Susan Calongne

REPORT ON

NORTH ALBUQUERQUE ACRES ARROYO AVULSION PROBLEMS

for

LA CUEVA, EL CAMINO and NORTH CAMINO ARROYOS DRAINAGE MANAGENENT PLAN

DRAFT

Prepared For:

ALBUQUERQUE METROPOLITAN ARROYO
FLOOD CONTROL AUTHORITY

Prepared By:

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95-190.3

MARCH 1997

TABLE OF CONTENTS

NORTH ALBUQUERQUE ACRES ARROYO AVULSION PROBLEMS

I. INTRODUCTION

A. To date the following tasks for the La Cueva, El Camino and North Camino Arroyos Drainage Management Plan have been completed:

-The La Cueva Tributary Diversion LOMR submittal (FEMA action pending)
-Photogrametric Mapping
-Literature Review
-Hydrology Report with Sediment and Erosion analysis

The Hydrology Report identified the major avulsion locations. At this point an evaluation of avulsion control options is in progress and this report is an attempt to clarify the issues involved.

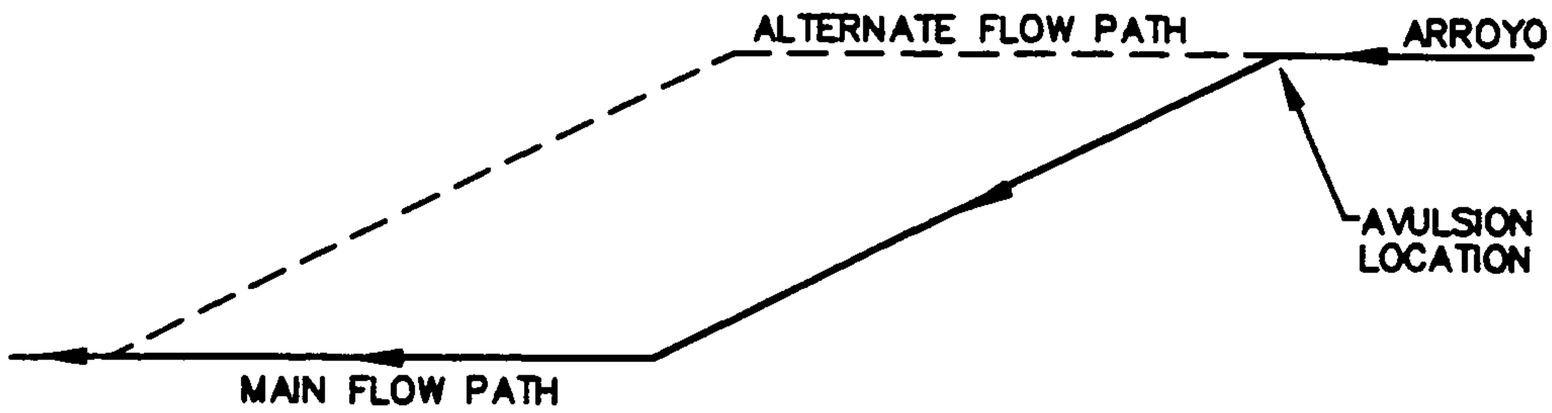
B. An arroyo avulsion can be defined as a location where the flow path of an arroyo may change course, either totally, or partially. An avulsion may be the result of natural forces, such as wind or water or due to some human activity such as road building or site grading. An avulsion may occur over time as the historic arroyo bed is altered by natural sediment and erosion processes, or quickly, if caused by human activity.

C. Indications of natural avulsions are apparent in an examination of historic aerial photographs of the North Camino, El Camino and La Cueva arroyo drainage basins, especially in the area from the base of the Sandia Mountains through North Albuquerque Acres. Additional potential avulsion sites, some caused by human activity, can be identified through a careful examination of existing topographic maps. The eight most significant avulsion sites, as judged by their impact on this study, are identified in Figures 1A and 1B as sites #1 through #8. (It should be noted that similar potential avulsions elsewhere in North Albuquerque Acres have been controlled or eliminated by manmade structures such as the AMAFCA dikes on Signal and Wilshire Avenues which prevent the La Cueva Arroyo from avulsing south to the North Domingo Baca Arroyo. Other avulsions have been controlled by arroyo crossing structures on Tramway Boulevard). Certain avulsions have been recognized since 1983(AMAFCA Board Resolution 1983-11), but have not yet been controlled.

D. The major consequences of these uncontrolled avulsions are as follows:

1. Engineers, planners, and developers are faced with a high degree of uncertainty as to the peak flow rates at critical locations throughout the area. Because of the uncertainty a worst case situation has to be evaluated and

infrastructure designed accordingly. This will result in multiple parallel structures designed to convey the same storm water as shown below.



BOTH MAIN FLOW PATH AND ALTERNATE FLOW PATH DRAINAGE FACILITIES MUST BE DESIGNED FOR FULL FLOW IN THE ARROYO.

2. The effective FEMA Flood Insurance Study, dating from 1983, displays the main arroyo floodplains. As a consequence of revised methodology, FEMA now recognizes the avulsion potential in areas like North Albuquerque Acres. Frequently, attempts to revise the floodplain to reflect the impact of flood control structures become entangled in questions concerning peak flow rates because of potential avulsions in distant upstream areas.

E. A task of the North Camino, El Camino and La Cueva Arroyo Drainage Management Plan is to evaluate various avulsion control measures and strategies, prepare cost estimates for their possible implementation, compare these with the estimated cost of a "no control" option and present this information to all interested parties including the City of Albuquerque and Bernalillo County. Based on these findings recommendations may be made for future action by AMAFCA or other concerned parties.

II. AVULSION CONTROL

A. The Hydrology Report for the La Cueva, North Camino and El Camino Drainage Management Plan, (September, 1996) is based on the assumption that all of the avulsions were controlled under both existing and future developed conditions. Various preliminary design avulsion control measures had been conceptually developed and were assumed to be in place. The results of this analysis are summarized in Table 1, "Existing and Future Flow Rates".

B. The avulsion control measures proposed a variety of site specific elements including armored dikes, training dikes, dip sections, bridges and raised roadways. The proposed measures at each specific location were as follows:

Avulsion #1, near the Juan Tabo Picnic Area access road, is located on both U.S. Forest Service and Sandia Pueblo land. Proposed solution is a 1000-foot long dike to maintain the separation of the El Camino and North Camino Arroyo flows.

Avulsion #2 is located on Modesto, 1200-feet west of Tennyson. Proposed solution includes a bridge type structure with training dikes to carry this existing paved road over the arroyo.

Avulsion #3 is located on Eagle Rock, 600-feet east of Lowell. Proposed solution consists of terminating the roadway on either side of the arroyo crossing with a cul-de-sac, and improving the arroyo conveyance across the Eagle Rock Right-of-Way.

Avulsion #4 is located between Eubank and Browning and includes arroyo crossings of both Modesto and Glendale. This is actually a series of interrelated avulsion areas on a braided portion of the La Cueva Arroyo. The proposed solution consists of dikes and roadway crossing structures at the most downstream location to prevent flows from escaping the La Cueva system. The Glendale location consists of terminating the roadway in a cull-de-sac on either side of the arroyo crossing near Browning along with an improved arroyo conveyance and dikes. The Modesto location consists of a bridge type structure with training dikes to carry the paved roadway over the arroyo flow line near Eubank. An alternative solution would be a lined channel from Browning to Barstow.

Avulsion #5 is located on Glendale 600-feet west of Holbrook. The proposed solution consists of a dike parallel to Glendale to prevent the arroyo from migrating to the north, plus terminating Glendale on either side of the arroyo crossing with a cul-de-sac and improving the arroyo conveyance across the Glendale Right-of-Way.

Avulsion #6 is located on Glendale 1000-feet west of Louisiana. The proposed solution consists of bridge crossing and training dikes for the main La Cueva Arroyo on Glendale, the exact location contingent on any future plans for this portion of the La Cueva Arroyo.

Avulsion #7 is located on Venice between Wyoming and Louisiana. The proposed solution is to terminate Venice with a cul-de-sac on either side of the arroyo crossing and to provide a small training dike on the south side of Venice.

Avulsion #8 is located on Elena near Louisiana. The proposed solution is to raise the Elena roadbed to create a dike to prevent the North Camino Arroyo from crossing Elena and flowing to the south to the Camino Arroyo.

C. The matrix at Table 2 establishes the relative priority of controlling the eight significant avulsions.

D. Figures 2A and 2B depict the measures necessary to control the eight significant avulsions and Table 3 summarizes the preliminary cost estimates for these measures.

III. NO CONTROL OPTION

A If avulsions are not controlled, a "worst case hydrology" must be examined for two reasons:

1. Using the "worst case" flow rates would enable developers or the municipal authorities to remove areas from floodplain upon completion of a project.

2. So that development could proceed during the interim period before upstream avulsion control measures are in place provided design was for the "worst case" flow rate.

B. The "worst case hydrology" is based on the following assumptions:

1. Each potential avulsion will involve 100% of the flow following the new path unless there is clear, quantifiable justification for a flow split.

2. Only one avulsion will occur at a time so that the "worst case" will reflect the results of a single avulsion that will cause the highest flow rates for a particular reach and not a combination of events.

C. The results of this revised evaluation are summarized in Tables 5-1, 5-2, and 5-3 and shown on Figures 3A and 3B. Where there is more than one significant avulsion that can cause a problem, a secondary avulsion and flow rate is also indicated. From a review of the summary tables it appears that avulsions 1 through 5 are the primary problem areas. However, this is somewhat misleading. Avulsion #6 results in major flooding on the northbound lanes and frontage road of I-25. Avulsions 7 and 8 result in all or part of the North Camino flowing along the east side of Coronado Airport runway to the El Camino Arroyo. Due to the fact that these avulsions involve the same water as Avulsion #1, they are not shown on Table 5-2 separately.

D. Cost estimates were prepared for the "no control" option. These are reported in Table 4. The basis for the cost estimates are contained in the Appendix. The cost estimates include Right-of-Way costs assuming existing platting and land values without any adjustment for the negative impact of floodplain designation.

IV. CONCLUSION

A. As can be seen from Tables 3 and 4, the long term cost of "no control" is estimated to be approximately twice that of implementing the control measures. This is primarily due to the cost of building additional or larger capacity arroyo road crossing structures.

B. There are also larger floodplain issues involved. The avulsion "control" option would remove more than fifty lots or parcels from floodplain while the "no control"

option would leave over 180 lots exposed to possible flooding even though they are not currently shown on FEMA maps as being in floodplain. No attempt was made to establish the relative community costs or benefits associated with these floodplain issues.

TABLE 1

EXISTING AND FUTURE FLOW RATES
(Assume All Avulsions Controlled)

	North Camino Arroyo (cfs)	El Camino Arroyo (cfs)	La Cueva Arroyo (cfs)
Tramway	AP 301.90	AP 200.0	AP 102.90
Existing	1718	472	2758
Future	1718	472	2758
Browning		AP 201.90	AP 107.29
Existing	-	587	2756
Future	-	587	2782
Eubank		AP 202.19	AP 109.99
Existing	-	619	2942
Future	-	646	3040
Holbrook	AP 303.90	AP 202.29	
Existing	1717	638	-
Future	1767	685	-
Ventura	AP 305.19	AP 202.39	AP 110.9
Existing	1736	638	2939
Future	1798	710	3048
Barstow	AP 305.29	AP 203.39	AP 111.99
Existing	1739	726	2953
Future	1829	920	3066
Wyoming		AP 204.9	AP 112.90
Existing	-	790	2986
Future	-	1130	3094
Louisiana			AP 113.90
Existing	-	-	2989
Future	-	-	3106
I-25	AP 313.99	AP 205.90	AP 115.90
Existing	1846	908	2994
Future	1982	1335	3108
North Diversion Channel	AP 402.90		AP 128.90
Existing	1863	-	3898
Future	2422	-	4591

Rev. 6/12/96

TABLE 2

AVULSION MATRIX

AVULSION / CONSEQUENCES	1. North Camino Arroyo at Juan Tabo	2. Middle La Cueva Trib. at Modesto, East of Lowell	3. Middle La Cueva Trib. at Eagle Rock, East of Lowell	4. North La Cueva Between Modesto and Eagle Rock East of Eubank	5. Camino Arroyo at Glendale Between Holbrook and Ventura	6. North La Cueva at Glendale, West of Louisiana	7. North Camino Trib. at Venice, West of Wyoming	8. North Camino at Wyoming, North of Elena
Is it a Major Threat to Life & Property?	YES	YES	YES	YES	YES	YES	NO	NO
Does it Result in Interbasin Diversion?	YES	YES	YES	YES	YES	YES	YES	YES
Does it Result in Bypass or Overload of Major Flood Control Structures?	YES	YES	YES	YES	YES	YES	YES	YES
What is Probability Occurrence?	HIGH	HIGH	HIGH	HIGH	LOW*	HIGH	LOW	MODERATE
What is 100-Year Flow Rate?	1718 cfs	765 cfs	765 cfs	2756 cfs	638 cfs	2994 cfs	297 cfs	1846 cfs
Score	9	8	8	9	6*	9	4	7
Location	S	B	B	B	B	A	B	B

YES = 1 HIGH = 3 Q ≥ 1000 cfs = 3
NO = 0 MODERATE = 2 Q = 500 to 1000 cfs = 2
LOW = 1 Q ≤ 500 cfs = 1

*Probability is low only if Avulsion No. 1 is controlled; otherwise the probability is HIGH and the Score is 8

S= Sandia Reservation
B= Bernalillo County
A= Within Cith Limits

TABLE 3

COST ESTIMATE
AVULSION CONTROL

Option 1	**Cost Estimate**
Juan Tabo Dike	$450,000.00
Various Control Measures at Locations 2-8*	$4,370,000.00
Total, Avulsion Control with Dike	$4,820,000.00
Option 2	
Eubank Dam - 65 ac-ft on 12 lots	$1,700,000.00
Various Avulsion Control at Locations 2-8*	$4,370,000.00
Total, Avulsion Control with Dam	$6,070,000.00

*Locations 2-8 will require 3 bridges, 4 dip-sections, miscellaneous dikes and berms, and 30 lots

TABLE 4

COST ESTIMATE
NO AVULSION CONTROL

Option 3	
Increased size of 20 future structures	$2,000,000.00
2 miles of **increased** capacity on future channels	$650,000.00
13 **additional** major structures, includes 39 lots (Q > 1000 cfs)	$6,250,000.00
7 **additional** minor structures, includes 14 lots (Q < 1000 cfs)	$1,440,000.00
Total, No Avulsion Control	$10,340,000.00

(All of the above estimates assume R-O-W costs of $80,000/NAA lot)

Note: These costs are only for increased size or additional structures for the "worst case" hydrology flow rates east of I-25.

TABLE 5-1

NORTH CAMINO ARROYO

	Avulsion Control Q_{100} (cfs)	No Avulsion Control, Primary Avulsion Q_{100} (cfs)	No Avulsion Control, Secondary Avulsion Q_{100} (cfs)
I-25 (AP 313.99)			
Existing	1846	#5 2127	NA
Future	1982	#5 2399	NA
North Diversion Channel (AP 402.9)			
Existing	1863	#5 2167	NA
Future	2422	#5 2883	NA

NORTH CAMINO TRIBUTARY ARROYO

Barstow (AP 307.9)			
Existing	181	#5 660	NA
Future	232	#5 744	NA
Coronado Airport (AP311.99)			
Existing	527	#5 875	NA
Future	820	#5 1290	NA

TABLE 5-2

EL CAMINO ARROYO

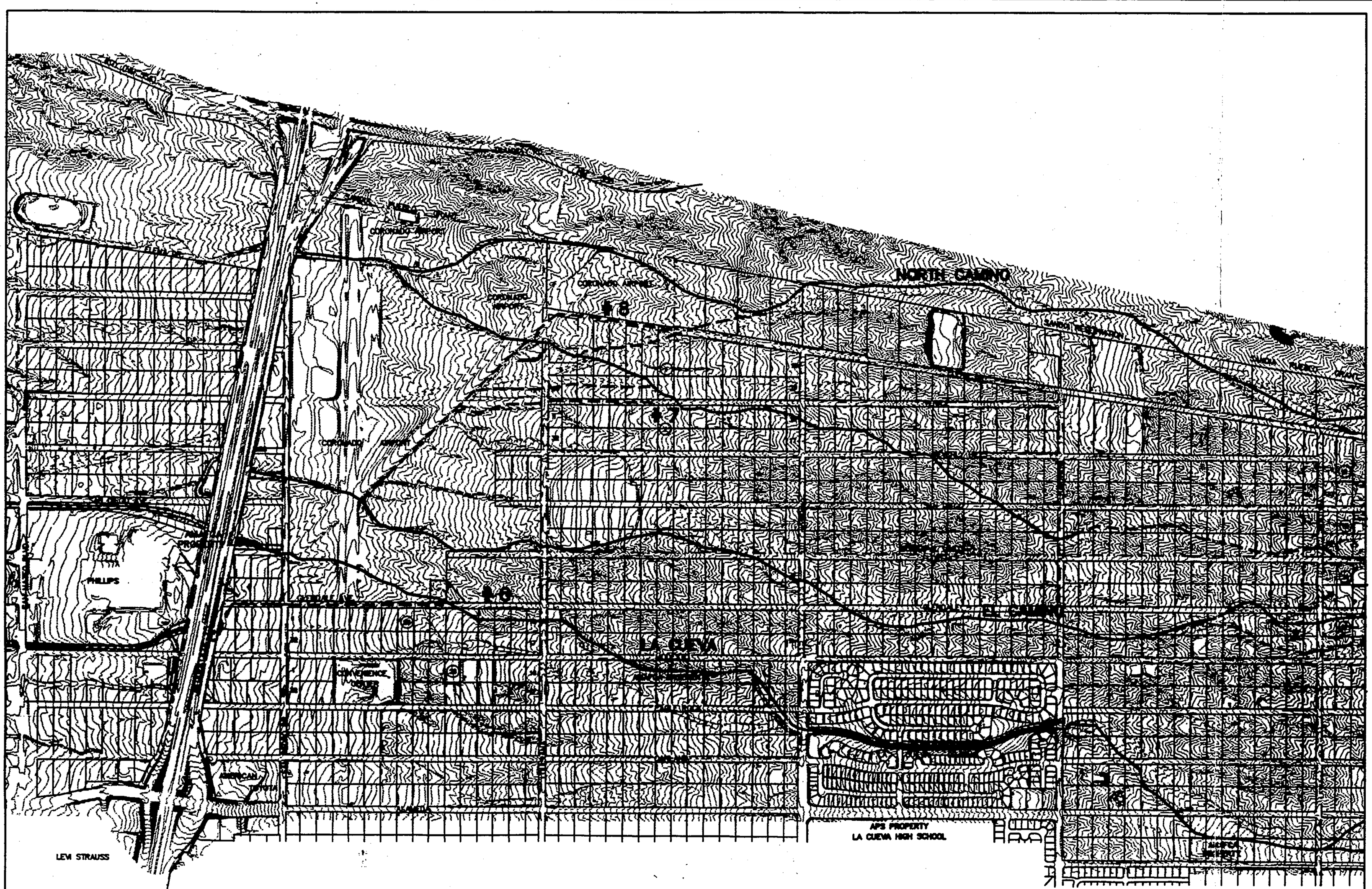
	Avulsion Control Q_{100} (cfs)	No Avulsion Control, Primary Avulsion Q_{100} (cfs)		No Avulsion Control, Secondary Avulsion Q_{100} (cfs)	
Tramway (AP 200.0)					
Existing	472	#1	1791	NA	
Future	472	#1	1791	NA	
Browning (AP 201.9)					
Existing	587	#1	1782	NA	
Future	587	#1	1796	NA	
Eubank (AP 202.19)					
Existing	619	#1	1790	NA	
Future	646	#1	1806	NA	
Holbrook (AP 202.29)					
Existing	638	#4	3161	#1	1803
Future	685	#4	3243	#1	1816
Ventura (AP 202.39)					
Existing	638	#4	3165	#1	1810
Future	710	#4	3247	#1	1826
Barstow (AP 203.39)					
Existing	726	#4	3213	#1	1841
Future	920	#4	3310	#1	1883
Wyoming (AP 204.9)					
Existing	790	#4	3243	#1	1852
Future	1130	#4	3380	#1	1926
I-25 (AP 205.9)					
Existing	908	#4	3286	#1	1876
Future	1335	#4	3438	#1	1975

FIS 3301 cfs

TABLE 5-3

LA CUEVA ARROYO

	Avulsion Control Q_{100} (cfs)	No Avulsion Control, Primary Avulsion Q_{100} (cfs)		No Avulsion Control, Secondary Avulsion Q_{100} (cfs)	
Eubank (AP 109.99)					
Existing	2942	#2	3535		NA
Future	3040	#2	3647		NA
Ventura (AP 110.90)					
Existing	2939	#3	3545	#2	3537
Future	3048	#3	3709	#2	3693
Barstow (AP 111.99)					
Existing	2953	#3	3560	#2	3530
Future	3066	#3	3744	#2	3727
Wyoming (AP 112.90)					
Existing	2986	#3	3597	#2	3562
Future	3094	#3	3795	#2	3774
Louisiana (AP 113.90)					
Existing	2989	#3	3589	#2	3548
Future	3106	#3	3820	#2	3799
I-25 (AP 115.90)					
Existing	2994	#3	3587	#2	3546
Future	3108	#3	3830	#2	3809
North Diversion Channel					
Existing	3898	#3	4545	#2	4440
Future	4591	#3	5290	#2	5251



LEGEND

- #2 AVULSION NUMBER
- (B) BLOCK NUMBER
- 1 LOT NUMBER
- EXISTING ARROYO FLOWLINE
- POTENTIAL AVULSION FLOW PATH

500 250 0 500 1000

SCALE: 1" = 500'

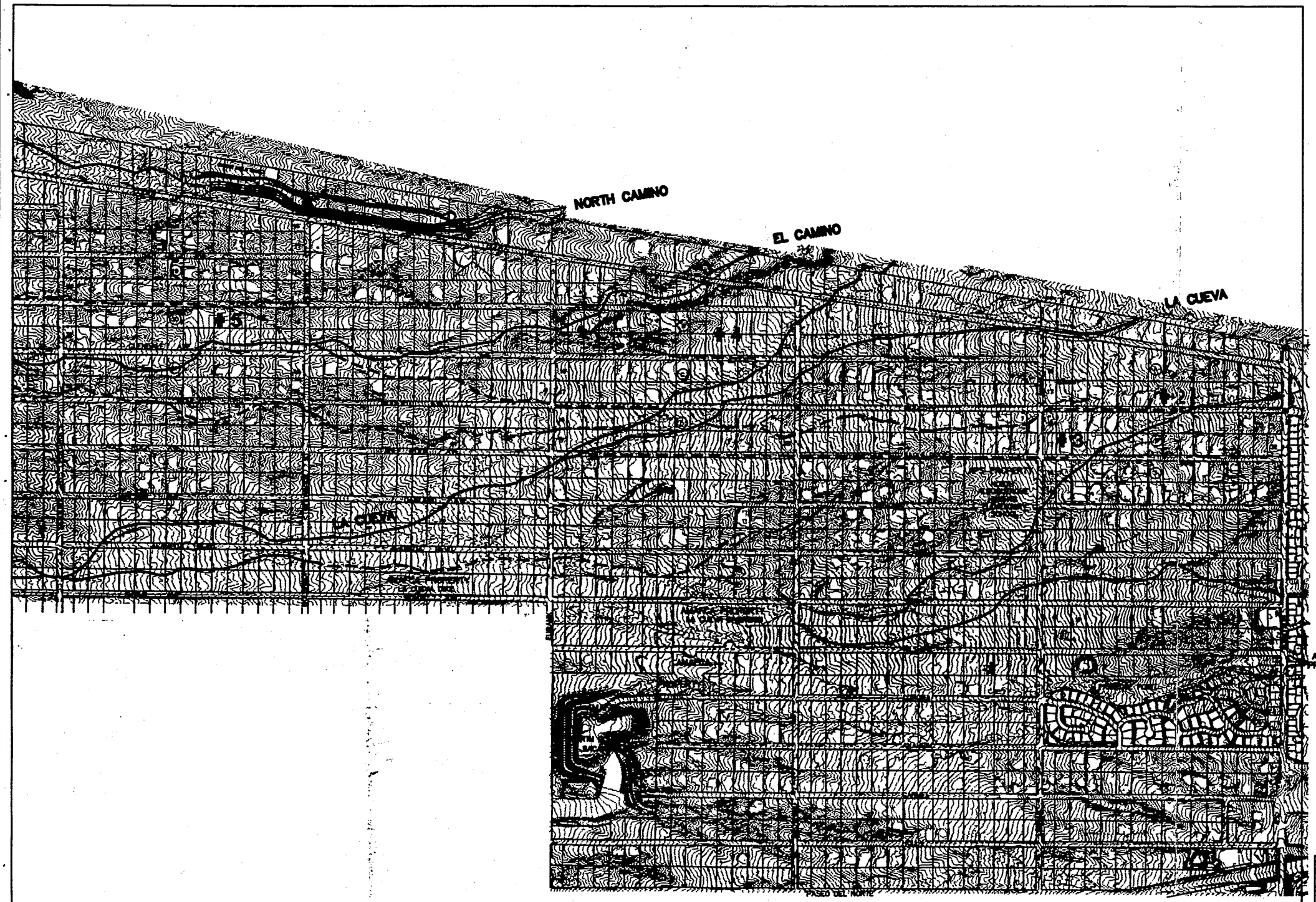
ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

TITLE: LA CUEVA, EL CAMINO AND NORTH CAMINO ARROYOS DRAINAGE MANAGEMENT PLAN

FIGURE 1A

SIGNIFICANT AVULSION LOCATION MAP

PROJECT | MAP NO. | SHEET OF



LEGEND

- #2 AVULSION NUMBER
- (10) BLOCK NUMBER
- 1 LOT NUMBER
- EXISTING ARROYO FLOW LINE
- POTENTIAL AVULSION FLOW PATH

N

SCALE: 1" = 800'

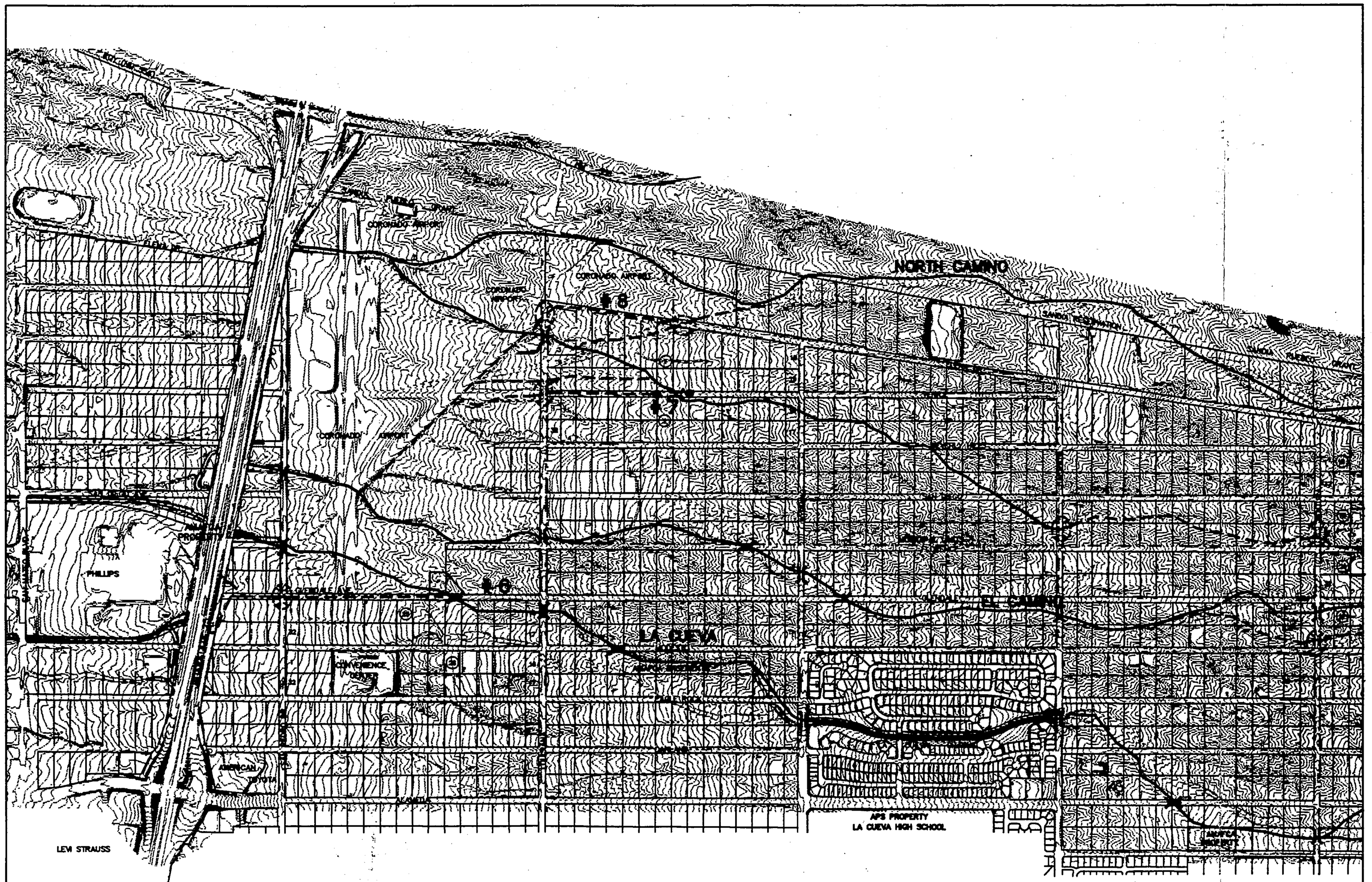
ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

TITLE: LA CUEVA, EL CAMINO AND NORTH CAMINO ARROYOS DRAINAGE MANAGEMENT PLAN

FIGURE 1B

SIGNIFICANT AVULSION LOCATION MAP

PROJECT NO. 95-150	MAP NO. B-C8,9,10	SHEET OF



LEGEND

- PROPOSED CUL-DE-SAC
- # 2 AVULSION NUMBER
- (16) BLOCK NUMBER
- 1 LOT NUMBER
- EXISTING ARROYO FLOWLINE
- POTENTIAL AVULSION FLOW PATH
- ADDITIONAL STRUCTURE
- INCREASED CAPACITY FOR REQUIRED STRUCTURE
- REQUIRED STRUCTURE

500 250 0 500 1000

SCALE: 1" = 500'

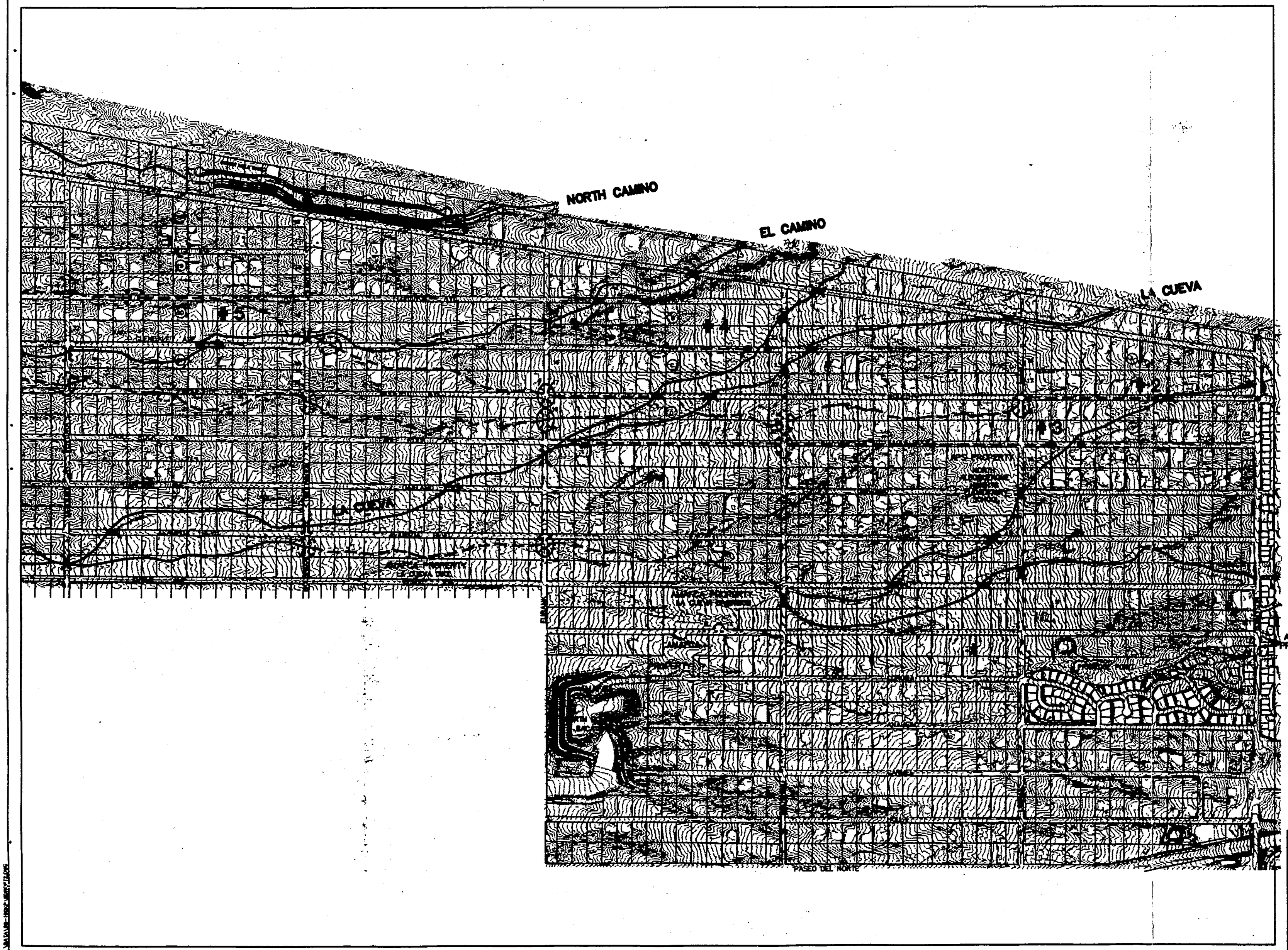
ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

TITLE: LA CUEVA, EL CAMINO AND NORTH CAMINO ARROYOS DRAINAGE MANAGEMENT PLAN

FIGURE 2A

AVULSION CONTROL MEASURES

PROJECT NO.	95-190	MAP NO.	SHEET	OF



LEGEND

- PROPOSED CUL-DE-SAC
- #2 AVULSION NUMBER
- (10) BLOCK NUMBER
- 1 LOT NUMBER
- EXISTING ARROYO FLOW LINE
- POTENTIAL AVULSION FLOW PATH
- ADDITIONAL STRUCTURE
- INCREASED CAPACITY FOR REQUIRED STRUCTURE
- REQUIRED STRUCTURE

N

500 250 0 500 1000

SCALE: 1" = 500'

Resource Technologies, Inc.

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

TITLE: LA CUEVA, EL CAMINO AND NORTH CAMINO ARROYOS DRAINAGE MANAGEMENT PLAN

FIGURE 2B

AVULSION CONTROL MEASURES

PROJECT NO. 95-190	MAP NO. B-C18,19,20	SHEET OF

O:\WATERSHED\95-190\2_MEMO\FIG2B.DWG

Albuquerque
Metropolitan
Arroyo
Flood
Control
Authority

2600 PROSPECT N E - ALBUQUERQUE N M 87107
TELEPHONE (505) 884-2215

MEMORANDUM

April 3, 1997

TO: Distribution List

FR: Kurt Browning, AMAFCA

RE: North Albuquerque Acres Arroyo Avulsion Problems Report - for the La Cueva and Camino Arroyos Drainage Management Plan

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Please find enclosed a copy of the referenced report. It represents an interim but crucial step in the development of a Drainage Management Plan.

To date, most of the technical data has been prepared, in order to study DMP arroyo options and alternatives. Due to the uncertainties of these avulsions, definitive DMP options are difficult to define.

The report contains estimates for avulsion control (best case hydrology) and no avulsion control (worst case hydrology). Not controlling the avulsions is more expensive in the long run, due to the need for increased size of drainage facilities and additional drainage facilities. The eight major avulsions identified, have significant impacts on planning, floodplains, FEMA submittals, development and drainage/road facilities in North Albuquerque Acres.

This report does not provide for commitments for avulsion control, but only describes the magnitude of the situation.

Resolving the avulsion control issue in NAA may require a coordinated effort of affected agencies and private parties.

There will be a briefing/meeting held on Tuesday, June 17, 1997, at 9:30 AM, at the AMAFCA office, for all interested agencies to present comments and input. We encourage everyone to become familiar with the ramifications of these avulsions and attend the meeting.

Distribution -

Barbara Seward, Commissioner, Bernalillo County
Susan Calongne, City/County Floodplain Administrator
Steve Miller, Bernalillo County Public Works Dept.
Dave Stoliker, BCPWD
Roger Paul, BCPWD
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Sam Bregman, City Councilor, City of Albuquerque
Bob Gurule, COA Public Works Dir.
John Castillo, COA
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Ron Short, COA Planning Director
Richard Dineen, COA
Carmen Chavez, COA
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Malcolm Montoya, Sandia Pueblo
Howard Stone, Bohannan-Huston
Carlos Padilla, AVID Engineering
Ellen Harvey, NAA Neighborhood Assn.
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La Cueva/Camino Arroyos

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CHECKED _____ DATE _____
APPROVED _____ DATE 6/17/97
TITLE Avulsion Meeting

PROJECT NO. _____
SHEET _____ OF _____
BY _____ DATE _____

	Name	Org.	Tel #
1.	Don Dixon	RTI	243-7300
2.	Susan Calongne	City/County FPA	924-3982
3.	Matthew Foster	Pueblo de Sandia	867-3317
4.	Steven P Harris	NMSHTD, D-3	841-2730
5.	Elvidio Diniz	Resource Tech	243 7300
6.	Dan Hogan	City of ABQ/Public Works	768-2778
7.	John Curtin	C.O.A./PWD/Hydl	768-2727
8.	Rae Van Hoven	NMSHTD	827-5323
9.	Martin Eckert, Jr.	AMAFCA	884-2215
10.	John Castillo	PWD/COA	768-3628
11.	Larry Blair	AMAFCA	884-2215
12.	Roger Paul	Bernalillo Co. PWD	848-1515
13.	Brad Catanach	Bernalillo Co. PWD	848-1583
14.	John Kelly	AMAFCA	884-2215
15.	Carlos Padilla	AVID Engineering	881-5357
16.	Thaddeus Lucero	Ber. County Planning	9243700
17.	Dan Grochowski	Bohannan-Huston Inc.	823-1000
18.	Bob Foglesong	Bernalillo County PWD	848-1511
19.	Ellen C. Harvey	North Albuquerque Acres Community Assoc.	884-1672
20.	Kurt Browning	AMAFCA	884-2215

TABLE 5-1

NORTH CAMINO ARROYO

	Avulsion Control Q_{100} (cfs)	No Avulsion Control, Primary Avulsion Q_{100} (cfs)		No Avulsion Control, Secondary Avulsion Q_{100} (cfs)
I-25 (AP 313.99)				
Existing	1846	#5	2127	NA
Future	1982	#5	2399	NA
North Diversion Channel (AP 402.9)				
Existing	1863	#5	2167	NA
Future	2422	#5	2883	NA

NORTH CAMINO TRIBUTARY ARROYO

Barstow (AP 307.9)				
Existing	181	#5	660	NA
Future	232	#5	744	NA
Coronado Airport (AP311.99)				
Existing	527	#5	875	NA
Future	820	#5	1290	NA
Wyoming (AP 310.9)				
Existing	199	#5	672	NA
Future	296	#5	766	NA

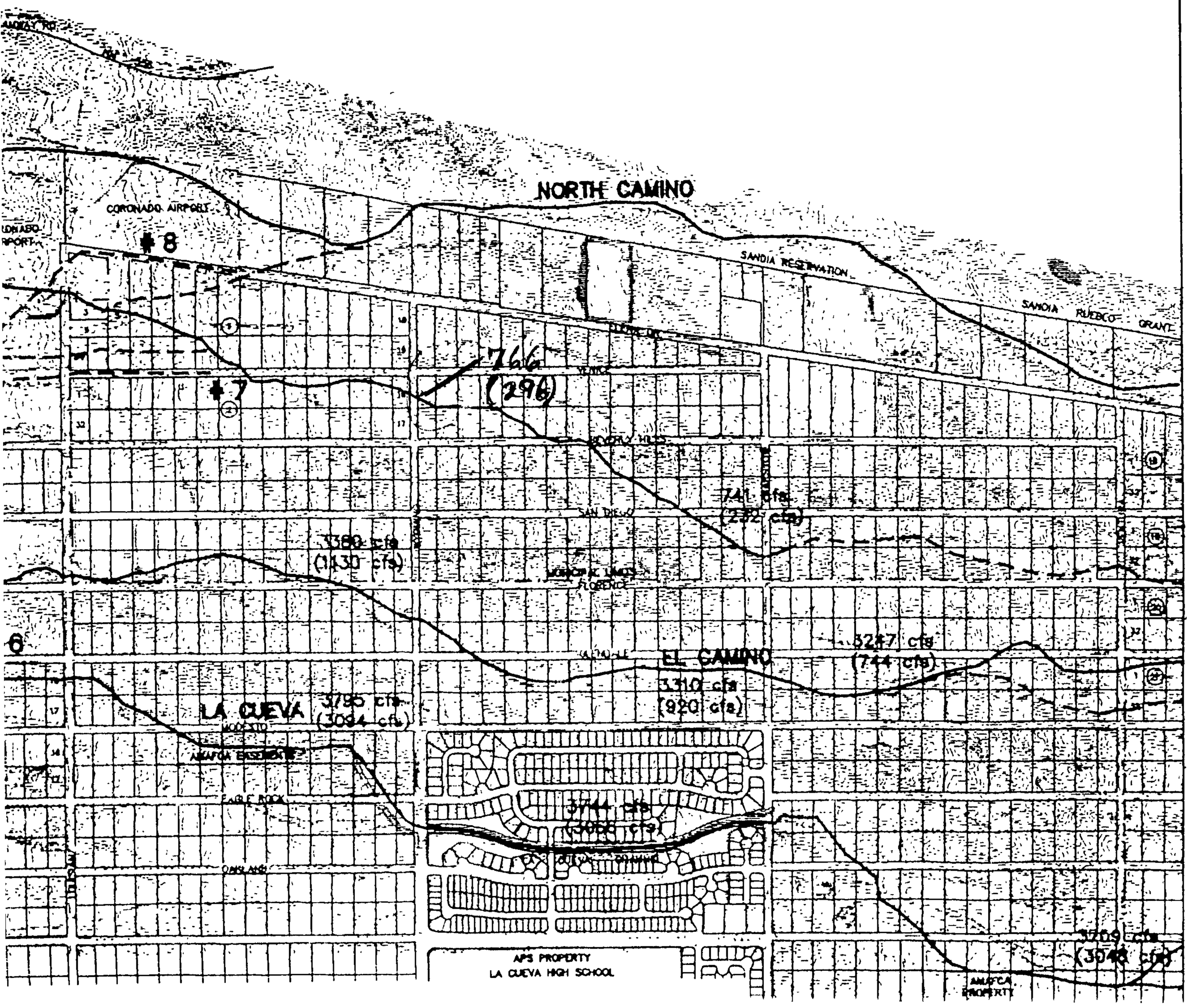
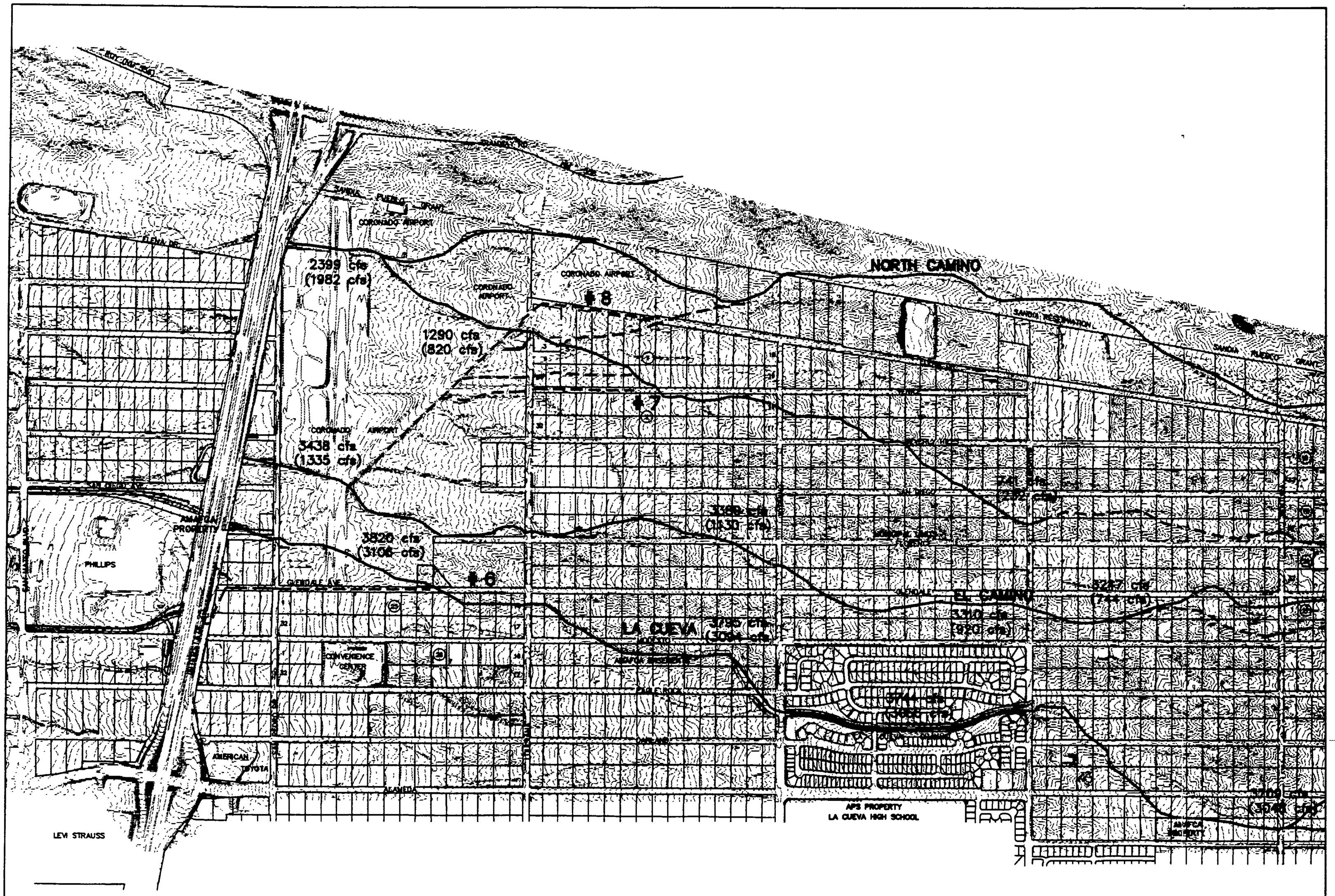

NORTH CAMINO
CORONADO AIRPORT
#8
#7
#6
SANDIA RESERVATION
SANDIA PUEBLO GRANT
766 cfs
(296 cfs)
741 cfs
(232 cfs)
3380 cfs
(1130 cfs)
3247 cfs
(744 cfs)
EL CAMINO
3310 cfs
(920 cfs)
LA CUEVA
3785 cfs
(3094 cfs)
3744 cfs
(3068 cfs)
3709 cfs
(3048 cfs)
APS PROPERTY
LA CUEVA HIGH SCHOOL
AMAFCA PROPERTY
2 AVULSION NUMBER
⑱ BLOCK NUMBER
1 LOT NUMBER
EXISTING ARROYO FLOWLINE
POTENTIAL AVULSION FLOW PATH
1890 cfs WORST CASE FLOW RATE – FUTURE CONDITION
(744 cfs) FUTURE CONDITION FLOW RATE WITH AVULSION CONTROL
500 250 0 500
SCALE: 1" = 500'

Figure 3A



LEGEND

- #2 AVULSION NUMBER
- (10) BLOCK NUMBER
- 1 LOT NUMBER
- EXISTING ARROYO FLOWLINE
- POTENTIAL AVULSION FLOW PATH
- 1890 cfs WORST CASE FLOW RATE – FUTURE CONDITION
- (744 cfs) FUTURE CONDITION FLOW RATE WITH AVULSION CONTROL

N

500 250 0 500 1000

SCALE: 1" = 500'

Resource Technology, Inc.

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

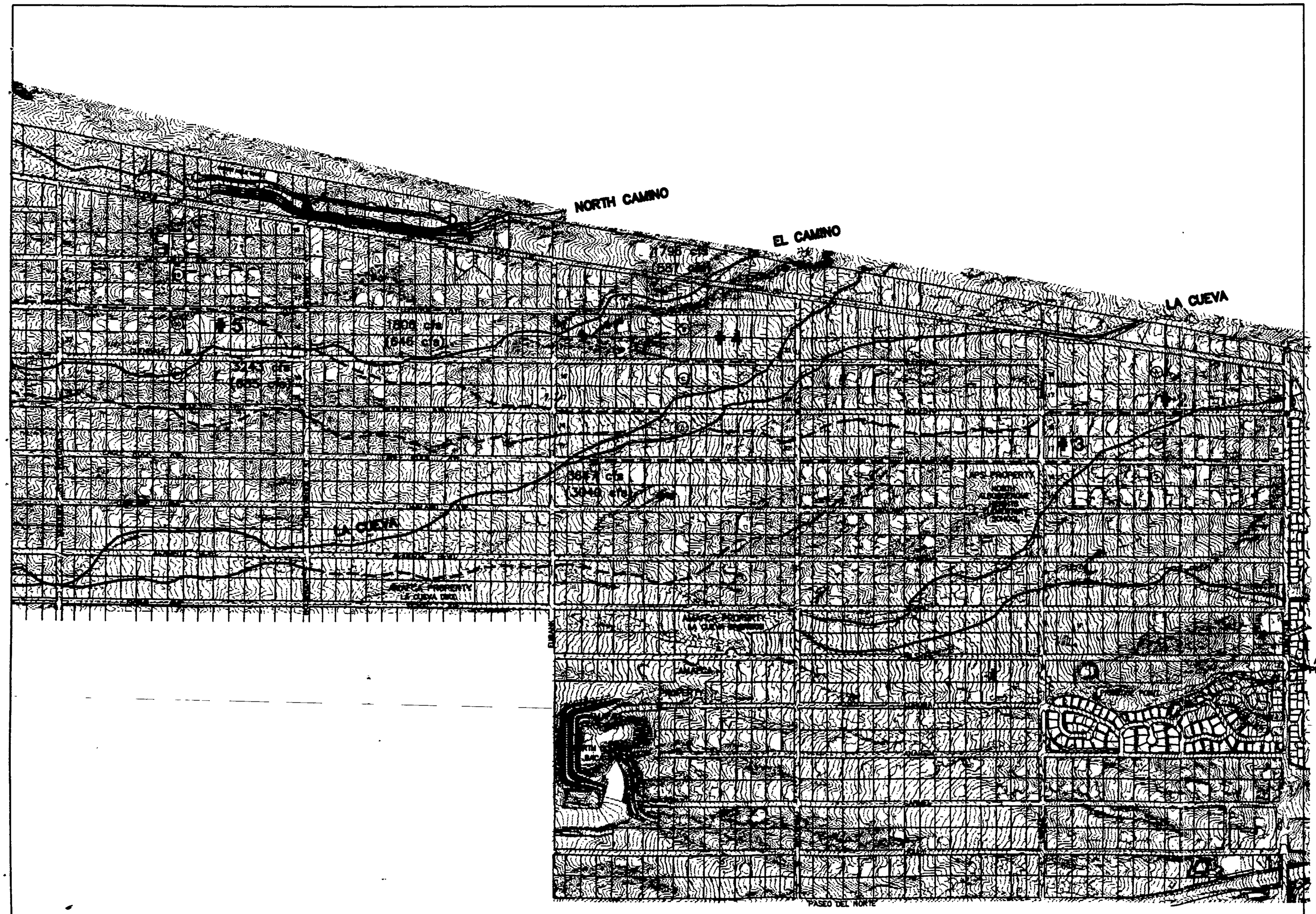
TITLE: LA CUEVA, EL CAMINO AND NORTH CAMINO ARROYOS DRAINAGE MANAGEMENT PLAN

FIGURE 3A

FUTURE CONDITION FLOW RATES

PROJECT NO.	95-190	MAP NO.	SHEET	OF

J:\DATA\95-190\DWG\FIG3A.DWG



LEGEND

- #2 — AVULSION NUMBER
- (16) — BLOCK NUMBER
- 1 — LOT NUMBER
- EXISTING ARROYO FLOW LINE
- POTENTIAL AVULSION FLOW PATH
- 1890 cfs — WORST CASE FLOW RATE – FUTURE CONDITION
- (744 cfs) — FUTURE CONDITION FLOW RATE WITH AVULSION CONTROL

N

500 250 0 500 1000

SCALE: 1" = 500'

Resource Technology, Inc.

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

TITLE: LA CUEVA, EL CAMINO AND NORTH CAMINO ARROYOS DRAINAGE MANAGEMENT PLAN

FIGURE 3B

FUTURE CONDITION FLOW RATES

PROJECT NO.	MAP NO.	SHEET
95-190	D-C18,19,20	OF

APPENDIX

JUAN TABO FLOOD CONTROL DIKE
COST ESTIMATE

	Unit	Quantity	Price	Cost
Borrow	CY	7500	$6.00	$45.000.00
Excavation	CY	8000	$2.50	$20.000.00
Embankment	CY	15000	$2.50	$37,500.00
Riprap, D_{50} = 1.0'	CY	1900	$125.00	$237.500.00
Re-seed	AC	2	$10,000.00	$20,000.00
Subtotal				$360,000.00
Engineering and Contingencies - 25%				$450.000.00

C \OFFICE\WPWIN\WPDOCS\95-190\BLAIR.LT2

Avulsion Control Locations 1-8

30 lots @ $80,000/lot	$2,400,000
3 Bridges @ $310,000	$930,000
4 Dip-sections @ $60,000	$180,000
2000-ft of Dike @$350/ft	$700,000
Elena Dr. (raise and riprap) 1/4 mile	$100,000
Total	$4,370,000

No Control Option Estimate

13 Major Structures	
11 Bridges @ $550,000	$6,050,000
2 Dip-sections @ $100,000	$200,000
7 Minor Structures	
4 Bridges @ 315,000	$1,260,000
3 Dip-Sections @ $60,000	$180,000
Total	$7,690,000
2 miles of Channel Freeboard walls @$60/ft	$650,000
20 structure upgrades @ $100,000	$2,000,000
Grand total	$10,340,000

EUBANK DAM COST ESTIMATE

Item	Unit	Quantity	Price	Cost
DETENTION DAM	Ac-Ft	65	$10,250.00	$666,250.00
Subtotal				$666,250.00
Engineering and Contingency	@20%			$133,750.00
Total				$800,000.00

Major Bridge Structure Cost Estimate

Item	Unit	Quantity	Price	Cost
Concrete Bridge	LS	1	$170,000.00	$170,000.00
Unclassified Excav	CY	8500	$1.10	$9,350.00
Embankment	CY	9200	$1.10	$10,120.00
Borrow	CY	3000	$6.00	$18,000.00
Paving	SY	2700	$7.50	$20,250.00
Guard Rail	LF	400	$15.00	$6,000.00
Riprap	CY	200	$125.00	$25,000.00
Subtotal				$258,720.00
Engineering and Contingency	@20%			$51,744.00
R/W 3 lots @ $80,000/lot				$240,000.00
Total				$550,464.00

Minor Bridge Structure @ 1/2 major struct plus R/W

Construction Cost=.5(310,464)=$155,232.00

R/W 2 lots @$80,000/lot=$160,000.00

Total $315,232.00

Major Arroyo Dip-Section Cost Estimate

Item	Unit	Quantity	Price	Cost
Unclassified Excav	CY	6000	$1.10	$6,600.00
Embankment	CY	4800	$1.10	$5,280.00
Paving	SY	1400	$7.50	$20,500.00
Riprap	CY	200	$125.00	$25,000.00
Subtotal				$47,380.00
Engineering and Contingency @20%				$9,476.00
R/W .5 Acre @ $90,000/Acre				$45,000.00
Total				$101,856.00

Minor Dip-Section @ 1/2 major struct plus R/W

Construction Cost=.5(56,856)=$28,428.00

R/W .34 Acre 90,000/acre =$30,600.00

Total $59,028.00