. ANY DAMAGE TO THE EXISTING FACILITIES (CURB & GUTTER), PAVEMENT, CONDUITS, LANDSCAPING, UTILITY LINES, ETC.) DURING CONSTRUCTION SHALL BE REPLACED AT THE CONTRACTORS' EXPENSE.
11. REMOVAL OF THE EXISTING CURB AND GUTTER SHALL BE AS PER COA STD. DWG. 2415 (SAWCUT ONLY).
12. WHEELCHAIR RAMPS SHALL BE CONSTRUCTED PRIOR TO ACCEPTANCE OF CURB & GUTTER.
13. FOR STORM DRAIN CONSTRUCTION, RCP PIPE JOINTS SHALL NOT BE GROUTED PRIOR TO FINAL INSPECTION. FINAL INSPECTION WILL DETERMINE JOINTS TO BE GROUTED FOR FINAL ACCEPTANCE OF THE CONSTRUCTION.

KEYED GENERAL NOTES

- 1 INSTALL 6' CONCRETE VALLEY GUTTER AS PER STD. DWG. 2420
- 2 INSTALL CONCRETE VALLEY GUTTER AS PER STD. DWG. 2421
- 3 INSTALL WHEELCHAIR RAMP AS PER DETAIL "A" SHEET 12
- 4 STD. CURB & GUTTER AS PER STD. DWG. 2415A
- 4A FUTURE STD. CURB & GUTTER
- 5 MEDIAN CURB & GUTTER AS PER STD. DWG. 2415B
- 5A FUTURE MEDIAN CURB & GUTTER
- 6 EXISTING 6' SIDEWALK
- 7 BUILD 6' SIDEWALK
- 8 INSTALL WHEELCHAIR RAMP AS PER DETAIL "B" SHEET 4
- 9 ASPHALT CURB AS PER STD. DWG. 2415
- 10 CONCRETE MEDIAN PAVING SECTION AS PER STD. DWG. 2408
- 11 TRAIL/BIKE PATH TO BE DESIGNED WITH LANDSCAPE PLANS
- 12 BUILD 4" TEXTURED MEDIAN PAVEMENT FROM MEDIAN NOSE TO 10' FROM NOSE (BAJA RED) MEDIAN NOSES SHALL BE PAINTED YELLOW TO APPROX. 6' BEHIND PC/PT. PER COA STD DWG 2408
- 13 DEPRESSED CURB & GUTTER AS PER STD. DWG. 2415A

Bohannan Huston INC

Courtyard I 7500 Jefferson St NE Albuquerque NM 87109-4335

ENGINEERING · SPATIAL DATA · ADVANCED TECHNOLOGIES

AS-BUILT INFORMATION

CONTRACTOR
WORK STAKED BY
INSPECTOR ACCEPTANCE BY — DATE
FIELD VERIFICATION BY — DATE
DRAWINGS CORRECTED BY — DATE
MICRO-FILM INFORMATION
RECORDED BY — DATE
NO

BENCH MARKS

ACS STATION NAMED 4 - K6. 3 -1/4" ALUM. CAP
HV18 # 4 - K6 GEOGRAPHIC POSITION (1927)
N.M. STATE PLANE COORDINATES (CENTRAL ZONE)
X=336,918.47, Y=1,483,515.05
GROUND-TO-GRID FACTOR .099966356
NGVD 1929 ELEVATION = 5732.892
ON PASEO DEL VULCAN, 0.91 MI NORTH OF I-40, 0.74 MI SOUTH OF POWERLINES, 39.6' NW OF CENTERLINE OF PASEO DEL VULCAN

SURVEY INFORMATION

FIELD NOTES

NO	BY	DATE

ENGINEER'S SEAL

KEVIN G. PATTON NEW MEXICO 13008 REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	REMARKS	BY
		REVISIONS	
		DESIGN	

DESIGNED BY	KM/JML	DATE 05/05
DRAWN BY	AR	DATE 05/05
CHECKED BY	KPD	DATE 05/05

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING DEVELOPMENT GROUP

STORMCLOUD OFFSITE
PAVING PLAN & PROFILE
ARROYO VISTA BLVD. STA. 96+50 - 101+00

DESIGN REVIEW COMMITTEE	CITY ENGINEER APPROVAL	LAST DESIGN UPDATE	MO /DAY/YR	MO /DAY/YR

CITY PROJECT NO.	ZONE MAP NO	SHEET	OF
650289	H9/J8/J9	11	21

SCALE 1" = 50' (HORIZ.)
1" = 10' (VERT)

BHI JOB NO 050316

12-APR-2006 -
P:\050316\cdp\pnp\offsite\050316ppnp10.dgn

Ronald D. Brown, Chair
Daniel F. Lyon, Vice Chair
Jim Eichenberg, Secretary-Treasurer
Janet Sakers, Asst. Secretary-Treasurer
Danny Hernandez, Director

John P. Kelly, P.E.
Executive Engineer

Albuquerque
Metropolitan
Arroyo
Flood
Control
Authority
2600 Prospect N.E., Albuquerque, NM 87107
Phone: (505) 884-2215 Fax: (505) 884-0214

Post-it® Fax Note 7671	Date 1-4	# of pages ▶ X 2
To BRAD BINGHAM	From LYNN MAZUR	
Co./Dept. HYDROLOGY	Co. AMAFCA	
Phone #	Phone #	
Fax #	Fax #	

File J-8/D1

January 4, 2006

Mr. Jared M. Lee, E.I.
Bohannan Huston, Inc.
7500 Jefferson St. NE, Courtyard I
Albuquerque, New Mexico 87109

Re: Revised Offsite Storm Drain Plans for Stormcloud Subdivision, Unit 1, ZAP J-8
City Project No. 650278

Dear Mr. Lee:

AMAFCA has reviewed the referenced plans with regard to the proposed drainage outfall to the Ladera Dam system and offers the following comments:

1. The 84-inch outfall to Ladera Dam 9 will have headcutting from the bottom of the dam. To protect the dissipator structure, there should be a riprap cutoff wall that extends to the minimum elevation of the dam, 5265. The area behind the cutoff wall can be compacted earth or similar size rock. See attached sketch.
2. After further research, I have determined that a 6-foot water quality manhole is not adequate for the flow rate. The North Domingo Baca / Corona storm drain project, designed by Bohannan Huston, used a 36-inch diversion pipe with an 8-foot water quality manhole for a similar flow rate. Please revise.

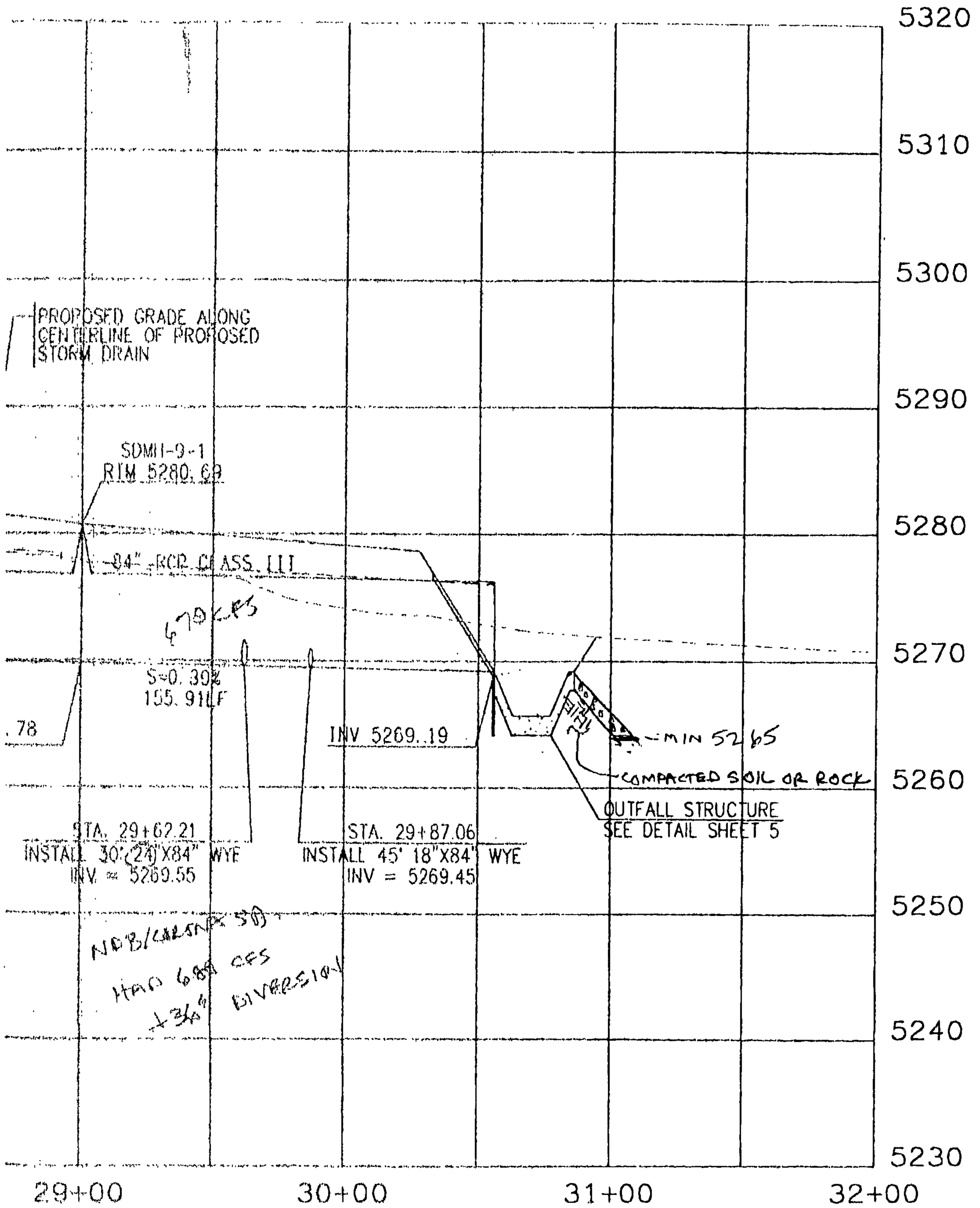
If you have any questions, please call me at 884-2215.

Sincerely,
AMAFCA

Lynn M. Mazur

Lynn M. Mazur, P.E., C.F.M.
Development Review Engineer

Cc: Brad Bingham, COA Hydrology


5320
5310
5300
5290
5280
5270
5260
5250
5240
5230
PROPOSED GRADE ALONG CENTERLINE OF PROPOSED STORM DRAIN
SDMH-9-1
RIM 5280.69
84" RCP CLASS III
S=0.30%
155.91LF
.78
INV 5269.19
MIN 5265
COMPACTED SOIL OR ROCK
OUTFALL STRUCTURE
SEE DETAIL SHEET 5
STA. 29+62.21
INSTALL 30' (24")X84" WYE
INV = 5269.55
STA. 29+87.06
INSTALL 45' 18"X84" WYE
INV = 5269.45
29+00
30+00
31+00
32+00

File

Bohannan ▲ Huston INC.

J-8/D1

Courtyard I
7500 Jefferson St. NE
Albuquerque, NM
87109-4335
www.bhinc.com
voice: 505.823.1000
facsimile: 505.798.7988
toll free: 800.877.5332

CLIENT/COURIER TRANSMITTAL

To: Brad Bingham, P.E.
Hydrology Development Section
Plaza Del Sol - 2nd Floor
Albuquerque NM

Requested by: Jared M. Lee

Date: 5-19-06

Time Due:
- ☐ This A.M.
- ☒ This P.M.
- ☐ Rush _____
- ☐ By Tomorrow

Phone: 924-3986

Job No.: 050316

Job Name: Stormcloud Offsite

DELIVERY VIA

- ☒ Courier
- ☐ Federal Express
- ☐ Mail
- ☐ UPS
- ☐ Other

PICK UP

Item: _____

ITEM NO.	QUANTITY	DESCRIPTION
1	1	Copy of letter to Hector Perez/Universal Constructors dated 5-18-06 re: Design Revision #9: Stormcloud Subdivision Offsite - COA Project #650289

COMMENTS / INSTRUCTIONS

RECEIVED
MAY 19 2006
HYDROLOGY SECTION

REC'D BY: Sandy Handley DATE: 05/19/06 TIME: 11:00

ENGINEERING ▲
SPATIAL DATA ▲
ADVANCED TECHNOLOGIES ▲

Bohannan ▲ Huston INC.

Courtyard I
7500 Jefferson St. NE
Albuquerque, NM
87109-4335

www.bhinc.com

voice: 505.823.1000
facsimile: 505.798.7988
toll free: 800.877.5332

May 18, 2006

Mr. Hector Perez
Universal Constructors, Inc.
3825 Academy Parkway North N E
Albuquerque, NM 87109

Re: Design Revision #9: Stormcloud Subdivision Offsite - COA Project #650289

Dear Hector:

Enclosed is Design Revision #9 to the above referenced project. This revision requires changes on Sheet 8. We have revised the 66" storm drain outlet to acquire adequate cover over the existing 48" San Juan Chama Waterline. We have raised the invert out to elevation 5280.72 and flattened the slope to 0.24%. This provides approximately 6 inches of cover between the two. Also attached is a structural support designed by HDR to be constructed at the crossing of the 48" SJCWL. Please note that Bohannan Huston Inc. has not reviewed the structural support design prepared by HDR . The additional structural support detail enclosed is requested by the City of Albuquerque and the design is by others.

Please incorporate these revisions into your work order set of construction plans and the as-built plans submitted with the close-out package. If I can provide additional information or answer any questions regarding this revision, please contact me at 823-1000.

Sincerely,

Jared M. Lee, E.I.
Design Engineer
Community Development and Planning

JML/am
Enclosure: Sheet 8
SJC DWP TRANSMISSION PIPELINE #4 – SHEET 34a

cc: Fred Ambrogi, Westland Development Co. (w/encl)
Carlos Spiess, Sundance Mechanical and Utility Corp. (w/encl)
Rick White, Jeff Mortensen & Associates (w/encl)
Jim Spinello, Smith Engineering (w/encl)
Brad Bingham, COA (w/encl)
Jim Pung, COA (w/encl)
John Stomp, COA (w/encl)
Carl Abrams, HDR (w/encl)
Kevin Patton, BHI (w/out encl)

RECEIVED
MAY 19 2006
HYDROLOGY SECTION

RECEIVED
MAY 19 2006
HYDROLOGY SECTION

(E) FLOWLINE DATA FOR CURB RETURN

PC	95 40
1	95 40
2	95 41
3	95 41
PT	95 41
PI	94 85

D = 89°42'11"
R = 30.00'
T = 29.84'
L = 46.97'
C = 42.32'

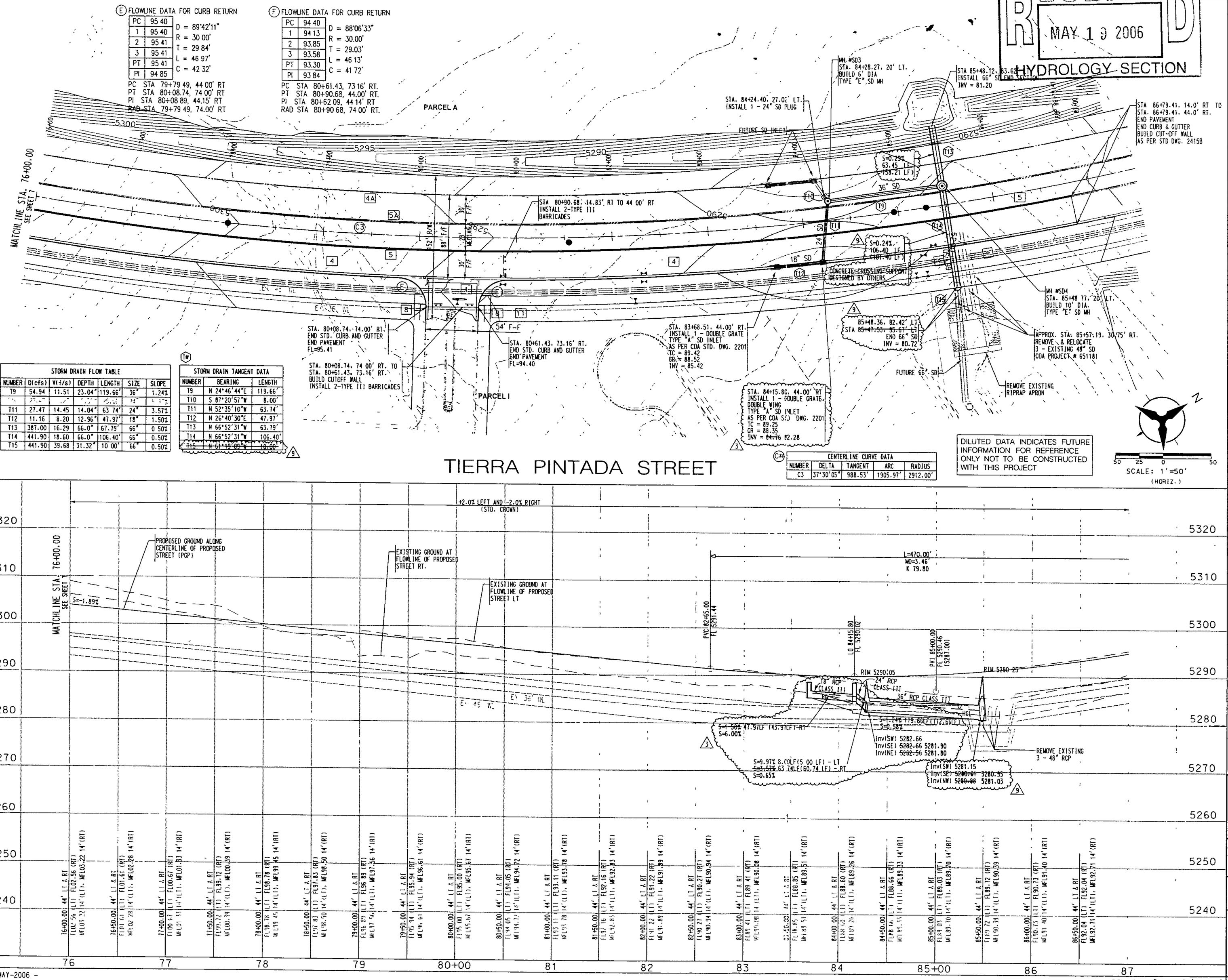
PC STA 79+79.49, 44.00' RT
PT STA 80+08.74, 74.00' RT
PI STA 80+08.89, 44.15' RT
RAD STA 79+79.49, 74.00' RT

(F) FLOWLINE DATA FOR CURB RETURN

PC	94 40
1	94 13
2	93.85
3	93.58
PT	93.30
PI	93.84

D = 88°06'33"
R = 30.00'
T = 29.03'
L = 46.13'
C = 41.72'

PC STA 80+61.43, 73.16' RT.
PT STA 80+90.68, 44.00' RT.
PI STA 80+62.09, 44.14' RT
RAD STA 80+90.68, 74.00' RT.



DILUTED DATA INDICATES FUTURE INFORMATION FOR REFERENCE ONLY NOT TO BE CONSTRUCTED WITH THIS PROJECT

STORM DRAIN FLOW TABLE						
NUMBER	Q(cfs)	V(f/s)	DEPTH	LENGTH	SIZE	SLOPE
T9	54.94	11.51	23.04"	119.66'	36"	1.24%
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
T11	27.47	14.45	14.04"	63.74'	24"	3.57%
T12	11.16	8.20	12.96"	47.97'	18"	1.50%
T13	387.00	16.29	66.0"	67.79'	66"	0.50%
T14	441.90	18.60	66.0"	106.40'	66"	0.50%
T15	441.90	39.68	31.32"	10.00'	66"	0.50%

STORM DRAIN TANGENT DATA		
NUMBER	BEARING	LENGTH
T9	N 24°46'44"E	119.66'
T10	S 87°20'57"W	8.00'
T11	N 52°35'10"W	63.74'
T12	N 26°40'30"E	47.97'
T13	N 66°52'31"W	63.79'
T14	N 66°52'31"W	106.40'
T15	N 61°19'05"W	10.00'

CENTERLINE CURVE DATA				
NUMBER	DELTA	TANGENT	ARC	RADIUS
C3	37°30'05"	988.53'	1905.97'	2912.00'

NOTES

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KEYED GENERAL NOTES

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2. INSTALL CONCRETE VALLEY GUTTER AS PER STD. DWG. 2421
3. INSTALL WHEELCHAIR RAMP AS PER DETAIL "A" SHEET 12
4. STD. CURB & GUTTER AS PER STD. DWG. 2415A
4A. FUTURE STD. CURB & GUTTER
5. MEDIAN CURB & GUTTER AS PER STD. DWG. 2415B
5A. FUTURE MEDIAN CURB & GUTTER
6. EXISTING 6' SIDEWALK
7. BUILD 6' SIDEWALK
8. INSTALL WHEELCHAIR RAMP AS PER DETAIL "B" SHEET 4
9. ASPHALT CURB AS PER STD. DWG. 2415
10. CONCRETE MEDIAN PAVING SECTION AS PER STD. DWG. 2408
11. TRAIL/BIKE PATH TO BE DESIGNED WITH LANDSCAPE PLANS
12. BUILD 4" TEXTURED MEDIAN PAVEMENT FROM MEDIAN NOSE TO 10' FROM NOSE (BAJA RED) MEDIAN NOSES SHALL BE PAINTED YELLOW TO APPROX. 6' BEHIND PC/PT. PER COA STD DWG 2408
13. DEPRESSED CURB & GUTTER AS PER STD. DWG. 2415A

Bohannan ▲ Huston INC.
Courtyard I 7500 Jefferson St NE Albuquerque, NM 87109-4335
ENGINEERING ▲ SPATIAL DATA ▲ ADVANCED TECHNOLOGIES

AS-BUILT INFORMATION
CONTRACTOR
WORK STAKED BY
INSPECTOR'S ACCEPTANCE BY — DATE
FIELD VERIFICATION BY — DATE
DRAWINGS CORRECTED BY — DATE
MICRO-FILM INFORMATION
RECORDED BY — DATE
NO

BENCH MARKS
ACS STATION NAMED 4 - K6, 3 -1/4" ALUM. CAP
HV18 = 4 - K6 GEOGRAPHIC POSITION (1927)
N.M. STATE PLANE COORDINATES (CENTRAL ZONE)
X=336,918.47, Y=1,483,515.05
GROUND-TO-GRID FACTOR .0999656356
NGVD 1929 ELEVATION = 5732.892
ON PASEO DEL VULCAN, 0.91 MI NORTH
OF I-40, 0.74 MI SOUTH OF POWERLINES, 39.6' NW OF CENTERLINE OF PASEO DEL VULCAN

SURVEY INFORMATION
FIELD NOTES

NO.	DATE	BY

ENGINEER'S SEAL
KEVIN R. PATTON NEW MEXICO 13685 REGISTERED PROFESSIONAL ENGINEER

NO	DATE	REMARKS	BY
1	05/10/06	ADJUST 66" SD OUTLET	JML
2	02/27/06	LOWERED SD TO ACCOMMODATE WL CROSSING	JML

REVISIONS

DESIGN		
DESIGNED BY	KW/JML	DATE 05/05
DRAWN BY	AR	DATE 05/05
CHECKED BY	KGP	

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING DEVELOPMENT GROUP

STORMCLOUD OFFSITE
PAVING PLAN & PROFILE
TIERRA PINTADA ST. STA. 76+00 - 87+00

DESIGN REVIEW COMMITTEE	CITY ENGINEER APPROVAL	LAST DESIGN UPDATE	MO /DAY/YR	MO /DAY/YR

CITY PROJECT NO.	ZONE MAP NO	SHEET	OF
650289	H9/J8/J9	8	21

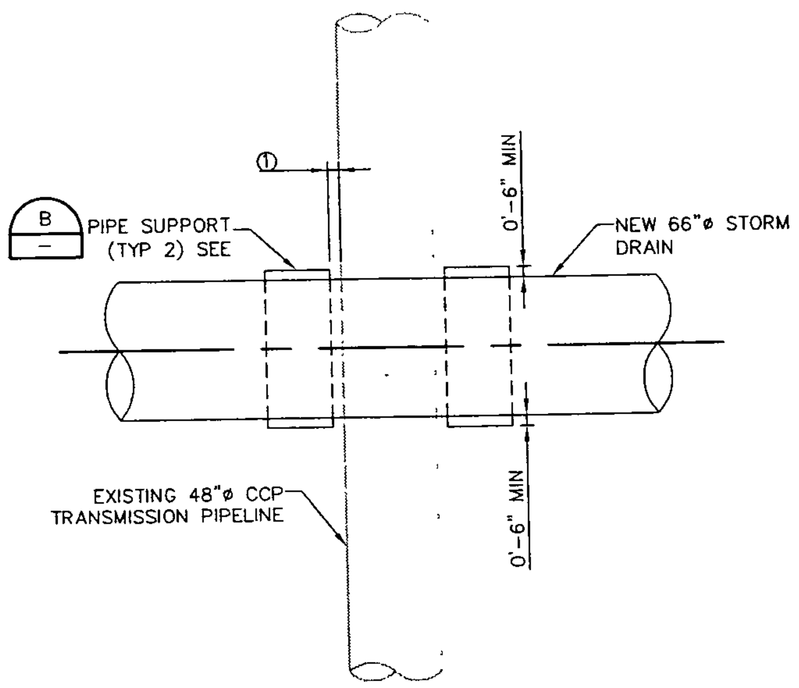
SCALE: 1" = 50' (HORIZ.)
1" = 10' (VERT.)

BHI JOB NO 050316

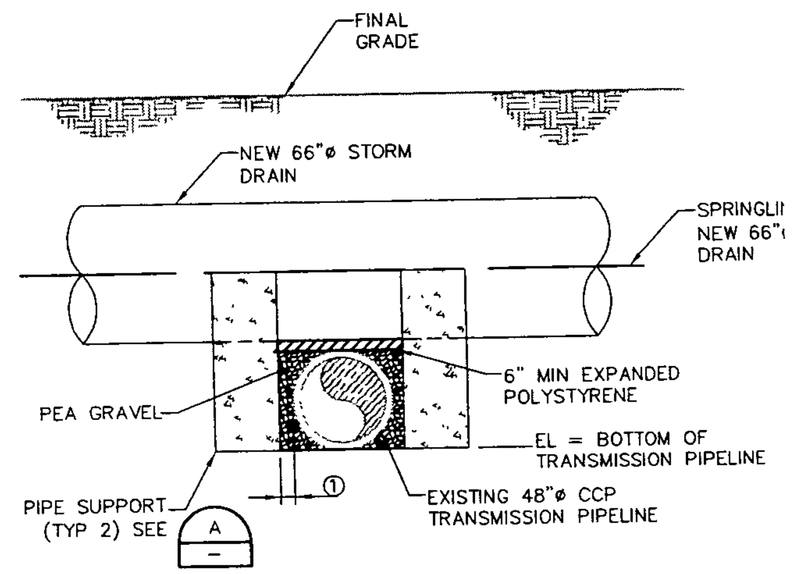
18-MAY-2006 -
P \050316\cdp\pnp\offsite\050316ppnp04 dgn

KEYED NOTES:

1 12" MAX – CONTRACTOR SHALL EXCAVATE BY HAND WITHIN 12" OF TRANSMISSION LINE



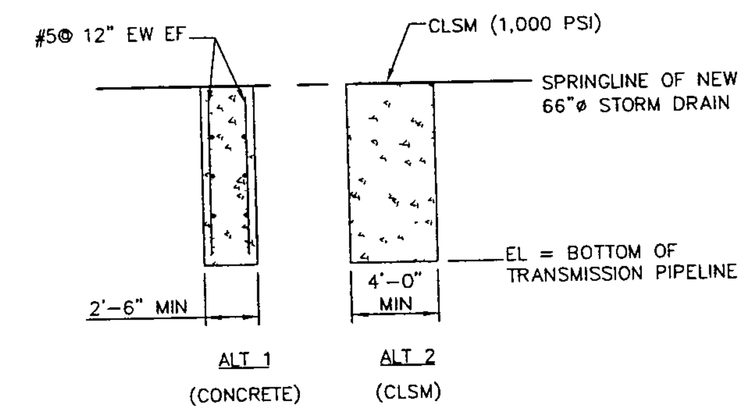
PLAN



SECTION

66" STORM DRAIN CROSSING (1/23)

NTS



TYPICAL PIPE SUPPORT ALTERNATIVES (A/–)

NTS

AS BUILT INFORMATION

CONTRACTOR | DATE
WORK STAKED BY | DATE
INSPECTOR'S ACCEPTANCE BY | DATE
FIELD VERIFICATION BY | DATE
DRAWINGS CORRECTED BY | DATE

MICRO-FILM INFORMATION

RECORDED BY | DATE
NO

BENCH MARKS

BRASS CAP STAMPED "L424 1982"
USC&GS STANDARD BENCH MARK DISK
ELEVATION = 5098.75 NAVD88, in U S feet
FROM THE JUNCTION OF I-40 & ST HWY 448, IN TOP OF AND 0.3' EAST OF THE WEST END OF THE SO CONC. ABUTMENT OF THE SO. BOUND OVERPASS OF I-40 & 22.0' WEST OF THE CENTER OF THE SO BOUND LANES OF THE HWY 448 THE BM IS 3.94' BELOW THE STATE HWY.

SURVEY INFORMATION

FIELD NOTES

NO.	BY	DATE

ENGINEER'S SEAL

CARL M. ABRAMS NEW MEXICO 13817 REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	REMARKS	BY
R	4/12/06	RECORD DRAWINGS	CMA

REVISIONS

DESIGN

		DATE
DESIGNED BY	CMA	2/08/06
DRAWN BY	RAG	2/08/06
CHECKED BY	WFZ	2/08/06

HDR
2155 LOUISIANA BLVD., NE
SUITE 8500
ALBUQUERQUE, NM 87110
MAIN (505) 830-5400
FAX. (505) 830-5454

ALBUQUERQUE BERNALILLO COUNTY WATER UTILITY AUTHORITY

TITLE: SJC DWP TRANSMISSION PIPELINE #4 – SOUTH SEG.
MISCELLANEOUS DETAILS

Design Review Committee | City Engineer Approval | Last Design Update | Mo. / Day / Yr | Mo. / Day / Yr

City Project No 6811-05 | Zone Map No | Sheet 34a Of 62

RECEIVED MAY 19 2006 HYDROLOGY SECTION

\04742_CCA_PIPE#4\CAD\SOUTH\Record\Sheet 32-35 Details.dwg, 5/16/2006 3:20:08 PM

County of Bernalillo

State of New Mexico

2400 BROADWAY, S.E.
ALBUQUERQUE, NEW MEXICO 87102
PUBLIC WORKS (505) 848-1500

BOARD OF COUNTY COMMISSIONERS
ALBERT "AL" VALDEZ, CHAIRMAN
DISTRICT 2
KEN SANCHEZ, VICE CHAIR
DISTRICT 1
EUGENE M. GILBERT, MEMBER
DISTRICT 3
BARBARA J. SEWARD, MEMBER
DISTRICT 4
LES HOUSTON MEMBER
DISTRICT 5
JUAN R. VIGIL, COUNTY MANAGER

DAVID K. ANDERSON ASSESSOR
JUDY D. WOODWARD, CLERK
THOMAS J. MESCALL, PROBATE JUDGE
JOE BOWDICH, SHERIFF
H. R. FINE, TREASURER

July 15, 1996

Dennis A. Lorenz, P.E.
Brasher & Lorenz, Inc.
4425 Juan Tabo Blvd. NE, Ste. 202
Albuquerque, New Mexico

RE: GRADING AND DRAINAGE PLAN FOR LADERA DAM NO. 5 ARROYO BORROW SITE (J8/D1) (PWD 96-106) SUBMITTED FOR GRADING PERMIT APPROVAL, ENGINEER'S STAMP DATED 6/24/96.

Dear Mr. Lorenz:

Based on the information provided with the submittal of July 3, 1996, the above referenced plan is approved for Grading Permit release.

Please be aware that the contractor must coordinate with John Kelly at AMAFCA and that no work will be allowed within Dam No. 5. Erosion control must be maintained at the proposed stockpile area during construction.

Due to concerns with channel widening and head-cutting, an Engineer's Certification will be required to assure that grading is maintained within the floodplain. At that time, please add the site inspection statement to the plan.

If you should have any questions, or if I may be of further assistance to you, please feel free to call me at 768-2666.

Sincerely,

Susan Calongne

Susan M. Calongne, P.E.
City/County Floodplain Administrator

c: Kurt Browning, Albuquerque Metropolitan Arroyo Flood Control Authority
Roger Paul, Bernalillo County Public Works Division
File

DRAINAGE INFORMATION SHEET

PROJECT TITLE: LADERA DAM NO 5 ARROYO BORROW SITE ZONE ATLAS/DRNG. FILE #: J8/W1

DRB #: _____ EPC #: _____ WORK ORDER #: _____

LEGAL DESCRIPTION: UNPLATTED LAND

CITY ADDRESS: NA.

ENGINEERING FIRM: BRASHER & LORENZ, INC. CONTACT: Dennis A. Lorenz, PE

ADDRESS: 4425 Juan Tabo Blvd. NE Suite 202 PHONE: 296-0422

OWNER: WESTLAND DEV CO INC CONTACT: LEROY CHAVEZ

ADDRESS: 401 COORS NW PHONE: 831-9600

ARCHITECT: NA CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: NA CONTACT: _____

ADDRESS: _____ PHONE: _____

CONTRACTOR: SALLS BROTHERS CONSTR. CONTACT: FRED SALLS

ADDRESS: 3811 ATRISCO NW PHONE: 839-4117

TYPE OF SUBMITTAL:

- ____ DRAINAGE REPORT
- X DRAINAGE PLAN
- ____ CONCEPTUAL GRADING & DRAINAGE PLAN
- ____ GRADING PLAN
- ____ EROSION CONTROL PLAN
- ____ ENGINEER'S CERTIFICATION
- ____ OTHER _____

PRE-DESIGN MEETING:

- X YES
- ____ NO
- ____ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

- ____ SKETCH PLAT APPROVAL
- ____ PRELIMINARY PLAT APPROVAL
- ____ S. DEV. PLAN FOR SUB'D. APPROVAL
- ____ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- ____ SECTOR PLAN APPROVAL
- ____ FINAL PLAT APPROVAL
- ____ FOUNDATION PERMIT APPROVAL
- ____ BUILDING PERMIT APPROVAL
- ____ CERTIFICATE OF OCCUPANCY APPROVAL
- X GRADING PERMIT APPROVAL
- ____ PAVING PERMIT APPROVAL
- ____ S.A.D. DRAINAGE REPORT
- ____ DRAINAGE REQUIREMENTS
- ____ OTHER _____ (SPECIFY)

DATE SUBMITTED: 6-24-96

BY: Dennis A. Lorenz

JUL - 3 1996

Fusion

County of Bernalillo

State of New Mexico

2400 BROADWAY, S.E.
ALBUQUERQUE, NEW MEXICO 87102
PUBLIC WORKS (505) 848-1500

BOARD OF COUNTY COMMISSIONERS
ALBERT "AL" VALDEZ, CHAIRMAN
DISTRICT 2
KEN SANCHEZ, VICE CHAIR
DISTRICT 1
EUGENE M. GILBERT, MEMBER
DISTRICT 3
BARBARA J. SEWARD MEMBER
DISTRICT 4
LES HOUSTON, MEMBER
DISTRICT 5
JUAN R. VIGIL, COUNTY MANAGER

DAVID K. ANDERSON ASSESSOR
JUDY D. WOODWARD, CLERK
THOMAS J. MESCALL, PROBATE JUDGE
JOE BOWDICH, SHERIFF
H. R. FINE, TREASURER

Date: 26-JUL-96

Subject: Submittal

Case No.: PWD-96-106

Zone Map No.: J-8

Street Address:

Legal Description: UNPLATTED LAND WITHIN ATRISCO LAND GRANT

Name of Applicant: Westland Develpment

Dear Applicant:

Bernalillo County Public Works Department will require **TWO WEEKS for review and comment of submittal and resubmittals, and ONE WEEK for final review and plat sign-off.** Major submittals may require more than two weeks for review and comment.
The issuance of a permit or a review or approval of plan specifications, computations, and shop drawings shall not be interpreted to be a permit for or an approval of any variance or violation of any of the provisions of any County or State codes, ordinances, standards, or policies. Nor shall such issuance of a permit or approval of plans, specifications, computations, and shop drawings prevent any authorized County representative or County inspector form thereafter requiring the correction of errors in said plans, specifications, computations, or shop drawings or from stopping construction operations which are being carried on thereunder when in violation of any County or State codes, ordinances, standards, or policies.
Review of construction plans, specifications, computations, and shop drawings is only for general conformance with the design concept of the project and general compliance with the plans and specifications and shall not be construed as relieving the Contractor, Land Divider, Subdivider, Engineer/Surveyor, or applicant of the full responsibility for: providing materials, equipment, and work required by the contract; the proper fitting and construction for the work; the accuracy and completeness of the submittal; selecting fabrication processes and techniques of construction; and performing the work in a safe manner.

REV 4-22-91 BR

COUNTY OF BERNALILLO

APPLICATION FOR CASE REVIEW

Please complete pages one and two of this application for review of your case. **Submit THREE bluelines of plat, drawings, or information with case submittals and THREE bluelines of plat, drawings, or information along with the original mylar for final sign-off applications. Submit a County Zone Atlas Map with subject property marked on the map.** If a Grading and Drainage plan is not included with a land division, replat, or conceptual plan, please submit one 8.5"x11" photcopy of a USGS quad map with the subject property superimposed.

NOTE: INCOMPLETE APPLICATIONS WILL BE RETURNED WITHOUT REVIEW.

1. APPLICANT INFORMATION:

a. Applicant is(check one):

X OWNER ____ SURVEYOR ____ AGENT
____ENGINEER ____DRAINAGE ENGINEER

b. Date of this application: 21-JUN-96

c. Signature of applicant:
(print)_____ (sign)_____

d. OWNER: Westland Develpment PHONE: 831-9600
401 Coors NW
Albuquerque, NM 87120

e. AGENT: Salls Brothers PHONE: 893-4117
3811 Atrisco NW # D
Albuquerque, NM 87120

f. OTHER(specify): PHONE:

, NM

2. TYPE OF SUBMITTAL (check one):

____REPLAT
____LAND DIVISION (MINOR SUBDIVISION)
____MAJOR SUBDIVISION
____CONSTRUCTION DRAWINGS
__X__GRADING/DRAINAGE PLAN
____AS-CONSTRUCTED GRADING/DRAINAGE PLAN
____VARIANCE REQUEST
____TRAFFIC IMPACT ANALYSIS/TRAFFIC STUDY
____INFRASTRUCTURE LIST/DESIGN REVIEW FEE
____OTHER (specify):_____

Your: X submittal of drainage information
___ resubmittal of drainage information

is: X approved.
___ approved with comments/conditions.
___ disapproved.
___ deferred to County Floodplain Administrator

TO BE FILLED OUT BY COUNTY PUBLIC WORKS DEPARTMENT ONLY

Case review comments are:

X attached.
___ not attached.
___ not attached. See remarks below.

Resubmittal is:

___ not required.
X required. When resubmitting, please use Resubmittal Form.

Please submit:

___ grading/drainage plan with revisions.
X as-constructed grading/drainage plan.
___ other: _____

It is required that:

___ Bernalillo County Public Works Department inspect improvements prior to final sign-off of plat.
___ Bernalillo County Public Works Department signature line be placed on plat.

Remarks: _____

TG [illegible], PE 7/22/96
Molzen-Corbin & Assoc., for
County Surface Water Hydrologist
Bernalillo County Public Works Department

Concur: KTB P.E. 7-25-96
Drainage Engineer
AMAFCA

cc:
___ Sandia Heights Homeowners Association
X Owner: Westland Development
X Agent: Dalla Brothers
X Case File: PWD-96-106
___ AMAFCA
X Susan Calongne, County Floodplain Administrator, COA
X Molzen-Corbin & Associates
X Other: Brasher & Lorenz

pb-wtz.1

BERNALILLO COUNTY PUBLIC WORKS DEPARTMENT
CASE FILE COMMENTS

CASE NO: PWD-96-106

ZONE MAP NO.: J-8

REFERENCE CASES:

STREET ADDRESS:

LEGAL DESCRIPTION: UNPLATTED LAND WITHIN ATRISCO LAND GRANT

COMMENTS OF:

21-JUN-96 DRAN:
1. Based on the information provided on the grading and drainage plan, with engineer's seal dated 06-24-96, this plan appears to meet the requirements established for this area and is therefore acceptable.
2. Development of this property must conform to this plan. Any proposed changes will require a revision to the plan prior to initiating the proposed change.
3. An "As-Constructed" grading and drainage plan, with engineer's certification that the constructed improvements are in substantial compliance with this plan, will be required prior to County Building and Zoning issuing an occupancy permit.

*** Inspection required, applicant required to obtain permits from G.J. Foster at Bernalillo County Public Works Department.
Phone (505) 848 - 1523

BERNALILLO COUNTY

PWD SUBMITTAL

Use for all PWD applications EXCEPT Street Excavation

☐ NEW SUBMITTAL

☐ RESUBMITTAL

☐ FINAL SIGNOFF

TODAY'S DATE 6·20·96

CASE NO: PWD-96-106

OWNER

OWNER WESTLAND DEVELPMENT PHONE 831-9600

MAILING ADDRESS 401 COORS NW CITY ABQ ZIP 87120

AGENT

AGENT / CONTRACTOR SALLS BROTHERS PHONE 839-4117

MAILING ADDRESS 3811 ATRISCO NW # D CITY ABQ ZIP 87120

STATE LICENSE NO EXP DATE VOLUME CLASS

ARCHITECT/ENGINEER BRASHER & LORENZ LICENSE NO PHONE 296·0422

SITE INFORMATION

SITE ADDRESS / DIRECTIONS NA. ZONE ATLAS NO.: J-8

LEGAL DESCRIPTION UNPLATTED LAND WITHIN ATRISCO LAND GRANT LOT SIZE NA

EXISTING BUILDING(S) AND USE: Ø PROPOSED BUILDING(S) Ø

UPC # — — — — —

TYPE OF SUBMITTAL

- ☐ REPLAT
- ☐ MINOR SUBDIVISION
- ☐ MAJOR SUBDIVISION
- ☐ CONSTRUCTION DRAWINGS
- ☒ GRADING & DRAINAGE PLAN
- ☐ AS-CONSTRUCTED GRADING & DRAINAGE PLAN
- ☐ VARIANCE REQUEST
- ☐ LAND DIVISION
- ☐ TRAFFIC IMPACT ANALYSIS / TRAFFIC STUDY
- ☐ INFRASTRUCTURE LIST / DESIGN REVIEW
- ☐ SPECIAL USE PERMIT
- ☐ BARRICADING PERMIT
- ☐ BUILDING PERMIT
- ☐ INSPECTION
- ☒ OTHER (Specify): EXCAVATION

The issuance of a permit or a review or approval of plan specifications, computations, and shop drawings, shall not be interpreted to be a permit for. or an approval of any variance or violation of any of the provisions of any COUNTY or STATE codes, ordinances, standards, or policies. Nor shall such issuance of a permit or approval of plans, specifications, computations, and shop drawings prevent any authorized COUNTY representative or COUNTY inspector form thereafter requiring the correction of errors in said plans, specifications, computations, or shop drawings or from stopping construction operations which are being carried on thereunder when in violation of any COUNTY or STATE codes, ordinances, standards, or policies.

☐ Owner ☐ Agent ☐ Contractor Signature _____ Date 6·20·96

COUNTY

BERNALILLO COUNTY USE ONLY

C/R's		TOTAL FEE:	
		Receipt No.:	
		Received By:	

Danny Hernandez - Chair
Janet Salers - Vice Chair
Tim Eichenberg - Secretary - Treasurer
Ronald D. Brown - Assistant Secretary - Treasurer
Daniel Lyon - Director

John P. Kelly, P.E.
Executive Engineer

Albuquerque
Metropolitan
Arroyo
Flood
Control
Authority
2600 Prospect N.E., Albuquerque, NM 87107
Phone: (505) 884-2215 Fax: (505) 884-0214

Post-it® Fax Note 7671	Date 3-6	# of pages ▶ 2
To JEREMY HOOVER	From LYNN MAZUR	
Co./Dept. HYDROLOGY	Co. AMAFCA	
Phone #	Phone #	
Fax #	Fax #	

March 6, 2007

Mr. Shahab Biazar, P.E.
Advanced Engineering & Consulting
4416 Anaheim Ave. NE
Albuquerque, NM 87113

Re: Work Order Plans for Stormcloud Subdivision, Units 4 & 5, ZAP H-9
City Project No. 650277, Engineer's Stamp Dated February 27, 2007

Dear Mr. Biazar:

AMAFCA has reviewed the referenced plans and offers the following comments:

1. The storm drain outfalls should discharge into the Mirehaven Arroyo upstream of the drop structures with riprap from the pipe outlet to the edge of the drop structures. The drop structures act as energy dissipators to slow the velocity of the storm water discharge. This will save some pipe length, also.
2. Provide off-line water quality manholes on the storm drain outfalls. AMAFCA can provide details.
3. The riprap on the channel side slopes should be grouted around the storm drains.
4. Provide a detail of the box culvert connection to the arroyo. The riprap downstream of the culvert must be sized if it is dumped, or use grouted riprap. Dumped riprap will require backfill over filter fabric.
5. Show the proposed channel improvements in plan view on the plan and profile sheets. On sheet 46, any portion of the water line crossing in the channel that is not under riprap or concrete must be covered by a concrete cap so that it is not broken during maintenance operations.
6. The Mirehaven Channel plans must be revised to reflect current construction, i.e., box culvert instead of a berm at Tierra Pintada. Also show the storm drain outfalls and water line crossing.

AMAFCA reviewed the report for capacity of Ladera Dam 12 prepared by Bohannan Huston, Inc., dated February 8, 2007. The analysis showed that the development of the referenced subdivision will not increase the 100-year water surface elevation in the dam. Therefore, AMAFCA will allow work order plans for this subdivision to proceed. However, any development west of Tierra Pintada / 98th Street may trigger the expansion of Ladera Dams 9 and 10 as has been discussed with Westland / Suncal since 2001.

AMAFCA will not sign work order plans until the executed Turnkey Agreement for construction of the Mirehaven Arroyo and Encroachment License are received. If you have ny questions, please call me at 884-2215.

Sincerely,
AMAFCA

Lynn M. Mazur

Lynn M. Mazur, P.E., C.F.M.
Development Review Engineer

Cc: Jeremy Hoover, City Hydrology
Leroy Chavez, Suncal
Craig Hoover, BHI

Westland Development, Co., Inc.

401 Coors Blvd N.W.
Albuquerque, New Mexico 87121
(505) 831-9600
FAX (505) 831-4865
1-800-726-3250

May 22, 1996

AMAFCA
2600 Prospect Ave, NE
Albuquerque, NM 87107

Bernalillo County Public Works
2400 Broadway, SE
Albuquerque, NM 87102

c/o Dennis Lorenz, Brasher Lorenz Inc. Consulting Engineers

RE: Merihaven Arroyo Excavation

To Whom It May Concern,

This letter is to advise those interested that Westland Development Co., Inc., hereby allows Salls Brothers to excavate up to one-foot of material within the Merihaven Arroyo. Salls Brothers will be responsible for all permits and shall indemnify Westland Development Co., Inc., from any liability.

Should you have any questions or concerns, please do not hesitate to contact me.

Sincerely,

Leroy J. Chavez
Vice President of Development

cc: Fred Salls, Salls Brothers

LJC:mo

Bohannan Huston INC.

Courtyard I
7500 Jefferson St. NE
Albuquerque, NM
87109-4335

www.bhinc.com

voice: 505.823.1000
facsimile: 505.798.7988
toll free: 800.877.5332

J-8/D1

November 4, 2005

Mr. Fred Salls
Salls Brothers Construction, Inc.
P O Box 66239
Albuquerque, NM 87193-6239

Re: Stormcloud Subdivision Final Grading Plan
CPN 650278, 650279, 650280, 650289

Dear Fred:

The following changes have been made to the final grading plan. The typical townhome section has been revised to add 5' to the pads for lots 392 thru 520; please refer to the attached exhibit. Side yard swale spots will remain the same, except where noted, but be shifted over five feet. Lots 406, 410, 412, 471 and 479 side yard spots were lowered for the new section as not to incur any side yard retaining wall.

Please let me know if you have questions

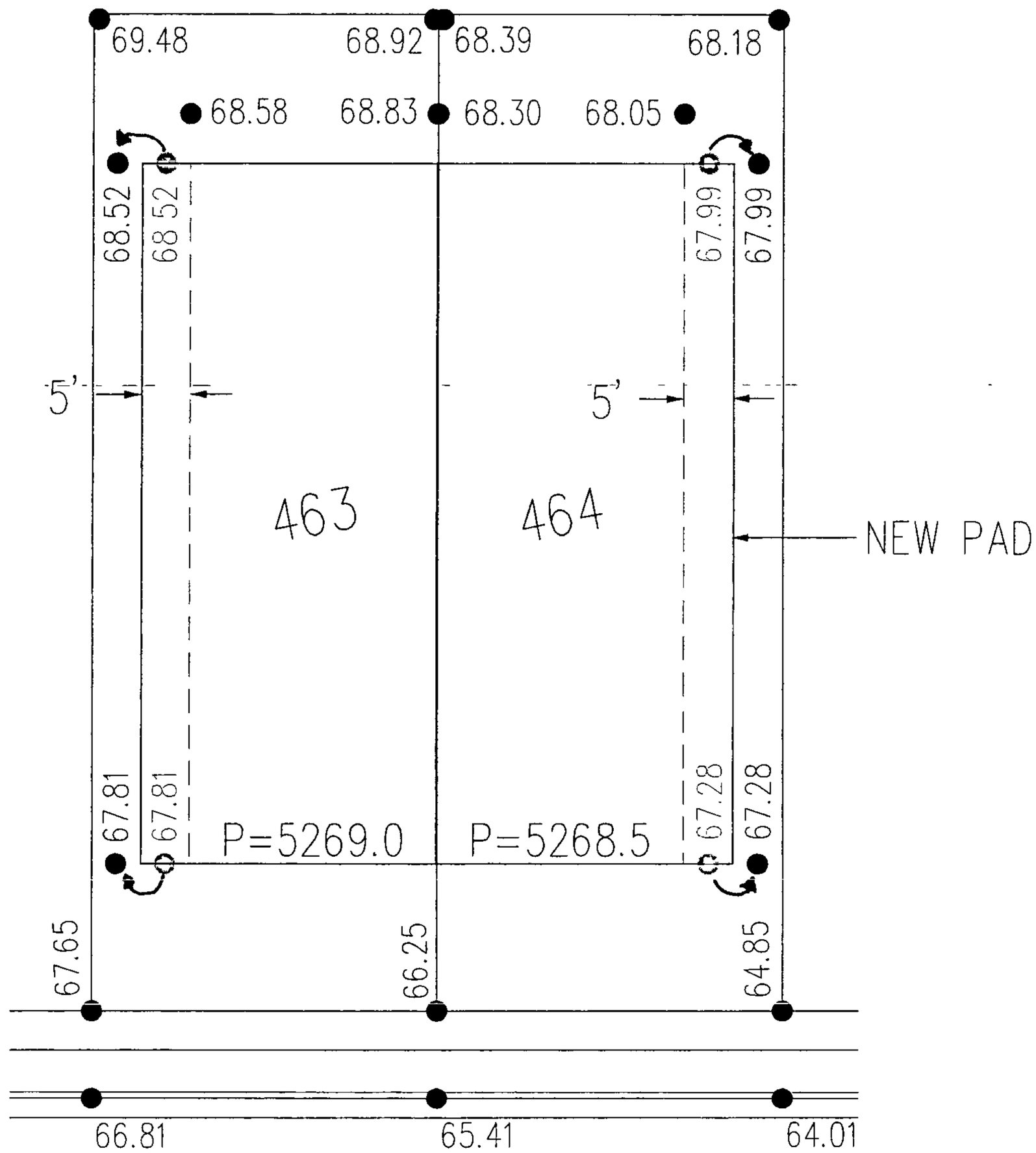
Sincerely,

Jared M. Lee, E.I.
Design Engineer
Community Development and Planning

JML/am
Enclosure

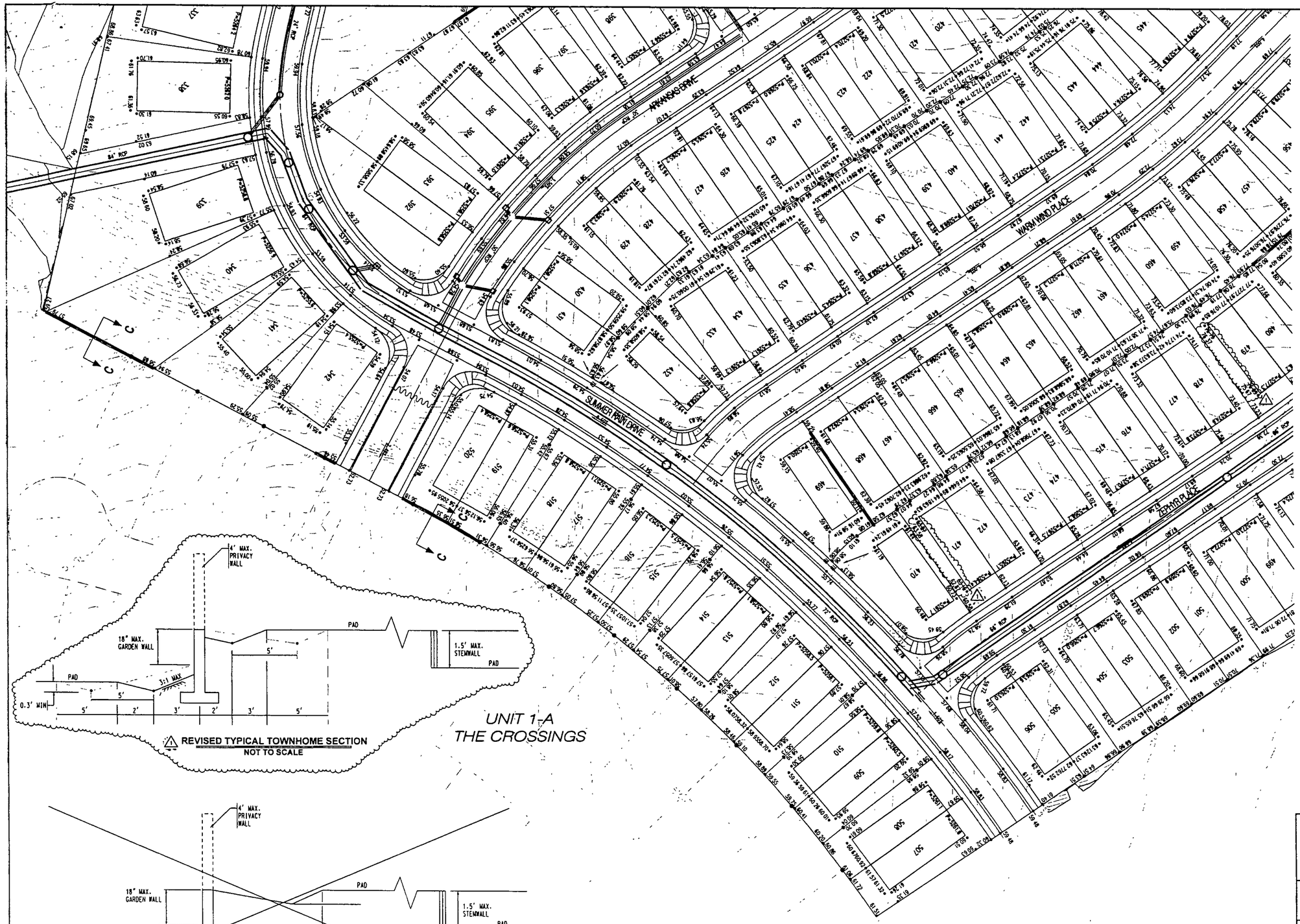
cc: Fred Ambrogi, Westland Development Corp. (w/encl)
Brad Bingham, COA Hydrology Division (w/encl)
Kevin Patton, BHI

RECEIVED
NOV 04 2005
HYDROLOGY SECTION

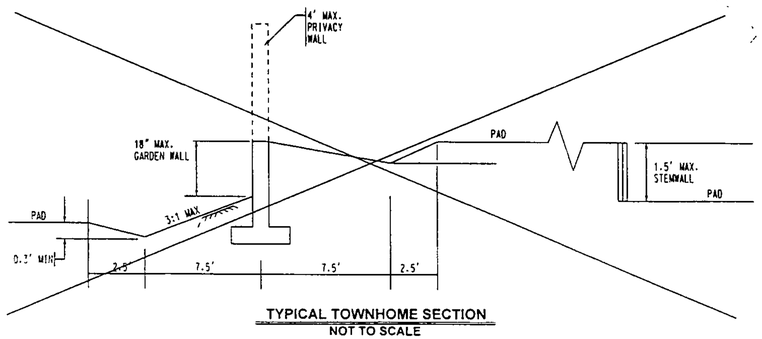


Typical Layout Revision

RECEIVED
NOV 04 2005
HYDROLOGY SECTION



REVISED TYPICAL TOWNHOME SECTION
NOT TO SCALE



TYPICAL TOWNHOME SECTION
NOT TO SCALE

LEGEND

PROPOSED SPOT ELEVATION	• 5235.25
EXISTING SPOT ELEVATION	+ 5235.25
EXISTING CONTOUR	
PHASE BOUNDARY	
DIRECTION OF FLOW	
EXISTING STORM DRAIN LINE	SD
PROPOSED STORM DRAIN INLET	
PROPOSED STORM DRAIN LINE	
PROPOSED STORM DRAIN MANHOLE	
PROPOSED WATER BLOCK	
RETAINING WALL	
GARDEN WALL	
POND CONTOUR	
PAD	
TB	10 P=5300.00 TURNED BLOCK

RECEIVED
NOV 04 2005
HYDROLOGY SECTION

N

40 20 0 40
SCALE: 1"=40'
(HORIZ.)

Bohannan Huston INC.
Courtyard I 7500 Jefferson St NE Albuquerque, NM 87109-4335
ENGINEERING · SPATIAL DATA · ADVANCED TECHNOLOGIES

NO.	DATE	REMARKS	BY
1	10/25/05	TYPICAL TOWNHOME SECTION REVISED, LOT 471 & 479 SECTIONAL SPOTS	JML

REVISIONS

		DATE
DESIGN		
DESIGNED BY	KM/JML	05/05
DRAWN BY	AR	05/05
CHECKED BY	KGP	05/05

AS-BUILT INFORMATION

		DATE
CONTRACTOR		
WORK STAKED BY		
INSPECTOR'S ACCEPTANCE BY		DATE
FIELD VERIFICATION BY		DATE
DRAWINGS CORRECTED BY		DATE
MICRO-FILM INFORMATION		
RECORDED BY		DATE
NO		

BENCH MARKS
ACS STATION NAMED 4 - K6. 3 1/4" ALUM. CAP
N.M. STATE PLANE COORDINATES (CENTRAL ZONE)
HV18 = 4 - K6 GEOGRAPHIC POSITION (1927)
X=336,918.47, Y=1,483,515.05
GROUND-TO-GRID FACTOR .0999656356
NGVD 1929 ELEVATION = 5732.892
ON PASEO DEL VULCAN, 0.91 MI NORTH OF I-40, 0.74 MI SOUTH OF POWERLINES, 39.6' NW OF CENTERLINE OF PASEO DEL VULCAN

SURVEY INFORMATION
FIELD NOTES

NO.	DATE	BY

ENGINEER'S SEAL
KEVIN G. PATTON
NEW MEXICO
13985
REGISTERED PROFESSIONAL ENGINEER

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING DEVELOPMENT GROUP

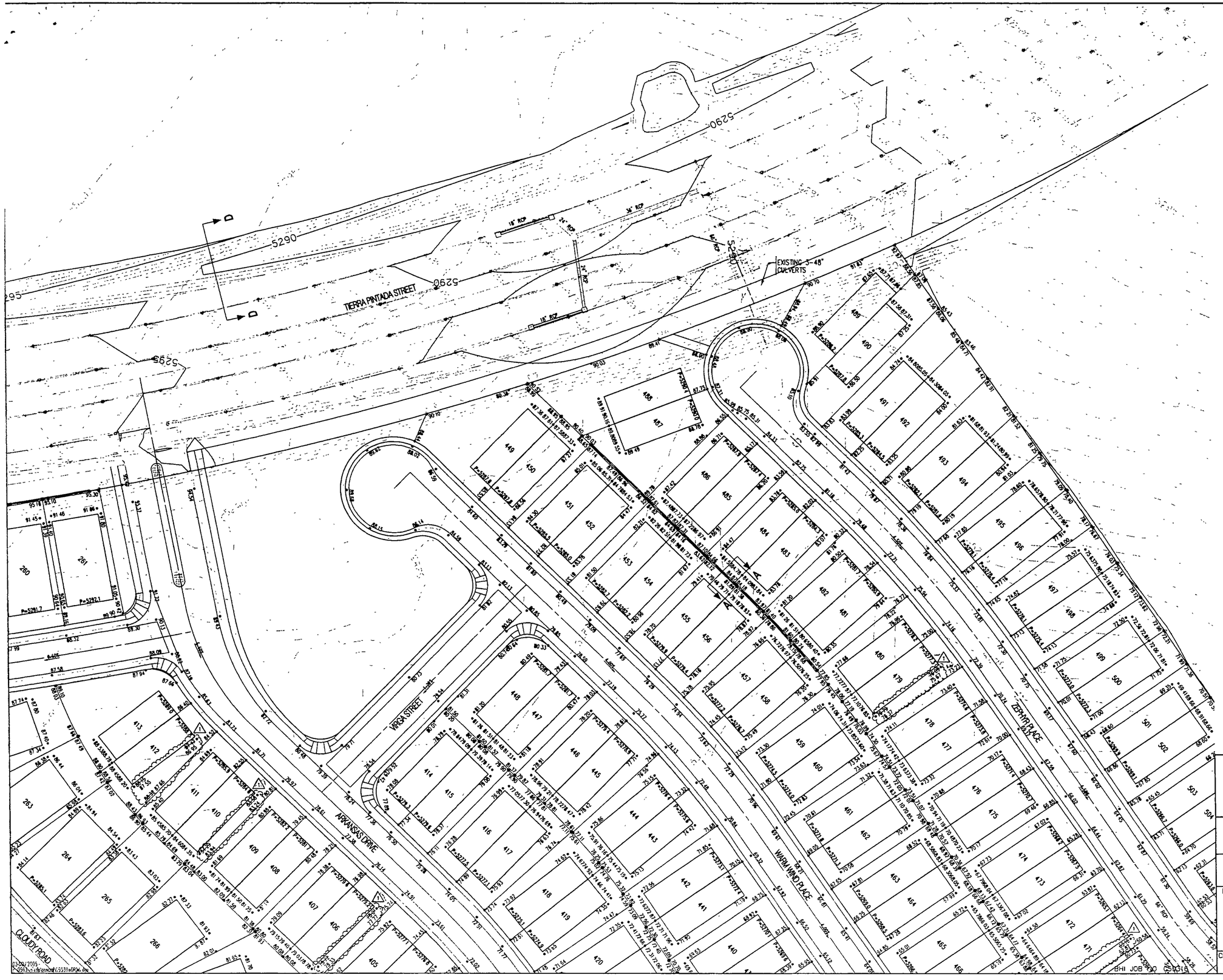
STORMCLOUD SUBDIVISION
GRADING AND DRAINAGE PLAN

DESIGN REVIEW COMMITTEE	CITY ENGINEER APPROVAL	LAST DESIGN UPDATE	MO /DAY/YR	MO /DAY/YR

CITY PROJECT NO.	ZONE MAP NO	SHEET	OF
650278-80	H-9, J-8, J-9	11	13

BHI JOB NO 050316

03-NOV-2005
Z:\050316\Acad general\050316CP11.dwg



LEGEND

PROPOSED SPOT ELEVATION	• 5235.25
EXISTING SPOT ELEVATION	× 5235.25
EXISTING CONTOUR	
PHASE BOUNDARY	
DIRECTION OF FLOW	
EXISTING STORM DRAIN LINE	SD
PROPOSED STORM DRAIN INLET	
PROPOSED STORM DRAIN LINE	
PROPOSED STORM DRAIN MANHOLE	
PROPOSED WATER BLOCK	
RETAINING WALL	
GARDEN WALL	
POND CONTOUR	
PAD	10 P=5300.00
TB	TURNED BLOCK

RECEIVED
HYDROLOGY SECTION

SCALE: 1"=40' (HORIZ.)

Bohannan Huston INC.
Courtyard I 7500 Jefferson St NE Albuquerque NM 87109-4335
ENGINEERING · SPATIAL DATA · ADVANCED TECHNOLOGIES

AS-BUILT INFORMATION
CONTRACTOR
WORK STAKED BY
SURVEYING WORK ACCEPTANCE BY — DATE
FIELD VERIFICATION BY — DATE
DRAWINGS CORRECTED BY — DATE
MICRO-FILM INFORMATION
RECORDED BY — DATE

BENCH MARKS
ACS STATION NAMED 4 - K6. 3 -1/4" ALUM. CAP HV18 = 4 - K6 GEOGRAPHIC POSITION (1927)
N.M. STATE PLANE COORDINATES (CENTRAL ZONE)
X=336,918.47, Y=1,483,515.05
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ON PASEO DEL VULCAN. 0.91 MI NORTH OF I-40. 0.74 MI SOUTH OF POWERLINES. 39.6' NW OF CENTERLINE OF PASEO DEL VULCAN

SURVEY INFORMATION
FIELD NOTES

NO.	BY	DATE

ENGINEER'S SEAL
KEVIN G. PATTON NEW MEXICO 13605 REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	REMARKS	BY
1	10/25/05	LOT 406, 410, 412, 470 & 479 SIDEWALK SPOTS REVISED	KM

REVISIONS
DESIGN

		DATE
DESIGNED BY	KM/JWL	05/05
DRAWN BY	AR	05/05
CHECKED BY	KGP	05/05

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING DEVELOPMENT GROUP

STORMCLOUD SUBDIVISION
GRADING AND DRAINAGE PLAN

DESIGN REVIEW COMMITTEE	CITY ENGINEER APPROVAL	LAST DESIGN UPDATE	MO./DAY/YR	MO./DAY/YR

CITY PROJECT NO	ZONE MAP NO	SHEET	OF
650278-80	H-9, J-8, J-9	6	13

Bohannan ▲ Huston INC.

file

Courtyard I
7500 Jefferson St. NE
Albuquerque, NM
87109-4335
www.bhinc.com
voice: 505.823.1000
facsimile: 505.798.7988
toll free: 800.877.5332

CLIENT/COURIER TRANSMITTAL

To: Brad Bingham, P.E., Senior Engineer
Planning Dept / Hydrology Dev Section
City of Albuquerque
600 Second Street NW - 2nd Floor West

Requested by: Jared Lee - am

Date: November 4, 2005

Time Due:
- ☒ **This A.M.**
- ☐ **This P.M.**
- ☐ **Rush** _____
- ☐ **By Tomorrow**

Phone: 924-3986

Job No.: 05 0316 006

Job Name: Stormcloud Subdivision

DELIVERY VIA

- ☒ **Courier**
- ☐ **Federal Express**
- ☐ **Mail**
- ☐ **UPS**
- ☐ **Other**

PICK UP

Item: _____

ITEM NO.	QUANTITY	DESCRIPTION
1	1	Copy of letter to Fred Salls/Salls Brothers Construction dated 11/4/05 re: Stormcloud Subdivision Final Grading Plan.

COMMENTS / INSTRUCTIONS

RECEIVED
NOV 04 2005
HYDROLOGY SECTION

*REC'D BY:*_____ *DATE:*_____ *TIME:*_____

ENGINEERING ▲
SPATIAL DATA ▲
ADVANCED TECHNOLOGIES ▲

SIL or FG is acceptable to AMAFCA for release of easement

won't vacate easements until LOMR approved

dike on mechanism on big bend that cuts off the mechanism B so the strong finger arroyos are probably not there

H9/D13
MOU for infrastructure before the per LOMR in MOU

Consider N-1 for not requiring SD infrastructure
o/c

resize C & D

BHI mention in application that SD infrastructure is not req'd due to it is already constructed

- C-D, prior to development the MOU is approved

CITY OF ALBUQUERQUE

July 2, 2010

Craig Hoover, PE
Bohannan Huston, Inc
7500 Jefferson NE
Albuquerque, NM 87109

Re: Storm Cloud Subdivision Amendment # 2
Engineer's Stamp not provided, (J8/D1)

Dear Mr. Hoover,

Based upon the information provided in your submittal dated 5-20-10, I offer the following comments:

- Please show the Sundoro Subdivision on Figure 1. It will paint a better picture of what is constructed.
- Has the proposed area been deeded to AMAFCA or will a new easement be required?
- The spillway for Dam 9 appears to be at elevation 5275.0, not 5276.0. It is also directed at a residence and if work is going to be performed on Dam 9, this may be a goods time to relocate the spillway.
- Will the City storm drain into Dam 9 be affected?

If you have any questions, you can contact me at 924-3986.

Sincerely,

Bradley L. Bingham

Bradley L. Bingham, PE
Principal Engineer, Planning Dept.
Building and Development Services

C: Lynn Mazur, AMAFCA
file

PO Box 1293
Albuquerque
NM 87103
www.cabq.gov

Bohannan Huston INC.

Courtyard I
7500 Jefferson St. NE
Albuquerque, NM
87109-4335

www.bhinc.com

voice: 505.823.1000
facsimile: 505.798.7988
toll free: 800.877.5332

MEMORANDUM

DATE: SEPTEMBER 3, 2010

TO: BRADLEY L. BINGHAM, P.E.
PLANNING DEPARTMENT

FROM: CRAIG W. HOOVER, P.E.
BOHANNAN HUSTON, INC.

RE: RESPONSE TO COMMENTS AND ADDITIONAL EXPLANATIONS FOR THE STORMCOULD SUBDIVISION DRAINAGE REPORT, AMENDMENT NO. 2

CC: LYNN MAZUR, AMAFCA

On July 2, 2010, Bohannan Huston, Inc. (BHI) received a letter from the City of Albuquerque (City), dated July 2, 2010. That letter stated that the City review of the Drainage Report, Amendment No. 2 (DR) for the Stormcloud Subdivision dated April 2010 was complete. The letter presented additional comments that were based on the City review. The following text provides the comments from the City review letter (in italics), along with BHI's response to each. Additional support and/or explanations are provided where necessary.

Comments and Explanations for the Drainage Report, Amendment No. 2

1. *Please show the Sundoro Subdivision on figure 1. It will paint a better picture of what is constructed.*

   BHI Response: Figure 1 has been revised to include the Sundoro Subdivision.

2. *Has the proposed area been deeded to AMAFCA or will a new easement be required?*

   BHI Response: According to the Plat of Sundoro Subdivision Unit 1, the proposed area is not deeded to AMAFCA. A new easement will be required.

3. *The spillway for Dam 9 appears to be at elevation 5275.0, not 5276.0. It is also directed at a residence and if work is going to be performed on Dam 9, this may be a good time to relocate the spillway.*

   BHI Response: The spillway for Dam 9 is at elevation 5276.0 per the dam as-builts. Per discussion with AMAFCA, a meeting was held years ago and it was decided that it will be recognized that the spillway is directed at homes, and that the spillway will not be relocated.

4. *Will the City storm drain into Dam 9 be affected?*

   BHI Response: No.

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DRAINAGE AND TRANSPORTATION INFORMATION SHEET
(Rev. 12/2005)

PROJECT TITLE: Stormcloud at Westland Improvements ZONE MAP/DRG. FILE # ~~H-8/9, J-8/9~~ J-08/D001
DRB#: _____ EPC#: _____ WORK ORDER#: _____

LEGAL DESCRIPTION: Tract I-2, Sundoro Unit 1
CITY ADDRESS: SE Corner Arroyo Vista Blvd. and Tierra Pintada Blvd.

ENGINEERING FIRM: Bohannan Huston, Inc
ADDRESS: 7500 Jefferson NE
CITY, STATE: Albuquerque, NM
CONTACT: Craig W. Hoover, P.E.
PHONE: 823-1000
ZIP CODE: 87109

OWNER: SunCal Companies
ADDRESS: 201 3rd St NW, Suite 500
CITY, STATE: Albuquerque, NM
CONTACT: Leroy Chavez
PHONE: 224-2300
ZIP CODE: 87102

ARCHITECT: _____
ADDRESS: _____
CITY, STATE: _____
CONTACT: _____
PHONE: _____
ZIP CODE: _____

SURVEYOR: _____
ADDRESS: _____
CITY, STATE: _____
CONTACT: _____
PHONE: _____
ZIP CODE: _____

CONTRACTOR: _____
ADDRESS: _____
CITY, STATE: _____
CONTACT: _____
PHONE: _____
ZIP CODE: _____

TYPE OF SUBMITTAL:
_____ DRAINAGE REPORT
_____ DRAINAGE PLAN 1st SUBMITTAL
_____ DRAINAGE PLAN RESUBMITTAL
_____ CONCEPTUAL G & D PLAN
_____ GRADING PLAN
_____ EROSION CONTROL PLAN
_____ ENGINEER'S CERT (HYDROLOGY)
_____ CLOMR/LOMR
_____ TRAFFIC CIRCULATION LAYOUT
_____ ENGINEER CERT (TCL)
_____ ENGINEER CERT (DRB SITE PLAN)
_X_ OTHER (Amendment No. 2 for Drainage Report)

CHECK TYPE OF APPROVAL SOUGHT:
_____ SIA/FINANCIAL GUARANTEE RELEASE
_____ PRELIMINARY PLAT APPROVAL
_____ S. DEV. PLAN FOR SUB'D APPROVAL
_____ S. DEV. FOR BLDG. PERMIT APPROVAL
_____ SECTOR PLAN APPROVAL
_____ FINAL PLAT APPROVAL
_____ FOUNDATION PERMIT APPROVAL
_____ BUILDING PERMIT APPROVAL
_____ CERTIFICATE OF OCCUPANCY (PERM)
_____ CERTIFICATE OF OCCUPANCY (TEMP)
_____ GRADING PERMIT APPROVAL
_____ PAVING PERMIT APPROVAL
_____ WORK ORDER APPROVAL
_X_ OTHER (Acceptance of Amendment No. 2)

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WAS A PRE-DESIGN CONFERENCE ATTENDED:
_____ YES
_____ NO
_____ COPY PROVIDED

SUBMITTED BY: [signature] DATE: May 21, 2010

Requests for approvals of Site Development Plans and/or Subdivision Plats shall be accompanied by a drainage submittal. The particular nature, location and scope to the proposed development define the degree of drainage detail One or more of the following levels of submittal may be required based on the following.

1. **Conceptual Grading and Drainage Plan** Required for approval of Site Development Plans greater than five (5) acres and Sector Plans.
2. **Drainage Plans**. Required for building permits, grading permits, paving permits and site plans less than five (5) acres.
3. **Drainage Report**· Required for subdivision containing more than ten (10) lots or constituting five (5) acres or more.

Janet Saiers, Chair
Danny Hernandez, Vice Chair
Ronald D. Brown, Secretary-Treasurer
Tim Eichenberg, Assistant Secretary-Treasurer
Daniel F. Lyon, Director

John P. Kelly, P.E
Executive Engineer

Albuquerque
Metropolitan
Arroyo
Flood
Control
Authority
2600 Prospect N.E., Albuquerque, NM 87107
Phone: (505) 884-2215 Fax: (505) 884-0214
Website: www.amafca.org

June 15, 2010

Mr. Craig W. Hoover, P.E.
Bohannan Huston, Inc.
7500 Jefferson St. NE, Courtyard I
Albuquerque, New Mexico 87109

Re: Stormcloud Subdivision Drainage Report, Amendment No. 2
Draft Dated May 19, 2010

Dear Mr. Hoover:

The referenced report (DR) was prepared to follow up the mitigation plan prepared by Metric Corporation (Pete Metzner), dated December 2009, revised March 2010. The mitigation plan proposed enlarging the bottoms of Ladera Dams 8 and 9 for replacement habitat area to satisfy the requirements of the 404 permit. The DR addresses how the enlarged dam pools can be used to handle increased runoff from upstream development. This option differs from the option presented in Amendment No. 2 to the DR, which proposed expanding the volume of Dams 9 and 10.

I have reviewed the DR and have the following comments:

1. Which version of AHYMO was used for the analysis?
2. Provide a disc with the AHYMO input and output files.
3. The summary tables in the DR only show results for Dams 8 and 9. Are other dams affected? The DR should state which other, if any, dams are affected. I would like to see a table with a side by side comparison of existing and fully developed conditions inflow, outflow, maximum water surface elevation and volume for all affected dams, including Dams 8 and 9.
4. On Figure 3, there appears to be a potential breach area in the northwest corner of Dam 8 at elevation 5292. This is a design detail that can be worked out with final plans. We will also need to maintain access around the dams.

AMAFCA will consider the option of increased volume for developed runoff in Dams 8 and 9 once the final DR has addressed the comments. We will have to submit a letter to the Office of the State Engineer stating the dams will be altered and AMAFCA will take responsibility for them.

If you have any questions, please call me at 884-2215.

Sincerely,
AMAFCA

Lynn M. Mazur, P.E., C.F.M.
Development Review Engineer

Cc: Jerry Lovato, AMAFCA
Brad Bingham, City Planning, Hydrology

Bohannan ▲ Huston INC.

Courtyard I
7500 Jefferson St. NE
Albuquerque, NM
87109-4335

www.bhinc.com

voice: 505.823.1000
facsimile: 505.798.7988
toll free: 800.877.5332

J-8/D1

April 18, 2006

Mr. Fred Salls
Salls Brothers Construction, Inc.
P O Box 66239
Albuquerque, NM 87193-6239

Re: Stormcloud Subdivision Final Grading Plan
CPN 650278, 650279, 650280, 650289

Dear Fred:

The purpose of this letter is to provide you with a design revision to the approved grading plan. The revision incorporates sheet 13A into the Final Grading Plan which is associated with the public storm drain, which will be constructed with Unit 2, City Project #650279, and the existing earthen channel. The design revision does not fill in most of the earthen channel. The existing earthen channel will be filled in by others at a later date. Please incorporate this design revision into the approved set of plans and provide as-built data to support the approval of the drainage certification.

Please feel free to contact us if you have any questions or concerns.

Sincerely,

Jared M. Lee, E.I.
Design Engineer
Community Development and Planning

JML/am
Enclosure: Sheet 13A

cc: Fred Ambrogi, Westland Development Corp (w/encl)
Brad Bingham, COA Hydrology Division (w/encl)
Kevin Patton, BHI (w/out encl)

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ENGINEERING
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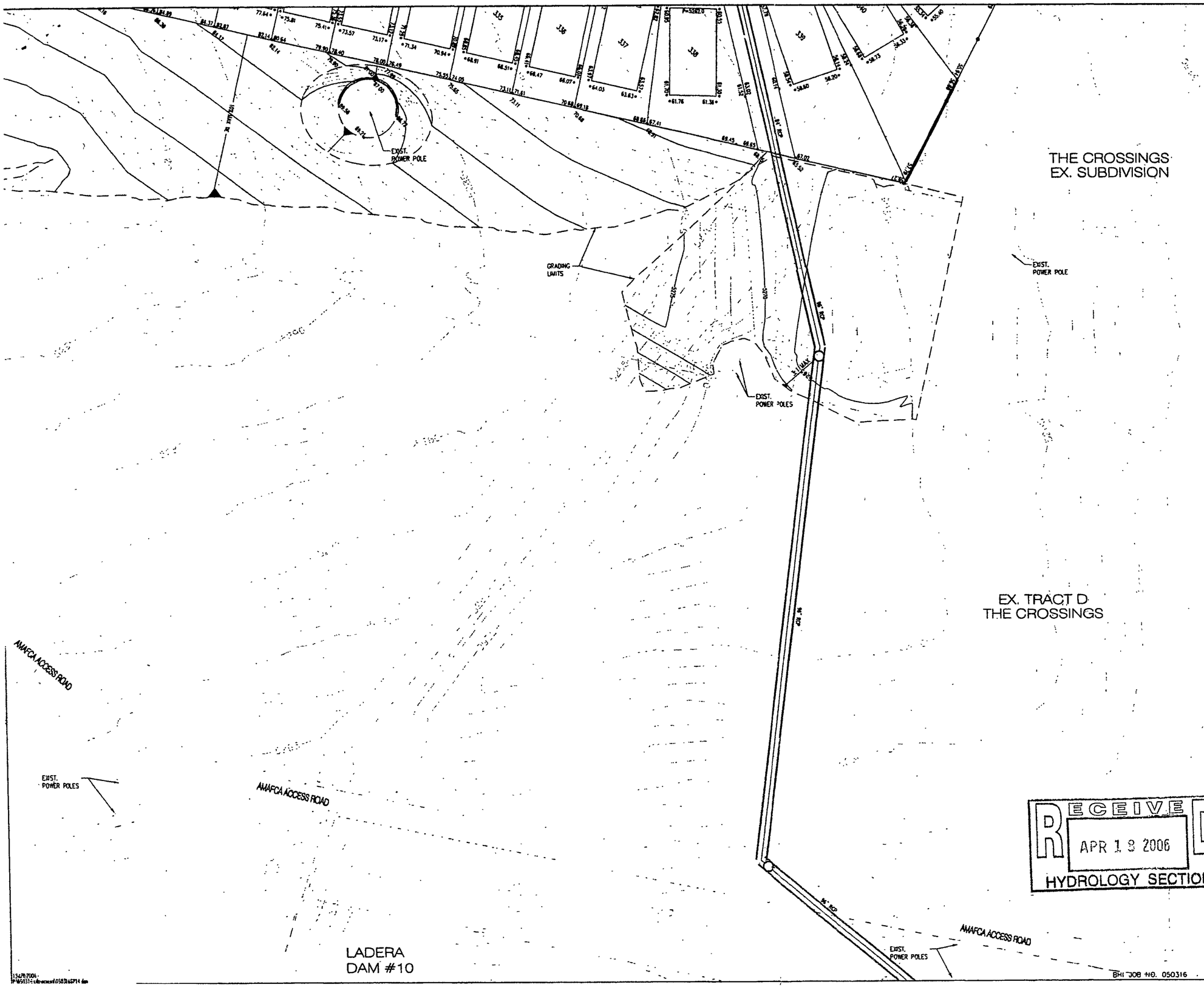

LEGEND

PROPOSED SPOT ELEVATION	• 5235.25
EXISTING SPOT ELEVATION	: 5235.25
EXISTING CONTOUR	
PHASE BOUNDARY	
DIRECTION OF FLOW	
EXISTING STORM DRAIN LINE	SD
PROPOSED STORM DRAIN INLET	
PROPOSED STORM DRAIN LINE	
PROPOSED STORM DRAIN MANHOLE	
PROPOSED WATER BLOCK	
RETAINING WALL	
GARDEN WALL	
POND CONTOUR	
PAD	10 P=6308.00
TB	TURNED BLOCK

N

40 20 0 40
SCALE: 1"=40'
(HORIZ.)

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HYDROLOGY SECTION

Bohannan Huston
Courtyard I 7500 Jefferson St. NE Albuquerque, NM 87109-4335
ENGINEERING SPATIAL DATA ADVANCED TECHNOLOGIES

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING DEVELOPMENT GROUP

STORMCLOUD SUBDIVISION
GRADING AND DRAINAGE PLAN

DESIGN REVIEW COMMITTEE	CITY ENGINEER APPROVAL	LAST DESIGN UPDATE	MO./DAY/YR.	MO./DAY/YR.

CITY PROJECT NO.	ZONE MAP NO.	SHEET	OF
650278-80	H-9, J-8, J-9	13A	13

BHI JOB NO. 050316

AS-BUILT INFORMATION
CONTRACTOR
MARKED BY
INSPECTOR'S ACCEPTANCE BY — DATE
FIELD VERIFICATION BY — DATE
DRAWINGS CORRECTED BY — DATE
MICRO-FILM INFORMATION
RECORDED BY — DATE
NO.

BENCH MARKS
ACS STATION NAMED 4 - K6. 3 -1/4" ALUM. CAP
NV18 = 4 - K6 GEOGRAPHIC POSITION (1927)
N.M. STATE PLANE COORDINATES (CENTRAL ZONE)
X=336,918.47,Y=1,483,515.05
GROUND-TO-GRID FACTOR .0999656356
NGVD 1929 ELEVATION = 5132.892
ON PASEO DEL VULCAN, 0.91 MI NORTH
OF I-40, 0.74 MI SOUTH OF POWERLINES, 35.6'
NW OF CENTERLINE OF PASEO DEL VULCAN

SURVEY INFORMATION
FIELD NOTES

NO.	BY	DATE

ENGINEER'S SEAL
KEVIN G. PATTON
NEW MEXICO
13686
REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	REMARKS	BY
1	4/05/06	DESIGN REVISION NO. 1; ADDED INS SHEET	JML

REVISIONS

DESIGNED BY	KM/JML	DATE 05/05
DRAWN BY	AR	DATE 05/05
CHECKED BY	KGP	DATE 05/05