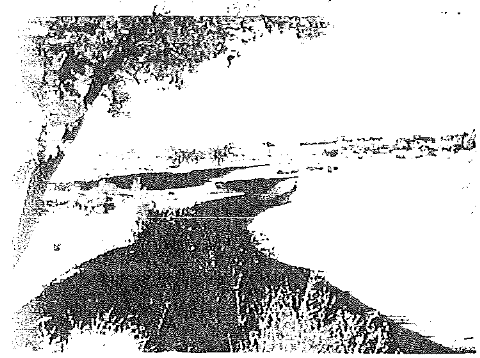
West I-40 Drainage Management Plan (DMP) Update



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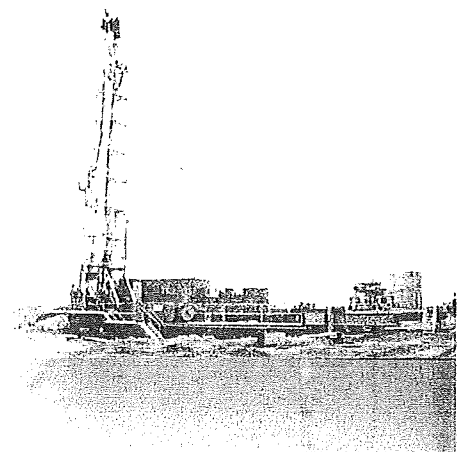
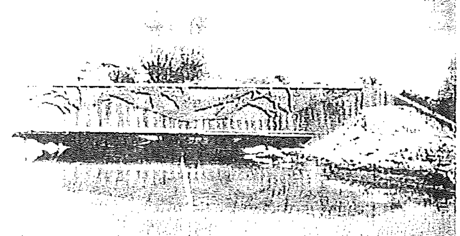




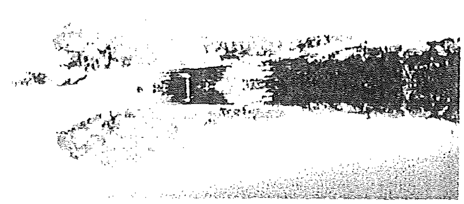
Prepared for:

Westland Development Co.

401 Coors Boulevard, NW

Albuquerque, NM 87121

Bohannan Huston



WEST I-40

DRAINAGE MANAGEMENT PLAN (DMP) UPDATE

December 2006

PREPARED BY:

BOHANNAN HUSTON INC.

COURTYARD ONE

7500 JEFFERSON NE

ALBUQUERQUE, NM 87109

B Sumrall 12/21/06

L. Brad Sumrall, P.E. Date

RESOLUTION 2006-9
ADOPTION OF WEST I-40 DRAINAGE MANAGEMENT PLAN
MODIFICATIONS 2006
FURTHER MODIFICATIONS OF THE DRAINAGE MANAGEMENT PLAN
AS IT PERTAINS TO THE AREA NORTH OF INTERSTATE 40 WEST OF COORS
BOULEVARD AND SOUTH OF THE PETROGLYPH NATIONAL MONUMENT

WHEREAS, in 1969 the City of Albuquerque purchased Right-of-Way for the sole purpose of maintaining an alignment for a drainage facility that would outfall to the Rio Grande at the West Bluff; and

WHEREAS, by Resolution 1975-8, the ALBUQUERUQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY, a political subdivision of the state of New Mexico, hereinafter called AMAFCA, adopted the Western Albuquerque Metropolitan Area Drainage Management Plan, acknowledging the City of Albuquerque's plan for an outfall to the Rio Grande and called for the construction of an I-40 Diversion Channel on the north side of I-40 from the Rio Grande to a point approximately 1800 feet west of Coors Boulevard in the vicinity of Estancia/Juniper Street intersection; and

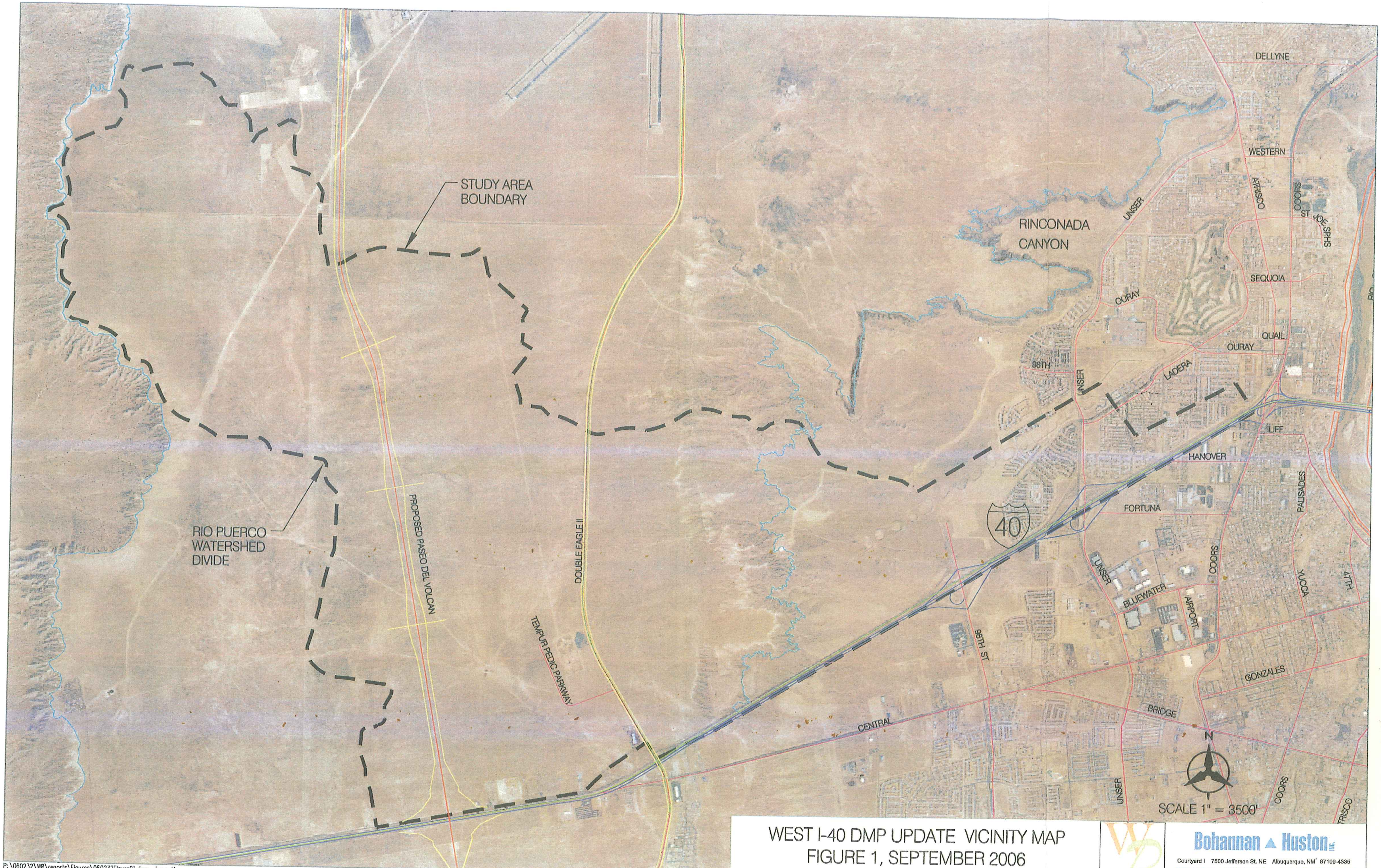
WHEREAS, by Resolution 1994-4, AMAFCA adopted the Amole/Westgate Drainage Management Plan by Scanlon & Associates and Debra Vaughan-Cleff, which identified capacity limitations at the Westgate Dam and proposed new dams on the east and west branches of the Amole Arroyo north of I-40 which would discharge to the proposed I-40 Diversion Channel; and

WHEREAS, in August of 1995, AMAFCA retained Bohannan-Huston, Inc., to prepare a Drainage Management Plan for the West I-40 area in order to optimize the use of the West Bluff Outfall, the Ladera system of dams and the future extension of the I-40 Diversion Channel; and

WHEREAS, in January of 1996, AMAFCA executed an Agreement with the City of Albuquerque to assume overall responsibility for completion the I-40 Diversion project, including Right-of-Way acquisition, construction of the West Bluff Phase IIA Project and preparation of a drainage management plan for the West Bluff, Amole north of I-40 and Ladera watersheds; and

WHEREAS, in July of 1999, the AMAFCA Board of Directors adopted the Amole-Hubbell Drainage Management Plan, prepared by Leedshill-Herkenhoff, Inc., which further confirmed the need for additional dams on the east and west branches of the Amole Arroyo north of I-40, discharging to a future West I-40 Diversion Channel; and

WHEREAS, In January of 2000, after numerous public meetings and discussions with the major land owners, the AMAFCA Board of Directors concluded that detailed planning efforts should be limited to the area generally east of the Atrisco Terrace and south and west of Petroglyph National Monument since consensus could not be reached on the best method to convey storm water flows originating west of the Petroglyph National Monument to the Ladera system and West I-40 Diversion Channel; and



WEST I-40 DMP UPDATE VICINITY MAP
FIGURE 1, SEPTEMBER 2006

Bohannan ▲ Huston Inc.
Courtyard I 7500 Jefferson St. NE Albuquerque, NM 87109-4335
ENGINEERING • SPATIAL DATA • ADVANCED TECHNOLOGIES

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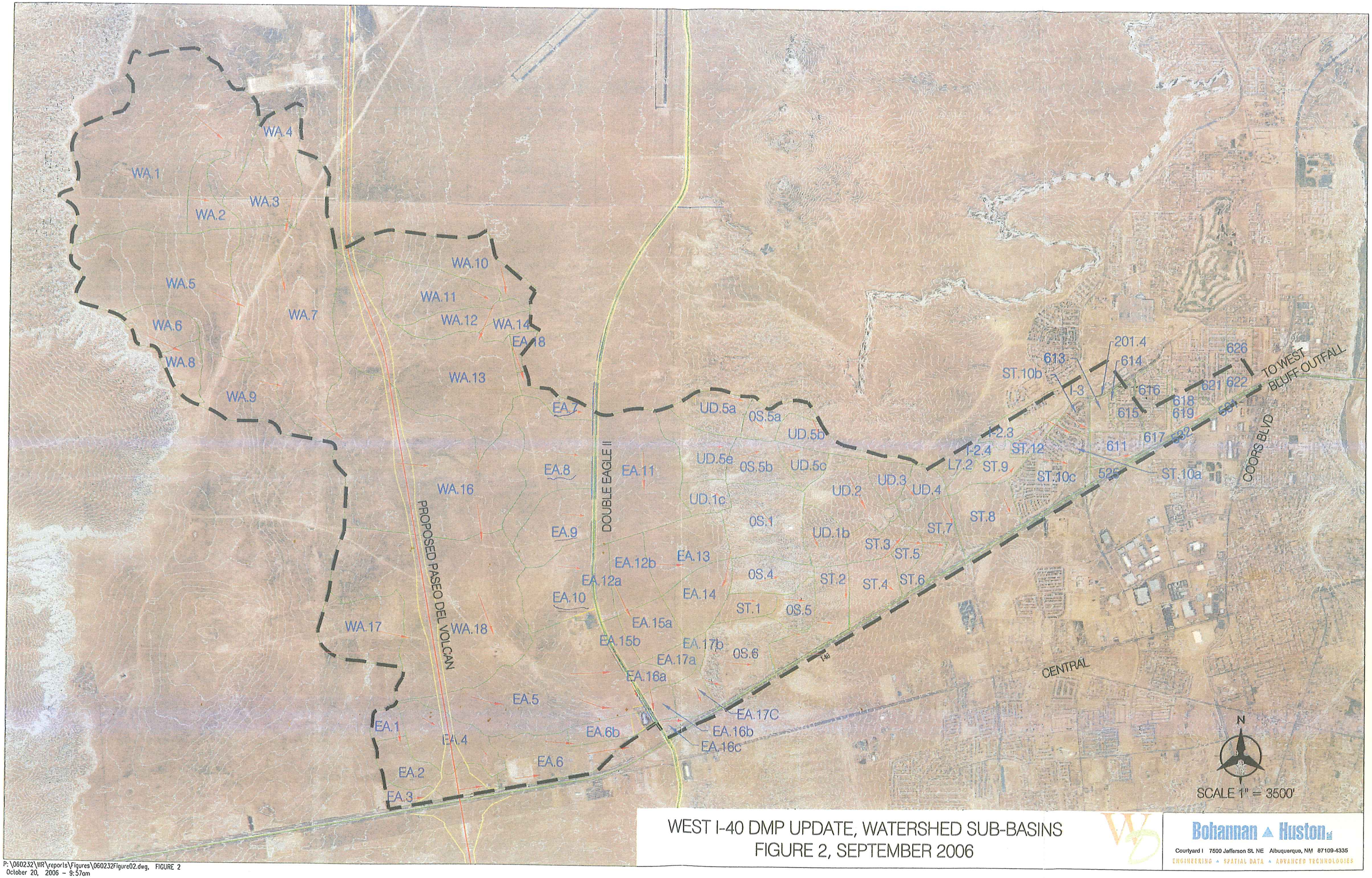

WEST I-40 DMP UPDATE, WATERSHED SUB-BASINS
FIGURE 2, SEPTEMBER 2006

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WHEREAS, on June 29, 2000, the AMAFCA Board of Directors adopted Resolution 2000-8 Modifying the West I-40 Drainage Management Plan (West I-40 DMP (2000)) that identifies regional and local drainage infrastructure within the I-40 Corridor; and

WHEREAS, the West I-40 DMP (2000) identifies a drainage diversion west of Paseo del Volcan east to the Rio Grande that serves several purposes at both the regional and local level, intercepting storm flows from drainage basins north of I-40 and preventing said flows from discharging under the interstate; and

WHEREAS, AMAFCA and the New Mexico Department of Transportation have coordinated drainage, transportation improvements along the north side of Interstate 40, between Coors Boulevard and Paseo del Volcan; and

WHEREAS, AMAFCA coordinated the plans for the West I-40 Phase III Diversion Channel with the New Mexico Department of Transportation and has acquired right-of-way necessary for the West I-40 DMP drainage project up to 98th Street; and

WHEREAS, the New Mexico Department of Transportation coordinated the plans for the I-40 / Coors Interchange with AMAFCA and has continued to coordinate with AMAFCA on three successive construction projects associated with the GRIP I-40 Corridor from Central to Coors including: I-40 from Central to 98th Street (CN G1313), I-40 from 98th Street to Coors (CN G1323), and the West Central Interchange (I-40 and Paseo del Volcan/Central Ave.) (CN G4013), collectively known as the New Mexico Department of Transportation's "GRIP I-40 PROJECTS"; and

WHEREAS, Westland Development Co. Inc., a majority landowner north of the I-40, has retained Bohannan Houston Inc. (BHI) to modify the West I-40 DMP (2000) to address current development design in the area. This drainage analysis has been reviewed by AMAFCA which includes modifications to the original West I-40 DMP (2000) which are technically feasible. Such document is known as the West I-40 DMP (2006); and

WHEREAS, the West I-40 DMP (2006) has identified trunk storm water diversion facilities within the GRIP I-40 PROJECTS; and

WHEREAS, the New Mexico Department of Transportation participation in the West I-40 DMP (2006) facilities will avoid having to extend drainage crossing structures under the reconstructed I-40 cross-section described in the GRIP I-40 PROJECTS; and

WHEREAS, diverting storm flows into West I-40 DMP (2006) facilities will direct New Mexico Department of Transportation storm flows into an existing AMAFCA system of storm water quality best management practices for storm water treatment, cleaning all debris and trash from storm water to the maximum extent practicable, before said storm flows enter the Rio Grande.

NOW THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY:

1. The improvements recommended by the West I-40 Drainage Management Plan 2006, prepared by Bohannan-Huston, Inc., dated October 26, 2006 are hereby adopted, subject to the following:

   a. Option 6.A identified in the West I-40 DMP (2000) is the selected option with conveyance of storm water flows around or through the Petroglyph National Monument to be determined at a later date. The conveyance of storm water flows around or through the Atrisco Terrace or Petroglyph National Monument shall be in general compliance with either Option 2.B or Option 3.C.1 as detailed in said Drainage Management Plan with regards to detention volumes and allowable flow rates.

   b. Conveyance of storm water flows within and above the Atrisco Terrace and Petroglyph National Monument will take into account the said Drainage Management Plan, Westland Master Plan, the Petroglyph National Monument General Management Plan and other planning documents in effect at the time of future development.

   c. Modifications to the adopted plan may be made as circumstances dictate, but shall be approved by the AMAFCA Board of Directors.

   d. The Drainage Management Plan utilizes various criteria to establish general project priorities from a technical perspective. These do not necessarily reflect the priorities to be used by the Board of Directors for funding and construction. Specific projects, if any, will be funded and scheduled by AMAFCA Board action based on evaluation of public safety needs, cost sharing benefits, orderly development of flood control infrastructure, overall community needs and regional planning requirements.

   e. The Drainage Management Plan identifies drainage and flood control infrastructure necessary to provide protection to the community from storm water runoff. The adoption of this plan does not imply a commitment on the part of AMAFCA Board of Directors to build any or all of said facilities. Financing and scheduling of improvements are subject to the availability of public funds and to initiatives by the private sector.

2. The adoption of this Resolution modifies Resolution 2000-8 and any other previous Resolutions or actions by the AMAFCA Board of Directors regarding the area north of I-40 and west of Coors Boulevard.

PASSED, ADOPTED AND APPROVED this 16th day of November, 2006.

Tim Eichenberg, Chairman 2006-9

Daniel F. Lyon, Secretary / Treasurer

- The 98th Street and Unser Ponds, required to regulate flows from adjoining developed areas into the I-40 diversion system
- The proposed Ladera Dam 5 Arroyo and Ladera Dams 5 and Dam 0. Dam 5 will regulate flows into the Ladera Dam system while Dam 0 will regulate incoming flows from other areas; both ultimately drain to the Ladera Golf Course Dam (Ladera Dam 15).

Today existing conveyance structures allow storm water to flow from north to south under the Intestate. The mainstay of the West I-40 DMP (BHI, 2000), is to intercept flows and divert them into an I-40 conveyance system thereby protecting areas south (downstream) of the Interstate which have limited drainage conveyance and storage capacity.

Many options and system modifications regarding the overall drainage system (I-40 conveyance system) were analyzed given recent changes in downstream infrastructure and to reflect development since 2000 while working to provide a detailed analysis of routing and detention facilities to optimize efficiencies in the drainage system. Significant changes to storage elements of the previously adopted system include:

- Diversion of East Amole watershed basins down the face of the escarpment into Dam 0 of the Ladera Dam system thereby reducing the detention volume and sizes of storm drain along the length of the I-40 diversion system
- Relocation of the East Amole Dam from its historic discharge point eastward, thereby minimizing construction costs by optimizing storage and providing additional environmental benefits
- Incorporation of surge ponding requirements in watersheds within future development areas in the West Amole system
- Addition of the 98th Street Surge Pond to attenuate peak flows emanating from developed watersheds west of 98th Street below the escarpment and providing a reduced pipe size required by NMDOT to minimize potential impacts to the 98th Street overpass piles within the NMDOT right-of-way
- Addition of a dam at the relocated Paseo del Volcan interchange
- Provide the opportunity for potential storage within future roadway right-of-way.

These changes enhance the operation of the entire storm drainage system with the goal of reducing construction costs, and enhancing flood protection for areas unable to effectively drain south of the Interstate.

II. METHODOLOGY

Hydrologic modeling was performed using the Arid Lands Hydrologic Model (AHYMO, Aug 97) in accordance with the City of Albuquerque Development Process Manual Section 22.2. This model requires inputs for basin area, land treatments related to pervious and impervious area, routing, precipitation, and to peak.

A. Precipitation

The design storm for this study was the 24-hour, 100-year event. The rainfall parameters originally came from the Amole-Westgate DMP, and were also used in the West I-40 DMP (BHI, 2000). Both of these studies were approved by AMAFCA. The West I-40 DMP (BHI, 2000) used three different rainfalls: Amole watershed, Ladera watershed above Dam 12, and Ladera watershed dam below Dam 12 including the West Bluff. Rainfall depths used are summarized in Table 1.

Table 1 – Rainfall Depths for Design Storm Events

Precip Duration	AMOLE WATERSHED			LADERA WATERSHED BELOW DAM 12 AND WEST BLUFF			LADERA WATERSHED ABOVE DAM 12		
	2yr	10yr	100yr	2yr	10yr	100yr	2yr	10yr	100yr
15 min	-	-	-	-	-	-	-	-	-
1 hr	0.73	1.24	1.87	0.76	1.25	1.9	0.69	1.16	1.76
6 hr	0.95	1.47	2.2	0.96	1.47	2.2	0.93	1.43	2.14
24 hr	1.15	1.77	2.66	1.15	1.77	2.65	1.13	1.74	2.60

B. Basin Delineation

Orthophoto topographic maps using a 10-foot contour interval, and the Westland Master Plan were used to adjust basin boundaries created in the previous West I-40 DMP (BHI, 2000). Basin boundaries were digitalized in AutoCAD®, and the digital map was used to determine the sub-basin sizes. Basins originally delineated for the West I-40 DMP were modified to reflect changes to existing and proposed land development boundaries where known. Since completion of the West I-40 DMP in 2000, significant development has occurred between 98th Street and Unser Boulevard. The new development includes residential sub-divisions along with new drainage infrastructure, creating new analysis points for basin delineation in this area. Basins within developed areas were adjusted to more accurately follow existing drainage paths. Little development has occurred west of 98th Street with the exception of the 300-acre Cordero Mesa Business Park, which includes the Tempur Pedic manufacturing facility on Double Eagle II Road, and the Shamrock Foods distribution facility currently under construction. In areas without development, streets and zoning divisions proposed in the Westland Master Plan were used to define basins as shown in Figure 3. Basins west of the Westland Master Plan area that contribute to the West Bluff outfall were left as historically found in the 2000 version of the West I-40 DMP.

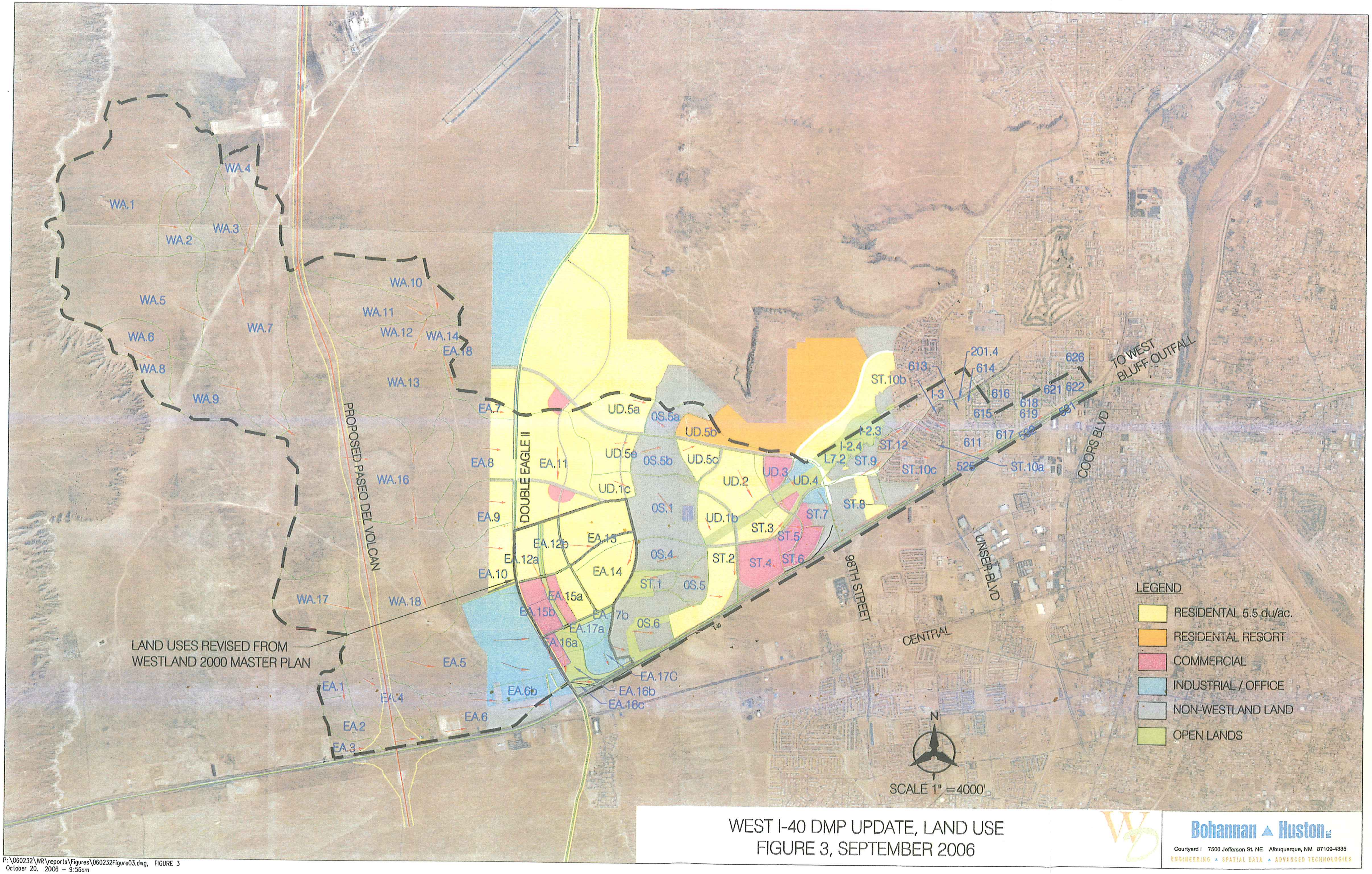
C. Land Treatments

Land treatments were assigned to sub-basins based on proposed land usage according to the procedure outlined in the COA Development Process Manual, Section 22.2. Land treatment percentages were established by land use occurring in a basin relative to the Westland Master Plan (see Figure 3). The proportion of treatments A, B, and C in undeveloped open areas were determined from existing Bernalillo County aerial mapping generated by BHI in 2004. Table 2 shows land treatment percentages relative to land use type based on zoning categories. A full list of land treatments used for each basin is included in the Appendix.

Table 2 – Land Treatments by Land Use Category

Land Treatment	*Residential 5.5 du/ac*	*Resort*	*Commercial C-1*	*Town Center TC*	*Industrial Park IP*	*Parks PARK/OL*
A	0%	0%	0%	0%	0%	5%
B	25%	35%	5%	5%	10%	40%
C	25%	35%	5%	5%	10%	40%
D	50%*	30%	90%	90%	80%	15%

* Includes parks and internal open space



WEST I-40 DMP UPDATE, LAND USE
FIGURE 3, SEPTEMBER 2006

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For areas west of the Westland Master Plan area where no land use designation is established, a weighted average of overall land use type from the master plan was created. The West I-40 DMP (BHI, 2000) assumed 5 dwelling units per acre for areas west of Double Eagle II Road (existing Paseo del Volcan). The weighted average method adopted for this update resulted in a distribution of 14.5% A, 21.6% B, 21.6% C and 42.3% D for the majority of the West Amole Watershed.

D. Routing

The Muskingum-Cunge method was used for all flow routing, consistent with previous studies in the area, and in accordance with locally adopted policy. Basin routing was adjusted from the previous model relative to creation of new conveyance infrastructure and revised basin boundaries. In areas where future development is not yet formally planned, particularly the West Amole watershed, open channels were used for routing purposes instead of storm drains. Formal development plans and design of local conveyance systems may permit other options in the future. Otherwise, storm drain and detention facilities were modeled consistent with the West I-40 DMP (BHI, 2000).

Basins west of the Westland Master Plan area were routed through six-foot deep lined trapezoidal channels with a ten foot wide bottom and 2 to 1 side-slopes. A Manning's "n" value of 0.022 was applied within all proposed channels to allow for flexibility in future design decisions in choosing lining types other than concrete. In other areas with defined land uses, reinforced concrete pipe (RCP) was selected as the most reasonable means of conveyance underground.

Three different routing scenarios were evaluated through the modeling process. The first, a free discharge scenario, was conducted to determine the necessary facilities to convey the flow assuming that all development will be allowed free discharge. Reducing the size of the detention ponds within the I-40 diversion system was the main consideration in this scenario.

The second scenario, an "optimized condition," was evaluated to help mitigate high peak flow rates affecting conveyance and detention facilities downstream. Many basins in the watershed, not yet developed, were planned to construct surge ponds in the future. Within the hydrologic model, a DIVIDE HYD command was inserted sending 75% of the base hydrograph into the conveyance system while the remaining 25% peak portion was detained in localized facilities.

The surge pond scenario is intended to embrace the opportunity for sustainable design through the use of techniques including localized detention ponding and catchments, infiltration basins, multi-use facilities accepting infrequent saturation, and other innovative means. Table 3 summarizes the basins for which flows were reduced using a surge pond.

Table 3 – Optimized Basis – Surge Ponds Included

Watershed	Basins Affected
West Amole	WA.1 WA.2 WA.3, WA.4, WA.5, WA.6, WA.7, WA.8, WA.9, WA.10, WA.11, WA.12, WA.13, WA.14, WA.16, WA.17, WA.18
East Amole	EA.1, EA.2, EA.3, EA.4, EA.7, EA.8, EA.9, EA.10, EA.11, EA.12A, EA. 12B, EA.13, EA.14, EA. 15A, EA.15B, EA.17A, EA.17B, EA.17C, EA.18
Upper Dam 5	UD.1B, UD.1C, UD.2, UD.5A, UD.5C, UD.5E
Southern Terrace	ST.2A, ST.2B

The third and final scenario evaluated carried the surge pond model forward with two significant adjustments. One adjustment was to relocate the East Amole Dam farther eastward into basin ST.2. The other change is the proposed relocation of the West Amole Dam, south of its location in the West I-40 DMP (BHI, 2000), a topographically more suitable site. However, the West Amole Dam can move farther up the West Amole arroyo to optimize maintenance efficiency of facilities and development as long as runoff from basins below the dam does not exceed downstream facility capacity. A minor item accommodated in this model was to allow historic flows to continue southward under the Interstate at the East Amole Arroyo and West Amole Arroyo crossings. These flows serve to fulfill requirements of Section 404 of the Clean Water Act administered by the Corps of Engineers. Basins EA.1, 2, 3, 4, 17 and a portion of 6 may be allowed to continue southward under the Interstate and EA 17 will discharge through the East Amole box culverts.

E. Runoff Flow Concentration - Time to Peak

Time to peak (Tp) values were calculated using the SCS Upland Method as prescribed in the COA DPM Section 22.2. Specific values for each basin Tp are included in the Appendix.

F. Sediment Bulking

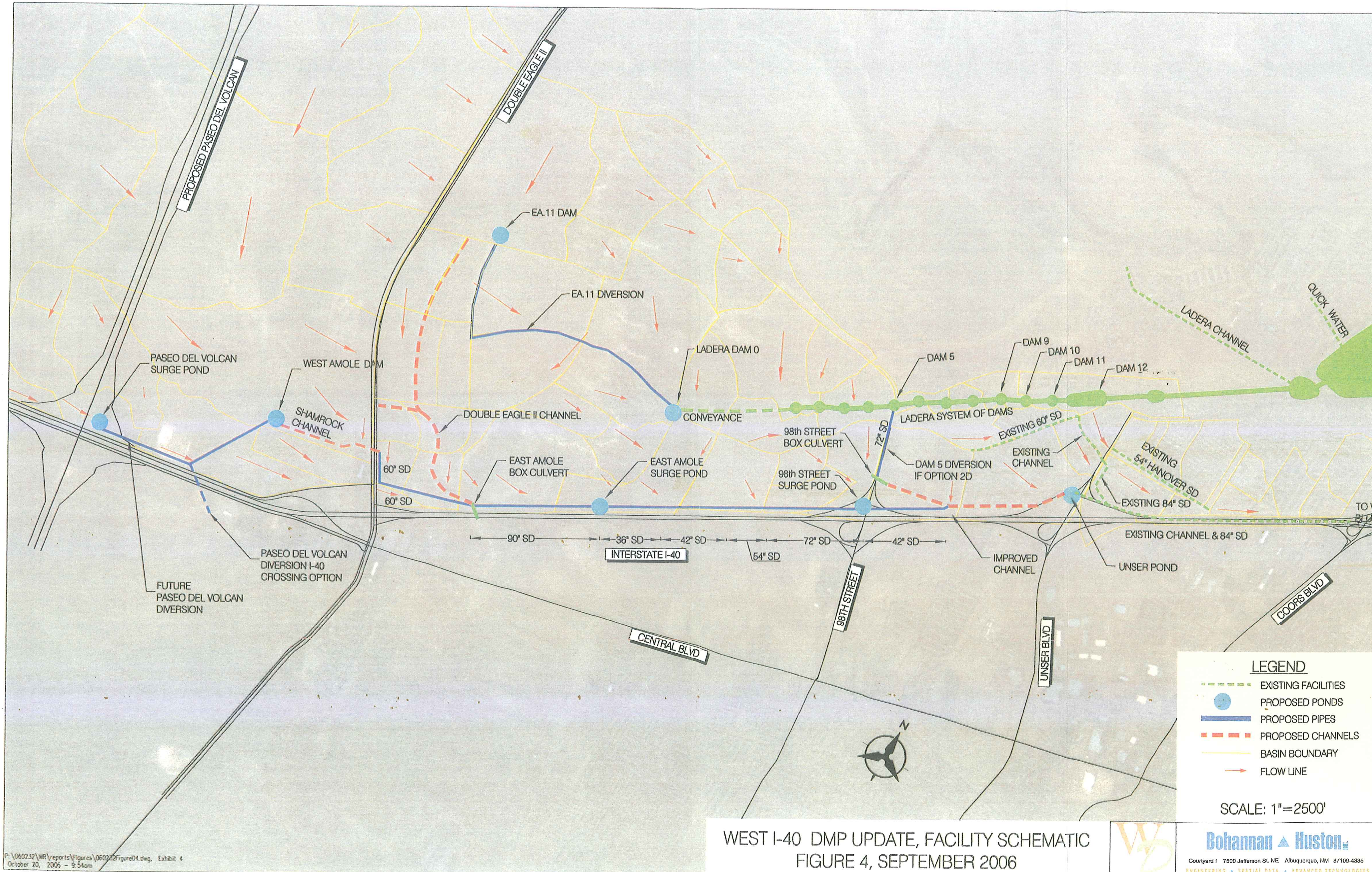
Sediment bulking parameters were originally developed by Mussetter Engineering, Inc. (MEI), and reported in "Analysis of Existing Conditions Sediment Yields and Detention Dam Trap Efficiencies, April 1996 (Volume IV)." The MEI study estimated sediment yield, sediment trapping, and bulking factors for dams in the Ladera system. The results from the MEI study were used in the West I-40 DMP (BHI, 2000), and have been carried over to this study. A uniform rate of 2.5% bulking was applied to all developed basins within the study area.

III. HYDROLOGY

This study constitutes an update to the West I-40 DMP (BHI, 2000); therefore existing conditions hydrology was not considered as it was analyzed previously. This update modeled basins based on proposed fully-developed conditions in response to changes in the study area already discussed. In general, runoff will flow from west to east and discharge from the study area at the West Bluff Outfall. Many of the drainage facilities included in the model do not currently exist but were included as recommendations to ensure safe and efficient operation of the conveyance system Proposed structures include the West Amole Dam and coupled Shamrock Channel, the East Amole Surge Pond, the future Paseo del Volcan detention pond and diversion (basins EA.1 through EA.4), the I-40 Storm Drain Diversion system, the 98th Street Surge Pond, the diversion of flow from East Amole basins into Ladera Dam 0, and related storm drains required to permit systemic operation. The 118th street pond was modeled as part of the process but later excluded given the relocated East Amole Dam served to reduce flows previously requiring this dam as described in the West I-40 DMP (BHI, 2000). Specifics of developed condition flows, detention, and conveyance are discussed in the following sections.

A. West Amole Watershed

The discharge point of the West Amole watershed is the proposed West Amole Dam. The West Amole watershed is approximately 9.5 sq miles in area, all of which drain efficiency to the proposed dam. Figure 4 shows the proposed conceptual locations of planned facilities. However the West Amole Dam may be moved up or down the West Amole arroyo to optimize efficiency, maintenance of facilities, and development in the future. The West Amole watershed's existing conditions are undeveloped, and no significant master planning exists. Consequently, basins were assumed to have the land treatment distributions discussed in Section 11.C. The one exception is the north.



WEST I-40 DMP UPDATE, FACILITY SCHEMATIC
FIGURE 4, SEPTEMBER 2006

end of the watershed, in a portion of basins WA.1 through 4 and a portion of WA.7 which encompasses the shooting range and is expected to remain as predominantly open space.

The natural drainage pattern of this area is from the northwest to the south-southeast. There are five historical playas in the watershed which help attenuate peak flows. These playas preserved in the developed conditions model are expected to serve as localized ponding within open space when development occurs. Location and configuration can be modified to optimize efficiency and maintenance of facilities and development. In the previous West I-40 DMP (BHI, 2000), the playas were not used to attenuate flow, and were not able to contain much of the developed flows within the basins. The volume within each playa was below a threshold that AHYMO recognized as a significant feature. Due to the large amount of runoff from the surrounding watersheds, the playas were modified by including a weir, helping to attenuate flow peaks through regulated discharge. Weir calculations for the playas are included in the Appendix. Under developed conditions, the outlet of the West Amole dam is diverted east through the Shamrock channel and downstream conveyance to the West I-40 system east of the Double Eagle II interchange (Figure 4). This flow along with local flows from the East Amole watershed ultimately discharges into the East Amole Surge Pond.

B. East Amole Watershed

The East Amole watershed encompasses approximately 5.5 square miles of area directly east of the West Amole watershed, and constitutes mesa top that historically drained southward. In the previous version of the DMP, the East Amole watershed flowed southward into the proposed East Amole dam located approximately 2,000 feet east of the Double Eagle II interchange. A new location for the East Amole dam was selected farther east in an area more suitable for construction of a large storage pool and dam embankment. The new location is approximately 4,000 feet farther east of the previous location in basin ST.2.

The relocated East Amole dam now operates as a surge pond and manages flows from approximately 1.5 square miles of the East Amole Watershed north of and along I-40 in addition to the outflow from West Amole Dam. Outflow from the West Amole dam is combined with the runoff from a portion of the East Amole watershed and discharges into the East Amole Surge Pond. At present, the only significant development in this area is the existing Tempur-Pedic facility and the Shamrock Foods facility now under construction, both located with Cordero Mesa Business Park.

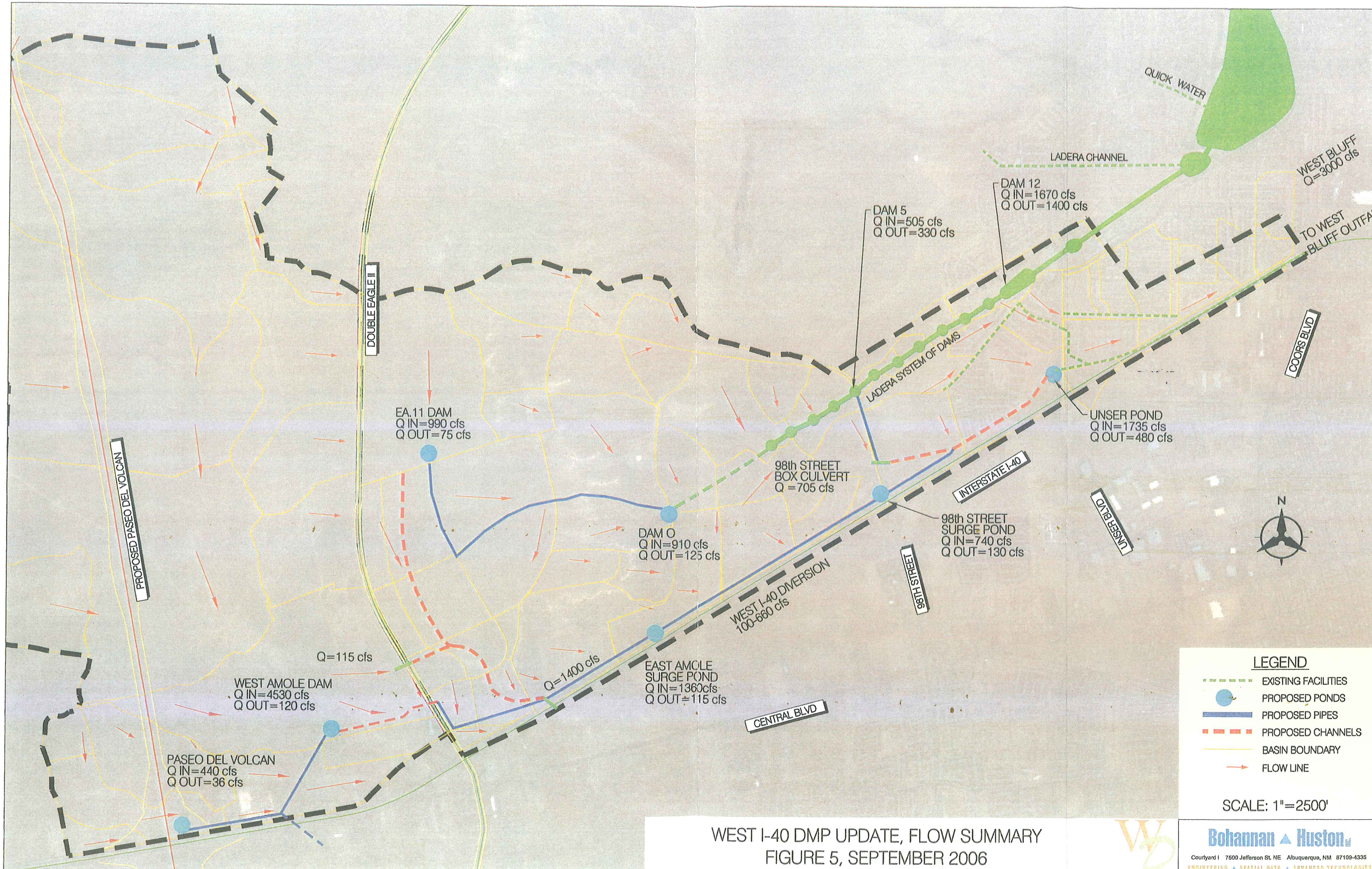
The Westland Master Plan extends eastward from just west of the Double Eagle II Road, providing a basic land use layout for basins in the East Amole watershed east and west of the road. Flow is conveyed through channels and pipes along proposed roads within the planned development. The East Amole Surge Pond ultimately discharges into the I-40 diversion, which conveys the outflow through the 98th Street and Unser Dam, to the West Bluff outfall. The following sub-sections describe specific aspects of watershed management that affect the operation of the overall West I-40 diversion.

1. Double Eagle II – Future PDV Diversion

In the previous West I-40 DMP, basins EA.1 through EA.6 flowed southward through culverts traversing I-40 and into the West Amole watershed south out of the study area. To reduce flooding south of I-40, this study diverted these basins into a pipe parallel to I-40, adding an additional 0.76 square miles to the study area. Runoff from basins EA.1 through EA.3 and the western half of EA.4 is detained in the proposed Paseo del Volcan interchange surge pond. This surge pond is slated to discharge either into the West Amole dam or south under the intestate following it's historic route. The Paseo del Volcan surge pond serves to intercept flows west of the proposed Paseo del Volcan interchange thereby reducing the flow and impacts to development south of the interstate and permitting flexibility for ultimate discharge scenarios.

2. EA.11 Diversion to the Ladera Dam System

Flow within the East Amole watershed basins west of the Double Eagle II roadway flow eastward through basin EA.11 and are detained in a proposed dam (EA.11 Dam) located in the southern portion of basin EA.11 and then diverted through a series of storm drains down the face of the escarpment into the Ladera Dam system. Flows are conveyed south through basin EA.13 and eastward across the escarpment to the proposed expansion of Dam 0 as shown in Figure 4. This pipe also intercepts runoff generated in basin EA.13. By diverting this flow, the existing Ladera system is optimized and pipe sizes and ponding facilities in the I-40 system are reduced.



WEST I-40 DMP UPDATE, FLOW SUMMARY
FIGURE 5, SEPTEMBER 2006

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C. Open Space Areas

The Open Space (OS basins) area is comprised of the watersheds that lie within the transition from the developed areas of the upper terrace of the East Amole watershed to the lower lying watersheds below the escarpment. They are appropriately called Open Space through their conveyance to the City of Albuquerque by Westland several years ago. These areas are fairly steep, sloping from west to east and provide a unique geologic window into the soil strata that comprise the West Mesa above. These areas will remain undeveloped and serve as wildlife habitat, public use areas, and as a geologic window as viewed from Downtown and areas east of the Rio Grande. Detention of flows within these areas creates standing water for interim periods, thereby improving wildlife habitat and enhancing local aquifer recharge.

The Open Space basins were delineated using natural topographic divides. The proposed extension of Ladera between OS.4 and OS.1 serves as the divide for these two basins. According to their natural flow patterns, OS.5a, OS.5b, OS.1, and OS.4 flow into Upper Dam 5 of the Ladera system. Open space basin OS.5 flows into the Southern Terrace watershed system while OS.6 discharges directly to the relocated East Amole surge pond.

D. Upper Dam 5 Watershed

The Upper Dam 5 watershed includes areas north of the Ladera Dam system that contribute flow to this series of dams and includes, as a worst case scenario, portions of the southern extent of Petroglyph National Monument. This Update does not make any recommendation as to options 2D or 3C.1 of the West I-40 DMP (BHI 2000). Part of this area is planned for residential and commercial development. Basins in this Upper Dam 5 watershed are denoted with a "UD" prefix. Ladera Dams 6 through 15 were not reanalyzed in this study except as discussed below, but are included in the AHYMO model.

The AHYMO analysis developed by BHI for the Storm Cloud CLOMR and outlined in the approved "Amendment No. 1 Stormcloud Subdivision Drainage Report" dated November 10, 2005 was inserted for this revision. This analysis found that under developed conditions, Dams #9, #10, and #11 were undersized and recommended improvements to Dams #9 and #10. The recommended improvements include expanding the storage pool of each dam and installing orifice plates to the primary spillways. The proposed improvements to Dams #9 and #10 would provide 1 foot of freeboard for each dam and alleviate the need to increase the size of Dam #11. The drainage report also demonstrated that the dams have adequate capacity to accommodate the Stormcloud subdivision but that improvements will be required when the basins upstream of the subdivision are developed. For purposes of this DMP revision, the developed conditions AHYMO model, which includes the improvements to Dams #9 and #10, was included to allow accurate modeling of the collective system downstream of Unser Boulevard. However, Dam 12 may require expansion in the future to accommodate fully developed conditions. Additional analysis may be necessary to assess interim conditions and determine the point of which expansion of Dam 12 is needed. Dam 12 has sufficient capacity for current existing conditions.

Initial flows into Dam 0 include OS.1 and OS.4 and flow diverted from portions of the East Amole watershed as previously described. The pond outflow is routed through basin UD.1b and into the rest of the Ladera system. Runoff from basins UD.2, UD.3, and UD.4 were evenly divided into the dams directly downstream. Two significant adjustments to the previous model are described below.

1. **Improved Dam 0**

Dam 0 was included in the previous West I-40 DMP (BHI 2000) and is part of the Ladera system. Dam 0 currently acts as a diversion for flow into the Ladera system, but is not large enough to detain runoff or significantly attenuate flow. This study proposes enlarging Dam 0 to manage runoff from basins UD.1c, OS.1, OS.4, which have a combined area of approximately 0.59 sq. miles. It will also accept flow from the East Amole watershed as described above. The enlargement of Dam 0 to detain approximately 30 acre-feet of runoff enables effective operation of the entire West I-40 diversion system once the diversion from the EA.11 pond is completed and flows from on top of the escarpment are conveyed eastward.

2. **Petroglyph Diversion**

The West I-40 DMP included an option to divert flow around the Petroglyph National Park into the Dam 5 arroyo. To create a conservative model, the Petroglyph diversion from the West I-40 DMP was included in this study. This ensures that effective operation of the downstream system does not get undersized by excluding the Petroglyph

Diversion. The diversion empties into basin UD.5a and runs through the escarpment into the Dam 5 Arroyo. The opportunity to allow developed flows to cross the Petroglyph Monument in the future exists. There were provisions made in the West I-40 DMP (BHI, 2000) that allowed flows from this area to continue through the Petroglyph National Monument similar to historic conditions. Alternative 2D shows a conveyance scenario that intercepts the Dam 5 arroyo. This Update does not make any recommendation as to Option 2D or 3C.1 of the West I-40 DMP (BHI, 2000).

E. Southern Terrace Watershed

The Southern Terrace watershed (ST basins) extends from the eastern edge of the East Amole watershed and parallels I-40 below the Ladera Dam system. Covering approximately 2.1 square miles, it terminates at the east end of the study area. This watershed includes areas with existing and planned development and accepts runoff from open space basin OS.5. Flow within this area is allowed free-discharge directly to the I-40 diversion system.

1. Dam 5 Diversion

The Dam 5 diversion is proposed in the West I-40 DMP under adopted Option 6a. It is included in this analysis to ensure that I-40 facilities are conservatively modeled as previously discussed. The Dam 5 diversion allows 65 cfs of the peak of the hydrograph to discharge under 98th street through the existing principle spillway and discharge into Dam 6. The rest of the Dam 5 outflow is directed down 98th Street in a proposed 72-inch storm drain which discharges into the West I-40 diversion system. In the previous West I-40 DMP (BHI, 2000), a pond was proposed north of the 98th Street interchange to intercept the 72-inch storm drain. This pond is no longer necessary, due to the proposed East Amole Surge Pond and Improved Dam 0. However, the 98th Street Surge Pond located within the interchange is required to reduce peak discharge rates in the storm drain main given constraints in the capacity of the system downstream at the Unser pond location.

2. Unser Pond

The Unser Pond accepts local flows from sub-basins ST.8, ST. 9, ST.10, ST.12, and the West I-40 diversion. This facility serves to attenuate the peak flow from the adjacent basins, and reduces the later hydrograph peak carried by the diversion system.

Basins ST.8, ST.9, ST.10, and ST.12 are developed residential sub-divisions. Basin ST.10 is divided into three subbasins, ST.10a, ST.10b, and ST.10c. Only ST.10c flows into the Unser Dam while subbasins ST.10a and ST.10b discharge through a storm drain under Unser Blvd. and into the Parkway, and Hanover Storm Drain systems respectively.

3. East of Unser Blvd.

Land east of Unser Blvd. is already developed and has been previously modeled by Wilson & Company as part of the design for the recent extension of the I-40 channel to Unser Blvd. This section of the current model was inserted to incorporate changes to the routing scenario. This includes routing of flows from Ladera Drive collected from basins south of Ladera, east of Unser and north of the interstate. A portion of basin ST.10, basins ST.10a and ST.10b, west of Unser is routed through the Parkway Channel and into an 84-inch pipe which discharges into the West I-40 channel terminating at the West Bluff outfall.

IV. MODELING RESULTS

Three model scenarios, free discharge, optimized with surge ponds, and a revised optimized model reflecting the relocated East Amole Dam showed differences in conveyance and detention facility sizes. A description of the three modeling scenarios and summary tables showing the differences are shown below. Table 4 and Figure 5 show flow results at significant points within the watershed while Table 5 contrasts facility sizes required for storage and conveyance.

A. Free Discharge

The free discharge analysis maximized facilities to accommodate the fully developed flow without any localized surge ponds or other detention facilities other than use of historic playas. All proposed detention facilities were smaller than those outlined in the previous West I-40 DMP although the Ladera Dam system now detains more runoff than before. This is likely due to changes in land treatments and modified routing for several main basin areas as previously noted. Table 4 shows each proposed detention facility, future conditions peak flows, storage volume requirements, peak discharge rates, and the time to peak for these outflows.

Table 4 Facility and Flow Comparison Between Model Iterations

		Revised West I-40 DMP				*Optimized West I-40 DMP*				*Free Discharge West I-40 DMP*				*West I-40 DMP (BHI,2000)*			
RESERVOIRS Location	Flow Source	Influent Q (cfs)	Stored Volume* (ac-ft)	Peak Discharge* (cfs)	Time to Peak (hr)	Influent Q (cfs)	Stored Volume* (ac-ft)	Peak Discharge* (cfs)	Time to Peak (hr)	Influent Q (cfs)	Stored Volume* (ac-ft)	Peak Discharge* (cfs)	Time to Peak (hr)	Previous Influent Q (cfs)	Previous Volume (ac-ft)	Previous Peak Discharge (cfs)	Time to Peak (hr)
West Amole Dam	All of West Amole Watershed	4,531	335	117	5	4,151	349.28	31	21	5,925	425.51	227	5	3670.44	599.2939	249.73	6
Southern Side of E.11	EA.7, EA.8, EA.9, EA.11	987	29	73	13	932	54.40	73	3	1,244	61.62	225	3	N/A	N/A	N/A	N/A
East Amole Dam	All of East Amole Watershed	1,301	154	116	25	2,073	133.81	129	4	2,280	262.52	225	20	2562.21	265.53	297.14	9
Pond #0	OS.1, UD.1a, UD.1b, OS.4	907	22	115	12	907	31.53	95	3	1,043	79.84	75	6	458.51	2.54	380.52	2
Dam 5 Arroyo Pond	OS.5ab, UD.5ae	613	91	282	13	613	91.08	282	13	773	91.83	283	13	338.20	84.67	268.19	13
Pond #5	dam 5 arroyo, pond #4 UD.4	503	34	329	16	503	33.60	332	15	550	33.66	333	15	1144.63	33.19	321.10	2
Pond #12	dam 5 arroyo, pond #4 UD.11	1,671	59	1397	2	1,657	58.73	1334	2	1,657	58.73	1334	2	1602.83	58.17	1162.08	2
98th Pond	all basins west of 98th	738	29	129	2	967	15.75	682	2	975	29.33	476	17	2047.13	43.24	774.01	2
Unser Pond	all basins west of Unser Blvd.	1,735	44	481	2	946	42.76	476	2	887	42.62	475	18	1440.28	41.31	1157.83	2

		Revised West I-40 DMP					*Optimized West I-40 DMP*					*West I-40 DMP (BHI,2000)*
CHANNELS Location	Flow Source	Channel Discharge (cfs)	Bottom Width (ft)	Channel Depth (ft)	Flow Depth (ft)	Channel Slope (ft/ft)	Channel Discharge (cfs)	Bottom Width (ft)	Channel Depth (ft)	Flow Depth (ft)	Channel Slope (ft/ft)	
Double Eagle II interchange to EA Intake Structure	East Amole Watershed, OS.6	1404	10	8	5.9	0.005	2029.59	10	6	5	0.047	Pipe previously proposed
I-40 from 98th to 90th	98th street dam	807	10	6	3.1	0.017	682.24	10	10	2.29	0.016	
I-40 from 90th to Unser	I40 and ST.8	1232	10	6	3.8	0.017	804.57	10	10	2.5	0.016	

** n= 0.022 used for all modeled channels*

		Revised West I-40 Revision			*Optimized West I-40 DMP*		
STORM DRAIN Location	Flow Source	Influent Q (cfs)	Slope (ft/ft)	Max Flow (cfs)	Influent Q (cfs)	Slope (ft/ft)	Max Flow (cfs)
42" south to 72"	EA.11, EA.7, EA. 8, EA.9	-	-	-	73	0.005	76.53
72" east to escartment	EA.11, EA.13	308	0.007	376	308.45	0.0068	375.67
54" pipe from 72" to Dam 0	EA.11, EA.13	306	0.028	354	306.34	0.028	353.97
36" pipe from EASP to 42"	EASP	116	0.016	79	-	-	-
42" pipe downstream to 54" pipe	EASP, ST.2a	169	0.035	175	-	-	-
54" pipe downstream to 72" pipe	ST.2b	330	0.036	401	-	-	-
72" pipe 54" to 98th Surge Pond	ST.4a	570	0.023	691	-	-	-
72" pipe from ST.4b to 98th Street	ST.4b	703	0.018	611	-	-	-
72" SD south on 98th to CBCs	Dam 5 Div, St.3	266	0.005	322	269.38	0.005	322.14

Table 5 Model Scenario Facility Comparison

Facility	Revised West I-40 DMP	Optimized Revision	Free Discharge	Relocated East Amole Dam	West I-40 DMP (2000)
West Amole Dam	335 ac-ft pond w/ 36" primary spillway	350 ac-ft pond w/18" primary spillway	426 ac-ft pond w/ 48" primary spillway	334 ac-ft pond w/36" primary spillway	136 ac-ft pond w/ 48" primary spillway
West Amole Diversion - Shamrock Channel	36" to 60" Pipe connecting to West Central channel	84" Pipe	84" Pipe	None required - direct connection to Shamrock Channel	66" Pipe & 5' deep channel
DE II Channel	5'-8- deep channel	-	-	-	-
Shamrock Channel - Shamrock SD to East Amole	Earth-lined channel 30 foot bottom with 3'H:1'V side slopes	Earth-lined channel 30 foot bottom with 3'H:1'V side slopes	84" pipe & 5' deep channel	Earth-lined channel 30 foot bottom with 3'H:1'V side slopes	7' deep channel
Relocated PdVolcan to Double Eagle II	60" increasing to 66" storm drain	66-inch increasing to 84-inch storm drain	72" increasing to 90" storm drain	66-inch to 84-inch	-
Double Eagle II Pond	Replaced with PDV pond	42 ac-ft pond w/ 24" pipe spillway	53 ac-ft pond w/ 30" pipe spillway	42 ac-ft pond w/ 24" pipe spillway	-
Storm Drain – Double Eagle II to East Amole Dam	pipe/channel	96-inch storm drain	Channel	90-inch storm drain	-
East Amole Dam	186 ac-ft surge pond w/ 36" pipe controling outflow. Located east of county landfill	125 ac-ft pond w/ 48" pipe spillway, historic location	263 ac-ft pond w/ 54" pipe spillway, historic location	122 ac-ft pond w/ 48" pipe spillway, relocated east of County landfill	266 ac-ft pond w/ 48" pipe spillway, historic location
Storm Drain - East Amole to 118th Street	36 to 42" pipe	48" to 60" pipe	60 to 66" pipe	48" pipe	54 to 90" Pipe (from East Amole to 98th Street
118th Street Pond	Not Required	35 ac-ft with 48" pipe spillway	60 ac-ft pond w/ 48" pipe spillway	Not required	-
Storm Drain - 118th Street to 98th Street	54 to 72" Pipe	60 to 66" Pipe	66 to 72" Pipe	48" transition to 60" pipe at basin ST.4	-
98th Street Pond	31 ac-ft surge pond w/ 42" pipe controled outfall	17 ac-ft with 2-78" pipe spillway	30 ac-ft pond w/ 90" pipe spillway	Not required	49 ac-ft pond w/4-4' x 5' CBC's spillway
Channel - 98th Street to Unser Pond	5' deep channel	5' deep channel	5' deep channel	5' deep channel	5' deep channel
Unser Pond	44 ac-ft pond w/2-4'x6' CBC's spillway	41 ac-ft pond w/2-4'x6' CBC's spillway	43 ac-ft pond w/2-4'x6' CBC's spillway	55 ac-ft pond w/2-4'x6' CBC's spillway	44.4 ac-ft pond w/4-4'x6' CBC's spillway

B. Optimized Watershed – Surge Pond Scenario

Requiring surge ponds for all future development greatly reduced the flows throughout the I-40 system. With the exception of Unser pond, ponds and conveyances were reduced significantly in size. The area contributing to the Unser pond is already developed thereby eliminating the installation of surge ponds. In addition, the proposed 98th Street Pond and the previously planned 118th Street Ponds were both reduced in size. Reductions to pond discharge rates also permitted reductions in pipe sizes.

C. Optimized Watershed – Surge Pond Scenario with Relocated Facilities

The final version of the model adopted for future conditions includes the surge pond requirement for basins proposed for development in the distant future, with relocated major facilities including the East Amole Surge Pond and the 98th Street Surge Pond. The following discussion and tables reflect this final model configuration; hereafter referred to as the Optimized condition.

1. Relocated East Amole Dam

The historic proposed location for the dam was just east of the Double Eagle II interchange where the historic East Amole arroyo crosses the interstate. The new location for the dam is approximately 4,200 feet to the east, at the eastern side of basin OS.6. This location better suits a dam pool and embankment given local topographic conditions. This change requires construction of larger storm drain to convey flows from the historic proposed location eastward along the interstate into the surge pond, however it reduces the pipe sizes below the surge pond, and overall, results in a more efficient drainage system.

2. West Amole Watershed

As currently modeled the West Amole watershed contains six reservoirs, five of which are existing playas with outlet controls, while the sixth structure is the West Amole Dam. The new West Amole Dam location is more conducive to grading activities and removes the need for additional conveyance from the dam outlet to the Shamrock Channel. This change affects the storage requirement because a larger portion of EA.5 is captured by the dam. In the optimized model, before relocation of the West Amole Dam, EA.5 was split with a portion of the flow discharging directly to the Shamrock Channel. Relocating the dam intercepts about half of these flows at the dam. However, the West Amole Dam location can move up or down the West Amole arroyo to better fit development in the future.

Peak runoff into the West Amole dam increased from the West I-40 DMP for both the free discharge and the optimized analysis. This change is likely due to several significant differences between the 2000 DMP model and this update, which influence the peak runoff rates including:

- Changes in anticipated land development with a reduction in the overall amount of impervious coverage
- Routing in constructed channels as opposed to natural land form conveyance
- Controlled outlets on the playas, and
- Requiring surge ponding in the upstream watershed to reduce peak runoff rates

Runoff rates and volumes in the optimized condition reflect the weighted land treatment application described previously. Routing in the West I-40 DMP model (BHI, 2000) utilized natural swales with modifications to the Manning's roughness factor to reflect some form lining with no change in the cross-section in the future. Current routing was redefined to reflect a constructed channel condition with a Manning's "n" value of 0.022 to allow for opportunities for alternative lining materials outside of the standard concrete lining option which implies a Manning's "n" value of 0.013. Controlled discharge through weirs in the existing playas also affects runoff rates and volumes.

The existing condition historic flows from the West Amole watershed must be addressed in advance of development in that area, as the diversion into the I-40 system affects the downstream infrastructure. The unconstrained flow rate of 680 cfs from the watershed is much larger than the controlled West Amole dam discharge rate of 117 cfs planned for future conditions. Therefore, consistent with recommendations in the West I-40 DMP (BHI, 2000), the West Amole Dam must be sized to control historic conditions. As determined in the West I-40 DMP (BHI, 2000), the required storage volume necessary for historic runoff is 140 ac-ft. With development, the revised drainage model shows the need to detain approximately 335 Ac-ft. The peak discharge from the West Amole basin must be limited to approximately 115 cfs primarily to limit its impact on the downstream system.

3. East Amole Watershed

The East Amole Surge Pond receives discharge from the West Amole Dam, and basins draining directly into the historic East Amole Arroyo. Within the context of the free discharge analysis, the storm drainage system was sized to convey the flow of the fully developed watershed. Table 4 which contrasts the free discharge, optimized "surge pond" condition, and the relocation of the East Amole Dam shows overall changes to storage and conveyance requirements. By optimizing and relocating the dam, the capacity needed for the East Amole Dam was reduced by 80 ac-ft to 186 ac-ft from 266 ac-ft as originally proposed in the previous West I-40 DMP (BHI, 2000).

4. Southern Terrace Watershed

The Southern Terrace Watershed flows directly into the I-40 diversion system. There are two key ponds along this system, 98th Street, and Unser pond. Under the initial free discharge model, a third ponding facility at 118th Street was proposed. The free discharge analysis required detention volumes of 60 ac-ft and 30 ac-ft for the 118th Street and 98th Street ponds respectively to prevent overwhelming the 60 ac-ft storage volume in the Unser Pond. The optimized revision reduced these volumes such that the 98th Street Dam decreased from 40 to 33 ac-ft and the 118th Street Dam was removed entirely. The 98th Street pond was chiefly affected by runoff peaks from the surrounding development rather than upstream discharge as can be seen by influent time to peak. Localized ponding in these developments would greatly reduce these flows. The relocation of the East Amole Dam eliminated the need for the 118th dam given the flow peaks were also attenuated in the 98th Street Surge Pond and the Unser Dam downstream. Detailed analysis of the Ladera Dam system showed Dam 3 has the potential to be removed. Analysis of this option shows that the Ladera system is able to accommodate this change but no longer meets the one foot freeboard requirement. This requirement can be met by increased localized ponding in the surrounding development or increasing storage in Dams 4 and 5.

5. Upper Dam 5 Watershed

The Upper Dam 5 watershed portion of the model was not changed from the previous West I-40 DMP other than decreasing overall runoff as a result of the surge pond condition. Surge ponds within the proposed resort areas will serve as a sustainable amenity suitable to support landscape irrigation, open space vegetation, roadside plantings, and other such areas. Flow from this system discharges southward into Ladera Dam 5. From there 65 cfs is conveyed into Ladera Dam 6. If the option to divert flows around the Petroglyph Monument is selected the remainder of the flow, exceeding the amount that can be conveyed to Ladera Dam 6,would require a 72-inch storm drain along 98th Street. This storm drain would discharge into the existing box culverts on 98th Street just north of the interchange and enter the West I-40 system. In this scenario, a peak flow of 265 cfs discharges from Dam 5 southward in the 72-inch storm drain.

V. CONCLUSION

The West I-40 drainage system has been thoroughly analyzed and the final system configuration suitable to support sustainable development determined. The relocation of the East and West Amole Dams, the requirement for surge ponding, and the flow diversion from East Amole watershed basins into the Ladera Dam system are recommended to ensure effective operation of the comprehensive facility network. In addition, intercepting flows that historically discharged southward under Interstate 40 is still a sound practice as proposed in the previous West I-40 DMP.

APPENDIX

LAND TREATMENT CALCULATIONS

West I-40 DMP Revision

Basin	Area (ac)	Area (sqmi)	%A	%B	%C	%D	Total
WEST AMOLE WATERSHED							
WA.1	925.6	1.45	73.04%	11.97%	3.66%	11.33%	100.00%
WA.2	91.8	0.14	53.31%	15.21%	9.71%	21.76%	100.00%
WA.3	121.8	0.19	53.70%	15.15%	9.59%	21.56%	100.00%
WA.4	130.7	0.20	78.56%	11.06%	1.97%	8.41%	100.00%
WA.5	546.6	0.85	0.00%	10.00%	10.00%	80.00%	100.00%
WA.6	101.8	0.16	0.00%	10.00%	10.00%	80.00%	100.00%
WA.7	744.5	1.16	18.82%	20.89%	20.28%	40.01%	100.00%
WA.8	71.4	0.11	0.00%	22.00%	22.00%	56.00%	100.00%
WA.9	192.5	0.30	0.00%	24.70%	24.70%	50.60%	100.00%
WA.10	218.4	0.34	0.00%	10.00%	10.00%	80.00%	100.00%
WA.11	216.8	0.34	0.00%	10.00%	10.00%	80.00%	100.00%
WA.12	89.1	0.14	0.00%	10.00%	10.00%	80.00%	100.00%
WA.13	623.3	0.97	0.00%	17.80%	17.80%	64.40%	100.00%
WA.14	38.0	0.06	0.00%	10.00%	10.00%	80.00%	100.00%
WA.15	22.4	0.03	0.00%	12.25%	12.25%	75.50%	100.00%
WA.16	890.4	1.39	0.00%	25.00%	25.00%	50.00%	100.00%
WA.17	200.0	0.31	0.00%	18.46%	18.46%	63.09%	100.00%
WA.18	879.3	1.37	0.00%	19.84%	19.84%	60.32%	100.00%
TOTAL	*6104.4*	*9.54*					
EAST AMOLE WATERSHED							
EA.1	37.5	0.06	0.00%	10.00%	10.00%	80.00%	100.00%
EA.2	143.5	0.22	0.00%	10.00%	10.00%	80.00%	100.00%
EA.3	37.5	0.06	0.00%	10.00%	10.00%	80.00%	100.00%
EA.4	176.4	0.28	0.00%	10.00%	10.00%	80.00%	100.00%
EA.5	568.5	0.89	0.00%	10.00%	10.00%	80.00%	100.00%
EA.6b	66.1	0.10	0.00%	10.00%	10.00%	80.00%	100.00%
EA.7	48.7	0.08	0.00%	25.00%	25.00%	50.00%	100.00%
EA.8	272.7	0.43	0.00%	25.00%	25.00%	50.00%	100.00%
EA.9	163.8	0.26	0.00%	25.00%	25.00%	50.00%	100.00%
EA.10	197.5	0.31	0.70%	26.70%	26.70%	45.90%	100.00%
EA.12a	71.7	1.31	0.00%	25.00%	25.00%	50.00%	100.00%
EA.12b	59.3	0.00	0.00%	25.00%	25.00%	50.00%	100.00%
EA.13	175.8	0.10	0.00%	25.00%	25.00%	50.00%	100.00%
EA.14	134.6	0.11	0.00%	25.00%	25.00%	50.00%	100.00%
EA.15a	52.9	0.09	0.00%	20.00%	20.00%	60.00%	100.00%
EA.15b	111.1	0.27	0.00%	5.00%	5.00%	90.00%	100.00%
EA.16a	34.1	0.21	25.62%	15.25%	15.25%	43.88%	100.00%
EA.16b	35.9	0.08	38.17%	20.27%	20.27%	21.29%	100.00%
EA.16c	13.7	0.17	0.00%	5.00%	5.00%	90.00%	100.00%
EA.17a	47.0	0.05	10.97%	13.29%	13.29%	62.45%	100.00%
EA.17b	13.8	0.06	13.48%	14.04%	14.04%	58.44%	100.00%
EA.17c	53.1	0.02	0.00%	10.00%	10.00%	80.00%	100.00%
TOTAL	*2515.3*	*5.16*					

LAND TREATMENT CALCULATIONS

West I-40 DMP Revision

Basin	Area (ac)	Area (sqmi)	%A	%B	%C	%D	Total
OPEN SPACE							
OS.5a	68.0	0.11	50.00%	25.00%	25.00%	0.00%	100.00%
OS.5b	98.5	0.15	50.00%	25.00%	25.00%	0.00%	100.00%
OS.1	219.3	0.34	50.00%	25.00%	25.00%	0.00%	100.00%
OS.3	129.1	0.20	30.00%	65.00%	5.00%	0.00%	100.00%
OS.4	101.8	0.16	15.00%	75.00%	10.00%	0.00%	100.00%
OS.5	60.2	0.09	45.00%	30.00%	25.00%	0.00%	100.00%
OS.6	203.4	0.32	45.00%	30.00%	31.41%	19.23%	125.64%
TOTAL	*880.2*	*1.38*					
SOUTHERN TERRACE AREA							
ST.1	51.9	0.08	5.00%	40.00%	40.00%	15.00%	100.00%
ST.2a	29.3	0.05	0.00%	22.36%	22.36%	55.27%	100.00%
ST.2b	79.8	0.12	0.00%	22.77%	22.77%	54.45%	100.00%
ST.3	71.8	0.11	0.00%	15.00%	15.00%	70.00%	100.00%
ST.4a	78.2	0.12	0.00%	5.00%	5.00%	90.00%	100.00%
ST.4b	34.6	0.05	0.00%	5.00%	5.00%	90.00%	100.00%
ST.5	30.5	0.05	0.00%	5.00%	5.00%	90.00%	100.00%
ST.6	34.5	0.05	0.00%	5.00%	5.00%	90.00%	100.00%
ST.7	82.4	0.13	0.00%	5.00%	5.00%	90.00%	100.00%
ST.8	149.8	0.23	0.71%	27.14%	27.14%	45.01%	100.00%
ST.9	65.5	0.10	0.00%	25.00%	25.00%	50.00%	100.00%
ST.11	64.0	0.10	0.00%	25.00%	25.00%	50.00%	100.00%
ST.10a	31.0	0.05	0.00%	25.00%	25.00%	50.00%	100.00%
ST.10b	25.9	0.05	0.00%	25.00%	25.00%	50.00%	100.00%
ST.10c	26.9	0.28	10.36%	25.00%	25.00%	39.64%	100.00%
ST.11	345.0	0.54	0.00%	25.00%	25.00%	50.00%	100.00%
ST.12	30.9	0.05	0.00%	25.00%	25.00%	50.00%	100.00%
TOTAL	*1231.9*	*2.17*					
UPPER DAM 5 WATERSHED							
UD.5a	99.4	0.16	0.00%	25.00%	25.00%	50.00%	100.00%
UD.1c	56.2	0.09	0.00%	25.00%	25.00%	50.00%	100.00%
UD.5e	119.7	0.19	0.00%	25.00%	25.00%	50.00%	100.00%
UD.5d	171.6	0.27	0.00%	25.00%	25.00%	50.00%	100.00%
UD.5b	84.2	0.13	0.00%	35.00%	35.00%	30.00%	100.00%
UD.5c	54.4	0.09	0.00%	25.00%	25.00%	50.00%	100.00%
UD.1a	48.2	0.08	0.73%	27.18%	27.18%	44.93%	100.00%
UD.2	168.1	0.26	5.57%	16.11%	16.11%	62.20%	100.00%
UD.1b	81.0	0.13	1.01%	28.03%	28.03%	42.93%	100.00%
UD.3	51.7	0.08	0.00%	11.68%	11.68%	76.64%	100.00%
UD.4	70.0	0.11	22.57%	16.62%	16.62%	44.19%	100.00%
UD.9	40.9	0.06	36.92%	25.00%	25.00%	13.08%	100.00%
UD.10	56.3	0.09	50.00%	25.00%	25.00%	0.00%	100.00%
UD.11	81.1	0.13	45.90%	25.00%	25.00%	4.10%	100.00%
TOTAL	*1182.9*	*1.85*					

Assumptions:

* Basins along OS are assumed to have development up to edge of the OS.

Time to Peak Calculation

West I-40 DMP Revision

Description	Var.	Unit	WA.1	WA.2	WA.3	WA.4	WA.5	WA.6	WA.7	WA.8	WA.9	WA.10	WA.11	WA.12	WA.13	WA.14	WA.16	WA.17	WA.18
Basin																			
Basin Area		Acres																	
Total Reach	L	Feet	9500.0	4800.0	4450.0	5550.0	10300.0	3550.0	12750.0	1950.0	6300.0	7600.0	6950.0	3500.0	11450.0	2200.0	10650.0	9050.0	10620.0
Overland Reach	L1	Feet	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0
Overland K	K1		0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Overland Slope	S1	Percent	1.88	0.83	1.69	4.00	1.80	1.69	2.67	0.50	1.75	1.36	1.36	1.79	0.63	0.20	2.61	0.77	3.81
Adj. Overland Slope	S1'	Percent	1.880	0.830	1.690	4.000	1.800	1.690	2.670	0.500	1.750	1.360	1.360	1.790	0.630	0.200	2.610	0.770	3.810
Gully Reach	L2	Feet	1600.0	1600.0	1600.0	1600.0	1600.0	1600.0	1600.0	1550.0	1600.0	1600.0	1600.0	1600.0	1600.0	1600.0	1600.0	1600.0	1600.0
Gully K	K2		2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
Gully Slope	S2	Percent	1.900	0.830	1.690	0.500	0.560	1.690	2.667	0.500	1.750	0.630	0.630	2.220	0.960	0.200	2.610	0.770	3.810
Adj. Gully Slope	S2'	Percent	1.900	0.830	1.690	0.500	0.560	1.690	2.667	0.500	1.750	0.630	0.630	2.220	0.960	0.200	2.610	0.770	3.810
Arroyo Reach	L3	Feet	7500.0	2800.0	2450.0	3550.0	8300.0	1550.0	10750.0	0.0	4300.0	5600.0	4950.0	1500.0	9450.0	200.0	8650.0	7050.0	8620.0
Arroyo K	K3		3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
Arroyo Slope	S3	Percent	0.840	0.830	0.830	0.500	0.720	1.690	0.770	0.500	1.750	1.250	1.400	0.330	1.160	0.200	1.040	1.990	0.700
Adj. Arroyo Slope	S3'	Percent	0.840	0.830	0.830	0.500	0.720	1.690	0.770	0.500	1.750	1.250	1.400	0.330	1.160	0.200	1.040	1.990	0.700
Lca	Lca	Feet	5500.0	3000.0	2100.0	3200.0	5600.0	1775.0	6850.0	1000.0	4200.0	3600.0	3500.0	1700.0	6300.0	1100.0	3550.0	3000.0	3450.0
Base Discharge	Qb	cfs	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ground Slope S	S	Percent	1.062	0.830	1.217	0.752	0.737	1.690	1.068	0.500	1.750	1.125	1.220	1.361	1.114	0.200	1.335	1.720	1.286
Adjusted Slope S'	S'	Percent	1.062	0.830	1.217	0.752	0.737	1.690	1.068	0.500	1.750	1.125	1.220	1.361	1.114	0.200	1.335	1.720	1.286
K	K		2.474	2.083	2.068	2.070	2.523	1.880	2.506	1.448	2.246	2.262	2.175	1.636	2.432	1.530	2.507	2.137	2.264
K'	K'		2.474	2.083	2.068	2.070	2.523	1.880	2.506	1.448	2.246	2.262	2.175	1.636	2.432	1.530	2.507	2.137	2.264
K''	K''		6.712	7.594	6.273	7.977	8.058	5.322	6.696	9.784	5.230	6.522	6.263	5.931	6.556	15.470	5.988	5.275	6.102
K'''	K'''		4.601	5.205	4.299	5.467	5.523	3.648	4.589	6.706	3.585	4.470	4.293	4.065	4.494	10.604	4.104	3.615	4.182
Kn	Kn		0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021
Orig. TC	TC	Hrs.	0.506	0.584	0.487	0.609	0.550	0.403	-	0.529	0.416	0.479	0.477	0.510	0.518	0.893	0.423	0.407	0.431
Adjusted TC	TC'	Hrs.	0.506	0.584	0.487	0.609	0.550	0.403	-	0.529	0.416	0.479	0.477	0.510	0.518	0.893	0.423	0.407	0.431
Time Lag	Lg	Hrs.	-	-	-	-	-	-	0.409	-	-	-	-	-	-	-	-	-	-
Time to Peak	TP	Hrs.	0.337	0.390	0.325	0.406	0.366	0.269	0.364	0.353	0.277	0.319	0.318	0.340	0.346	0.596	0.282	0.271	0.287

Time to Peak Calculation

West I-40 DMP Revision

Description	Var.	Unit	EA.1	EA.2	EA.3	EA.4	EA.5	EA.7	EA.8	EA.9	EA.10	EA.18
Basin Area		Acres										
Total Reach	L	Feet	1150.0	5450.0	2900.0	5400.0	11230.0	3870.0	5250.0	3950.0	3870.0	2050.0
Overland Reach	L1	Feet	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0
Overland K	K1		0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Overland Slope	S1	Percent	0.73	0.73	0.73	0.97	0.97	0.20	0.57	1.01	0.53	0.20
Adj. Overland Slope	S1'	Percent	0.730	0.730	0.730	0.970	0.970	0.200	0.570	1.010	0.530	0.200
Gully Reach	L2	Feet	750.0	1600.0	1600.0	1600.0	1600.0	1600.0	1600.0	1600.0	1600.0	1600.0
Gully K	K2		2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
Gully Slope	S2	Percent	0.700	0.700	0.700	0.970	0.970	0.200	0.570	0.700	0.530	0.200
Adj. Gully Slope	S2'	Percent	0.700	0.700	0.700	0.970	0.970	0.200	0.570	0.700	0.530	0.200
Arroyo Reach	L3	Feet	0.0	3450.0	900.0	3400.0	9230.0	1870.0	3250.0	1950.0	1870.0	50.0
Arroyo K	K3		3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
Arroyo Slope	S3	Percent	0.700	0.700	0.700	0.970	0.970	0.200	0.700	1.010	2.650	0.200
Adj. Arroyo Slope	S3'	Percent	0.700	0.700	0.700	0.970	0.970	0.200	0.700	1.010	2.650	0.200
Lca	Lca	Feet	580.0	2700.0	1450.0	2700.0	3750.0	1900.0	1750.0	1980.0	1940.0	1900.0
Base Discharge	Qb	cfs	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ground Slope S	S	Percent	0.710	0.702	0.704	0.970	0.970	0.200	0.650	0.884	1.554	0.200
Adjusted Slope S'	S'	Percent	0.710	0.702	0.704	0.970	0.970	0.200	0.650	0.884	1.554	0.200
K	K		1.221	2.168	1.742	2.156	2.525	1.940	2.092	1.934	1.369	1.477
K'	K'		1.221	2.168	1.742	2.156	2.525	1.940	2.092	1.934	1.369	1.477
K"	K"		8.208	8.256	8.245	7.025	7.025	15.470	8.578	7.357	5.549	15.470
K'''	K'''		5.626	5.659	5.651	4.815	4.815	10.604	5.880	5.042	3.804	10.604
Kn	Kn		0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021
Orig. TC	TC	Hrs.	0.310	0.600	0.551	0.523	0.454	1.239	0.632	0.603	0.630	0.862
Adjusted TC	TC'	Hrs.	0.310	0.600	0.551	0.523	0.454	1.239	0.632	0.603	0.630	0.862
Time Lag	Lg	Hrs.	-	-	-	-	-	-	-	-	-	-
Time to Peak	TP	Hrs.	0.207	0.400	0.367	0.348	0.303	0.826	0.421	0.402	0.420	0.575

Prepared By: JT O'Brien
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Time to Peak Calculation

West I-40 DMP Revision

Description	Var.	Unit	OS.1	OS.4	OS.5	OS.6	ST.1	ST.2a	ST.2b	ST.3	ST.4a	ST.4b	ST.5	ST.6	ST.7	ST.8	ST.9
Basin Area	A	Acres	70.68	137.40	89.80	234.14	27.00			94.23	98.33		33.99	45.44	45.44	45.44	
Total Reach	L	Feet	3567.9	3596.2	2016.9	2957.3	2490.0	2591.6	1928.1	3150.0	2608.75	1640.0	1119.11	1400.21	1950.0	3270.0	2770.0
Overland Reach	L1	Feet	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0
Overland K	K1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Overland Slope	S1	Percent	8.70	10.00	2.50	13.75	2.80	5.00	8.75	4.10	0.25	6.20	2.50	2.50	2.90	2.90	2.17
Adj. Overland Slope	S1'	Percent	5.720	5.847	2.500	6.118	2.800	4.760	5.726	4.097	0.250	5.261	2.500	2.500	2.900	2.900	2.170
Gully Reach	L2	Feet	1600.0	1600.0	1600.0	1600.0	1600.0	1600.0	1528.1	1600.0	1600.0	1240.0	719.1	1000.2	1550.0	1600.0	1600.0
Gully K	K2		2.000	2.000	7.800	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
Gully Slope	S2	Percent	5.000	5.000	9.000	6.870	2.800	2.900	6.217	4.100	4.680	8.870	4.680	4.680	2.900	2.900	2.200
Adj. Gully Slope	S2'	Percent	4.760	4.760	5.753	5.433	2.800	2.900	5.266	4.097	4.562	5.739	4.562	4.562	2.900	2.900	2.200
Arroyo Reach	L3	Feet	1567.9	1596.2	16.9	957.3	490.0	591.6	0.0	1150.0	608.8	0.0	1.0	1.0	0.0	1270.0	770.0
Arroyo K	K3		3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
Arroyo Slope	S3	Percent	4.470	5.000	1.200	4.200	2.800	1.100	1.100	4.100	3.300	4.200	3.300	3.300	2.900	2.900	2.170
Adj. Arroyo Slope	S3'	Percent	4.000	4.760	1.200	4.189	2.800	1.100	1.100	4.097	3.300	4.189	3.300	3.300	2.900	2.900	2.170
Lca	Lca	Feet	1125.0	1600.0	1200.0	1500.0	830.0	980.0	980.0	1570.0	1901.0	1300.0	1902.0	1903.0	975.0	1640.0	1390.0
Base Discharge	Qb	cfs	100.0	276.2	175.4	488.0	76.5	77.1	77.1	323.2	426.5	426.5	131.63	197.62	197.62	197.62	197.62
Ground Slope S	S	Percent	5.182	5.556	7.646	6.936	2.800	2.813	6.743	4.100	3.679	8.219	3.904	4.060	2.900	2.900	2.187
Adjusted Slope S'	S'	Percent	4.858	5.032	5.579	5.448	2.800	2.813	5.404	4.097	3.679	5.662	3.904	4.059	2.900	2.900	2.187
K	K		2.116	2.112	2.234	1.974	1.826	1.847	1.681	1.989	1.061	1.551	1.351	1.435	1.660	2.014	1.901
K'	K'		2.036	2.066	2.485	1.917	1.826	1.837	1.658	1.989	1.057	1.591	1.344	1.426	1.660	2.014	1.901
K"	K"		3.139	3.703	3.241	3.943	3.940	3.936	2.840	4.222	4.683	3.775	3.679	3.882	4.593	4.593	5.288
K'''	K'''		2.151	2.538	2.221	2.703	2.700	2.698	1.947	2.894	3.210	2.588	2.522	2.661	3.148	3.148	3.625
Kn	Kn		0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	1.021	0.021	2.021	3.021	0.021	0.021	0.021
Orig. TC	TC	Hrs.	0.206	0.201	0.091	0.158	0.226	0.232	0.123	0.217	0.356	0.102	0.116	0.135	0.192	0.265	0.274
Adjusted TC	TC'	Hrs.	0.209	0.175	0.106	0.130	0.226	0.232	0.118	0.149	0.356	0.074	0.116	0.073	0.192	0.265	0.274
Time Lag	Lg	Hrs.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Time to Peak	TP	Hrs.	0.139	0.134	0.133	0.133	0.151	0.155	0.133	0.145	0.237	0.133	0.133	0.133	0.133	0.177	0.182

Note:

Basins ST.8, ST.9, ST.10a, ST.10b and ST.10c time to peak set to min. value 0.133 hr in AHYMO model based upon observed existing conditions within each basin.

Prepared By Laura Marquis
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Time to Peak Calculation
West I-40 DMP Revision

Description	Var.	Unit	EA.6b	EA.12a	EA.12b	EA.13	EA.14	EA.15a	EA.15b	EA.16a	EA.16b	EA.16c	EA.17a	EA.17b	EA.17c	OS.5a	OS.5b
Basin Area	A	Acres	66.1	49.4	108.8	229.0	178.0	100.8	35.9	34.10	35.90	13.70	47.00	13.80	53.10	38.46	67.43
Total Reach	L	Feet	2344.7	3017.4	3685.5	5100.0	3800.0	3490.8	2218.4	2047.7	1552.7	2035.2	2295.6	1596.6	2620.3	3216.6	2934.1
Overland Reach	L1	Feet	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0
Overland K	K1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Overland Slope	S1	Percent	1.50	0.10	0.50	6.75	6.25	0.50	0.38	0.75	0.75	0.10	0.10	0.38	0.75	7.50	6.20
Adj. Overland Slope	S1'	Percent	1.500	0.100	0.500	5.406	5.275	0.500	0.375	0.750	0.750	0.100	0.100	0.375	0.750	5.555	5.261
Gully Reach	L2	Feet	1600.0	1600.0	1600.0	1600.0	1600.0	1600.0	1600.0	1600.0	1152.7	1600.0	1600.0	1196.6	1600.0	1600.0	1600.0
Gully K	K2		2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
Gully Slope	S2	Percent	1.300	0.500	0.125	4.680	4.680	1.560	0.594	0.813	0.250	1.750	1.688	1.003	2.560	2.500	5.200
Adj. Gully Slope	S2'	Percent	1.300	0.500	0.125	4.562	4.562	1.560	0.594	0.813	0.250	1.750	1.688	1.003	2.560	2.500	4.867
Arroyo Reach	L3	Feet	344.7	1017.4	1685.5	3100.0	1800.0	1490.8	218.4	47.7	0.0	35.2	295.6	0.0	620.3	1216.6	934.1
Arroyo K	K3		3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
Arroyo Slope	S3	Percent	1.163	0.500	1.208	0.690	0.280	0.436	0.917	2.100	0.200	5.600	0.500	2.800	1.934	5.000	3.960
Adj. Arroyo Slope	S3'	Percent	1.163	0.500	1.208	0.690	0.200	1.150	1.150	2.100	0.200	5.050	0.500	2.800	1.934	4.760	3.960
Lca	Lca	Feet	1000.0	1800.0	1800.0	2550.0	1900.0	1910.0	1000.0	550.0	550.0	550.0	1050.0	1000.0	1750.0	870.0	650.0
Base Discharge	Qb	cfs	200.0	300.0	300.0	700.3	545.5	525.0	300.0	90.3	100.0	90.3	600.0	50.0	700.0	73.0	129.7
Ground Slope S	S	Percent	1.314	0.447	0.661	2.417	2.761	0.959	0.586	0.830	0.379	1.492	1.258	0.846	2.136	4.067	4.942
Adjusted Slope S'	S'	Percent	1.314	0.447	0.661	2.417	2.761	0.959	0.586	0.830	0.379	1.492	1.258	0.846	2.136	4.066	4.727
K	K		1.803	1.569	1.357	1.856	1.375	1.820	1.639	1.652	1.563	0.889	1.013	1.388	1.615	1.914	1.976
K'	K'		1.803	1.569	1.357	1.832	1.210	2.136	1.647	1.652	1.563	0.889	1.013	1.388	1.615	1.852	1.946
K"	K"		6.838	12.611	10.370	6.317	5.651	9.524	11.011	7.455	11.241	5.561	8.516	6.641	6.720	3.242	3.335
K"'	K"'		4.687	8.644	7.108	4.330	3.873	6.528	7.547	5.110	7.705	3.811	5.837	4.552	4.606	2.222	2.286
Kn	Kn		0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021
Orig. TC	TC	Hrs.	0.315	0.799	0.928	0.394	0.462	0.544	0.491	0.378	0.449	0.521	0.561	0.347	0.308	0.231	0.186
Adjusted TC	TC'	Hrs.	0.315	0.799	0.928	0.394	0.462	0.544	0.491	0.378	0.449	0.521	0.561	0.347	0.308	0.199	0.164
Time Lag	Lg	Hrs.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Time to Peak	TP	Hrs.	0.210	0.533	0.618	0.262	0.308	0.363	0.327	0.252	0.299	0.347	0.374	0.232	0.206	0.154	0.133

Note:

Basins ST.8, ST.9, ST.10a, ST.10b and ST.10c time to peak set to min. value 0.133 hr in AHYMO model based upon observed existing conditions within each basin.

Time to Peak Calculation
West I-40 DMP Revision

Description	Var.	Unit								
Basin			ST.11	UD.5a	UD.5b	UD.5c	UD.2	UD.1b	UD.3	UD.4
Basin Area	A	Acres	344.95	51.02	89.46	90.56	152.15	87.14	51.68	70.03
Total Reach	L	Feet	7650.0	2500	5800	2094.55	2740	1990	1832	2160
Overland Reach	L1	Feet	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0
Overland K	K1		1	1	1	1	1	1	1	1
Overland Slope	S1	Percent	2.48	2.60	4.80	8.70	5.50	6.03	3.82	2.67
Adj. Overland Slope	S1'	Percent	2.480	2.600	4.641	5.720	5.008	5.207	3.820	2.670
Gully Reach	L2	Feet	1600.0	1600.0	1600.0	1600.0	1600.0	1590.0	1432.0	1600.0
Gully K	K2		2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
Gully Slope	S2	Percent	2.480	2.600	4.800	3.700	5.500	6.030	3.820	2.670
Adj. Gully Slope	S2'	Percent	2.480	2.600	4.641	3.700	5.008	5.207	3.820	2.670
Arroyo Reach	L3	Feet	5650.0	500.0	3800.0	94.6	740.0	0.0	0.0	160.0
Arroyo K	K3		3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
Arroyo Slope	S3	Percent	0.900	2.600	4.800	3.200	5.500	6.030	3.820	2.670
Adj. Arroyo Slope	S3'	Percent	0.900	2.600	4.641	3.200	5.008	5.207	3.820	2.670
Lca	Lca	Feet	5100.0	1900.0	1900.0	1300.0	1350.0	1000.0	900.0	1050.0
Base Discharge	Qb	cfs	1232.07	100.0	300.0	322.9	599.7	301.1	100.0	100.0
Ground Slope S	S	Percent	1.313	2.600	4.800	4.632	5.500	6.030	3.820	2.670
Adjusted Slope S'	S'	Percent	1.313	2.600	4.641	4.530	5.008	5.207	3.820	2.670
K	K		2.430	1.829	2.351	1.710	1.894	1.665	1.642	1.723
K'	K'		2.430	1.829	2.351	1.638	1.894	1.665	1.642	1.723
K"	K"		9.488	4.291	3.914	4.014	4.268	3.697	3.540	4.234
K'''	K'''		6.503	2.941	2.683	2.752	2.925	2.534	2.426	2.902
Kn	Kn		0.024	0.021	0.021	0.021	0.021	0.021	0.021	0.021
Orig. TC	TC	Hrs.	0.501	0.235	0.245	0.158	0.171	0.135	0.159	0.213
Adjusted TC	TC'	Hrs.	0.501	0.235	0.228	0.099	0.116	0.096	0.159	0.213
Time Lag	Lg	Hrs.	-	-	-	-	-	-	-	-
Time to Peak	TP	Hrs.	0.334	0.157	0.164	0.133	0.133	0.133	0.133	0.142

Note:

Basins ST.8, ST.9, ST.10a, ST.10b and ST.10c time to peak set to min. value 0.133 hr in AHYMO model based upon observed existing conditions within each basin.

trial 1

WEIR COEFFICENT = 2.630   X-SECTION DISTANCE = 0.500

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	8.0	5	48.0	0.0	9	184.0	6.0
2	12.0	6.0	6	148.0	0.0	10	196.0	8.0
3	24.0	4.0	7	160.0	2.0			
4	36.0	2.0	8	172.0	4.0			

WSEL FT.	DEPTH INC FT.	FLOW AREA SQ.FT.	FLOW RATE (CFS)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS
0.500	0.500	51.500	95.208	1.849	106.000
1.000	1.000	106.000	275.611	2.600	112.000
1.500	1.500	163.500	517.934	3.168	118.000
2.000	2.000	224.000	815.270	3.640	124.000
2.500	2.500	287.500	1164.330	4.050	130.000
3.000	3.000	354.000	1563.354	4.416	136.000
3.500	3.500	423.500	2011.386	4.749	142.000
4.000	4.000	496.000	2507.942	5.056	148.000
4.500	4.500	571.500	3052.840	5.342	154.000
5.000	5.000	650.000	3646.103	5.609	160.000
5.500	5.500	731.500	4287.891	5.862	166.000
6.000	6.000	816.000	4978.467	6.101	172.000
6.500	6.500	903.500	5718.170	6.329	178.000
7.000	7.000	994.000	6507.391	6.547	184.000
7.500	7.500	1087.500	7346.566	6.755	190.000
8.000	8.000	1184.000	8236.161	6.956	196.000

Weir calculation done for existing playas in the west and east amole watershed that overflowed in AHYMO model.
Weirs were added on to existing stage discharge curves in DMP, 2000.

Playas affected in:
WA.1
WA.10
WA.16
EA.2

P:\060232\WR\study\Programs\AHYMO\Combined\Weir outflow.txt
Prepared By: Laura Marquis