City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

January 15, 2004

Gregory Krenik, P.E.
Mark Goodwin & Associates, PA
P.O. Box 90606
Albuquerque, NM 87199

Re: Westbrook Heights Unit 2, SIA/Financial Guarantee Release
Engineer's Stamp dated 10-09-03 (L10/D25)
Certification dated 1-13-04

Dear Mr. Krenik,

Based upon the information provided in your submittal received 1-14-04, the above referenced certification is approved for release of SIA and Financial Guarantee.

If you have any questions, you can contact me at 924-3981.

Sincerely,

Kristal D. Metro
Engineering Associate, Planning Dept.
Development and Building Services

C: Arlene Portillo, COA# 720481
file

THE CITY OF ALBUQUERQUE IS AN EQUAL OPPORTUNITY/REASONABLE ACCOMMODATION EMPLOYER

DRAINAGE AND TRANSPORTATION INFORMATION SHEET

(REV. 1/28/2003rd)

PROJECT TITLE: WESTBROOK HEIGHTS UNIT 2 ZONE MAP/DRG. FILE #: L-10 / D 25?
DRB #: 1001334 EPC#: WORK ORDER#:

LEGAL DESCRIPTION: TRACT 465 AND A PORTION OF TRACT 466, UNIT 7, TOWN OF ATRISCO GRANT
CITY ADDRESS:

ENGINEERING FIRM: MARK GOODWIN & ASSOCIATES, PA
ADDRESS: P.O. Box 90606
CITY, STATE: ALBUQUERQUE NM
CONTACT: GREGORY J. KRENIK, PE
PHONE: 828-2200
ZIP CODE: 87199

OWNER: C + W LAND DEVELOPMENT
ADDRESS: PO Box 12317
CITY, STATE: ALBUQUERQUE NM
CONTACT: REX WILSON
PHONE: 822-5562
ZIP CODE: 87195

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

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

CONTRACTOR:
ADDRESS:
CITY, STATE:
CONTACT:
PHONE:
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)

WAS A PRE-DESIGN CONFERENCE ATTENDED:

- X YES
- ____ NO
- ____ COPY PROVIDED

RECEIVED
JAN 14 2004
HYDROLOGY SECTION

DATE SUBMITTED 1-13-04 BY:
GREGORY J. KRENIK, PE

Requests for approvals of Site Development Plans and/or Subdivision Plats shall be accompanied by a drainage submittal. The particular nature, location and scope ot 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.

DRAINAGE AND TRANSPORTATION INFORMATION SHEET

(REV. 1/28/2003rd)

L-10/D25

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ADDRESS: — PHONE:
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- ____ ENGINEER'S CERTIFICATION (HYDROLOGY)
- ____ CLOMR/LOMR
- ____ TRAFFIC CIRCULATION LAYOUT (TCL)
- ____ ENGINEERS CERTIFICATION (TCL)
- ____ ENGINEERS CERTIFICATION (DRB APPR. SITE PLAN)
- ____ OTHER

ADDED ONE LOT AND REMOVED MIDDLE STREET.

CHECK TYPE OF APPROVAL SOUGHT:

- ____ SIA / FINANCIAL GUARANTEE RELEASE
- X PRELIMINARY PLAT APPROVAL
- ____ S. DEV. PLAN FOR SUB'D. APPROVAL
- ____ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
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- ____ 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:

- X YES
- ____ NO
- ____ COPY PROVIDED

RECEIVED
OCT 10 2003
HYDROLOGY SECTION

DATE SUBMITTED: 10-10-03 BY:

GREGORY J. KRENIK, PE

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

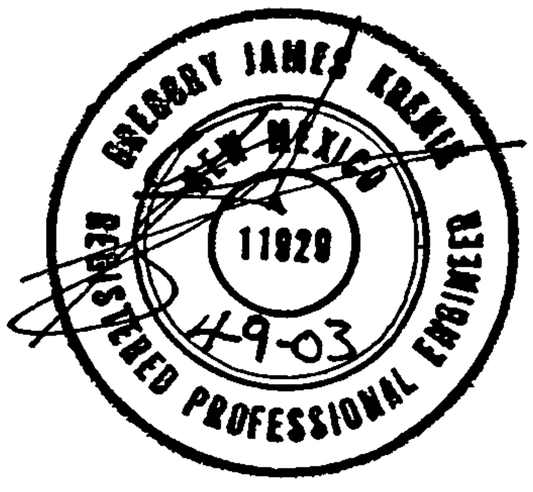
Drainage Report

for

WESTBROOK HEIGHTS UNIT 2

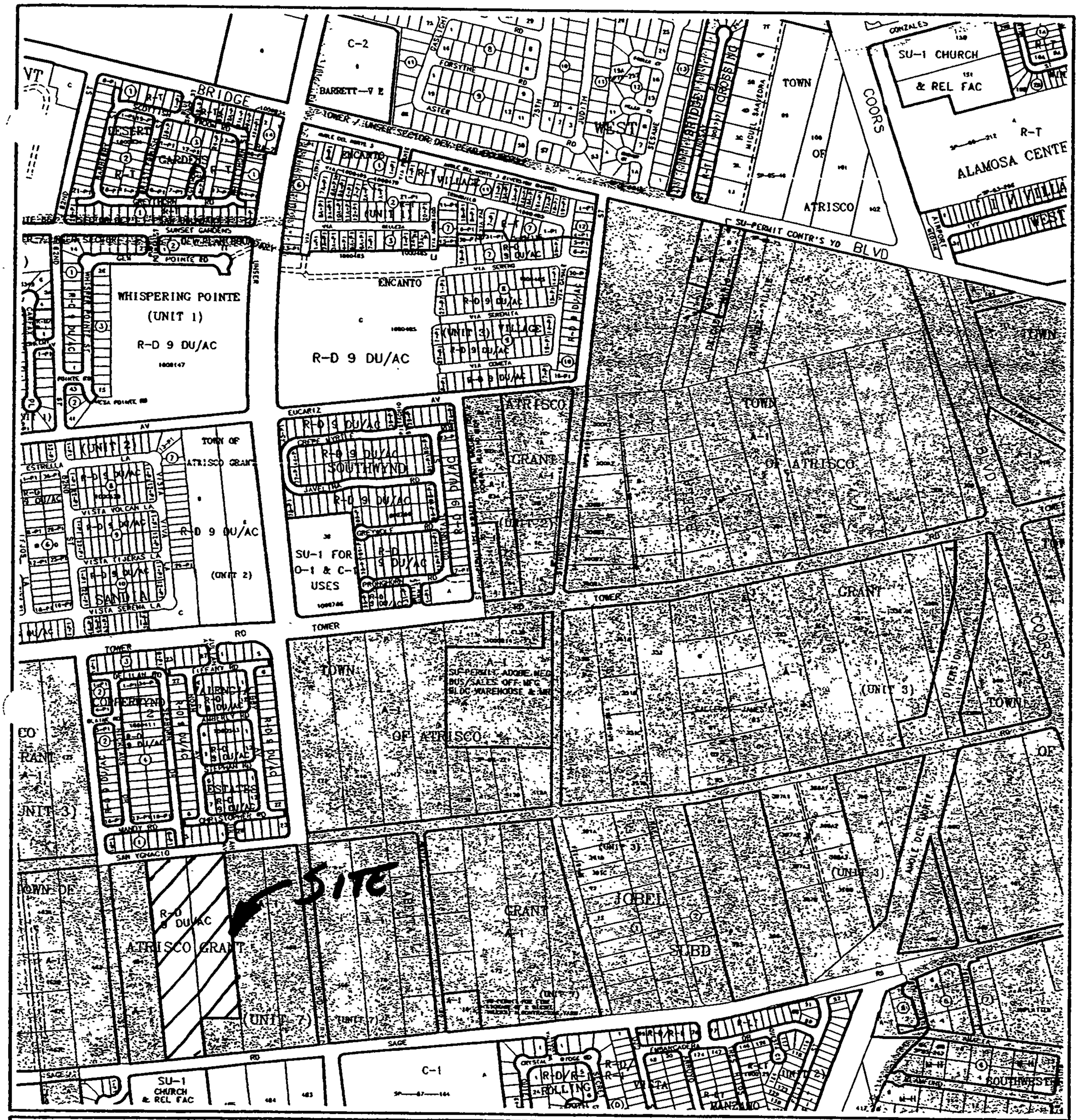
REVISED PAGES

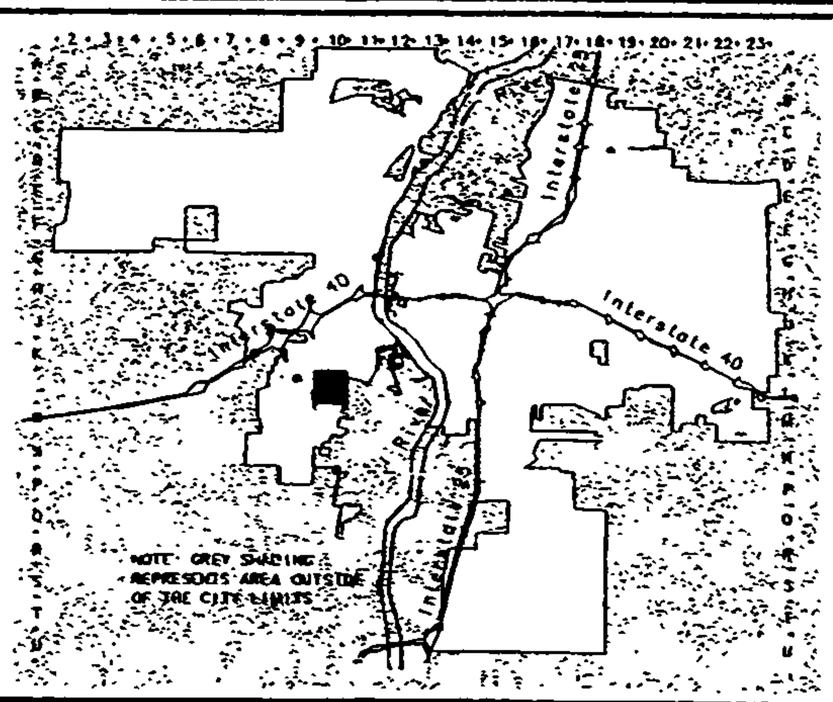
RECEIVED
OCT 10 2003
HYDROLOGY SECTION



10-9-03

April 2003





CITY OF
Albuquerque

A lbuquerque G eographic I nformation S ystem

PLANNING DEPARTMENT

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GRAPHIC SCALE IN FEET

250 0 750 1000

Zone Atlas Page

L-10-Z

Map Amended through January 21, 2003

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Consulting Engineers
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e-mail: dmg@swcp.com

PROJECT WESTBROOK HEIGHTS UNIT 2
SUBJECT DRAINAGE CALCS
BY GJK DATE 3-25-03
CHECKED ____ DATE ____
SHEET 1 OF ____

REVISED 10-9-03

- SITE DOES NOT LIE IN A 100 YR FLOOD PLAIN.
- OFFSITE FLOWS FROM THE WEST 5 ACRES CROSS AT OUR SW CORNER. THESE FLOWS WILL BE ROUTED ALONG THE PROPERTY LINE TO SAGE ROAD.
- RUN OFF WILL BE RETAINED IN A TEMPORARY POND ADJACENT TO SAGE ROAD UNTIL THE STORMDRAIN OUTFALL TO THE ARROYO IS COMPLETED. THIS PROJECT WILL CONSTRUCT A PORTION OF THE STORMDRAIN IN SAGE ALONG OUT FRONTAGE.
- TOTAL SITE = 9.0720 AC

58 LOTS

DRIVE PADS = 20×20×59 = 23,600 SF = 0.5418 AC TYPE "D"
PADS = 35×65×59 = 134,225 SF = 3.0814 AC TYPE "D"
ROW = 1.3090 AC 80% D = 1.0472 AC
20% B = 0.2618 AC

- TOTAL LAND TREATMENTS

B = 0.2618 + 4.1398 = 4.4016 AC = 48.52%

D = 0.5418 + 3.0814 + 1.0472 = 4.6704 AC = 51.48%

P_1 = 1.87 in
P_6 = 2.20 in
P_{24} = 2.66 in

FROM TR55 OUTPUT SHEETS 8-10

Q = 29.31 CFS
V = 1.0097 AC-FT

- FIND Q per LOT

Q_L = 29.31 / 59 = 0.4968 CFS
V_L = 1.0097 / 59 = 0.017114 AC-FT

- LOTS 22 + 23 BLOCK 2 WILL DIRECT DISCHARGE TO SAN IGNACIO RD AND THE FLOW WILL ENTER THE BEE HIVE INLET AT INTER.

Q = 2 × 0.4968 = 0.9936 CFS TO SAN IGNACIO.

FIND STREET CAPACITY OF 28' F-F @ 0.5% SLOPE, MTBL CHG

d = 0.33
WP = 28.66
A = 4.735
V = 1.86 F/S
Q = 8.81 CFS

$d + V^2/2g$ = 0.38 < 0.51 OK

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PROJECT WESTBROOK HEIGHTS UNIT 2
SUBJECT DRAINAGE CALCS
BY GJK DATE 3-25-03
CHECKED ____ DATE ____
SHEET 2 OF ____

REVISED 10-9-03

- FIND THE NUMBER OF LOTS THAT CAN DRAIN BEFORE STD C+G IS REQUIRED.

LOTS = 8.81/0.4968

= 17.73 SAY 17

- STD C+G WILL START ON COREL DRIVE AT LOT 1, BLK 3 ON THE WEST SIDE AND THE SE RETURN OF MAGNA ROAD ON THE EAST SIDE AND CONTINUE SOUTH.
- STD C+G WILL START ON BRETON ROAD AT LOT 5, BLK 2 ON THE SOUTH SIDE AND THE NW RETURN OF BRACKETT DRIVE AND CONTINUE WEST.

- FIND FLOW IN COREL DRIVE JUST SOUTH OF BRETON ROAD.

Q = 47 LOT x 0.4968
= 23.35 CFS

FIND d

d = 0.53
WP = 29.06
A = 8.71
V = 2.77 FPS
Q = 24.11 CFS ≈ 23.35 OK
$d + V^2/2g = 0.65 < 0.85$ OK

INSTALL 2 SGL "A" INLETS - 1 BETWEEN LOTS 6+7, BLK 1 AND THE OTHER AT THE RETURN OF BRETON ROAD.

- FROM NOMO SHEET 6

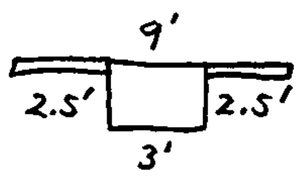
$Q_{grate} = 6.2$ CFS

$Q_{PAST\ INLETS} = 23.35 - 2(6.2)$
$= 10.95$ CFS

- INSTALL 2-SGL "A" INLETS WITH DOUBLE THROATS FOR A SUMP CONDITION TO ACCEPT THE REMAINING FLOW.

Q = (10 x 0.4968 : + 10.95
= 15.9180 CFS

$Q/P = 30\ H^{1.5}$ P = 17



H = 0.46' < 0.67 OK

H = 0.70' < 0.85 OK THIS IS VALUE IF ONLY CURB OPENING IS USED. P = 9

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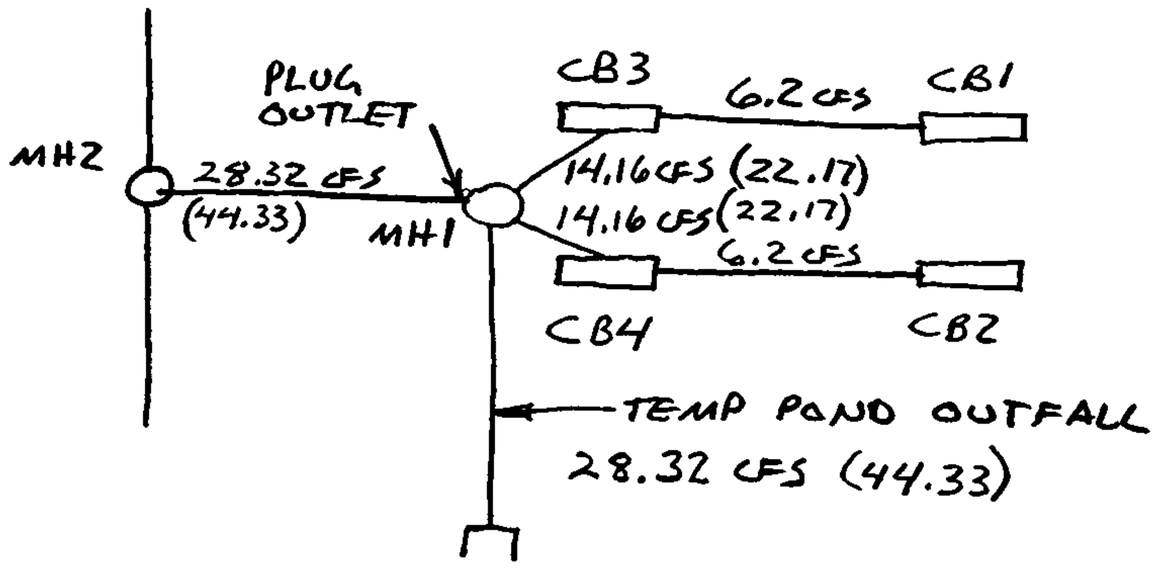
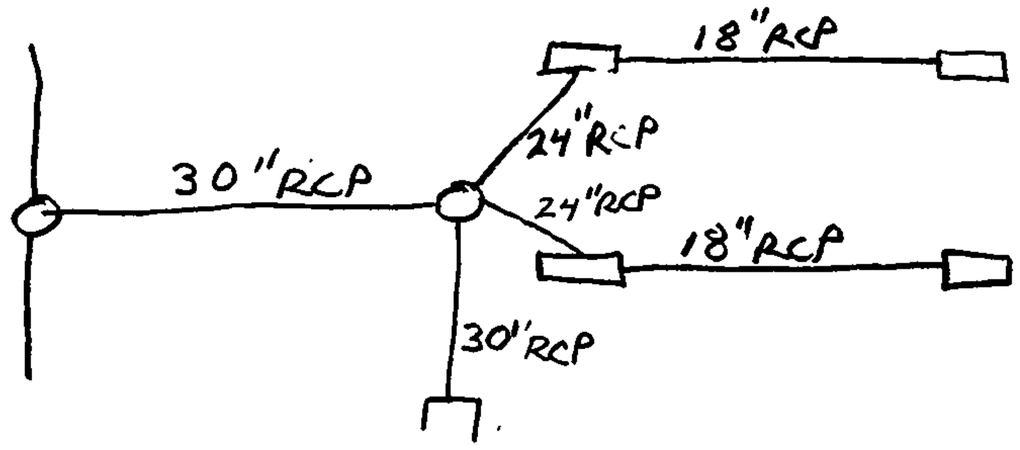
PROJECT WESTBROOK HEIGHTS UNIT 2
SUBJECT DRAINAGE CALCS
BY GJK DATE 3-25-03
CHECKED ____ DATE ____
SHEET 3 OF ____
REVISED 10-9-03

- SIZE STORMDRAIN



STRUCTURE	TYPE	PIPE SIZE LEAVING	Q LEAVING	SLOPE LEAVING	GRATE	INV
CB1	SGL A	18"	6.2	1%		
CB2	SGL A	18"	6.2	1%		
CB3	SGL A, DBL THT	24"	14.16 (22.17)	1%		
CB4	SGL A, DBL THT	24"	14.16 (22.17)	1%		
MH1	6' DIA	30"	28.32 (44.34)			
MH2						
POND OUTFALL	HEADWALL	--	28.32 (44.34)	--	--	71.00

- FROM NOMO SHEET 7
  - 18" RCP AT 1% CARRIES 10.5 CFS
  - 24" RCP AT 1% CARRIES 22.2 CFS
  - 30" RCP AT 1% CARRIES 40.0 CFS



- SIZE TEMP. RETENTION POND

$$V_{100AYS} = V_6 + A_0\left(\frac{P_{100}-P_6}{12}\right)$$

$$= 57\,(0.017114) + 4.6704\left(\frac{(3.6)-2.20}{12}\right)$$

$$= 1.5476 \text{ AC-FT}$$

$$= 67{,}414 \text{ CF REQUIRED}$$

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PROJECT WESTBROOK HEIGHTS UNIT 2
SUBJECT DRAINAGE CALCS
BY GJK DATE 3-25-03
CHECKED ____ DATE ____
SHEET 4 OF ____
REVISED 10-9-03

ELEV	AREA (SF)	VOLUME (CF)	
72	1469	0	
73	2085	1777	
74	2775	4207	
75	3538	6858.5	
76	4374	10,814.5	
77	5 780	15, 891.5	
78	7794	22, 678.5	
79	9897	31, 524	
80	12,068	42, 506.5	
81	14,302	55, 691.5	← 81.76 IS WATER SURFACE = 67,414 CF
82	16,603	71, 144	

- SIZE EMERGENCY SPILLWAY

Q = 28.36 CFS

SPILLWAY CAN ONLY BE AT THE SE CORNER OF SAGE ROAD FRONTAGE – ELEV 82.82 = LOWEST FLOWLINE ELEV.

ADD AREA OF 82.82

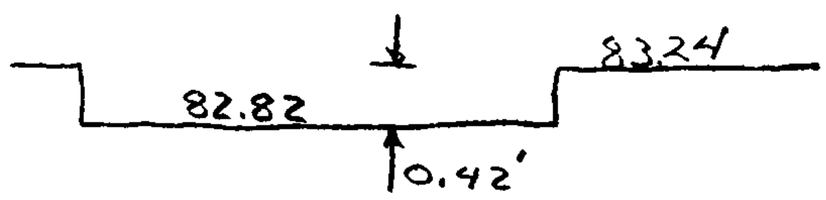
82	16,603	71,144	
82.82	34,229	91,985	← VOLUME = 2.16 100 YR STORMS = 1.36 10 DAY STORMS

OPTION 1: CONSTRUCTING A SPILLWAY WILL PREVENT CONSTRUCTION OF THE ROADWAY IMPROVEMENTS EAST OF THE RETURN INTO ~~THE~~ SUBDIVISION ON SAGE.

$Q = 2.95 L H^{1.5}$

USE $L = 35$

$H = 0.42'$



OPTION 2: CONSTRUCT NO SPILLWAY AND ASSUME VOLUME AVAILABLE IS ENOUGH. CONSTRUCT SAGE ROAD IMPROVEMENTS.

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PROJECT WESTBROOK HEIGHTS UNIT 2
SUBJECT DRAINAGE CALCS
BY GJK DATE 3-25-03
CHECKED _____ DATE _____
SHEET 5 OF ____

- DETERMINE SAGE ROAD STORMDRAIN

- THE STORMDRAIN WAS ORIGINALLY DESIGNED BY ANDREWS, ASBURY & ROBERTS, INC AS PART OF THE TOWER/SAGE DRAINAGE MASTER PLAN. (APPENDIX "A").

- THE CONNECTION TO THE AMOLE AND WEST TO 700' EAST OF UNSER HAS BEEN CONSTRUCTED BY THE ROLLING HILLS SUBDIVISION, DESIGNED BY ISAACSON & ARFMAN, P.A. (5379.90) AND VISTA MANZANO SUBDIVISION, DESIGNED BY TIERRA WEST, LLC (620781 + 620881)

- SINCE THEN DESERT SAGE SUBDIVISION HAS BEEN CONSTRUCTED, SAGE POINT SUBDIVISION IS UNDER CONSTRUCTION AND DESERT SAGE 3 IS IN THE PROCESS OF DRC PLANS.

- USING THE DRAINAGE AREA MAP FROM THE AAR REPORT AS A BASE, BASIN SG-D HAS HAD THE AREA SOUTH OF SAGE ROAD REMOVED FROM THE BASIN LEAVING 17.4656 AC AS THE REVISED AREA OF THE BASIN.

- USING INFORMATION FROM DESERT SAGE 3 REPORT BASIN SG-D WAS RECALCULATED INTO BASINS SGA-D AND SGB-D. BASIN SGA-D IS DESERT SAGE 3 & 82nd ST AND BASIN SGB-D IS THE AREA WEST OF DESERT SAGE 3 & SAGE ROAD.

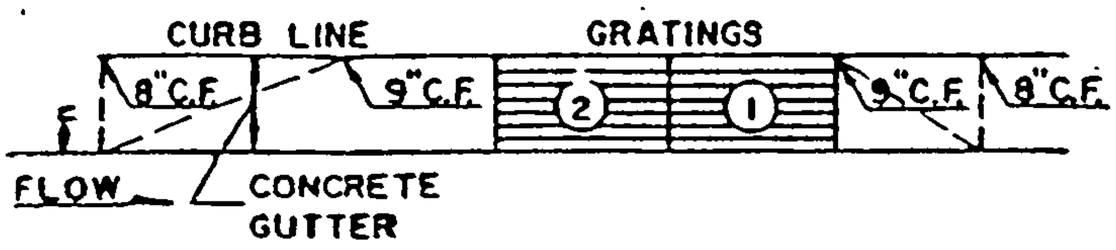
- WESTBROOK HEIGHTS UNIT 2 FALLS WITHIN BASIN S7-D AND IS WITHIN THE LAND TREATMENTS OF 29% B AND 71% D.

PER THE AHYMO OUTPUT SHEETS 11-16

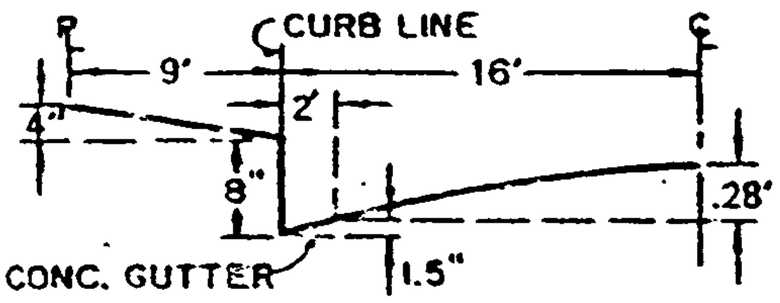
	REVISED	PER AAR REPORT
SG-D	33.09 CFS	54.70 CFS
S7-D	65.63 CFS	69.88 CFS
S8-D	81.76 CFS	87.17 CFS
S9-D	153.05 CFS	165.79 CFS
AP 35	33.09 CFS	.55 CFS
AP 36	92.98 CFS	118 CFS
AP 37	174.55 CFS	201 CFS
AP 38	230.44 CFS	251 CFS

** SEE SAGE ROAD STORMDRAIN FROM 82nd STREET TO THE AMOLE CHANNEL CALCULATIONS SHEETS 17-32

GRATING CAPACITIES FOR TYPE DOUBLE "A", "C," AND "D"



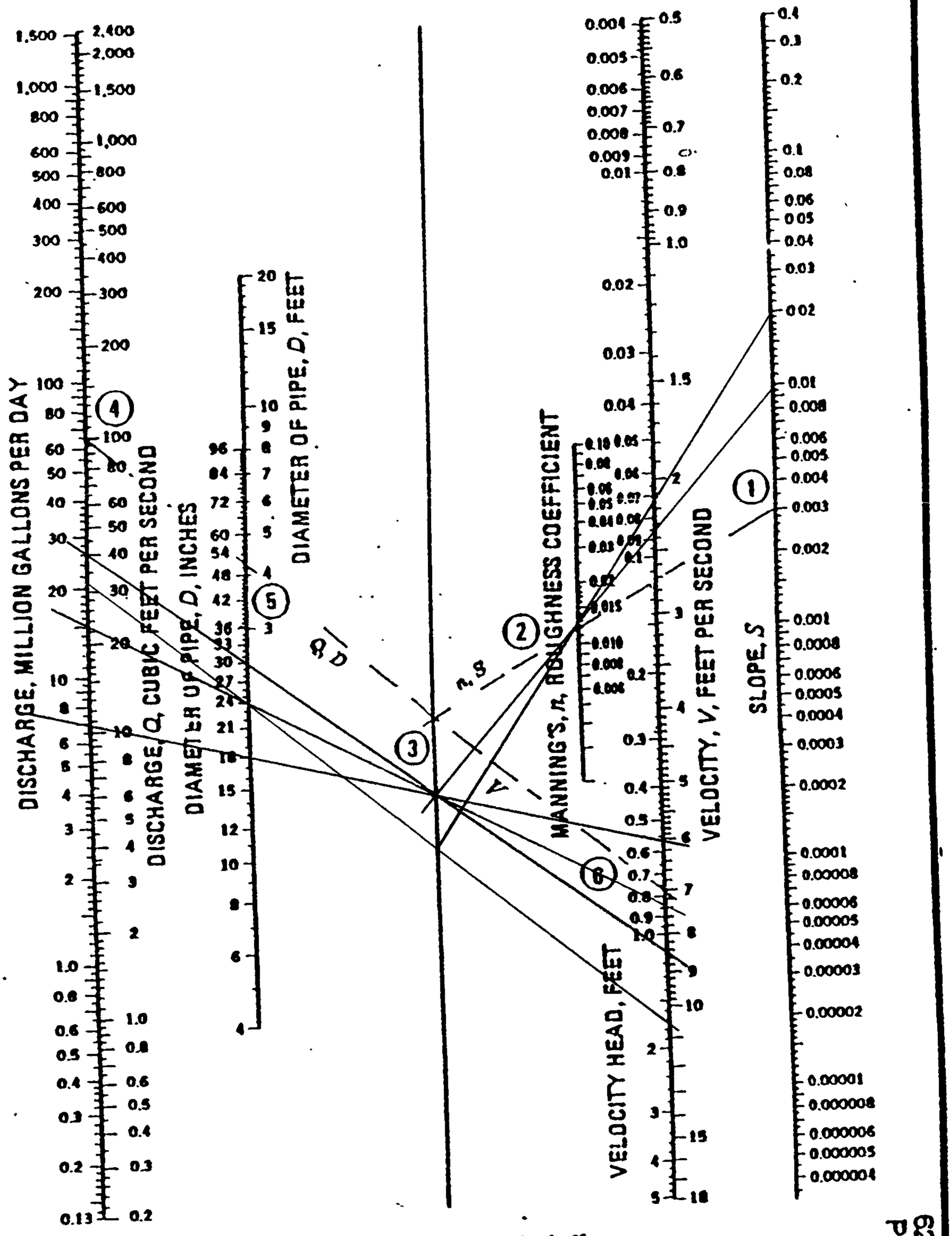
GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION
(ABOVE BASIN)

D = DEPTH OF FLOW (FT.) ABOVE NORMAL GUTTER GRADE

Reference: American Concrete Pipe Association (1980).



B) Circular Pipe Solution

```
START                    TIME=0.0
***** HYDROGRAPH FOR SAGE POINTE 2 59 LOTS
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
COMPUTE NM HYD           ID=1 HYD NO=101.1 AREA=0.014175 SQ MI
                         PER A=0 B=48.52 C=0 D=51.48
                         TP=0.1333 HR MASS RAINFALL=-1
PRINT HYD                ID=1 CODE=1
FINISH
```

```
          AHYMO PROGRAM (AHYMO194) - AMAFCA Hydrologic Model - January,
1994
                RUN DATE (MON/DAY/YR) = 10/09/2003
                START TIME (HR:MIN:SEC) = 16:17:49     USER NO.=
M_GOODWN.I01
                INPUT FILE = SAGEPT2.DAT

     START                    TIME=0.0
     ***** HYDROGRAPH FOR SAGE POINTE 2 59 LOTS
     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

                    COMPUTED 6-HOUR RAINFALL DISTRIBUTION BASED ON NOAA
ATLAS 2 - PEAK AT 1.40 HR.
                    DT =     .033330 HOURS        END TIME =      5.999400
HOURS

  .0103     .0000   .0016   .0033   .0050   .0067   .0085
  .0243     .0122   .0141   .0160   .0180   .0201   .0222
  .0415     .0266   .0289   .0312   .0337   .0362   .0388
  .0637     .0443   .0472   .0502   .0534   .0567   .0601
  .1050     .0675   .0715   .0758   .0809   .0865   .0924
  .7600     .1334   .1771   .2398   .3254   .4379   .5814
 1.5106     .9780  1.1804  1.2649  1.3363  1.3997  1.4575
 1.7989    1.5600  1.6061  1.6493  1.6900  1.7284  1.7646
 1.9576    1.8314  1.8623  1.8915  1.9193  1.9456  1.9518
 1.9912    1.9630  1.9682  1.9732  1.9780  1.9825  1.9869
 2.0174    1.9953  1.9993  2.0031  2.0068  2.0104  2.0140
 2.0392    2.0207  2.0240  2.0272  2.0303  2.0333  2.0363
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 2.0746    2.0605  2.0629  2.0653  2.0677  2.0700  2.0723
 2.0896    2.0768  2.0790  2.0812  2.0833  2.0855  2.0875
 2.1033    2.0916  2.0936  2.0956  2.0976  2.0995  2.1014
 2.1159    2.1051  2.1070  2.1088  2.1106  2.1124  2.1141
 2.1276    2.1176  2.1193  2.1210  2.1227  2.1244  2.1260
 2.1386    2.1292  2.1308  2.1324  2.1340  2.1355  2.1371
 2.1489    2.1401  2.1416  2.1431  2.1446  2.1460  2.1475
 2.1587    2.1504  2.1518  2.1532  2.1546  2.1560  2.1573
           2.1600  2.1614  2.1627  2.1640  2.1654  2.1667
```

```
2.1680
                    2.1692  2.1705  2.1718  2.1731  2.1743  2.1756
2.1768
                    2.1780  2.1792  2.1804  2.1817  2.1829  2.1840
2.1852
                    2.1864  2.1876  2.1887  2.1899  2.1910  2.1922
2.1933
                    2.1944  2.1956  2.1967  2.1978  2.1989  2.2000

     COMPUTE NM HYD       ID=1 HYD NO=101.1 AREA=0.014175 SQ MI
                          PER A=0 B=48.52 C=0 D=51.48
                          TP=0.1333 HR MASS RAINFALL=-1

          K =    .072649HR    TP =    .133300HR    K/TP RATIO =    .545000
SHAPE CONSTANT, N =  7.106420
          UNIT PEAK =   28.810    CFS   UNIT VOLUME =    .9990       B =
526.28      P60 = 1.8700
          AREA =       .007297 SQ MI    IA =     .10000 INCHES    INF =
.04000 INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER
METHOD - DT =    .033330


          K =    .130992HR    TP =    .133300HR    K/TP RATIO =    .982685
SHAPE CONSTANT, N =  3.593448
          UNIT PEAK =   16.876    CFS   UNIT VOLUME =    .9995       B =
327.09      P60 = 1.8700
          AREA =       .006878 SQ MI    IA =     .50000 INCHES    INF =
1.25000 INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER
METHOD - DT =    .033330

     PRINT HYD            ID=1 CODE=1

                                        PARTIAL HYDROGRAPH   101.10


          RUNOFF VOLUME =     1.33564 INCHES     =       1.0097 ACRE-FEET
          PEAK DISCHARGE RATE =      29.31 CFS  AT   1.500 HOURS   BASIN
AREA =    .0142 SQ. MI.


FINISH

     NORMAL PROGRAM FINISH          END TIME (HR:MIN:SEC) = 16:17:50
```

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

July 11, 2003

Gregory J. Krenik, PE
Mark Goodwin & Associates
P.O. 90606
Albuquerque, NM 87199

Re: Westbrook Heights Unit 2 Subdivision Revised Grading Plan
Engineer's Stamp dated 6-18-03 (L10/D25)

Dear Mr. Krenik,

Based upon the information provided in your submittal dated 6-19-03, the above referenced plan is approved for Preliminary Plat action by the DRB. This is now the plan that must be certified for release of SIA and Financial Guarantees.

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

Sincerely,

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

C: file

THE CITY OF ALBUQUERQUE IS AN EQUAL OPPORTUNITY/REASONABLE ACCOMMODATION EMPLOYER

DRAINAGE AND TRANSPORTATION INFORMATION SHEET

(REV. 1/28/2003rd)

L-10/D25

PROJECT TITLE: WESTBROOK HEIGHTS UNIT 2 ZONE MAP/DRG. FILE #: ~~L-10~~

DRB #: 1001334 EPC#: WORK ORDER#:

LEGAL DESCRIPTION: TRACT 465 AND A PORTION OF TRACT 466, UNIT 7, TOWN OF ATRISCO GRANT

CITY ADDRESS:

ENGINEERING FIRM: MARK GOODWIN & ASSOCIATES, PA
ADDRESS: P.O. Box 90606
CITY, STATE: ALBUQUERQUE NM

CONTACT: GREGORY J. KRENIK, PE
PHONE: 828-2200
ZIP CODE: 87199

OWNER: C + W LAND DEVELOPMENT
ADDRESS: PO Box 12317
CITY, STATE: ALBUQUERQUE NM

CONTACT: REX WILSON
PHONE: 822-5562
ZIP CODE: 87195

ARCHITECT:
ADDRESS:
CITY, STATE:

CONTACT:
PHONE:
ZIP CODE:

SURVEYOR:
ADDRESS
CITY, STATE:

CONTACT:
PHONE:
ZIP CODE:

CONTRACTOR:
ADDRESS:
CITY, STATE:

CONTACT:
PHONE:
ZIP CODE:

CHECK TYPE OF SUBMITTAL:

___ DRAINAGE REPORT
___ DRAINAGE PLAN 1st SUBMITTAL, *REQUIRES TCL or equal*
_X_ DRAINAGE PLAN RESUBMITTAL
___ CONCEPTUAL GRADING & DRAINAGE PLAN
___ 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
_X_ 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
_X_ OTHER (SPECIFY) ROUGH GRADING APPROVAL

LOWERED ELEVATIONS 1.5' TO BALANCE EARTHWORK

WAS A PRE-DESIGN CONFERENCE ATTENDED:

_X_ YES
___ NO
___ COPY PROVIDED

RECEIVED
JUN 19 2003
HYDROLOGY SECTION

DATE SUBMITTED 6-18-03 BY: GREGORY J. KRENIK, PE

Requests for approvals of Site Development Plans and/or Subdivision Plats shall be accompanied by a drainage submittal The particular nature , location and scope ot 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

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

November 14, 2003

Gregory J. Krenik, PE
Mark Goodwin & Associates
P.O. 90606
Albuquerque, NM 87199

Re: Westbrook Heights Unit 2 Subdivision Revised Grading Plan
Engineer's Stamp dated 10-9-03 (L10/D25)

Dear Mr. Krenik,

Based upon the information provided in your submittal dated 10-10-03, the above referenced plan is approved for Preliminary Plat action by the DRB. This is now the plan that must be certified for release of SIA and Financial Guarantees and all others are void.

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

Sincerely,

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

C: file

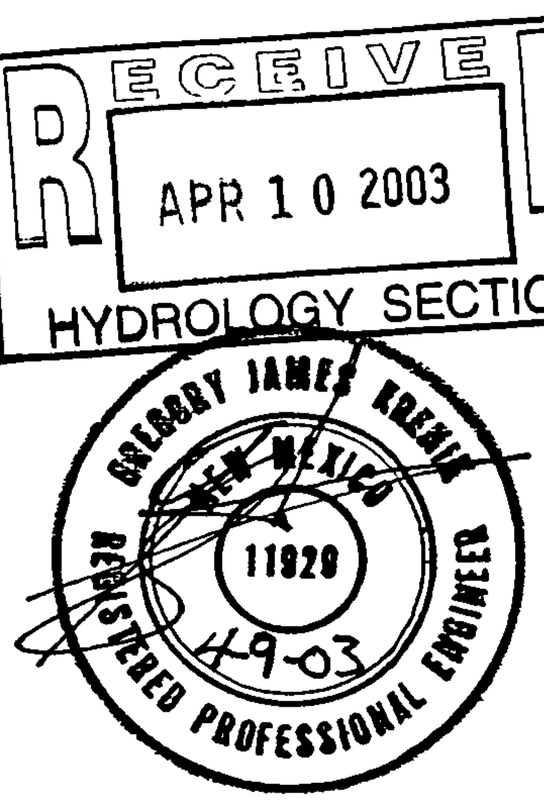
THE CITY OF ALBUQUERQUE IS AN EQUAL OPPORTUNITY/REASONABLE ACCOMMODATION EMPLOYER

Drainage Report

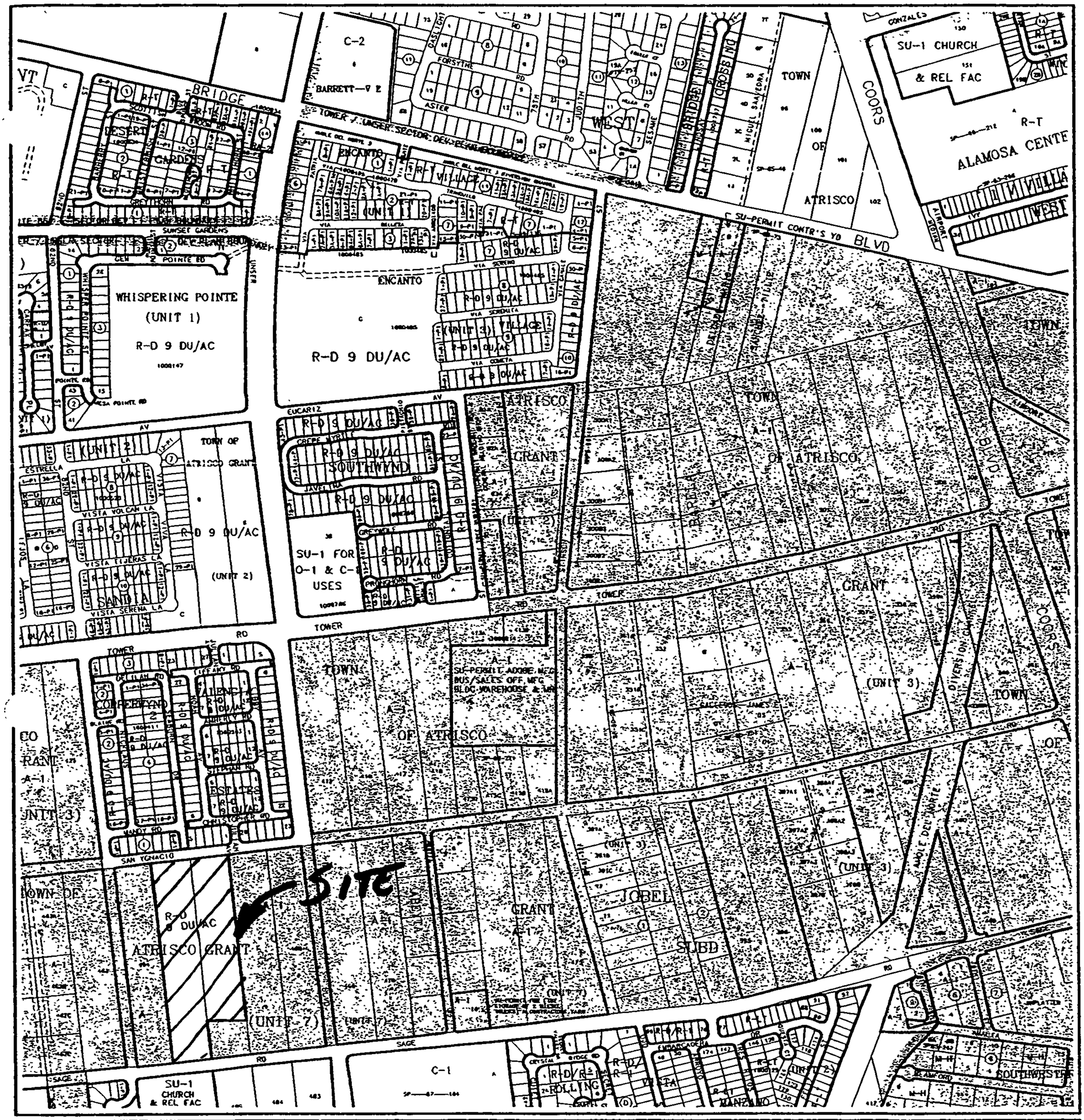
for

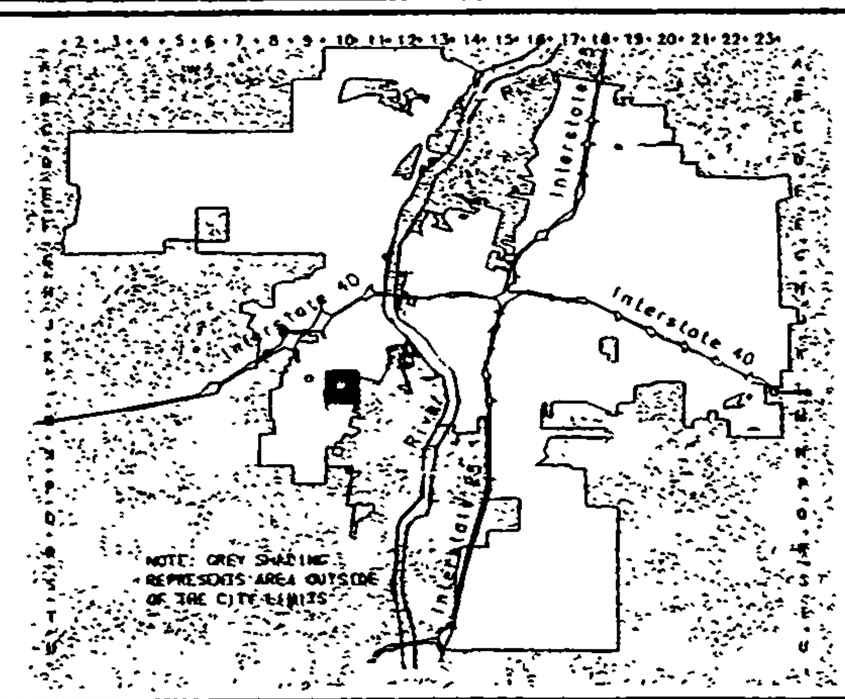
WESTBROOK HEIGHTS UNIT 2

RECEIVED
APR 10 2003
HYDROLOGY SECTION



April 2003





CITY OF
Albuquerque

Albuquerque Geographic Information System
PLANNING DEPARTMENT

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GRAPHIC SCALE IN FEET

250 0 750 1000

Zone Atlas Page

L-10-Z

Map Amended through January 21, 2003

D. Mark Goodwin & Associates, P.A.
Consulting Engineers
P.O. BOX 90606, ALBUQUERQUE, NM 87199
(505) 828-2200 FAX 797-9539
e-mail: dmg@swcp.com

PROJECT WESTBROOK HEIGHTS UNIT 2
SUBJECT DRAINAGE CALCS
BY GJK DATE 3-25-03
CHECKED _____ DATE _____
SHEET 1 OF ____

- SITE DOES NOT LIE IN A 100 YR FLOOD PLAIN.
- OFFSITE FLOWS FROM THE WEST 5 ACRES CROSS AT OUR SW CORNER. THESE FLOWS WILL BE ROUTED ALONG THE PROPERTY LINE TO SAGE ROAD.
- RUN OFF WILL BE RETAINED IN A TEMPORARY POND ADJACENT TO SAGE ROAD UNTIL THE STORMDRAIN OUTFALL TO THE AMOLE IS COMPLETED. THIS PROJECT WILL CONSTRUCT A PORTION OF THE STORMDRAIN IN SAGE ALONG OUT FRONTAGE.

- TOTAL SITE = 9.0720 AC

58 LOTS

DRIVE PADS = 20x20x58 = 23,200 SF = 0.5326 AC TYPE "D"
PADS = 35x65x58 = 131,950 SF = 3.0292 AC TYPE "D"
ROW = 1.4262 AC 80% D = 1.1410 AC
20% B = 0.2852 AC

- TOTAL UNDISTURBED

B = 0.2852 + 4.0840 = 4.3692 AC = 48.16%

D = 0.5326 + 3.0292 + 1.1410 = 4.7028 AC = 51.84%

P_1 = 1.87 in
P_6 = 2.20 in
P_{24} = 2.66 in

FROM AHYMO OUTPUT SHEETS 8-10

Q = 29.38 CFS
V = 1.0133 AC-FT

- FIND Q per LOT

Q_L = 29.38/58 = 0.5066 CFS
V_L = 1.0133/58 = 0.01747 AC-FT

- LOTS 22 + 23 BLOCK 2 WILL DIRECT DISCHARGE TO SAN IGNACIO RD AND THE FLOW WILL ENTER THE BEE HIVE INLET AT INNER.

Q = 2 x 0.50655
= 1.0131 CFS TO SAN IGNACIO.

FIND STREET CAPACITY OF 28' F-F @ 0.5% SLOPE, MTBL CHG

d = 0.33
WP = 28.66
A = 4.735
V = 1.86 F/S
Q = 8.81 CFS

$d + V^2/2g = 0.38 < 0.51$ OK

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PROJECT WESTBROOK HEIGHTS UNIT 2
SUBJECT DRAINAGE CALCS
BY GJK DATE 3-25-03
CHECKED _____ DATE _____
SHEET 2 OF ____

- FIND THE NUMBER OF LOTS THAT CAN DRAIN BEFORE STD C+G IS REQUIRED.

$$\text{LOTS} = 8.81 / 0.50655$$
$$= 17.39 \quad \text{SAY } 17$$

- STD C+G WILL START ON COREL DRIVE AT LOT 1, BLK 3 ON THE WEST SIDE AND THE SE RETURN OF MAGNA ROAD ON THE EAST SIDE AND CONTINUE SOUTH.
- STD C+G WILL START ON BRETON ROAD AT LOT 5, BLK 2 ON THE SOUTH SIDE AND THE NW RETURN OF BRACKETT DRIVE AND CONTINUE WEST.

- FIND FLOW IN COREL DRIVE JUST SOUTH OF BRETON ROAD.

$Q = 46 \text{ LOT} \times 0.50655$
$= 23.30$ CFS

FIND d

$d = 0.53$
$wP = 29.06$
$A = 8.71$
$V = 2.77$ F/S
$Q = 24.11$ CFS ≈ 23.30 OK
$d + V^2/2g = 0.65 < 0.85$ OK

INSTALL 2 SGL "A" INLETS - 1 BETWEEN LOTS 6+7, BLK 1 AND THE OTHER AT THE RETURN OF BRETON ROAD.

- FROM NOMO SHEET 6

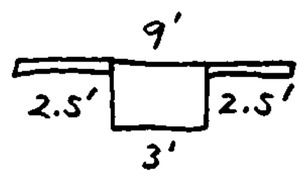
$Q_{grate} = 6.2$ CFS

$Q_{PAST\ INLETS} = 23.30 - 2(6.2)$
$= 10.90$ CFS

- INSTALL 2-SGL "A" INLETS WITH DOUBLE THROATS FOR A SUMP CONDITION TO ACCEPT THE REMAINING FLOW.

$Q = (10 \times 0.50655) + 10.90$
$= 15.9655$ CFS

$Q/P = 30 H^{1.5}$ $P = 17$



$H = 0.46' < 0.67$ OK

$H = 0.70' < 0.85$ OK THIS IS VALUE IF ONLY CURB OPENING IS USED. P=9

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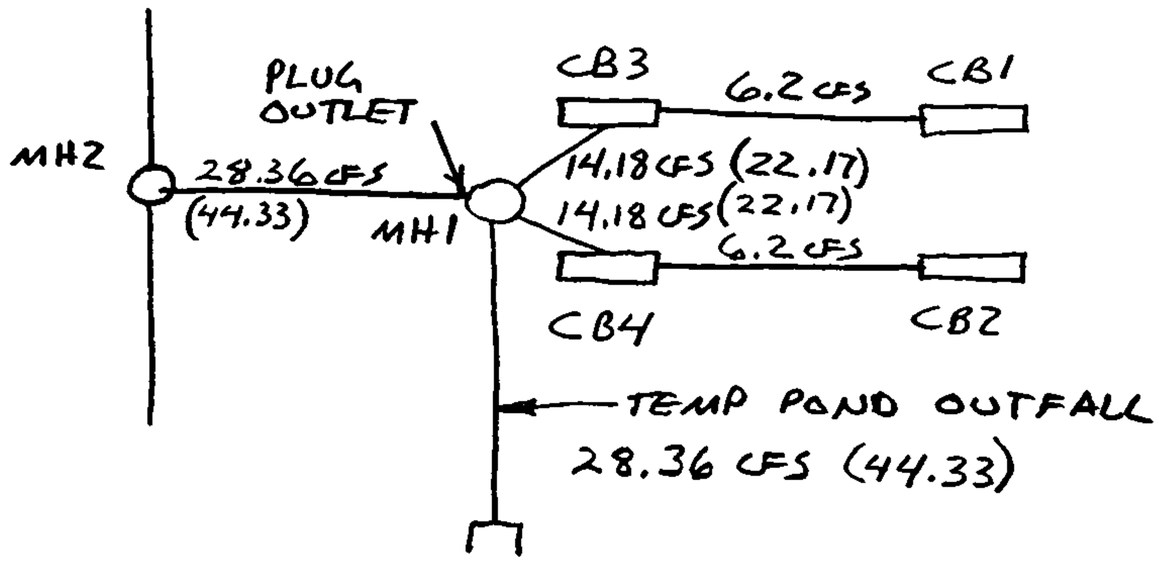
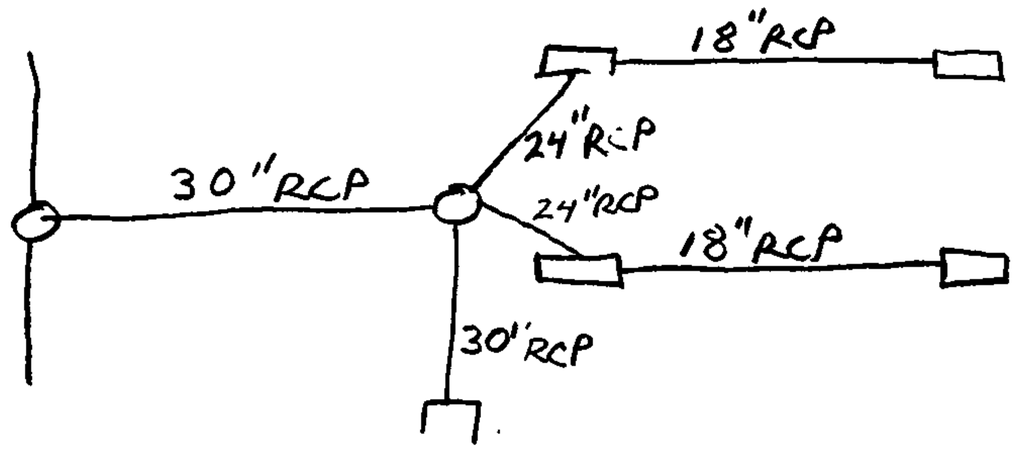
PROJECT WESTBROOK HEIGHTS UNIT 2
SUBJECT DRAINAGE CALCS
BY GJK DATE 3-25-03
CHECKED ____ DATE ____
SHEET 3 OF ____

- SIZE STORMDRN



STRUCTURE	TYPE	PIPE SIZE LEAVING	Q LEAVING	SLOPE LEAVING	GATE	INV
CB1	SGL A	18"	6.2	1%		
CB2	SGL A	18"	6.2	1%		
CB3	SGL A, DBL THT	24"	14.18 (22.17)	1%		
CB4	SGL A, DBL THT	24"	14.18 (22.17)	1%		
MH1	6' DIA	30"	28.36 (44.34)			
MH2						
POND OUTFALL	HEADWALL	--	28.36 (44.34)	--	--	71.00

- FROM NOMO SHEET 7
  - 18" RCP AT 1% CARRIES 10.5 CFS
  - 24" RCP AT 1% CARRIES 22.2 CFS
  - 30" RCP AT 1% CARRIES 40.0 CFS



- SIZE TEMP. RETENTION POND

$$V_{10DAYS} = V_6 + A_D\left(\frac{P_{100} - P_6}{12}\right)$$

$$= 56(0.01747) + 4.7028\frac{(3.6) - 2.20)}{12}$$

$$= 1.5545 \text{ AC-FT}$$

$$= 67,712 \text{ CF} \quad \text{REQUIRED}$$

D. Mark Goodwin & Associates, P.A.
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P.O. BOX 90606, ALBUQUERQUE, NM 87199
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e-mail: dmg@swcp.com

PROJECT WESTBROOK HEIGHTS UNIT 2
SUBJECT DRAINAGE CALCS
BY GJK DATE 3-25-03
CHECKED ____ DATE ____
SHEET 4 OF ____

ELEV	AREA (SF)	VOLUME (CF)	
72	1469	0	
73	2085	1777	
74	2775	4207	
75	3538	6858.5	
76	4374	10,814.5	
77	5 780	15, 891.5	
78	7794	22, 678.5	
79	9897	31, 524	
80	12,068	42, 506.5	
81	14,302	55, 691.5	← 81.78 IS WATER SURFACE
82	16,603	71, 144	= 67,712 CF

- SIZE EMERGENCY SPILLWAY

Q = 28.36 CFS

SPILLWAY CAN ONLY BE AT THE SE CORNER OF SAGE ROAD FRONTAGE – ELEV 82.82 = LOWEST FLOWLINE ELEV.

ADD AREA OF 82.82

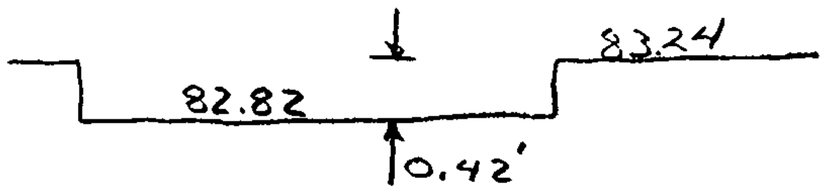
82	16,603	71,144	
82.82	34,229	91,985	← VOLUME = 2.16 100 YR STORMS
			= 1.36 10 day STORMS

OPTION 1: CONSTRUCTING A SPILLWAY WILL PREVENT CONSTRUCTION OF THE ROADWAY IMPROVEMENTS EAST OF THE RETURN INTO THE SUBDIVISION ON SAGE.

$Q = 2.95 L H^{1.5}$

USE $L = 35$

$H = 0.42'$



OPTION 2: CONSTRUCT NO SPILLWAY AND ASSUME VOLUME AVAILABLE IS ENOUGH. CONSTRUCT SAGE ROAD IMPROVEMENTS.

D. Mark Goodwin & Associates, P.A.
Consulting Engineers
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PROJECT WESTBROOK HEIGHTS UNIT 2
SUBJECT DRAINAGE CALCS
BY GJK DATE 3-25-03
CHECKED _____ DATE _____
SHEET 5 OF ____

- DETERMINE SAGE ROAD STORMDRAIN

- THE STORMDRAIN WAS ORIGINALLY DESIGNED BY ANDREWS, ASBURY & ROBERTS, INC AS PART OF THE TOWER/SAGE DRAINAGE MASTER PLAN. (APPENDIX "A").

- THE CONNECTION TO THE AMOLE AND WEST TO 700' EAST OF UNSER HAS BEEN CONSTRUCTED BY THE ROLLING HILLS SUBDIVISION, DESIGNED BY ISAACSON & ARFMAN, P.A. (5379.90) AND VISTA MANZANO SUBDIVISION, DESIGNED BY TIERRA WEST, LLC (620781 + 620881)

- SINCE THEN DESERT SAGE SUBDIVISION HAS BEEN CONSTRUCTED, SAGE POINT SUBDIVISION IS UNDER CONSTRUCTION AND DESERT SAGE 3 IS IN THE PROCESS OF DRC PLANS.

- USING THE DRAINAGE AREA MAP FROM THE AAR REPORT AS A BASE, BASIN SG-D HAS HAD THE AREA SOUTH OF SAGE ROAD REMOVED FROM THE BASIN LEAVING 17.4656 AC AS THE REVISED AREA OF THE BASIN.

- USING INFORMATION FROM DESERT SAGE 3 REPORT BASIN SG-D WAS RECALCULATED INTO BASINS SGA-D AND SGB-D. BASIN SGA-D IS DESERT SAGE 3 & 82nd ST AND BASIN SGB-D IS THE AREA WEST OF DESERT SAGE 3 & SAGE ROAD.

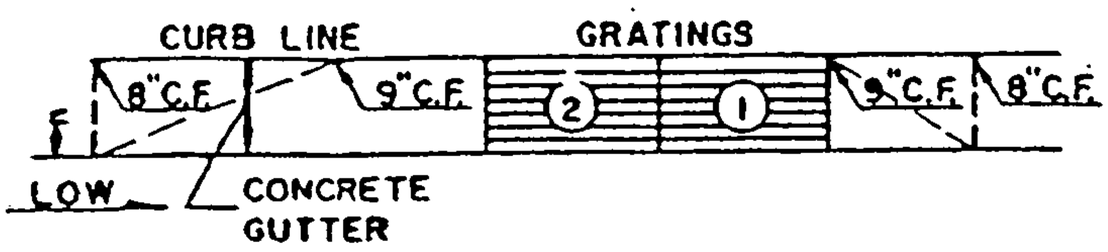
- WESTBROOK HEIGHTS UNIT 2 FALLS WITHIN BASIN S7-D AND IS WITHIN THE LAND TREATMENTS OF 29% B AND 71% D.

PER THE AHYMO OUTPUT SHEETS 11-16

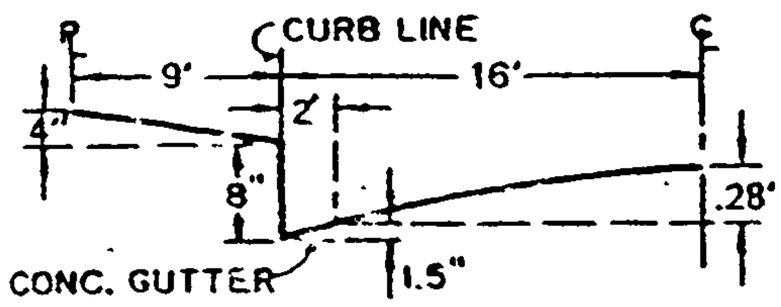
	REVISED	PER AAR REPORT
SG-D	33.09 CFS	54.70 CFS
S7-D	65.63 CFS	69.88 CFS
S8-D	81.76 CFS	87.17 CFS
S9-D	153.05 CFS	165.79 CFS
AP 35	33.09 CFS	55 CFS
AP 36	92.98 CFS	118 CFS
AP 37	174.55 CFS	201 CFS
AP 38	230.44 CFS	251 CFS

** SEE SAGE ROAD STORMDRAIN FROM 82nd STREET TO THE AMOLE CHANNEL CALCULATIONS SHEETS 17-32

GRATING CAPACITIES FOR TYPE DOUBLE "A", "C," AND "D"

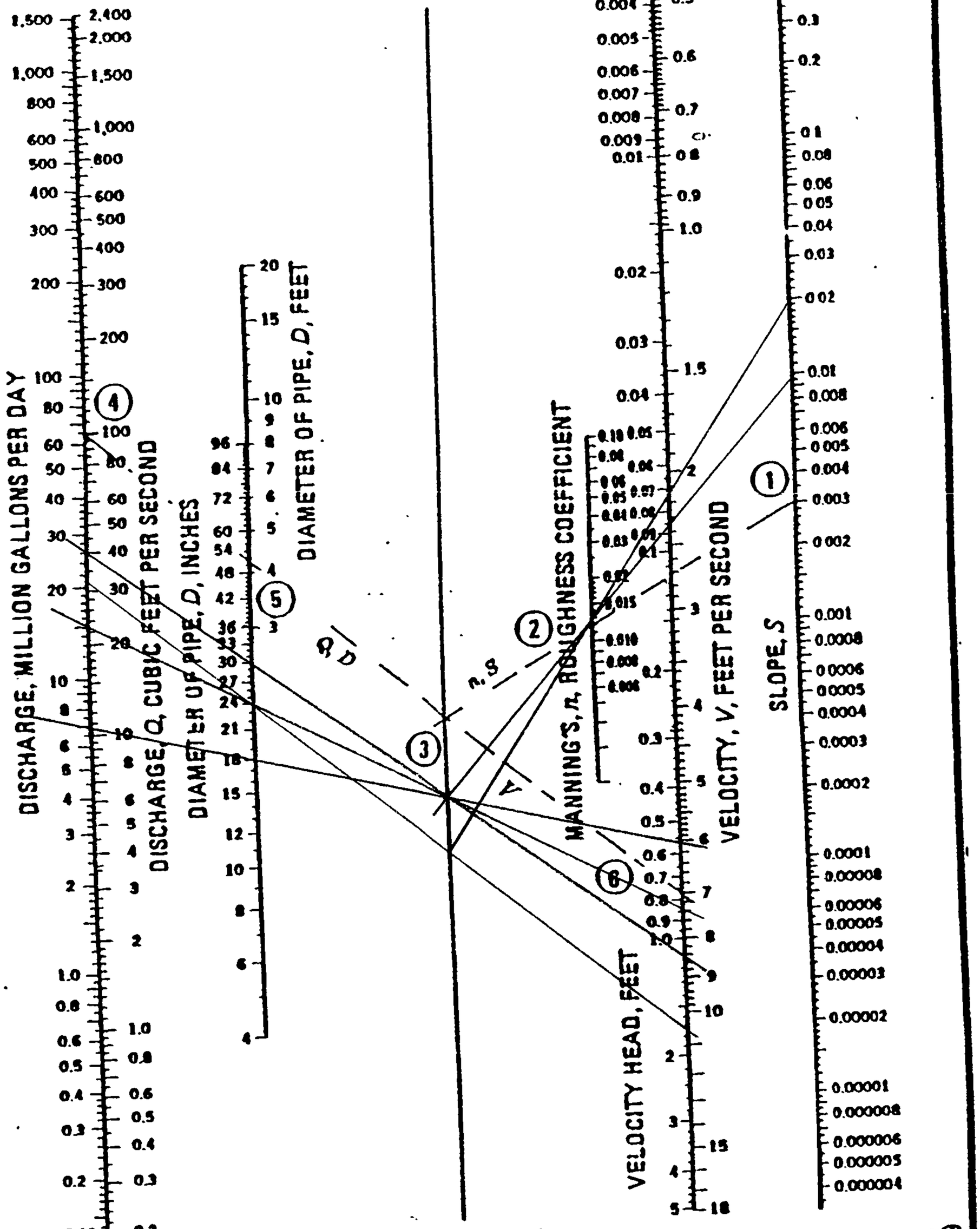


GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION
(ABOVE BASIN)

Reference: American Concrete Pipe Association (1980).



B) Circular Pipe Solution

```
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***** HYDROGRAPH FOR SAGE POINTE 2 58 LOTS
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
COMPUTE NM HYD          ID=1 HYD NO=101.1 AREA=0.014175 SQ MI
                        PER A=0 B=48.16 C=0 D=51.84
                        TP=0.1333 HR MASS RAINFALL=-1
PRINT HYD               ID=1 CODE=1
FINISH
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1994
               RUN DATE (MON/DAY/YR) = 03/25/2003
               START TIME (HR:MIN:SEC) = 11:00:06     USER NO.=
M_GOODWN.I01
               INPUT FILE = sagept2.dat

     START                    TIME=0.0
     ***** HYDROGRAPH FOR SAGE POINTE 2 58 LOTS
     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

                         COMPUTED 6-HOUR RAINFALL DISTRIBUTION BASED ON NOAA
ATLAS 2 - PEAK AT 1.40 HR.
                         DT =     .033330 HOURS        END TIME =      5.999400
HOURS

      .0103
      .0243
      .0415
      .0637
      .1050
      .7600
     1.5106
     1.7989
     1.9576
     1.9912
     2.0174
     2.0392
     2.0580
     2.0746
     2.0896
     2.1033
     2.1159
     2.1276
     2.1386
     2.1489
     2.1587

      .0000    .0016    .0033    .0050    .0067    .0085
      .0122    .0141    .0160    .0180    .0201    .0222
      .0266    .0289    .0312    .0337    .0362    .0388
      .0443    .0472    .0502    .0534    .0567    .0601
      .0675    .0715    .0758    .0809    .0865    .0924
      .1334    .1771    .2398    .3254    .4379    .5814
      .9780   1.1804   1.2649   1.3363   1.3997   1.4575
     1.5600   1.6061   1.6493   1.6900   1.7284   1.7646
     1.8314   1.8623   1.8915   1.9193   1.9456   1.9518
     1.9630   1.9682   1.9732   1.9780   1.9825   1.9869
     1.9953   1.9993   2.0031   2.0068   2.0104   2.0140
     2.0207   2.0240   2.0272   2.0303   2.0333   2.0363
     2.0420   2.0448   2.0475   2.0502   2.0528   2.0554
     2.0605   2.0629   2.0653   2.0677   2.0700   2.0723
     2.0768   2.0790   2.0812   2.0833   2.0855   2.0875
     2.0916   2.0936   2.0956   2.0976   2.0995   2.1014
     2.1051   2.1070   2.1088   2.1106   2.1124   2.1141
     2.1176   2.1193   2.1210   2.1227   2.1244   2.1260
     2.1292   2.1308   2.1324   2.1340   2.1355   2.1371
     2.1401   2.1416   2.1431   2.1446   2.1460   2.1475
     2.1504   2.1518   2.1532   2.1546   2.1560   2.1573
     2.1600   2.1614   2.1627   2.1640   2.1654   2.1667
```

```
2.1680
                    2.1692  2.1705  2.1718  2.1731  2.1743  2.1756
2.1768
                    2.1780  2.1792  2.1804  2.1817  2.1829  2.1840
2.1852
                    2.1864  2.1876  2.1887  2.1899  2.1910  2.1922
2.1933
                    2.1944  2.1956  2.1967  2.1978  2.1989  2.2000

     COMPUTE NM HYD       ID=1 HYD NO=101.1 AREA=0.014175 SQ MI
                          PER A=0 B=48.16 C=0 D=51.84
                          TP=0.1333 HR MASS RAINFALL=-1

          K =    .072649HR    TP =    .133300HR    K/TP RATIO =    .545000
SHAPE CONSTANT, N =  7.106420
          UNIT PEAK =   29.012    CFS   UNIT VOLUME =    .9990       B =
526.28      P60 = 1.8700
          AREA =       .007348 SQ MI    IA =    .10000 INCHES    INF =
.04000 INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER
METHOD - DT =    .033330


          K =    .130992HR    TP =    .133300HR    K/TP RATIO =    .982685
SHAPE CONSTANT, N =  3.593448
          UNIT PEAK =   16.751    CFS   UNIT VOLUME =    .9995       B =
327.09      P60 = 1.8700
          AREA =       .006827 SQ MI    IA =    .50000 INCHES    INF =
1.25000 INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER
METHOD - DT =    .033330

     PRINT HYD            ID=1 CODE=1

                                        PARTIAL HYDROGRAPH   101.10


          RUNOFF VOLUME =     1.34032 INCHES     =       1.0133 ACRE-FEET
          PEAK DISCHARGE RATE =      29.38 CFS  AT   1.500 HOURS   BASIN
AREA =    .0142 SQ. MI.


FINISH

     NORMAL PROGRAM FINISH          END TIME (HR:MIN:SEC) = 11:00:06
```

```
START                TIME=0.0
***** HYDROGRAPH FOR SAGE ROAD STORMDRAIN
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 S6A-D (FROM DESERT SAGE 3 REPORT)
COMPUTE NM HYD       ID=1 HYD NO=101.1 AREA=0.0101 SQ MI
                     PER A=0 B=48.07 C=0 D=51.93
                     TP=0.31 HR MASS RAINFALL=-1
PRINT HYD            ID=1 CODE=1
*BASIN S6B-D (FROM DESERT SAGE 3 REPORT)
COMPUTE NM HYD       ID=2 HYD NO=101.2 AREA=0.01719 SQ MI
                     PER A=0 B=55.16 C=0 D=44.84
                     TP=0.31 HR MASS RAINFALL=-1
PRINT HYD            ID=2 CODE=1
*BASIN S7-D
COMPUTE NM HYD       ID=3 HYD NO=101.3 AREA=0.057031 SQ MI
                     PER A=0 B=29 C=0 D=71
                     TP=0.46 HR MASS RAINFALL=-1
PRINT HYD            ID=3 CODE=1
*BASIN S8-D
COMPUTE NM HYD       ID=4 HYD NO=101.4 AREA=0.068281 SQ MI
                     PER A=0 B=37 C=0 D=63
                     TP=0.39 HR MASS RAINFALL=-1
PRINT HYD            ID=4 CODE=1
*BASIN S7-D
COMPUTE NM HYD       ID=5 HYD NO=101.5 AREA=0.074844 SQ MI
                     PER A=0 B=50 C=0 D=50
                     TP=0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=5 CODE=1
ADD HYD              ID=6 HYD NO=101.6 ID=1 ID=2
PRINT HYD            ID=6 CODE=1
ADD HYD              ID=7 HYD NO=101.7 ID=6 ID=3
PRINT HYD            ID=7 CODE=1
ADD HYD              ID=8 HYD NO=101.8 ID=7 ID=4
PRINT HYD            ID=8 CODE=1
ADD HYD              ID=9 HYD NO=101.9 ID=8 ID=5
PRINT HYD            ID=9 CODE=1
FINISH
```

```
          AHYMO PROGRAM (AHYMO194) - AMAFCA Hydrologic Model - January,
1994
               RUN DATE (MON/DAY/YR) = 04/07/2003
               START TIME (HR:MIN:SEC) = 14:02:57     USER NO.=
M_GOODWN.I01
               INPUT FILE = SAGERDSD.DAT


     START                  TIME=0.0
     ***** HYDROGRAPH FOR SAGE ROAD STORMDRAIN
     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

                       COMPUTED 6-HOUR RAINFALL DISTRIBUTION BASED ON NOAA
ATLAS 2 - PEAK AT 1.40 HR.
                       DT =     .033330 HOURS        END TIME =     5.999400
HOURS
                        .0000   .0016   .0033   .0050   .0067   .0085
.0103
                        .0122   .0141   .0160   .0180   .0201   .0222
.0243
                        .0266   .0289   .0312   .0337   .0362   .0388
.0415
                        .0443   .0472   .0502   .0534   .0567   .0601
.0637
                        .0675   .0715   .0758   .0809   .0865   .0924
.1050
                        .1334   .1771   .2398   .3254   .4379   .5814
.7600
                        .9780  1.1804  1.2649  1.3363  1.3997  1.4575
1.5106
                       1.5600  1.6061  1.6493  1.6900  1.7284  1.7646
1.7989
                       1.8314  1.8623  1.8915  1.9193  1.9456  1.9518
1.9576
                       1.9630  1.9682  1.9732  1.9780  1.9825  1.9869
1.9912
                       1.9953  1.9993  2.0031  2.0068  2.0104  2.0140
2.0174
                       2.0207  2.0240  2.0272  2.0303  2.0333  2.0363
2.0392
                       2.0420  2.0448  2.0475  2.0502  2.0528  2.0554
2.0580
                       2.0605  2.0629  2.0653  2.0677  2.0700  2.0723
2.0746
                       2.0768  2.0790  2.0812  2.0833  2.0855  2.0875
2.0896
                       2.0916  2.0936  2.0956  2.0976  2.0995  2.1014
2.1033
                       2.1051  2.1070  2.1088  2.1106  2.1124  2.1141
2.1159
                       2.1176  2.1193  2.1210  2.1227  2.1244  2.1260
2.1276
                       2.1292  2.1308  2.1324  2.1340  2.1355  2.1371
2.1386
                       2.1401  2.1416  2.1431  2.1446  2.1460  2.1475
2.1489
                       2.1504  2.1518  2.1532  2.1546  2.1560  2.1573
2.1587
```

```
                    2.1600  2.1614  2.1627  2.1640  2.1654  2.1667
2.1680
                    2.1692  2.1705  2.1718  2.1731  2.1743  2.1756
2.1768
                    2.1780  2.1792  2.1804  2.1817  2.1829  2.1840
2.1852
                    2.1864  2.1876  2.1887  2.1899  2.1910  2.1922
2.1933
                    2.1944  2.1956  2.1967  2.1978  2.1989  2.2000

     *BASIN S6A-D (FROM DESERT SAGE 3 REPORT)
     COMPUTE NM HYD       ID=1 HYD NO=101.1 AREA=0.0101 SQ MI
                          PER A=0 B=48.07 C=0 D=51.93
                          TP=0.31 HR MASS RAINFALL=-1

          K =    .168950HR    TP =    .310000HR    K/TP RATIO =    .545000
SHAPE CONSTANT, N =  7.106420
          UNIT PEAK =    8.9041    CFS   UNIT VOLUME =     .9987       B =
526.28       P60 = 1.8700
          AREA =       .005245 SQ MI    IA =     .10000 INCHES    INF =
.04000 INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER
METHOD - DT =    .033330


          K =    .304632HR    TP =    .310000HR    K/TP RATIO =    .982685
SHAPE CONSTANT, N =  3.593450
          UNIT PEAK =    5.1227    CFS   UNIT VOLUME =     .9972       B =
327.09       P60 = 1.8700
          AREA =       .004855 SQ MI    IA =     .50000 INCHES    INF =
1.25000 INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER
METHOD - DT =    .033330

     PRINT HYD            ID=1 CODE=1

                                          PARTIAL HYDROGRAPH   101.10


          RUNOFF VOLUME =      1.34148 INCHES      =         .7226 ACRE-FEET
          PEAK DISCHARGE RATE =       12.77 CFS  AT    1.700 HOURS   BASIN
AREA =    .0101 SQ. MI.


     *BASIN S6B-D (FROM DESERT SAGE 3 REPORT)
     COMPUTE NM HYD       ID=2 HYD NO=101.2 AREA=0.01719 SQ MI
                          PER A=0 B=55.16 C=0 D=44.84
                          TP=0.31 HR MASS RAINFALL=-1

          K =    .168950HR    TP =    .310000HR    K/TP RATIO =    .545000
SHAPE CONSTANT, N =  7.106420
          UNIT PEAK =    13.086    CFS   UNIT VOLUME =     .9991       B =
526.28       P60 = 1.8700
          AREA =       .007708 SQ MI    IA =     .10000 INCHES    INF =
.04000 INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER
METHOD - DT =    .033330


          K =    .304632HR    TP =    .310000HR    K/TP RATIO =    .982685
```

```
SHAPE CONSTANT, N =  3.593450
          UNIT PEAK =   10.005    CFS   UNIT VOLUME =    .9986        B =
327.09       P60 = 1.8700
          AREA =       .009482 SQ MI    IA =    .50000 INCHES    INF =
1.25000 INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER
METHOD - DT =   .033330

     PRINT HYD            ID=2 CODE=1

                                        PARTIAL HYDROGRAPH   101.20


          RUNOFF VOLUME =     1.24945 INCHES     =        1.1455 ACRE-FEET
          PEAK DISCHARGE RATE =      20.31 CFS  AT   1.700 HOURS   BASIN
AREA =    .0172 SQ. MI.

     *BASIN S7-D
     COMPUTE NM HYD       ID=3 HYD NO=101.3 AREA=0.057031 SQ MI
                          PER A=0 B=29 C=0 D=71
                          TP=0.46 HR MASS RAINFALL=-1

          K =    .250700HR    TP =    .460000HR    K/TP RATIO =    .545000
SHAPE CONSTANT, N =  7.106437
          UNIT PEAK =   46.326    CFS   UNIT VOLUME =    .9998        B =
526.28       P60 = 1.8700
          AREA =       .040492 SQ MI    IA =    .10000 INCHES    INF =
.04000 INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER
METHOD - DT =   .033330


          K =    .452035HR    TP =    .460000HR    K/TP RATIO =    .982685
SHAPE CONSTANT, N =  3.593454
          UNIT PEAK =   11.760    CFS   UNIT VOLUME =    .9988        B =
327.09       P60 = 1.8700
          AREA =       .016539 SQ MI    IA =    .50000 INCHES    INF =
1.25000 INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER
METHOD - DT =   .033330

     PRINT HYD            ID=3 CODE=1

                                        PARTIAL HYDROGRAPH   101.30


          RUNOFF VOLUME =     1.58903 INCHES     =        4.8333 ACRE-FEET
          PEAK DISCHARGE RATE =      65.63 CFS  AT   1.866 HOURS   BASIN
AREA =    .0570 SQ. MI.


     *BASIN S8-D
     COMPUTE NM HYD       ID=4 HYD NO=101.4 AREA=0.068281 SQ MI
                          PER A=0 B=37 C=0 D=63
                          TP=0.39 HR MASS RAINFALL=-1

          K =    .212837HR    TP =    .390000HR    K/TP RATIO =    .545736
SHAPE CONSTANT, N =  7.094166
```

```
          UNIT PEAK =    57.985     CFS   UNIT VOLUME =     .9998        B =
525.70       P60 = 1.8700
          AREA =       .043017 SQ MI     IA =     .10000 INCHES     INF =
.04000 INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER
METHOD - DT =    .033330


          K =    .382444HR     TP =    .390000HR     K/TP RATIO =    .980625
SHAPE CONSTANT, N =  3.601149
          UNIT PEAK =    21.224     CFS   UNIT VOLUME =     .9993        B =
327.64       P60 = 1.8700
          AREA =       .025264 SQ MI     IA =     .50000 INCHES     INF =
1.25000 INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER
METHOD - DT =    .033330

     PRINT HYD            ID=4 CODE=1

                                        PARTIAL HYDROGRAPH   101.40

          RUNOFF VOLUME =      1.48519 INCHES      =        5.4085 ACRE-FEET
          PEAK DISCHARGE RATE =       81.76 CFS  AT    1.766 HOURS   BASIN
AREA =    .0683 SQ. MI.


     *BASIN S7-D
     COMPUTE NM HYD       ID=5 HYD NO=101.5 AREA=0.074844 SQ MI
                          PER A=0 B=50 C=0 D=50
                          TP=0.1333 HR MASS RAINFALL=-1

          K =    .072858HR     TP =    .133300HR     K/TP RATIO =    .546571
SHAPE CONSTANT, N =  7.080254
          UNIT PEAK =    147.40     CFS   UNIT VOLUME =     .9993        B =
525.05       P60 = 1.8700
          AREA =       .037422 SQ MI     IA =     .10000 INCHES     INF =
.04000 INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER
METHOD - DT =    .033330


          K =    .130406HR     TP =    .133300HR     K/TP RATIO =    .978286
SHAPE CONSTANT, N =  3.609940
          UNIT PEAK =    92.156     CFS   UNIT VOLUME =     1.000        B =
328.27       P60 = 1.8700
          AREA =       .037422 SQ MI     IA =     .50000 INCHES     INF =
1.25000 INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER
METHOD - DT =    .033330

     PRINT HYD            ID=5 CODE=1

                                        PARTIAL HYDROGRAPH   101.50


          RUNOFF VOLUME =      1.31643 INCHES      =        5.2547 ACRE-FEET
          PEAK DISCHARGE RATE =      153.05 CFS  AT    1.500 HOURS   BASIN
AREA =    .0748 SQ. MI.
```

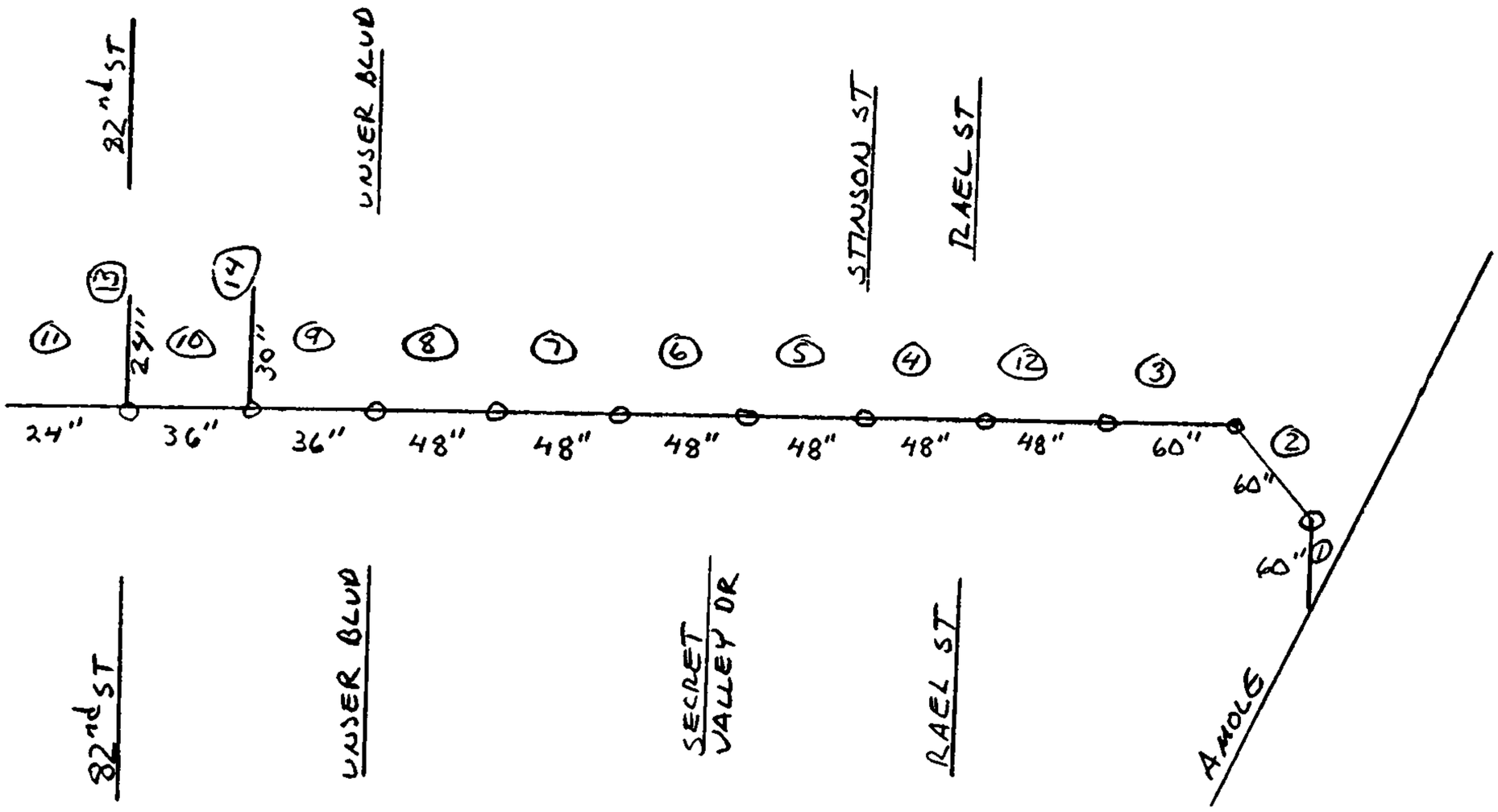
```
      ADD HYD              ID=6 HYD NO=101.6 ID=1 ID=2
      PRINT HYD            ID=6 CODE=1

                                          PARTIAL HYDROGRAPH   101.60

          RUNOFF VOLUME =     1.28347 INCHES     =       1.8680 ACRE-FEET
          PEAK DISCHARGE RATE =      33.09 CFS  AT   1.700 HOURS   BASIN
AREA =    .0273 SQ. MI.


      ADD HYD              ID=7 HYD NO=101.7 ID=6 ID=3
      PRINT HYD            ID=7 CODE=1

                                          PARTIAL HYDROGRAPH   101.70

          RUNOFF VOLUME =     1.49013 INCHES     =       6.7013 ACRE-FEET
          PEAK DISCHARGE RATE =      92.98 CFS  AT   1.800 HOURS   BASIN
AREA =    .0843 SQ. MI.


      ADD HYD              ID=8 HYD NO=101.8 ID=7 ID=4
      PRINT HYD            ID=8 CODE=1

                                          PARTIAL HYDROGRAPH   101.80

          RUNOFF VOLUME =     1.48791 INCHES     =      12.1097 ACRE-FEET
          PEAK DISCHARGE RATE =     174.55 CFS  AT   1.800 HOURS   BASIN
AREA =    .1526 SQ. MI.


      ADD HYD              ID=9 HYD NO=101.9 ID=8 ID=5
      PRINT HYD            ID=9 CODE=1

                                          PARTIAL HYDROGRAPH   101.90

          RUNOFF VOLUME =     1.43148 INCHES     =      17.3644 ACRE-FEET
          PEAK DISCHARGE RATE =     230.44 CFS  AT   1.733 HOURS   BASIN
AREA =    .2274 SQ. MI.


      FINISH

          NORMAL PROGRAM FINISH          END TIME (HR:MIN:SEC) = 14:02:58
```

HYDRAULIC REPORT FOR

SAGE ROAD STORMDRAIN

FROM 82ND STREET TO

AMOLE CHANNEL



LINES 1-6 & 12 ARE EXIST.

LINES 11 & 13 ARE PART OF

DESERT SAGE UNIT 3

LINE 14 IS PART OF WEST-

BROOK HEIGHTS UNIT 2

1
)

Run date: 04-08-2003
File: c:sagerdsd.ST3

Return Period = 100 Yrs
Rainfall file: Your_County

LINE 1 / Q = 230.4 / HT = 60 / WID = 60 / N = .013 / L = 32.18 / JLC = .25

---

1 / Outfall

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	13.13	60.00	8.13	11.74	15.27	0.00	2.36	19.63
UPSTRM	13.35	59.99	8.35	11.74	15.49	1.89	5.14	19.63

Drainage area (ac)	= 0	Slope of invert (%)	= 0.684
Runoff coefficient	= 0	Slope energy grade line (%)	= 0.677
Time of conc (min)	= 24	Critical depth (in)	= 50.83
Inlet time (min)	= 0	Req'd length curb inlet (ft)	= 211.1
Intensity (in/hr)	= 0.00	Req'd grate area (sf)	= 60.6
Cumulative C*A	= 0.0	Depth at inlet opening (in)	= 6
Flow contrib (cfs)	= 230.4	Confluence angle (deg)	= 0
Default Q (cfs)	= 230.44	Natural ground elev (ft)	= 18.5
Line capac. (cfs)	= 215.4	Line storage (cuft)	= 632

LINE 2 / Q = 230.4 / HT = 60 / WID = 60 / N = .013 / L = 143 / JLC = .25

---

2 / DNLN = 1

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	13.88	53.56	9.42	12.37	16.26	35.91	4.07	18.62
UPSTRM	16.37	50.87	12.13	12.98	18.99	43.11	2.82	17.75

Drainage area (ac)	= 0	Slope of invert (%)	= 1.895
Runoff coefficient	= 0	Slope energy grade line (%)	= 1.906
Time of conc (min)	= 23	Critical depth (in)	= 50.83
Inlet time (min)	= 0	Req'd length curb inlet (ft)	= 211.1
Intensity (in/hr)	= 0.00	Req'd grate area (sf)	= 60.6
Cumulative C*A	= 0.0	Depth at inlet opening (in)	= 6
Flow contrib (cfs)	= 230.4	Confluence angle (deg)	= 45
Default Q (cfs)	= 230.44	Natural ground elev (ft)	= 19.95
Line capac. (cfs)	= 358.6	Line storage (cuft)	= 2600

LINE 3 / Q = 230.4 / HT = 60 / WID = 60 / N = .013 / L = 348.59 / JLC = .25

---

3 / DNLN = 2

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	17.02	58.72	12.13	11.80	19.18	17.25	2.82	19.53
UPSTRM	24.60	50.87	20.36	12.98	27.22	43.11	3.84	17.75

Drainage area (ac)	= 0	Slope of invert (%)	= 2.361
Runoff coefficient	= 0	Slope energy grade line (%)	= 2.304
Time of conc (min)	= 21	Critical depth (in)	= 50.83
Inlet time (min)	= 0	Req'd length curb inlet (ft)	= 211.1
Intensity (in/hr)	= 0.00	Req'd grate area (sf)	= 60.6
Cumulative C*A	= 0.0	Depth at inlet opening (in)	= 6
Flow contrib (cfs)	= 230.4	Confluence angle (deg)	= 45
Default Q (cfs)	= 230.44	Natural ground elev (ft)	= 29.21
Line capac. (cfs)	= 400.2	Line storage (cuft)	= 6498

LINE 4 / Q = 174.6 / HT = 48 / WID = 48 / N = .013 / L = 542.82 / JLC = .25

---

4 / DNLN = 12

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	35.38	48.00	30.12	13.89	38.38	0.00	6.39	12.56
UPSTRM	58.84	45.75	55.03	14.13	61.94	20.30	8.4	12.35

Drainage area (ac)	= 0	Slope of invert (%)	= 4.589
Runoff coefficient	= 0	Slope energy grade line (%)	= 4.341
Time of conc (min)	= 16	Critical depth (in)	= 45.70
Inlet time (min)	= 0	Req'd length curb inlet (ft)	= 159.9
Intensity (in/hr)	= 0.00	Req'd grate area (sf)	= 45.9
Cumulative C*A	= 0.0	Depth at inlet opening (in)	= 6
Flow contrib (cfs)	= 174.5	Confluence angle (deg)	= 0
Default Q (cfs)	= 174.55	Natural ground elev (ft)	= 67.43
Line capac. (cfs)	= 307.7	Line storage (cuft)	= 6763

LINE 5 / Q = 93.0 / HT = 48 / WID = 48 / N = .013 / L = 173.41 / JLC = .25

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5 / DNLN = 4

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	59.62	48.00	55.13	7.40	60.47	0.00	8.29	12.56
UPSTRM	65.61	34.31	62.75	9.67	67.06	43.34	6.23	9.61

Drainage area (ac)	= 0	Slope of invert (%)	= 4.394
Runoff coefficient	= 0	Slope energy grade line (%)	= 3.803
Time of conc (min)	= 15	Critical depth (in)	= 34.21
Inlet time (min)	= 0	Req'd length curb inlet (ft)	= 85.2
Intensity (in/hr)	= 0.00	Req'd grate area (sf)	= 24.5
Cumulative C*A	= 0.0	Depth at inlet opening (in)	= 6
Flow contrib (cfs)	= 92.9	Confluence angle (deg)	= 0
Default Q (cfs)	= 92.98	Natural ground elev (ft)	= 72.98
Line capac. (cfs)	= 301.1	Line storage (cuft)	= 1923

LINE 6 / Q = 93.0 / HT = 48 / WID = 48 / N = .013 / L = 422.27 / JLC = .25

---

6 / DNLN = 5

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	65.97	37.47	62.85	8.69	67.14	38.81	6.13	10.70
UPSTRM	67.84	34.53	64.96	9.61	69.27	43.13	7.09	9.68

Drainage area (ac)	= 0	Slope of invert (%)	= 0.500
Runoff coefficient	= 0	Slope energy grade line (%)	= 0.504
Time of conc (min)	= 13	Critical depth (in)	= 34.21
Inlet time (min)	= 0	Req'd length curb inlet (ft)	= 85.2
Intensity (in/hr)	= 0.00	Req'd grate area (sf)	= 24.5
Cumulative C*A	= 0.0	Depth at inlet opening (in)	= 6
Flow contrib (cfs)	= 92.9	Confluence angle (deg)	= 0
Default Q (cfs)	= 92.98	Natural ground elev (ft)	= 76.06
Line capac. (cfs)	= 101.5	Line storage (cuft)	= 4303

LINE 7 / Q = 93.0 / HT = 48 / WID = 48 / N = .013 / L = 450 / JLC = .25

---

7 / DNLN = 6

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	68.20	37.63	65.06	8.69	69.37	38.81	7	10.70
UPSTRM	70.19	34.53	67.31	9.61	71.62	43.13	6.69	9.68

Drainage area (ac)	= 0	Slope of invert (%)	= 0.500
Runoff coefficient	= 0	Slope energy grade line (%)	= 0.501
Time of conc (min)	= 10	Critical depth (in)	= 34.21
Inlet time (min)	= 0	Req'd length curb inlet (ft)	= 85.2
Intensity (in/hr)	= 0.00	Req'd grate area (sf)	= 24.5
Cumulative C*A	= 0.0	Depth at inlet opening (in)	= 6
Flow contrib (cfs)	= 92.9	Confluence angle (deg)	= 0
Default Q (cfs)	= 92.98	Natural ground elev (ft)	= 78
Line capac. (cfs)	= 101.6	Line storage (cuft)	= 4586

LINE 8 / Q = 93.0 / HT = 48 / WID = 48 / N = .013 / L = 450 / JLC = .25

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8 / DNLN = 7

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	70.55	37.63	67.41	8.69	71.72	38.81	6.58	10.70
UPSTRM	72.54	34.53	69.66	9.61	73.97	43.13	6.33	9.68

Drainage area (ac)	= 0	Slope of invert (%)	= 0.500
Runoff coefficient	= 0	Slope energy grade line (%)	= 0.501
Time of conc (min)	= 8	Critical depth (in)	= 34.21
Inlet time (min)	= 0	Req'd length curb inlet (ft)	= 85.2
Intensity (in/hr)	= 0.00	Req'd grate area (sf)	= 24.5
Cumulative C*A	= 0.0	Depth at inlet opening (in)	= 6
Flow contrib (cfs)	= 92.9	Confluence angle (deg)	= 0
Default Q (cfs)	= 92.98	Natural ground elev (ft)	= 80
Line capac. (cfs)	= 101.6	Line storage (cuft)	= 4586

LINE 9 / Q = 59.0 / HT = 36 / WID = 36 / N = .013 / L = 760 / JLC = .25

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9 / DNLN = 8

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	72.90	36.00	69.76	8.35	73.98	0.00	7.23	7.07
UPSTRM	78.85	36.00	73.56	8.35	79.93	0.00	7.16	7.07

Drainage area (ac)	= 0	Slope of invert (%)	= 0.500
Runoff coefficient	= 0	Slope energy grade line (%)	= 0.783
Time of conc (min)	= 3	Critical depth (in)	= 29.37
Inlet time (min)	= 0	Req'd length curb inlet (ft)	= 54.1
Intensity (in/hr)	= 0.00	Req'd grate area (sf)	= 15.5
Cumulative C*A	= 0.0	Depth at inlet opening (in)	= 6
Flow contrib (cfs)	= 59	Confluence angle (deg)	= 0
Default Q (cfs)	= 59	Natural ground elev (ft)	= 83.72
Line capac. (cfs)	= 47.2	Line storage (cuft)	= 5372

LINE 10 / Q = 45.0 / HT = 36 / WID = 36 / N = .013 / L = 356 / JLC = .25

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10 / DNLN = 9

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	79.12	36.00	73.66	6.37	79.75	0.00	7.05	7.07
UPSTRM	80.74	36.00	75.44	6.37	81.37	0.00	6.75	7.07

Drainage area (ac)	= 0	Slope of invert (%)	= 0.500
Runoff coefficient	= 0	Slope energy grade line (%)	= 0.455
Time of conc (min)	= 1	Critical depth (in)	= 25.65
Inlet time (min)	= 0	Req'd length curb inlet (ft)	= 41.2
Intensity (in/hr)	= 0.00	Req'd grate area (sf)	= 11.8
Cumulative C*A	= 0.0	Depth at inlet opening (in)	= 6
Flow contrib (cfs)	= 45	Confluence angle (deg)	= 0
Default Q (cfs)	= 45	Natural ground elev (ft)	= 85.2
Line capac. (cfs)	= 47.2	Line storage (cuft)	= 2516

LINE 11 / Q = 20.3 / HT = 24 / WID = 24 / N = .013 / L = 256 / JLC = .25

---

11 / DNLN = 10

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	80.89	24.00	75.54	6.47	81.54	0.00	7.65	3.14
UPSTRM	83.12	24.00	76.82	6.46	83.77	0.00	7.68	3.14

Drainage area (ac)	= 0	Slope of invert (%)	= 0.500
Runoff coefficient	= 0	Slope energy grade line (%)	= 0.870
Time of conc (min)	= 0	Critical depth (in)	= 19.15
Inlet time (min)	= 0	Req'd length curb inlet (ft)	= 18.6
Intensity (in/hr)	= 0.00	Req'd grate area (sf)	= 5.3
Cumulative C*A	= 0.0	Depth at inlet opening (in)	= 6
Flow contrib (cfs)	= 20.3	Confluence angle (deg)	= 0
Default Q (cfs)	= 20.31	Natural ground elev (ft)	= 86.5
Line capac. (cfs)	= 16.0	Line storage (cuft)	= 804

LINE 12 / Q = 174.6 / HT = 48 / WID = 48 / N = .013 / L = 387.86 / JLC = .25

---

12 / DNLN = 3

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	25.25	48.00	20.46	13.89	28.25	0.00	4.75	12.56
UPSTRM	34.61	45.75	30.02	14.13	37.71	20.30	6.5	12.35

Drainage area (ac)	= 0	Slope of invert (%)	= 2.465
Runoff coefficient	= 0	Slope energy grade line (%)	= 2.438
Time of conc (min)	= 19	Critical depth (in)	= 45.70
Inlet time (min)	= 0	Req'd length curb inlet (ft)	= 159.9
Intensity (in/hr)	= 0.00	Req'd grate area (sf)	= 45.9
Cumulative C*A	= 0.0	Depth at inlet opening (in)	= 6
Flow contrib (cfs)	= 174.5	Confluence angle (deg)	= 0
Default Q (cfs)	= 174.55	Natural ground elev (ft)	= 40.52
Line capac. (cfs)	= 225.5	Line storage (cuft)	= 4832

LINE 13 / Q = 12.8 / HT = 24 / WID = 24 / N = .013 / L = 140 / JLC = .25

---

13 / DNLN = 10

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	80.89	24.00	76.04	4.07	81.15	0.00	7.15	3.14
UPSTRM	81.40	24.00	77.44	4.06	81.66	0.00	3.82	3.14

Drainage area (ac)	= 0	Slope of invert (%)	= 1.000
Runoff coefficient	= 0	Slope energy grade line (%)	= 0.365
Time of conc (min)	= 0	Critical depth (in)	= 15.18
Inlet time (min)	= 0	Req'd length curb inlet (ft)	= 11.7
Intensity (in/hr)	= 0.00	Req'd grate area (sf)	= 3.4
Cumulative C*A	= 0.0	Depth at inlet opening (in)	= 6
Flow contrib (cfs)	= 12.7	Confluence angle (deg)	= 90
Default Q (cfs)	= 12.77	Natural ground elev (ft)	= 83.27
Line capac. (cfs)	= 22.6	Line storage (cuft)	= 440

LINE 14 / Q = 13.7 / HT = 30 / WID = 30 / N = .013 / L = 260 / JLC = .25

---

14 / DNLN = 9

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	79.12	30.00	73.66	2.79	79.24	0.00	7.55	4.91
UPSTRM	79.44	30.00	75.25	2.79	79.56	0.00	4.48	4.91

Drainage area (ac)	= 0	Slope of invert (%)	= 0.612
Runoff coefficient	= 0	Slope energy grade line (%)	= 0.111
Time of conc (min)	= 0	Critical depth (in)	= 14.83
Inlet time (min)	= 0	Req'd length curb inlet (ft)	= 12.5
Intensity (in/hr)	= 0.00	Req'd grate area (sf)	= 3.6
Cumulative C*A	= 0.0	Depth at inlet opening (in)	= 6
Flow contrib (cfs)	= 13.6	Confluence angle (deg)	= 90
Default Q (cfs)	= 13.69	Natural ground elev (ft)	= 82.24
Line capac. (cfs)	= 32.1	Line storage (cuft)	= 1276

APPENDIX A

CITY OF ALBUQUERQUE
NEW MEXICO

AMOLE DEL NORTE
STORM DRAINAGE FACILITIES

TOWER/SAGE
DRAINAGE MASTER PLAN

RECEIVED
OCT 15 1997
HYDROLOGY SECTION

ANDREWS, ASBURY & ROBERT, INC.
CONSULTING ENGINEERS
ALBUQUERQUE, NEW MEXICO

CITY OF ALBUQUERQUE
NEW MEXICO

AMOLE DEL NORTE
STORM DRAINAGE FACILITIES

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APRIL 1995

REVISED OCTOBER 1997

Prepared By

ANDREWS, ASBURY & ROBERT, INC.
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City of Albuquerque

TOWER/SAGE DRAINAGE MASTER PLAN

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TABLE OF CONTENTS - CONTINUED

TABLE 2
TOWER/SAGE DRAINAGE MASTER PLAN
AHYMO BASIN PARAMETER WORKSHEET
PEAK BASIN FLOWS AND VOLUMES

(ALL FLOWS & VOLUMES INCLUDE A 5% BULKING FACTOR)

BASIN	AREA (ac.)	AREA (sq.mi.)	LENGTH (ft.)	ELEV. DIFF. (ft.)	SLOPE (%)	K	VEL (fps)	T(c) (hr.)	T(p) (hr.)	LAND TREATMENT (%) A	B	C	D	10 YEAR PEAK FLOW (6hr.) (cfs)	10 YEAR RUNOFF VOLUME (24hr.) (ac.ft.)	100 YEAR PEAK FLOW (6hr.) (cfs)	100 YEAR RUNOFF VOLUME (24hr.) (ac.ft.)
S5-D	15.2	0.0238	400	6.0	1.50	3.0	3.67	0.03	0.02								
			1000	4.0	0.40	3.0	1.90	0.15	0.10								
		TOTAL =						0.18	0.12		41		59	33	1.3	56	2.3
S6-D	24.2	0.0378	400	1.0	0.25	1.0	0.50	0.22	0.15								
			400	1.0	0.25	3.0	1.50	0.07	0.05								
			200	2.0	1.00	3.0	3.00	0.02	0.01								
			1100	5.0	0.45	3.0	2.02	0.15	0.10								
		TOTAL =						0.47	0.31		40		60	32	2.2	55	3.7
S7-D	36.5	0.0570	400	2.0	0.50	1.0	0.71	0.16	0.10								
			950	1.0	0.11	2.0	0.65	0.41	0.27								
			650	3.0	0.46	2.0	1.36	0.13	0.09								
		TOTAL =						0.70	0.46		29		71	43	3.7	70	6.2
S8-D	43.7	0.0683	400	2.0	0.50	1.0	0.71	0.16	0.10								
			1000	1.0	0.10	3.0	0.95	0.29	0.20								
			1100	6.0	0.55	3.0	2.22	0.14	0.09								
		TOTAL =						0.59	0.39		37		63	52	4.1	87	6.8
S9-D	47.9	0.0748	300	10.0	3.33	1.0	1.83	0.05	0.03								
			950	9.0	0.95	3.0	2.92	0.09	0.06								
			1150	33.0	2.87	3.0	5.08	0.06	0.04								
		TOTAL =						0.20	0.13		50		50	94	3.7	166	6.5

SEE MAP NO. 2 FOR BASIN IDENTIFICATION

TABLE 3

TOWER/SAGE DRAINAGE MASTER PLAN

SUMMARY OF PEAK DISCHARGES AND PEAK VOLUMES

(ALL FLOWS INCLUDE A 5% BULKING FACTOR)

ANALYSIS POINT	Q(10) (6hr.) (cfs)	V(10) (24hr.) (ac.ft.)	Q(100) (6hr.) (cfs)	V(100) (24hr.) (ac.ft.)
1	70	3.2	112	5.2
2	126	5.7	204	9.4
3	179	8.3	292	13.7
4	244	11.4	397	18.8
5	298	14.0	490	23.2
6	73	3.7	119	6.1
7	78	4.2	132	7.0
8	86	4.7	147	7.9
9	445	22.0	748	36.8
10	457	22.6	766	37.8
11	35	1.5	58	2.4
12	77	3.5	132	5.8
13	118	5.6	211	9.6
14	142	6.8	252	11.6
15	46	1.9	77	3.2
16	65	2.7	109	4.6
17	132	5.5	228	9.6
18	185	8.0	318	13.8
19	33	1.3	56	2.3
20	345	16.5	599	27.7
21	820	39.3	1414	67.2
22	23	39.3	25	67.2
23	59	42.1	90	71.9
24	111	45.8	178	78.1
25	151	50.2	250	85.9
26	56	2.5	91	4.1
27	104	5.2	170	8.7
28	127	8.2	207	13.5
29	14	0.5	24	0.9
30	22	1.1	39	1.9
31	24	1.7	46	3.0
32	30	2.1	57	3.7
33	180	11.7	303	19.6
34	217	14.9	368	25.2
35	32	2.2	55	3.7
36	71	5.9	118	9.8
37	120	9.9	201	16.7
38	149	13.7	251	23.2
39	58	2.4	96	4.0
40	83	3.6	138	5.9
41	124	5.4	199	8.9
42	48	2.1	77	3.4
43	171	7.5	276	12.3
44	175	8.0	283	13.2
45	36	1.5	55	2.5

NOTE: SEE MAP NO. 2 FOR LOCATION OF ANALYSIS POINTS

AMOLE DEL NORTE STORM DRAINAGE FACILITIES
TOWER/SAGE DRAINAGE MASTER PLAN

AHYMO SUMMARY TABLE (AH
INPUT FILE = MASTer6.IN

DATE (MON/DAY/YR) =10/09/1997
USER NO.= ANASRONM.101

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=	2.210
SEDIMENT BULK										PK BF =	1.05
COMPUTE NM HYD	A1-D&AP#1	-	3	.04580	111.86	4.273	1.74932	1.533	3.816	PER IMP=	76.00
ROUTE	AP-1R	3	2	.04580	109.16	4.273	1.74933	1.533	3.724		
COMPUTE NM HYD	A2-D	-	3	.03950	95.91	3.514	1.66790	1.500	3.794	PER IMP=	70.00
ADD HYD	AP#2	2& 3	10	.08530	203.51	7.787	1.71161	1.533	3.728		
ROUTE	AP#2R	10	2	.08530	194.79	7.787	1.71162	1.567	3.568		
COMPUTE NM HYD	A3-D	-	3	.04190	102.87	3.576	1.60006	1.500	3.836	PER IMP=	65.00
ADD HYD	AP#3	2& 3	10	.12720	291.85	11.362	1.67486	1.533	3.585		
ROUTE	AP#3R	10	2	.12720	286.92	11.362	1.67487	1.533	3.524		
COMPUTE NM HYD	A4-D	-	3	.04390	109.89	4.223	1.80360	1.533	3.911	PER IMP=	80.00
ADD HYD	AP#4	2& 3	10	.17110	396.80	15.585	1.70789	1.533	3.624		
ROUTE	AP#4R	10	2	.17110	392.87	15.585	1.70790	1.567	3.588		
COMPUTE NM HYD	A5-D	-	3	.04520	102.56	3.694	1.53221	1.500	3.545	PER IMP=	60.00
ADD HYD	AP#5	2& 3	10	.21630	490.46	19.279	1.67118	1.533	3.543		
ROUTE	AP#5R	10	2	.21630	488.61	19.279	1.67118	1.567	3.530		
COMPUTE NM HYD	A6-D	-	3	.04520	95.37	3.367	1.39652	1.500	3.297	PER IMP=	50.00
ADD HYD	PART_AP#9	2& 3	10	.26150	573.77	22.645	1.62370	1.567	3.428		
COMPUTE NM HYD	A7-D	-	3	.02060	43.47	1.534	1.39651	1.500	3.297	PER IMP=	50.00
ADD HYD	PART_AP#9	10& 3	10	.28210	616.11	24.180	1.60711	1.533	3.413		
COMPUTE NM HYD	A8-D&AP#6	-	3	.05700	119.28	5.070	1.66790	1.567	3.270	PER IMP=	70.00
ROUTE	AP&6R	3	2	.05700	115.76	5.070	1.66791	1.600	3.173		
COMPUTE NM HYD	A9-D	-	3	.01020	22.61	.760	1.39652	1.500	3.464	PER IMP=	50.00
ADD HYD	AP#7	2& 3	20	.06720	131.61	5.830	1.62670	1.600	3.060		
ROUTE	AP#7R	20	2	.06720	131.12	5.830	1.62671	1.600	3.049		
COMPUTE NM HYD	A10-D	-	3	.01020	22.61	.760	1.39652	1.500	3.464	PER IMP=	50.00
ADD HYD	AP#8	2& 3	20	.07740	146.97	6.590	1.59636	1.600	2.967		
ROUTE	AP#8R	20	2	.07740	143.44	6.590	1.59637	1.633	2.896		
ADD HYD	AP#9	10& 2	10	.35950	747.50	30.769	1.60480	1.567	3.249		
ROUTE	AP#9R	10	2	.35950	747.19	30.769	1.60480	1.567	3.248		
COMPUTE NM HYD	A11-D	-	3	.00860	22.64	.802	1.74932	1.500	4.113	PER IMP=	76.00
ADD HYD	AP#10	2& 3	20	.36810	765.60	31.572	1.60817	1.567	3.250		
COMPUTE NM HYD	B1-D&AP#11	-	3	.02300	57.58	2.013	1.64077	1.500	3.912	PER IMP=	68.00
ROUTE	AP#11R	3	2	.02300	53.26	2.013	1.64077	1.533	3.618		
COMPUTE NM HYD	B2-D	-	3	.03500	83.14	2.860	1.53221	1.500	3.712	PER IMP=	60.00
ADD HYD	AP#12	2& 3	10	.05800	132.29	4.873	1.57525	1.533	3.564		
ROUTE	AP#12R	10	2	.05800	124.14	4.873	1.57526	1.567	3.344		
COMPUTE NM HYD	B3-D	-	3	.04360	89.24	3.247	1.39652	1.533	3.198	PER IMP=	50.00
ADD HYD	AP#13	2& 3	10	.10160	210.88	8.120	1.49854	1.533	3.243		
ROUTE	AP#13R	10	2	.10160	209.23	8.120	1.49855	1.567	3.218		
COMPUTE NM HYD	B4-D	-	3	.02300	50.97	1.713	1.39652	1.500	3.463	PER IMP=	50.00
ADD HYD	AP#14	2& 3	10	.12460	251.67	9.833	1.47971	1.567	3.156		
ROUTE	AP#14R	10	12	.12460	251.49	9.833	1.47971	1.567	3.154		
COMPUTE NM HYD	S1-D&AP#15	-	3	.03140	77.10	2.680	1.60006	1.500	3.836	PER IMP=	65.00
ROUTE	AP-15R	3	2	.03140	75.27	2.680	1.60006	1.533	3.745		
COMPUTE NM HYD	S2-D	-	3	.01630	36.13	1.214	1.39652	1.500	3.463	PER IMP=	50.00
ADD HYD	AP#16	2& 3	10	.04770	109.77	3.894	1.53049	1.533	3.596		
ROUTE	AP#16R	10	2	.04770	109.08	3.894	1.53050	1.533	3.573		

100 YEAR – 6 HOUR SUMMARY

100/6

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	S3-D	-	3	.05670	119.63	4.223	1.39652	1.500	3.297	PER IMP= 50.00
ADD HYD	AP#17	2& 3	10	.10440	227.71	8.117	1.45773	1.533	3.408	
ROUTE	AP#17R	10	2	.10440	224.43	8.117	1.45773	1.533	3.359	
COMPUTE NM HYD	S4-D	-	3	.04360	93.23	3.563	1.53221	1.533	3.341	PER IMP= 60.00
ADD HYD	AP#18	2& 3	10	.14800	317.66	11.679	1.47967	1.533	3.354	
*SXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX										
ROUTE	AP#18R	10	2	.14800	310.07	11.680	1.47967	1.567	3.274	
ADD HYD	AP#14	12& 2	10	.27260	561.56	21.513	1.47969	1.567	3.219	
ROUTE	AP#14R	10	2	.27260	560.09	21.513	1.47969	1.567	3.210	
COMPUTE NM HYD	S5-D	-	3	.02380	56.16	1.928	1.51864	1.500	3.687	PER IMP= 59.00
ADD HYD	AP#19	2& 3	10	.29640	606.42	23.440	1.48281	1.567	3.197	
ROUTE	AP#20R	11	10	.29640	608.87	23.440	1.48281	1.567	3.210	
*SXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX										
ADD HYD	PART_AP#21	20&10	10	.66450	1374.46	55.012	1.55226	1.567	3.232	
COMPUTE NM HYD	B5-D_TWRPND	-	3	.03910	54.90	1.551	.74390	1.500	2.194	PER IMP= 5.00
ADD HYD	AP#21	10& 3	20	.70360	1423.86	56.563	1.50733	1.567	3.162	
ROUTE RESERVOIR	AP#22	20	12	.70360	25.11	35.840	.95509	2.967	.056	AC-FT= 51.032
ROUTE	AP#22R	12	2	.70360	25.11	35.755	.95282	3.000	.056	
COMPUTE NM HYD	B6-D	-	3	.04590	67.94	3.917	1.60006	1.700	2.313	PER IMP= 65.00
ADD HYD	AP#23	2& 3	10	.74950	89.55	39.672	.99245	1.700	.187	
ROUTE	AP#23R	10	2	.74950	87.07	39.559	.98964	1.767	.182	
COMPUTE NM HYD	B7-D	-	3	.05910	96.51	5.129	1.62720	1.667	2.552	PER IMP= 67.00
ADD HYD	AP#24	2& 3	10	.80860	178.22	44.688	1.03624	1.700	.344	
ROUTE	AP#24R	10	2	.80860	176.44	44.591	1.03398	1.733	.341	
COMPUTE NM HYD	B8-D	-	3	.08910	85.98	6.636	1.39652	1.900	1.508	PER IMP= 50.00
ADD HYD	AP#25	2& 3	30	.89770	249.54	51.227	1.06996	1.767	.434	
COMPUTE NM HYD	A12-D&AP#26	-	3	.03590	90.60	3.349	1.74932	1.500	3.943	PER IMP= 76.00
ROUTE	AP#26R	3	2	.03590	88.53	3.349	1.74933	1.533	3.853	
COMPUTE NM HYD	A13-D	-	3	.04520	85.68	3.857	1.60006	1.567	2.962	PER IMP= 65.00
ADD HYD	AP#27	2& 3	10	.08110	170.19	7.207	1.66612	1.567	3.279	
ROUTE	AP#27R	10	2	.08110	163.37	7.207	1.66613	1.567	3.148	
COMPUTE NM HYD	A14-D	-	3	.04520	63.41	4.021	1.66790	1.767	2.192	PER IMP= 70.00
ADD HYD	AP#28	2& 3	10	.12630	206.62	11.227	1.66675	1.600	2.556	
ROUTE	AP#28R	10	2	.12630	205.14	11.227	1.66676	1.633	2.538	
COMPUTE NM HYD	A15-D	-	3	.02530	47.80	2.067	1.53221	1.567	2.952	PER IMP= 60.00
ADD HYD	PART_AP#33	2& 3	20	.15160	250.62	13.295	1.64430	1.600	2.583	
COMPUTE NM HYD	A17-D&AP#29	-	3	.01080	23.94	.804	1.39652	1.500	3.464	PER IMP= 50.00
ROUTE	AP&29R	3	2	.01080	17.25	.804	1.39654	1.567	2.496	
COMPUTE NM HYD	A18-D	-	3	.01030	24.48	.842	1.53221	1.500	3.713	PER IMP= 60.00
ADD HYD	AP#30	2& 3	10	.02110	39.23	1.646	1.46272	1.533	2.905	
ROUTE	AP&30R	10	2	.02110	27.05	1.646	1.46274	1.633	2.003	
COMPUTE NM HYD	A19-D	-	3	.01080	21.52	.883	1.53221	1.567	3.114	PER IMP= 60.00
ADD HYD	AP#31	2& 3	10	.03190	46.47	2.529	1.48619	1.600	2.276	
ROUTE	AP#31R	10	2	.03190	45.55	2.529	1.48621	1.633	2.231	
COMPUTE NM HYD	A20-D	-	3	.00690	16.40	.564	1.53221	1.500	3.715	PER IMP= 60.00
ADD HYD	AP#32	2& 3	10	.03880	56.70	3.092	1.49437	1.600	2.283	
ROUTE	AP#32R	10	22	.03880	53.24	3.092	1.49438	1.633	2.144	
ADD HYD	AP#33	20&22	10	.19040	302.55	16.387	1.61374	1.600	2.483	
ROUTE	AP#33R	10	2	.19040	300.65	16.387	1.61375	1.633	2.467	
COMPUTE NM HYD	A16-D	-	3	.06380	76.29	4.752	1.39652	1.733	1.868	PER IMP= 50.00
ADD HYD	AP#34	2& 3	10	.25420	368.19	21.139	1.55922	1.667	2.263	
COMPUTE NM HYD	S6-D&AP#35	-	3	.03780	54.70	3.089	1.53221	1.700	2.261	PER IMP= 60.00

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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	AP#35R	3	2	.03780	53.55	3.089	1.53221	1.733	2.213	
COMPUTE NM HYD	S7-D	-	3	.05700	69.88	5.112	1.68147	1.867	1.915	PER IMP= 71.00
ADD HYD	AP#36	2& 3	10	.09480	118.32	8.201	1.62194	1.800	1.950	
ROUTE	AP#36R	10	2	.09480	115.67	8.201	1.62195	1.833	1.906	
COMPUTE NM HYD	S8-D	-	3	.06830	87.17	5.730	1.57292	1.767	1.994	PER IMP= 63.00
ADD HYD	AP#37	2& 3	10	.16310	201.19	13.930	1.60141	1.800	1.927	
ROUTE	AP#37R	10	2	.16310	201.09	13.930	1.60141	1.833	1.926	
COMPUTE NM HYD	S9-D	-	3	.07480	165.79	5.571	1.39652	1.500	3.463	PER IMP= 50.00
ADD HYD	AP#38	2& 3	20	.23790	251.17	19.501	1.53698	1.767	1.650	
COMPUTE NM HYD	C1-D&AP#39	-	3	.03860	96.00	3.350	1.62720	1.500	3.886	PER IMP= 67.00
ROUTE	AP#39R	3	2	.03860	93.15	3.350	1.62720	1.533	3.771	
COMPUTE NM HYD	C2-D	-	3	.01880	46.17	1.604	1.60006	1.500	3.837	PER IMP= 65.00
ADD HYD	AP#40	2& 3	10	.05740	137.58	4.954	1.61830	1.500	3.745	
ROUTE	AP#40R	10	2	.05740	136.26	4.954	1.61831	1.533	3.709	
COMPUTE NM HYD	C3-D	-	3	.02340	66.79	2.420	1.93929	1.500	4.460	PER IMP= 90.00
ADD HYD	AP#41	2& 3	10	.08080	199.05	7.374	1.71126	1.533	3.849	
COMPUTE NM HYD	C4-D&AP#42	-	3	.03080	76.75	2.829	1.72218	1.500	3.893	PER IMP= 74.00
ROUTE	AP#42R	3	2	.03080	76.59	2.829	1.72219	1.533	3.885	
ADD HYD	AP#43	10& 2	10	.11160	275.63	10.203	1.71427	1.533	3.859	
ROUTE	AP#43R	10	2	.11160	261.93	10.203	1.71427	1.533	3.667	
COMPUTE NM HYD	C5-D	-	3	.00910	21.80	.762	1.57073	1.500	3.742	PER IMP= 50.00
ADD HYD	AP#44	2& 3	10	.12070	283.42	10.966	1.70345	1.533	3.669	
COMPUTE NM HYD	C6-D&AP#45	-	3	.01940	55.38	2.007	1.93929	1.500	4.460	PER IMP= 90.00
FINISH										