

WEST I-40 DMP

VOLUME II

FINAL HYDROLOGY

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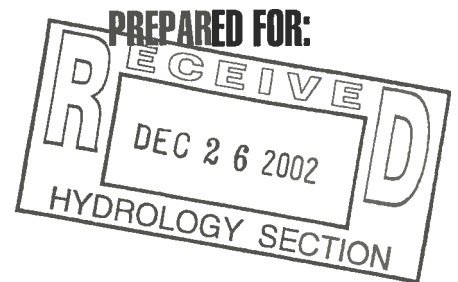
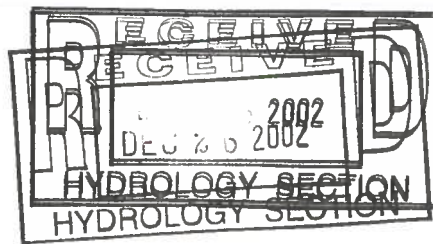
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FLOOD CONTROL AUTHORITY
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11/1/2000

VOLUME I – Drainage Management Plan

EXECUTIVE SUMMARY	vi
I. INTRODUCTION	1
II. HYDROLOGY	4
A. METHODOLOGY	4
1. Land Treatments	4
2. Routing	4
3. Basin Delineation	5
4. Precipitation	5
5. Time of Concentration	7
6. Sediment Bulking	7
B. HYDROLOGY MODEL	8
1. General	8
2. Existing Conditions Description	8
3. Existing Floodplains	12
4. Developed Conditions Description	12
C. SEDIMENT TRANSPORT ANALYSIS	16
1. Sediment Yield (from MEI report)	16
2. Sediment Trapping	16
3. Bulking Factors	17
4. Petroglyph National Monument Stabilization	19
5. Reconnaissance	20
D. HYDRAULIC ANALYSIS OF EXISTING DRAINAGE FACILITIES	21
1. General	21
2. Amole Watershed Drainage Facilities	22
3. Ladera Watershed Drainage Facilities	22
4. West Bluff Watershed Drainage Facilities	27
III. FACILITIES PLANNING	29
A. GENERAL	29
B. TRUNK FACILITIES	30
C. PREFERRED OPTIONS	34
1. Option 2D	34
2. Option 3C.1	37
3. Option 6A	40
IV. CONCLUSION	43

TABLES

Table 1 – Rainfall Depths for Design Storm Events	7
Table 2 – Sediment Bulking Factors	18
Table 3 – Key 100yr Flows – Amole Watershed	22
Table 4 – Ladera Dams Hydrology Summary	24
Table 5 – Key 100yr Flows – Ladera Watershed	25
Table 6 – Key 100yr Flows – Ladera, Quickwater and Rinconada Channels	26
Table 7 - Key 100yr Flows – Dams 1, 5 and 9	26
Table 8 – Key 100yr Flows – CBCs at 98 th Street and at Unser Boulevard	27
Table 9 – Key 100yr Flows – West Mesa Diversion	29
Table 10 – Key 100yr Flows – CBC at West Bluff Outfall	29
Table 11 – Trunk Facility Sizes	31
Table 12 – Construction Phases and Costs Associated with Trunk Facilities	32
Table 13 – Option 2D Key Elements	34
Table 14 – Option 3C.1 Key Elements	37
Table 15 – Option 6A Key Elements	42

FIGURES

Figure 1 – Vicinity Map	2
Figure 2 – Basin Map	6
Figure 3 – Existing Model	9
Figure 3A – Flood Plain Removal	13
Figure 4 – Development Scenario 1	14
Figure 5 – Development Scenario 2	15
Figure 6 – Existing and Developed Key 100-Year Flows	11
Figure 7 – Trunk Facilities	33
Figure 8 – Option 2D - Divert Mirehaven Arroyos in Pipe to New D5 Dam and Build Dam 5 Diversion	35
Figure 9 – Option 3C.1 – Detention Above Petroglyph National Monument	38
Figure 10 – Option 6A – Growth to Atrisco Terrace	41

APPENDIX

Appendix A	Cost Estimates
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VOLUME II – Final Hydrology *(Bound Separately)*

I.	INTRODUCTION.....	1
II.	HYDROLOGY	4
A.	METHODOLOGY.....	4
B.	HYDROLOGY MODEL	4
1.	Existing Conditions	4
2.	Developed Conditions Description.....	7
3.	Option 2D.....	7
4.	Option 3C.1.....	10
5.	Option 6A.....	10
III.	CONCLUSION	14

TABLES

Table 1 –	Summary of Key Flow Rates.....	13
Table 2 –	Summary of Proposed Dam Sites.....	14


FIGURES

Figure 1 –	Vicinity map	2
Figure 2 –	Basin Map.....	5
Figure 3 –	Existing Model.....	6
Figure 4 –	Development Scenario 2.....	8
Figure 5 –	Option 2D - Divert Mirehaven Arroyos in Pipe to New D5 Dam and Build Dam 5 Diversion	9
Figure 6 –	Option 3C.1 – Detention Above Petroglyph National Monument	11
Figure 7 –	Option 6A – Growth to Atrisco Terrace	12

APPENDICES

Appendix A -	Development Scenario 2 Summary of Modeling Assumptions
Appendix B -	Time of Concentration and Time to Peak Calculations
Appendix C -	Basin Parameters Summary Existing Conditions Development Scenario 2
Appendix D -	Existing Conditions AHYMO Summary Table
Appendix E -	Option 2D AHYMO Summary Table
Appendix F -	Option 3C1 AHYMO Summary Table

VOLUME III – Supplemental Maps *(Bound Separately)*



C-1 -	Cover Sheet
R-1 – R-8	ROW/Easement Mapping
Plates 1-14	Existing Drainage Basin Mapping
D-1 – D-2	Developed Conditions Drainage Basin Mapping (Color)
N-1 – N-4	Proposed DMP Facilities Mapping (Color)

VOLUME IV – Supporting Documents *(Bound Separately)*

Literature Review with Addendum
Draft Working Hydrology
Preliminary Options Summary
Sediment Reconnaissance
Analysis of Existing Conditions Sediment Yields and Detention Dam Trap Efficiencies
Sediment Erosion Analysis Within Petroglyph National Monument
Public Meeting Minutes and Survey Results
Cultural Resource Survey

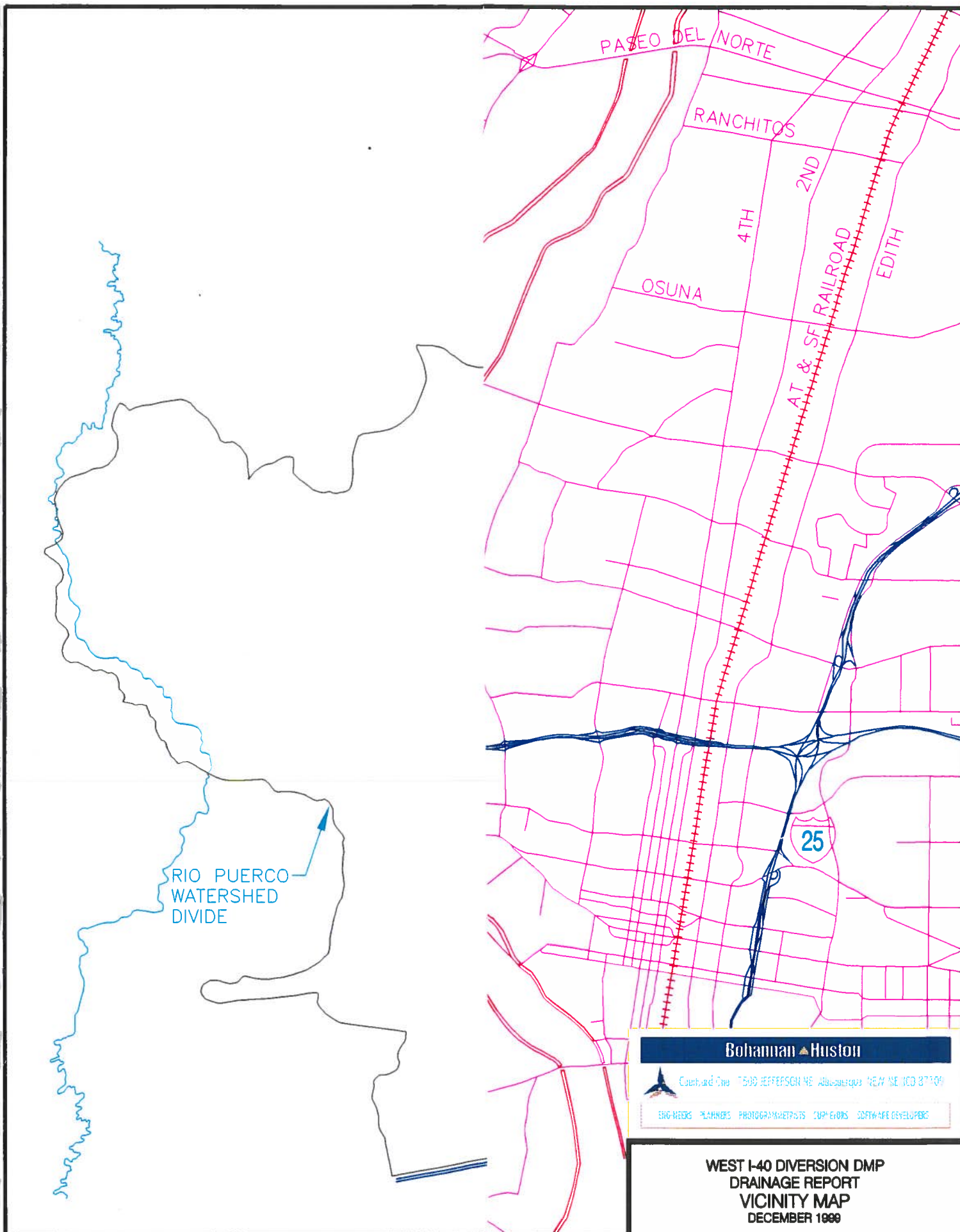
I. INTRODUCTION

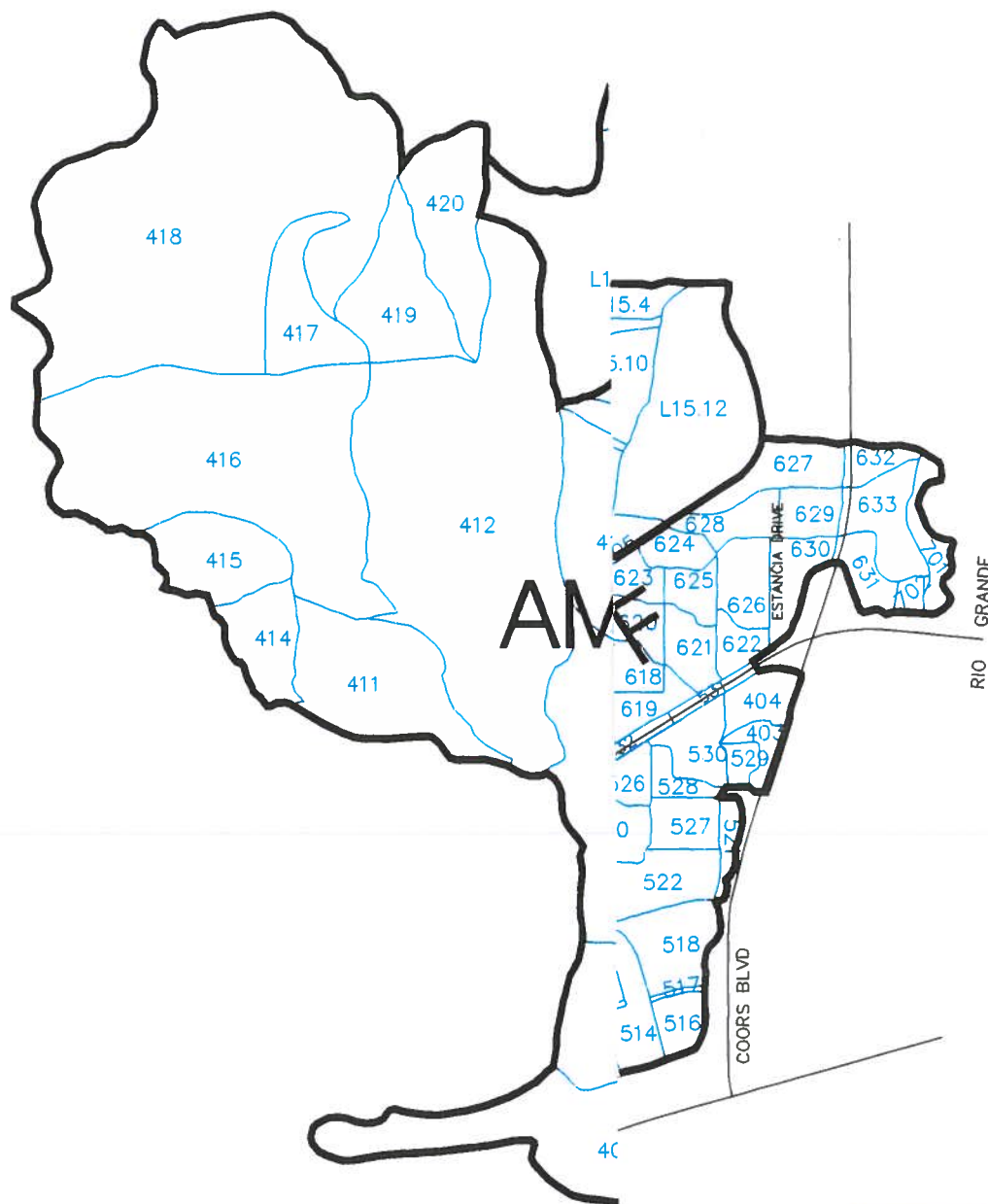
The West Interstate 40 Diversion Drainage Management Plan (West I-40 DMP) study area is located on the west side of Albuquerque and is composed of the Upper Amole, Ladera, and West Bluff watersheds. The Albuquerque Metropolitan Arroyo and Flood Control Authority (AMAFCA) contracted with Bohannon Huston, Inc. (BHI) to provide a comprehensive drainage management plan of the region. The project area encompasses approximately 40 square miles (see Vicinity Map, Figure 1). The general limits of the project are: the Rio Puerco escarpment on the west, Double Eagle II Airport and Vulcan Volcano on the north, Coors Boulevard and the Rio Grande Bluff on the east, and Bluewater Road and I-40 on the south.

The purpose of this report is to summarize the hydrology models and results for existing conditions, and the two preferred options, Option 2D and Option 3C.1. A hydrology model was not prepared for Option 6A the recommended option because it is based on the worst case (highest) flow rate or volume from either Option 2D or Option 3C.1 to allow either of these options to be implemented in the future. This is discussed in more detail in the section describing the hydrology models.

The project area has three outfalls to the Rio Grande: the West Bluff Outfall to the Rio Grande, the Ladera Dam 15 outfall pipe to the San Antonio Arroyo, and the Westgate Dam outfall pipe to the Amole-Hubbell detention facilities. Each of the outfalls has deficiencies as summarized below:

- The West Bluff Outfall has a capacity of 2,585 cubic feet per second (cfs), but, due to the lack of additional drainage infrastructure, upstream flows cannot reach the facility.
- The 60" outfall pipe from Ladera Dam 15 is at capacity.
- The Westgate Dam and the downstream Amole-Hubbell System do not have the capacity for fully developed conditions flows. This situation resulted in the adoption of the **Amole Arroyo – Westgate Dam Drainage Management Plan** (Amole-Westgate DMP), Debra Vaughan-Cleff, P.E., June, 1994. The primary recommendation of this DMP was to detain and divert all runoff from the Amole-Hubbell Watershed north of I-40 to the West Bluff Outfall.





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**WEST I-40 DIVERSION DMP
DRAINAGE REPORT
BASIN MAP
MAY 1996**

FIGURE 2

The **Amole–Westgate DMP**, adopted by the AMAFCA Board via Resolution 1994-4, April 28, 1994, served as the starting point for the development of the West I-40 DMP. Significant capacity and flooding problems exist south of I-40.

The **Amole–Westgate DMP** proposed several measures, including the East and West Amole Detention Dams north of I-40 and I-40 Diversion, as a means of diverting runoff to the river north of I-40. Diverting runoff north of I-40 makes use of the existing West Bluff Outfall while reducing the need to use Middle Rio Grande Conservancy District (MRGCD) irrigation canals and drains as storm water outfalls. In addition, the Amole Detention Dams and West I-40 Diversion:

- diverts a substantial portion of the existing watershed that causes flooding in the southwest valley;
- reduces flows impacting the area from I-40 all the way south to the Hubbell Lake outfall; an area which currently lacks an outfall to the Rio Grande;
- eliminates capacity problems at the Westgate Dam, and;
- eliminates over 110 acres of existing floodplain.

The drainage management options presented in this DMP consider the limited outfalls to the river both north and south of I-40 and thus build on the **Amole–Westgate DMP** premise of diverting runoff north of I-40 to the West Bluff Outfall. As part of the DMP, six (6) options with several sub options, for a total of fifteen options were developed. The rejected options and earlier versions of the preferred options are included in the Preliminary Options Summary as part of Volume IV. The West I-40 Tech Team narrowed the selection to Options 2D and 3C.1. A third preferred option, Option 6A, was then added because the Tech Team was unable to reach a consensus supporting as either Option 2D or Option 3C.1. Option 6A, the recommended option, is discussed in more detail along with options 2D and 3C.1 in the Facilities Planning section of the DMP.

II. HYDROLOGY

A. METHODOLOGY

Hydrologic modeling for this project was performed using the Albuquerque Metropolitan Arroyo Flood Control Authority Hydrologic Model, January 1994 (AHYMO) computer program, in accordance with the City of Albuquerque Development Process Manual Section 22.2, January 1993. The study area, watersheds, and basins are shown in the Basin Map and Existing Model drawing (Figures 2 and 3). Detailed information concerning hydrologic parameters such as land treatments, routing, basin delineation, precipitation, time of concentration, and sediment bulking is presented in the DMP (Volume I) and in the Working Draft Hydrology Report (Volume IV). Summaries of key hydrologic input data are provided in Appendices A – C.

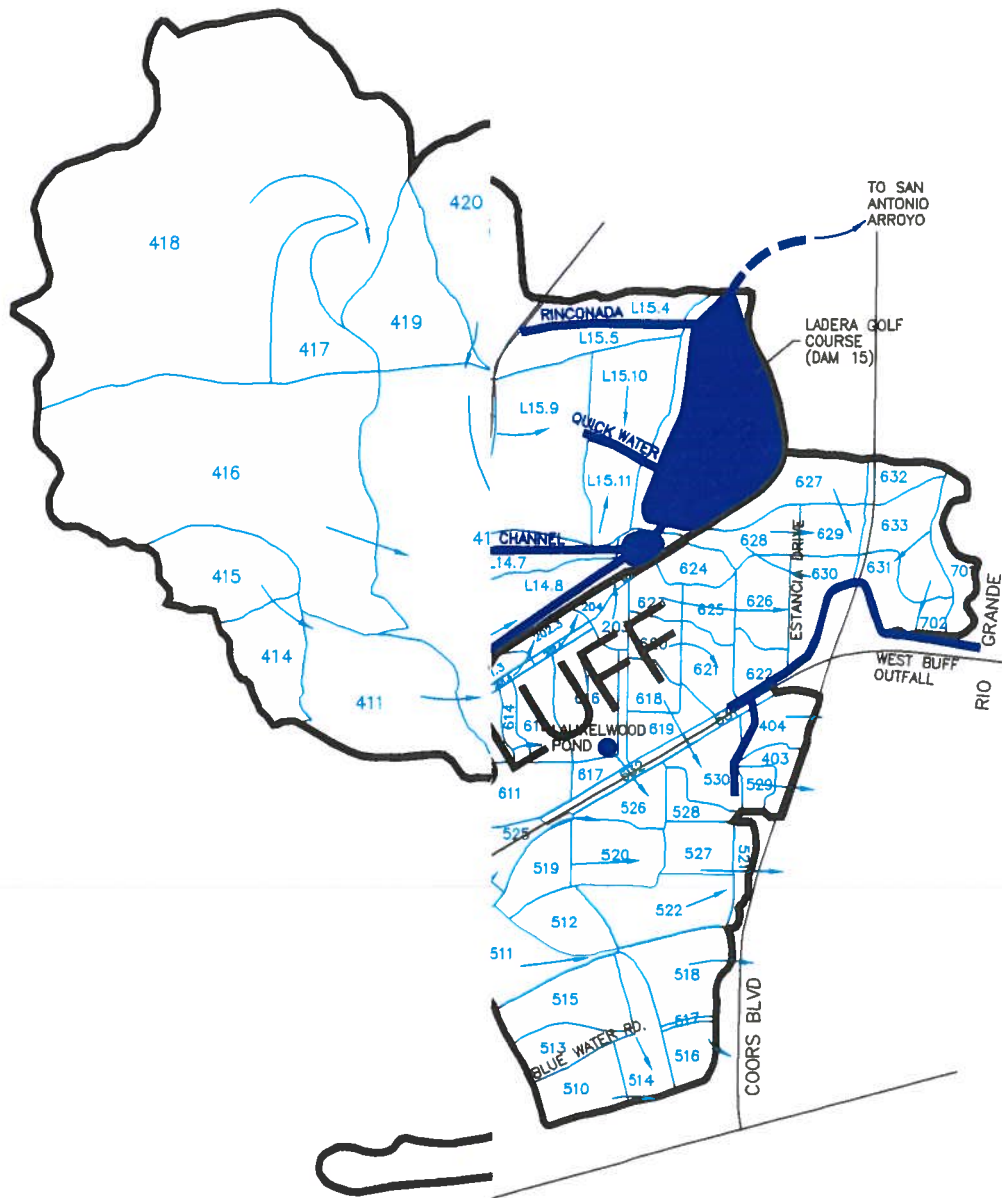
B. HYDROLOGY MODEL

Numerous hydrologic models were created with the development of the West I-40 DMP supporting each of the drainage management options. This hydrology report presents three models, the existing conditions, Option 2D and Option 3C.1 models.

1. Existing Conditions

'Existing' refers to the watershed as it appeared in 1996, with 1996 development levels and drainage improvements, as shown in Figure 3. The major drainage structures or arroyos in the existing model are:

- West Bluff Outfall from the Rio Grande to Estancia Drive
- Ladera Dams Zero through 15
- Mirehaven Diversion Channel from Dam Zero to Dam 1
- Mirehaven Diversion Channel between Dams 13 and 14
- Ladera Channel to Dam 14
- Laurelwood Pond
- Rinconada Channel to Dam 15
- Quickwater Channel to Dam 15



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**WEST I-40 DIVERSION DMP
DRAINAGE REPORT
FIGURE 3
EXISTING MODEL
MAY 1998**

FIGURE 3

- Undeveloped Mirehaven Arroyos discharging to Dam 12
- Undeveloped Amole Arroyos north of I-40

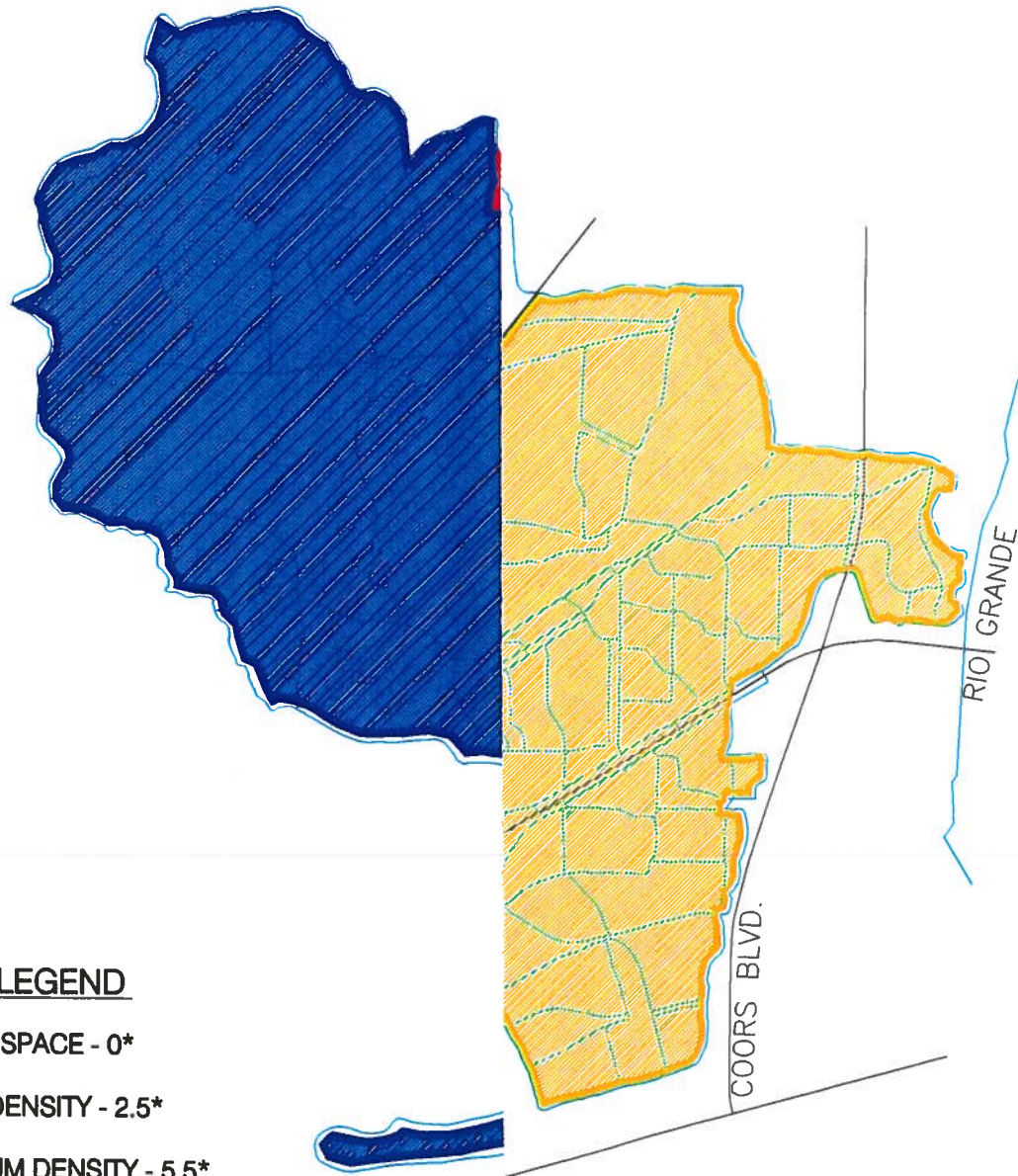
The AHYMO summary table for the existing conditions hydrology model is presented in Appendix D.

2. Developed Conditions Description







Two developed conditions were analyzed for this DMP. The first condition, Development Scenario 1, is guided by the 1991 Comprehensive Plan. The second condition, Development Scenario 2, is based on the Westland Sector Development Plan and the adopted **Amole-Westgate DMP**. The hydrology models for all of the drainage management options are based on Development Scenario 2, see figure 4.

3. Option 2D

Option 2D (Figure 5) is one of the preferred options because it diverts flows around the Monument, thus protecting the Monument. It accomplishes this diversion with a series of buried storm drains, rather than open channels, reducing the potential future constraints on development while also creating several opportunities for neighborhood parks and multi use facilities. Flow from the proposed Paseo Del Volcan Dam will be conveyed in a pipe through two Dams, the A2 Dam and the C Dam, to the D5 Dam. From this point, flow will be conveyed to Ladera Dam 5 via the Dam 5 Arroyo. These dams present opportunities to create ball fields and parks. Flows that enter the Petroglyph National Monument will be maintained at historic levels and follow their natural paths along Mirehaven A, B, and C Arroyos, in existing drainage easements, until the south east boundary of the Monument where an improved channel will convey the flow to Dam 12 of the Ladera system. Key flow rates and dam sizes for Option 2D, including trunk facilities, are provided in Tables 1 and 2, respectively. A summary of the hydrology model output for Option 2D is presented in Appendix E.



LEGEND

-  OPEN SPACE - 0*
-  LOW DENSITY - 2.5*
-  MEDIUM DENSITY - 5.5*
-  PER AMOLE DMP - 3 TO 5*
-  URBAN - 5*
-  HIGH DENSITY OR COMMERCIAL - UP TO 12*
-  WESTLAND SECTOR PLAN BOUNDARY
- *DWELLING UNITS/ACRE

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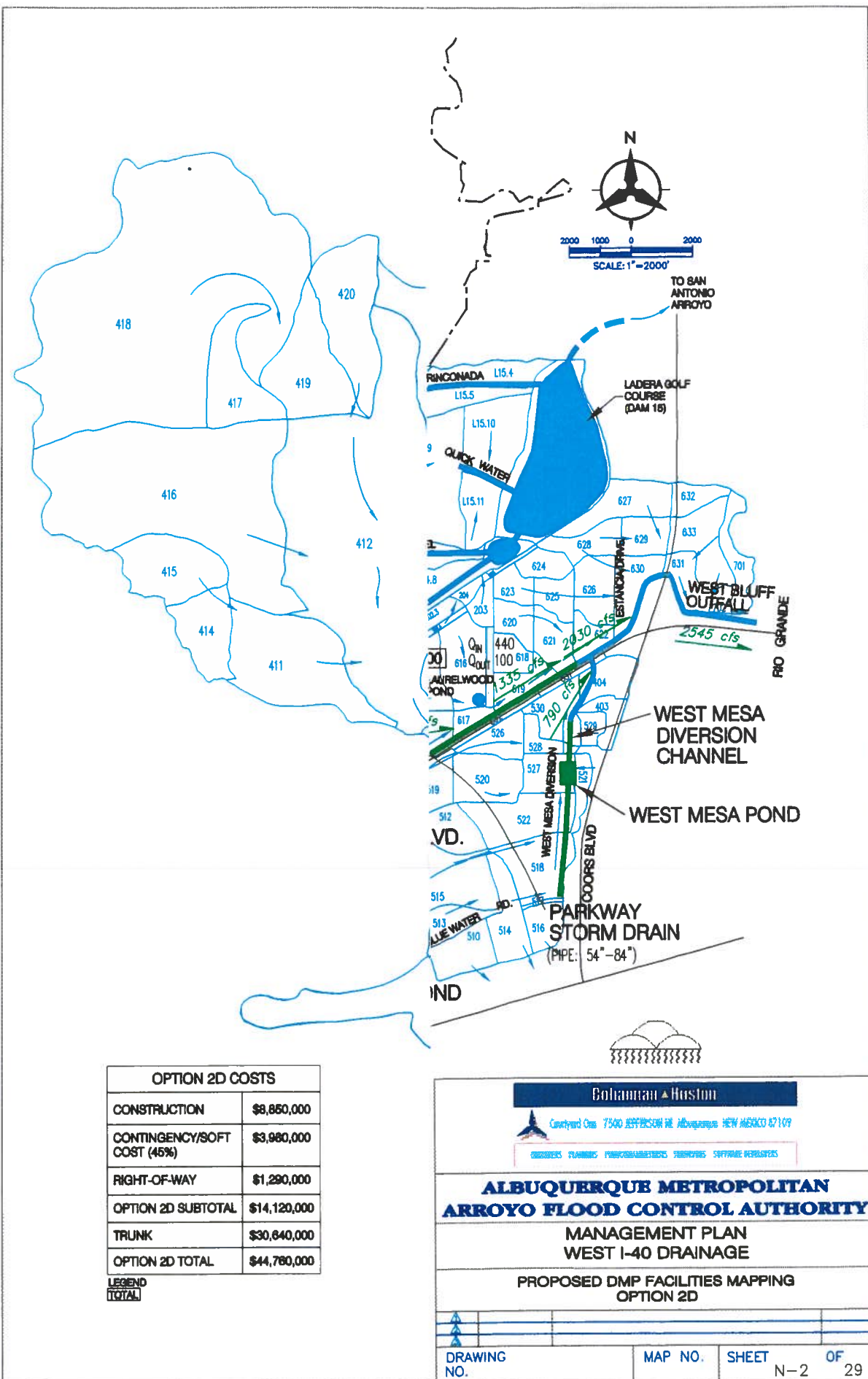


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WEST I-40 DIVERSION DMP
DRAINAGE REPORT
DEVELOPMENT SCENARIO 2
MAY 1998

FIGURE 4



4. Option 3C.1

Option 3C.1 (Figure 6) is one of the preferred options because it places fewer constraints on Westland's property upstream of the Monument. Option 3C.1 proposes to convey flows through the Monument using a series of buried storm drain that follow the natural path of the existing arroyos. Flow from the proposed Paseo del Volcan Dam is diverted to Mirehaven A2 Dam in a pipe and then diverted to Mirehaven Arroyo B. Mirehaven C flows are regulated by Mirehaven C Dam before entering the Monument. Flows are conveyed through the Monument along both Mirehaven B and Mirehaven C Arroyos in buried storm drains in existing drainage easements. These Mirehaven flows exit the Petroglyph Monument Boundary at the southeast boundary and are then conveyed in an improved channel to Ladera Dam 12.

Flow rates and dam sizes for Option 3C.1 are shown in Tables 1 and 2, respectively. Additional hydrologic information is included in the AHYMO model summary output in Appendix F.

5. Option 6A

Option 6A (Figure 7) represents the worst case (highest) flow rate and volume from either option 2D or 3C.1, with the exception of the two Amole Dams which are sized for existing conditions. By sizing facilities in the lower portion of the watershed for the worst case scenario, Option 6A satisfies immediate needs and the requirements of the adopted Amole Westgate and Amole Hubbell DMP's, without precluding future selection on either option 2D or 3C.1.

Despite using the worst case flow rate, the flow rates for Option 6A are not much greater in any instance than the lower flow rate from either Option 2D or 3C.1. This is due to the multiple detention facilities in the upper portion of the watershed in both option 2D and 3C.1. These facilities produce nearly identical developed flow rates for each option in the lower portion of the watershed. This is clearly illustrated in Table 1. Further, due to upstream detention proposed with both Options 2D and 3C.1, the flow rates to size conveyances for arroyos, such as the Mirehaven, between the Monument/Atrisco Terrace, and the Ladera Dams are

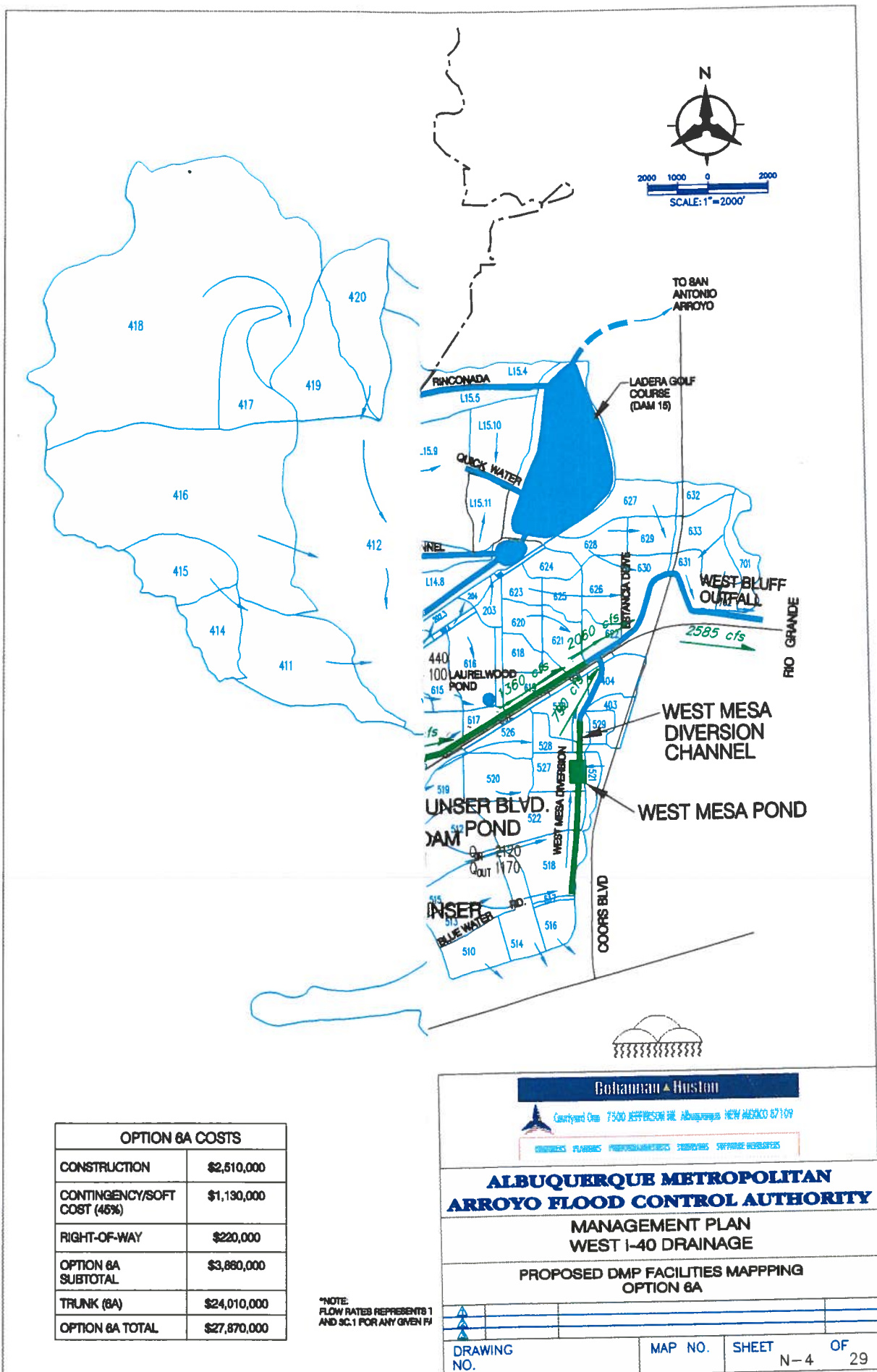


FIGURE 7

only slightly larger than existing conditions flow rates, plus sediment. This increase is due to the runoff from development of the area between the Monument/Atrisco Terrace and the Ladera Dams.

TABLE 1
SUMMARY OF KEY FLOW RATES

Description	Option 2D			Option 3C.1			Option 6A		
	Pipe/ Channel	Dam		Pipe/ Channel	Dam		Pipe/ Channel	Dam	
		In (cfs)	Out (cfs)		In (cfs)	Out (cfs)		In (cfs)	Out (cfs)
West Amole Dam	-	3880	250	-	3880	250	-	3880	250
Amole Diversion - West Amole Dam to Paseo del Volcan	665	-	-	665	-	-	665	-	-
Amole Diversion - Paseo del Volcan to East Amole Dam	1715	-	-	1715	-	-	1715	-	-
East Amole Dam	-	2650	300	-	2650	300	-	2650	300
Paseo del Volcan Dam	-	2060	300	-	2060	300	-	-	-
Petroglyph Diversion - Paseo del Volcan to A2 Dam	510	-	-	510	-	-	-	-	-
Mirehaven A2 Dam	-	510	265	-	510	265	-	-	-
Petroglyph Diversion - A2 Dam to C Dam	265	-	-	-	-	-	-	-	-
C Dam	-	1125	335	-	1290	260	-	-	-
Petroglyph Diversion C Dam to D5 Dam	340	-	-	-	-	-	-	-	-
D5 Dam	-	340	270	-	-	-	-	-	-
C1 and C2 Storm Drains	190 ea.	-	-	645 ea.	-	-	-	-	-
Dam 5 Arroyo	1135	-	-	1135	-	-	1135	-	-
Dam 1 Arroyo	745	-	-	745	-	-	745	-	-
Dam 0 Arroyo	460	-	-	460	-	-	460	-	-
A2 Dam Outfall - A2 Dam to Training Dike	-	-	-	450	-	-	-	-	-
Mirehaven Pipe from C Dam to Confluence	-	-	-	255	-	-	-	-	-
Mirehaven Channel from Confluence to National Monument Boundary	-	-	-	1325	-	-	-	-	-
Mirehaven Channel - Petroglyph National Monument to 98 th Street	1405	-	-	1495	-	-	1495	-	-
Mirehaven Channel - 98 th Street to Dam 12	1655	-	-	1650	-	-	1655	-	-
Ladera Dam 5 (Enlarge)	-	1145	320	-	1105	220	-	1145	320
Dam 5 Diversion from Ladera Dam 5 to I-40 Diversion	255	-	-	-	-	-	255	-	-
Ladera Dam 11 (Enlarge for 3C.1 and 6A)	-	-	-	-	290	45	-	290	45
Dam 12 Diversion from Ladera Dam 12	-	-	300	-	-	300	-	-	300
Parkway Storm Drain (Dam 12 Diversion)	555	-	-	615	-	-	615	-	-
I-40 Diversion: East Amole to 98 th Street	1805	-	-	1805	-	-	1805	-	-
I-40 Pond at 98 th Street	-	2120	765	-	2120	765	-	2120	765
I-40 Diversion Channel - 98 th Street to Unser Boulevard	1090	-	-	1090	-	-	1090	-	-
I-40 Pond at Unser Boulevard	-	1565	1170	-	1565	1170	-	1565	1170
I-40 Diversion Channel - Unser Boulevard to West Mesa Diversion	1350	-	-	1360	-	-	1360	-	-
Laurelwood Pond	-	440	100	-	440	100	-	440	100
West Mesa Diversion Pond	-	530	420	-	530	420	-	530	420
West Mesa Diversion Channel	255	-	-	255	-	-	255	-	-
West Mesa Diversion Channel Concrete Box Culvert	790	-	-	790	-	-	790	-	-
Confluence of I-40 and West Mesa Diversion Channel	2030			2060			2060		
West Bluff Outfall	2545			2585			2585		

what is actual

TABLE 2
SUMMARY OF PROPOSED DAM SITES

Description	Option 2D				Option 3C.1				Option 6A			
	Flow In (cfs)	Flow Out (cfs)	100 Yr. Water Surface Area	100 Yr. Storage Volume (ac-ft)	Flow In (cfs)	Flow Out (cfs)	100 Yr. Water Surface Area	100 Yr. Storage Volume (ac-ft)	Flow In (cfs)	Flow Out (cfs)	100 Yr. Water Surface Area	100 Yr. Storage Volume (ac-ft)
West Amole Dam	3880	250	-	600	3880	250	-	600	3880	250	-	136*
East Amole Dam	2650	300	-	270	2650	300	-	270	2650	300	-	60*
Paseo del Volcan Dam	2060	300	30	198.3	2060	300	30	198.3	-	-	-	-
Mirehaven A2 Dam	510	265	-	21.8	510	265	-	21.8	-	-	-	-
Mirehaven C Dam	925	335	-	42.5	1285	255	-	54	-	-	-	-
D5 Dam	340	270	-	102	-	-	-	-	-	-	-	-
Ladera Dam 1	1110	265	-	41 (was 30)	1110	265	-	41	1110	265	-	41
Ladera Dam 3	180	45	-	45.4 (was 29.7)	180	45	-	45.4	180	45	-	45.4
Ladera Dam 5 (Enlarge for All Options)	1145	320	-	37.8 (was 31.5)	1105	220	-	35.8	1145	320	-	37.8
Ladera Dam 11 (Enlarge for 3C.1 and 6A)	565	55	-	36.2 (was 29)	290	45	-	45.5	290	45	-	45.5
I-40 Pond at 98 th Street	2120	765	8	49	2120	745	8	49	2120	765	8	49
I-40 Pond at Unser Boulevard	1555	1170	6	44.4	1565	1165	6	44.4	1565	1170	6	44.4
West Mesa Diversion Pond	530	425	1	6.5	530	425	1	6.5	530	425	1	6.5

*Sized for existing conditions flows.

Different

III. CONCLUSION

The three preferred options represent the best options for drainage management within the West I-40 study area. These options are the result of years of analysis and refinement based on input from both the AMAFCA Board and the Tech Team.

Based on the inability of the two major landowners to reach an agreement concerning either Option 2D or 3C.1, Option 6A is the recommended option. This option addresses immediate and short-term drainage needs in the study area, while allowing the two majority landowners more time to reach an agreement with regard to management of drainage relating to the Monument.