[redacted]

MARK GOODWIN & ASSOCIATES
CONSULTING ENGINEERS

Revised Amole Hubbell Drainage Management Plan and Rio Bravo Channel Design (Anderson Hills Development)

Prepared for:
AMAFCA
City of Albuquerque
Bernalillo County

Prepared by
Mark Goodwin & Associates, P.A.

May 22, 2003

f.\\2106anderson hills\ AMAFCA_rpt.wpd

TABLE OF CONTENTS

I. PROJECT DESCRIPTION

II. EXISTING INFRASTRUCTURE AND PREVIOUS REPORTS

III. DEVELOPED DRAINAGE CONDITIONS - HYDROLOGY

A. Revised AMOLE HUBBELL Drainage Plan

B. Anderson Hills

IV. DEVELOPED DRAINAGE CONDITIONS - HYDRAULICS

A. Rio Bravo Channel

B. Anderson Hills

FIGURE 1: VICINITY MAP

FIGURE 2.1 CURRENT FEMA FLOODPLAIN MAP

FIGURE 2.2 REVISED FEMA FLOODPLAIN MAP (Per RTI 2003 report)

FIGURE 2.3 PROPOSED REVISED FEMA FLOODPLAIN MAP (This report)

FIGURE 3: REVISED AMOLE HUBBELL DRAINAGE BASIN MAP

TABLE 1: Summary of Hydrology for South Powerline and Rio Bravo Drainage Basin

TABLE 2: Summary of Hydrology for Sacate Blanco Drainage Basin

TABLE 3: Summary of Hydraulics for Rio Bravo Channel

APPENDIX A.1 - HYDROLOGY (OFFSITE)

Time of Concentration Calculations
Rio Bravo AHYMO Input File - Marked Up
Revised Rio Bravo AYHMO Summary
Revised Rio Bravo AHYMO Input
Revised Rio Bravo AHYMO Output
Rio Bravo Pond #10 Volume Calculations
Revised Sacate Blanco AHYMO Summary
Revised Sacate Blanco AHYMO Output

APPENDIX B.1 - HYDRAULICS (OFFSITE)

Rio Bravo Channel HEC-RAS Output

POCKET A:

Revised Amole Hubbell Drainage Basin Map
Anderson Hills Onsite and Temporary Offsite Drainage Basin Map
Rio Bravo Channel Plans

I. PROJECT DESCRIPTION / EXECUTIVE SUMMARY

The proposed Anderson Hills Development consists of approximately 1015 single family lots covering an approximate area of 207.5 acres. The project site is located immediately north of the Rio Bravo Channel adjacent to Dennis Chavez Blvd. and west of Grace Vigil Road. Two proposed principal arterial roads, 98th street and Unser Blvd., bisect the property in a north south direction which also serve to divide the project into three distinct project areas to be known as the "Highlands", "Meadows" and "Mesa" @ Anderson Hills. These three areas will be further subdivided and developed in 1 to 5 Units.

The entire project site is part of the Rio Bravo Basin as shown in the Amole-Hubbell Drainage Management Plan. Ultimately the project site is to drain southward into the Rio Bravo channel where the flows are then conveyed eastward.

The primary purpose of this report is to obtain the approval of both AMAFCA and Bernalillo County Hydrology in order to proceed with the construction design and ultimate approval of the two proposed 98th Street and Unser Blvd. crossings over the Rio Bravo channel adjacent to Dennis Chavez Blvd. These will serve as the two primary access locations for the Anderson Hills development. The proposal is to construct box culverts at both locations. At the 98th street crossing this will involve the lowering of approximately 500 linear feet of the channel as a result of the channel being perched in this area above the existing Dennis Chavez Blvd.

In an initial effort to obtain approval of the box culvert crossings, the Amole-Hubbell Drainage Management Plan needed to be re-evaluated and updated to reflect the existing and proposed drainage conditions that effect the Rio Bravo Channel and determine to what extent the channel has the capacity to convey 'developed' flows from the adjacent subasins and preliminarily determine to what extent the upstream and northerly subasins will need to be restricted in their discharge to the channel. The re-evaluation involved revisions to the Rio Bravo Basin, the Sacate Blanco Basin, the Borrego Basin and the South Powerline Basin. The results of this re-evaluation indicate that the Rio Bravo Channel has the capacity for free discharge of both the Anderson Hills development and the sub basin immediately west of our project site and adjacent to the Rio Bravo channel as shown on the Revised Amole Hubbell Drainage Basin Map.

II. EXISTING INFRASTRUCTURE AND PREVIOUS REPORTS

The revisions in this report relied on the latest hydrology and hydraulic analyses found in the following reports:

1. *"AMOLE - HUBBELL Drainage Management Plan"*
   Prepared for AMAFCA, by Leedshill Herkenhoff, Inc., July 22, 1999.

2. *"Borrega Detention Dam & North Borrega Channel" Design Analysis Report*
   Prepared for AMAFCA by Wilson & Company Engineers & Architects, April 2000.

3. *"Preliminary Master Drainage Plan for Arrowood Ranch Development"*
   by American Engineering & Surveying Inc., November 2000.

4. *"CLOMR Request for Paakweree Village"*
   by Wilson & Company, April 2000.

5. *"Revised Borrega Arroyo LOMR"*
   Prepared for AMAFCA by Bohannan Houston Inc., March 2002.

6. *"LOMR for Rio Bravo Boulevard Channel"*
   Prepared for AMAFCA by Resource Technology Inc., November 2000.

Since the adoption of the Amole Hubbell DMP in 1999 the following drainage facilities have been constructed:

1. *The Borrega Dam has been constructed with some modification to the Amole Hubbell DMP watershed boundaries,*

2. *The Rio Bravo Channel has also been constructed as planned,*

3. *The Gibson Boulevard corridor has been shifted several hundred feet south of the Amole Hubbell DMP location thus shifting about 30 acres from the South Power Line and / or Sacate Blanco Watershed into the Amole Arroyo Watershed below Westgate Dam,*

4. *Construction of the Amole Channel between Westgate Dam and the Snow Vista Channel is expected to begin in September 2003 and it has been designed to receive developed drainage from that 30 acres.*

III. DEVELOPED DRAINAGE CONDITIONS - HYDROLOGY

A. REVISED AMOLE-HUBBELL DRAINAGE MANAGEMENT PLAN

The offsite hydrology was re-analyzed in order to determine the ultimate developed conditions flows that will ultimately reach the Rio Bravo channel so the Anderson Hills Subdivision can proceed with development. A hydraulic analysis of the Rio Bravo channel demonstrates that there is sufficient channel capacity to receive free discharge from both the proposed Anderson Hills development and the adjacent Westland's property located between Anderson Hills and 106th Street. In addition the channel has capacity to receive the attenuated flows from the portion of the Westpack property below 106th St. Plans for the Gibson Blvd Corridor and the Borrega Dam reduce the size of the original watershed draining to the Rio Bravo Channel such that the existing channel still has capacity for higher densities within the remaining watershed and for the elimination of Rio Bravo Pond # 10 and for the additional flow from Westpack properties (attenuated). As a result of subasin boundary changes there is a net shift of 12.80 ac-ft of runoff volume that will now bypass the Amole Dam and flow directly into the Hubbell Lake. This change is due to 16.66 ac-ft of runoff volume for the Westpack property now flowing to the Hubbell outfall and 3.86 ac-ft of runoff volume from subasin B-5 flowing to the Amole outfall.

The only change that the proposed Anderson Hills development is making to the Amole Hubbell DMP is slightly higher densities draining to the Rio Bravo Channel. Additional changes to the DMP to accommodate other development are as follows;

1. *Gibson Blvd. corridor shifted south thus diverting a portion of the Sacate Blanco into the Amole Basin.*

2. *Borrega Dam is designed to receive a significant portion of the watershed previously assumed to drain to Rio Bravo.*

3. *Pond # 10 on Westland's property was deleted from the DMP because the channel seems to have capacity which eliminates the need for a detention pond The peak flow from the area occurs earlier than the larger peak flow from the South Powerline Basin so deletion of that pond has less impact on the total flow in the channel than would the deletion of other ponds.*

4. *Westpack Properties below the power line is to be diverted south to the Rio Bravo Channel after being attenuated in an onsite pond. A pipe will be constructed thru Anderson Hills to serve Westpack and a portion of Westland Property that would otherwise be difficult to drain.*

5. *The land use densities were revised to be consistent with the zoning in the approved Rio Bravo Sector Plan and the Land Use Map as published in the approved Amole Hubbell DMP. Previously used land use densities were underestimated.*

6. *Drainage basin divides now follow lines of ownership and divides between developments. It appears the previous calculated areas were overestimated in the Sacate Blanco basin so*

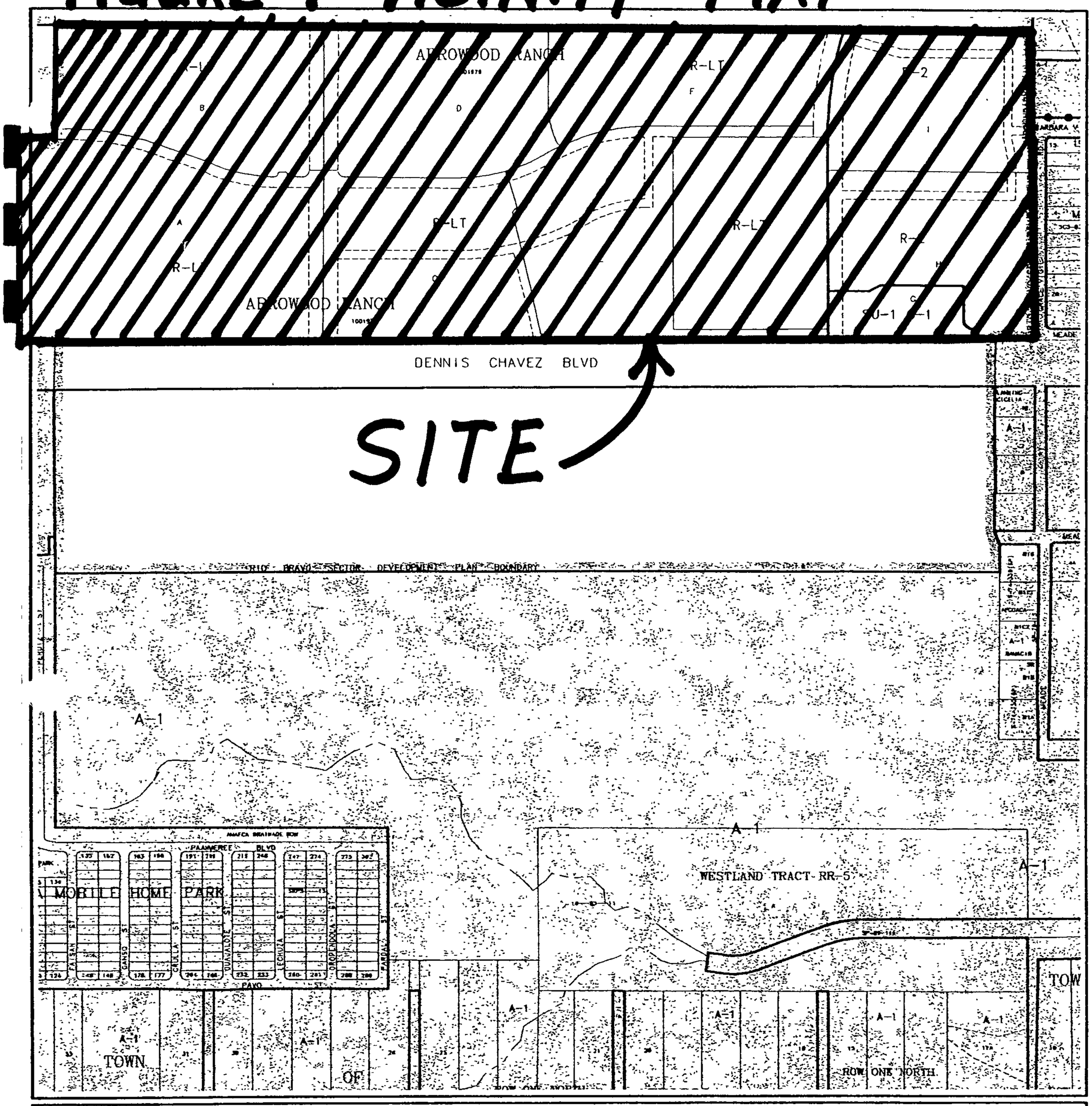
that the new total area is not equal to the old total area. Time of Concentrations were also recalculated for the revised subasins. New Routing routines were added for a) Pond #10 on West Pack property, b) the Rio Bravo Channel and c) the pipes in the Sacate Blanco and in the west part of Anderson Hills. The South Powerline Basins were not changed except as required by changes to the Borrega Dam and the Gibson Corridor, including deletion of Ponds # 7 and #1.

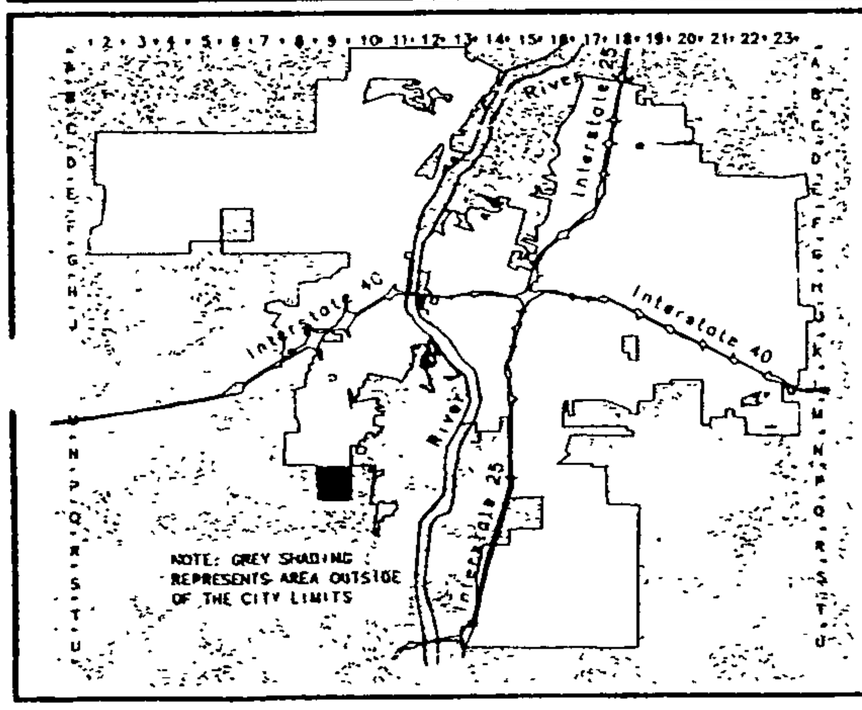
IV. DEVELOPED DRAINAGE CONDITIONS - HYDRAULICS

A. RIO BRAVO CHANNEL

The existing conditions model used in this report was taken from the LOMR currently in the process of being submitted to FEMA by Resource Technology Inc. for AMAFCA and Bernalillo County and is assumed to be the "Duplicated Effective Model." Two Box Culverts were added to this existing model; one at the proposed Unser Blvd. crossing and one at the proposed 98th Street crossing The flows in the model were changed from existing drainage conditions to the ultimate developed drainage conditions for the entire upstream watersheds Most of the watershed is now being annexed. Developed condition flows will be submitted to FEMA for Floodmap revisions. A one foot high berm is needed in two locations to contain the freeboard as summarized in Table 3. The flood plain is contained in the lined portion of the concrete channel.

FIGURE 1 VICINITY MAP





CITY OF
Albuquerque

Albuquerque Geographic Information System
PLANNING DEPARTMENT

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GRAPHIC SCALE IN FEET

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Zone Atlas Page

P-9-Z

Map Amended through January 22, 2003

TABLE 1
DRAINAGE BASIN SUMMARY

SHEET. 1 OF 2

Basin ID	OLD[1] AREA (sq,mi.)	OLD[1] IMPERVIOUS (%)	OLD[1] VOLUME (Ac*ft)	DIVERTED TO AMOLE (sq mi)	DIVERTED TO SECATE BLANCO (sq mi)	DIVERTED TO BORREGA (sq mi)	NEW AREA (sq mi)	NEW IMPERVIOUS (%)	NEW 24-HR VOLUME (Ac*ft)
South Power line and Rio Bravo									
60104	0.1172	40	8.911	0.1100					
60106	0.0480	49	4.089	0.0051			0.0501	49	4.268
60107	0.0313	49	2.667				0.0313	49	2.667
60108	0.0924	35	6.561				0.0924	35	6.561
60109	0.0414	49	3.527				0.0414	49	3.527
60110	0.1046	41	8.052				0.1046	41	8.052
60111	0.0384	49	3.272				0.0384	49	3.272
60113	0.0580	48	4.887				0.0580	48	4.887
60116	0.0310	49	3.246				0.0310	49	3.246
60114	0.2162	37	15.759				0.2162	37	15.759
60115	0.0764	47	6.339				0.0764	47	6.339
60116	0.0244	49	2.079				0.0244	49	2.079
B1	0.0308	34	2.240						
B3(W)	0.0938	34	6.821						
B2	0.0754	34	5.483						
B4(W)	0.0641	34	4.661						
50103	0.0540	32	3.665			0.0540			
50104	0.0393	35	2.791			0.0393			
50105	0.1266	49	10.786			0.1266			
B3(E)	0.1250	34	9.090						
B5	0.3470	34	26.747		0.0412				
B4(E)	0.0783	34	6.035						
B6	0.5810	16	39.005			0.5478			

Basin ID	OLD[1] AREA (sq,mi.)	OLD[1] IMPERVIOUS (%)	OLD[1] VOLUME (Ac*ft)	DIVERTED TO AMOLE (sq mi)	DIVERTED TO SECATE BLANCO (sq mi)	DIVERTED TO BORREGA (sq mi)	NEW AREA (sq mi)	NEW IMPERVIOUS (%)	NEW 24-HR VOLUME (Ac*ft)
South Power line and Rio Bravo (Cont.)									
201							0.0969	57	8.046
202							0.0826	57	6.858
203							0.0772	40	6.012
204							0.1093	57	10.253
205							0.1776	57	16.660
206							0.0210	57	1.970
207							0.0302	46	2.510
208A							0.0320	41	2.520
208B							0.0270	47	2.262
209							0.0111	65	1.116
210							0.0228	40	1.776
211							0.1530	57	7.242
212							0.0095	65	0.955
213							0.0174	40	1.355
214							0.0593	57	5.563
215							0.0310	57	2.908
216							0.0555	40	4.322
	0.0123	ADDED FROM WEST END OF DENNIS CHAVEZ BLVD.							
	0.1947	ADDED FROM SECATE BLANCO.							
TOTAL	2.7016		186.713	0.1151	0.0412	0.7677	1.7776		142.985

(1) Results from Amole Hubbell Drainage Management Plan, Leedshill, 7/22/99

:\\2002\A02106\DRAIN_arearb

TABLE 2
DRAINAGE BASIN SUMMARY

SHEET. 1 OF 1

Basin ID	OLD[1] AREA (sq,mi.)	OLD[1] IMPERVIOUS (%)	OLD[1] 24-HR VOLUME (Ac*ft)	DIVERTED TO AMOLE (sq mi)	DIVERTED TO RIO BRAVO (sq mi)	NEW AREA (sq mi)	NEW IMPERVIOUS (%)	NEW 24-HR VOLUME (Ac*ft)
SACATE BLANCO								
D60101	0.0482	67	5.045					
D60102	0.1019	60	9.956	0.0158				
D60103	0.0392	51	3.485	0.0392				
D60104	0.0391	40	3.151	0.0391				
D60105	0.1040	54	9.800	0.0021				
D60106	0.0364	49	3.287	0.0023				
D60107A	0.0189	49	1.707		0.0101			
D60107B	0.0430	54	4.060		0.0227			
D60109	0.0577	49	5.211		0.0577			
D60111	0.0157	49	1.418		0.0157			
D60112	0.0947	66	9.848		0.0090			
D60116	0.0837	49	7.559		0.0690			
D60117	0.1065	69	11.394		0.0006			
D60118	0.0855	63	8.544	0.0070				
60121						0.1265	57	11.867
60122						0.0259	57	2.430
60123						0.0699	57	6.557
60124						0.1997	57	18.734
60125						0.0082	65	0.823
60126						0.1779	57	16.689
60127						0.0137	65	1.375
60128						0.0326	57	3.058
B5	0.0412	PART OF OLD RIO BRAVO BASIN ADDED TO SECATE BLANCO						
40001	0.0703	PART OF OLD AMOLE BASIN ADDED TO SECATE BLANCO						
TOTAL	0.9860		84.465	0.1060	0.1848	0.6544		61.533

1) Results from Amole Hubbell Drainage Management Plan, Leedshill, 7/22/99

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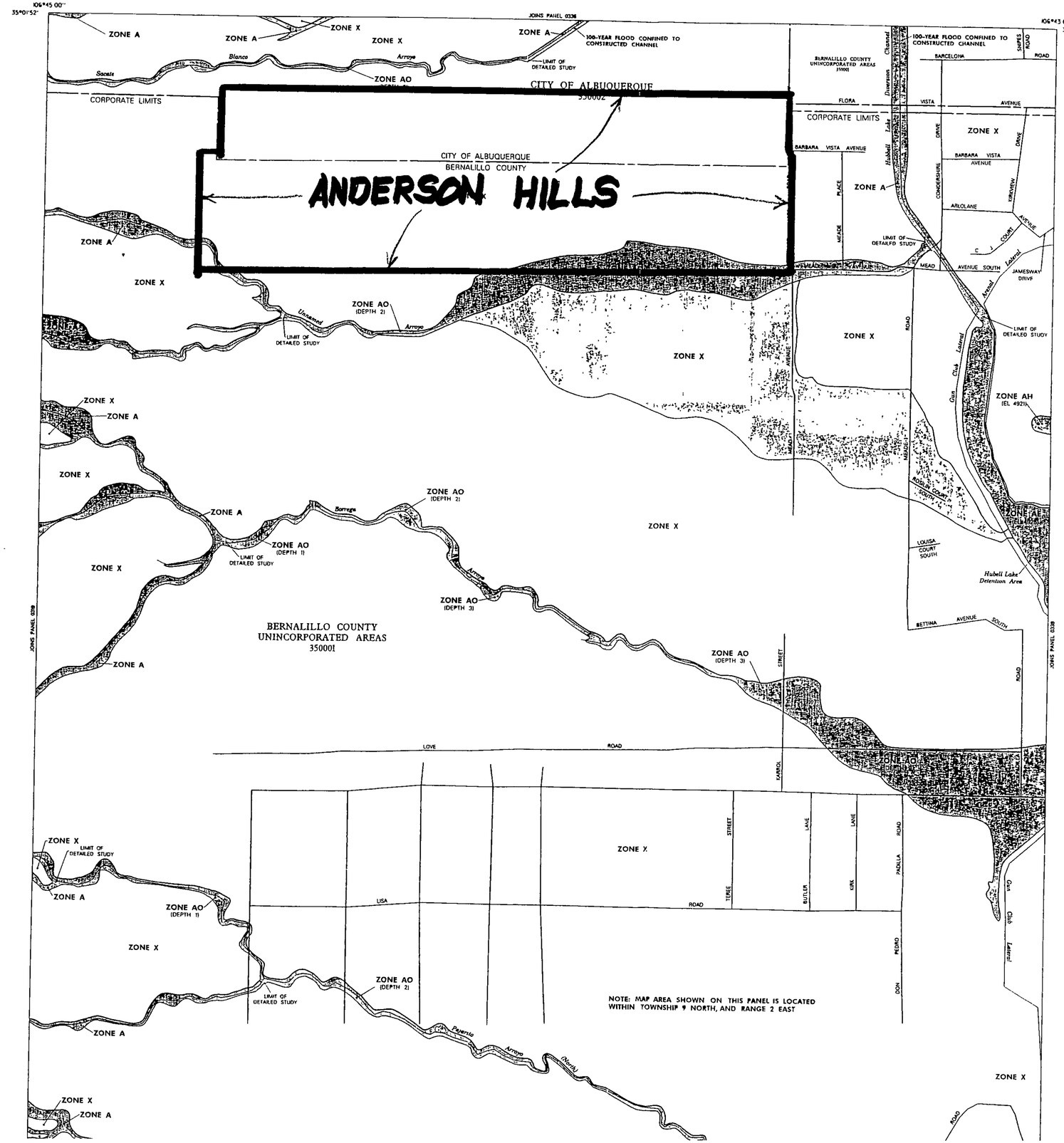
Table 3 - Summary of Hydraulic Calculations For Rio Bravo Channel

River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Max Chl Dpt (ft)	Vel Chnl (ft/s)	Req'd Freeboard	Req'd Depth	Actual Depth	Comments
88 18200	400.31	5209 80	5211.66	1.86	18.80	1 80	3.66	2 00	Future new channel
86.18400	400 31	5200 60	5202.46	1.86	18.83	1.81	3 67	2 00	Future new channel
84.18600	400.31	5193.40	5195 43	2.03	16 86	1.77	3.80	2 00	Future new channel
82 19100	400 31	5176.30	5178.27	1 97	17.04	1.77	3 74	2 00	Future new channel
80 19200	400 31	5169.20	5171 33	2 13	21 45	1 88	4.01	2.50	Future new channel
78.20000	400 31	5143.50	5145.59	2.09	15.44	1.75	3.84	2.50	Future new channel
202+25 BEGIN ANDERSON HILLS									
76.20350	475 80	5129 90	5131.96	2.06	18.82	1.82	3.88	2 50	Future new channel
205+00 BEGIN CONCRETE									
74 20500	475 80	5123 21	5124.97	1 76	20.91	1.84	3.60	4.00	
72.20925	475 80	5113.43	5115.32	1.89	18 85	1.81	3 70	4 00	
70 21300	475 80	5100.01	5101.64	1.63	23 18	1 88	3 51	4 00	
68 21500	475.80	5091 71	5093.37	1.66	22.53	1 87	3 53	4.00	
67 21705	475 80	5084.12	5085 84	1 72	21.54	1 85	3.57	4.00	Begin new wing walls
64.21780	475 80	5076.94	5078.44	1 50	26.43	1 93	3.43	6.00	Begin new CBC
218+64 CENTERLINE 98TH STREET									
63.21868	664.28	5074.12	5076.42	2.30	24.08	1.96	4.26	6.00	New CBC
62.21955	664.28	5071.34	5073.62	2.28	24.26	1.96	4.24	6.00	End new CBC
61.22030	664.28	5070.96	5073.20	2 24	20.82	1.88	4.12	5.00	End new wing walls
60.22200	664 28	5070.11	5072 93	2.82	14 96	1.77	4.59	5 00	New channel
59 22305	664.28	5069 66	5072.83	3.17	12 56	1.72	4.89	4.00	End new channel
58.22500	664 28	5063.80	5066.06	2.26	20.63	1.87	4.13	4.00	Add 1' berm
56.22650	664 28	5055 55	5057 51	1.96	25.24	1.95	3.91	4.00	
54.22800	664 28	5050 51	5052 57	2 06	23.44	1.92	3.98	4.00	
52.23000	664.28	5044 61	5046.76	2.15	22.05	1.90	4.05	4.00	
50.23300	664.28	5037.29	5039.60	2 31	20.65	1.88	4.19	4.00	
48 23500	664 28	5032.41	5034.70	2.29	20.95	1 88	4.17	5 00	
46 23800	664 28	5024.10	5026 31	2.21	21.99	1.90	4 11	5.00	
44.24100	664.28	5016 81	5019.14	2 33	20 91	1 89	4.22	5.00	
42 24200	664 28	5014.54	5016 89	2 35	20.68	1.88	4.23	5.00	
40 24442	664 28	5009 05	5011.40	2 35	20.65	1.88	4.23	5.00	Begin new wing walls
39 24527	664.28	5007.18	5009.86	2.68	20.67	1 90	4.58	6.00	Begin new CBC
246+06 UNSER BLVD.									
38 24606	796.18	5005.38	5008.70	3.32	20.00	1.92	5.24	6.00	New CBC
37.24693	796.18	5003.57	5006.76	3.19	20.82	1.94	5.13	6.00	End new CBC
36.24768	796 18	5002.07	5004.67	2.60	21.72	1.92	4.52	5.00	End new wing walls
34.24800	796.18	5001.54	5004.18	2.64	21.28	1.91	4.55	5.00	
32.25000	796.18	4998.24	5001.02	2.78	19.73	1.89	4.67	5.00	
30 25200	796 18	4996.18	4999.25	3.07	17 16	1.84	4.91	5 00	
28.25400	796.18	4994.12	4997.28	3.16	16.48	1 82	4.98	5.00	
26.25600	796 18	4992.06	4995.28	3 22	16 31	1.82	5.04	5.00	Add 1' berm
24.25650	994.00	4991 38	4995.26	3.88	15.20	1 82	5.70	5.00	Add 1' berm
257+20 END ANDERSON HILLS									
22 25900	994.00	4987 98	4991.44	3.46	18.00	1.88	5.34	5 00	Add 1' berm
20.26000	994 00	4986.84	4990.28	3.44	18.02	1.88	5.32	5.00	Add 1' berm
18 26200	994.00	4984 58	4988.03	3 45	17.97	1.88	5.33	5.00	Add 1' berm
16.26300	994 00	4981 39	4984.46	3.07	21.22	1.94	5.01	5 00	Add 1' berm
14.26500	994 00	4975.02	4977.83	2.81	24 16	2.00	4 81	6 00	
12 26700	994 00	4970 99	4973 93	2.94	22 59	1.97	4 91	6.00	
10.26776	994 00	4969.47	4972.44	2.97	22.36	1.96	4.93	6.00	
BEGIN BOX CULVERT									
8.26925	994.00	4966.52	4970.73	4.21	19.70	1.96	6.17	6.00	
7.27150	994.00	4948.13	4950.60	2 47	33 50	2 19	4.66	6.00	
6 27219	994.00	4946.75	4949.64	2.89	28.67	2.11	5.00	6.00	
5 27249	994.00	4945.90	4948.14	2.24	28.75	2.06	4.30	6.00	

FIGURE 2.1

CURRENT FLOODPLAIN MAP PANEL # 338 Effective Sept. 20, 1996



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

- ZONE A — No base flood elevations determined
- ZONE AE — Base flood elevations determined.
- ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined
- ZONE AO — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined
- ZONE A99 — To be protected from 100-year flood by Federal flood protection system under construction; no base elevations determined
- ZONE V — Coastal flood with velocity hazard (wave action); no base flood elevations determined
- ZONE VE — Coastal flood with velocity hazard (wave action); base flood elevations determined

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

- ZONE X — Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood

OTHER AREAS

- ZONE X — Areas determined to be outside 500-year floodplain
- ZONE D — Areas in which flood hazards are undetermined

UNDEVELOPED COASTAL BARRIERS

Identified 1983 | Identified 1990 | Otherwise Protected Areas

Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas

- Flood Boundary
- Floodway Boundary
- Zone D Boundary
- Boundary Dividing Special Flood Hazard Zones and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones
- 513 — Base Flood Elevation Line Elevation in Feet. See Map Index for Elevation Datum
- D — Cross Section Line
- (EL 987) — Base Flood Elevation in Feet Where Uniform Within Zone See Map Index for Elevation Datum
- RM7 × — Elevation Reference Mark
- • M2 — River Mile
- 97°07 30 , 32°22 30 — Horizontal Coordinates Based on North American Datum of 1927 (NAD 27) Projection

NOTES

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size or all planimetric features outside Special Flood Hazard Areas.

Coastal base flood elevations apply only landward of 0.0 NGVD and include the effects of wave action; these elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Areas of Special Flood Hazard (100-year flood) include Zones A, AE, AH, AO, A99, V and VE.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

This map may incorporate approximate boundaries of Coastal Barrier Resource System Units and/or Otherwise Protected Areas established under the Coastal Barrier Improvement Act of 1990 (PL 101-591).

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of this map.

For community map revision history prior to countywide mapping, see Section 8.0 of the Flood Insurance Study Report.

For adjoining map panels and base map source, see separately printed Map Index.

MAP REPOSITORY
Refer to Repository Listing on Map Index

EFFECTIVE DATE OF
COUNTYWIDE FLOOD INSURANCE RATE MAP
SEPTEMBER 20 1996

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE DATE shown on this map to determine when actual rates apply to structures in zones where elevations or depths have been established.

To determine if flood insurance is available contact an insurance agent or call the National Flood Insurance Program at (800) 638-6620.

N

APPROXIMATE SCALE IN FEET
500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

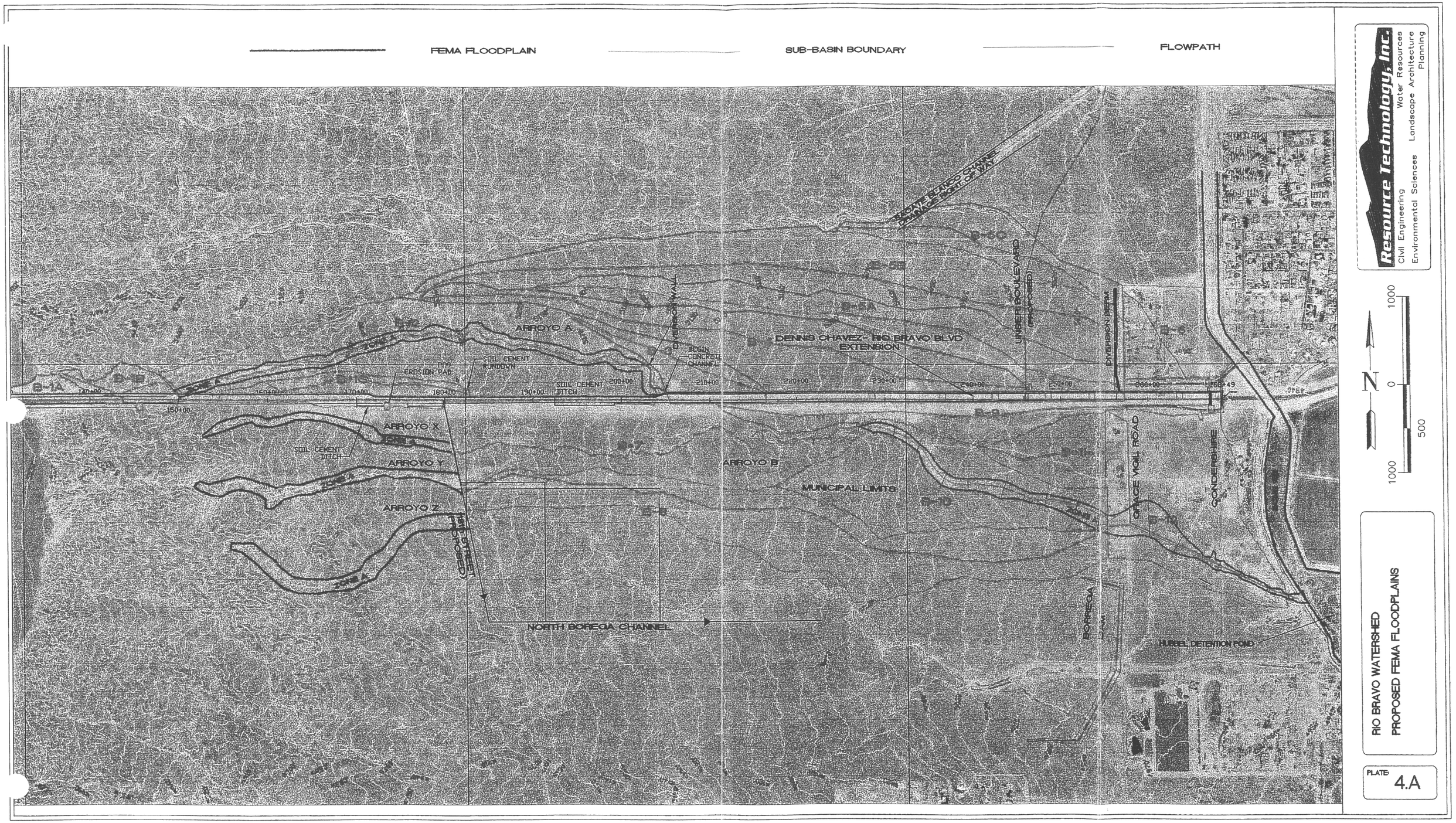
FIRM
FLOOD INSURANCE RATE MAP

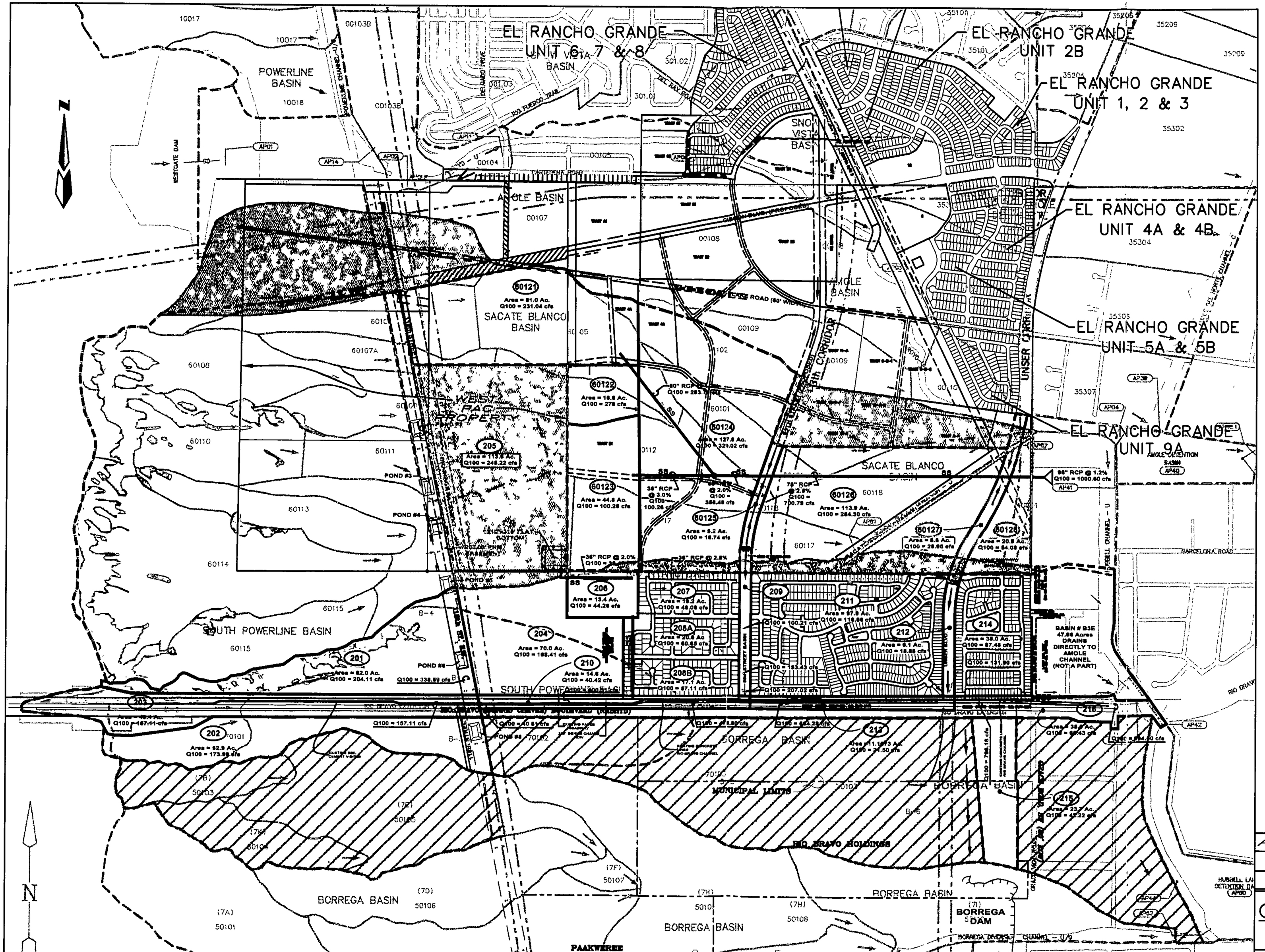
BERNALILLO COUNTY, NEW MEXICO AND INCORPORATED AREAS

PANEL 338 OF 825
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS COMMUNITY	NUMBER	PANEL	SUFFIX
ALBUQUERQUE, CITY OF	350002	0338	D
BERNALILLO COUNTY UNINCORPORATED AREAS	350001	0338	D

FIGURE 2.2


FEMA FLOODPLAIN
SUB-BASIN BOUNDARY
FLOWPATH
ARROYO A
ARROYO X
ARROYO Y
ARROYO Z
ARROYO B
DENNIS CHAVEZ - RIO BRAVO BLVD EXTENSION
UNIVERSE BOULEVARD (PROPOSED)
MUSKET BLVD
BEGIN CONCRETE CHANNEL
SOIL CEMENT RUNDOWN
SOIL CEMENT DITCH
EROSION PAD
MUNICIPAL LIMITS
NORTH BOREGA CHANNEL
BOREGA
GRACE WALL ROAD
CONDER LINE
HUBBEL DETENTION POND
N
1000
0
500
1000
Resource Technology, Inc.
Civil Engineering
Environmental Sciences
Water Resources
Landscape Architecture
Planning
RIO BRAVO WATERSHED
PROPOSED FEMA FLOODPLAINS
PLATE 4.A



LEGEND

SACATE BLANCO NOW DIVERTED TO AMOLE

AMOLE NOW DIVERTED TO SACATE BLANCO

BIO BRAVO NOW DIVERTED TO SACATE BLANCO

SACATE BRANCO NOW DIVERTED TO RIO BRAVO

RIO BRAVO NOW DIVERTED TO AMOLE

RIO BRAVO BASIN NOW DIVERTED TO BORREGA (MOSTLY)

FIGURE 3

ANDERSON HILLS SUBDIVISION

REVISED AMOLE HUBBELL

DRAINAGE BASIN MAP

MARK GOODWIN & ASSOCIATES, P.A.
CONSULTING ENGINEERS
P.O. BOX 90606
ALBUQUERQUE, NEW MEXICO 87199
(505)828-2200, FAX (505)797-9539

Designed: DMG	Drawn: NHE	Checked: DMG	
Scale: 1" = 400'	Date: 4-25-03	Job: A02109	Sheet 1 of 1

A2109AND/DWG/HYDROLOGY/WATERSHED_EX 5-21-03 NHE

TIME OF CONCENTRATION COMPUTATIONS

SHEET. 1 OF 2

Basin ID	Length (ft)	Slope %	K	V (fps)	Tc (min)	Tp (hr)
60121	100	0.5	0.7	0.50	3.4	
	300	3.3	1.0	1.82	2.8	
	1600	3.3	2.0	3.63	7.3	
	1000	1.6	3.0	3.79	4.4	
					17.9	0.20
60122	100	0.5	0.7	0.50	3.4	
	300	2.5	1.0	1.58	3.2	
	400	2.5	2.0	3.16	2.1	
	500	0.5	2.0	1.41	5.9	
					14.5	0.16
60123	100	0.5	0.7	0.50	3.4	
	300	4.0	1.0	2.00	2.5	
	300	4.0	2.0	4.00	1.3	
	1300	0.5	2.0	1.41	15.3	
	400	0.3	3.0	1.50	4.4	
					26.9	0.30
60124	100	0.5	0.7	0.50	3.4	
	300	2.5	1.0	1.58	3.2	
	1600	2.5	2.0	3.16	8.4	
	1300	1.2	3.0	3.29	6.6	
					21.6	0.24
60125	400	0.5	1.0	0.71	9.4	
	600	0.5	2.0	1.41	7.1	
					16.5	0.18

Basin ID	Length (ft)	Slope %	K	V (fps)	Tc (min)	Tp (hr)
60126	100	0.5	0.7	0.50	3.4	
	300	2.6	1.0	1.61	3.1	
	1600	2.6	2.0	3.22	8.3	
	400	2.6	3.0	4.84	1.4	
	1300	1.2	3.0	3.29	6.6	
					22.7	0.25
60127	400	1.0	1.0	1.00	6.7	
	900	1.0	2.0	2.00	7.5	
					14.2	0.16
60128	100	0.5	0.7	0.50	3.4	
	300	2.0	1.0	1.41	3.5	
	300	2.0	2.0	2.83	1.8	
	1200	0.6	2.0	1.55	12.9	
					21.6	0.24
201, 202	400	20.0	0.7	3.13	2.1	
, & 203	500	10.0	2.0	6.32	1.3	
	1100	7.0	2.0	5.29	3.5	
	2000	5.0	3.0	6.71	5.0	
					11.9	0.13
204	100	0.5	0.7	0.50	3.4	
	300	3.6	1.0	1.90	2.6	
	1600	3.6	2.0	3.79	7.0	
	1400	0.5	3.0	2.12	11.0	
					24.0	0.27
205	100	0.5	0.7	0.50	3.4	
	300	4.6	1.0	2.14	2.3	
	1400	4.6	2.0	4.29	5.4	
	2400	0.6	3.0	2.32	17.2	
					28.4	0.32

Revise 207
Add 208A
208B

Basin ID	Length (ft)	Slope %	K	V (fps)	Tc (min)	Tp (hr)
206	100	0.5	0.7	0.50	3.4	
	300	3.2	1.0	1.79	2.8	
	300	3.2	2.0	3.58	1.4	
	500	0.5	2.0	1.41	5.9	
					13.5	0.15
207	170	1.0	0.7	0.70	4.0	
	230	1.1	1.0	1.02	3.7	
	210	1.1	2.0	2.05	1.7	
	400	3.2	2.0	3.56	1.9	
	710	4.0	2.0	4.00	3.0	
	430	1.0	2.0	2.00	3.6	
	160	1.0	3.0	3.00	0.9	
	1090	1.0	3.0	3.00	6.1	
					24.9	0.28
209	400	0.5	1.0	0.71	9.4	
	800	0.5	2.0	1.41	9.4	
	800	1.3	2.0	2.28	5.8	
					24.7	0.27
210	400	3.6	1.0	1.90	3.5	
	1600	3.6	2.0	3.79	7.0	
	1600	3.2	3.0	5.37	5.0	
					15.5	0.17
211	100	0.5	0.7	0.50	3.4	
	300	2.6	1.0	1.61	3.1	
	1600	2.6	2.0	3.22	8.3	
	2000	1.2	3.0	3.29	10.1	
					24.9	0.28

Basin ID	Length (ft)	Slope %	K	V (fps)	Tc (min)	Tp (hr)
212	400	1.0	1.0	1.00	6.7	
	1200	1.0	2.0	2.00	10.0	
					16.7	0.19
213	400	2.7	1.0	1.64	4.1	
	1600	2.7	2.0	3.29	8.1	
	700	2.7	3.0	4.93	2.4	
					14.5	0.16
214	100	0.5	0.7	0.50	3.4	
	300	2.0	1.0	1.41	3.5	
	400	2.0	2.0	2.83	2.4	
	1200	0.5	2.0	1.41	14.1	
	300	0.5	3.0	2.12	2.4	
					25.8	0.29
215	100	0.5	0.7	0.50	3.4	
	200	1.5	1.0	1.22	2.7	
	1700	0.5	2.0	1.41	20.0	
	400	0.5	3.0	2.12	3.1	
					29.3	0.33
216	400	2.7	1.0	1.64	4.1	
	1600	2.7	2.0	3.29	8.1	
	2000	2.7	3.0	4.93	6.8	
	4000	2.7	4.0	6.57	10.1	
					29.1	0.32

```
START                    0.0 HOURS   PC=0   PL=-1
*S
*S                RIO BRAVO
*S
*S
*S
*S 100-YR, 24-HR STORM WITHOUT SEDIMENT
*S FILE NAME: RB_DMP.DAT
*S BY: RICHARD STOCKTON
*S LAST REVISION: 4-22-98
*S*************************************************************************
*****
*S THE PURPOSE OF THIS MODEL IS TO CALCULATE THE RUNOFF FROM FROM THE
*S SACATE BLANCO WATERSHED WEST OF THE POWERLINE EASEMENT (AKA SOUTH
*S POWERLINE DIVERSION AND DETENTION FACILITY); BORREGA SUB-BASINS
50103,
*S 50104, AND 50105, AND THE RIO BRAVO WATERSHED. RIO BRAVO SUB-BASINS
*S B-2 AND PART OF B-4 THAT CONTRIBUTE TO THE RIO BRAVO CHANNEL ARE
PONDED.
*S THE TOTAL DISCHARGE INTO THE RIO BRAVO CHANNEL IS LIMITED TO 520 CFS.
*S
*S FLOWS FROM THIS WATERSHED ARE CONVEYED TO HUBBLE LAKE DETENTION
*S FACILITY VIA THE HUBBLE LAKE/AMOLE DIVERSION CHANNEL.
*S
*S THE ORGINIAL RIO BRAVO MODEL WAS DEVELOPED BY AVID (AND ACCEPTED BY
*S THE COUNTY).  ASSUMPTIONS MADE IN THE AVID MODEL ARE INCORPORATED No Longer
*S HEREIN Vallid and have been completely revised. Significant Portion of
*S the watershed are now diverted to the AMOLE and Borega watersheds and a large
*S*****Area*****From*****Sacate*****Blanco*****is*****now*****added*****to*****Rio*****Bravo,*****Pond*****F*****has*****been*****deleted.
*S ANALYSIS ASSUMPTIONS:
*S*************************************************************************
*S 1. ALL LAND IN THE RIO BRAVO BASIN IS MODELED AS DEVELOPED CONDITION
AT 3 DU/AC.
*S   at 6 DU/AC except Steep Slopes in 201 & 202 and Anderson Hills where lower density
*S 2. THE PUNCH HYD COMMAND WAS ADDED TO THE END OF THIS FILE SO THE   is being propo
OUTFALL
*S    HYDROGRAPH COULD BE USED IN THE AMOLE DEL NORTE EXISTING
CONDITIONS MODEL
*S    AA100D1B.DAT, WHICH WILL BE USED IN THE ANALYSIS OF THE AMOLE
ARROYO SYSTEM.
*S
*S 3. NO BULKING FACTORS WERE ADDED TO THE AREA TRIBUTARY TO THE RIO
BRAVO
*S    CHANNEL DUE TO THE INCORPORATION OF DETENTION PONDS. HOWEVER,
BULKING FACTORS
*S    HAVE BEEN ADDED TO BASINS TRIBUTARY TO HUBBELL CHANNEL AND LAKE.
*S
*S*************************************************************************
****
*S100 YEAR 24HR STORM DEVELOPED CONDITION
RAINFALL                 TYPE=2  0.0  1.87  2.20  2.66    DT=0.05
** 10 YEAR 24HR STORM DEVELOPED CONDITION
**RAINFALL               TYPE=2  0.0  1.25  1.47  1.77    DT=0.05
**  2 YEAR 24HR STORM DEVELOPED CONDITION
**RAINFALL               TYPE=2  0.0  0.74  0.95  1.15    DT=0.05
*S*************************************************************************
*****
*S
*S*********************************************************
*S ADD BASINS FROM SOUTH POWERLINE DIVERSION
*S TO THE RIO BRAVO RUN
```

```
*S
*S*************************************************************
*S
~~*S CALCULATE THE FLOW FROM SUB-BASIN A60104~~
~~COMPUTE NM HYD          ID=2  HYD=A60104  AREA=0.1172 SQ MI~~
                          ~~A=0  B=41  C=19  D=40~~
                          ~~TP=0.133  MASSRAIN=-1~~
~~PRINT HYD               ID=2  CODE=1~~
~~*S~~
~~ROUTE RESERVOIR         ID=10 HYD=POND1.OUT I=2 CODE=10~~
                          ~~Q OUT   STORE   ELEV~~
                          ~~0       0       10~~
                          ~~10      2       11~~
                          ~~17.6    4       12~~
                          ~~25.0    8       13~~
~~PRINT HYD               ID=10  CODE=1~~
~~*S~~
~~*S ROUTE FLOWS TO POND 2~~
~~COMPUTE RATING CURVE    CID=1  VS NO=1  CODE=1~~
                          ~~SLP=0.015 D=2.0 N=0.013~~
~~COMPUTE TRAVEL TIME     ID=10  REACH NO=1  NO VS=1  L=2000 FT~~
                          ~~SLP=0.015~~
~~ROUTE                   OUTFLOW ID=11  OUTFLOW HYD=POND1.ROUTE~~
                          ~~INFLOW ID=10  DT=0.0~~
~~PRINT HYD               ID=11 CODE=1~~
~~*S~~
*S CALCULATE THE FLOW FROM SUB-BASIN A60106
COMPUTE NM HYD            ID=1  HYD=A60106  AREA=~~0.0480~~ 0.0501 SQ MI
                          A=0  B=28  C=23  D=49
                          TP=0.133  MASSRAIN=-1
PRINT HYD                 ID=1  CODE=1
*S
*S CALCULATE THE FLOW FROM SUB-BASIN A60107A
COMPUTE NM HYD            ID=2  HYD=A60107A  AREA=0.0313 SQ MI
                          A=0  B=28  C=23  D=49
                          TP=0.133  MASSRAIN=-1
PRINT HYD                 ID=2  CODE=1
*S
ADD HYD                   ID=3  HYD=A60107A.1  I=1  II=2
PRINT HYD                 ID=3  CODE=1
*S
*S ROUTE THE COMBINED FLOW FROM SUB-BASIN A60107A.
COMPUTE RATING CURVE      CID=1  VS NO=1  NO SEGS=1
                          MIN ELEV=100.0 FT  MAX ELEV=103.0 FT
                          CH SLP=.03  FP SLOPE=.03
                          N=-.03  DIST=29
                          DIST    ELEV    DIST    ELEV    DIST    ELEV
                          0       103.0   12.0    100.0   17.0    100.0
                          29.0    103.0
COMPUTE TRAVEL TIME       ID=12  REACH NO=1  NO VS=1  L=600 FT
                          SLP=.03
ROUTE                     OUTFLOW ID=12  OUTFLOW HYD=6107.5
                          INFLOW ID=3  DT=0.0
PRINT HYD                 ID=12 CODE=1
*S
*S CALCULATE THE FLOW FROM SUB-BASIN A60108
COMPUTE NM HYD            ID=1  HYD=A60108  AREA=0.0924 SQ MI
                          A=0  B=48 C=17  D=35
                          TP=0.133  MASSRAIN=-1
PRINT HYD                 ID=2  CODE=1
*S
```

```
*S ROUTE FLOW FROM SUB-BASIN A60108 THROUGH SUB-BASIN A60109 TO POND 2
COMPUTE RATING CURVE     CID=1  VN=1  NS=1  MIN EL=100  MAX EL=104
                         CS=0.05  FS=0.05  N=0.03  DIST=28
                         DIST    EL      DIST    EL
                         0       104     4       100
                         24      100     28      104
COMPUTE TRAVEL TIME      ID=10  RN=1  NVS=1  L=800  S=0.05
ROUTE                    ID=10  HYD=A60108.5  INFLOW ID=1  DT=0.0
PRINT HYD                ID=10  CODE=1
*S
*S CALCULATE THE FLOW FROM SUB-BASIN A60109
COMPUTE NM HYD           ID=2  HYD=A60109  AREA=0.0414 SQ MI
                         A=0  B=28  C=23  D=49
                         TP=0.133   MASSRAIN=-1
PRINT HYD                ID=2  CODE=1
*S
```

~~*S ADD THE ROUTED FLOW FROM SUB-BASIN A60107A.5 TO THE FLOW FROM SUB-BASIN A60104.5~~
~~ADD HYD ID=11 HYD=POND2.A1 I=11 II=12~~
~~PRINT HYD ID=11 CODE=1~~

```
*S
*S ADD THE ROUTED FLOW FROM SUB-BASIN POND2.A1 TO THE FLOW FROM SUB-
BASIN A60108.5
ADD HYD                  ID=11  HYD=POND2.A2  I=12  II=10
PRINT HYD                ID=11  CODE=1
*S
*S ADD THE ROUTED FLOW FROM SUB-BASIN POND2.A2 TO THE FLOW FROM SUB-
BASIN A60109
*S HYD=POND2.IN IS THE TOTAL INFLOW INTO POND 2.
ADD HYD                  ID=11  HYD=POND2.IN  I=11  II=2
PRINT HYD                ID=11  CODE=1
*S
*S ROUTE FLOW THROUGH POND 2
ROUTE RESERVOIR     ID=20 HYD=POND2.OUT I=11 CODE=10
                       Q OUT   STORE    ELEV
                        0              0      10
                        22.2         2      11
                        49.4         4      11.5
                        89.2         7      12
                       143.5      10      12.5
PRINT HYD               ID=20 CODE=1
*S
*S ROUTE FLOWS TO POND 3
COMPUTE RATING CURVE     CID=1  VN=1  NS=1  MIN EL=100  MAX EL=104
                         CS=0.005  FS=0.005  N=0.03  DIST=29
                         DIST    EL      DIST    EL
                         0       104     12       100
                         17      100     29      104
COMPUTE TRAVEL TIME      ID=11  RN=1  NVS=1  L=800  S=0.005
ROUTE                    ID=11  HYD=POND2.ROUTE  INFLOW ID=20  DT=0.0
PRINT HYD                ID=11  CODE=1
*S
*S CALCULATE THE FLOW FROM SUB-BASIN A60110
COMPUTE NM HYD           ID=1  HYD=A60110  AREA=0.1046 SQ MI
                         A=0   B=40 C=19  D=41
                         TP=0.133   MASSRAIN=-1
PRINT HYD                ID=1  CODE=1
*S
*S ROUTE FLOW FROM SUB-BASIN A60110 THROUGH SUB-BASIN A60111 TO POND 3
COMPUTE RATING CURVE     CID=1  VN=1  NS=1  MIN EL=100  MAX EL=104
                         CS=0.053  FS=0.053  N=0.03  DIST=18
```

```
                          DIST     EL       DIST     EL
                          0        104      4        100
                          14       100      18       104
COMPUTE TRAVEL TIME       ID=10  RN=1  NVS=1  L=1700  S=0.053
ROUTE                     ID=10  HYD=A60110.5  INFLOW ID=1  DT=0.0
PRINT HYD                 ID=10  CODE=1
*S
*S CALCULATE THE FLOW FROM SUB-BASIN A60111
COMPUTE NM HYD            ID=1  HYD=A60111  AREA=0.0384 SQ MI
                          A=0  B=28  C=23  D=49
                          TP=0.133   MASSRAIN=-1
PRINT HYD                 ID=1  CODE=1
*S
*S ADD THE ROUTED FLOW FROM SUB-BASIN A60110.5 TO THE FLOW FROM SUB-
BASIN A60111.
ADD HYD                   ID=11  HYD=POND3.A1  I=11  II=10
PRINT HYD                 ID=11  CODE=1
*S
*S ADD THE ROUTED FLOW FROM POND2.ROUTE TO THE FLOW FROM SUB-BASIN
A60111.
*S HYD=POND3.IN IS THE TOTAL INFLOW INTO POND 3.
ADD HYD                    ID=10 HYD=POND3.IN  I=11  II=1
PRINT HYD                  ID=10  CODE=1
*S
*S ROUTE FLOW THROUGH POND 3
ROUTE RESERVOIR      ID=30 HYD=POND3.OUT I=10 CODE=10
                          Q OUT   STORE    ELEV
                          0          0      10
                          39.1      1      11
                          82.0      3      11.5
                          141.1    5      12
                          217.8    8        12.5
PRINT HYD                ID=30 CODE=1
*S
*S ROUTE FLOWS TO POND 4
COMPUTE RATING CURVE      CID=1  VN=1  NS=1  MIN EL=100  MAX EL=104
                          CS=0.005  FS=0.005  N=0.03  DIST=34
                          DIST     EL       DIST     EL
                          0        104      12        100
                          22       100      34       104
COMPUTE TRAVEL TIME       ID=10  RN=1  NVS=1  L=500  S=0.005
ROUTE                     ID=10  HYD=POND3.ROUTE  INFLOW ID=30  DT=0.0
PRINT HYD                 ID=10  CODE=1
*S
*S CALCULATE THE FLOW FROM SUB-BASIN A60113
COMPUTE NM HYD            ID=1  HYD=A60113  AREA=0.0580 SQ MI
                          A=0  B=29 C=23  D=48
                          TP=0.133   MASSRAIN=-1
PRINT HYD                 ID=1  CODE=1
*S
*S CALCULATE THE FLOW FROM SUB-BASIN A60116N
COMPUTE NM HYD            ID=2  HYD=A60116N  AREA=0.0381 SQ MI
                          A=0  B=28  C=23  D=49
                          TP=0.133   MASSRAIN=-1
PRINT HYD                 ID=2  CODE=1
*S
*S ADD THE ROUTED FLOW FROM POND 3.ROUTE TO THE FLOW FROM SUB-BASIN
A60113.
ADD HYD                   ID=10  HYD=POND4.A1  I=10  II=1
PRINT HYD                 ID=10  CODE=1
*S
```

```
*S ADD THE ROUTED FLOW FROM SUB-BASIN POND3.A1 TO THE FLOW FROM SUB-
BASIN A60116N
*S HYD=POND2.IN IS THE TOTAL INFLOW INTO POND 2.
ADD HYD                 ID=10  HYD=POND4.IN  I=10  II=2
PRINT HYD               ID=10  CODE=1
*S
*S ROUTE FLOW THROUGH POND 4
ROUTE RESERVOIR         ID=40 HYD=POND4.OUT I=10 CODE=10
                        Q OUT   STORE    ELEV
                        0              0      10
                        39.1         1      11
                        82.0         3      11.5
                        141.1       5      12
                        217.8       8      12.5
                        313.4      10      13
PRINT HYD              ID=40 CODE=1
*S
*S ROUTE FLOWS TO POND 5
COMPUTE RATING CURVE    CID=1  VN=1  NS=1  MIN EL=100  MAX EL=104
                        CS=0.005  FS=0.005  N=0.03  DIST=34
                        DIST    EL      DIST    EL
                        0       104     12       100
                        22      100     34      104
COMPUTE TRAVEL TIME     ID=10  RN=1  NVS=1  L=450  S=0.005
ROUTE                   ID=10  HYD=POND4.ROUTE  INFLOW ID=40  DT=0.0
PRINT HYD               ID=10  CODE=1
*S
*S CALCULATE THE FLOW FROM SUB-BASIN A60114
COMPUTE NM HYD          ID=1  HYD=A60114  AREA=0.2162 SQ MI
                        A=0  B=46  C=17  D=37
                        TP=0.133   MASSRAIN=-1
PRINT HYD               ID=1  CODE=1
*S
*S ROUTE FLOW FROM SUB-BASIN A60114 THROUGH SUB-BASIN A60116S TO POND 5.
COMPUTE RATING CURVE    CID=1  VN=1  NS=1  MIN EL=100  MAX EL=104
                        CS=0.046  FS=0.046  N=0.03  DIST=18
                        DIST    EL      DIST    EL
                        0       104     4       100
                        14      100     18      104
COMPUTE TRAVEL TIME     ID=11  RN=1  NVS=1  L=700  S=0.046
ROUTE                   ID=11  HYD=A60114.5  INFLOW ID=1  DT=0.0
PRINT HYD               ID=11  CODE=1
*S
*S CALCULATE THE FLOW FROM SUB-BASIN A60115
COMPUTE NM HYD          ID=2  HYD=A60115  AREA=0.0764 SQ MI
                        A=0  B=32  C=21  D=47
                        TP=0.133   MASSRAIN=-1
PRINT HYD               ID=2  CODE=1
*S
*S ROUTE FLOW FROM SUB-BASIN A60115 THROUGH SUB-BASIN A60116S TO POND 5.
COMPUTE RATING CURVE    CID=1  VN=1  NS=1  MIN EL=100  MAX EL=104
                        CS=0.044  FS=0.044  N=0.03  DIST=18
                        DIST    EL      DIST    EL
                        0       104     4       100
                        14      100     18      104
COMPUTE TRAVEL TIME     ID=12  RN=1  NVS=1  L=900  S=0.044
ROUTE                   ID=12  HYD=A60115.5  INFLOW ID=2  DT=0.0
PRINT HYD               ID=12  CODE=1
*S
*S CALCULATE THE FLOW FROM SUB-BASIN A60116S
COMPUTE NM HYD          ID=1  HYD=A60116S  AREA=0.0244 SQ MI
```

```
                          A=0  B=28  C=23  D=49
                          TP=0.133   MASSRAIN=-1
PRINT HYD                 ID=1  CODE=1
*S
*S ADD THE ROUTED FLOW FROM POND4.ROUTE TO THE FLOW FROM SUB-BASIN
A60114.5
ADD HYD                   ID=10  HYD=POND5.A1  I=10  II=11
PRINT HYD                 ID=10  CODE=1
*S
*S ADD THE ROUTED FLOW FROM SUB-BASIN POND5.A1 TO THE FLOW FROM SUB-
BASIN A60115.5
ADD HYD                   ID=10  HYD=POND5.A2  I=10  II=12
PRINT HYD                 ID=10  CODE=1
*S
*S ADD THE ROUTED FLOW FROM SUB-BASIN POND5.A2 TO THE FLOW SUB-BASIN
A60116S.5
*S HYD=POND5.IN IS THE TOTAL INFLOW INTO POND 5.
ADD HYD                   ID=10  HYD=POND5.IN  I=10  II=1
PRINT HYD                 ID=10  CODE=1
*S
*S ROUTE FLOW THROUGH POND 5
ROUTE RESERVOIR           ID=50 HYD=POND5.OUT I=10 CODE=10
                          Q OUT   STORE    ELEV
                          0               0      10
                          39.1         1      11
                          82.0         3      11.5
                          141.1       5      12
                          217.8      7     12.5
                          313.4      9     13
                          429.3      11     13.5
PRINT HYD                ID=50 CODE=1
*S
*S ROUTE FLOWS TO POND 6
COMPUTE RATING CURVE      CID=1  VN=1  NS=1  MIN EL=100  MAX EL=104
                          CS=0.005  FS=0.005  N=0.03  DIST=34
                          DIST    EL      DIST    EL
                          0       104     12       100
                          22      100     34      104
COMPUTE TRAVEL TIME       ID=10  RN=1  NVS=1  L=900  S=0.005
ROUTE                     ID=10  HYD=POND5.ROUTE  INFLOW ID=50  DT=0.0
PRINT HYD                 ID=10  CODE=1
*S
*S*************************201*************************************
*S COMPUTE HYDROGRAPH FOR ~~B-1~~ OF RIO BRAVO          0.0969
COMPUTE NM HYD            ID=1  HYD NO=201.0  DA=~~0.0308~~ SQ MI
                          %A=0.0  %B=~~33.0~~ 27  %C=~~33.0~~ 27  %D=~~34.0~~ 46
                          TP=~~0.1333~~ CK HR
                          MASS RAINFALL=-1
PRINT HYD                 ID=1 CODE=1
~~*S~~
~~*S ROUTE B-1 THROUGH B-3.  ASSUME LINED CHANNEL~~
~~COMPUTE RATING CURVE~~  ~~CID=1  VS NO=1  NO SEGS=1~~
                          ~~MIN ELEV=100.0 FT  MAX ELEV=106.0 FT~~
                          ~~CH SLP=.045  FP SLOPE=.045~~
                          ~~N=.013  DIST=25.5~~
                          ~~DIST  ELEV  DIST  ELEV  DIST  ELEV~~
                          ~~0  106.0  12.0  100.0  17.0  100.0~~
                          ~~29.0  106.0~~
~~COMPUTE TRAVEL TIME~~   ~~ID=11  REACH NO=1  NO VS=1  L=2800 FT~~
                          ~~SLP=.045~~
~~ROUTE~~                 ~~OUTFLOW ID=11  OUTFLOW HYD=201.5~~
```

```
                                INFLOW ID=1  DT=0.0
PRINT HYD                       ID=11 CODE=1
*S                              202          of
*S COMPUTE HYDROGRAPH FOR B-3 (WEST) FROM RIO BRAVO.  REDUCE AREA TO 60
AC.                                                   0.0826
COMPUTE NM HYD                  ID=1  HYD NO=203.0  DA=0.0938 SQ MI
                                %A=0.0  %B=33.0  %C=33.0  %D=33.0
                                TP=0.1333 HR  OK 27.0  27.0  46.0
                                MASS RAINFALL=-1
PRINT HYD                       ID=1 CODE=1
*S
*S ADD THE ROUTED FLOWS FROM SUB-BASIN 201.5 TO THE FLOWS FROM SUB-BASIN
203
ADD HYD                         ID=11 HYD=203.1  ADD ID=1 TO ID=11
PRINT HYD                       ID=11 CODE=1
*S
*S ADD THE ROUTED FLOW FROM POND 5.ROUTE TO THE FLOW FROM SUB-BASIN 201
201.5
ADD HYD                         ID= 11 HYD=POND6.IN I=10 II=11
PRINT HYD                       ID=11 CODE=1
*S
*S ROUTE FLOW THROUGH POND 6
ROUTE RESERVOIR                 ID=60 HYD=POND6.OUT I=11 CODE=10
                                Q OUT   STORE    ELEV
                                0              0      10
                                39.1         1      11
                                82.0         3      11.5
                                141.1       5      12
                                217.8       7     12.5
                                313.4       9     13
                                429.3       11   13.5
PRINT HYD                      ID=60 CODE=1
*S
*S ROUTE FLOWS TO POND 6
COMPUTE RATING CURVE            CID=1  VN=1  NS=1  MIN EL=100  MAX EL=104
                                CS=0.005  FS=0.005  N=0.03  DIST=34
                                DIST    EL      DIST    EL
                                0       104     12       100
                                22      100     34      104
COMPUTE TRAVEL TIME             ID=10  RN=1  NVS=1  L=600  S=0.005
ROUTE                           ID=10  HYD=POND6.ROUTE  INFLOW ID=60  DT=0.0
PRINT HYD                       ID=10  CODE=1
*S
*S*************************************************************
*S                                 202
*S COMPUTE FLOWS FROM SUB-BASIN B-2 OF RIO BRAVO  0.0826
COMPUTE NM HYD                  ID=1  HYD NO=202.0  DA=0.0754 SQ MI
                                %A=0  %B=33 27 %C=33  %D=34
                                TP=0.1333 HR  27  46
                                MASS RAINFALL=-1
PRINT HYD                       ID=1 CODE=1
*S
*S ROUTE FLOWS TO POND 8
COMPUTE RATING CURVE            CID=1  VS NO=1  NO SEGS=1
                                MIN ELEV=100.0 FT  MAX ELEV=106.0 FT
                                CH SLP=0.0386  FP SLOPE=0.0386
                                N=0.030  DIST=34
                                DIST    ELEV    DIST    ELEV    DIST    ELEV
                                0       106.0   12.0    100.0   22.0    100.0
                                34.0    106.0
COMPUTE TRAVEL TIME             ID=11  REACH NO=2  NO VS=1  L=3200 FT
```

```
                                SLP=0.0386
ROUTE                           OUTFLOW ID=11  OUTFLOW HYD=202.5
                                INFLOW ID=1  DT=0.0
PRINT HYD                       ID=11 CODE=1
*S
*S COMPUTE HYDROGRAPH FOR B-4 (WEST) FROM RIO BRAVO REDUCE AREA TO 41 AC
COMPUTE NM HYD                  ID=1  HYD NO=204.0  DA=0.0641 SQ MI
                                %A=0  %B=33  %C=33  %D=34
                                TP=0.1333 HR
                                MASS RAINFALL=-1
PRINT HYD                       ID=1 CODE=1
*S
*S ADD THE ROUTED FLOWS FROM SUB-BASIN 202.5 TO THE FLOWS FROM SUB-BASIN
204
ADD HYD                         ID=11  HYD=204.1  I=1  II=11
PRINT HYD                       ID=11  CODE=1
*S
*S COMPUTE FLOWS FROM SUB-BASIN 50103 FROM BORREGA
COMPUTE NM HYD                  ID=1 HYD=103 DA=0.054 SM
                                A=0 B=53 C=15 D=32
                                TP=.1333 HR RAIN=-1
PRINT HYD                       ID=1 CODE=10
*S
*S ROUTE FLOWS TO POND 7
COMPUTE RATING CURVE            CID=1  VS NO=1  NO SEGS=1
                                MIN ELEV=100.0 FT  MAX ELEV=106.0 FT
                                CH SLP=0.0482  FP SLOPE=0.0482
                                N=0.030  DIST=34
                                DIST    ELEV    DIST    ELEV    DIST    ELEV
                                0       106.0   12.0    100.0   22.0    100.0
                                34.0    106.0
COMPUTE TRAVEL TIME             ID=12  REACH NO=2  NO VS=1  L=2800 FT
                                SLP=0.0482
ROUTE                           OUTFLOW ID=12  OUTFLOW HYD=103.5
                                INFLOW ID=1  DT=0.0
PRINT HYD                       ID=12 CODE=1
*S
*S COMPUTE FLOWS FROM SUB-BASIN 50104 FROM BORREGA
COMPUTE NM HYD                  ID=1 HYD=104 DA=0.0393 SM
                                A=0 B=48 C=17 D=35
                                TP=.1333 HR RAIN=-1
PRINT HYD                       ID=1 CODE=10
*S
*S ROUTE FLOWS TO POND 7
COMPUTE RATING CURVE            CID=1  VS NO=1  NO SEGS=1
                                MIN ELEV=100.0 FT  MAX ELEV=106.0 FT
                                CH SLP=0.045  FP SLOPE=0.045
                                N=0.030  DIST=34
                                DIST    ELEV    DIST    ELEV    DIST    ELEV
                                0       106.0   12.0    100.0   22.0    100.0
                                34.0    106.0
COMPUTE TRAVEL TIME             ID=13  REACH NO=2  NO VS=1  L=2000 FT
                                SLP=0.045
ROUTE                           OUTFLOW ID=13  OUTFLOW HYD=104.5
                                INFLOW ID=1  DT=0.0
PRINT HYD                       ID=13 CODE=1
*S
*S ADD THE ROUTED FLOWS FROM SUB-BASIN 50103.5 TO THE ROUTED FLOWS
*S  FROM SUB-BASIN 50104.5
ADD HYD                         ID=12  HYD=104.6  I=12  II=13
PRINT HYD                       ID=12  CODE=1
```

```
*S
*S COMPUTE FLOWS FROM SUB-BASIN 50105 (WEST) FROM BORREGA
*S REDUCE AREA TO 81 AC.
COMPUTE NM HYD              ID=1 HYD=105 DA=0.1266 SM
                            A=0 B=28 C=23 D=49
                            TP=.1333 HR RAIN=-1
PRINT HYD                   ID=1 CODE=10
*S
*S ADD THE ROUTED FLOWS FROM SUB-BASIN 50105 (WEST) TO THE ROUTED FLOWS
*S  FROM SUB-BASIN 50104.6

ADD HYD                     ID=12  HYD=POND7.IN  I=1  II=12
PRINT HYD                   ID=12  CODE=1
*S
*S ROUTE FLOWS THROUGH POND 7
ROUTE RESERVOIR             ID=70 HYD=POND7.OUT I=12 CODE=10
                            Q OUT    STORE     ELEV
                            0          0         10
                            39.7       3         11
                            48.6       6         11.5
                            56.2       9         12
                            62.8       12         12.5
                            68.8       15         13
PRINT HYD                   ID=70 CODE=1
*S
*S ROUTE FLOWS TO POND 8
COMPUTE RATING CURVE        CID=1  VS NO=1  CODE=-1
                            SLP=0.01 D=3.0 N=0.013
COMPUTE TRAVEL TIME         ID=12  REACH NO=1  NO VS=1  L=400 FT
                            SLP=0.01
ROUTE                       OUTFLOW ID=12  OUTFLOW HYD=POND7.ROUTE
                            INFLOW ID=70  DT=0.0
PRINT HYD                   ID=12 CODE=1
*S
*S ADD THE FLOW FROM SUB-BASIN 204.1 TO THE FLOW FROM POND7.ROUTE
ADD HYD                     ID=11 HYD=POND8.IN I=11 II=12
PRINT HYD                   ID=11 CODE=10
*S
*S ROUTE FLOWS THROUGH POND 8
ROUTE RESERVOIR             ID=80 HYD=POND8.OUT I=11 CODE=10
                            Q OUT    STORE     ELEV
                            0          0         10
                            39.7       3         11
                            48.6       6         11.5
                            56.2       9         12
                            62.8       12         12.5
                            68.8       15         13
PRINT HYD                   ID=80 CODE=1
*S
*S ROUTE FLOWS TO JUNCTION
COMPUTE RATING CURVE        CID=1  VS NO=1  CODE=-1
                            SLP=0.01 D=3.0 N=0.013
COMPUTE TRAVEL TIME         ID=11  REACH NO=1  NO VS=1  L=600 FT
                            SLP=0.01
ROUTE                       OUTFLOW ID=11  OUTFLOW HYD=POND8.ROUTE
                            INFLOW ID=80  DT=0.0
PRINT HYD                   ID=11 CODE=1
*S
*S ADD THE FLOWS FROM POND6.ROUTE TO THE FLOWS FROM POND8.ROUTE
*S AT THE JUNCTION POINT
ADD HYD                     ID=11 HYD=JUNCTION I=11 II=10
```

```
PRINT HYD                    ID=11 CODE=10
*S
*S ROUTE THE FLOWS FROM THE JUNCTION POINT TO THE RIO BRAVO CHANNEL
COMPUTE RATING CURVE         CID=1  VS NO=1  NO SEGS=1
                             MIN ELEV=100.0 FT  MAX ELEV=106.0 FT
                             CH SLP=.025  FP SLOPE=.025
                             N=-.013  DIST=25.5
                             DIST    ELEV    DIST    ELEV    DIST    ELEV
                             0       106.0   12.0    100.0   17.0    100.0
                             29.0    106.0
COMPUTE TRAVEL TIME          ID=12  REACH NO=2  NO VS=1  L=6000 FT
                             SLP=.025
ROUTE                        OUTFLOW ID=12  OUTFLOW HYD=202.2
                             INFLOW ID=11  DT=0.0
PRINT HYD                    ID=12 CODE=1
*S
*S COMPUTE THE FLOW FROM SUB-BASIN B-3 (EAST) FROM RIO BRAVO
*S REDUCE AREA TO 80 AC
COMPUTE NM HYD               ID=1  HYD NO=203.0  DA=0.1250 SQ MI
                             %A=0.0  %B=33.0  %C=33.0  %D=34.0
                             TP=0.1333 HR
                             MASS RAINFALL=-1
PRINT HYD                    ID=1 CODE=1
*S
*S ROUTE FLOWS FROM 203.0 IN A LOCAL POND CALLED POND 9
ROUTE RESERVOIR              ID=90 HYD=POND9.OUT I=1 CODE=10
                             Q-OUT    STORE   ELEV
                             0          0       10
                             39.7       3       11
                             48.6       6       11.5
                             56.2       9       12
PRINT HYD                    ID=90  CODE=1
*S
*S ADD THE FLOW FROM POND9.OUT TO THE FLOW FROM SUB-BASIN 202.2
*S THIS IS THE TOTAL FLOW INTO THE RIO BRAVO CHANNEL
ADD HYD                      ID=99 HYD=CHANNEL.IN I=12 II=90
PRINT HYD                    ID=99 CODE=10
*S
*S ROUTE THE FLOWS IN THE RIO BRAVO CHANNEL TO THE HUBBELL CHANNEL
COMPUTE RATING CURVE         CID=1  VS NO=1  NO SEGS=1
                             MIN ELEV=100.0 FT  MAX ELEV=106.0 FT
                             CH SLP=.025  FP SLOPE=.025
                             N=-.013  DIST=34
                             DIST    ELEV    DIST    ELEV    DIST    ELEV
                             0       106.0   12.0    100.0   22.0    100.0
                             34.0    106.0
COMPUTE TRAVEL TIME          ID=12  REACH NO=2  NO VS=1  L=6000 FT
                             SLP=.025
ROUTE                        OUTFLOW ID=12  OUTFLOW HYD=CHANNEL.ROUTE
                             INFLOW ID=99  DT=0.0
PRINT HYD                    ID=12 CODE=1
*S
*S*****************************************
*S
*S GENERATION OF SEDIMENT LIKELY, BULK FLOWS 6%
SEDIMENT BULK                CODE=1   BK=1.06
*S COMPUTE HYDROGRAPH FOR B-5
COMPUTE NM HYD               ID=1  HYD NO=205.0  DA=0.347 SQ MI
                             %A=0.0  %B=33.0  %C=33.0  %D=34.0
                             TP=0.17 HR
                             MASS RAINFALL=-1
```

Compute 203
d
Route Channel thru ~~210~~ 204
Compute 204, Add, Route Thru 210
Compute 205
d & 10 Route
Compute
Route thru 206
Compute 206
Add
Route Thru 207
t
Compute 207
d
Compute 209
d
Compute 210
Add to 204
Add to ~~210~~ 209
Route Thru 213
Compute 211
Compute 212
Compute 213
Add to 210
d to 212
Route thru 214
Compute 214
d
Compute 215
d & Route
Compute 216
d Hyde

```
PRINT HYD                ID=1 CODE=1
*S
*S ADD THE ROUTED FLOWS FROM CHANNEL.ROUTE TO THE FLOWS
*S FROM SUB-BASIN B-5
ADD HYD                       ID=99 HYD=RB1-DMP.HYD I=1 II=12
*S HYD=RB1-DMP.HYD IS *****AP 43*****
PUNCH HYD                ID=99
*S
*S
*S*************************************************
*S
*S
*S GENERATION OF SEDIMENT LIKELY, BULK FLOWS 6%
SEDIMENT BULK            CODE=1   BK=1.06
*S COMPUTE HYDROGRAPH FOR B-4 (EAST) FROM RIO BRAVO REDUCE AREA TO 50.1
AC
COMPUTE NM HYD           ID=1  HYD NO=204.0  DA=0.0783 SQ MI
                         %A=0  %B=33  %C=33  %D=34
                         TP=0.1333 HR
                         MASS RAINFALL=-1
PRINT HYD                ID=1 CODE=1
*S
*S ROUTE TOTAL FLOW THROUGH B-6 IN ARROYO
COMPUTE RATING CURVE     CID=1  VS NO=1  NO SEGS=1
                         MIN ELEV=100.0 FT  MAX ELEV=106.0 FT
                         CH SLP=.021  FP SLOPE=.021
                         N=-.03  DIST=39
                         DIST     ELEV     DIST     ELEV     DIST     ELEV
                         0        106.0    12.0     100.0    27.0     100.0
                         39.0     106.0
COMPUTE TRAVEL TIME      ID=2  REACH NO=2  NO VS=1  L=6600 FT
                         SLP=.021
ROUTE                    OUTFLOW ID=2  OUTFLOW HYD=202.2
                         INFLOW ID=1  DT=0.0
PRINT HYD                ID=2 CODE=1
*S
*S COMPUTE HYDROGRAPH FOR B-6
*S GENERATION OF SEDIMENT LIKELY, BULK FLOWS 6%
SEDIMENT BULK            CODE=1   BK=1.06
COMPUTE NM HYD           ID=1  HYD NO=206.0  DA=0.581 SQ MI
                         %A=0  %B=9  %C=75  %D=16
                         TP=0.39 HR
                         MASS RAINFALL=-1
PRINT HYD                ID=1 CODE=1
*S
*S ADD FLOW FROM B-4 (EAST) TO ROUTED FLOW
*S HYD=RB2-DMP.HYD IS *****AP 44*****
ADD HYD                  ID=3  HYD=RB2-DMP.HYD  I=1  II=2
PRINT HYD                ID=3  CODE=1
PUNCH HYD                ID=3
FINISH
```

RIO BRAVO, AHYMO, SUMMARY

```
(s16.66H
  AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) -                          - VERSION:  1997.02d      RUN DATE (MON/DAY/YR) =05/01/2003
  INPUT FILE = rb_dmp.dat                                                                    USER NO.= AHYMO-I-9702dGoodwinM-AH

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

  START                                                                                                   TIME=       .00
  *S
  *S              RIO BRAVO
  *S
  *S
  *S
  *S 100-YR, 24-HR STORM WITHOUT SEDIMENT
  *S FILE NAME: RB_DMP.DAT
  *S BY: RICHARD STOCKTON
  *S REVISED BY JAMES D. HUGHES @MARK GOODWIN AND ASSOCIATES 4-25-03
  *S LAST REVISION: 4-22-98
  *S*************************************************************************
  *S THE PURPOSE OF THIS MODEL IS TO CALCULATE THE RUNOFF FROM FROM THE
  *S SACATE BLANCO WATERSHED WEST OF THE POWERLINE EASEMENT (AKA SOUTH
  *S POWERLINE DIVERSION AND DETENTION FACILITY);
  *S AND THE RIO BRAVO WATERSHED.
  *S
  *S FLOWS FROM THIS WATERSHED ARE CONVEYED TO HUBBLE LAKE DETENTION
  *S FACILITY VIA THE HUBBLE LAKE/AMOLE DIVERSION CHANNEL.
  *S
  *S THE ORGINIAL RIO BRAVO MODEL WAS DEVELOPED BY AVID (AND ACCEPTED BY
  *S THE COUNTY).  ASSUMPTIONS MADE IN THE AVID MODEL ARE INVALID, AND HAVE
  *S BEEN CORRECTED WITH THE 4-25-03 REVISIONS. DIVERSIONS TO THE BOREGA DAM
  *S AND THE AMOLE CHANNEL REDUCE THIS BASIN AND 114 AC. OF THE SACATE BLANCO
  *S BELOW THE POWER LINE IS ADDED TO THE RIO BRAVO CHANNEL.
  *S PONDS 7 & 9 ARE DELETED AND POND 10 IS ADDED.
  *S*********************************************************************
  *S ANALYSIS ASSUMPTIONS:
  *S*********************************************************************
  *S 1. ALL LAND IN THE RIO BRAVO BASIN IS MODELED AS DEVELOPED CONDITION AT
  *S    6 DU/AC, EXCEPT ANDERSON HILLS WHERE LOWER DENSITIES ARE CERTAIN, AND
  *S    EXCEPT IN BASINS 201 AND 202 WHERE THERE IS NO LIGHT.
  *S 2. THE PUNCH HYD COMMAND WAS ADDED TO THE END OF THIS FILE SO THE OUTFALL
  *S    HYDROGRAPH COULD BE USED IN THE AMOLE DEL NORTE EXISTING CONDITIONS MODEL
  *S    AA100D1B.DAT, WHICH WILL BE USED IN THE ANALYSIS OF THE AMOLE ARROYO SYSTE
  *S
```

```
*S 3. NO BULKING FACTORS WERE ADDED TO THE AREA TRIBUTARY TO THE RIO BRAVO
*S    CHANNEL DUE TO THE INCORPORATION OF DETENTION PONDS. HOWEVER, BULKING FACT
*S    HAVE BEEN ADDED TO BASINS TRIBUTARY TO HUBBELL CHANNEL AND LAKE.
*S
*S*************************************************************************
*S100 YEAR 24HR STORM DEVELOPED CONDITION
RAINFALL  TYPE= 2                                                                    RAIN24=   2.660
*S*************************************************************************
*S
*S*********************************************************
*S ADD BASINS FROM SOUTH POWERLINE DIVERSION
*S TO THE RIO BRAVO RUN
*S
*S*********************************************************
*S
*S CALCULATE THE FLOW FROM SUB-BASIN A60106
COMPUTE NM HYD        A60106   -     1        .05010       106.82       4.268      1.59741    1.500    3.331 PER IMP=  49.00
*S
*S CALCULATE THE FLOW FROM SUB-BASIN A60107A
COMPUTE NM HYD       A60107A   -     2        .03130        66.74       2.667      1.59742    1.500    3.332 PER IMP=  49.00
*S
```

```
(s16.66H
   AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) -                        - VERSION:  1997.02d      RUN DATE (MON/DAY/YR) =05/01/2003
   INPUT FILE = sb_dmp.dat                                                                 USER NO.= AHYMO-I-9702dGoodwinM-AH

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

   START                                                                                                   TIME=       .00
   *S
   *S      SACATE BLANCO WATERSHED
   *S
   *S
   *S 100-YR, 24-HR STORM WITH SEDIMENT
   *S FILE NAME: SB_DMP.DAT
   *S BY: RICHARD STOCKTON   PEER REVIEWED BY: CLINT DODGE
   *S LAST REVISION: 04-22-98
   *S*************************************************************************
   *S THE PURPOSE OF THIS MODEL IS TO CALCULATE THE RUNOFF FROM THE SACATE BLANCO
   *S WATERSHED.  FLOWS FROM THIS BASIN IS CONVEYED TO THE AMOLE DETENTION FACILITY
   *S VIA THE AMOLE ARROYO.  BASIN BOUNDARIES WERE DETERMINED FROM NOVEMBER 1995
   *S AREIAL, TOPOGRAPHICAL MAPS AND PREVIOUS STUDIES.
   *S
   *S*************************************************************************
   *S ANALYSIS ASSUMPTIONS:
   *S*************************************************************************
   *S 1. ALL LAND IN THIS BASIN IS MODELED AS DEVELOPED CONDITION.
   *S
   *S 2. THE PUNCH HYD COMMAND WAS ADDED TO THE END OF THIS FILE SO THE OUTFALL
   *S    HYDROGRAPH COULD BE USED IN THE AMOLE ARROYO DEVELOPED CONDITIONS MODEL
   *S    AA_DMP.DAT, WHICH WILL BE USED IN THE ANALYSIS OF THE AMOLE/HUBBLE
   *S    LAKE DETENTION SYSTEM.
   *S
   *S 3. FLOWS GENERATED FROM AREAS WEST OF THE POWERLINE ARE DIVERTED TO THE RIO
   *S    BRAVO CHANNEL.  THIS FACILITY IS CALLED THE SOUTH POWERLINE DIVERSION.
   *S
   *S 4. REVISIONS ON 4-29-03 BY JDH DIVERT 114 AC BELOW THE POWER LINE THROUGH
   *S    ANDERSON HILLS TO THE RIO BRAVO CHANNEL AND THE NORTH EDGE OF THE BASIN
   *S    WAS REDEFINED BY THE NEW LOCATION OF GIBSON BLVD AND BY DIVIDES BETWEEN
   *S    LAND OWNERS. SEDIMENT BULKING WAS REMOVED SINCE THE DIRT CHANNEL
   *S    WILL NOW BE A PIPE
   *S*************************************************************************
   *S100 YEAR 24HR STORM DEVELOPED CONDITION
   RAINFALL  TYPE= 2                                                                       RAIN24=   2.660
```

SACATE BLANCO, AHYMO SUMMARY

```
COMPUTE NM HYD        121.00   -     2        .12650       231.04      11.867      1.75892    1.550    2.854 PER IMP=  57.00
COMPUTE NM HYD        122.00   -     1        .02590        52.66       2.430      1.75891    1.550    3.177 PER IMP=  57.00
ADD HYD               122.10  1& 2   3        .15240       283.70      14.296      1.75891    1.550    2.909
ROUTE                 122.10    3    4        .15240       276.86      14.296      1.75892    1.600    2.839
COMPUTE NM HYD        123.00   -     2        .06990       100.26       6.557      1.75892    1.650    2.241 PER IMP=  57.00
ROUTE                 123.10    2    1        .06990       100.78       6.557      1.75892    1.700    2.253
ADD HYD               103.10  1& 4   3        .22230       362.09      20.854      1.75891    1.600    2.545
COMPUTE NM HYD        124.00   -     2        .19970       329.02      18.734      1.75892    1.600    2.574 PER IMP=  57.00
ADD HYD               124.10  2& 3   1        .42200       691.11      39.587      1.75891    1.600    2.559
COMPUTE NM HYD        125.00   -     2        .00820        16.74        .823      1.88120    1.550    3.189 PER IMP=  65.00
ADD HYD               124.10  1& 2   3        .43020       706.38      40.410      1.76124    1.600    2.566
ROUTE                 123.10    3    4        .43020       695.58      40.410      1.76124    1.650    2.526
COMPUTE NM HYD        126.00   -     2        .17790       284.30      16.689      1.75892    1.600    2.497 PER IMP=  57.00
ADD HYD               126.10  2& 4   3        .60810       977.63      57.098      1.76056    1.650    2.512
COMPUTE NM HYD        127.00   -     2        .01370        28.95       1.375      1.88120    1.550    3.302 PER IMP=  65.00
ADD HYD               127.10  3& 2   1        .62180       997.46      58.473      1.76322    1.650    2.506
COMPUTE NM HYD        128.00   -     2        .03260        54.08       3.058      1.75892    1.600    2.592 PER IMP=  57.00
*S HYD NO. SB_DMP.HYD IS ***** AP 62 *****
ADD HYD           SB_DMP.HYD  1& 2  99        .65440      1049.84      61.531      1.76300    1.650    2.507
FINISH
(s10H
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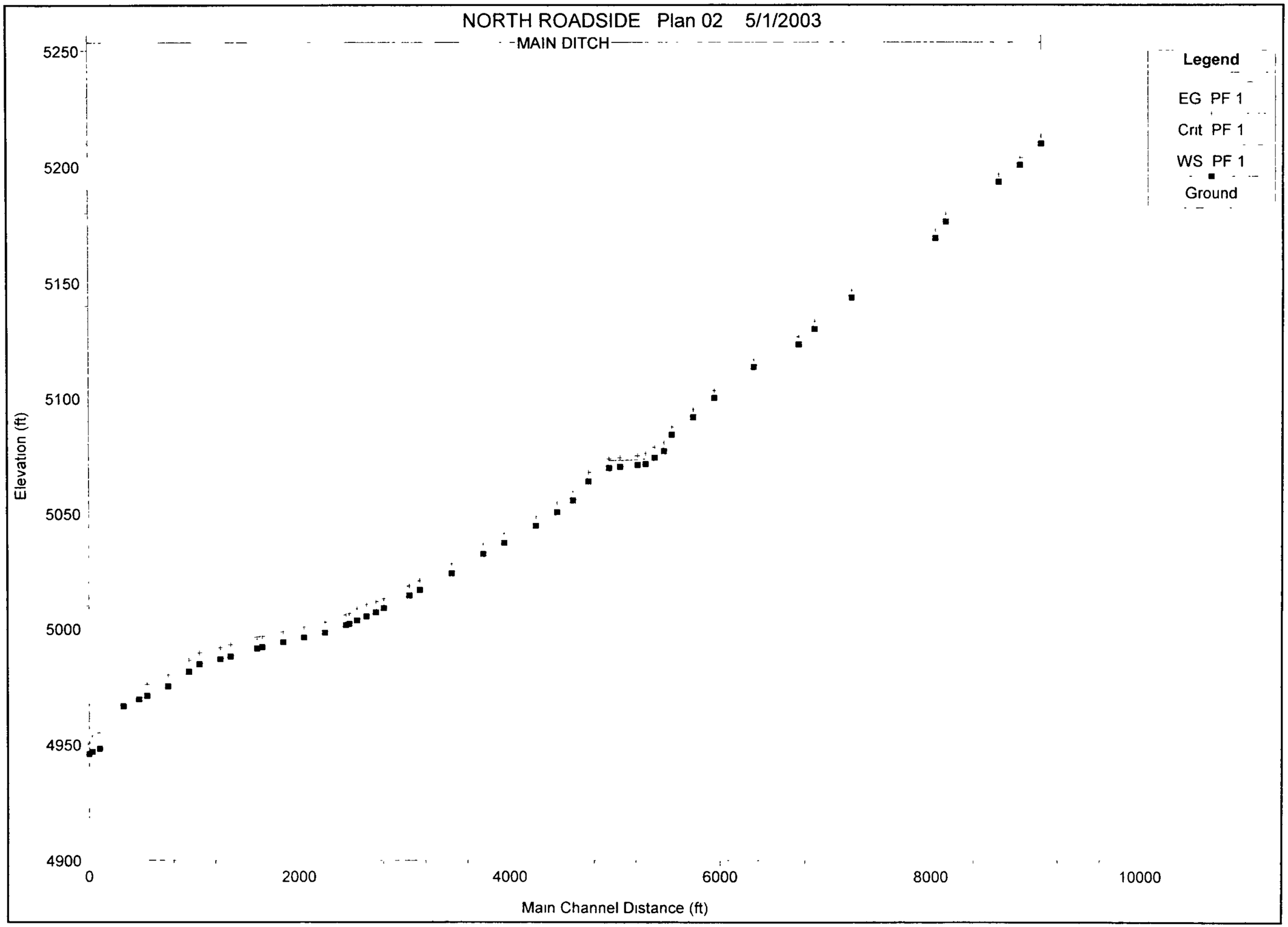

NORTH ROADSIDE Plan 02 5/1/2003
MAIN DITCH
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Elevation (ft)
5250
5200
5150
5100
5050
5000
4950
4900
0
2000
4000
6000
8000
10000
Main Channel Distance (ft)

HEC-RAS Plan Plan 01 River: RIO BRAVO Reach: MAIN DITCH

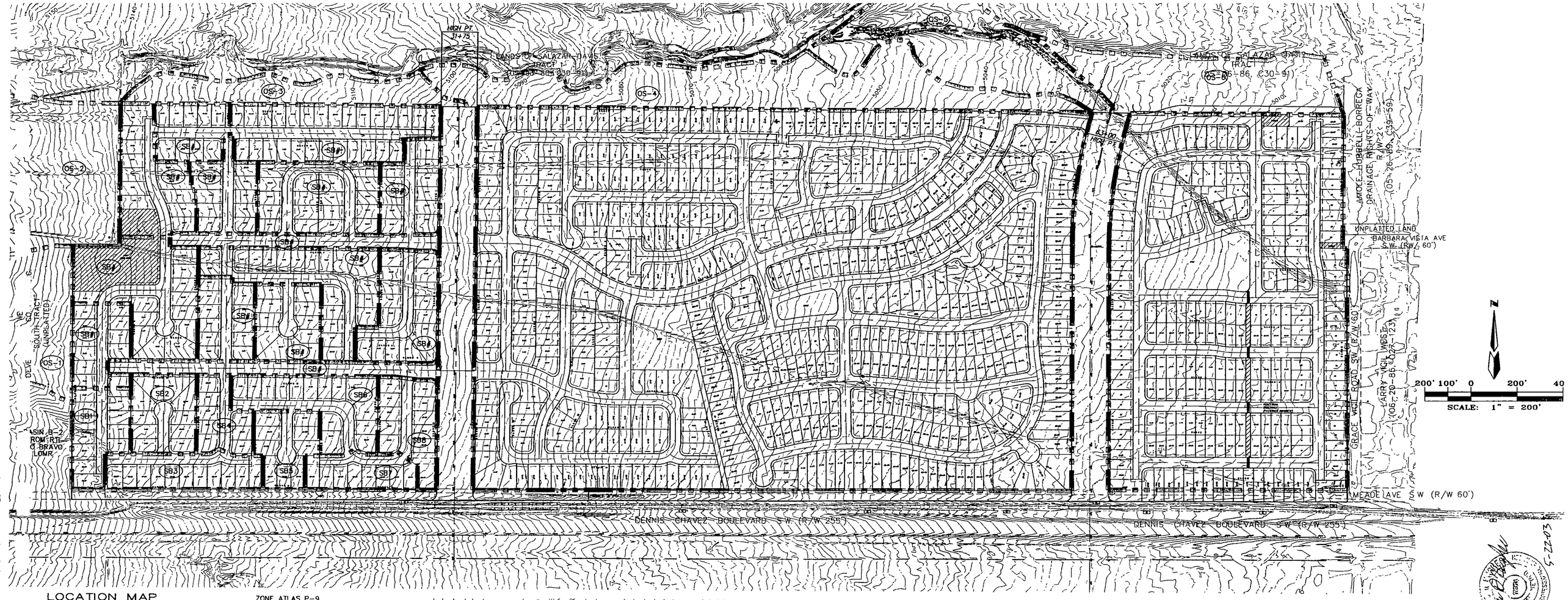
Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN DITCH	88.18200	400 31	5209 80	5211 66	5212.94	5217 15	0.046053	18 80	21.29	18 89	3 12
MAIN DITCH	86.18400	400 31	5200 60	5202 46	5203 74	5207.97	0.046268	18.83	21 26	18 87	3.13
MAIN DITCH	84.18600	400.31	5193.40	5195 43	5196 58	5199 84	0.033417	16 86	23 75	19 44	2.69
MAIN DITCH	82.19100	400 31	5176.30	5178 27	5179.44	5182.78	0.035348	17.04	23 49	19 80	2.76
MAIN DITCH	80.19200	400 31	5169.20	5171.33	5172.97	5178.48	0 048774	21.45	18 66	13.49	3.21
MAIN DITCH	78.20000	400.31	5143.50	5145 59	5146.61	5149.30	0.027116	15.44	25.93	20 76	2 43
MAIN DITCH	76.20350	475 80	5129.90	5131.96	5133.28	5137.46	0 040989	18.82	25 29	20 51	2 99
MAIN DITCH	74.20500	475.80	5123.21	5124 97	5126.52	5131.75	0 033789	20.91	22 76	17.85	3 26
MAIN DITCH	72.20925	475 80	5113.43	5115 32	5116.74	5120.84	0 018925	18 85	25 24	18.54	2 85
MAIN DITCH	70.21300	475 80	5100.01	5101.64	5103.31	5109 98	0 045307	23 18	20.52	17.21	3.74
MAIN DITCH	68.21500	475 80	5091.71	5093.37	5095.02	5101 25	0 041756	22 53	21 12	17 39	3 60
MAIN DITCH	67.21705	475 80	5084.12	5085.84	5087 43	5093 04	0.036767	21 54	22 09	17.66	3.39
MAIN DITCH	64.21780	475.80	5076 94	5078 44	5080 59	5089.29	0.055837	26.43	18.00	12.00	3.80
MAIN DITCH	63.22042	664 28	5074 12	5076 42	5078 68	5085 42	0.029996	24.08	27 59	12 00	2.80
MAIN DITCH	62.21955	664 28	5071.34	5073 62	5075.89	5082 76	0.030666	24 26	27.39	12 00	2.83
MAIN DITCH	61.22030	664 28	5070.96	5073 20	5074 89	5079.93	0.025439	20.82	31 90	20 25	2 92
MAIN DITCH	60.22200	664 28	5070.11	5072 93	5074.04	5076 41	0 010166	14.96	44 40	23 14	1 90
MAIN DITCH	59.22305	664 28	5069.66	5072.83	5073.58	5075.28	0.006326	12 56	52 91	25 09	1 52
MAIN DITCH	58.22500	664 28	5063.80	5066 06	5067 72	5072.67	0 024789	20 63	32 20	20 33	2 89
MAIN DITCH	56.22650	664 28	5055.55	5057.51	5059.47	5067.40	0.043617	25 24	26 32	18 82	3 76
MAIN DITCH	54.22800	664 28	5050 51	5052 57	5054 43	5061.11	0 035457	23 44	28 34	19.35	3.41
MAIN DITCH	52.23000	664.28	5044.61	5046.76	5048 54	5054 31	0.029868	22.05	30 12	19 81	3.15
MAIN DITCH	50.23300	664 28	5037.29	5039 60	5041.32	5046 23	0.023088	20 65	32 17	19 03	2.80
MAIN DITCH	48.23500	664 28	5032 41	5034 70	5036 43	5041.52	0 024038	20 95	31.71	18 93	2 85
MAIN DITCH	46.23800	664 28	5024.10	5026 31	5028.12	5033 82	0.027567	21.99	30 20	18 59	3 04
MAIN DITCH	44.24100	664 28	5016.81	5019 14	5020 87	5025 93	0 023856	20.91	31.77	18 91	2 84
MAIN DITCH	42.24200	664 28	5014.54	5016 89	5018.60	5023.53	0 023142	20.68	32 12	18.99	2 80
MAIN DITCH	40.24442	664 28	5009.05	5011.40	5013 11	5018 02	0 023030	20 65	32 17	19.00	2.80
MAIN DITCH	39.24527	664 28	5007.18	5009 86	5011.73	5016 49	0.019136	20 67	32 14	12 00	2 23
MAIN DITCH	38.24606	796 18	5005.38	5008 70	5010 52	5014 91	0 014816	20 00	39 81	12 00	1 94
MAIN DITCH	37.24693	796 18	5003.57	5006.76	5008.70	5013.49	0.016612	20 82	38 25	12 00	2 05
MAIN DITCH	36.24768	796 18	5002.07	5004 67	5006.55	5011.99	0 022674	21.72	36 66	19 74	2 81
MAIN DITCH	34.24800	796 18	5001.54	5004.18	5006.02	5011 21	0.021418	21 28	37 41	19 90	2.73
MAIN DITCH	32.25000	796 18	4998.24	5001 02	5002.72	5007 07	0 017350	19 73	40 35	20 49	2 48
MAIN DITCH	30.25200	796 18	4996 18	4999 25	5000 66	5003 82	0 011770	17 16	46 40	21 65	2 07
MAIN DITCH	28.25400	796 18	4994 12	4997 28	4998 60	5001 49	0 010527	16 48	48 31	22 01	1.96

HEC-RAS Plan Plan 01 River: RIO BRAVO Reach: MAIN DITCH (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN DITCH	26.25600	796 18	4992.06	4995 28	4996.59	4999.41	0 010021	16 31	48.82	21.66	1.91
MAIN DITCH	24.25650	994.00	4991 38	4995.26	4996.40	4998.85	0.007127	15.20	65 39	24 96	1.65
MAIN DITCH	22.25900	994 00	4987 98	4991 44	4993.01	4996 47	0 011332	18 00	55.24	23 25	2.06
MAIN DITCH	20.26000	994 00	4986.84	4990.28	4991.84	4995.32	0 011476	18.02	55.15	23 43	2.07
MAIN DITCH	18.26200	994 00	4984.58	4988.03	4989.58	4993 04	0.011387	17.97	55 31	23 46	2.06
MAIN DITCH	16.26300	994 00	4981 39	4984.46	4986 39	4991.45	0.018009	21.22	46.85	21.91	2 56
MAIN DITCH	14.26500	994 00	4975 02	4977 83	4980 02	4986 89	0 025833	24.16	41 14	20.80	3 03
MAIN DITCH	12.26700	994 00	4970.99	4973.93	4975.99	4981.85	0 021421	22.59	44 00	21 37	2.77
MAIN DITCH	10.26776	994.00	4969.47	4972.44	4974 48	4980 21	0.020746	22.36	44 45	21 37	2.73
MAIN DITCH	8.26925	994 00	4966.52	4970 73	4973 52	4976 75	0.018732	19.70	50.47	12 00	1 69
MAIN DITCH	7.27150	994 00	4948 13	4950 60	4955.13	4968 03	0 076236	33 50	29.67	12 00	3 75
MAIN DITCH	6.27219	994 00	4946 75	4949 64	4953.75	4962.40	0 050035	28.67	34.67	12 00	2.97
MAIN DITCH	5.27249	994 00	4945 90	4948 14	4950 52	4960 97	0 045533	28.75	34 57	20.91	3 94

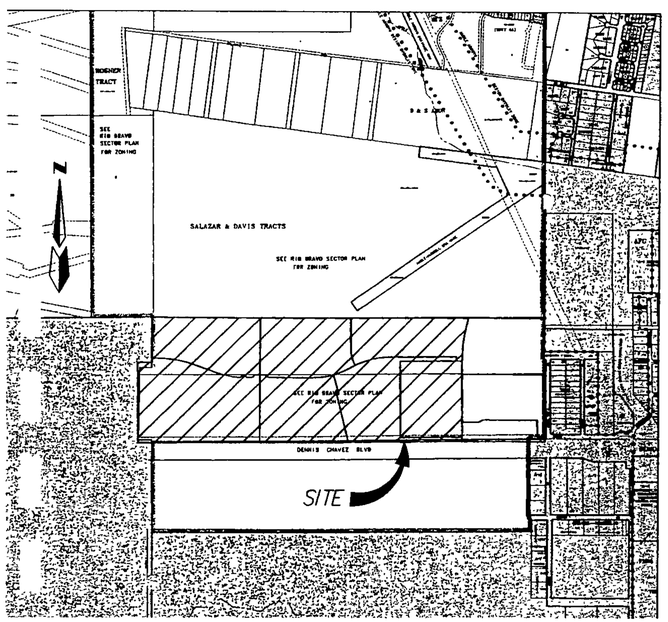
HEC-RAS Plan Plan 01 River RIO BRAVO Reach MAIN DITCH

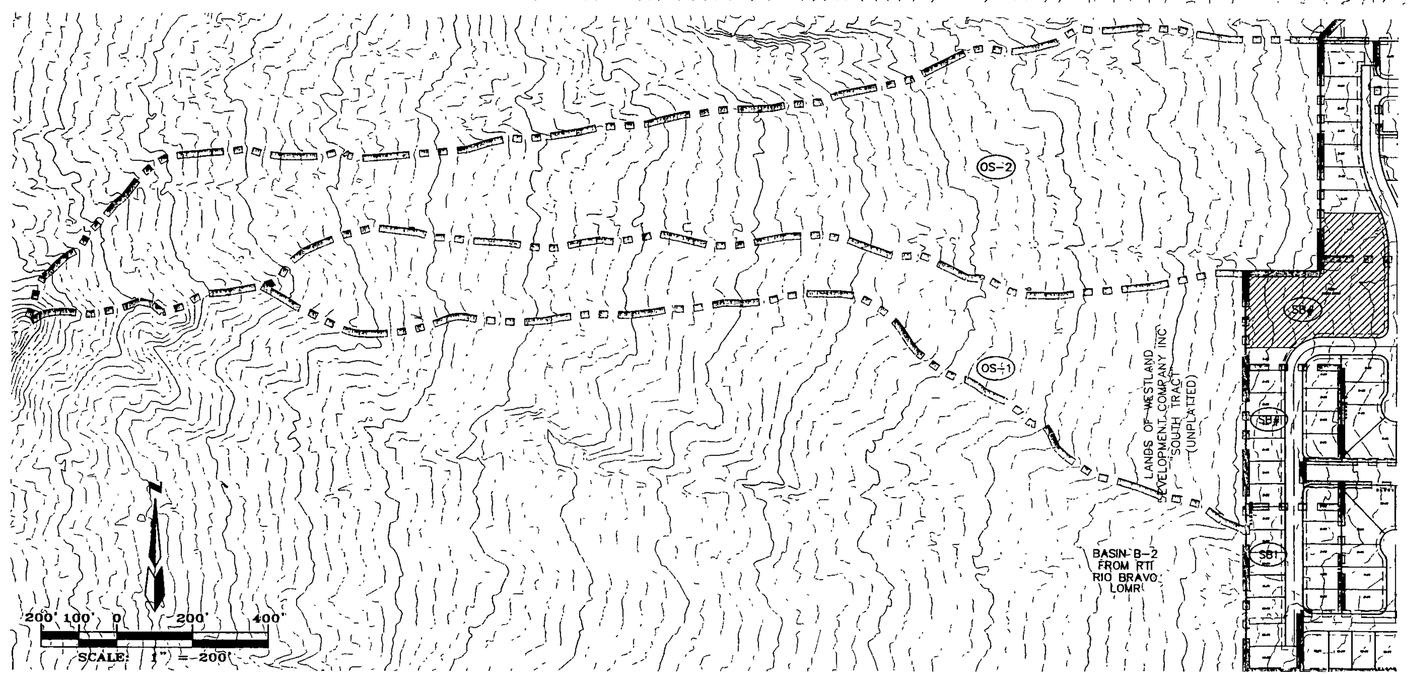
Reach	River Sta	E.G. Elev	W.S Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
		(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
MAIN DITCH	88.18200	5217 15	5211 66	5 49				400 31		18 89
MAIN DITCH	86.18400	5207 97	5202 46	5 51	9 21	0 00		400 31		18 87
MAIN DITCH	84 18600	5199 84	5195 43	4 41	7 80	0 33		400 31		19 44
MAIN DITCH	82.19100	5182 78	5178.27	4.51	17 09	0 01		400.31		19 80
MAIN DITCH	80.19200	5178 48	5171 33	7 15	4 10	0 26		400 31		13 49
MAIN DITCH	78.20000	5149 30	5145 59	3 70	28 19	1 05		400 31		20 76
MAIN DITCH	76.20350	5137 46	5131 96	5 50	11 70	0 18		475 80		20 51
MAIN DITCH	74.20500	5131 75	5124 97	6 79	5 57	0 13		475 80		17 85
MAIN DITCH	72.20925	5120 84	5115 32	5 52	10 53	0 38		475 80		18 54
MAIN DITCH	70.21300	5109 98	5101 64	8 35	10 51	0 29		475 80		17 21
MAIN DITCH	68.21500	5101 25	5093 37	7 88	8 64	0 16		475 80		17 39
MAIN DITCH	67.21705	5093 04	5085 84	7 21	8 02	0 21		475 80		17 66
MAIN DITCH	64.21780	5089 29	5078 44	10 85	3 37	0 37		475 80		12 00
MAIN DITCH	63.22042	5085.42	5076 42	9 00	3 33	0 56		664 28		12 00
MAIN DITCH	62.21955	5082 76	5073.62	9 14	2.64	0 01		664 28		12 00
MAIN DITCH	61.22030	5079 93	5073 20	6 73	2 09	0 72		664 28		20 25
MAIN DITCH	60.22200	5076 41	5072 93	3 48	2 57	0 99		664 28		23 14
MAIN DITCH	59.22305	5075 28	5072 83	2 45	0 83	0 31		664 28		25 09
MAIN DITCH	58.22500	5072 67	5066 06	6 61	2.18	0 42		664 28		20 33
MAIN DITCH	56.22650	5067 40	5057 51	9 89	4 86	0 34		664 28		18 82
MAIN DITCH	54.22800	5061 11	5052 57	8 53	5 88	0 41		664 28		19 35
MAIN DITCH	52.23000	5054 31	5046 76	7 55	6 50	0 29		664 28		19 81
MAIN DITCH	50.23300	5046 23	5039 60	6 62	7 83	0 29		664 28		19 03
MAIN DITCH	48.23500	5041 52	5034.70	6 81	4 71	0 02		664 28		18 93
MAIN DITCH	46.23800	5033 82	5026 31	7 51	7.68	0 06		664 28		18 59
MAIN DITCH	44.24100	5025 93	5019 14	6 79	7 68	0 22		664 28		18 91
MAIN DITCH	42.24200	5023.53	5016 89	6 64	2 35	0 04		664 28		18 99
MAIN DITCH	40.24442	5018 02	5011 40	6 62	5 55	0 03		664 28		19 00
MAIN DITCH	39.24527	5016 49	5009 86	6 63	1 56	0 01		664 28		12 00
MAIN DITCH	38.24606	5014.91	5008 70	6 21	1 46	0 13		796 18		12 00
MAIN DITCH	37.24693	5013.49	5006 76	6 73	1 38	0 05		796 18		12 00
MAIN DITCH	36.24768	5011.99	5004 67	7 32	1 45	0 06		796 18		19 74
MAIN DITCH	34.24800	5011.21	5004 18	7 03	0 70	0 09		796 18		19 90
MAIN DITCH	32.25000	5007 07	5001 02	6 05	3 84	0 30		796 18		20 49
MAIN DITCH	30.25200	5003 82	4999.25	4 57	2 82	0 45		796 18		21 65
MAIN DITCH	28.25400	5001 49	4997 28	4 22	2 22	0 11		796 18		22 01
MAIN DITCH	26.25600	4999 41	4995 28	4 13	2 06	0 03		796 18		21 66
MAIN DITCH	24.25650	4998 85	4995 26	3.59	0 41	0 17		994 00		24 96
MAIN DITCH	22.25900	4996 47	4991 44	5 03	2 22	0 15		994 00		23 25
MAIN DITCH	20.26000	4995 32	4990 28	5 04	1 14	0 00		994 00		23 43
MAIN DITCH	18.26200	4993 04	4988 03	5 02	2 28	0 01		994 00		23 46
MAIN DITCH	16.26300	4991.45	4984 46	6.99	1 41	0 20		994 00		21 91
MAIN DITCH	14.26500	4986 89	4977 83	9 07	4 30	0 21		994 00		20 80
MAIN DITCH	12.26700	4981 85	4973 93	7 92	4 69	0 34		994 00		21 37
MAIN DITCH	10.26776	4980 21	4972 44	7 77	1 60	0 05		994 00		21 37
MAIN DITCH	8.26925	4976 75	4970 73	6 02	2 93	0 52		994 00		12 00
MAIN DITCH	7.27150	4968 03	4950 60	17 43	7 54	1 14		994 00		12 00
MAIN DITCH	6 27219	4962 40	4949 64	12 76	4 22	1 39		994 00		12.00
MAIN DITCH	5 27249	4960 97	4948.14	12 84	1 43	0 01		994 00		20 91



LOCATION MAP ZONE ATLAS P-9

SCALE. NONE





ONSITE AND TEMPROARY

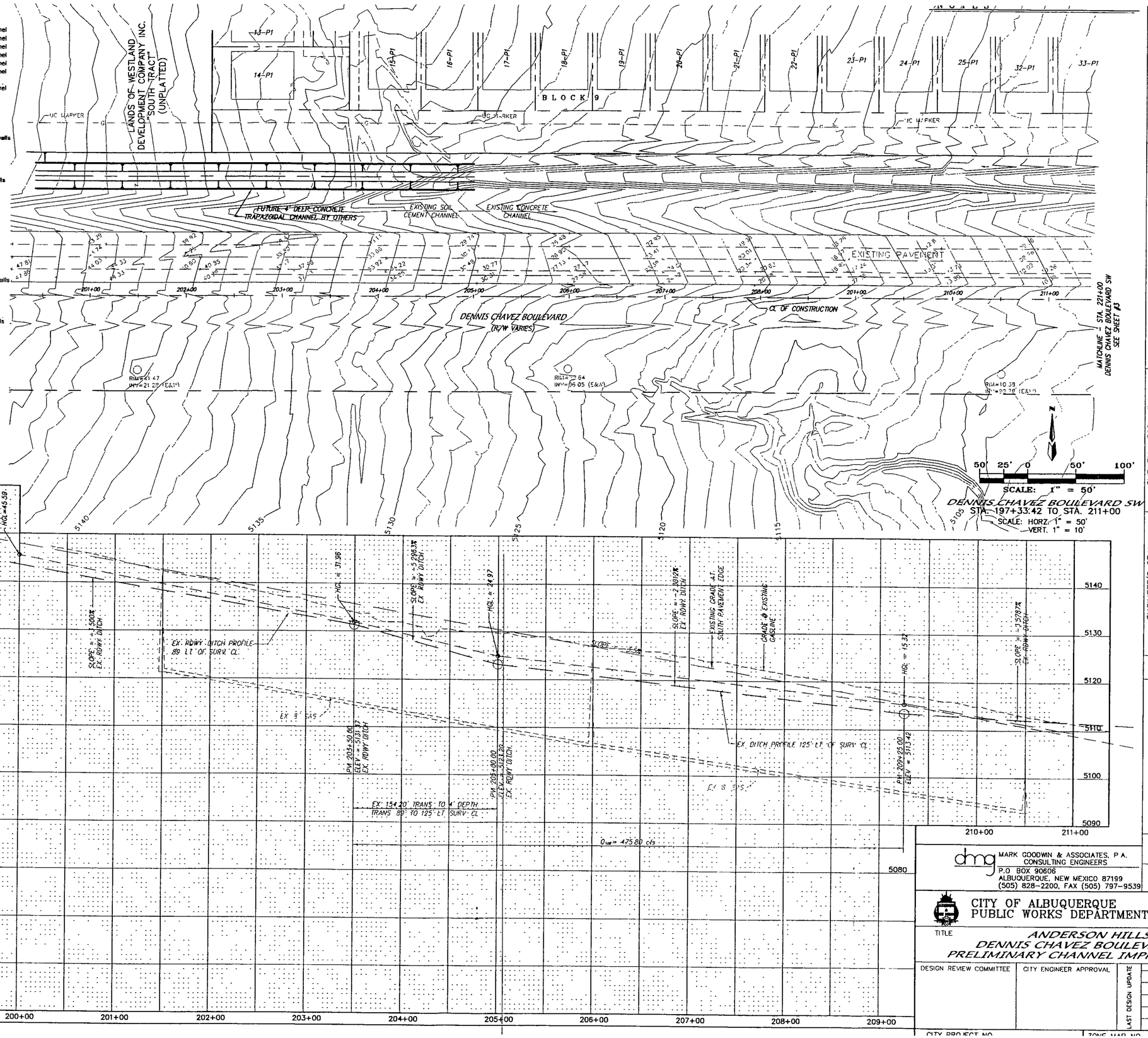
OFFSITE DRAINAGE

BASIN MAP

dmg
MARK GOODWIN & ASSOCIATES, P.A
CONSULTING ENGINEERS
P.O. BOX 90606
ALBUQUERQUE, NEW MEXICO 87199
(505)828-2200, FAX (505)797-9539

5-22-03

River Sta	Q Total (cfs)	Min Chl El	W S Elev	Crit Dpth (ft)	Vel Chnl (ft/s)	Reqd Freeboard	Reqd Depth	Actual Depth	Comments
18200	400 31	5209 80	5211 66	1 86	18 80	1 80	3 66	2 00	Future new channel
18400	400 31	5200 60	5202 46	1 86	18 83	1 81	3 67	2.00	Future new channel
18600	400 31	5193 40	5195 43	2 03	16 86	1 77	3 80	2 00	Future new channel
19100	400 31	5176 30	5178 27	1 97	17 04	1 77	3 74	2 00	Future new channel
80 19200	400 31	5169 20	5171 33	2.13	21 45	1 88	4 01	2 50	Future new channel
78 20000	400 31	5143 50	5145 59	2 09	15 44	1 75	3 84	2 50	Future new channel
+25 BEGIN ANDERSON HILLS									
20350	475 80	5129 90	5131 96	2 06	18 82	1 82	3 88	2 50	Future new channel
+00 BEGIN CONCRETE									
.20500	475 80	5123 21	5124 97	1 76	20 91	1 84	3 60	4.00	
.20925	475 80	5113 43	5115 32	1 89	18 85	1 81	3 70	4 00	
70 21300	475 80	5100 01	5101 64	1.63	23 18	1 88	3 51	4 00	
68 21500	475 80	5091 71	5093 37	1 66	22 53	1 87	3 53	4 00	
21705	475 80	5084 12	5085 84	1 72	21 54	1 85	3 57	4 00	Begin new wing walls
21780	475 80	5076 94	5078 44	1 50	26 43	1 93	3 43	6 00	Begin new CBC
-64 CENTERLINE 98TH STREET									
21868	664 28	5074 12	5076 42	2 30	24.08	1 96	4 26	6 00	New CBC
62 21955	664 28	5071 34	5073 62	2 28	24 26	1 96	4 24	6 00	End new CBC
61 22030	664 28	5070 96	5073 20	2 24	20 82	1 88	4 12	5 00	End new wing walls
22200	664 28	5070 11	5072 93	2 82	14 96	1 77	4 59	5 00	New channel
22305	664 28	5069 66	5072 83	3.17	12 56	1 72	4 89	4 00	End new channel
22500	664 28	5063 80	5066.06	2 26	20 63	1 87	4 13	4 00	Add 1' berm
22650	664 28	5055 55	5057 51	1 96	25 24	1 95	3 91	4 00	
22800	664 28	5050 51	5052 57	2 06	23 44	1 92	3 98	4 00	
52 23000	664 28	5044 51	5046 76	2 15	22 05	1 90	4 05	4 00	
50 23300	664 28	5037 29	5039 60	2 31	20 65	1 88	4 19	4 00	
23500	664 28	5032 41	5034 70	2 29	20 95	1 88	4 17	5 00	
23800	664 28	5024 10	5026 31	2 21.	21 99	1 90	4 11	5 00	
24100	664 28	5016 81	5019 14	2 33	20 91	1 89	4 22	5 00	
24200	664 28	5014 54	5016 89	2 35	20 68	1 88	4 23	5 00	
40 24442	664 28	5009 05	5011 40	2 35	20 65	1 88	4 23	5 00	Begin new wing walls
39 24527	664 28	5007 18	5009 86	2 68	20 67	1 90	4 58	6 00	Begin new CBC
06 UNSER BLVD									
24606	796 18	5005 38	5008 70	3 32	20 00	1 92	5 24	6 00	New CBC
24693	796 18	5003 57	5006 76	3.19	20 82	1 94	5 13	6 00	End new CBC
24768	796 18	5002 07	5004 67	2 60	21 72	1 92	4 52	5 00	End new wing walls
24800	796 18	5001 54	5004 18	2 64	21 28	1 91	4 55	5 00	
32 25000	796 18	4998 24	5001 02	2 78	19 73	1 89	4 67	5 00	
30 25200	796 18	4996 18	4999 25	3 07	17 16	1 84	4 91	5 00	
25400	796 18	4994.12	4997 28	3 16	16 48	1 82	4 98	5 00	
25600	796 18	4992 06	4995 28	3 22	16 31	1 82	5 04	5 00	Add 1' berm
25650	994 00	4991 38	4995 26	3 88	15 20	1 82	5 70	5.00	Add 1' berm
20 END ANDERSON HILLS									
22 25900	994 00	4987 98	4991 44	3 46	18 00	1 88	5 34	5 00	Add 1' berm
20 26000	994 00	4986 84	4990 28	3 44	18 02	1 88	5 32	5 00	Add 1' berm
26200	994 00	4984 58	4988 03	3 45	17 97	1 88	5 33	5 00	Add 1' berm
26300	994 00	4981 39	4984 46	3 07	21 22	1 94	5 01	5 00	Add 1' berm
26500	994 00	4975 02	4977 83	2 81	24 16	2 00	4 81	6 00	
26700	994 00	4970 99	4973.93	2 94	22 59	1 97	4 91	6 00	
10,26776	994.00	4969 47	4972 44	2 97	22 36	1 96	4 93	6 00	
BEGIN BOX CULVERT									
8 26925	994.00	4966 52	4970 73	4 21	19 70	1 96	6 17	6 00	
7150	994 00	4948 13	4950 60	2 47	33 50	2 19	4 66	6 00	
7219	994 00	4946 75	4949 64	2 89	28 67	2 11	5 00	6 00	
7249	994 00	4945 90	4948.14	2.24	28 75	2 06	4 30	6 00	



AS BUILT INFORMATION

CONTRACTOR
WORK STAKED BY
FIELD INSPECTOR
ACCEPTANCE BY
FIELD VERIFICATION BY
DRAWINGS CORRECTED BY
RECORDED BY
DATE

MICRO-FILM INFORMATION

NO.

BENCH MARKS

STATION "2-P10" IS LOCATED 4.9 MI. SW OF DOWNTOWN ALBUQUERQUE TO REACH STATION FROM INT. OF COORS AND DENNIS CHAVEZ BLVD. (FORMERLY RIO BRAVO), GO N. ON COORS 0.1 MI. TO FLORA VISTA AND GO WEST ON FLORA VISTA 0.5 MI. TO CONDERSVIRE, THEN GO S. ON CONDERSHIRE 0.4 MI. TO A POINT APPROX. 50 FT. W. OF THE STATION. STATION MARK IS AN ACS 3 1/4" ALUM. CAP STAMPED "2-P10, 1987" RIVETED TO A PIPE PROJECTING 0.25 FT. ABOVE THE GROUND. X=35941.13, Y=1464349.24 (NAD 27) Z=4991 (NGVD 29)

SURVEY INFORMATION

FIELD NOTES

NO.	BY	DATE

ENGINEER'S SEAL

NO	DATE	REMARKS	BY
		REVISIONS	

DESIGN DATE 2/03

DESIGNED BY JDH

DRAWN BY NHE

dmg MARK GOODWIN & ASSOCIATES, P.A.
CONSULTING ENGINEERS
P.O BOX 90606
ALBUQUERQUE, NEW MEXICO 87199
(505) 828-2200, FAX (505) 797-9539

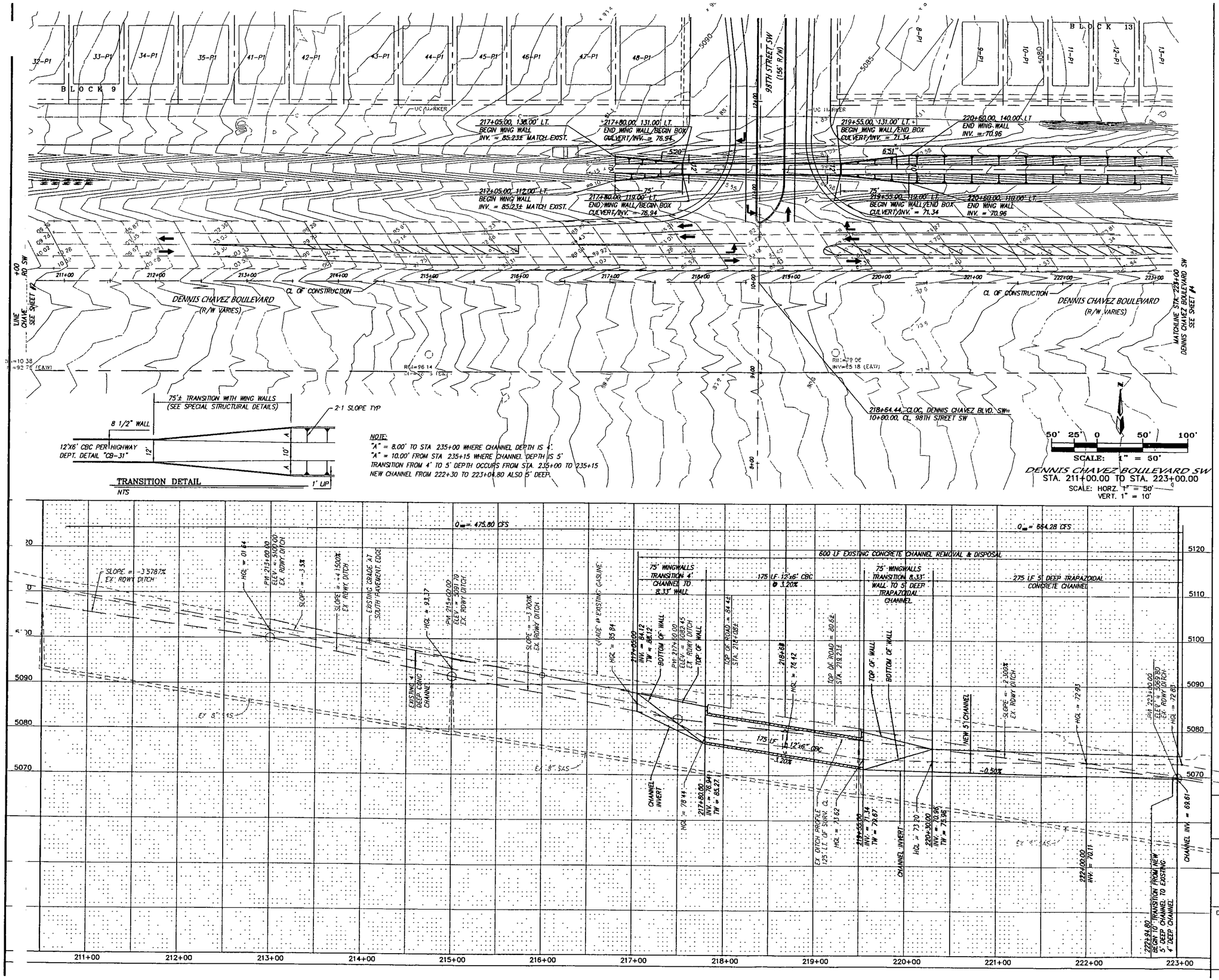
CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT

TITLE

ANDERSON HILLS
DENNIS CHAVEZ BOULEVARD SW
PRELIMINARY CHANNEL IMPROVEMENTS

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

CITY PROJECT NO. | ZONE MAP NO. | SHEET | OF



AS BUILT INFORMATION

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

BENCH MARKS

STATION "2-P10" IS LOCATED 4.9 MI. SW OF DOWNTOWN ALBUQUERQUE TO REACH STATION FROM INT. OF COORS AND DENIS CHAVEZ BLVD. (FORMERLY RIO BRAVO), GO N. ON COORS 0.1 MI. TO FLORA VSTA. AND GO WEST ON FLORA VSTA 0.5 MI. TO CONDERSHIRE, THEN GO S. ON CONDERSHIRE 0.4 MI. TO A POINT APPROX. 50 FT. W. OF THE STATION. STATION MARK IS AN ACS 3 1/4" ALUM CAP STAMPED "2-P10, 1987" RIVETTED TO A PIPE PROJECTING 0.25 FT. ABOVE THE GROUND. X=35841.13, Y=1494349.24 (NAD 27) Z=4991 (NGVD 29).

SURVEY INFORMATION

FIELD NOTES

NO.	BY	DATE

ENGINEER'S SEAL

REVISIONS

NO	DATE	REMARKS	BY

DESIGN	DATE	2/03
DESIGNED BY	JDH	
DRAWN BY	NHE	

mg MARK GOODWIN & ASSOCIATES, P.A.
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(505) 828-2200, FAX (505) 797-9539

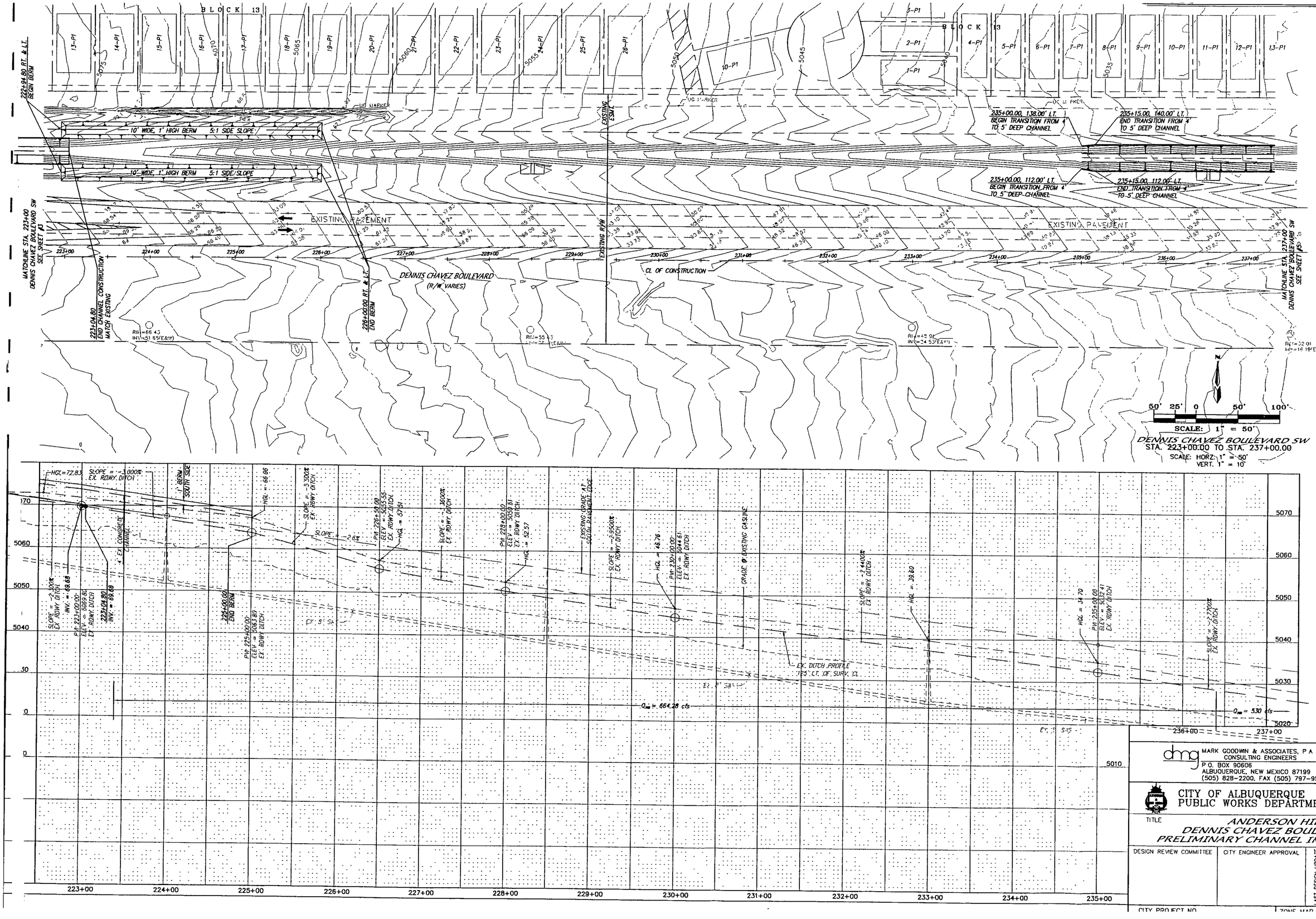
CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT

TITLE

ANDERSON HILLS
DENNIS CHAVEZ BOULEVARD SW
PRELIMINARY CHANNEL IMPROVEMENTS

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

CITY PROJECT NO | ZONE MAP NO | SHEET | OF



AS BUILT INFORMATION

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

BENCH MARKS

STATION "2-P10" IS LOCATED 4.9 MI. SW. OF DOWNTOWN ALBUQUERQUE TO REACH STATION FROM INT. OF COORS AND DENS CHAVEZ BLVD. (FORMERLY RIO BRAVO), GO N. ON COORS 0.1 MI. TO FLORA VISTA AND GO WEST ON FLORA VISTA 0.5 MI. TO CONDERSHIRE, THEN GO S. ON CONDERSHIRE 0.4 MI. TO A POINT APPROX. 50 FT. W. OF THE STATION. STATION MARK IS AN ACS 3 1/4" ALUM CAP STAMPED "2-P10, 1987" RIVETED TO A PIPE PROJECTING 0.25 FT ABOVE THE GROUND. X=353841.13 Y=1464349.24 (NAD 27) Z=4991 (NGVD 29)

SURVEY INFORMATION

FIELD NOTES

NO	BY	DATE

ENGINEER'S SEAL

STATE OF NEW MEXICO
STEVEN D. HUGHES
5327
REGISTERED PROFESSIONAL ENGINEER

NO	DATE	REMARKS	BY

REVISIONS

		DATE
DESIGN		
DESIGNED BY	JDH	2/03
DRAWN BY	NHE	2/03

dmg
MARK GOODWIN & ASSOCIATES, P.A.
CONSULTING ENGINEERS
P.O. BOX 90606
ALBUQUERQUE, NEW MEXICO 87199
(505) 828-2200, FAX (505) 797-9539

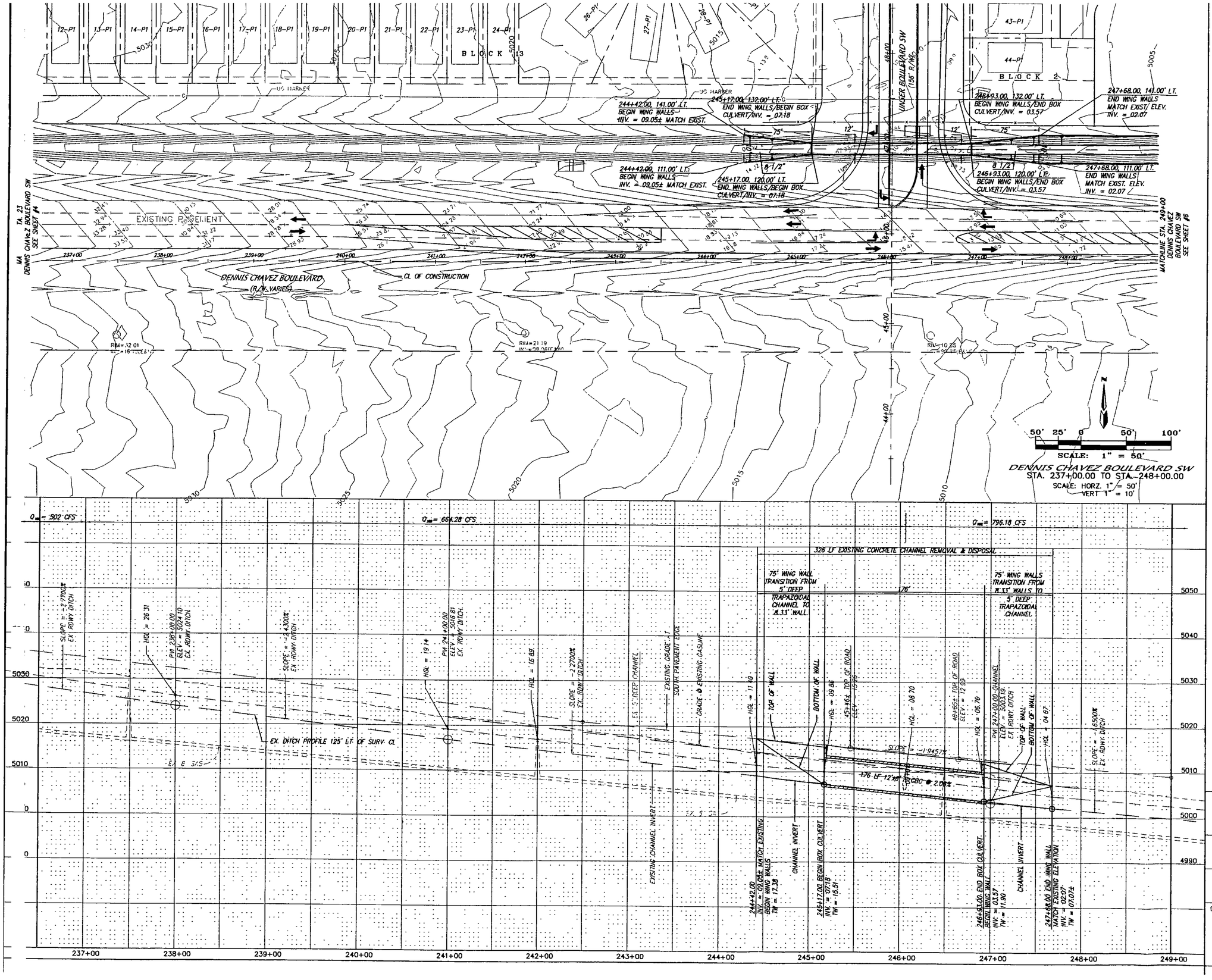
CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT

TITLE

ANDERSON HILLS
DENNIS CHAVEZ BOULEVARD SW
PRELIMINARY CHANNEL IMPROVEMENTS

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

CITY PROJECT NO. | ZONE MAP NO. | SHEET | OF



AS BUILT INFORMATION

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

MICRO-FILM INFORMATION

RECORDED BY	
DATE	
NO	

BENCH MARKS

STATION "2-P10" IS LOCATED 4.9 MI. SW OF DOWNTOWN ALBUQUERQUE TO REACH, STATION FROM INT. OF COORS AND DENIS CHAVEZ BLVD. (FORMERLY RIO BRAVO), GO N. ON COORS 0.1 MI. TO FLORA VISTA AND GO WEST ON FLORA VISTA 0.5 MI. TO CONDERSHIRE, THEN GO S. ON CONDERSHIRE 0.4 MI. TO A POINT APPROX. 50 FT. W. OF THE STATION. STATION MARK IS AN ACS 3 1/4" ALUM. CAP STAMPED "2-P10, 1987" RIVETTED TO A PIPE PROJECTING 0.25 FT. ABOVE THE GROUND. X=35841.13, Y=1494349.24 (NAD 27) Z=4991 (NGVD 29)

SURVEY INFORMATION

FIELD NOTES

NO	BY	DATE

ENGINEER'S SEAL

U. HUGH JENNINGS
NEW MEXICO
13978
PROFESSIONAL ENGINEER
6-22-03

NO	DATE	REMARKS	BY

REVISIONS

		DATE
DESIGN		
DESIGNED BY	JDH	2/03
DRAWN BY	WHE	2/03

dmg
MARK GOODWIN & ASSOCIATES, P.A.
CONSULTING ENGINEERS
P.O. BOX 90606
ALBUQUERQUE, NEW MEXICO 87199
(505) 828-2200, FAX (505) 797-9539

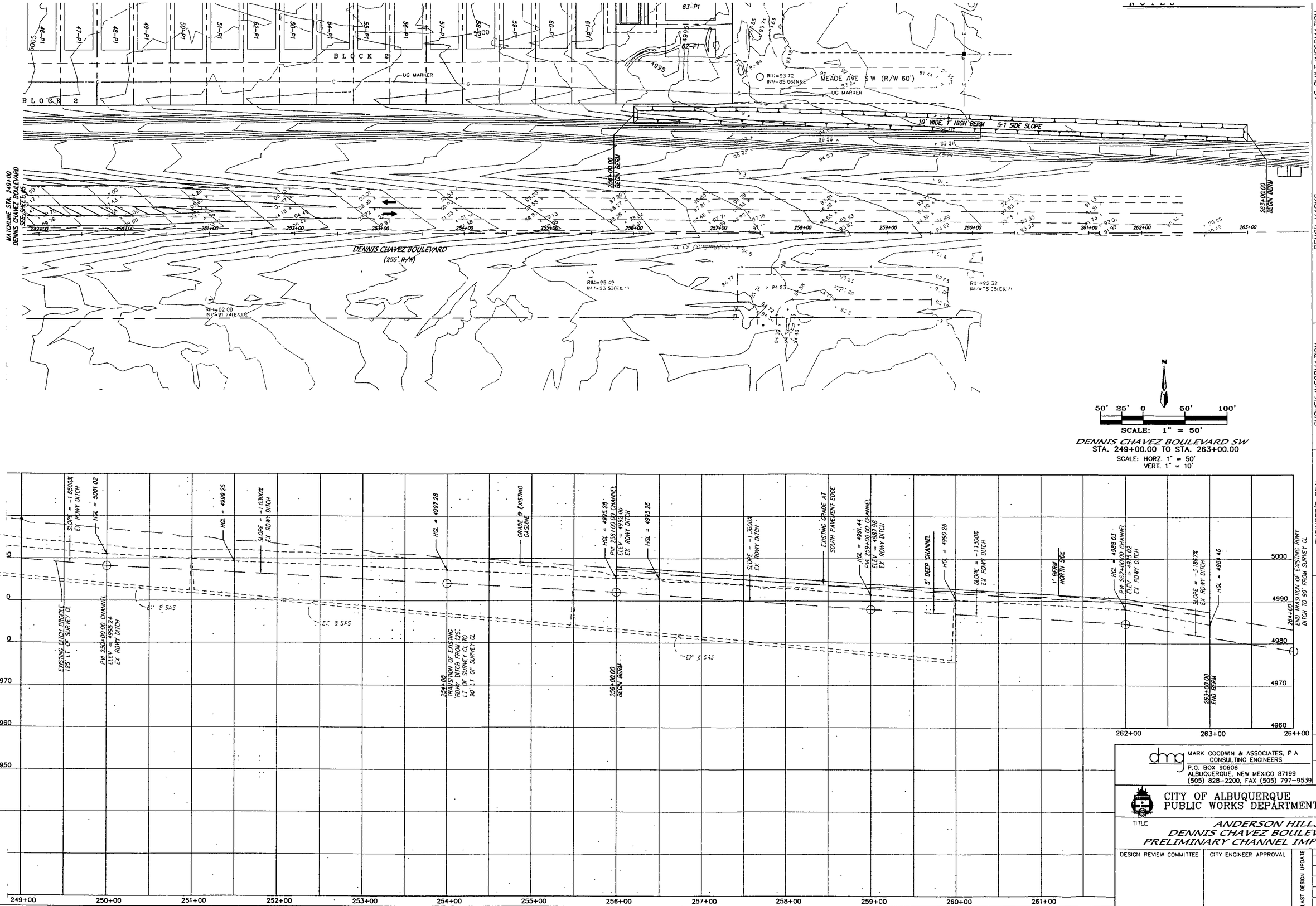
CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT

TITLE

ANDERSON HILLS
DENNIS CHAVEZ BOULEVARD SW
PRELIMINARY CHANNEL IMPROVEMENTS

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

CITY PROJECT NO. | ZONE MAP NO. | SHEET | OF



50' 25' 0 50' 100'

SCALE: 1" = 50'

DENNIS CHAVEZ BOULEVARD SW
STA. 249+00.00 TO STA. 263+00.00
SCALE: HORZ. 1" = 50'
VERT. 1" = 10'

AS BUILT INFORMATION

	DATE
CONTRACTOR	
WORK STAKED BY	
AS-BUILTS BY	
ACCEPTANCE BY	
FIELD VERIFICATION BY	
DRAWINGS CORRECTED BY	

MICRO-FILM INFORMATION

	DATE
RECORDED BY	
NO.	

BENCH MARKS

SURVEY INFORMATION

FIELD NOTES

NO.	BY	DATE

ENGINEER'S SEAL

NO	DATE	REMARKS	BY
		REVISIONS	

		DATE
DESIGN		2/03
DESIGNED BY	JDH	2/03
DRAWN BY	NHE	

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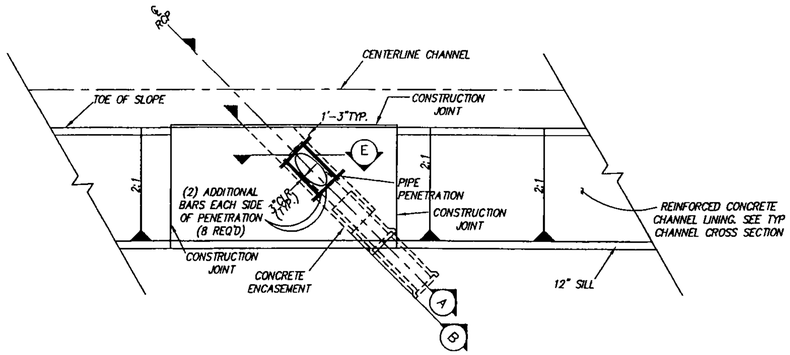
CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT

TITLE

ANDERSON HILLS
DENNIS CHAVEZ BOULEVARD SW
PRELIMINARY CHANNEL IMPROVEMENTS

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

CITY PROJECT NO. | ZONE MAP NO. | SHEET | OF



NOTE: CUT TYPICAL CHANNEL REINFORCING @ RCP PENETRATION. FIELD BEND CUT-BARS INTO CONCRETE ENCASEMENT 1'-3" MAINTAIN 3"CLR. (MIN) ON ALL SIDES.

TYPICAL PIPE PENETRATION (PLAN VIEW)

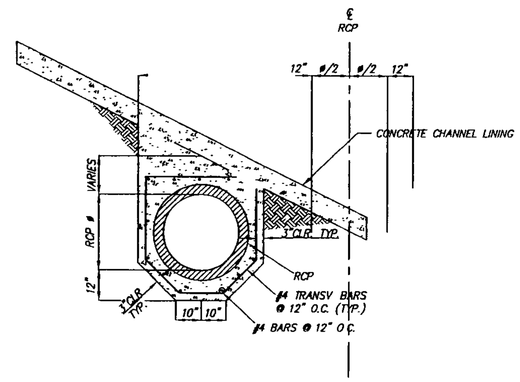
N.T.S.

TABLE OF DIMENSIONS								
CHANNEL STATION	PIPE DIAMETER	SLOPE	SKEW	CHANNEL DEPTH	INVERT TO INVERT A	B	C	D
	4.5	0.39	60°	8.0	0.0	0.0	9.20	3.0
	4.5	1.00	45°	8.0	1.0	2.0	9.20	3.0
	4.5	1.00	90°	7.5–8.0	0.0	0.0	9.20	3.0
	2.0	1.00	45°	7.5–8.0	1.0	2.0	7.07	3.0
	2.0	1.00	45°	7.5–8.0	1.0	2.0	7.07	3.0
	2.0	1.00	45°	7.5–8.0	1.0	2.0	7.07	3.0
	5.5	1.36	45°	7.5–8.0	0.0	0.0	9.20	3.0
	5.0	2.40	45°	7.5–8.0	0.0	0.0	9.20	3.0
	2.5	1.97	45°	7.5–7.7	0.0	0.0	7.07	3.0
	2.0	1.81	45°	7.5–7.7	1.0	2.0	7.07	3.0
	2.5	0.40	45°	7.5–7.7	0.0	0.0	7.07	3.0
	FEET	PERCENT	DEGREES	FEET	FEET	FEET	FEET	FEET

NOTES

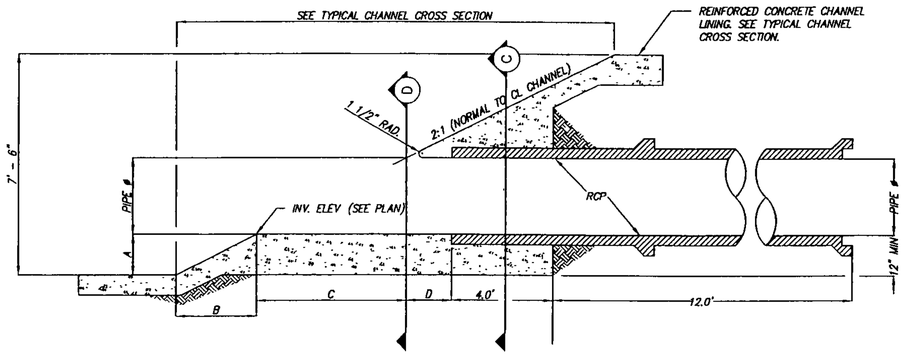
1. THE PIPE PENETRATION DETAILED HEREIN SHALL BE PAID FOR UNDER PIPE PENETRATION, (EACH) AND SHALL BE COMPENSATED FOR THE PENETRATION COMPLETE AND IN PLACE. INCLUDED IN THIS WORK (BUT NOT LIMITED TO) IS GRADING, SUBGRADE PREPARATION, REINFORCED CONCRETE, CONSTRUCTION JOINTS, CONCRETE PLACEMENT, 16' OF PROPER SIZE RCP, PRECAST PLUG IF NO CONNECTION IS MADE WITH THIS PROJECT, BACKFILL, AND FINISHING. NOTE: THE MEASUREMENT FOR CONCRETE CHANNEL LINING IS CONTINUOUS AND UNINTERRUPTED AT THE PENETRATION LOCATION

2. THE TYPICAL TRANSVERSE AND LONGITUDINAL REINFORCEMENT SHALL BE CONTINUOUS THRU THE CONSTRUCTION JOINT LAPPED BAR SPLICES ADJACENT TO THE JOINT IS PERMITTED.
   #8 BAR LAP = 4'-2"
   #7 BAR LAP = 3'-2"
   #5 BAR LAP = 2'-2"



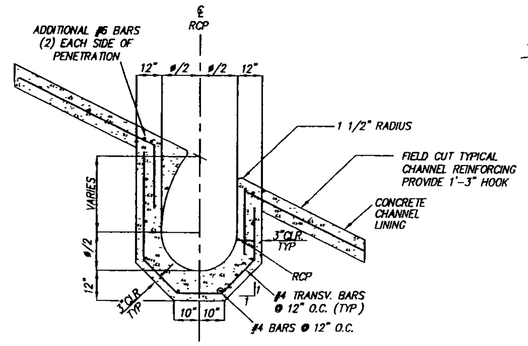
SECTION C – C

N.T.S.



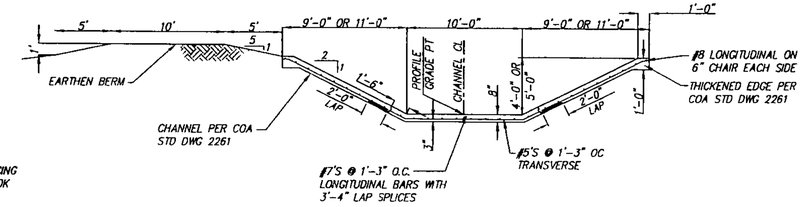
SECTION A – A

N.T.S.



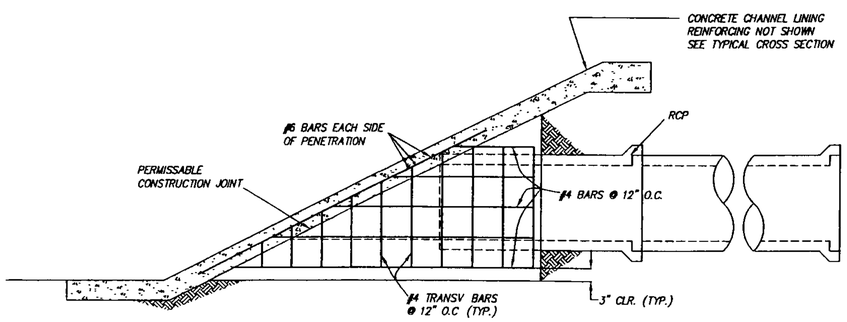
SECTION D – D

N.T.S.



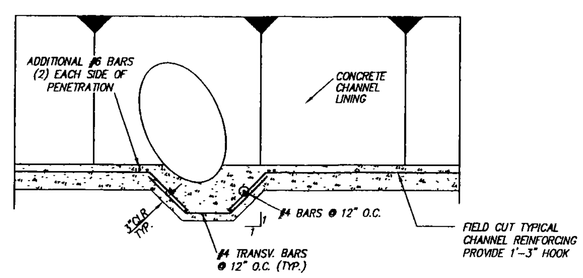
CHANNEL SECTION

N.T.S.



SECTION B – B

N.T.S.



SECTION E – E

N.T.S.

AS BUILT INFORMATION

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

MICRO-FILM INFORMATION

BENCH MARKS

STATION "2-P10" IS LOCATED 4.9 MI. SW OF DOWNTOWN ALBUQUERQUE, TO REACH STATION FROM INT. OF COORS AND DENIS CHAVEZ BLVD. (FORMERLY RIO BRAVO), GO N. ON COORS 0.1 MI. TO FLORA VISTA AND GO WEST ON FLORA VISTA 0.5 MI. TO CONDERSHIRE, THEN GO S. ON CONDERSHIRE 0.4 MI. TO A POINT APPROX. 50 FT. W. OF THE STATION. STATION MARK IS AN ACS 3 1/4" ALUM CAP STAMPED "2-P10, 1992" RIVETED TO A PIPE PROJECTING 0.25 FT ABOVE THE GROUND. Y=1484112 X=1464240.24 (NAD 27) Z=4001.(NGVD 29)

SURVEY INFORMATION

FIELD NOTES

NO.	BY	DATE

ENGINEER'S SEAL

NO	DATE	REMARKS	BY

REVISIONS

DESIGN

DESIGNED BY JDH DATE 5/03

DRAWN BY NHE DATE 5/03

dmg MARK GOODWIN & ASSOCIATES, P A
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(505) 828-2200, FAX (505) 797-9539

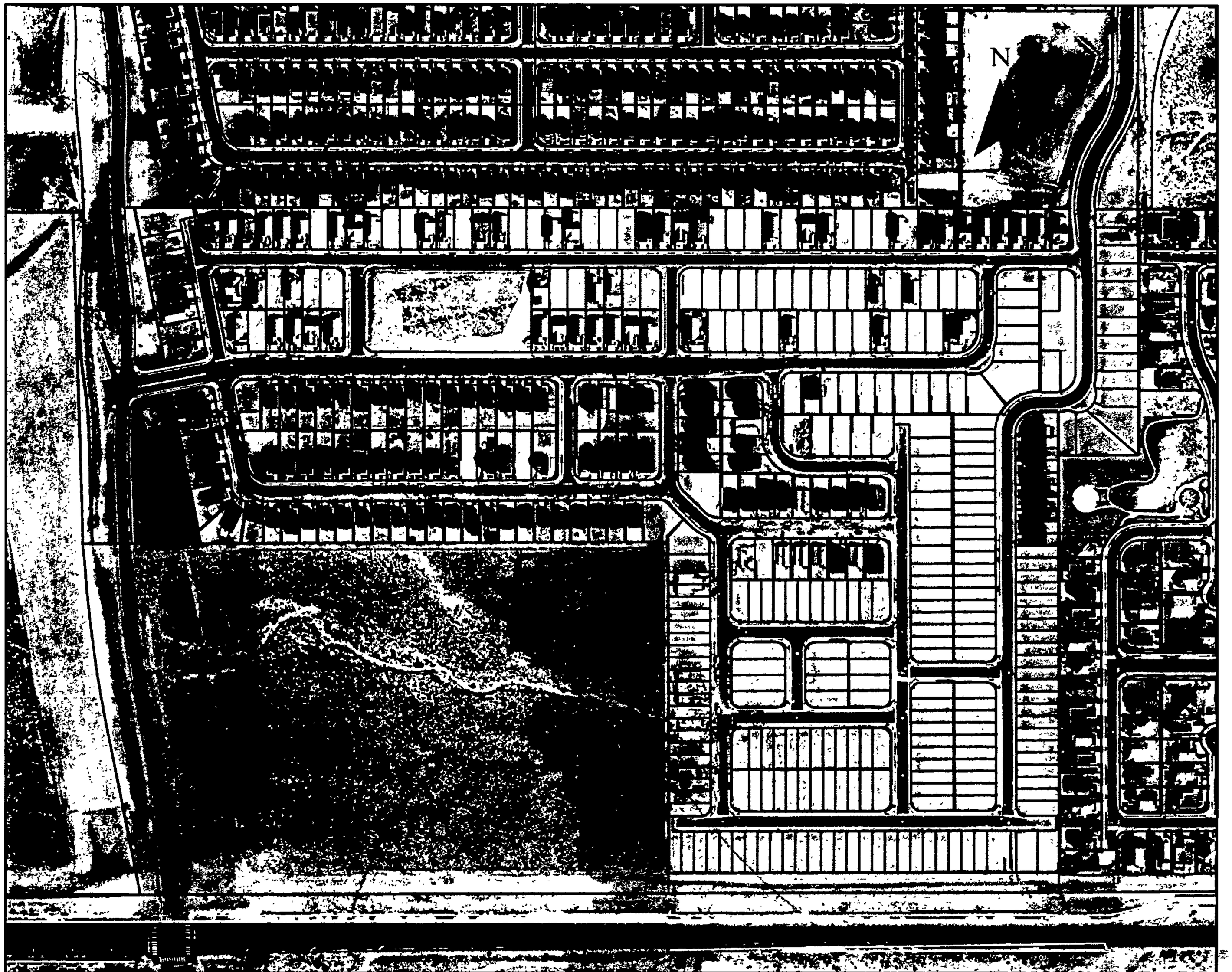
CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT

TITLE

ANDERSON HILLS
DETAIL SHEET
PRELIMINARY CHANNEL IMPROVEMENTS

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

CITY PROJECT NO. | ZONE MAP NO. | SHEET | OF



Hot ?

channel ?, silt/mud 70 acres 168,41 cfs = 2.4 cfs/ac