DRAINAGE PLAN SUMMARY
for
COTTONWOOD VILLAGE

October 1995

DRAINAGE PLAN FOR LOTS 1A, 2A-1 & 2B-1, NORTHEAST PORTION OF BLACK RANCH
Cottonwood Village

This proposed development and plat was previously planned and platted by Bohannan-Huston in 1989. It consisted of a total of 7 lots, 6 of which have remained vacant and one that has been doing business as Pep Boys. Our goal is to replat the existing 4 lots south of Pep Boys into 3 lots.

On the previous conceptual grading plan, drainage was to be collected in four ponds from 4 separate basins as follows and as shown on the attached:

Drainage Basin A – covering most of the 2 most southerly lots; 1.71 AC

Drainage Basin B – covering the area between Basin A and Pep Boys; 1.79 AC

Drainage Basin C – covering Pep Boys; 2.27 AC

Drainage Basin D – covering the remaining lots north of Pep Boys; 2.34 AC

Four ponding areas were planned; one pond for Basin A, one pond for Basin B, one pond for Basin D and one pond for Basin C behind Pep Boys for the remaining area. Ponds B and D were to be intermediate, collecting basin runoff and discharging into Pond C before discharging directly into the acequia. Retention of runoff was required initially for the Pep Boys site since the North Coors Drainage Improvements to the Corrales Acequia were not yet in place. Pipes connecting future ponds for Basin B and D were placed in the embankment and plugged so that future development could be readily accommodated in the future. Since completion of the channel improvements, the active pond for the Pep Boys property is now a smaller detention pond. Improvements to the Corrales Acequia include a spillway at the southeast corner of Basin A, to which developed and controlled runoff will be conveyed.

From the Bohannan-Huston plan (copy from AMAFCA microfilm enclosed) of the Pep Boys facility, ultimate detention ponding capacity is as follows:

Ponding Area B	*0.205 Ac. Ft. (34.5%)*
Ponding Area C	*0.260 Ac. Ft. (43.8%)*
Ponding Area D	*0.1421 Ac. Ft. (21.7%)*
	0.593 Ac. Ft.

The revision to the North Coors Drainage Management Plan (NCDMP) by Wilson & Co. updated the hydrology and produced a maximum storage requirement of 0.5554 Ac. Ft. (see pg. 24 of Wilson's AHYMO) for the series of Ponds B, C & D. Of this hydrograph's volume, 34.5% will result in a ponding requirement of 0.1916 Ac. Ft. or 8347 Ft^3. for Pond B. Total peak discharge for Basins B, C & D from AHYMO routing by Wilson & Co., will be 25.21 cfs (see pg. 23 of Wilson's AHYMO). The Basin B portion of the total translates into an anticipated peak discharge of 8.70 cfs (34.5%) uncontrolled.

The NCDMP revision permits an allowable discharge rate of 6.0 cfs from Pond C east of Pep Boys (designated pond 8.1 in the attached NCDMP summary table) into the Corrales Acequia. For Basin B, the 34.5% portion of this predetermined discharge results in an allowable flow of 2.07 cfs. This rate will be achieved by means of an orifice covering the proposed 18" storm drain opening.

In an effort to eliminate the potential impact of this discharge on the existing Basin C pond east of Pep Boys, runoff from Basin B will instead be ponded in the parking lot and diverted south to the spillway at the southeast corner of Basin A after being detained in an intermediate pond below the parking area. Detention volume of at least 8347 ft³ will be provided in the Basin B parking lot.

Runoff from Basin A will also be collected in a parking lot pond, then discharged via an 18" storm drain into the intermediate pond below the parking area. Utilizing the revised NCDMP provided by Wilson & Co. (Hyd No. 509.1, pg. 27 of Wilson's AHYMO run), ponding volume required for Basin A is 0.1542 Ac. Ft. or 6,716 ft³, and the controlled discharge rate is 3.0 cfs. The uncontrolled discharge rate is 9.0 cfs. (See calculations summary table from Wilson & Co. NCDMP to find developed rate and allowable rate of 3 cfs from pond #8.2.)

Combining the developed, unrestricted flow form both Basin A and B would yield a potential maximum discharge of 17.7 cfs. A spillway discharging from the parking lot to the existing AMAFCA spillway located at the southeast corner of the site will be sized to accommodate this flow.

Off-site flow also has the potential to impact this site. Undeveloped flow from the proposed Riverwalk site, in conjunction with some flow from Alameda west and Coors Blvd. pavement totals approximately 35 cfs. Once across Coors Blvd., the flow is presently steered down a shotcrete/riprap channel existing along this site's south property line, which will remain and continue to convey these off-site flows, but only under emergency conditions. Natural depressions along the west side of Coors, occupying a volume of 8325 ft³ (0.191 Ac. Ft.), will allow sediment to accumulate and act as a buffer on the peak flow of 35 cfs. A retention pond planned for the area between our site and Coors Blvd. will provide an additional 5072 Ft.³ of storage. A temporary asphalt emergency spillway will safely convey an estimated peak discharge 27 cfs that will result from the ponding effects. Coincidentally, the NCDMP has anticipated that 27 cfs of developed runoff will ultimately be discharged from the Riverwalk Pond #7.

dmg D. Mark Goodwin & Associates, P.A.
Consulting Engineers and Surveyors

PROJECT Cottonwood Village
SUBJECT Drainage
BY JMM DATE 10/6/95
CHECKED _____ DATE _____
SHEET 1 OF ____

Off-Site Areas

On the west side of Coors Blvd., off site runoff is generated in three basins that are each identified in the North Coors Drainage Mngmt. Plan:

4.1.3 Riverwalk

4.1.4. Service Rd. along north side of Alameda West

4.1.5 Coors Blvd. Right of Way

The Riverwalk report by Bohannan-Huston, dated 1989 and 1990 was review to determine exact runoff quantities under existing conditions. It was found that only 7.17 Acres of the site drains toward Coors Blvd. from existing topography. Two natural depressions collect runoff and sediment prior to discharging across Coors. These natural depressions were found to occupy a volume of 8325 ft^3, or 0.1953 Ac. Ft. As a result, ultimate discharge will be relatively clean. From the NCOMP, the required sediment storage is 0.0024 Ac.Ft./Ac.

Vol. = (0.0024)(7.17 Ac.) = 0.0172 Ac.Ft.

Current AHYMO was utilized to determine that 13.94 cfs and 0.4538 ft^3 is generated within the Riverwalk basin under existing conditions.

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Storage for Ponding Area X (PRIMARILY OFF SITE AREAS)

Elevation	Area	Avg. Area	Depth	Volume (Ac.Ft)
12.0	0			
		705	2.0	0.0324
14.0	1410			
		1860	0.68	0.0290
14.68	2310			
		2708	0.67	0.0416
15.35	3105			0.103

Storage for Ponding Area Y

14.5	0			
		517.5	0.5	0.006
15.0	1035			
		2335	1.0	0.0536
16.0	3636			
		4653	0.5	0.0534
16.5	5670			0.113 Ac.Ft.

Basin Z discharges directly into Basin Y without storage. Volume generated in Basins Y and Z from AHYMO is 0.102 Ac.Ft. so the on-site pond Y provides enough storage to fully retain the generated volume in both basins Y and Z.

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BY GNM DATE 10/6/95
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SHEET 3 OF ____

PONDING VOLUMES (ON-SITE PARKING)

Ponding Area A

Elevation	Area ft^2	Avg. Area ft^2	Depth ft	Volume ft^3
5009.2	0			
		900	0.8	900
5010.0	1800			
		4320	1.0	4320
5011.0	6480			
		7380	0.21	1550
5011.21	8280			

6770 ft^3

Ponding volume required is 6716 ft^3

Ponding Area B

Elevation	Area ft^2	Avg. Area ft^2	Depth ft	Volume ft^3
5009.2	0			
		855 878	0.8	684 702
5010.0	1710 1755			
		3690 3713	1.0	3690 3713
5011.0	5610 5670			
		7065 6773	0.60	4239 4196
5011.60	8460 8316			

8613 ft^3
8610

ponding vol. req'd is 8449 ft^3

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PROJECT Cottonwood Village
SUBJECT Drainage
BY GMH DATE 10/6/95
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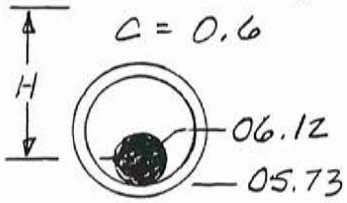
SHEET 4 OF ____

CONTROLLED DISCHARGE

Allowable discharge rate from Basin A is 3.0 cfs.*
Covering the opening of the RCP storm drain will be a 9¼" diameter orifice set at the invert of the opening (see detail on plan). Max Water Surface = 11.21 $A = 0.467 ft^2$ $C = 0.6$

$$H = \frac{\left(\frac{R}{CA}\right)^2}{2g} = \frac{\left[\frac{5.07}{(0.6)(0.467)}\right]^2}{2(32.2)} = 5.09 \text{ ft}$$



This will regulate the discharge into the ponding area below and east of the parking area, prior to discharge into the Corrales Acequia. Resultant inv. elev. 5.37

* 2.07 cfs from basin B results in total flow of 5.07 cfs

Allowable discharge from Basin B is 2.07 cfs - Use 6" orifice
Max Water Surface = 11.60 $A = 0.196 ft^2$ $C = 0.60$

$$H = \frac{\left[\frac{2.07}{(0.6)(0.196)}\right]^2}{2(32.2)} = 4.81 \text{ ft}$$

= 11.60

As a result, discharge from Pond B is throttled down to a rate of 2.07 cfs through the 18" RCP. This will discharge into the catch basin for pond A. The catch basin will have two chambers; one acting as a by-pass for Basin B and one throttling flow for Basin A. See attached pipe chart to verify that min. slope of 0.4% will sufficiently convey the 5.07 from pond A to the spillway at the south end of the site.

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SUBJECT Drainage
BY JMM DATE 10/6/25
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SHEET 5 OF ____

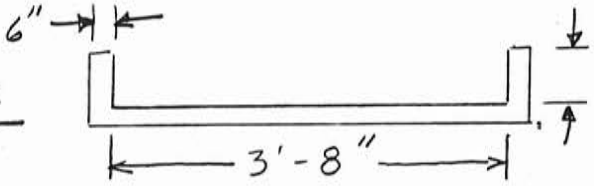
The spillway from ponds A and B to the existing AMAFCA spillway on the Corrales Acequia is to be sized for a developed flow of 17.7 cfs (Pond A = 9 cfs & Pond B = 8.7 cfs)

$Q = 2.9\ L H^{3/2}$ $\qquad L = \frac{Q}{2.9(H)^{3/2}} = \frac{17.7\ cfs}{2.9(.79)^{1.5}} = 8.69'$

Use 8'-8" opening

Once in the channel from the spillway, its flow capacity needs to be checked:

SECTION ONE

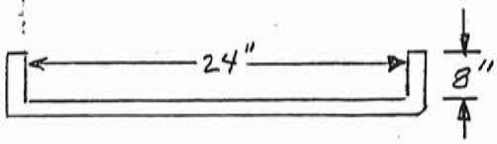


WP = 4.84
A = 2.34
slope = 1.83%

$Q = \frac{1.49}{.014}(2.34)\left(\frac{2.34}{4.84}\right)^{.67}(.0183)^{.5}$

Q = 22.02 cfs or 24% of the anticipated 17.7 cfs

SECTION TWO



WP = 3.34
A = 1.34
slope = 7.65%

$Q = \frac{1.49}{.014}(1.34)\left(\frac{1.34}{3.34}\right)^{.67}(.0765)^{.5} = 21.4\ cfs$

This channel is capable of receiving 21% of the 17.7 cfs.

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PROJECT Cottonwood Village
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BY gmm DATE 10/6/95
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Temporary Asphalt Emergency Spillway

$Q = 29.77$ cfs $\quad L = \frac{Q}{2.9(H)^{1.5}} = \frac{29.77}{2.9(0.67)^{1.5}} = 18.71$

use 18'-9"

This swale will connect the ponding area along the west side of the site with the shotcrete channel along the south side of the site.

$WP = 13'$ $\quad Area = 6'$ $\quad Slope = 1.26\%$ $\quad width = 9'$

$$Q = \frac{1.49}{.015}(6)\left(\frac{6}{13}\right)^{.67}(.0126)^{.5} = 39.9 \text{ cfs}$$

$$Q = \frac{1.49}{.015}(4.69)\left(\frac{4.69}{8.34}\right)^{.67}(.015)^{.5} = 38.80$$

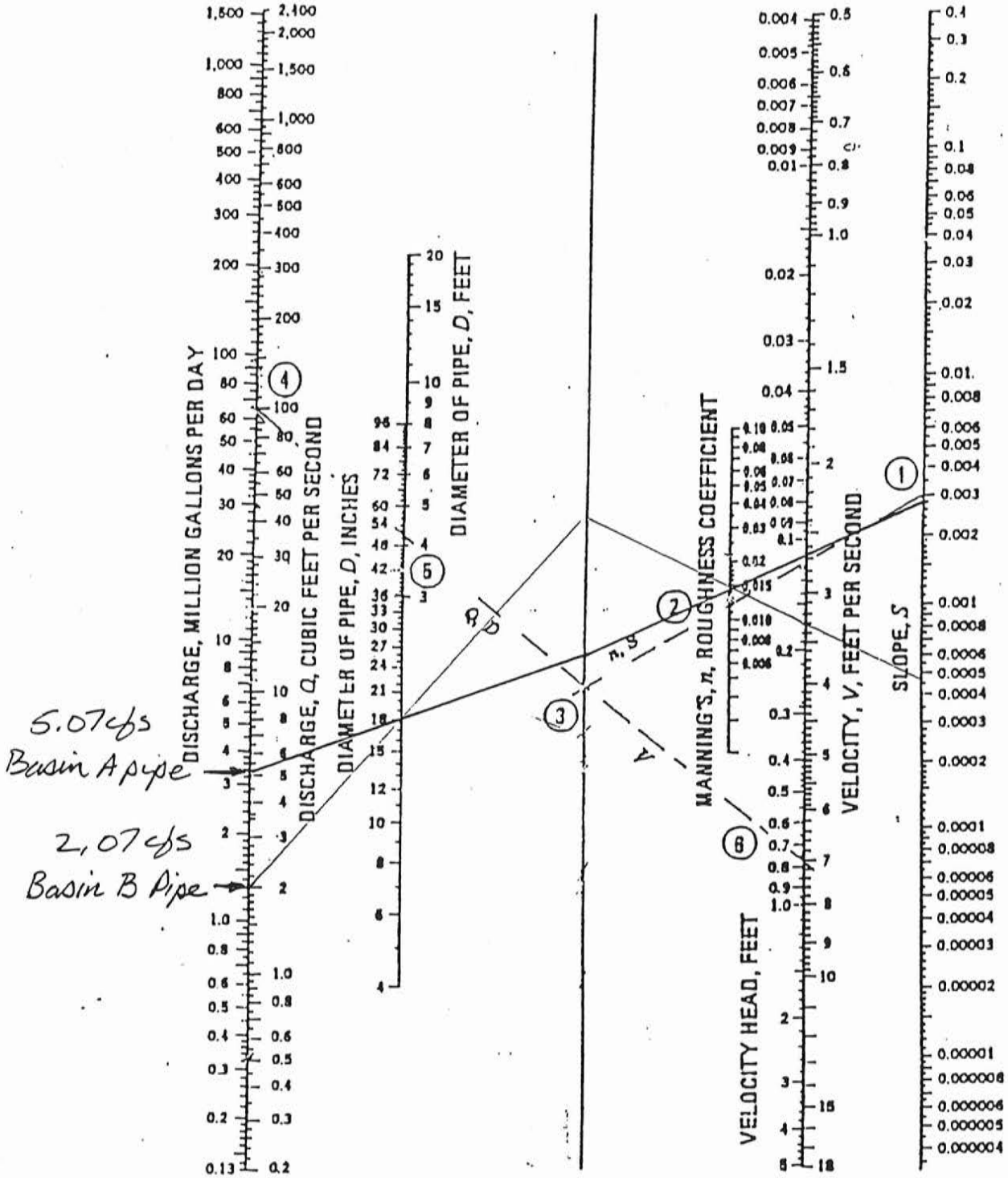
this is substantially greater than the anticipated flow of 29.77 cfs.

18" RCP's conveying flow from ponds A and B to the emergency spillway on-site.

- Slope of Pipe from D.I. in basin A $s = 1.0\%$
  Discharge from Basin A = 5.07 cfs
  Necessary slope to convey this flow is 0.3%
- slope of pipe from D.I. in Basin B $s = 0.45\%$
  Discharge from Basin B = 2.07 cfs
  Necessary slope to convey this flow is 0.05%

Basin A&B Pipes sht. 7

Reference: American Concrete Pipe Association (1980).



5.07 cfs
Basin A pipe

2.07 cfs
Basin B Pipe

B) Circular Pipe Solution

Storm Drain Discharging to Spillway

625-040-207-a
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PROPOSED CONDITIONS ON-SITE

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AHYMO PROGRAM (AHYMO194) - AMAFCA Hydrologic Model - January, 1994
     RUN DATE (MON/DAY/YR) = 09/14/1995
     START TIME (HR:MIN:SEC) = 16:14:27      USER NO.= M_GOODWN.I01
     INPUT FILE = RUDYOS.DAT

START                  TIME=0.0

*****RUDY'S ON COORS

*****SEPTEMBER 1995

RAINFALL               TYPE=1 RAIN QUARTER=0.0 IN

                       RAIN ONE=1.87 IN RAIN SIX=2.19 IN

                       RAIN DAY=2.62 IN DT=0.0333 HR

                  COMPUTED 6-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2
- PEAK AT 1.40 HR.
                  DT =     .033300 HOURS        END TIME =     5.994000 HOURS
                     .0000   .0015   .0031   .0047   .0063   .0080   .0097
                     .0114   .0132   .0151   .0169   .0189   .0209   .0229
                     .0250   .0271   .0294   .0317   .0340   .0365   .0390
                     .0417   .0444   .0473   .0502   .0533   .0566   .0600
                     .0636   .0673   .0713   .0765   .0820   .0879   .1000
                     .1280   .1711   .2330   .3177   .4291   .5713   .7484
                     .9647  1.1723  1.2575  1.3292  1.3929  1.4508  1.5041
                    1.5535  1.5997  1.6430  1.6838  1.7222  1.7586  1.7929
                    1.8255  1.8564  1.8857  1.9135  1.9399  1.9471  1.9528
                    1.9582  1.9633  1.9682  1.9729  1.9774  1.9818  1.9859
                    1.9900  1.9939  1.9977  2.0013  2.0049  2.0083  2.0117
                    2.0150  2.0182  2.0213  2.0243  2.0273  2.0302  2.0331
                    2.0359  2.0386  2.0413  2.0439  2.0465  2.0490  2.0515
                    2.0539  2.0563  2.0587  2.0610  2.0633  2.0656  2.0678
```

2.0844	2.0863	2.0883	2.0902	2.0921	2.0939	2.0958
2.0976	2.0994	2.1012	2.1029	2.1046	2.1064	2.1081
2.1097	2.1114	2.1131	2.1147	2.1163	2.1179	2.1195
2.1211	2.1226	2.1242	2.1257	2.1272	2.1287	2.1302
2.1316	2.1331	2.1346	2.1360	2.1374	2.1388	2.1402
2.1416	2.1430	2.1444	2.1457	2.1471	2.1484	2.1497
2.1510	2.1523	2.1536	2.1549	2.1562	2.1575	2.1587
2.1600	2.1612	2.1625	2.1637	2.1649	2.1661	2.1673
2.1685	2.1697	2.1709	2.1720	2.1732	2.1743	2.1755
2.1766	2.1778	2.1789	2.1800	2.1811	2.1822	2.1833
2.1844	2.1855	2.1866	2.1877	2.1887	2.1898	

sht 9

****** PROPOSED CONDITIONS WITHIN ON-SITE BASIN "A"

COMPUTE NM HYD ID=1 HYD NO=101.1 AREA=0.0021 SQ MI

PER A=0 PER B=15 PER C=0 PER D=85

TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 7.0473 CFS UNIT VOLUME = .9978 B = 526.28
P60 = 1.8700
AREA = .001785 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .130992HR TP = .133300HR K/TP RATIO = .982685 SHAPE CONSTANT, N = 3.593448
UNIT PEAK = .77294 CFS UNIT VOLUME = .9821 B = 327.09
P60 = 1.8700
AREA = .000315 SQ MI IA = .50000 INCHES INF = 1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 101.10

RUNOFF VOLUME = 1.76218 INCHES = .1974 ACRE-FEET
PEAK DISCHARGE RATE = 5.41 CFS AT 1.499 HOURS BASIN AREA = .0021 SQ. MI.

****** PROPSODED CONDITIONS WITNIN ON-SITE BASIN "B"

COMPUTE NM HYD ID=2 HYD NO=101.2 AREA=0.0023 SQ MI

PER A=0 PER B=15 PER C=0 PER D=85

TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 7.7184 CFS UNIT VOLUME = .9978 B = 526.28
P60 = 1.8700
AREA = .001955 SQ MI IA = .10000 INCHES INF = .04000 I

```
NCHES PER HOUR
        RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=    .033300


        K =    .130992HR     TP =    .133300HR     K/TP RATIO =    .982685      SHAPE
 CONSTANT, N =  3.593448
        UNIT PEAK =    .84655     CFS   UNIT VOLUME =     .9835        B =    327.09
      P60 = 1.8700
        AREA =       .000345 SQ MI     IA =     .50000 INCHES     INF =    1.25000 I
NCHES PER HOUR
        RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=    .033300

    PRINT HYD            ID=2 CODE=1                                    sht 10


                                        PARTIAL HYDROGRAPH    101.20


        RUNOFF VOLUME =      1.76218 INCHES      =         .2162 ACRE-FEET
        PEAK DISCHARGE RATE =        5.92 CFS   AT    1.499 HOURS    BASIN AREA =
 .0023 SQ. MI.


    ADD HYD              ID=1 HYD NO=101.3 ID=1 ID=2

    PRINT HYD            ID=1 CODE=1


                                        PARTIAL HYDROGRAPH    101.30


        RUNOFF VOLUME =      1.76205 INCHES      =         .4135 ACRE-FEET
        PEAK DISCHARGE RATE =       11.34 CFS   AT    1.499 HOURS    BASIN AREA =
 .0044 SQ. MI.


    FINISH


        NORMAL PROGRAM FINISH          END TIME (HR:MIN:SEC) = 16:14:34
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EXISTING CONDITIONS OFF-SITE, UPSTREAM

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AHYMO PROGRAM (AHYMO194) - AMAFCA Hydrologic Model - January, 1994
     RUN DATE (MON/DAY/YR) = 09/14/1995
     START TIME (HR:MIN:SEC) = 15:43:38      USER NO.= M_GOODWN.I01
     INPUT FILE = RUDYA.DAT

START                TIME=0.0

*****COTTONWOOD VILLAGE RETAIL CENTER ON COORS BLVD.

*****SEPTEMBER 1995

RAINFALL             TYPE=1 RAIN QUARTER=0.0 IN

                     RAIN ONE=1.87 IN RAIN SIX=2.19 IN

                     RAIN DAY=2.62 IN DT=0.0333 HR

          COMPUTED 6-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2
```

DT = .033300 HOURS END TIME = 5.994000 HOURS

.0000	.0015	.0031	.0047	.0063	.0080	.0097
.0114	.0132	.0151	.0169	.0189	.0209	.0229
.0250	.0271	.0294	.0317	.0340	.0365	.0390
.0417	.0444	.0473	.0502	.0533	.0566	.0600
.0636	.0673	.0713	.0765	.0820	.0879	.1000
.1280	.1711	.2330	.3177	.4291	.5713	.7484
.9647	1.1723	1.2575	1.3292	1.3929	1.4508	1.5041
1.5535	1.5997	1.6430	1.6838	1.7222	1.7586	1.7929
1.8255	1.8564	1.8857	1.9135	1.9399	1.9471	1.9528
1.9582	1.9633	1.9682	1.9729	1.9774	1.9818	1.9859
1.9900	1.9939	1.9977	2.0013	2.0049	2.0083	2.0117
2.0150	2.0182	2.0213	2.0243	2.0273	2.0302	2.0331
2.0359	2.0386	2.0413	2.0439	2.0465	2.0490	2.0515
2.0539	2.0563	2.0587	2.0610	2.0633	2.0656	2.0678
2.0699	2.0721	2.0742	2.0763	2.0784	2.0804	2.0824
2.0844	2.0863	2.0883	2.0902	2.0921	2.0939	2.0958
2.0976	2.0994	2.1012	2.1029	2.1046	2.1064	2.1081
2.1097	2.1114	2.1131	2.1147	2.1163	2.1179	2.1195
2.1211	2.1226	2.1242	2.1257	2.1272	2.1287	2.1302
2.1316	2.1331	2.1346	2.1360	2.1374	2.1388	2.1402
2.1416	2.1430	2.1444	2.1457	2.1471	2.1484	2.1497
2.1510	2.1523	2.1536	2.1549	2.1562	2.1575	2.1587
2.1600	2.1612	2.1625	2.1637	2.1649	2.1661	2.1673
2.1685	2.1697	2.1709	2.1720	2.1732	2.1743	2.1755
2.1766	2.1778	2.1789	2.1800	2.1811	2.1822	2.1833
2.1844	2.1855	2.1866	2.1877	2.1887	2.1898	

sht 12

****** EXISTING OFF-SITE CONDITIONS WEST OF COORS IN A PORTION OF RIVERWALK

****** NCDMP BASIN 4.1.3.

COMPUTE NM HYD ID=1 HYD NO=101.1 AREA=0.01120 SQ MI

PER A=75 PER B=0 PER C=5 PER D=20

TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420

UNIT PEAK = 8.8436 CFS UNIT VOLUME = .9980 B = 526.28

P60 = 1.8700

AREA = .002240 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR

RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .160070HR TP = .133300HR K/TP RATIO = 1.200827 SHAPE CONSTANT, N = 2.959335

UNIT PEAK = 18.719 CFS UNIT VOLUME = .9990 B = 278.49

P60 = 1.8700

AREA = .008960 SQ MI IA = .63125 INCHES INF = 1.61750 INCHES PER HOUR

RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 101.10

RUNOFF VOLUME = .75978 INCHES = .4538 ACRE-FEET

.0112 SQ. MI.

sht 13

****** HYDROGRAPH 313.1 FROM 75% OF THE NCDMP BASIN 4.1.4.

****** SERVICE ROAD ALONG NORTH SIDE OF ALEMEDA WEST SHOPPING CENTER

COMPUTE NM HYD ID=2 HYD NO=101.2 AREA=0.0029 SQ MI

PER A=0 PER B=0 PER C=0 PER D=100

TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 11.449 CFS UNIT VOLUME = .9984 B = 526.28 P60 = 1.8700
AREA = .002900 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD -- DT = .033300

PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 101.20

RUNOFF VOLUME = 1.95593 INCHES = .3025 ACRE-FEET
PEAK DISCHARGE RATE = 8.12 CFS AT 1.499 HOURS BASIN AREA = .0029 SQ. MI.

****** HYDROGRAPH 314.1 FROM NCDMP BASIN 4.1.5.(COORS BLVD. RIGHT-OF-WAY

****** WEST OF ROADWAY CENTERLINE)

COMPUTE NM HYD ID=3 HYD NO=101.3 AREA=0.0018 SQ MI

PER A=0 PER B=0 PER C=0 PER D=100

TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 7.1065 CFS UNIT VOLUME = .9978 B = 526.28 P60 = 1.8700
AREA = .001800 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 101.30

RUNOFF VOLUME = 1.95593 INCHES = .1878 ACRE-FEET
PEAK DISCHARGE RATE = 5.04 CFS AT 1.499 HOURS BASIN AREA = .0018 SQ. MI.

****** ABOVE HYDROGRAPHS TO BE COMBINED TO REPRESENT ALL FLOW CROSSING COORS

****** AND DISCHARGING INTO POND X

sht 14

ADD HYD ID=1 HYD NO=102 ID=1 ID=2

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 102.00

RUNOFF VOLUME = 1.00576 INCHES = .7563 ACRE-FEET
PEAK DISCHARGE RATE = 22.05 CFS AT 1.499 HOURS BASIN AREA = .0141 SQ. MI.

ADD HYD ID=1 HYD NO=103 ID=1 ID=3

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 103.00

RUNOFF VOLUME = 1.11331 INCHES = .9441 ACRE-FEET
PEAK DISCHARGE RATE = 27.09 CFS AT 1.499 HOURS BASIN AREA = .0159 SQ. MI.

ACROSS COORS

****** FOLLOWING TWO HYDROGRAPHS REPRESENT FLOW GENERATED WITHIN EASTERN

****** PORTION OF COORS BLVD. RIGHT-OF-WAY

****** HYDROGRAPH FOR BASIN Z, DISCHARGING INTO BASIN Y

COMPUTE NM HYD ID=4 HYD NO=101.4 AREA=0.0005 SQ MI

PER A=0 PER B=0 PER C=50 PER D=50

TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = .98701 CFS UNIT VOLUME = .9880 B = 526.28 P60 = 1.8700
AREA = .000250 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .105867HR TP = .133300HR K/TP RATIO = .794199 SHAPE CONSTANT, N = 4.514851
UNIT PEAK = .72795 CFS UNIT VOLUME = .9822 B = 388.14 P60 = 1.8700
AREA = .000250 SQ MI IA = .35000 INCHES INF = .83000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

```
    PRINT HYD             ID=4 CODE=1

                                        PARTIAL HYDROGRAPH    101.40

        RUNOFF VOLUME =      1.47351 INCHES      =          .0393 ACRE-FEET
        PEAK DISCHARGE RATE =        1.17 CFS   AT    1.499 HOURS    BASIN AREA =
.0005 SQ. MI.


    ****** HYDROGRAPH FOR BASIN Y

    COMPUTE NM HYD        ID=5 HYD NO=101.5 AREA=0.0008 SQ MI

                          PER A=0 PER B=0 PER C=50 PER D=50

                          TP=0.1333 HR MASS RAINFALL=-1

        K =    .072649HR     TP =    .133300HR     K/TP RATIO =    .545000      SHAPE
 CONSTANT, N =  7.106420
        UNIT PEAK =    1.5792     CFS    UNIT VOLUME =     .9922        B =    526.28
      P60 = 1.8700
        AREA =       .000400 SQ MI     IA =     .10000 INCHES     INF =     .04000 I
NCHES PER HOUR
        RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=    .033300

        K =    .105867HR     TP =    .133300HR     K/TP RATIO =    .794199      SHAPE
 CONSTANT, N =  4.514851
        UNIT PEAK =    1.1647     CFS    UNIT VOLUME =     .9897        B =    388.14
      P60 = 1.8700
        AREA =       .000400 SQ MI     IA =     .35000 INCHES     INF =     .83000 I
NCHES PER HOUR
        RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=    .033300

    PRINT HYD             ID=5 CODE=1

                                        PARTIAL HYDROGRAPH    101.50

        RUNOFF VOLUME =      1.47351 INCHES      =          .0629 ACRE-FEET
        PEAK DISCHARGE RATE =        1.87 CFS   AT    1.499 HOURS    BASIN AREA =
.0008 SQ. MI.


    ****** ADD HYDROGRAPHS FROM BASINS Y AND Z

    ADD HYD               ID=4 HYD NO=104 ID=4 ID=5

    PRINT HYD             ID=4 CODE=1

                                        PARTIAL HYDROGRAPH    104.00

        RUNOFF VOLUME =      1.47308 INCHES      =          .1021 ACRE-FEET
        PEAK DISCHARGE RATE =        3.04 CFS   AT    1.499 HOURS    BASIN AREA =
.0013 SQ. MI.
```

****** ADD COMBINED HYDROGRAPH TO BASIN X HYDROGRAPH

ADD HYD ID=1 HYD NO=105 ID=1 ID=4

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 105.00

RUNOFF VOLUME = 1.14050 INCHES = 1.0462 ACRE-FEET
PEAK DISCHARGE RATE = 30.14 CFS AT 1.499 HOURS BASIN AREA = .0172 SQ. MI.

****** ALL FLOWS WILL BE COLLECTED IN POND X AND ROUTED DOWN CHANNEL ALONG

****** SOUTH PROPERTY LINE

ROUTE RESERVOIR ID=6 HYD NO=106 INFLOW ID=1 CODE=24

OUTFLOW(CFS)	STORAGE(AC-FT)	DEPTH(FT)
0.0	0.0	0.0
0.1	0.0614	2.68
31.8	0.103	3.35

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

TIME (HRS)	INFLOW (CFS)	ELEV (FEET)	VOLUME (AC-FT)	OUTFLOW (CFS)
.00	.00	.00	.000	.00
.80	.00	.00	.000	.00
1.60	22.02	3.18	.093	23.91
2.40	1.24	2.71	.063	1.29
3.20	.24	2.68	.062	.24
4.00	.13	2.68	.061	.13
4.80	.12	2.68	.061	.12
5.59	.14	2.68	.061	.13
6.39	.01	2.61	.060	.10
7.19	.00	2.35	.054	.09
7.99	.00	2.11	.048	.08
8.79	.00	1.90	.043	.07
9.59	.00	1.70	.039	.06
10.39	.00	1.53	.035	.06
11.19	.00	1.37	.031	.05
11.99	.00	1.23	.028	.05
12.79	.00	1.11	.025	.04
13.59	.00	1.00	.023	.04
14.39	.00	.89	.020	.03
15.18	.00	.80	.018	.03
15.98	.00	.72	.017	.03
16.78	.00	.65	.015	.02
17.58	.00	.58	.013	.02
18.38	.00	.52	.012	.02
19.18	.00	.47	.011	.02

PEAK DISCHARGE = 29.769 CFS - PEAK OCCURS AT HOUR 1.53
MAXIMUM WATER SURFACE ELEVATION = 3.307

MAXIMUM STORAGE = .1003 AC-FT INCREMENTAL TIME= .033300HR

PRINT HYD ID=6 CODE=1

sht 17

PARTIAL HYDROGRAPH 106.00

RUNOFF VOLUME = 1.12996 INCHES = 1.0365 ACRE-FEET
PEAK DISCHARGE RATE = 29.77 CFS AT 1.532 HOURS BASIN AREA = .0172 SQ. MI.

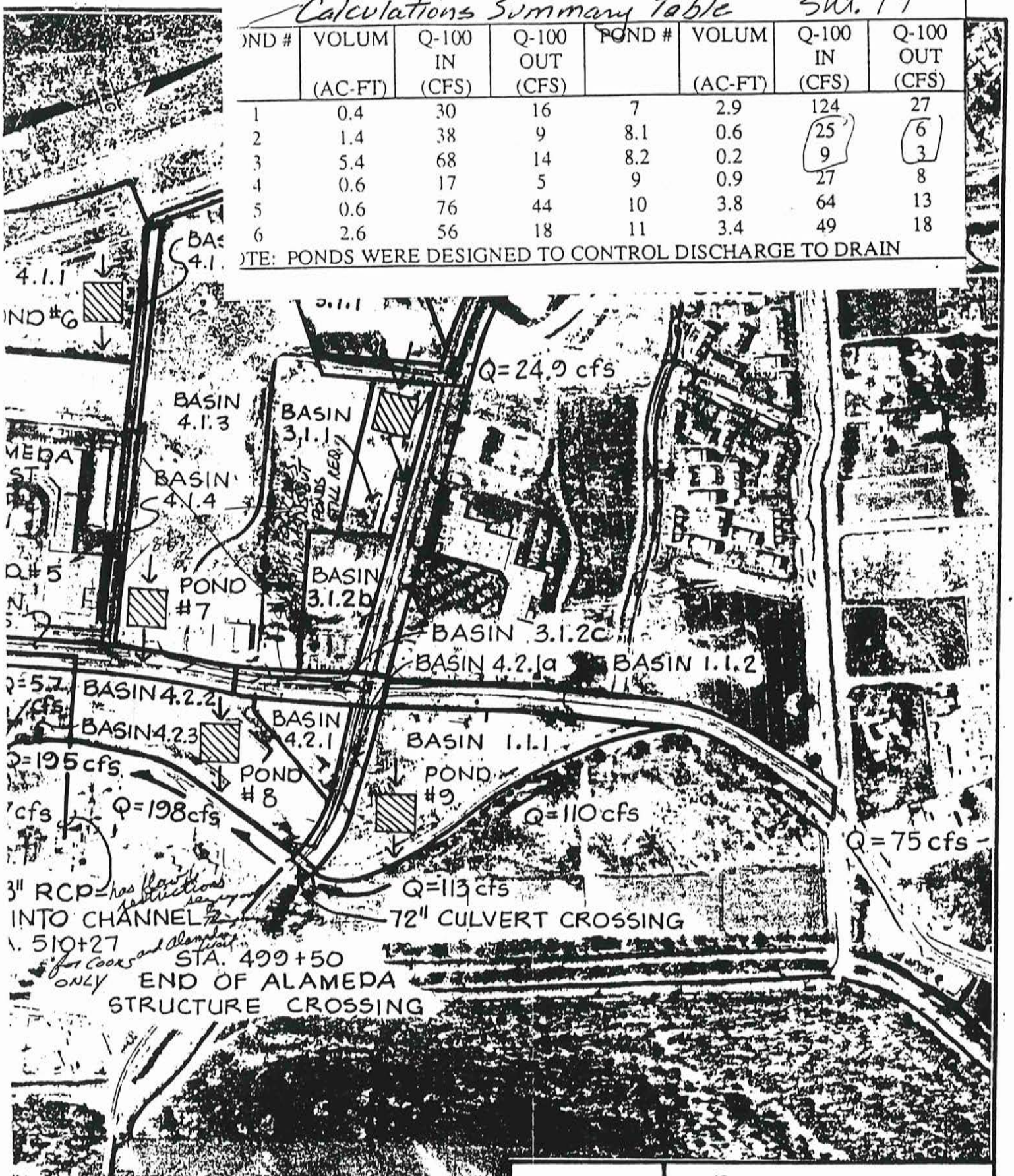
FINISH

NORMAL PROGRAM FINISH END TIME (HR:MIN:SEC) = 15:43:47

Calculations Summary Table Sht. 19

POND #	VOLUM (AC-FT)	Q-100 IN (CFS)	Q-100 OUT (CFS)	POND #	VOLUM (AC-FT)	Q-100 IN (CFS)	Q-100 OUT (CFS)
1	0.4	30	16	7	2.9	124	27
2	1.4	38	9	8.1	0.6	25	6
3	5.4	68	14	8.2	0.2	9	3
4	0.6	17	5	9	0.9	27	8
5	0.6	76	44	10	3.8	64	13
6	2.6	56	18	11	3.4	49	18

NOTE: PONDS WERE DESIGNED TO CONTROL DISCHARGE TO DRAIN



WILSON & COMPANY

REVISION TO THE NO. COORS DRAINAGE MANAGEMENT PLAN

DSGN. JMS	DR. RAG	CK. DBT
FILE 92-527A	DATE 9/92	SHEET 1 of 1

```
PRINT HYD          ID=2  CODE=1

                                   HYDROGRAPH FROM AREA   308.31


   RUNOFF VOLUME =    31.54496 INCHES     =     139.7215 ACRE-FEET
   PEAK DISCHARGE RATE =     190.18 CFS  AT   1.565 HOURS   BASIN AREA =   .0777 SQ. MI.



*
*  COMPUTE HYDROGRAPH FROM AREA 4.2.2 - VALUES OBTAINED
*  FROM TRACT C-2 DRAINAGE REPORT - BOHANNAN-HUSTON INC.- 1989
*  TRACT C-2 HAS 2-OUTLETS TO CORRALES MAIN CANAL
*
COMPUTE NM HYD     ID=4 HYD NO=309.1 DA=0.0098 PER A=0
                   PER B=15  PER C=0  PER D=85 TP=-0.13333 RAIN=-1

   K =   .07256538   TP =   .13333HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
   UNIT PEAK =   32.880    CFS   UNIT VOLUME =    .9990      B =   526.28      P60 = 1.8700
   AREA =      .008330 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
   RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033300


   K =   .11102138   TP =   .13333HR    K/TP RATIO =   .832635     SHAPE CONSTANT, N =  3.593450
   UNIT PEAK =   1.5062    CFS   UNIT VOLUME =    .9967      B =   327.09      P60 = 1.8700
   AREA =      .001470 SQ MI    IA =    .50000 INCHES    INF =   1.25000 INCHES PER HOUR
   RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033300

PRINT HYD          ID=4 CODE=1

                                   HYDROGRAPH FROM AREA   309.10


   RUNOFF VOLUME =     1.77074 INCHES     =        .9255 ACRE-FEET
   PEAK DISCHARGE RATE =      25.31 CFS  AT   1.499 HOURS   BASIN AREA =   .0093 SQ. MI.



*
*  ROUTE THROUGH A POND (POND #8.1, SEE DRAINAGE MAP)
*
ROUTE RESERVOIR    ID=5  HYD NO=509.1  INFLOW ID=4 CODE=10
                   OUTFLOW(CFS)  STORAGE(AC-FT) DEPTH(FT)
                    0.0          0.0           0.0
                    1.0          0.19          0.5
                    3.3          0.38          1.0
                    4.0          0.40          1.5
                    5.0          0.50          2.0
                    6.0          0.50          2.5

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

   TIME      INFLOW    ELEV      VOLUME    OUTFLOW
   (HRS)     (CFS)     (FEET)    (AC-FT)   (CFS)
```

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.00	.00	.00	.000	.00
.33	.00	.00	.000	.00
.67	.00	.00	.000	.00
1.00	.00	.00	.000	.00
1.33	7.11	.09	.034	.18
1.67	12.89	1.82	.453	4.63
2.00	5.98	2.27	.555	5.55
2.33	1.29	1.98	.495	4.96
2.66	.54	1.48	.396	3.97
3.00	.23	1.12	.308	3.23
3.33	.18	.77	.239	2.09
3.66	.15	.55	.199	1.21
4.00	.14	.46	.176	.92
4.33	.13	.41	.155	.82
4.66	.13	.36	.138	.73
5.00	.14	.32	.123	.65
5.33	.15	.29	.110	.58
5.66	.16	.26	.099	.52
5.99	.17	.24	.090	.47
6.33	.02	.21	.080	.42
6.66	.00	.18	.069	.35
6.99	.00	.16	.060	.32
7.33	.00	.14	.052	.27
7.66	.00	.12	.045	.24
7.99	.00	.10	.039	.20
8.33	.00	.09	.034	.18
8.66	.00	.08	.029	.15
8.99	.00	.07	.025	.13
9.32	.00	.06	.022	.11
9.66	.00	.05	.019	.10
9.99	.00	.04	.016	.09
10.32	.00	.04	.014	.07
10.66	.00	.03	.012	.06
10.99	.00	.03	.011	.06
11.32	.00	.02	.009	.05
11.66	.00	.02	.008	.04
11.99	.00	.02	.007	.04
12.32	.00	.02	.006	.03
12.66	.00	.01	.005	.03
12.99	.00	.01	.004	.02
13.32	.00	.01	.004	.02
13.66	.00	.01	.003	.02
13.99	.00	.01	.003	.02
14.32	.00	.01	.002	.01
14.66	.00	.01	.002	.01
14.99	.00	.00	.002	.01
15.32	.00	.00	.002	.01
15.66	.00	.00	.001	.01
15.99	.00	.00	.001	.01
16.32	.00	.00	.001	.01
16.66	.00	.00	.001	.00

PEAK DISCHARGE = 5.554 CFS - PEAK OCCURS AT HOUR 2.03
MAXIMUM WATER SURFACE ELEVATION = 2.277
MAXIMUM STORAGE = .5554 AC-FT INCREMENTAL TIME= .0333000HRS

PRINT HYD ID=5 CODE=1

OUTFLOW HYDROGRAPH RESERVOIR 509.10

RUNOFF VOLUME = 1.77030 INCHES = .9253 ACRE-FEET
PEAK DISCHARGE RATE = 5.55 CFS AT 2.031 HOURS BASIN AREA = .0098 SQ. MI.

*
* ADD FLOWS TO FLOWS IN THE MAIN CHANNEL
*
ADD HYD ID=5 HYD NO=309.2 ID=1 ID=5
PRINT HYD ID=5 CODE=1

HYDROGRAPH FROM AREA 309.20

RUNOFF VOLUME = 28.26833 INCHES = 131.9131 ACRE-FEET
PEAK DISCHARGE RATE = 200.28 CFS AT 1.533 HOURS BASIN AREA = .0875 SQ. MI.

*
* ROUTE THE FLOWS TO THE SECOND OUTLET (STA 510+00)
* IN THE CORRALES ACEQUIA FROM TRACT C-2
*
COMPUTE TRAVEL TIME ID=1 REACH=7 NO VS=1 L=580 FT SLP=0.0005

TRAVEL TIME TABLE
REACH= 7.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.421	4.423	4.91	.1451
.842	9.272	15.67	.0953
1.263	14.546	31.07	.0754
1.684	20.246	50.76	.0643
2.105	26.371	74.83	.0569
2.526	32.922	102.66	.0517
2.947	39.898	134.39	.0477
3.368	47.299	171.19	.0445
3.789	55.127	212.24	.0418
4.211	63.379	257.56	.0396
4.632	72.057	307.44	.0378
5.053	81.161	362.91	.0361
5.474	90.690	421.37	.0347
5.895	100.644	485.55	.0334
6.316	111.024	554.98	.0322
6.737	121.830	629.46	.0312
7.158	133.061	709.22	.0302
7.579	144.717	794.38	.0294
8.000	156.799	885.05	.0285

ROUTE ID=1 HYD NO=6.1 INFLOW ID=5 DT=0.0333
PRINT HYD ID=1 CODE=1

OUTFLOW HYDROGRAPH REACH 6.10

RUNOFF VOLUME = 28.19637 INCHES = 131.5831 ACRE-FEET
PEAK DISCHARGE RATE = 191.89 CFS AT 1.566 HOURS BASIN AREA = .0875 SQ. MI.

*
* COMPUTE HYDROGRAPH FOR REMAINING AREA OF 4.2.2
*
COMPUTE NM HYD ID=2 HYD NO=309.1 DA=0.0034 PER A=0
PER B=15 PER C=0 PER D=85 TP=-0.13333 RAIN=-1

K = .072665HR TP = .13333HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 11.407 CFS UNIT VOLUME = .9984 B = 526.28 P60 = 1.8700
AREA = .002899 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .111021HR TP = .13333HR K/TP RATIO = .832685 SHAPE CONSTANT, N = 3.593450
UNIT PEAK = 1.2511 CFS UNIT VOLUME = .9893 B = 327.09 P60 = 1.8700
AREA = .000510 SQ MI IA = .50000 INCHES INF = 1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=2 CODE=1

HYDROGRAPH FROM AREA 309.10

RUNOFF VOLUME = 1.77074 INCHES = .1211 ACRE-FEET
PEAK DISCHARGE RATE = 3.75 CFS AT 1.499 HOURS BASIN AREA = .0034 SQ. MI.

*
* ROUTE THROUGH A POND (POND #3.2, SEE DRAINAGE MAP)
*
ROUTE RESERVOIR ID=3 HYD NO=309.1 INFLOW ID=2 CODE=10

OUTFLOW(CFS)	STORAGE(AC-FT)	DEPTH(FT)
0.0	0.0	0.0
0.5	0.08	0.5
1.5	0.10	1.0
2.5	0.13	1.5
3.5	0.17	2.0

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

TIME (HRS)	INFLOW (CFS)	ELEV (FEET)	VOLUME (AC-FT)	OUTFLOW (CFS)
.00	.00	.00	.000	.00
.33	.00	.00	.000	.00
.67	.00	.00	.000	.00
1.00	.00	.00	.000	.00

Sht 24

1.33	2.47	.07	.012	.07
1.67	4.48	1.72	.143	2.94
2.00	2.08	1.70	.146	2.90
2.33	.45	1.16	.109	1.92
2.66	.18	.50	.084	.70
3.00	.09	.46	.072	.45
3.33	.06	.40	.064	.40
3.66	.05	.34	.055	.34
4.00	.05	.30	.048	.30
4.33	.05	.26	.041	.26
4.66	.05	.22	.036	.22
5.00	.05	.20	.031	.20
5.33	.05	.17	.028	.17
5.66	.05	.15	.025	.15
5.99	.06	.14	.022	.14
6.33	.01	.12	.019	.12
6.66	.00	.10	.016	.10
6.99	.00	.09	.014	.09
7.33	.00	.07	.012	.07
7.66	.00	.06	.010	.06
7.99	.00	.05	.008	.05
8.33	.00	.04	.007	.04
8.66	.00	.04	.006	.04
8.99	.00	.03	.005	.03
9.32	.00	.03	.004	.03
9.66	.00	.02	.003	.02
9.99	.00	.02	.003	.02
10.32	.00	.02	.002	.02
10.66	.00	.01	.002	.01
10.99	.00	.01	.002	.01
11.32	.00	.01	.001	.01
11.66	.00	.01	.001	.01
11.99	.00	.01	.001	.01
12.32	.00	.01	.001	.01
12.65	.00	.00	.001	.00

PEAK DISCHARGE = 3.105 CFS - PEAK OCCURS AT HOUR 1.80
MAXIMUM WATER SURFACE ELEVATION = 1.803
MAXIMUM STORAGE = .1542 AC-FT INCREMENTAL TIME= .033300HRS

PRINT HYD ID=3 CODE=1

OUTFLOW HYDROGRAPH RESERVOIR 509.10

RUNOFF VOLUME = 1.77057 INCHES = .3211 ACRE-FEET
PEAK DISCHARGE RATE = 3.11 CFS AT 1.792 HOURS BASIN AREA = .0014 SQ. MI.

*
* ADD THE FLOWS TO THE FLOWS IN THE CANAL (STA 510+27)
*
ADD HYD ID=6 HYD=509.12 ID=3 ID=1
PRINT HYD ID=6 CODE=1

OUTFLOW HYDROGRAPH RESERVOIR 509.12

sht. 25

```
*
* COMPUTE HYDROGRAPH FROM AREA 4.1.4 AREA=0.0038 SQ MI - 100% IMP
*
COMPUTE NM HYD      ID=4 HYD NO= 313.1 DA=0.0038 SQ MI PER A=0
                    PER B=0  PER C=0  PER D=100 TP=-0.133333 RAIN=-1

   K =  .072556HR    TP =  .133333HR   K/TP RATIO =  .545000    SHAPE CONSTANT, N =  7.106420
   UNIT PEAK =  14.999   CFS  UNIT VOLUME =   .9986     B =  526.28     P60 = 1.8700
   AREA =     .003800 SQ MI   IA =   .10000 INCHES   INF =   .04000 INCHES PER HOUR
   RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033300

PRINT HYD           ID=4 CODE=1

                                  HYDROGRAPH FROM AREA  313.10


   RUNOFF VOLUME =    1.96545 INCHES     =       .3983 ACRE-FEET
   PEAK DISCHARGE RATE =     10.54 CFS  AT  1.499 HOURS   BASIN AREA =  .0038 SQ. MI.



*
ADD HYD             ID=5 HYD NO=313.2 ID=6 ID=4
* AREAS 4.1.1 THRU 4.1.4 COMBINED
PRINT HYD           ID=5 CODE=1

                                  HYDROGRAPH FROM AREA  313.20


   RUNOFF VOLUME =    1.76131 INCHES     =      9.1692 ACRE-FEET
   PEAK DISCHARGE RATE =     88.63 CFS  AT  1.565 HOURS   BASIN AREA =  .0975 SQ. MI.



*
* COMPUTE HYDROGRAPH FROM AREA 4.1.5 AREA=0.0033 SQ MI - 100% IMP
*
COMPUTE NM HYD      ID=6 HYD NO= 314.1 DA=0.0033 SQ MI PER A=0
                    PER B=0  PER C=0  PER D=100 TP=-0.133333 RAIN=-1

   K =  .072667HR    TP =  .133333HR   K/TP RATIO =  .545000    SHAPE CONSTANT, N =  7.106420
   UNIT PEAK =  13.025   CFS  UNIT VOLUME =   .9985     B =  526.28     P60 = 1.8700
   AREA =     .003300 SQ MI   IA =   .10000 INCHES   INF =   .04000 INCHES PER HOUR
   RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033300

PRINT HYD           ID=6 CODE=1

                                  HYDROGRAPH FROM AREA  314.10


   RUNOFF VOLUME =    1.96545 INCHES     =       .3459 ACRE-FEET
   PEAK DISCHARGE RATE =     9.24 CFS  AT  1.499 HOURS   BASIN AREA =  .0033 SQ. MI.
```

dmg
D. MARK GOODWIN & ASSOCIATES, P.A.
CONSULTING ENGINEERS & SURVEYORS

PROJECT Cottonwood Village
SUBJECT Drainage
BY AMM DATE 10/31/95
CHECKED _____ DATE _____
SHEET 26 OF _____

Calculations to Address Comments Dated 10/27/95

1. Surface inlet to pond x is the result of 3.04 cfs from pond Y and the 0.29 cfs from basin X1 (see attached AHYMO for basin X1). Basin X1 is 4140 ft² of pavement as shown on the plan.

Required curb openings entering pond x

$$L = \frac{Q}{2.9(H)^{1.5}} = \frac{3.33}{2.9(0.5)^{1.5}} = 3.25 \text{ ft}$$

2 - 2' wide curb openings should be enough.

Required curb opening for discharge from Pond X

$$L = \frac{3.04}{(2.9)(0.5)^{1.5}} = 2.97 \text{ ft}$$ 3'-0" opening is OK

Spillway between areas A and B

As shown on the plan, the maximum discharge from pond B is anticipated to 8.70 cfs. with an H = 0.4 ft and a minimum length of 24 ft. the proposed spillway will have a capacity of:

$$Q = 2.9 L (H)^{1.5} = 2.9(24)(0.4)^{1.5} = 17.6 \text{ cfs}$$

Therefore it's OK as proposed

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PROJECT Cottonwood Village
SUBJECT Drainage
BY JMM DATE 10/31/95
CHECKED ____ DATE ____
SHEET 21 OF ____

3. The inlet area of a standard grate for the single "D" inlet is 4.438 ft². With a max water surface @ 11.21 in A and 11.60 in B, the h in A is 2.01 in A and 2.4 in B with a top of grate elevation of 9.20 in both.

A:

$Q = 0.6(A)\sqrt{2gh} = 0.6(4.438)\sqrt{2(32.2)(2.01)}$

$Q = 30.3$ cfs

with a 50% clogging fact $Q = 15.15$ cfs which is greater than the 9.0 cfs expected.

B:

$Q = 0.6(4.438)\sqrt{2(32.2)(2.40)} = 33.1$ cfs

w/ 50% clogging factor $Q = 16.6$ cfs

which is greater than the expected 8.70 cfs

```
      AHYMO PROGRAM (AHYMO194) - AMAFCA Hydrologic Model - January, 1994
           RUN DATE (MON/DAY/YR) = 10/31/1995
           START TIME (HR:MIN:SEC) = 11:19:41      USER NO.= M_GOODWN.I01
           INPUT FILE = RUDYX1.DAT

   START                  TIME=0.0

   *****COTTONWOOD VILLAGE RETAIL CENTER ON COORS BLVD.

   *****NOVEMBER 1995

   RAINFALL               TYPE=1 RAIN QUARTER=0.0 IN

                          RAIN ONE=1.87 IN RAIN SIX=2.19 IN

                          RAIN DAY=2.62 IN DT=0.0333 HR

                     COMPUTED 6-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2
PEAK AT 1.40 HR.
                     DT =     .033300 HOURS        END TIME =     5.994000 HOURS
                        .0000    .0015    .0031    .0047    .0063    .0080    .0097
                        .0114    .0132    .0151    .0169    .0189    .0209    .0229
                        .0250    .0271    .0294    .0317    .0340    .0365    .0390
                        .0417    .0444    .0473    .0502    .0533    .0566    .0600
                        .0636    .0673    .0713    .0765    .0820    .0879    .1000
                        .1280    .1711    .2330    .3177    .4291    .5713    .7484
                        .9647   1.1723   1.2575   1.3292   1.3929   1.4508   1.5041
                       1.5535   1.5997   1.6430   1.6838   1.7222   1.7586   1.7929
                       1.8255   1.8564   1.8857   1.9135   1.9399   1.9471   1.9528
                       1.9582   1.9633   1.9682   1.9729   1.9774   1.9818   1.9859
                       1.9900   1.9939   1.9977   2.0013   2.0049   2.0083   2.0117
                       2.0150   2.0182   2.0213   2.0243   2.0273   2.0302   2.0331
                       2.0359   2.0386   2.0413   2.0439   2.0465   2.0490   2.0515
                       2.0539   2.0563   2.0587   2.0610   2.0633   2.0656   2.0678
                       2.0699   2.0721   2.0742   2.0763   2.0784   2.0804   2.0824
                       2.0844   2.0863   2.0883   2.0902   2.0921   2.0939   2.0958
                       2.0976   2.0994   2.1012   2.1029   2.1046   2.1064   2.1081
                       2.1097   2.1114   2.1131   2.1147   2.1163   2.1179   2.1195
                       2.1211   2.1226   2.1242   2.1257   2.1272   2.1287   2.1302
                       2.1316   2.1331   2.1346   2.1360   2.1374   2.1388   2.1402
                       2.1416   2.1430   2.1444   2.1457   2.1471   2.1484   2.1497
                       2.1510   2.1523   2.1536   2.1549   2.1562   2.1575   2.1587
                       2.1600   2.1612   2.1625   2.1637   2.1649   2.1661   2.1673
                       2.1685   2.1697   2.1709   2.1720   2.1732   2.1743   2.1755
                       2.1766   2.1778   2.1789   2.1800   2.1811   2.1822   2.1833
                       2.1844   2.1855   2.1866   2.1877   2.1887   2.1898

   ****** PROPOSED CONDITIONS WITHIN BASIN X1

   COMPUTE NM HYD         ID=1 HYD NO=101.1 AREA=0.0001 SQ MI

                          PER A=0 PER B=0 PER C=0 PER D=100

                          TP=0.1333 HR MASS RAINFALL=-1

         K =    .072649HR     TP =    .133300HR     K/TP RATIO =    .545000      SHAPE
CONSTANT, N =   7.106420
```

UNIT PEAK = .39481 CFS UNIT VOLUME = .9710 B = 526.28
P60 = 1.8700
AREA = .000100 SQ MI IA = .10000 INCHES INF = .04000 I
NCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD -- DT
= .033300

PRINT HYD ID=1 CODE=1

sht 29

PARTIAL HYDROGRAPH 101.10

RUNOFF VOLUME = 1.95593 INCHES = .0104 ACRE-FEET
PEAK DISCHARGE RATE = .29 CFS AT 1.499 HOURS BASIN AREA =
.0001 SQ. MI.

FINISH

NORMAL PROGRAM FINISH END TIME (HR:MIN:SEC) = 11:19:48