DRAINAGE STUDY
FOR TRACTS A, B, & C SCHWARTZMAN INDUSTRIAL PARK UNIT 1

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October 10, 2001

PREPARED FOR:

HUNTINGTON DEVELOPMENT GROUP, LLC
3100 WEST SAHARA, SUITE 101
LAS VEGAS, NV 89102

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PREPARED BY:

Scott J. Steffen, P.E. 10/10/01 Date

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I. INTRODUCTION

This drainage study establishes a drainage management plan for the planned development of Tracts A, B, and C, Schwartzman Industrial Park, Unit 1; and a tract of land currently owned by Bernalillo County, known as Tract 1-A (Site). This report is submitted for grading plan approval in order to obtain: 1) final plat approval for the Tract C minor subdivision action, and 2) preliminary plat approval for the Rio Bravo Corporate Park subdivision. Prior to final plat and building permit approvals of this project, Bernalillo County must approve final grading plans and work order construction plans.

Tracts A, B, and C are currently zoned M-2, Heavy Manufacturing, and cover approximately forty-three (43) acres of in the South Valley area of Bernalillo County. Tract A is approximately eight (8) acres, Tract B seven (7) acres, and Tract C twenty-eight (28) acres. Tract 1-A is currently zoned M-2, and covers approximately two (2) acres. The proposed Site development will be light and heavy industrial uses. The Site is planned to be subdivided into twenty-nine (29) one and two acre lots to be known as the Rio Bravo Corporate Park. The Site is at the southeast corner of the Rio Bravo Boulevard, S.E. and Prince Street, S.E. intersection. Figure 1 shows a vicinity map for the project location.

Site development and grading will occur in multiple phases. A portion of Tract C will be graded in the first phase upon approval of a minor subdivision platting action that will subdivide Tract C into five (5) lots in support of the planned County Fire Station Project; Tracts A, B, 1-A, and the remainder of Tract C will be graded in future phases upon approval of the preliminary plat and subsequent final plat that will create the remaining lots of the Rio Bravo Corporate Park. Tract C contains seventeen (17) of the twenty-nine (29) lots in the ultimate development condition for the Site. A grading and drainage plan for the Rio Bravo Corporate Park is presented in this report based on the proposed development condition for the Site (see **Plate 1**). Phase I will be graded per the Tract C "Interim" grading plan presented in this report (see **Plate 2**).

An approved grading plan is a requirement for final plat approval of the minor subdivision platting action that will subdivide Tract C (see **Plate 3**). The purpose of the minor subdivision is to

divide out approximately two (2) acres of land (Tract C-2) from Tract C, which will be exchanged with Bernalillo County for Tract 1-A. The proposed development for Tract C-2 is a new County fire station. Tract C-2 has an approved grading plan (Bernalillo County file number PWDN 100091) for the proposed fire station layout, and therefore is not included in the drainage management plan presented in this report.

II. METHODOLOGY

Existing and proposed site hydrological conditions were analyzed for the 100-year, 6-hour design storm in accordance with the procedure described in "Part A – Procedure for 40 Acre and Smaller Basins" per revised Section 22.2, Hydrology, of the Development Process Manual (DPM) for the City of Albuquerque, dated January 1993. This procedure was used to calculate the peak rate of discharge and the volume of runoff generated for each sub-basin within the Site (See sub-basin map, **Plate 4**). The same procedure is used to analyze off-site flows reaching the Site from the south. The results are included in **Appendix A.**

There is no public storm drain outfall available to the Site. Therefore, all runoff generated by the proposed development must be ponded onsite via retention. The criterion for retaining the developed runoff is the 100-year, 10-day storm. The runoff volumes for the 10-day storm are analyzed using Equation (a-9) of the revised DPM, Section 22.2. The calculations include an estimate of the pond area required to retain the runoff volume.

Street flows must also be ponded onsite. Flows will be conveyed from the streets to the retention ponds via sidewalk drains. Sidewalk drain capacities were analyzed using the broad-crested weir equation, the peak flow in the street, and depth of flow entering the drain. Flow depths were analyzed using the street capacity nomographs in Section 22.2 of the DPM. Hydraulic computations are included in **Appendix B.**

III. EXISTING CONDITIONS

A. Topography

The Site is currently undeveloped land. The eastern one-fifth of the Site slopes from east to west at a uniform grade of approximately 3.5 percent. The remainder of the Site generally slopes from southeast to northwest, marked by local high and low points. The lowest topographic point occurs in the northwest corner of the Site. Vegetation consists of native grasses and small scrub oaks.

B. Existing Drainage Patterns

The predominant drainage pattern is from the southeast to the northwest towards the low point in the northwest corner of the Site. There is ponding of rainfall and interception of runoff in localized low points throughout the site. A portion of Tract A lies within an "AH" flood hazard zone, as designated on Panel 344 of 825 of the National Flood Insurance Program, Flood Insurance Rate Maps published by FEMA for Bernalillo County, New Mexico (September 1996), with a base flood elevation of 4937 feet (NGVD 1929). The grading plan (see **Plate 1**) presented in this report is based on NAVD 1988 vertical datum. The base flood elevation is 4939.7 feet based on NAVD 1988. Figure 2 shows the existing condition basin map for the on-site and off-site basins. The FEMA flood hazard zone is also shown on Figure 2 and Plate 1.

Limited off-site runoff reaches the Site. The AMAFCA South Diversion Channel lies to the east of the Site and blocks off-site runoff from the east. Minimal runoff is generated from the western slope of the channel embankment, which enters the Site. Rio Bravo Boulevard lies to the north of the Site. The roadbed is elevated across the Site property, blocking off-site runoff from the north. There is curb and gutter on the south side of Rio Bravo that directs runoff to existing storm drain facilities. The properties to the west of the Site are lower in elevation and therefore do not contribute runoff to the Site. This includes Prince Street, which slopes from east to west.

Land to the south of the Site is currently a mobile home development.

Approximately twenty (20) acres of this development drain through the proposed Site. Local low points throughout the contributing area intercept rainfall and runoff, limiting the amount of runoff entering the Site. The impervious subarea of the two off-site basins was measured at ten (10) percent of the total area. Due to the local ponding effect observed in the field, the remaining ninety (90) percent of the area was treated as Type A land for analyzing the runoff volume from the off-site basins.

IV. LAND TREATMENTS

The percent impervious was determined using the "Heavy Industrial" category from Table A-5 of the DPM, Section 22.2.

V. PROPOSED CONDITIONS

A. Rio Bravo Corporate Park

The proposed development is a light and heavy industrial subdivision with 29 lots on approximately 45 acres. Proposed street configurations for the Site are shown on the Grading Plan (**Plate 1**). As previously stated, there is no public storm drain outfall available to the Site and all runoff generated by the proposed development must be ponded onsite via retention. Each lot will be required to retain its own developed runoff plus the runoff generated by that portion of the public right-of-way across the lot frontage. In some cases, it is not possible to retain the entire runoff volume on an individual lot. Where this occurs, runoff is conveyed to ponds on adjacent lots. Approximately eleven and one-half (11.5) acre-feet of runoff are generated under the ultimate developed condition for the Site. This is an increase of about nine (9) acre-feet from the existing condition. The proposed basins are illustrated on the Proposed Basin Map, **Plate 4**.

Two off-site basins drain approximately twenty (20) acres of a mobile home development to the south of the proposed development (see **Plate 4**). Approximately 1.5

acre-feet of runoff are generated from these basins. The runoff from the development will be intercepted and retained by ponds along the southern boundary of the Site. Runoff from basin SB-01 will be retained in ponds on Lots 25, 26, and 27. In addition to providing storage for flows generated on-site, Lot 25 must provide an additional 11,500 cubic feet of storage for the off-site flows from basin SB-01. Lots 26 and 27 must provide an additional 19,500 and 25,000 cubic feet, respectively, for the off-site flows from basin SB-01. Lots 22 and 23 must each provide an additional 3,600 cubic feet for the off-site flows from basin SB-02.

The total volume of retention storage required is approximately thirteen (13) acre-feet. **Appendix A** shows the 10-day storm volume storage required for each lot. In addition, the required pond volume for each lot is shown on the Proposed Basin Map, **Plate 4**. The pond volume must be greater than the storm volume in order to retain the design storm on-site. Proposed on-site retention pond locations for each lot, based on an average pond depth of two (2) feet, are shown on the grading plan.

Maintenance of the ponds is the responsibility of each lot owner. Bernalillo County will have the right to enter any property to maintain the ponds and the authority to assess the lot owner in the event that the owner does not properly maintain the pond(s).

By the nature of this development, the grading plan does not consider future access and facility layouts for each lot. Therefore, pond location and configuration may vary depending on the actual plat actions and future layout for each lot. Future lot specific designs may revise the pond configuration, but the volume (see **Appendix A** and **Plate 4**) and function of the pond(s) must conform to the requirements established in this master plan.

As stated in Section I, if one or more of the remaining four (4) lots from the minor subdivision platting action is sold prior to being subdivided as part of the major subdivision platting action, which creates the remaining twenty-eight (28) lots of the Rio Bravo Corporate Park, the future owner(s) may wish to eliminate the split pads as shown on the

proposed grading plan. If this occurs, the owners will be required to submit a separate grading plan for their proposed lot development. However, they will be required to maintain the intent of this drainage management plan by providing retention pond volume equal to the sum of the pond volumes shown in this report for those lots in the ultimate twenty-nine lot configuration that are part of their lot, including volumes necessary to accommodate any off-site runoff.

B. FEMA Floodplain

Section III-A describes the FEMA flood hazard zone that encumbers a portion of Tract A (see Figure 3). The retention ponds described in this drainage management plan intercept all storm runoff on a per lot basis, which under existing conditions flowed to the flood hazard zone. The on-site ponds also intercept and retain storm runoff from the off-site basins to the south and east of the site as previously described in this report. In addition, all on-site ponds are sized such that the ponding depth of the 6-hour, 100-year storm is less than one foot. Finally, all retention ponds will require drainage easements and covenant agreements that give Bernalillo County the authority and right to enter and maintain the ponds. Therefore, the ponds proposed in this plan effectively eliminate the need for the FEMA flood hazard zone.

Upon approval of this drainage report by Bernalillo County Public Works, a request for a Conditional Letter of Map Revision (CLOMR) will be submitted to FEMA to completely remove the flood hazard zone from Tract A based on the ponds proposed in this plan. Once the site has been mass graded and the retention ponds certified, a Letter of Map Revision (LOMR) request will be made to FEMA.

C. Tract C "Interim" Grading

The Tract C "Interim" grading (Phase 1) includes Business Avenue and Lot 14 of the ultimate Rio Bravo Corporate Park configuration (the northwest quarter of Tract C-3 in

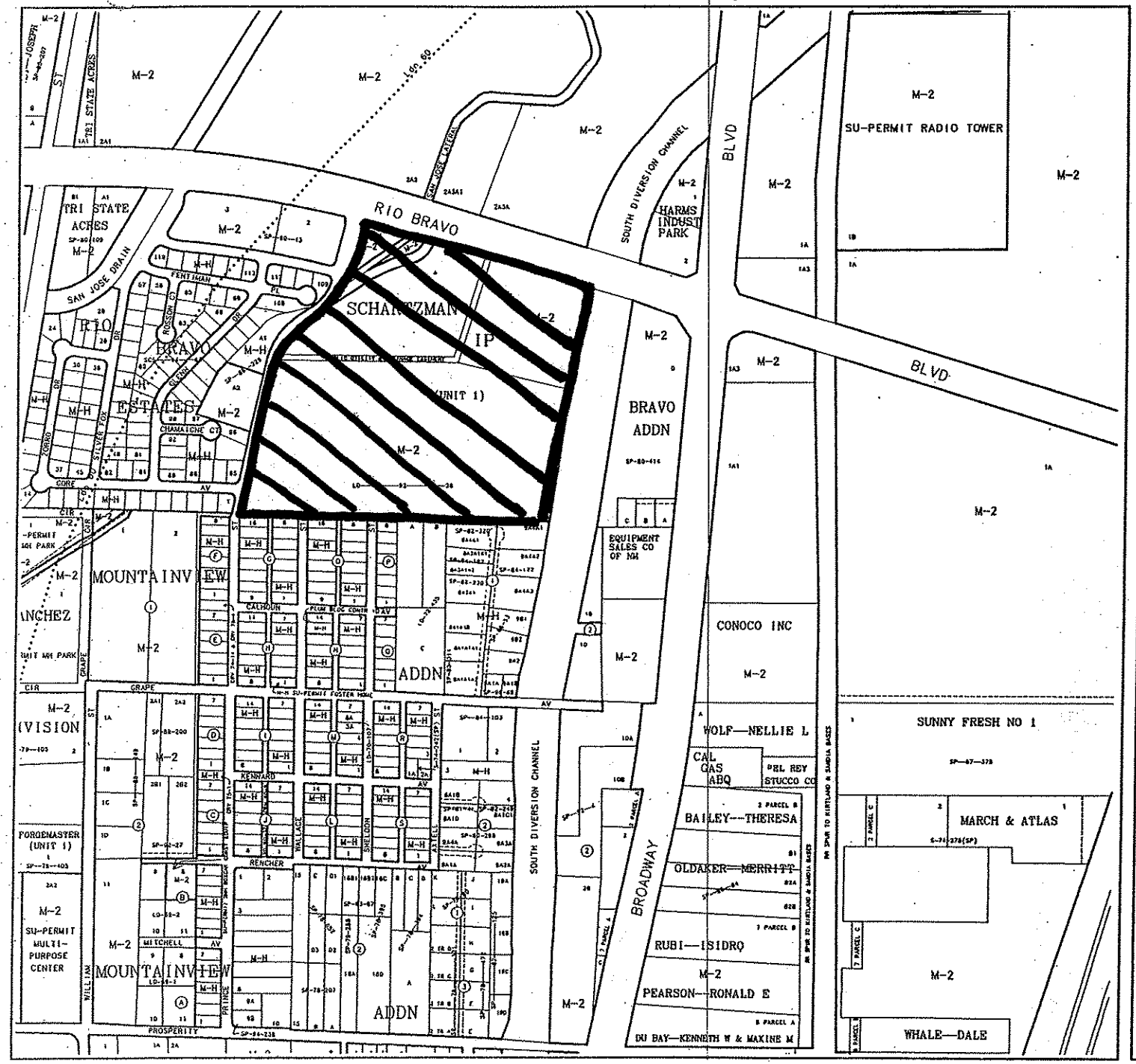
the minor subdivision). Business Avenue will connect to Prince Street to the west and terminate to the east at a temporary turn around located in an existing private access easement at the intersection of Business Avenue and Corporate Street. Phase 1 follows the grading and drainage plan for the Rio Bravo Corporate Park (see Section A above) as presented in this report for the ultimate development condition. The Phase 1 grading plan (**Plate 2**) shows the limits of "interim" grading. The remainder of Tract C will be developed in Phase 2 per the drainage management plan for the proposed development.

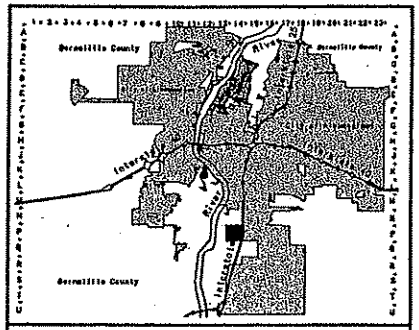
As stated in Section V-A, each lot will be required to retain the runoff generated by that portion of the public right-of-way across the lot frontage. This runoff will be conveyed to the retention ponds via sidewalk culverts. By the nature of this development, the grading plan does not consider future access and facility layouts for each lot. Therefore, sidewalk drain locations may vary depending on the future layout for each lot and are not specified on the grading plan. Construction of sidewalk drains will be the responsibility of the individual lot owners and must conform to the number of sidewalk drains (see **Appendix A**) established in this master plan. This results in an interim condition for the street improvements. Initial construction of street improvements will include pavement and estate type curb (see Section A-A, **Plate 2**). This will allow for drainage of the street frontage into the retention ponds. When the individual lots are developed, the future owners will be responsible for construction of type II pinned curb, sidewalk, and sidewalk drains across their lot frontage. The combination of the estate curb and the pinned curb will act as a standard curb and gutter section, allowing the construction of the necessary sidewalk drains.

VI. CONCLUSION

This report provides a detailed study of the existing and proposed runoff, and pond volumes. Included are an existing conditions basin map, proposed conditions basin map, grading plans, and all necessary hydrologic and hydraulic analyses. This drainage plan maintains the overall drainage pattern of the area, accommodates off-site runoff, removes existing floodplains, and allows for safe management of storm runoff in permanent as well as interim conditions.

FIGURE 1





N

SCALE IN FEET

250 0 500 1000

1" = 500'

BERNALILLO COUNTY STATE OF NEW MEXICO

LEGAL DESCRIPTION

T8N

R3E

SEC 8

UNIFORM PROPERTY CODE

1-014-053

P-14-Z

Bernalillo County

Map Amended by AGIS through October 07, 1996

FIGURE 2

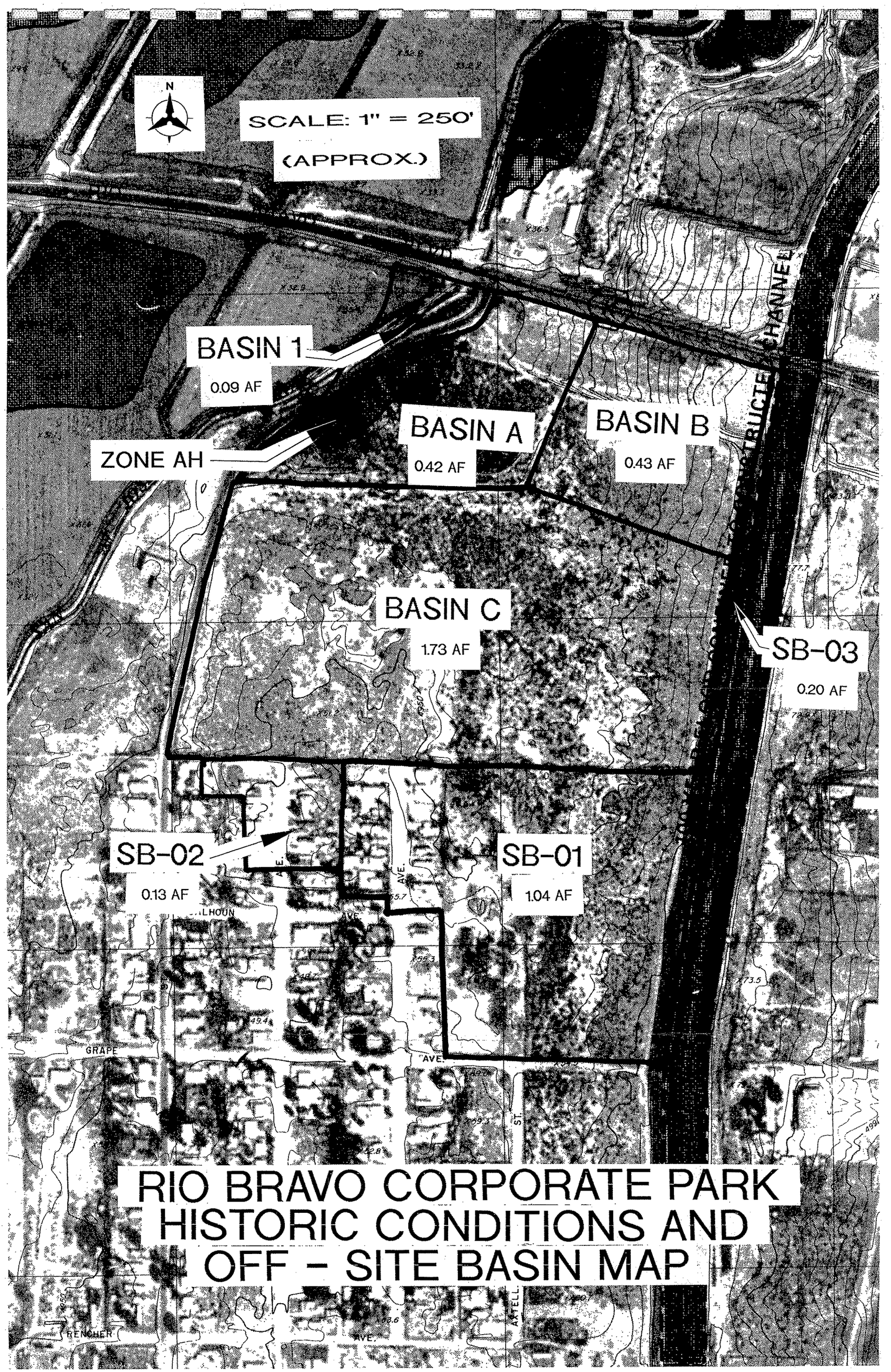
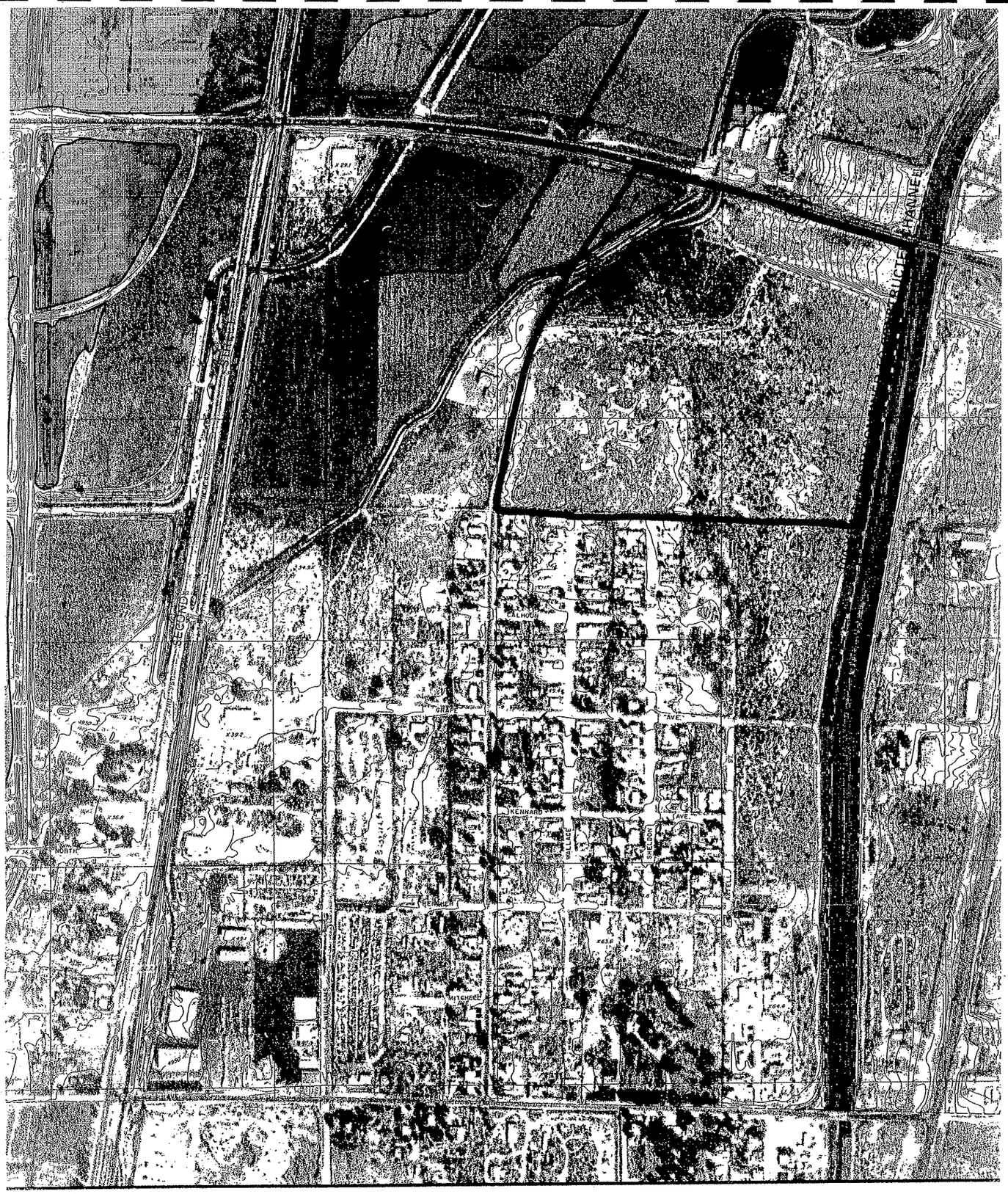

N
SCALE: 1" = 250'
(APPROX.)
BASIN 1
0.09 AF
ZONE AH
BASIN A
0.42 AF
BASIN B
0.43 AF
BASIN C
1.73 AF
SB-03
0.20 AF
SB-02
0.13 AF
SB-01
1.04 AF
RIO BRAVO CORPORATE PARK
HISTORIC CONDITIONS AND
OFF - SITE BASIN MAP

FIGURE 3



REFERENCE MARK	ELEVATION (FT. NGVD)	DESCRIPTION OF LOCATION	REFERENCE MARK
RM 75	4935.26	New Mexico State Highway Commission (NMSHC) standard brass tablet, stamped "STA NM500-2", set in top of a concrete post flush with the ground, located 73.2' north of Rio Bravo Blvd., at the crossing of the Paiarito Lateral, and 2.1' south of a	RM 77

NATIONAL FLOOD INSURANCE PROGRAM

FLOODWAY

FLOOD BOUNDARY AND FLOODWAY MAP

CITY OF

ALBUQUERQUE, NEW MEXICO

BERNALILLO COUNTY

PANEL 40 OF 50

COMMUNITY-PANEL NUMBER

350002 0040

EFFECTIVE DATE:

SEPTEMBER 15, 1982

APPENDICES

APPENDIX A - EXISTING AND PROPOSED CONDITIONS HYDROLOGIC CALCULATIONS

APPENDIX B - SIDEWALK DRAIN CAPACITY CALCULATIONS

APPENDIX A

EXISTING AND PROPOSED CONDITIONS
HYDROLOGIC CALCULATIONS

RIO BRAVO CORPORATE PARK

Existing Conditions

Description of Calculations

Column Description

(1) Drainage basin number, corresponding to Tracts A through C, Schwartzman Industrial Park Unit 1, and offsite basins SB-1 through SB-3.

(2) Drainage basin area in square feet.

(3) Drainage basin area in acres.

(4)-(7) Land treatment percentages. Impervious area from Table A-5, DPM Section 22.2.

(8) Peak discharge, in cubic feet/second per acre, for the 100-year 6-hour storm.

Q(p) = Q(pA)*A(A)+Q(pB)*A(B)+Q(pC)*A('C')+Q(pD)*A(D); where

Q(pA) is the peak discharge for land type A from Table A-9, DPM Section 22.2 for precip zone 2.
A(A) is the land treatment percentage for land type A multiplied by the drainage basin area.
The remaining quantities are determined in the same manner for land types B-D.

(9) Column (8) multiplied by column (3).

(10) Runoff volume, in inches, for the 100-year 6-hour storm.

V(e) = E(A)*A(A)+E(B)*A(B)+E(C)*A('C')+E(D)*A(D); where

E(A) is the excess precip for land type A from Table A-8, DPM Section 22.2 for precip zone 2.
A(A) is the land treatment percentage for land type A multiplied by the drainage basin area.
The remaining quantities are determined in the same manner for land types B-D.

(11) Runoff volume, in cubic feet, for the 100-year 6-hour storm.

Column (10) multiplied by column (2) divided by 12.

RIO BRAVO CORPORATE PARK

Existing Conditions Basin Data Table

This table is based on the DPM Section 22.2, Zone: 2

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
BASIN	Area (sq ft)	Area (ac)	Land Treatment Percentages A	B	C	D	Q(100) (cfs/ac.)	Q(100) (cfs)	V(100) (inches)	V(100) (cf)
Tract A	360,532	8.28	77.0%	15.0%	8.0%	0.0%	1.79	*14.85*	*0.62*	***18,492***
Tract B	303,614	6.97	37.0%	50.0%	13.0%	0.0%	2.13	*14.81*	*0.73*	***18,546***
Tract C	1,204,504	27.65	39.0%	41.0%	20.0%	0.0%	2.17	*60.04*	*0.75*	***75,532***
Tract 1	77,081	2.24	77.0%	15.0%	8.0%	0.0%	1.79	*4.01*	*0.62*	***3,954***
Totals:	1,945,732	45.13						*93.71*		***116,524***

Offsite Basins

Sheldon (SB-1)	791,327	18.17	90.0%	0.0%	0.0%	10.0%	1.87	*34.04*	*0.69*	***45,435***
Wallace (SB-2)	100,082	2.30	90.0%	0.0%	0.0%	10.0%	1.87	*4.31*	*0.69*	***5,746***
AMAFCA (SB-3)	90,229	2.07	0.0%	0.0%	100.0%	0.0%	3.14	*6.50*	*1.13*	***8,497***
Totals:	981,638	22.54						*44.85*		***59,678***

A-2

RIO BRAVO CORPORATE PARK

Fully Developed Condition

Description of Calculations

Column Description

(1) Drainage basin number, corresponding to lots 1-29 of Rio Bravo Corporate Park subdivision.

(2) Drainage basin area, including right-of-way frontage, in square feet.

(3) Drainage basin area, including right-of-way frontage, in acres.

(4)-(7) Land treatment percentages. Impervious area from Table A-5, DPM Section 22.2. Impervious area for basins 3 through 5 and 27 through 29 adjusted to account for embankment slope area for AMAFCA South Diversion Channel.

(8) Peak discharge, in cubic feet/second per acre, for the 100-year 6-hour storm.

Q(p) = Q(pA)*A(A)+Q(pB)*A(B)+Q(pC)*A('C')+Q(pD)*A(D); where

Q(pA) is the peak discharge for land type A from Table A-9, DPM Section 22.2 for precip zone 2.
A(A) is the land treatment percentage for land type A multiplied by the drainage basin area.
The remaining quantities are determined in the same manner for land types B-D.

(9) Column (8) multiplied by column (3).

(10) Runoff volume, in inches, for the 100-year 6-hour storm.

V(e) = E(A)*A(A)+E(B)*A(B)+E(C)*A('C')+E(D)*A(D); where

E(A) is the excess precip for land type A from Table A-8, DPM Section 22.2 for precip zone 2.
A(A) is the land treatment percentage for land type A multiplied by the drainage basin area.
The remaining quantities are determined in the same manner for land types B-D.

(11) Runoff volume, in cubic feet, for the 100-year 6-hour storm.

Column (10) multiplied by column (2) divided by 12.

(12) Runoff volume, in cubic feet, for the 100-year 10 day storm, equation a-9, DPM Section 22.2.

V(10 days) = V(360)+A(D)*(P(10 days) - P(360))/12 inches/foot; where

V(360) is the value in column (11) for the basin.
A(D) is the area of land treatment D, in cubic feet, in the basin.
P(10 days) is the precip depth, inches, for the 100-year storm from Table A-2, DPM Section 22.2.
P(360) is the precip depth, inches, for the 100-year storm from Table A-2, DPM Section 22.2.

(13) Pond volume in cubic feet as shown on the grading plan.

(14) Notes, see calculations sheet.

RIO BRAVO CORPORATE PARK

Fully Developed Condition

This table is based on the DPM Section 22.2, Zone: 2

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
BASIN NUMBER	**Area + ROW**		**Land Treatment Percentages**				**Peak Discharge**		**Runoff Volume**			**Grading Plan Pond Volume**	**Notes**
							Q(100)	Q(100)	V(100)	V(100) 6HR	V(100) 10DAY		
	(sq. ft.)	(acres)	A	B	C	D	(cfs/ac.)	(cfs)	(inches)	(cf)	(cf)	(cf)	
1	86,114	1.98	0.0%	15.0%	5.0%	80.0%	4.26	*8.42*	*1.87*	***13,416***	***22,601***	*24,314*	
2	76,885	1.77	0.0%	15.0%	5.0%	80.0%	4.26	*7.52*	*1.87*	***11,978***	***20,179***	*23,082*	
3	60,099	1.38	0.0%	16.0%	11.0%	73.0%	4.14	*5.71*	*1.80*	***8,998***	***14,848***	*16,564*	
4	63,977	1.47	0.0%	19.0%	31.0%	50.0%	3.76	*5.52*	*1.56*	***8,309***	***12,574***	*0*	1
5	109,029	2.50	0.0%	16.0%	13.0%	71.0%	4.11	*10.29*	*1.78*	***16,144***	***26,466***	*43,227*	2
6	70,242	1.61	0.0%	15.0%	5.0%	80.0%	4.26	*6.87*	*1.87*	***10,943***	***18,436***	*20,980*	
7	73,470	1.69	0.0%	15.0%	5.0%	80.0%	4.26	*7.18*	*1.87*	***11,446***	***19,283***	*20,168*	
8	46,183	1.06	0.0%	15.0%	5.0%	80.0%	4.26	*4.52*	*1.87*	***7,195***	***12,121***	*13,758*	
9	54,317	1.25	0.0%	15.0%	5.0%	80.0%	4.26	*5.31*	*1.87*	***8,462***	***14,256***	*15,208*	
10	44,496	1.02	0.0%	15.0%	5.0%	80.0%	4.26	*4.35*	*1.87*	***6,932***	***11,678***	*13,252*	
11	46,400	1.07	0.0%	15.0%	5.0%	80.0%	4.26	*4.54*	*1.87*	***7,229***	***12,178***	*15,148*	
12	46,400	1.07	0.0%	15.0%	5.0%	80.0%	4.26	*4.54*	*1.87*	***7,229***	***12,178***	*13,716*	
13	97,383	2.24	0.0%	15.0%	5.0%	80.0%	4.26	*9.52*	*1.87*	***15,171***	***25,559***	*29,726*	
14	49,280	1.13	0.0%	15.0%	5.0%	80.0%	4.26	*4.82*	*1.87*	***7,677***	***12,934***	*13,548*	
15	49,280	1.13	0.0%	15.0%	5.0%	80.0%	4.26	*4.82*	*1.87*	***7,677***	***12,934***	*13,548*	
16	108,962	2.50	0.0%	15.0%	5.0%	80.0%	4.26	*10.65*	*1.87*	***16,975***	***28,598***	*29,922*	
17	100,883	2.32	0.0%	15.0%	5.0%	80.0%	4.26	*9.86*	*1.87*	***15,717***	***26,478***	*27,724*	
18	49,341	1.13	0.0%	15.0%	5.0%	80.0%	4.26	*4.82*	*1.87*	***7,687***	***12,950***	*13,318*	
19	48,944	1.12	0.0%	15.0%	5.0%	80.0%	4.26	*4.79*	*1.87*	***7,625***	***12,846***	*13,548*	
20	51,783	1.19	0.0%	15.0%	5.0%	80.0%	4.26	*5.06*	*1.87*	***8,067***	***13,591***	*13,696*	
21	56,353	1.29	0.0%	15.0%	5.0%	80.0%	4.26	*5.51*	*1.87*	***8,779***	***14,790***	*15,494*	
22	69,438	1.59	0.0%	15.0%	5.0%	80.0%	4.26	*6.79*	*1.87*	***10,818***	***18,225***	*22,092*	3
23	47,510	1.09	0.0%	15.0%	5.0%	80.0%	4.26	*4.65*	*1.87*	***7,402***	***12,469***	*16,042*	3
24	47,384	1.09	0.0%	15.0%	5.0%	80.0%	4.26	*4.63*	*1.87*	***7,382***	***12,436***	*15,082*	
25	49,220	1.13	0.0%	15.0%	5.0%	80.0%	4.26	*4.81*	*1.87*	***7,668***	***12,918***	*26,408*	4
26	49,941	1.15	0.0%	15.0%	5.0%	80.0%	4.26	*4.88*	*1.87*	***7,780***	***13,107***	*34,121*	4
27	109,912	2.52	0.0%	16.0%	10.0%	74.0%	4.16	*10.49*	*1.81*	***16,547***	***27,392***	*54,135*	4,5
28	112,638	2.59	0.0%	16.0%	11.0%	73.0%	4.14	*10.71*	*1.80*	***16,865***	***27,828***	*29,834*	6
29	101,448	2.33	0.0%	16.0%	10.0%	74.0%	4.16	*9.68*	*1.81*	***15,273***	***25,283***	*27,406*	7
Totals:	1,977,312	45.39						*191.25*		***303,394***	***507,136***	***615,061***	

Offsite Basins

AMAFCA-4	15,832	0.36	0.0%	0.0%	100.0%	0.0%	3.14	*1.14*	*1.13*	***1,491***	***1,491***	
AMAFCA-5	24,648	0.57	0.0%	0.0%	100.0%	0.0%	3.14	*1.78*	*1.13*	***2,321***	***2,321***	
AMAFCA-27	15,114	0.35	0.0%	0.0%	100.0%	0.0%	3.14	*1.09*	*1.13*	***1,423***	***1,423***	
AMAFCA-28	18,849	0.43	0.0%	0.0%	100.0%	0.0%	3.14	*1.36*	*1.13*	***1,775***	***1,775***	
AMAFCA-29	15,786	0.36	0.0%	0.0%	100.0%	0.0%	3.14	*1.14*	*1.13*	***1,487***	***1,487***	
Sheldon	791,327	18.17	90.0%	0.0%	0.0%	10.0%	1.87	*34.04*	*0.69*	***45,435***	***55,986***	
Wallace	100,082	2.30	90.0%	0.0%	0.0%	10.0%	1.87	*4.31*	*0.69*	***5,746***	***7,081***	
Totals:	1,772,965	40.70						*78.90*		***59,678***	***71,564***	

Notes:

1 No ponds on Lot 4 (i.e., in basin 4). All runoff is conveyed to Lot 5 pond.
2 Includes volume necessary to retain runoff from basin 4 and off-site runoff from AMAFCA-4&5 basins (43,227>=12,574+26,466+1,491+2,321).
3 Includes volume necessary to retain off-site runoff from Wallace basin.
4 Includes volume necessary to retain off-site runoff from Sheldon basin.
5 Includes volume necessary to retain off-site runoff from AMAFCA-27 basin.
6 Includes volume necessary to retain off-site runoff from AMAFCA-28 basin.
7 Includes volume necessary to retain off-site runoff from AMAFCA-29 basin.

D-4

Peak Discharge per Acre - DPM Section 22.2 Table A-9

Zone	A	B	C	D
1	1.29	2.03	2.87	4.37
2	1.56	2.28	3.14	4.70
3	1.87	2.60	3.45	5.02
4	2.20	2.92	3.73	5.25

Excess Precipitation in inches - DPM Section 22.2 Table A-8

Zone	A	B	C	D
1	0.44	0.67	0.99	1.97
2	0.53	0.78	1.13	2.12
3	0.66	0.92	1.29	2.36
4	0.80	1.08	1.46	2.64

Depth in inches at 100-year storm - DPM Section 22.2 Table A-2

Zone	P(60)	P(360)	P(1440)	P(4days)	P(10days)
1	1.87	2.20	2.66	3.12	3.67
2	2.01	2.35	2.75	3.30	3.95
3	2.14	2.60	3.10	3.95	4.90
4	2.23	2.90	3.65	4.70	5.95

APPENDIX B

SIDEWALK DRAIN
CAPACITY CALCULATIONS

RIO BRAVO CORPORATE PARK

Sidewalk Drain Capacity

Description of Calculations

Column Description

(1) Drainage basin number, corresponding to lots 1-29 of Rio Bravo Corporate Park subdivision.

(2) Lot frontage street area, in square feet.

(3) Lot frontage street area, in acres.

(4)-(7) Land treatment percentages. Impervious area from Table A-5, DPM Section 22.2.

(8) Peak discharge, in cubic feet/second per acre, for the 100-year 6-hour storm.

Q(p) = Q(pA)*A(A)+Q(pB)*A(B)+Q(pC)*A('C')+Q(pD)*A(D); where

Q(pD) is the peak discharge for land type D from Table A-9, DPM Section 22.2 for precip zone 2.

A(D) is the land treatment percentage for land type D multiplied by the drainage basin area.

The remaining quantities are determined in the same manner for land types A-C.

(9) Column (8) multiplied by column (3).

(10) Street slope in feet/feet from the grading plan.

(11) Flow depth, D, in street from Plate 22.3, DPM Section 22.2 based on street slope, column (10), and one half street flow, column (9).

(12) Sidewalk drain width in feet. Referred to as length in the broadcrested weir equation.

(13) Length of sidewalk drain, in feet, from face of curb to discharge point. Referred to as breadth in the broadcrested weir equation.

(14) Sidewalk drain capacity, in cubic feet per second, calculated from broadcrested weir equation:

Q = C*L*H^(3/2); where

C = Broadcrested weir coefficient, Table 5-3, Brater and King.

L = Weir length, column (12).

H = Flow head in feet, column (11).

(15) Number of sidewalk drains required for each lot. Calculated as:

# of drains = Roundup(Column (9) divided by Column (14),0)

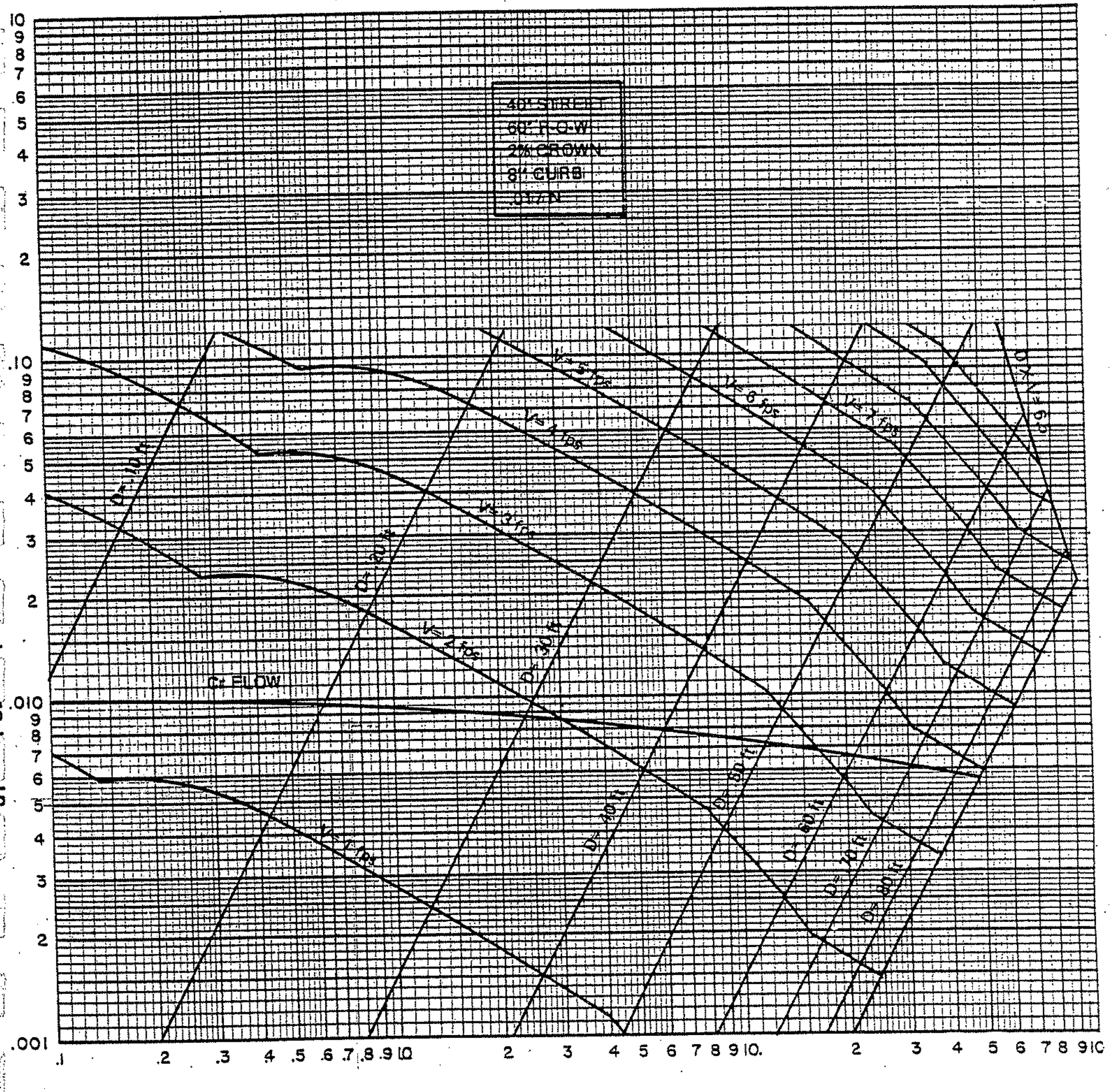
RIO BRAVO CORPORATE PARK

Street Flow and Sidewalk Drain Calculations

This table is based on the DPM Section 22.2, Zone: 2

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
BASIN	Street Area	Street Area	Land Treatment Percentages				Q(100)	Q(100)	Street Slope	Flow Depth	Length, L	Breadth, b	Flow, Q	Number
	(sq ft)	(ac.)	A	B	C	D	(cfs/ac.)	(cfs)	(ft/ft)	(ft)	(ft)	(ft)	(cfs)	of Drains
1	6142	0.14	0.0%	0.0%	0.0%	100.0%	4.70	*0.66*	0.0050	*0.23*	1.00	10.00	*0.27*	*3.00*
2	6864	0.16	0.0%	0.0%	0.0%	100.0%	4.70	*0.74*	0.0189	*0.19*	1.00	10.00	*0.21*	*4.00*
3	3697	0.08	0.0%	0.0%	0.0%	100.0%	4.70	*0.40*	0.0342	*0.15*	1.00	10.00	*0.14*	*3.00*
4	624	0.01	0.0%	0.0%	0.0%	100.0%	4.70	*0.07*	0.0200	*0.10*	1.00	10.00	*0.08*	*1.00*
5	726	0.02	0.0%	0.0%	0.0%	100.0%	4.70	*0.08*	0.0200	*0.10*	1.00	10.00	*0.08*	*1.00*
6a	5635	0.13	0.0%	0.0%	0.0%	100.0%	4.70	*0.61*	0.0189	*0.18*	1.00	10.00	*0.19*	*4.00*
6b	6317	0.15	0.0%	0.0%	0.0%	100.0%	4.70	*0.68*	0.0053	*0.22*	1.00	10.00	*0.26*	*3.00*
6c	2258	0.05	0.0%	0.0%	0.0%	100.0%	4.70	*0.24*	0.0061	*0.14*	1.00	10.00	*0.13*	*2.00*
7a	5133	0.12	0.0%	0.0%	0.0%	100.0%	4.70	*0.55*	0.0342	*0.18*	1.00	10.00	*0.19*	*3.00*
7b	6332	0.15	0.0%	0.0%	0.0%	100.0%	4.70	*0.68*	0.0053	*0.22*	1.00	10.00	*0.26*	*3.00*
7c	3245	0.07	0.0%	0.0%	0.0%	100.0%	4.70	*0.35*	0.0061	*0.18*	1.00	10.00	*0.19*	*2.00*
8	4878	0.11	0.0%	0.0%	0.0%	100.0%	4.70	*0.53*	0.0050	*0.21*	1.00	10.00	*0.24*	*3.00*
9	2955	0.07	0.0%	0.0%	0.0%	100.0%	4.70	*0.32*	0.0050	*0.18*	1.00	10.00	*0.19*	*2.00*
10	5611	0.13	0.0%	0.0%	0.0%	100.0%	4.70	*0.61*	0.0061	*0.21*	1.00	10.00	*0.24*	*3.00*
11	4797	0.11	0.0%	0.0%	0.0%	100.0%	4.70	*0.52*	0.0061	*0.20*	1.00	10.00	*0.22*	*3.00*
12	4797	0.11	0.0%	0.0%	0.0%	100.0%	4.70	*0.52*	0.0061	*0.20*	1.00	10.00	*0.22*	*3.00*
13	6706	0.15	0.0%	0.0%	0.0%	100.0%	4.70	*0.72*	0.0061	*0.23*	1.00	10.00	*0.27*	*3.00*
14	3520	0.08	0.0%	0.0%	0.0%	100.0%	4.70	*0.38*	0.0061	*0.20*	1.00	10.00	*0.22*	*2.00*
15	3520	0.08	0.0%	0.0%	0.0%	100.0%	4.70	*0.38*	0.0061	*0.20*	1.00	10.00	*0.22*	*2.00*
16	12434	0.29	0.0%	0.0%	0.0%	100.0%	4.70	*1.34*	0.0061	*0.26*	1.00	10.00	*0.33*	*5.00*
17	11540	0.26	0.0%	0.0%	0.0%	100.0%	4.70	*1.25*	0.0051	*0.26*	1.00	10.00	*0.33*	*4.00*
18	3520	0.08	0.0%	0.0%	0.0%	100.0%	4.70	*0.38*	0.0140	*0.18*	1.00	10.00	*0.19*	*2.00*
19	3520	0.08	0.0%	0.0%	0.0%	100.0%	4.70	*0.38*	0.0140	*0.18*	1.00	10.00	*0.19*	*2.00*
20	3755	0.09	0.0%	0.0%	0.0%	100.0%	4.70	*0.41*	0.0145	*0.18*	1.00	10.00	*0.19*	*3.00*
21	4650	0.11	0.0%	0.0%	0.0%	100.0%	4.70	*0.50*	0.0145	*0.19*	1.00	10.00	*0.21*	*3.00*
22	5180	0.12	0.0%	0.0%	0.0%	100.0%	4.70	*0.56*	0.0145	*0.19*	1.00	10.00	*0.21*	*3.00*
23	4150	0.10	0.0%	0.0%	0.0%	100.0%	4.70	*0.45*	0.0145	*0.18*	1.00	10.00	*0.19*	*3.00*
24	4150	0.10	0.0%	0.0%	0.0%	100.0%	4.70	*0.45*	0.0140	*0.18*	1.00	10.00	*0.19*	*3.00*
25	4150	0.10	0.0%	0.0%	0.0%	100.0%	4.70	*0.45*	0.0140	*0.18*	1.00	10.00	*0.19*	*3.00*
26	4178	0.10	0.0%	0.0%	0.0%	100.0%	4.70	*0.45*	0.0051	*0.20*	1.00	10.00	*0.22*	*3.00*
27	655	0.02	0.0%	0.0%	0.0%	100.0%	4.70	*0.07*	0.0051	*0.10*	1.00	10.00	*0.08*	*1.00*
28	5296	0.12	0.0%	0.0%	0.0%	100.0%	4.70	*0.57*	0.0051	*0.22*	1.00	10.00	*0.26*	*3.00*
29	5369	0.12	0.0%	0.0%	0.0%	100.0%	4.70	*0.58*	0.0061	*0.21*	1.00	10.00	*0.24*	*3.00*
Totals:		**3.59**					4.70	**16.86**						

STREET CAPACITY



REV. 3-83

Peak Discharge per Acre - DPM Section 22.2 Table A-9

Zone	A	B	C	D
1	1.29	2.03	2.87	4.37
2	1.56	2.28	3.14	4.70
3	1.87	2.60	3.45	5.02
4	2.20	2.92	3.73	5.25

Excess Precipitation in inches - DPM Section 22.2 Table A-8

Zone	A	B	C	D
1	0.44	0.67	0.99	1.97
2	0.53	0.78	1.13	2.12
3	0.66	0.92	1.29	2.36
4	0.80	1.08	1.46	2.64

Depth in inches at 100-year storm - DPM Section 22.2 Table A-2

Zone	P(60)	P(360)	P(1440)	P(4days)	P(10days)
1	1.87	2.20	2.66	3.12	3.67
2	2.01	2.35	2.75	3.30	3.95
3	2.14	2.60	3.10	3.95	4.90
4	2.23	2.90	3.65	4.70	5.95

Table 5-3 (Brater and King, Pg 5-40) C-value, Broadcrested Weir

Head	Breadth of weir crest, feet				
feet	1.0	2.0	5.0	10.0	15.0
0.2	2.69	2.54	2.34	2.49	2.68
0.4	2.72	2.61	2.50	2.56	2.70
0.6	2.75	2.61	2.70	2.70	2.70
0.8	2.85	2.60	2.68	2.69	2.64
1.0	2.98	2.66	2.68	2.68	2.63

PLATES

PLATE 1 - SITE GRADING PLAN

PLATE 2 - TRACT C "INTERIM" GRADING PLAN

PLATE 3 - TRACT C FINAL PLAT

PLATE 4 - PROPOSED BASIN MAP

PLATE 1

SITE GRADING PLAN

Pocket

PLATE 2

TRACT C "INTERIM" GRADING PLAN

Pocket

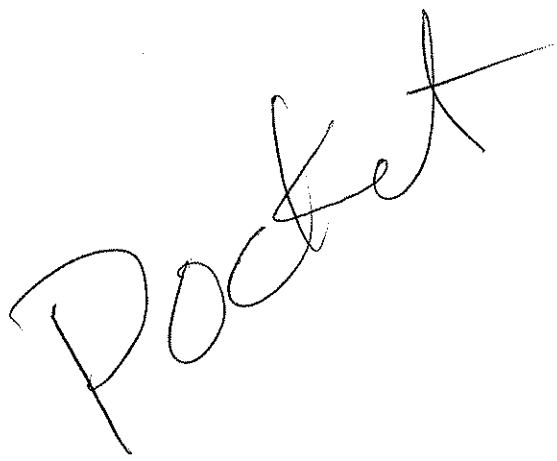
PLATE 3

TRACT C FINAL PLAT

Pocket

PLATE 4

PROPOSED BASIN MAP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