CITY OF ALBUQUERQUE

Timothy M. Keller, Mayor

PO Box 1293

Albuquerque

NM 87103

www.cabq.gov

December 15, 2017

Vincent Steiner, PE
Bohannan Huston, Inc.
7500 Jefferson St NE
Albuquerque, NM 87109

RE: Master Drainage Report for Westpoint 40
Drainage Master Plan
Stamp Date: 10/10/17
Hydrology File: K09D041

Dear Mr. Steffen:

First let me apologize for the delay in issuing this letter. As you are aware, I needed to wait till I received a copy of AMAFCA white paper dated November 30. 2017. We also attended a presentation of this white paper by AMAFCA on December 5, 2017. The City of Albuquerque Hydrology Section recognize that the NRCS SCS method needs to be further studied and this method needs to be added to the City's DPM. We also recognize that a majority of the FEMA accepted models use the SCS method. Therefore, we would like you to use the following parameters in the HEC-HMS model until the City revises the DPM.

- The use of just four CN values, one for each of the land treatments already described in the DPM: A=76, B=80, C=85 and D=98. This way the hydrologic soil groups don't need to be determined to select the CN and the soil maps do not need to be consulted.
- These CNs are for a 24 hour precipitation distribution using NOAA Atlas 14 with the peak at 12 hours.
- Lag=$0.6T_c$ where T_c is calculated using the procedure already in the DPM

Based upon the information provided in your submittal received 11/09/17, the Drainage Master Plan **is not** approved for Work Order. The following comments need to be addressed for approval of the above referenced project:

1. Based on the above recommended parameters, please revise both the HEC-HMS model and the Hydrology section under VII. Calculations.

2. Please provide an engineering stamp on the signature page of the master drainage report.

3. On Exhibit 2 - Sheet 2 of 2, please label the existing storm sewer on 90th St. just south of Blue Water as an existing 54" RCP.

4. On Exhibit 3 – Sheet 2 of 4, please add a note that a spillway will be provide from the detention pond to Daytona Rd within the proposed drainage easement. Also add this wordage about the spillway in the drainage report Section V. Developed Conditions B.2 Option A.

5. On Exhibit 3 – Sheet 3 of 4, please add a drainage easement on the entire dike since it is carrying public storm water.

6. On Exhibit 3 – Sheet 4 of 4, please add a drainage easement on the entire dike since it is carrying public storm water.

7. Under Appendix B – Hydraulic Analysis Supporting Data, Section 1 Storm Drain Capacity Calculations, please provide both the HGL and EGL for the proposed storm sewer pipes. Also provide a profile showing the HGL of both the existing storm sewer and the proposed storm sewer. Please also provide the digital copies of the model along with all the other hydrology models used in this report.

PO Box 1293

Albuquerque

NM 87103

www.cabq.gov

If you have any questions, please contact me at 924-3995 or rbrissette@cabq.gov.

Sincerely,

Renée C. Brissette

Renée C. Brissette, P.E. CFM
Senior Engineer, Hydrology
Planning Department

Bohannan ▲ Huston

Courtyard I
7500 Jefferson St. NE
Albuquerque, NM
87109-4335

www.bhinc.com

voice: 505.823.1000
facsimile: 505.798.7988
toll free: 800.877.5332

November 6, 2017

Renee C. Brissette, PE
City of Albuquerque
600 2nd Street NW
Albuquerque, NM 87102

Re: Master Drainage Report for Westpoint 40 (Avalon Subdivision Unit 5)
Comment Response Letter
DRB Case No. 1009438, Hydrology File No. K09D041

Dear Renee:

Please find attached the second submittal of the Master Drainage Report for Westpoint 40 (Avalon Subdivision Unit 5) located within Zone Atlas Map Number J-9-Z and K-9-Z, to the southeast of the Interstate 40 and 98th Street interchange. The report has been revised to address your comments and in accordance with our August 31, 2017, phone conversation. We are requesting your review and approval.

Your comments provided in a letter dated August 30, 2017, and a response to each are provided below:

1. Since this DMP is changing the drainage basins of the Amole-Hubbell 2013 DMP approval by AMAFCA will be need prior to Hydrology approval. Please contact Bradley Bingham, PE at (505) 884-2215 or bbingham@amafca.org.
   - *Response: The proposed revisions to the Amole-Hubbell DMP Update (2013) have been coordinated with Mr. Bingham at AMAFCA. Section V.C was added to the report to demonstrate the proposed revisions to the DMP Update do not result in increased peak discharges downstream of the project site and/or do not exceed the capacity of downstream storm drains. An email documenting Mr. Bingham's concurrence with these findings and agreement to amend the DMP Update is attached for reference.*
2. Since this master drainage report's basins differs from the Amole-Hubbell DMP, please provide an analysis of the downstream pipe capacity to include the whole watershed for the storm sewer system including all existing and future development. Please take the analysis to the next manhole after the last proposed discharge point. This analysis should show the existing HGL and the adjusted HGL from the proposed changes in the drainage basins. The off-site drainage from I-40 and 98th Street, are eventually to go into a diversion system along 981 Street as per the Amole-Hubbell DMP. This DMP proposes to include this drainage through your site and into the Bluewater storm drain system. If the Bluewater storm drain system cannot handle this added drainage, then the existing temporary retention pond on Tract 10 will have to stay in place until the 98th Street diversion system is constructed.
   - *Response: An analysis of the capacity of downstream storm drains is provided in Appendix B and summarized in Section IV.C of this report. This analysis includes the entire contributing drainage area associated with each storm drain reach. Section V.B.1 and the allowable discharge calculations provided in Appendix C demonstrate the proposed drainage concept does not result in increased storm drain peak*

discharges in downstream storm drains compared to discharges and HGLs shown on current as-built drawings. Because there are no proposed increases to storm drain discharges or associated HGLs, and in accordance with our August 31, 2017, phone conversation, re-analysis of the HGLs is not necessary.

The additional report revision requests listed in your August 30, 2017, letter and the manner in which they were addressed are provided below:

1. On your existing model, Point J OS6 needs to be routed through a reach to J E-4. This existing drainage channel can be seen on the aerial.
   - *Response: No revision to the model has been made. The diversion at junction J_OS6 is modeled externally from HEC-HMS based on the hydraulic capacity of the on-grade curb inlets along 98th Street. The portion of the peak discharge draining to the existing retention pond on Tract 10 is conservatively added to the HEC-HMS peak discharge for junction J_E-4, and this is reflected in the results summary table on Exhibit 2 – Existing Conditions Drainage Map. As a result, routing the entire flow at J_OS6 to J_E-4 would overestimate the flow at J_E-4. This conservative approach of adding the peak discharge diverted to the project site by the 98th Street inlets to the peak discharge calculated at J_E-4 is appropriate given the existing conditions HEC-HMS results will not be used for design purposes.*
2. The second set of Time of Concentration Calculations should be labeled Proposed Conditions.
   - *Response: Revised as requested*
3. On your Street Capacity Calculations, are you including the future Bluewater? If so, then Bluewater is 68ft R.O.W and is classified a Major Collector.
   - *Response: Yes. Bluewater Road is included in the street capacity analysis. Street capacity calculations have been added to Appendix B.*

If you have questions or require additional information, please contact me at 823-1000.

Sincerely,

Vincent Steiner

Vincent Steiner, PE
Engineer
Water Resources

VS/le
Attachments:
Email documenting AMAFCA concurrence with Amole-Hubbell DMP Update Amendment (Brad Bingham, November 2, 2017)

cc: Kurt Browning, Titan Development (w/o encls.)
Sal Perdomo, Titan Development (w/o encls.)
Bo Johnson, Curb Inc. (w/o encls.)
Yolanda Padilla Moyer, BHI (w/o encls.)

Vincent Steiner

From: Bingham, Brad <bbingham@amafca.org>
Sent: Thursday, November 02, 2017 4:10 PM
To: Vincent Steiner
Cc: Craig Hoover; Sarah Ganley; Brissette, Renee C.
Subject: RE: Revision to Amole-Hubbell DMP FW: Master Drainage Report for Westpoint 40 (Avalon Subdivision Unit 5)

Follow Up Flag: Follow up
Flag Status: Completed

Vincent, Renee,
I have reviewed the report and concur with the conclusion. I will amend the Amole-Hubbell DMP accordingly.
Thanks for keeping me in the loop

From: Vincent Steiner [mailto:vsteiner@bhinc.com]
Sent: Thursday, November 2, 2017 3:32 PM
To: Bingham, Brad
Cc: Craig Hoover ; Sarah Ganley
Subject: Revision to Amole-Hubbell DMP FW: Master Drainage Report for Westpoint 40 (Avalon Subdivision Unit 5)

Hi Brad,

Have you had a chance to review the master drainage report at the link in the 10/10/2017 email below? Please let me know if you have any questions or would like to discuss anything.

Thank you in advance,

Vincent Steiner, PE, CFM
Engineer
Water Resources
Direct line: 505.798.7862

Bohannan Huston
7500 Jefferson St. NE
Albuquerque, NM 87109-4335
www.bhinc.com
voice: 505.823.1000 **fax:** 505.798.7988 **toll free:** 800.877.5332

From: Vincent Steiner
Sent: Tuesday, October 17, 2017 8:15 AM
To: 'bbingham@amafca.org' <bbingham@amafca.org>
Subject: FW: Master Drainage Report for Westpoint 40 (Avalon Subdivision Unit 5)

Hi Brad,

Have you had a chance to review the master drainage report at the link below? **Section V.C is what we added to compare the proposed drainage concept to previous DMPs** and, if you like, can focus your review there. I would be happy to discuss this with you if that would be helpful.

Thanks,

Vincent Steiner, PE, CFM
Engineer
Water Resources
Direct line: 505.798.7862

Bohannan Huston
7500 Jefferson St. NE
Albuquerque, NM 87109-4335
www.bhinc.com
voice: 505.823.1000 **fax:** 505.798.7988 **toll free:** 800.877.5332

From: Vincent Steiner
Sent: Tuesday, October 10, 2017 9:36 PM
To: 'bbingham@amafca.org' <bbingham@amafca.org>
Cc: Yolanda Padilla Moyer <ypadilla@bhinc.com>
Subject: Master Drainage Report for Westpoint 40 (Avalon Subdivision Unit 5)

Good evening Brad,

Available at the link below is the Master Drainage Report for Westpoint 40, revised based on our conversation on 8/30/2017 in your office. This is the Master Drainage Report for various parcels at the southeast corner of the I-40 and 98th Street interchange that would modify the Amole-Hubbell 2013 DMP. To address COA Hydrology review comments (attached for reference) and based on our conversation, Section V.C has been added to the report to specifically compare the proposed drainage concept to the Amole-Hubbell 2013 DMP. The report demonstrates that flows from the proposed drainage concept and drainage basin modifications are not greater than per the Amole-Hubbell 2013 DMP.

Sorry it has taken awhile to get this back to you. If it would help you to have a quick conversation to refresh your memory on our previous discussion or if you have any questions, please give me a call.

As discussed, if you concur with the report and find it be an acceptable modification to the Amole-Hubbell 2013 DMP please provide documentation (email or letter) that I can include in our resubmittal to COA Hydrology.

Thank you,

Use the following link to download files.
https://sfspublic.bhinc.com/EmailAccess.aspx?tk=TKvsteinerD10102017213533

NOTE: These files will expire in 60 days(09-Dec-2017) from the time this email was generated.

MASTER DRAINAGE REPORT FOR WESTPOINT 40 (AVALON SUBDIVISION UNIT 5)

OCTOBER 10, 2017

Prepared for:

Titan Development
6300 Riverside Plaza, NW, Suite 200
Albuquerque, NM 87120

and

Curb, Inc.
5160 San Francisco Road NE
Albuquerque, NM 87109

Prepared by:

Bohannan Huston

Engineering
Spatial Data
Advanced Technologies

MASTER DRAINAGE REPORT

FOR

WESTPOINT 40

(AVALON SUBDIVISION UNIT 5)

OCTOBER 10, 2017

Prepared for:

TITAN DEVELOPMENT

6300 RIVERSIDE PLAZA NW, SUITE 200

ALBUQUERQUE, NM 87120

and

CURB, INC.

5160 SAN FRANCISCO ROAD NE

ALBUQUERQUE, NM 87109

Prepared by:

BOHANNAN HUSTON, INC.

7500 JEFFERSON STREET NE

ALBUQUERQUE, NM 87109

Prepared by:		Reviewed by:	
Vincent Steiner		Craig Hoover	10/10/17
Vincent Steiner, PE	Date	Craig Hoover, PE	Date

Bohannan Huston

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

EXHIBITS

I. INTRODUCTION

This Master Drainage Report has been prepared to support the overall development of Westpoint 40, a portion of the Plat of Tracts 1 through 12 Avalon Subdivision Unit 5 (tracts 1, 2, 6, 7, and 9-11, plat provided in Appendix D). The project site is approximately 116 acres of undeveloped land to the southeast of the I-40 and 98th Street interchange, proposed for commercial/industrial development.

This report presents the overall drainage concept for the Westpoint 40 site and provides recommendations for detention basin sizing to support the development of each tract, in accordance with the City of Albuquerque drainage design criteria provided in the Development Process Manual (DPM). The drainage concept associated with the backbone roadways (Bluewater Road, Daytona Road, and 94th Street) is also included. The proposed drainage concept is based on the existing drainage patterns (including the accommodation of offsite runoff from the I-40 right-of-way) and the capacity of existing downstream infrastructure.

II. PROJECT DESCRIPTION

A. LOCATION

The Westpoint 40 site (herein also referred to as “project site”) is located entirely within the City of Albuquerque, zone atlas map numbers J-9-Z and K-9-Z. It is south of I-40, east of 98th Street NW, and to the north of Bluewater Road NW and Los Volcanes Road NW. The site is split by Daytona Road (which becomes 94th Street after it curves to the south) and is bounded on the east (north of Los Volcanes Road) by existing commercial and light industrial development. A newly constructed apartment complex (Village at Avalon) and existing single-family residential developments (across 90th Street NW and Bluewater Road NW) are located to the southeast. (Please see Figure 1.)

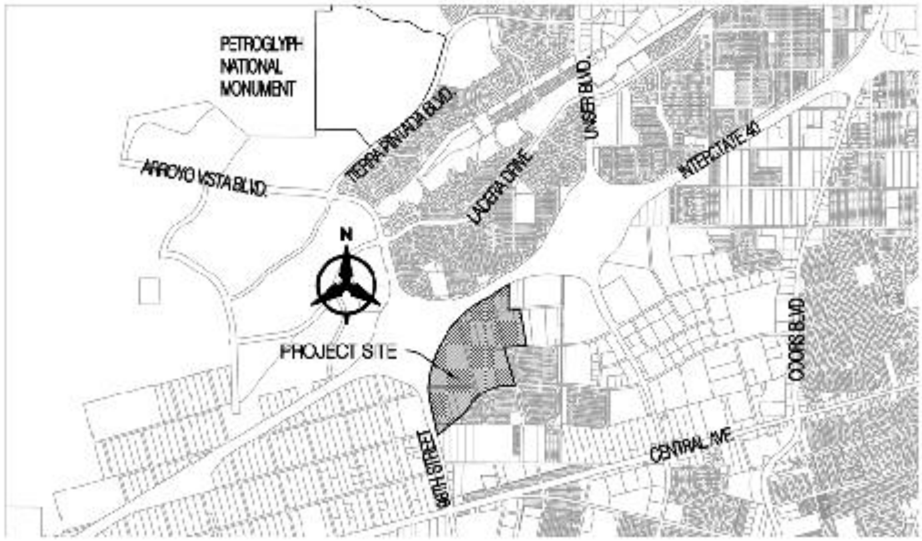


Figure 1 – Location Map

B. LEGAL DESCRIPTION

The site consists of Tracts 1, 2, 6, 7, and 9 through 11 of the Plat of Tracts 1 through 12 Avalon Subdivision Unit 5 (Bernalillo County Clerk's document #2014040949, Appendix D).

C. FEMA FLOOD HAZARD ZONE

The project site is located within FEMA Zone A Special Flood Hazard Area (SFHA) and Zone X, as shown on the effective Flood Insurance Rate Map (FIRM), map number 35001C0328J (revised November 4, 2016) and revised by LOMR 17-06-0267P (effective November 28, 2016). A portion of the FIRM, a FIRMette, (Figure 2) and the LOMR determination document (Figure 3) are provided for reference.

The existing Zone A within the project site is associated with the retention area located within Tract 10. Drainage improvements to eliminate the need for this retention area are discussed later in this report.

The LOMR removed a Zone AE from the project site, associated with Mirehaven Arroyo C, based on the West I-40 Channel and West I-40 Storm Drain constructed by the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) upstream of I-40 that are designed to convey the 100-year discharge. This LOMR became effective in 2016, and the project site is no longer impacted by the Mirehaven Arroyo C.

1 inch = 500 feet 1:6,000

0 500 1,000 2,000 Feet

0 125 250 500 Meters

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

BERNALILLO COUNTY, NEW MEXICO
and Incorporated Areas

PANEL **328** OF **825**

FEMA

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALBUQUERQUE, CITY OF	350002	0328	J
BERNALILLO COUNTY	350001	0328	J

VERSION NUMBER
2.3.3.2

MAP NUMBER
35001C0328J

MAP REVISED
NOVEMBER 4, 2016

FIGURE 2 - FIRMETTE

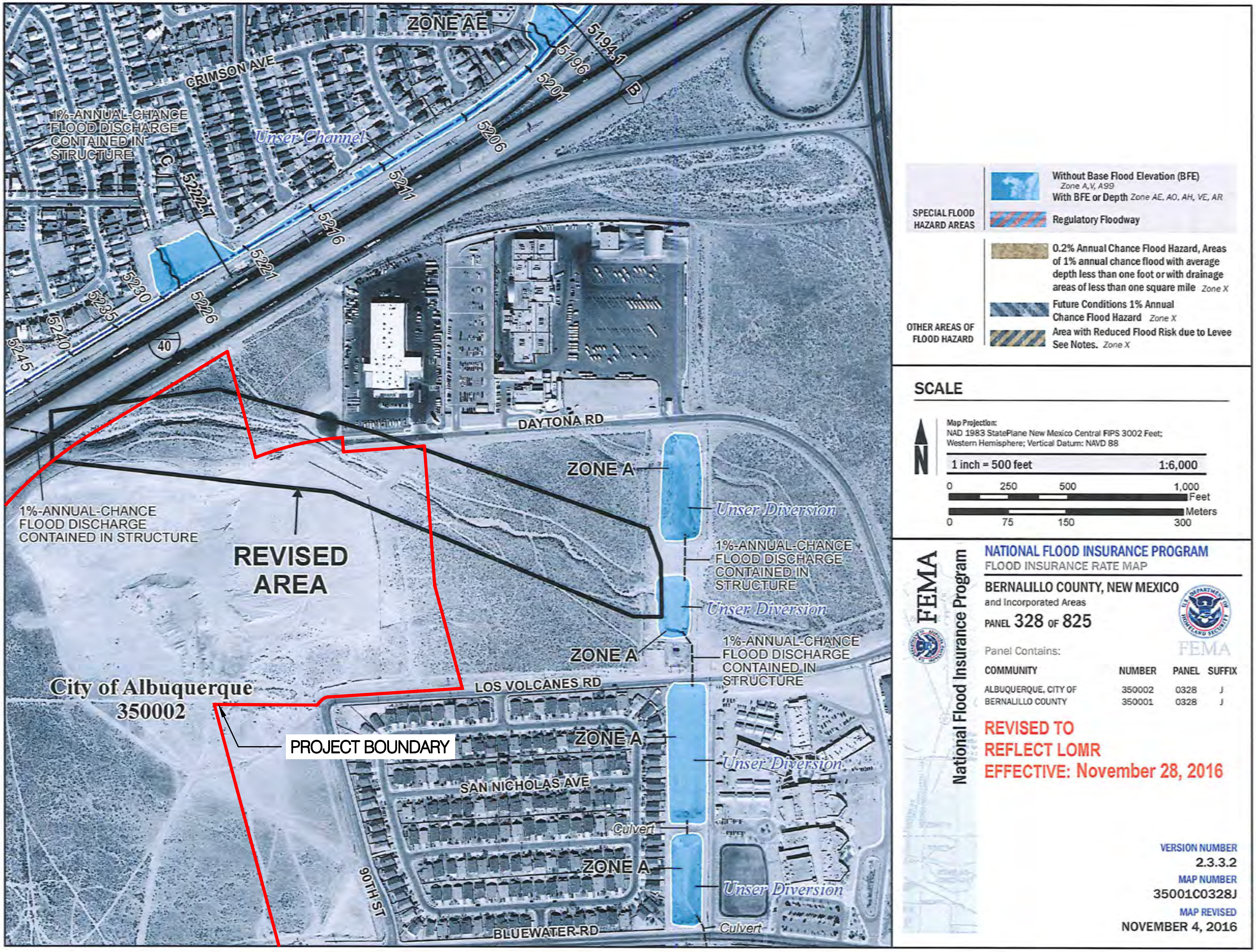


FIGURE 3 – LOMR MAP

III. BACKGROUND DOCUMENTS

Various drainage master plans and drainage reports have been prepared that address portions of the project site or larger watersheds of which the Westpoint 40 site is a part.

The *Amole-Hubbell Drainage Master Plan Update* (DMP Update) (Wilson & Company, 2013) evaluates the approximately 20 square mile watershed contributing to the Amole Detention Pond and the Hubbell Lake Detention Pond and was prepared on behalf of AMAFCA. Excerpts of the DMP Update are provided in Appendix D for reference. The DMP Update breaks the overall watershed into seven large basins, with the project site located within the Tierra Bayita Basin (a subbasin of the Amole Del Norte Basin). The Tierra Bayita Basin is drained by three storm drain systems that drain to the Tierra Bayita Channel which generally follows the Bridge Boulevard SW alignment. The DMP Update included an extensive review of drainage plans and reports related to the study area, some of which inform the proposed drainage concept for the project site. The DMP Update references "Bluewater Road near 90th Street Drainage Analysis" by Tierra West, dated December 20, 2001, to indicate that the portion of the project site that drains to 90th Street (subbasins TB 202.1 and TB 202.2 or current tracts 1, 7, 9, 10, 11, and a portion of tract 2) should be restricted to a maximum discharge of 2.05 cfs/ac. Comparison of the drainage concept proposed by this Master Drainage Report to DMP Update is provided in Section V.C below.

The approved *Drainage Report for West Ridge Mobile Home Park* (Tierra West, October 1997) discusses the Westpoint 40 project site in terms of future development in the drainage basins upstream of the mobile home park. Excerpts of the drainage report are provided in Appendix D for reference. The report is consistent with the *Amole-Hubbell Drainage Master Plan Update* in that the portion of the Westpoint 40 project site that drains to 90th Street (basins 10D, 11D, and 12D) has an allowable discharge of 2.05 cfs/ac based on the capacity of the 90th Street storm drain (which has now been constructed). This report clarifies that the 2.05 cfs/ac allowable discharge assumed that flows from the NMDOT ROW north of the project site would be conveyed through the site to the Bluewater Road storm drain. This report also indicates that the existing retention pond within Tract 10 was constructed as a temporary solution to protect downstream development from offsite flows, particularly from flows north of Interstate 40.

The approved *I-40 South and Unser Mini Drainage Master Plan* (Easterling Consultants, November 2014) addresses the northeast portion of the project site that drains to the Unser Diversion Channel System (UDC). The *Amole-Hubbell Drainage Master Plan Update* addresses this area; however, the *I-40 South and Unser Mini Drainage Master Plan* is more current and reflects the existing condition of UDC Ponds 5 and 6. The Mini DMP from 2014 supersedes the DMP Update from 2013. Excerpts of the drainage report are provided in Appendix D for reference. Based on that report's analysis of Pond 4 of the UDC, the portion of the project site that drains to Pond 4 can discharge freely. The drainage master plan does not specifically discuss the discharge of the portion of the Westpoint 40 project site that drains to the Daytona Road storm drain and ultimately flows into the UDC Pond 6. These subbasins are modeled in the proposed condition of the *I-40 South and Unser Mini Drainage Master Plan* as discharging freely with 90 percent imperviousness. Comparison of the drainage concept proposed by this Master Drainage Report to the Mini DMP is provided in Section V.C below.

IV. EXISTING CONDITIONS

The existing Westpoint 40 site is undeveloped land, a portion of which has been mass graded to provide earth for adjacent development. The site is bounded on the north by the developed I-40 right-of-way (ROW), on the west by the developed 98th Street NW (ROW), on the east by commercial/industrial and residential (both single and multi-family) development, and on the south by residential development. The project site is platted with seven large tracts and is split by the Daytona Road/94th Street (ROW), all of which are undeveloped.

A. OFFSITE DRAINAGE

The site is impacted by flows from the north and west, generally associated with the I-40 and 98th Street rights-of-way. The site was previously impacted by additional runoff from north of I-40, but that is no longer the case with the completion of the I-40 Interceptor improvements by AMAFCA. Existing offsite drainage conditions and the subbasins described below are shown on Exhibit 1 – Offsite Drainage Map and Exhibit 2 – Existing Conditions Drainage Map. Hydrologic modeling summary results are provided in Appendix A.

Subbasins OS-1 and OS-2 represent areas entirely within I-40 (ROW) that drain to the project site by means of culverts and median drains. Subbasin OS-3 is retained within the interior of the southwest ramp of the 98th Street interchange and does not impact the project site. Subbasins OS-4 and OS-5 are mostly within I-40 ROW (a small portion of OS-5 is within private property to the south of I-40 ROW) and are conveyed across 98th Street by concrete box culverts (CBCs). Subbasins OS-6 and OS-7 represent pavement drainage from 98th Street that is captured in a pair of storm drain inlets and discharge to the site via a short 18-inch CMP storm drain. These storm drain inlets only capture a portion of the flow associated with these subbasins. The interception capacity has been estimated based on a hydraulic analysis (external to the hydrologic analysis model – HEC-HMS) and is reflected in the results summary tables. For hydrologic analysis, all I-40 ROW has been considered “mass graded” and the percent imperviousness has been measured based on existing conditions.

Offsite flows from subbasin OS-1 drain through the project site and enter the Daytona Road storm drain at a temporary desiltation pond within Tract 3. Flows from subbasins OS-2, OS-4, OS-5, OS-6, and OS-7 drain through the project site and are retained in the temporary pond within Tract 10.

B. ONSITE DRAINAGE

The site generally slopes from northwest to southeast and consists of undeveloped land. Portions of the site have been mass graded, and this has been considered in the determination of the rainfall loss curve numbers. Existing onsite drainage conditions described below are shown on Exhibit 2 – Existing Conditions Drainage Map. Hydrologic modeling summary results are provided in Appendix A.

Subbasin E-1 combines with offsite subbasin OS-1 and enters the existing storm drain in Daytona Road at a temporary desiltation pond within Tract 3 (i.e. outside the project site). The natural channel associated with the Mirehaven C Arroyo is located within subbasin E-1, but the majority of historical flow to this channel has been diverted. Subbasin E-2 drains to a temporary swale along the west side of the FedEx Ground property and enters the existing Los Volcanes Road storm drain at a temporary desiltation pond in the southeast corner of Tract 6. Subbasin E-3 drains to a temporary swale along the west side of the Village at Avalon apartment complex that drains to a temporary desiltation pond in the southeast corner of Tract 9. Runoff in excess of this temporary desiltation pond is conveyed into Bluewater Road by an overflow spillway. Subbasin E-4 combines with offsite subbasins OS-2, OS-3, OS-4, OS-6, and OS-7 and drains to the existing retention pond on Tract 10. Subbasin E-5 drains to Bluewater Road and enters the storm drain system via existing inlets.

The existing retention pond on Tract 10 was designed for a runoff volume of 5.9 ac-ft. The existing retention pond has adequate capacity to retain the total contributing runoff volume of approximately 3.7 ac-ft (from subbasins E-4, OS-2, OS-3, OS-4, OS-6, and OS-7).

The northeast portion of the existing project site (subbasins E-1 and E-2) ultimately drains to the Unser Diversion Channel System. The rest of the project site not retained in the existing pond on Tract 10 (subbasins E-3and E-5) ultimately drains to the Tierra Bayita Channel and then into the N-S Coors Pond (located at the northwest corner of Coors Boulevard SW and Tower Road SW).

C. DOWNSTREAM CAPACITY

The capacity of downstream drainage infrastructure is limited by the various storm drain systems immediately downstream of the project site and is summarized in Table 1.

Table 1 – Downstream Capacity Summary

Location	Size & Type	Slope (%)	Capacity[1] (cfs)
Daytona Road – east of existing end of pavement	36” RCP	1.1	75
Los Volcanes Road – south of FedEx Ground	30” RCP	4.5	93
	36” RCP	1.7	93
Bluewater Road – 90th Street to Adonai Road	36” RCP	0.9	68
	42” RCP	1.8	145
	48” RCP	2.9	263

[1] Capacity estimated based on normal depth. Refer to Appendix B for calculations.

Regional drainage infrastructure (i.e. the UDC and the Tierra Bayita Channel along with the N-S Coors Pond) has capacity to accommodate more flow than the existing local infrastructure summarized in Table 1 can convey. Previous studies were either prepared before this drainage infrastructure was constructed (*Drainage Report for West Ridge Mobile Home Park*) or did not consider the ability of local drainage infrastructure to convey runoff from the project area to the regional drainage infrastructure (*Amole-Hubbell Drainage Master Plan Update* and *I-40 South and Unser Mini Drainage Master Plan*). As a result, allowable discharges for the project site determined by this Master Drainage Report are less than recommended by previous studies. These allowable discharges are provided in Section V below.

V. DEVELOPED CONDITIONS

The project site is zoned SU-1 (Special Use Zone), with portions designated for development as C-2 (Community Commercial) and IP (Industrial Park). The conceptual grading and associated drainage basin boundaries are based on the existing topography, existing tract lines, and the location of proposed roadways (Daytona Road and 94th Street). There are no development plans currently available for the project site to inform developed conditions hydrologic modeling, so various assumptions have been made. Tracts 1, 10, and the southerly portion of Tract 2 have been analyzed as one drainage area (i.e. draining to one detention pond) because it is anticipated that tract lines will shift as this portion of the site is developed. All tracts have been assumed to consist of 85 percent imperviousness in the developed condition based on the City of Albuquerque zoning code for C-2 and IP zoning requiring 15 percent (minimum) landscaping. This is a conservative estimate considering that the recently constructed FedEx Ground facility to the east of Tract 6 is approximately 75 percent impervious. ROW areas are assumed to be 90 percent impervious.

A. OFFSITE DRAINAGE

This report assumes that all offsite flows that currently impact the project site will continue to do so in perpetuity. This differs from the *Amole-Hubbell Drainage Master Plan Update* (Wilson & Company, 2013), which assumed that existing runoff from west of 98th Street would be diverted to the south in the ultimate condition. Given the vast majority of this runoff originates on I-40 ROW and topography would make it difficult to divert flows from drainage subbasins OS-4 and OS-5 to the south, this conservative approach is more appropriate. This revision to the *Amole-Hubbell Drainage Master Plan Update* does not result in increased flows downstream of the project site compared to that DMP (because of the proposed onsite detention), as further described in Section V.C. If this offsite flow from west of 98th Street is diverted away from the project site in the future, there may be an opportunity to reduce the size of or eliminate onsite detention pond(s) based on further analysis.

B. CONCEPTUAL DRAINAGE PLAN

Three options have been developed to allow flexibility as the project site is developed in accommodating offsite flows from the I-40 ROW and from west of 98th Street. Each option is further described below and are illustrated on Exhibit 3 – Developed Conditions Drainage Map. This conceptual drainage plan is intended to support the design of drainage improvements (detention pond sizing, backbone storm drain sizing, etc.) as the project site is developed.

The analyses and assumptions presented herein support the conceptual drainage plan recommendations and do not eliminate the obligation of engineers responsible for future design of the project site to ensure the appropriateness of their design. If development of the project site encounters constraints that are not addressed by this conceptual plan, revisions should be evaluated to ensure the existing downstream capacity is not exceeded.

Detention ponds to accommodate onsite flows are conceptually sized to provide first flush retention (runoff volume associated with 0.44-inch rainfall minus 0.10-inch initial abstraction from all onsite impervious areas) in the pond bottom at a depth of 1 foot and the conceptual pond footprints shown on Exhibit 3 reflect this assumption. As each pond is designed in conjunction with the project site's development and if it is determined that the soils will accommodate greater retention depth while still satisfying City of Albuquerque design criteria for stormwater disposal (or some other method of disposal is employed that satisfies COA criteria), the pond footprint could be reduced and the depth increased. The estimated detention volume requirements for ponds (of which first flush retention volume may be a part) is based on the allowable discharge determined by the existing downstream capacity and the assumption that contributing onsite drainage areas will be developed as 85 percent impervious (a conservative estimate). If future development plans show that a tract or portion of a tract will be less than 85 percent impervious, less detention volume would be necessary to satisfy the allowable discharge criteria established by this report. The pond footprint, depth, location, outlet structure, and other design details may vary from the estimates and assumptions provided below so long as the capacity of downstream infrastructure is not exceeded. Outlet structures in particular should be further evaluated during final design to ensure that conveyance capacity, clogging potential, water quality criteria, etc. are adequately addressed.

For master planning purposes, it has been assumed that each existing tract will contain one detention pond (except in the case of tracts 1, a portion of 2 that drains south, and 10 which are assumed to all drain to one pond). As development of the project site occurs, additional ponds may be constructed within each tract if required. Additional basins within each tract shall be sized based on the allowable unit discharge criteria identified in this report. ROW associated with Bluewater Road, Daytona Road, and 94th Street will discharge freely to the associated storm drain systems.

For the purposes of this study (intended to develop drainage concepts for the project site), the outlet structure for ponds has been assumed to be either City of Albuquerque (COA) Type D (single or double, depending on the flowrate) storm inlets or storm drains with a headwall inlet condition. The Type D inlet maximizes the conveyance capacity while limiting the necessary headwater depth (and associated pond depth) since the pond footprint has been assumed based on providing first flush retention in the bottom 1 foot of each basin. Alternative outlet structures are acceptable and should be evaluated during final design. Alternative outlet structures may be preferable if deeper ponds with smaller footprints are proposed or if clogging of the Type D inlet is of concern, as long as the allowable discharge is not exceeded and other COA pond design criteria are satisfied. The outlet structure for ponds that accommodate offsite flows or a combination of onsite and offsite flows are assumed to be storm drain with the pipe flowline set 1 foot above the pond bottom. The size of outlet pipe depends on the desired pond peak outflow discharge and peak storage depth.

1. ALLOWABLE DISCHARGES

Allowable discharges from the project site are limited by the capacity of existing downstream storm drain systems summarized in Table 1. Table 2 summarizes the allowable discharges per unit area (cfs per acre) for each tract and option (where applicable). The various drainage options are discussed further below, and allowable discharge calculations are provided in Appendix C.

Table 2 – Allowable Discharge Summary

Tract & Option	Allowable Unit Discharge[1] (cfs/ac)	Drainage Area (ac)	Allowable Discharge (cfs)
Tract 1 – Options A & B	1.5	32.7	48.8
Tract 1 – Option C	0.6	32.7	19.5
Tract 2 – All Options (North, drains to Daytona Road storm drain)	3.1	9.5	29.4
Tract 2 – Options A & B (South, drains to Bluewater Road storm drain)	1.5	4.3	6.4
Tract 2 – Option C (South, drains to Bluewater Road storm drain)	0.6	4.3	2.6
Tract 3[2] – All Options	3.1	5.7	17.5
Tract 6 – All Options	3.2	14.6	46.7
Tract 7 – All Options	3.2	14.6	46.3
Tract 9 – Options A & B	1.5	16.1	24.0
Tract 9 – Option C	0.6	16.1	9.6
Tract 10 – Options A & B	1.5	7.3	10.8
Tract 10 – Options C	0.6	7.3	4.3
Tract 11 – Options A & B	1.5	16.7	24.9
Tract 11 – Option C	0.6	16.7	10.0

[1] Refer to Appendix C for Allowable Unit Discharge calculations, based on downstream capacity, free discharge from ROW, and accommodation of offsite flows.

[2] Tract 3 is not a part of this Master Drainage Report, but a developed condition allowable discharge is provided based on the assumption that all tracts draining to Daytona Road will be held to the same detention requirements.

2. BLUEWATER ROAD DRAINAGE AREAS – OPTION A

Option A consists of a detention pond along the western boundary of Tract 1 to capture and attenuate offsite flows from I-40 ROW. This pond would allow sediment to drop out and would be drained by an 18-inch storm drain (with an associated peak outflow of approximately 20 cfs) that passes through Tract 1 within a new drainage easement and connects to the proposed storm drain in 94th Street, which will connect to the existing storm drain in Bluewater Road. Other detention ponds will be provided to accommodate onsite flows only, will discharge to the existing or proposed storm drains in the adjacent public roadways, and ensure downstream capacities are not exceeded. The conceptual size and design parameters for proposed ponds based on the HEC-HMS modeling are provided in Table 3.

Table 3 – Option A Pond Summary

Pond Location (HEC-HMS name)	First Flush Volume (ac-ft)	Detention Volume (ac-ft)	Peak Inflow (cfs)	Peak Outflow (cfs)	Max Detention Depth (ft)	Outlet Structure
Tract 1 – offsite flows (B_OS-P2)	N/A	2.66	82	10	2.7	1-18" Storm Drain
Tract 9 (B_TR9)	0.39	1.51	62	24	2.0	COA Single Type D (Std. Dtl. 2206)
Tract 10 (B_TR10)	1.07	4.04	170	66	2.4	COA Double Type D (Std. Dtl. 2206)
Tract 11 (B_TR11)	0.40	1.59	64	23	2.0	COA Single Type D (Std. Dtl. 2206)

The benefits of Option A include:

- The offsite drainage solution is accommodated in a centralized location at the rear of the site away from the primary points of access along Bluewater Road and Daytona Road/94th Street.
- Each tract can be developed without providing for offsite flows in their detention pond design.
- The large existing retention pond on Tract 10 (a FEMA Zone A) is no longer necessary to accommodate offsite flow and the developable area of Tract 10 is increased. A relatively small detention pond will still be required on Tract 10 to accommodate onsite flows.

3. BLUEWATER ROAD DRAINAGE AREAS – OPTION B

Option B consists of a trainer dike (or other structure to capture offsite flows along the western boundary of Tract 1) and channel within a new drainage easement to convey offsite flows to a detention pond on Tract 10. This pond would accommodate these offsite flows as well as onsite flows (assumed for the purposes of this study to be from tracts 1, a portion of 2 that drains south, and 10) and thus would require greater volume than the pond in the same location for Options A or C (as a result of the increased offsite flows). The other detention ponds will be provided to accommodate onsite flows only. All ponds will discharge to the existing or proposed storm drains in the adjacent public roadways and ensure downstream capacities are not exceeded. The conceptual size and design parameters for proposed ponds based on the HEC-HMS modeling are provided in Table 4.

Table 4 – Option B Pond Summary

Pond Location (HEC-HMS name)	First Flush Volume (ac-ft)	Detention Volume (ac-ft)	Peak Inflow (cfs)	Peak Outflow (cfs)	Max Detention Depth (ft)	Outlet Structure
Tract 9 (B_TR9)	0.39	1.51	62	24	2.0	COA Single Type D (Std. Dtl. 2206)
Tract 10 (B_TR10)	1.07	6.70	248	66	4.0	1-36" Storm Drain
Tract 11 (B_TR11)	0.40	1.59	64	23	2.0	COA Single Type D (Std. Dtl. 2206)

The benefits of Option B include:

- The 'regional' pond would be located in approximately the same location as the existing retention pond.
- One less pond would be required than proposed under Option A.

The proposed channel to convey offsite flows through Tract 1 would need to be armored to prevent erosion due to the natural topography that will cause flow velocities in excess of those allowable for earthen channels. The channel could also be replaced by a storm drain sized to convey the 100-year flow if it is preferred based on cost, future site planning, or other factors.

4. BLUEWATER ROAD DRAINAGE AREAS – OPTION C

Option C consists of a trainer dike (or other structure to capture offsite flows along the western boundary of Tract 1) and channel within a new drainage easement, similar to Option B. Rather than conveying offsite flows to a pond, this channel will convey flows to an inlet structure that drains to the proposed storm drain in 94th Street. Detention ponds that ultimately outfall to Bluewater Road will be provided to accommodate onsite flows, like Options A and B, but will provide additional volume and attenuation to account for the offsite flows that would free discharge into the downstream storm drain. All ponds will discharge to the existing or proposed storm drains in the adjacent public roadways and ensure downstream capacities are not exceeded. The conceptual size and design parameters for proposed ponds based on the HEC-HMS modeling are provided in Table 5.

Table 5 – Option C Pond Summary

Pond Location (HEC-HMS name)	First Flush Volume (ac-ft)	Detention Volume (ac-ft)	Peak Inflow (cfs)	Peak Outflow (cfs)	Max Detention Depth (ft)	Outlet Structure
Tract 9 (B_TR9)	0.39	1.87	62	9	2.7	1-24" Storm Drain
Tract 10 (B_TR10)	1.07	5.14	170	24	3.5	1-36" Storm Drain
Tract 11 (B_TR11)	0.40	1.94	64	10	2.8	1-24" Storm Drain

The benefits of Option C include:

- No 'regional' pond is necessary and no one tract is burdened more than others with providing detention volume to accommodate offsite flows.
- One less pond would be required than proposed under Option A.

5. DAYTONA ROAD AND LOS VOLCANES ROAD DRAINAGE AREAS

The proposed drainage concept for the northeast portion of the project site (shown on Exhibit 3, sheet 1 of 4), which drains to the Unser Diversion Channel System, is based on the capacity of immediately downstream existing storm drain systems and allowable discharges discussed above. This portion of the project site is unaffected by the various options for addressing offsite flows that are described above. A drainage easement (to be dedicated in conjunction with future development) is proposed on Tract 2 to allow offsite flows from I-40 to be conveyed to Tract 3, maintaining the existing condition. The existing storm drain systems in Daytona Road and Los Volcanes Road will need to be extended to the west to provide an outfall for the detention ponds on Tract 2 and Tract 7, respectively. If the future detention pond(s) on Tract 6 are not located in the southeast corner of the site, allowing for connection to the existing storm drain manhole in Los Volcanes Road, extension of this storm drain may be necessary to accommodate development of Tract 6. Based on the allowable discharge from the portion of Tract 2 that drains east, a 24-inch storm drain should be extended west in Daytona Road. Based on the allowable discharge from Tract 7, a 24-inch storm drain should be extended west in Los Volcanes Road (assumed to be at 6 percent slope based on the existing road profile). Tract 3 is not a part of the project site. It is assumed that when Tract 3 is developed, a detention pond will be constructed to restrict outflow the allowable unit discharge presented herein. This assumed future condition is reflected in the developed conditions HEC-HMS modeling. The conceptual size and design parameters for proposed ponds based on the HEC-HMS modeling are provided in Table 6.

Table 6 – Tracts 2, 6, and 7 Pond Summary

Pond Location (HEC-HMS name)	First Flush Volume (ac-ft)	Detention Volume (ac-ft)	Peak Inflow (cfs)	Peak Outflow (cfs)	Max Detention Depth (ft)	Outlet Structure
Tract 2 (B_TR2-1)	0.23	0.81	37	28	1.8	COA Double Type D (Std. Dtl. 2206)
Tract 6 (B_TR6)	0.35	0.84	54	44	2.1	COA Double Type D (Std. Dtl. 2206)
Tract 7 (B_TR7)	0.35	0.84	55	41	2.1	COA Double Type D (Std. Dtl. 2206)

C. COMPARISON TO PREVIOUS DRAINAGE MASTER PLANS

The *Amole-Hubbell Drainage Master Plan Update* (DMP Update) (Wilson & Company, 2013) is the most current DMP that addresses the portion of the site draining to Bluewater Road. This report's drainage basin boundaries west of 98th Street differ from the DMP Update because it is assumed that flows that currently impact the project site will continue to do so in perpetuity. The DMP Update proposed that drainage areas west of 98th Street be diverted to the south on the west side of 98th Street but it is unknown if or when that diversion may occur. The allowable discharges and detention ponds proposed by this report ensure that the increased drainage area contributing to the Bluewater Road storm drain will not increase the storm drain peak discharge. Table 7 provides comparisons at equivalent analysis points for the DMP Update and the drainage concept proposed by this report.

The *I-40 South and Unser Mini Drainage Master Plan* (Easterling Consultants, November 2014) addresses the portion of the site draining to Daytona Road and Los Volcanes Road and then to the Unser Diversion Channel System (UDC). The Mini DMP analyzed the capacity of the UDC considering the reduced flows resulting from construction of the West I-40 Drainage Channel and concluded that this portion of the project site may discharge freely to the UDC (based on 90 percent imperviousness development, more conservative than assumed for this report). The proposed drainage concept differs from the assumption of the Mini DMP by providing onsite detention ponds to ensure the capacity of existing storm drain infrastructure upstream of the UDC is not exceeded, since the capacity of the two, downstream storm drain systems are the downstream constraint rather than the UDC. Existing storm drain capacity calculations are documented in the Allowable Discharge

Calculations (Appendix C). Table 7 provides comparisons at equivalent analysis points for the Mini DMP and the drainage concept proposed by this report. Note that the proposed drainage concept routes less onsite drainage area through the Daytona Road storm drain and more through the Los Volcanes Road storm drain. However, the combined discharge, proposed by this report, is less than the allowable discharge stated in the Mini DMP, and the capacities of the two, downstream storm drain systems are not exceeded.

Table 7 – Comparison to Previous Drainage Master Plans

Location	**Westpoint 40 MDR (cfs)**		**Amole-Hubbell DMP Update (2013)**		**I-40 South & Unser Mini DMP (2014)**	
	Analysis Point	**Discharge (cfs)**	**Analysis Point**	**Discharge (cfs)**	**Analysis Point**	**Discharge (cfs)**
Bluewater Road storm drain at 94th Street[1]	J_BW2 - Option A	107	Pond TB1A outflow	180	N/A	
	J_BW2 - Option B	97				
	J_BW2 - Option C	110				
Bluewater Road storm drain west of 90th Street[1]	J_BW3 - Option A	137[2]	Pond TB1A + Pond TB1B	294	N/A	
	J_BW3 - Option B	127[2]				
	J_BW3 - Option C	122[2]				
Daytona Road at east boundary of Tract 3[2]	J_DAYT-CONN	72	N/A		AP-1.1	91.9
Los Volcanes Road at east boundary of Tract 6[3]	J_LV-CONN	88	N/A		AP-6	69.2

[1] Total flow in Bluewater Road storm drain.

[2] Includes this report's HEC-HMS model results at junction J_BW3 and 5.3cfs outflow from Village at Avalon Apartments detention basin per the approved Grading and Drainage Plan, sheet CG-502 (Isaacson & Arfman P.A., signed 12/9/2015).

[3] Estimated surface flow and storm drain flow in Daytona Road, west of Bruckner's Truck Stop.

[4] Estimated surface flow and storm drain flow in Los Volcanes Road, at proposed connection to existing manhole near southwest corner of FedEx Ground property.

D. TRACT 10 RETENTION POND

Development downstream of the project site is currently protected by the existing retention pond on Tract 10. For each developed condition option, this existing pond should remain in the interim until new drainage infrastructure is constructed to accommodate both onsite flows from the project site and offsite flows from the north. After drainage infrastructure has been constructed (the location and size of which depends on the various options presented in this report), the pond may be eliminated or reduced in size. Similarly, the existing Zone A SFHA associated with this pond may be eliminated or reduced in size through the FEMA map revision processes (CLOMR and/or LOMR).

E. BACKBONE STORM DRAIN DESIGN

Street capacity analysis was performed based on preliminary roadway profiles for the Daytona Road and 94th Street extension, as well as for the portions of future Bluewater Road improvements. This analysis shows that the proposed 36-foot wide (Daytona Road and 94th Street) and 48-foot wide roadways satisfy COA street hydraulic design criteria provided in Chapter 22, Section 3.E of the COA DPM (100-year flow depth less than 0.2 feet above the top of curb and contained within the ROW, 10-year flow depth less than 0.5 feet). As a result, new storm drain inlets will only be necessary in sump conditions. These storm drain inlets shall be designed for the discharges provided in Table 8.

Table 8 – Storm Drain Inlet Design Discharge Summary

Drainage Area[1]	Design Discharge[2] (cfs)	Contributing Drainage Areas
BW2	7	BW1 & BW2
DY2	8	DY2

[1] Refer to Exhibit 3 – Developed Conditions Drainage Map for reference.
[2] Rounded to nearest 1 cfs.

To provide an outfall from future detention pond(s) in Tract 1 and the portion of Tract 2 that drains to Bluewater Road, a storm drain ranging in size from 42 inches to 18 inches should be extended north in 94th Street. The minimum size required for this storm drain will depend on how offsite flows from west of the project size are accommodated (i.e. Options A, B, or C) and the development of Tracts 1 and 2. To allow for flexibility in future development, the range of storm drain sizes specified above is based on the capacity of the existing downstream storm drain in Bluewater Road (145 cfs for the 42-inch RCP at 1.8 percent) and the allowable unit discharges for Tracts 1 and 2 (specified in Table 2). Extensions of existing storm drains within Daytona Road and Los Volcanes Road will be necessary to convey outflow from proposed detention ponds on Tract 2 and Tract 7, respectively. These storm drain extensions are discussed further in Section V.B.5 above. These storm drain extensions are not necessary to accommodate roadway drainage which may continue to drain in the historical direction.

VI. GRADING PLAN

The assumed developed conditions drainage patterns are reflected on Exhibit 3 – Developed Conditions Drainage Map. No grading plan for the overall project site is available at this time.

VII. CALCULATIONS

A. HYDROLOGY

Hydrologic analysis of the existing and developed conditions for the 100-year, 6-hour design storm was performed using the Hydrologic Modeling System software developed by the Hydrologic Engineering Center (HEC-HMS, version 4.1). The digital HEC-HMS models are provided in Appendix E. HEC-HMS was applied using methodologies recommended by the AMAFCA *HEC-HMS White Paper*, including:

- Precipitation data is from NOAA Atlas 14 for the project site.
- Rainfall distribution was modeled using the “Frequency Storm” method in HEC-HMS with an intensity position of 25 percent.
- Rainfall losses were estimated using the SCS Curve Number (CN) Method.
- Runoff transformation was modeled using the SCS Unit Hydrograph transform.

Pervious curve numbers were determined for each subbasin using Table 2-2 of the NRCS’s *Urban Hydrology for Small Watersheds* (TR-55), and calculations are provided in Appendix A. Percent impervious was entered into HEC-HMS along with the pervious curve number to allow the software to develop the final weighted curve number and calculate the associated rainfall losses. The percent impervious for existing subbasins was measured based on aerial photography. Onsite subbasins that will be developed are assumed to be 85 percent imperviousness based on zoning code landscape requirements.

Lag time was calculated as 0.6 times the time of concentration (Tc) for each subbasin, with a minimum Tc of 12 minutes, based on recommendations in TR-55. Time of concentration was calculated using methods consistent with Chapter 22, Section 2 of the COA DPM. Calculations are provided in Appendix A.

Outlet structures for the conceptual developed conditions detention ponds were modeled in HEC-HMS. The stage-discharge relationship of the Type D storm inlets was modeled using the weir equation based on the open length of the structure grates (excluding bars). The capacity of storm drains with a headwall inlet was modeled as a culvert with assumed length and slope to ensure that they will function under inlet control. The stage-discharge relationship of proposed outlet structures (including consideration of weir flow and orifice flow and potential impacts of downstream conveyance systems) should be evaluated based on final design characteristics. If an outlet structure may be impacted by flow in the storm drain to which it discharges (i.e. the downstream hydraulic grade line is higher than the pond bottom) this should be evaluated during final design.

Sediment bulking has not been considered. For the developed conditions analysis, onsite runoff will be primarily from impervious areas, and sediment discharge should be negligible. Offsite runoff will likely be conveyed through desiltation ponds designed to limit the sediment that enters critical drainage infrastructure.

B. HYDRAULICS

The normal depth capacity of existing and proposed storm drains was analyzed, which assumes the pipe flowing under gravity flow. Existing pipe sizes, materials, and slopes are taken from as-built plans. Proposed pipes are assumed to be reinforced concrete (RCP) with a Manning's n of 0.013. Normal depth calculations are provided in Appendix B.

C. FIRST FLUSH RETENTION

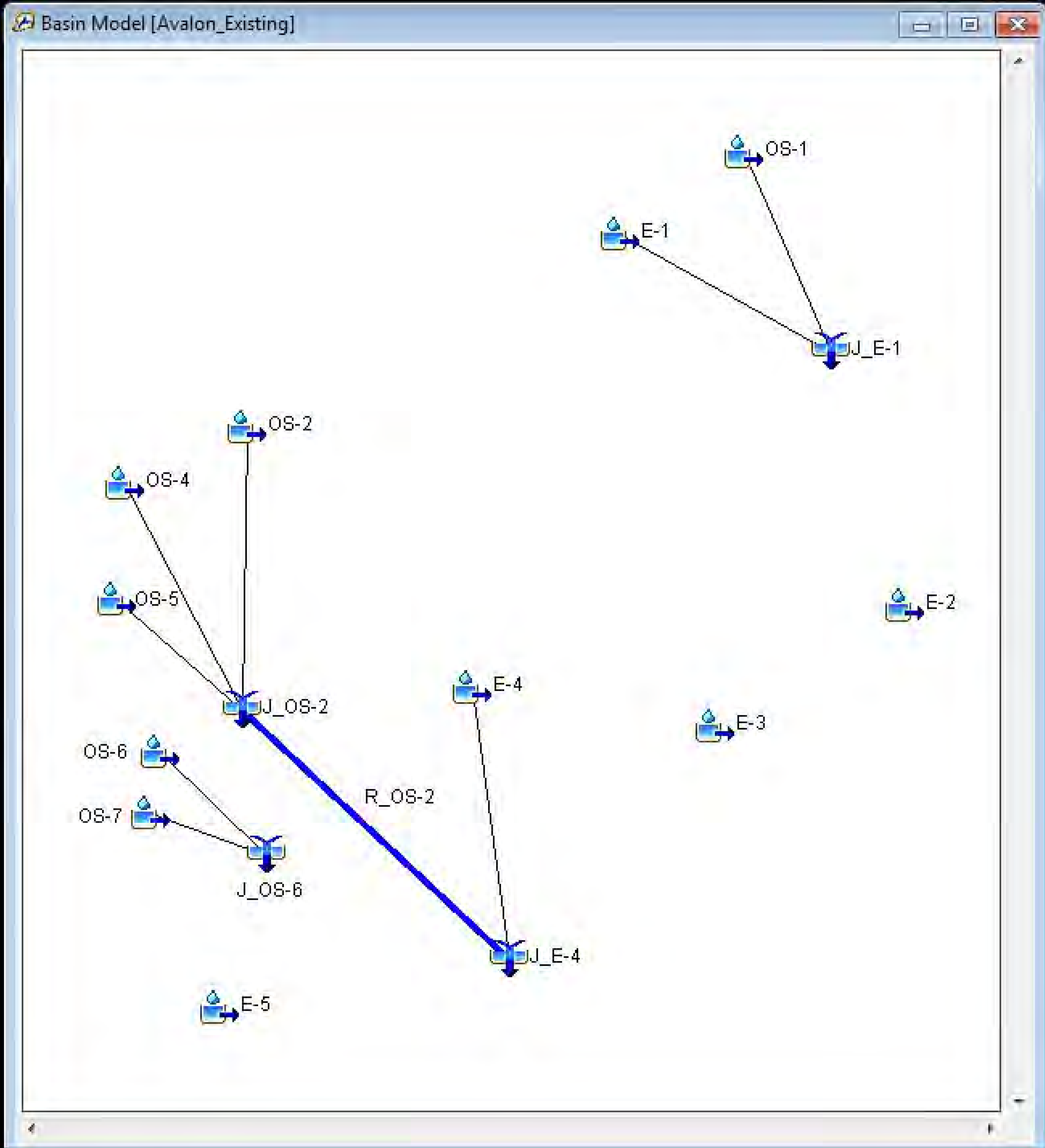
First flush retention volume ("design standard volume") requirements, in accordance with COA Development Process Manual (DPM) Chapter 22, Section 11, are based on 0.34 inches of runoff from onsite impervious areas. The DPM defines the first flush volume as runoff from impervious surfaces from the 90th percentile storm (0.44-inch). The COA allows 0.10 inches of initial abstraction to be excluded from the 0.44-inch rainfall depth, resulting in a design depth of 0.34 inches.

VIII. CONCLUSION

This Master Drainage Report provides the drainage concept to support development of the Westpoint 40 project site in accordance with the City of Albuquerque drainage design criteria provided in the Development Process Manual. Proposed drainage improvements are based on existing drainage patterns and existing downstream capacities. Options are provided to accommodate offsite flows from I-40 ROW to allow for flexibility as the site develops.

APPENDIX A – HYDROLOGIC ANALYSIS
SUPPORTING DATA

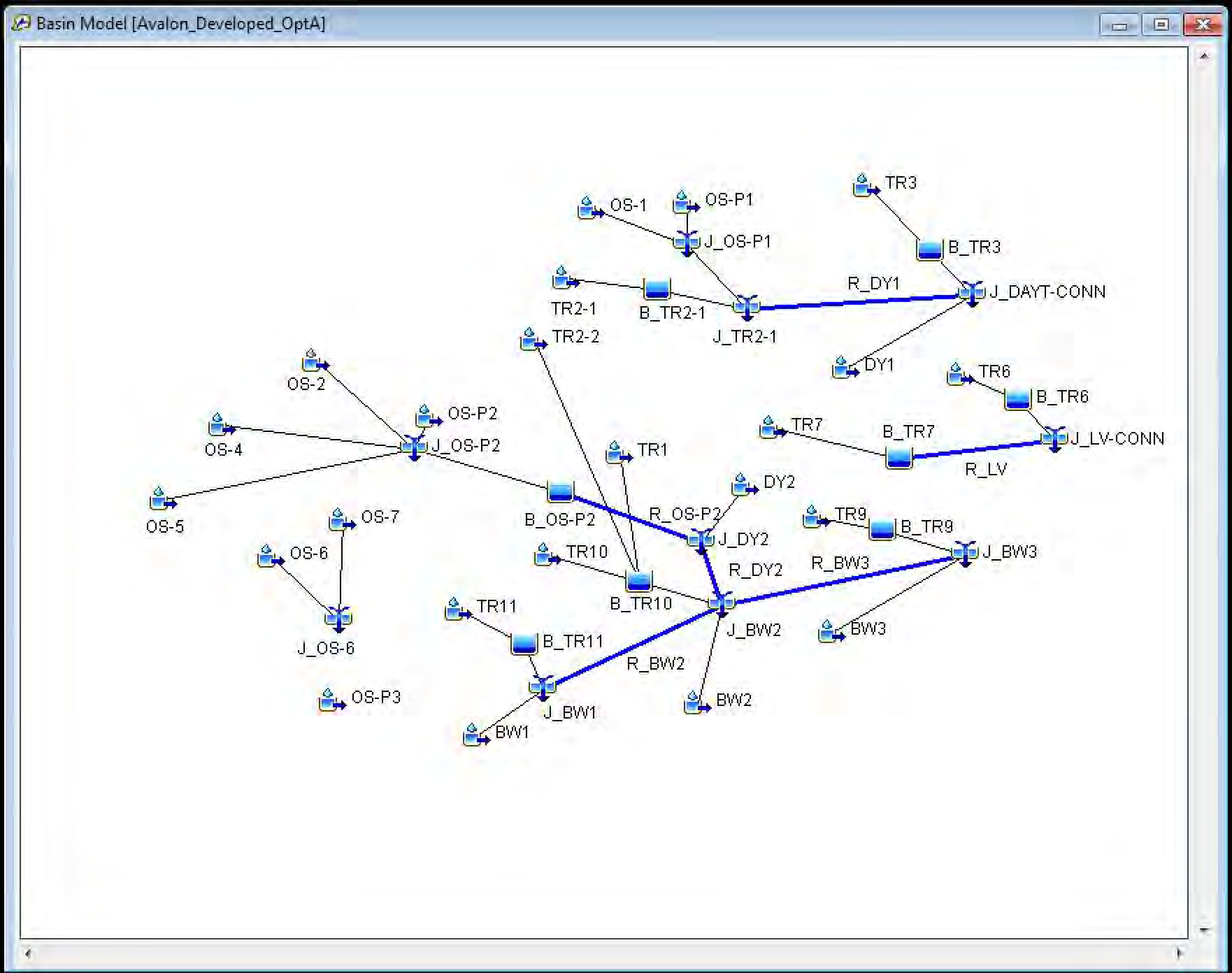
1. HEC-HMS Hydrologic Model Results Summary – Existing Conditions
2. HEC-HMS Hydrologic Model Results Summary – Developed Conditions, Option A
3. HEC-HMS Hydrologic Model Results Summary – Developed Conditions, Option B
4. HEC-HMS Hydrologic Model Results Summary – Developed Conditions, Option C
5. NOAA 14 Rainfall Data
6. NRCS Soil Survey Map
7. Weighted Curve Number Calculations
8. Lag Time Calculations


Basin Model [Avalon_Existing]
OS-1
E-1
J_E-1
OS-2
OS-4
OS-5
E-2
E-4
J_OS-2
E-3
OS-6
R_OS-2
OS-7
J_OS-6
J_E-4
E-5

Project: 20180059_AvalonUnit5 Simulation Run: Existing_100Yr-6Hr

Start of Run: 01Jan2001, 00:00 Basin Model: Avalon_Existing
End of Run: 02Jan2001, 00:00 Meteorologic Model: Frequency-100Yr-6
Compute Time: 10Aug2017, 11:43:41 Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
E-1	0.02009	8.3	01Jan2001, 01:40	0.43
E-2	0.04866	27.9	01Jan2001, 01:44	0.54
E-3	0.07215	5.7	01Jan2001, 01:54	0.12
E-4	0.06520	7.6	01Jan2001, 01:50	0.19
E-5	0.00836	0.2	01Jan2001, 02:04	0.04
J_E-1	0.03023	22.0	01Jan2001, 01:42	0.70
J_E-4	0.12451	72.1	01Jan2001, 01:44	0.56
J_OS-2	0.05931	66.1	01Jan2001, 01:40	0.97
J_OS-6	0.00606	17.5	01Jan2001, 01:38	2.23
OS-1	0.01014	13.8	01Jan2001, 01:42	1.24
OS-2	0.01791	20.4	01Jan2001, 01:40	0.92
OS-4	0.01914	21.7	01Jan2001, 01:40	0.97
OS-5	0.02226	24.3	01Jan2001, 01:42	1.00
OS-6	0.00281	8.1	01Jan2001, 01:38	2.23
OS-7	0.00325	9.4	01Jan2001, 01:38	2.23
R_OS-2	0.05931	65.2	01Jan2001, 01:42	0.97

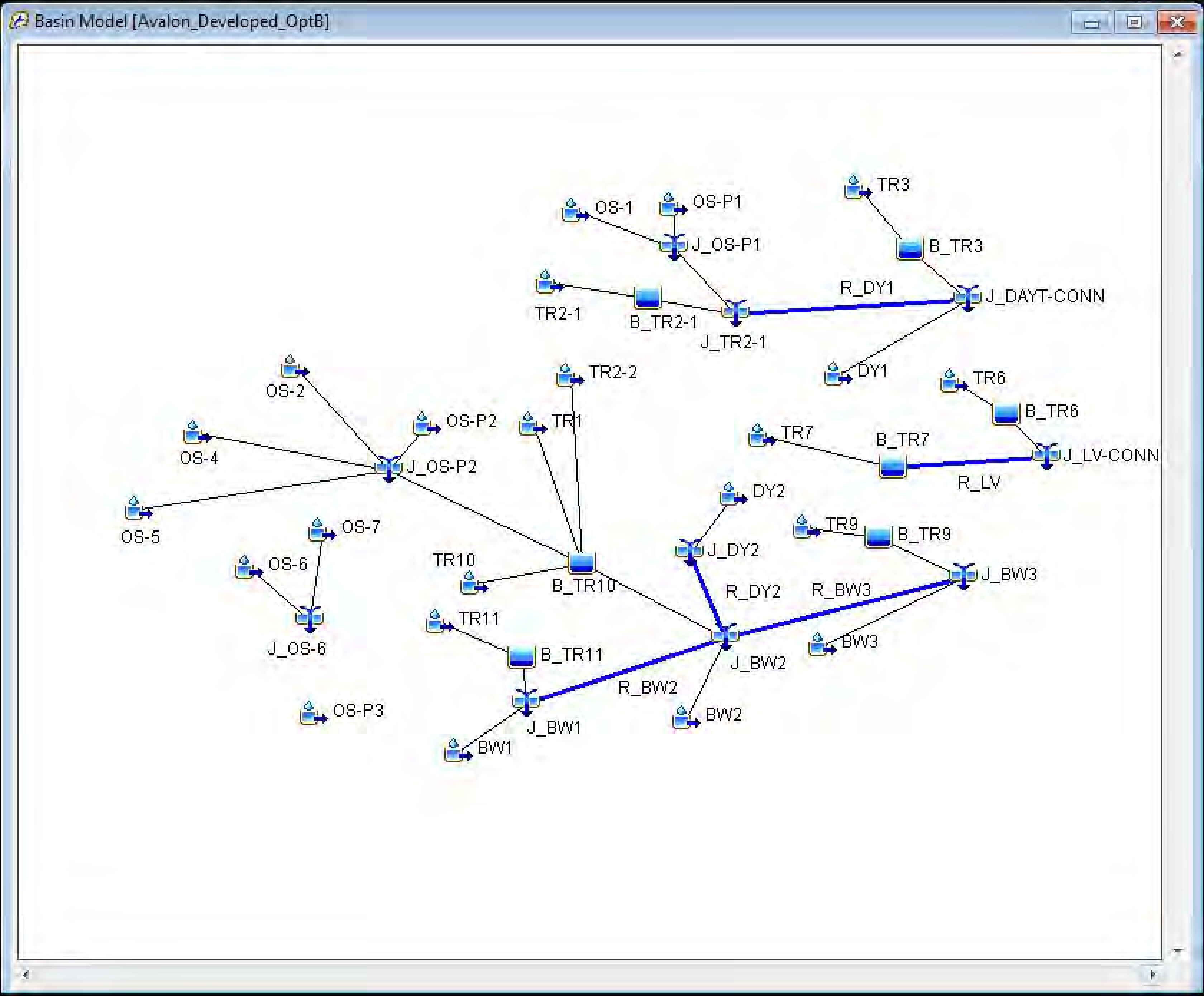

Basin Model [Avalon_Developed_OptA]
TR3
OS-1
OS-P1
J_OS-P1
B_TR3
R_DY1
J_DAYT-CONN
TR2-1
B_TR2-1
J_TR2-1
TR2-2
DY1
TR6
B_TR6
OS-2
OS-P2
OS-4
J_OS-P2
TR7
B_TR7
J_LV-CONN
R_LV
TR1
DY2
OS-5
B_OS-P2
R_OS-P2
TR9
B_TR9
OS-7
J_DY2
OS-6
TR10
J_BW3
R_DY2
R_BW3
B_TR10
TR11
J_OS-6
J_BW2
BW3
B_TR11
R_BW2
OS-P3
J_BW1
BW2
BW1

Project: 20180059_AvalonUnit5 Simulation Run: Devel_100Yr-6Hr-OptA

Start of Run:	01Jan2001, 00:00	Basin Model:	Avalon_Developed_
End of Run:	02Jan2001, 00:00	Meteorologic Model:	Frequency-100Yr-6
Compute Time:	23Aug2017, 12:31:35	Control Specifications:	Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
BW1	0.00239	6.2	01Jan2001, 01:38	0.26
BW2	0.00085	2.2	01Jan2001, 01:38	0.09
BW3	0.00143	3.7	01Jan2001, 01:38	0.15
B_OS-P2	0.07759	9.6	01Jan2001, 02:18	3.14
B_TR10	0.06908	65.9	01Jan2001, 01:52	5.40
B_TR11	0.02604	23.1	01Jan2001, 01:52	1.87
B_TR2-1	0.01491	28.2	01Jan2001, 01:44	1.53
B_TR3	0.00884	17.3	01Jan2001, 01:44	0.72
B_TR6	0.02283	44.0	01Jan2001, 01:44	1.94
B_TR7	0.02258	44.0	01Jan2001, 01:44	1.91
B_TR9	0.02516	23.7	01Jan2001, 01:52	1.83
DY1	0.00225	5.8	01Jan2001, 01:38	0.24
DY2	0.00527	9.2	01Jan2001, 01:48	0.57
J_BW1	0.02843	25.5	01Jan2001, 01:50	2.12
J_BW2	0.18122	106.7	01Jan2001, 01:52	11.33
J_BW3	0.20781	131.5	01Jan2001, 01:52	13.31
J_DAYT-CONN	0.04183	71.6	01Jan2001, 01:42	3.54
J_DY2	0.08286	15.0	01Jan2001, 01:54	3.71
J_LV-CONN	0.04541	87.9	01Jan2001, 01:44	3.85
J_OS-P1	0.01583	22.3	01Jan2001, 01:40	1.06
J_OS-P2	0.07759	82.2	01Jan2001, 01:40	3.82
J_OS-6	0.00607	17.5	01Jan2001, 01:38	0.72
J_TR2-1	0.03074	49.8	01Jan2001, 01:42	2.58
OS-P1	0.00568	9.0	01Jan2001, 01:40	0.39
OS-P2	0.01827	16.5	01Jan2001, 01:42	0.76
OS-P3	0.00285	1.7	01Jan2001, 01:46	0.09
OS-1	0.01015	13.8	01Jan2001, 01:42	0.67

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
OS-2	0.01791	20.4	01Jan2001, 01:40	0.88
OS-4	0.01915	21.8	01Jan2001, 01:40	0.99
OS-5	0.02226	24.3	01Jan2001, 01:42	1.19
OS-6	0.00282	8.1	01Jan2001, 01:38	0.34
OS-7	0.00325	9.4	01Jan2001, 01:38	0.39
R_BW2	0.02843	25.4	01Jan2001, 01:52	2.12
R_BW3	0.18122	106.5	01Jan2001, 01:52	11.33
R_DY1	0.03074	49.4	01Jan2001, 01:42	2.58
R_DY2	0.08286	15.0	01Jan2001, 01:56	3.71
R_LV	0.02258	43.9	01Jan2001, 01:44	1.91
R_OS-P2	0.07759	9.6	01Jan2001, 02:20	3.14
TR1	0.05107	125.3	01Jan2001, 01:38	5.23
TR10	0.01134	27.8	01Jan2001, 01:38	1.16
TR11	0.02604	63.9	01Jan2001, 01:38	2.67
TR2-1	0.01491	36.6	01Jan2001, 01:38	1.53
TR2-2	0.00667	16.4	01Jan2001, 01:38	0.68
TR3	0.00884	21.7	01Jan2001, 01:38	0.91
TR6	0.02283	54.2	01Jan2001, 01:40	2.34
TR7	0.02258	55.4	01Jan2001, 01:38	2.31
TR9	0.02516	61.7	01Jan2001, 01:38	2.58



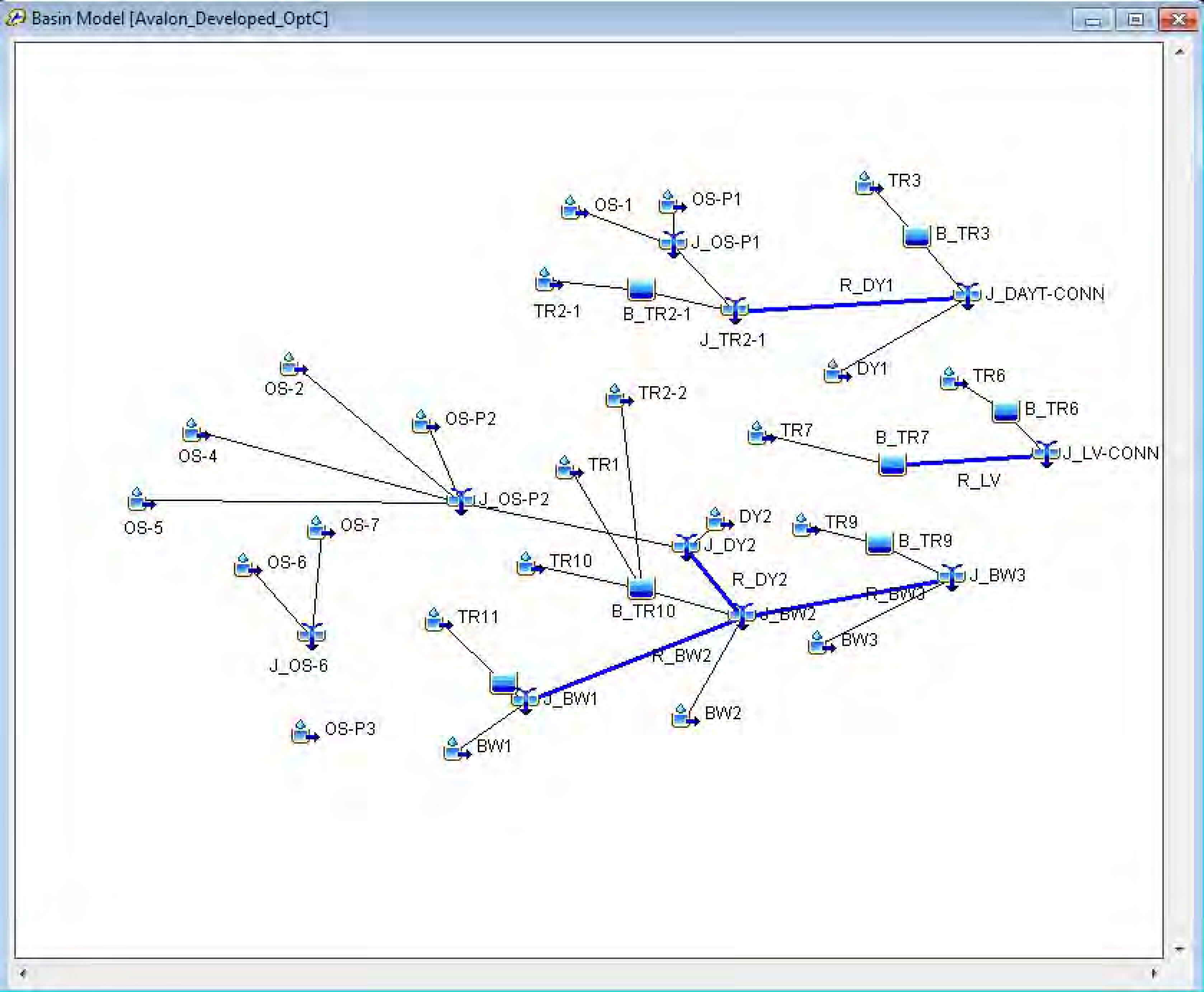
Basin Model [Avalon_Developed_OptB]
TR3
OS-1
OS-P1
J_OS-P1
B_TR3
R_DY1
J_DAYT-CONN
TR2-1
B_TR2-1
J_TR2-1
DY1
OS-2
TR2-2
TR6
OS-P2
TR1
B_TR6
OS-4
J_OS-P2
TR7
B_TR7
J_LV-CONN
R_LV
DY2
OS-5
OS-7
TR9
B_TR9
J_DY2
OS-6
TR10
B_TR10
J_BW3
R_DY2
R_BW3
J_OS-6
TR11
B_TR11
BW3
J_BW2
R_BW2
OS-P3
J_BW1
BW2
BW1

Project: 20180059_AvalonUnit5 Simulation Run: Devel_100Yr-6Hr-OptB

Start of Run:	01Jan2001, 00:00	Basin Model:	Avalon_Developed_
End of Run:	02Jan2001, 00:00	Meteorologic Model:	Frequency-100Yr-6
Compute Time:	23Aug2017, 12:31:53	Control Specifications:	Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
BW1	0.00239	6.2	01Jan2001, 01:38	0.26
BW2	0.00085	2.2	01Jan2001, 01:38	0.09
BW3	0.00143	3.7	01Jan2001, 01:38	0.15
B_TR10	0.14667	65.5	01Jan2001, 02:00	9.06
B_TR11	0.02604	23.1	01Jan2001, 01:52	1.87
B_TR2-1	0.01491	28.2	01Jan2001, 01:44	1.53
B_TR3	0.00884	17.3	01Jan2001, 01:44	0.72
B_TR6	0.02283	44.0	01Jan2001, 01:44	1.94
B_TR7	0.02258	44.0	01Jan2001, 01:44	1.91
B_TR9	0.02516	23.7	01Jan2001, 01:52	1.83
DY1	0.00225	5.8	01Jan2001, 01:38	0.24
DY2	0.00527	9.2	01Jan2001, 01:48	0.57
J_BW1	0.02843	25.5	01Jan2001, 01:50	2.12
J_BW2	0.18122	97.4	01Jan2001, 01:54	11.84
J_BW3	0.20781	121.6	01Jan2001, 01:54	13.82
J_DAYT-CONN	0.04183	71.6	01Jan2001, 01:42	3.54
J_DY2	0.00527	9.2	01Jan2001, 01:48	0.57
J_LV-CONN	0.04541	87.9	01Jan2001, 01:44	3.85
J_OS-P1	0.01583	22.3	01Jan2001, 01:40	1.06
J_OS-P2	0.07759	82.2	01Jan2001, 01:40	3.82
J_OS-6	0.00607	17.5	01Jan2001, 01:38	0.72
J_TR2-1	0.03074	49.8	01Jan2001, 01:42	2.58
OS-P1	0.00568	9.0	01Jan2001, 01:40	0.39
OS-P2	0.01827	16.5	01Jan2001, 01:42	0.76
OS-P3	0.00285	1.7	01Jan2001, 01:46	0.09
OS-1	0.01015	13.8	01Jan2001, 01:42	0.67
OS-2	0.01791	20.4	01Jan2001, 01:40	0.88

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
OS-4	0.01915	21.8	01Jan2001, 01:40	0.99
OS-5	0.02226	24.3	01Jan2001, 01:42	1.19
OS-6	0.00282	8.1	01Jan2001, 01:38	0.34
OS-7	0.00325	9.4	01Jan2001, 01:38	0.39
R_BW2	0.02843	25.4	01Jan2001, 01:52	2.12
R_BW3	0.18122	97.4	01Jan2001, 01:56	11.84
R_DY1	0.03074	49.4	01Jan2001, 01:42	2.58
R_DY2	0.00527	9.2	01Jan2001, 01:48	0.57
R_LV	0.02258	43.9	01Jan2001, 01:44	1.91
TR1	0.05107	125.3	01Jan2001, 01:38	5.23
TR10	0.01134	27.8	01Jan2001, 01:38	1.16
TR11	0.02604	63.9	01Jan2001, 01:38	2.67
TR2-1	0.01491	36.6	01Jan2001, 01:38	1.53
TR2-2	0.00667	16.4	01Jan2001, 01:38	0.68
TR3	0.00884	21.7	01Jan2001, 01:38	0.91
TR6	0.02283	54.2	01Jan2001, 01:40	2.34
TR7	0.02258	55.4	01Jan2001, 01:38	2.31
TR9	0.02516	61.7	01Jan2001, 01:38	2.58


Basin Model [Avalon_Developed_OptC]
TR3
OS-1
OS-P1
J_OS-P1
B_TR3
R_DY1
J_DAYT-CONN
TR2-1
B_TR2-1
J_TR2-1
DY1
TR6
OS-2
TR2-2
B_TR6
OS-P2
TR7
B_TR7
J_LV-CONN
OS-4
TR1
R_LV
OS-5
J_OS-P2
DY2
TR9
OS-7
B_TR9
J_DY2
OS-6
TR10
J_BW3
R_DY2
R_BW3
B_TR10
J_BW2
TR11
BW3
J_OS-6
R_BW2
J_BW1
BW2
OS-P3
BW1

Project: 20180059_AvalonUnit5 Simulation Run: Devel_100yr-6Hr-OptC

Start of Run: 01Jan2001, 00:00 Basin Model: Avalon_Developed_
End of Run: 02Jan2001, 00:00 Meteorologic Model: Frequency-100Yr-6
Compute Time: 23Aug2017, 12:32:06 Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
BW1	0.00239	6.2	01Jan2001, 01:38	0.26
BW2	0.00085	2.2	01Jan2001, 01:38	0.09
BW3	0.00143	3.7	01Jan2001, 01:38	0.15
B_TR10	0.06908	24.1	01Jan2001, 02:06	5.39
B_TR11	0.02604	9.5	01Jan2001, 02:06	1.89
B_TR2-1	0.01491	28.2	01Jan2001, 01:44	1.53
B_TR3	0.00884	17.3	01Jan2001, 01:44	0.72
B_TR6	0.02283	44.0	01Jan2001, 01:44	1.94
B_TR7	0.02258	44.0	01Jan2001, 01:44	1.91
B_TR9	0.02516	9.2	01Jan2001, 02:06	1.82
DY1	0.00225	5.8	01Jan2001, 01:38	0.24
DY2	0.00527	9.2	01Jan2001, 01:48	0.57
J_BW1	0.02843	10.6	01Jan2001, 02:00	2.15
J_BW2	0.18122	110.4	01Jan2001, 01:42	12.02
J_BW3	0.20781	116.8	01Jan2001, 01:44	14.00
J_DAYT-CONN	0.04183	71.6	01Jan2001, 01:42	3.54
J_DY2	0.08286	89.6	01Jan2001, 01:42	4.39
J_LV-CONN	0.04541	87.9	01Jan2001, 01:44	3.85
J_OS-P1	0.01583	22.3	01Jan2001, 01:40	1.06
J_OS-P2	0.07759	82.2	01Jan2001, 01:40	3.82
J_OS-6	0.00607	17.5	01Jan2001, 01:38	0.72
J_TR2-1	0.03074	49.8	01Jan2001, 01:42	2.58
OS-P1	0.00568	9.0	01Jan2001, 01:40	0.39
OS-P2	0.01827	16.5	01Jan2001, 01:42	0.76
OS-P3	0.00285	1.7	01Jan2001, 01:46	0.09
OS-1	0.01015	13.8	01Jan2001, 01:42	0.67
OS-2	0.01791	20.4	01Jan2001, 01:40	0.88

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
OS-4	0.01915	21.8	01Jan2001, 01:40	0.99
OS-5	0.02226	24.3	01Jan2001, 01:42	1.19
OS-6	0.00282	8.1	01Jan2001, 01:38	0.34
OS-7	0.00325	9.4	01Jan2001, 01:38	0.39
R_BW2	0.02843	10.6	01Jan2001, 02:00	2.15
R_BW3	0.18122	109.6	01Jan2001, 01:44	12.02
R_DY1	0.03074	49.4	01Jan2001, 01:42	2.58
R_DY2	0.08286	89.6	01Jan2001, 01:42	4.39
R_LV	0.02258	43.9	01Jan2001, 01:44	1.91
TR1	0.05107	125.3	01Jan2001, 01:38	5.23
TR10	0.01134	27.8	01Jan2001, 01:38	1.16
TR11	0.02604	63.9	01Jan2001, 01:38	2.67
TR2-1	0.01491	36.6	01Jan2001, 01:38	1.53
TR2-2	0.00667	16.4	01Jan2001, 01:38	0.68
TR3	0.00884	21.7	01Jan2001, 01:38	0.91
TR6	0.02283	54.2	01Jan2001, 01:40	2.34
TR7	0.02258	55.4	01Jan2001, 01:38	2.31
TR9	0.02516	61.7	01Jan2001, 01:38	2.58

NOAA Atlas 14, Volume 1, Version 5
Location name: Albuquerque, New Mexico, USA*
Latitude: 35.085°, Longitude: -106.7413°
Elevation: 5235.19 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.168 (0.144-0.196)	0.217 (0.186-0.253)	0.292 (0.249-0.340)	0.351 (0.298-0.407)	0.431 (0.364-0.500)	0.493 (0.415-0.572)	0.559 (0.468-0.648)	0.629 (0.522-0.729)	0.724 (0.595-0.840)	0.800 (0.652-0.927)
10-min	0.255 (0.219-0.297)	0.331 (0.283-0.385)	0.444 (0.379-0.518)	0.534 (0.454-0.620)	0.655 (0.554-0.760)	0.750 (0.632-0.871)	0.851 (0.712-0.986)	0.958 (0.795-1.11)	1.10 (0.906-1.28)	1.22 (0.993-1.41)
15-min	0.316 (0.271-0.369)	0.409 (0.351-0.478)	0.551 (0.469-0.643)	0.661 (0.562-0.768)	0.813 (0.686-0.943)	0.930 (0.783-1.08)	1.06 (0.882-1.22)	1.19 (0.986-1.38)	1.37 (1.12-1.59)	1.51 (1.23-1.75)
30-min	0.425 (0.366-0.496)	0.552 (0.472-0.643)	0.742 (0.632-0.866)	0.891 (0.758-1.03)	1.09 (0.924-1.27)	1.25 (1.06-1.45)	1.42 (1.19-1.65)	1.60 (1.33-1.85)	1.84 (1.51-2.13)	2.03 (1.66-2.36)
60-min	0.527 (0.452-0.615)	0.683 (0.584-0.796)	0.918 (0.782-1.07)	1.10 (0.938-1.28)	1.35 (1.14-1.57)	1.55 (1.31-1.80)	1.76 (1.47-2.04)	1.98 (1.64-2.29)	2.28 (1.87-2.64)	2.52 (2.05-2.92)
2-hr	0.605 (0.517-0.714)	0.773 (0.661-0.916)	1.03 (0.874-1.21)	1.23 (1.04-1.44)	1.51 (1.27-1.77)	1.74 (1.46-2.03)	1.98 (1.65-2.31)	2.24 (1.84-2.61)	2.60 (2.11-3.02)	2.89 (2.33-3.37)
3-hr	0.652 (0.565-0.768)	0.831 (0.716-0.978)	1.09 (0.941-1.28)	1.30 (1.12-1.52)	1.58 (1.35-1.85)	1.82 (1.54-2.12)	2.06 (1.74-2.40)	2.33 (1.94-2.71)	2.69 (2.22-3.13)	2.99 (2.44-3.49)
6-hr	0.752 (0.656-0.876)	0.951 (0.830-1.11)	1.23 (1.07-1.43)	1.45 (1.26-1.68)	1.75 (1.51-2.02)	1.98 (1.70-2.29)	2.23 (1.90-2.57)	2.48 (2.11-2.87)	2.84 (2.39-3.29)	3.14 (2.61-3.63)
12-hr	0.843 (0.741-0.962)	1.06 (0.936-1.21)	1.35 (1.18-1.54)	1.58 (1.38-1.79)	1.88 (1.64-2.13)	2.12 (1.83-2.40)	2.36 (2.03-2.67)	2.61 (2.23-2.96)	2.96 (2.51-3.36)	3.24 (2.72-3.68)
24-hr	0.949 (0.841-1.08)	1.19 (1.06-1.35)	1.49 (1.32-1.69)	1.73 (1.53-1.95)	2.05 (1.81-2.32)	2.30 (2.02-2.59)	2.56 (2.24-2.88)	2.82 (2.45-3.17)	3.17 (2.74-3.57)	3.44 (2.96-3.88)
2-day	1.01 (0.896-1.13)	1.26 (1.12-1.42)	1.58 (1.40-1.77)	1.83 (1.62-2.04)	2.16 (1.91-2.41)	2.42 (2.13-2.70)	2.68 (2.36-2.99)	2.95 (2.58-3.29)	3.31 (2.88-3.70)	3.58 (3.10-4.01)
3-day	1.13 (1.02-1.25)	1.41 (1.27-1.56)	1.75 (1.58-1.93)	2.01 (1.81-2.22)	2.36 (2.13-2.61)	2.63 (2.36-2.91)	2.91 (2.60-3.21)	3.19 (2.84-3.52)	3.56 (3.15-3.93)	3.84 (3.38-4.24)
4-day	1.26 (1.15-1.38)	1.56 (1.43-1.71)	1.91 (1.75-2.09)	2.19 (2.00-2.39)	2.57 (2.34-2.80)	2.85 (2.59-3.11)	3.14 (2.84-3.43)	3.43 (3.09-3.74)	3.81 (3.42-4.16)	4.09 (3.66-4.47)
7-day	1.44 (1.32-1.57)	1.79 (1.64-1.95)	2.18 (2.00-2.37)	2.48 (2.27-2.70)	2.88 (2.63-3.12)	3.18 (2.90-3.45)	3.47 (3.16-3.77)	3.76 (3.42-4.08)	4.13 (3.74-4.48)	4.40 (3.98-4.78)
10-day	1.60 (1.47-1.74)	1.98 (1.82-2.16)	2.43 (2.23-2.63)	2.77 (2.55-3.01)	3.23 (2.96-3.50)	3.58 (3.27-3.87)	3.92 (3.58-4.25)	4.26 (3.88-4.62)	4.70 (4.26-5.10)	5.03 (4.54-5.46)
20-day	2.01 (1.84-2.19)	2.49 (2.29-2.72)	3.03 (2.78-3.29)	3.43 (3.15-3.73)	3.94 (3.61-4.28)	4.31 (3.95-4.68)	4.67 (4.27-5.06)	5.01 (4.57-5.43)	5.43 (4.95-5.89)	5.73 (5.22-6.23)
30-day	2.41 (2.21-2.61)	2.99 (2.74-3.23)	3.60 (3.30-3.89)	4.05 (3.71-4.37)	4.61 (4.22-4.97)	5.01 (4.58-5.40)	5.39 (4.93-5.81)	5.74 (5.25-6.19)	6.17 (5.63-6.65)	6.47 (5.89-6.98)
45-day	2.94 (2.71-3.18)	3.64 (3.36-3.93)	4.33 (4.00-4.68)	4.83 (4.45-5.21)	5.43 (5.01-5.86)	5.84 (5.39-6.30)	6.22 (5.74-6.70)	6.55 (6.04-7.06)	6.92 (6.39-7.46)	7.15 (6.61-7.70)
60-day	3.39 (3.13-3.67)	4.19 (3.87-4.54)	5.00 (4.62-5.41)	5.58 (5.15-6.02)	6.27 (5.79-6.77)	6.75 (6.23-7.28)	7.18 (6.63-7.75)	7.57 (6.98-8.17)	8.01 (7.39-8.65)	8.29 (7.66-8.95)

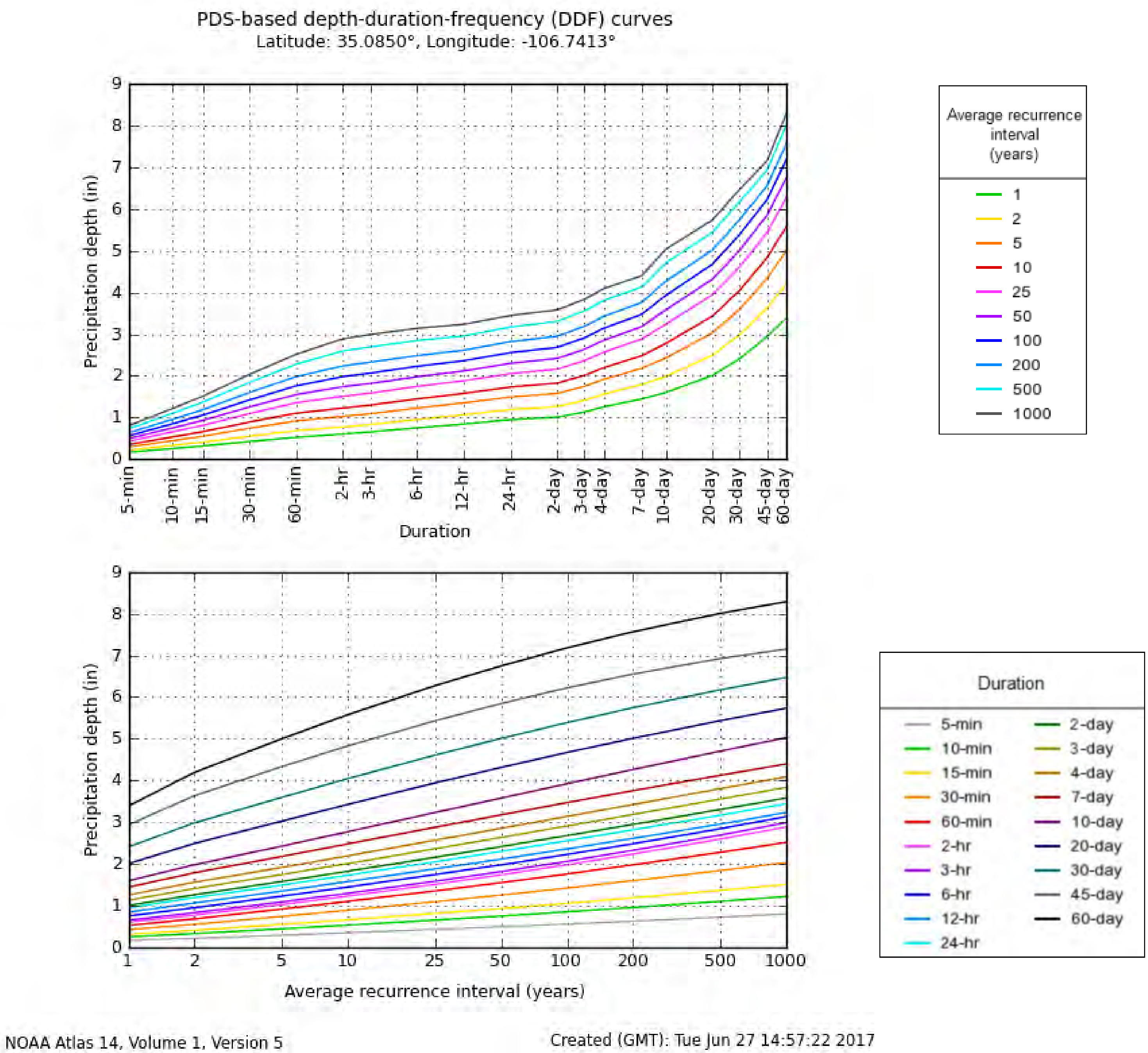
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

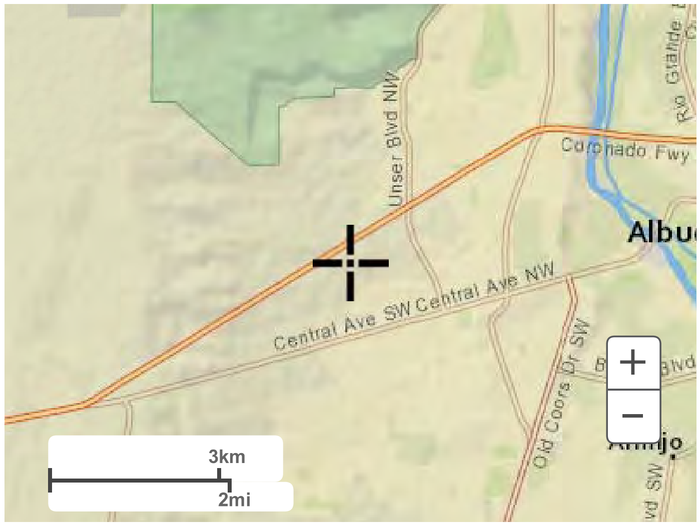
PF graphical



[Back to Top](#)

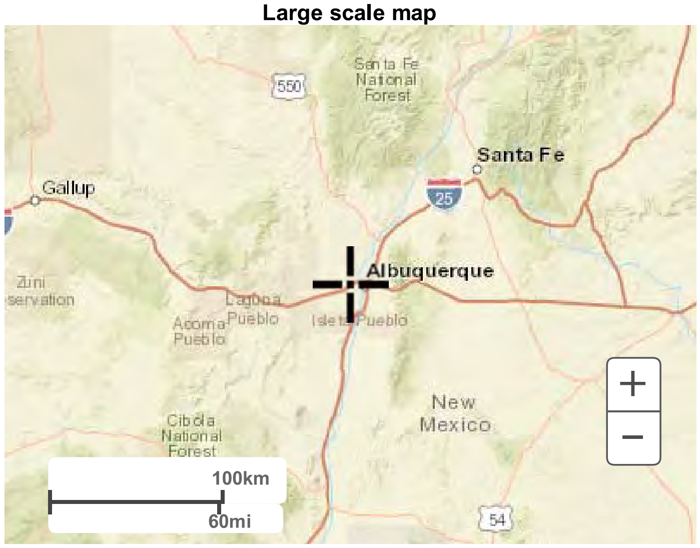
Maps & aerials

Small scale terrain

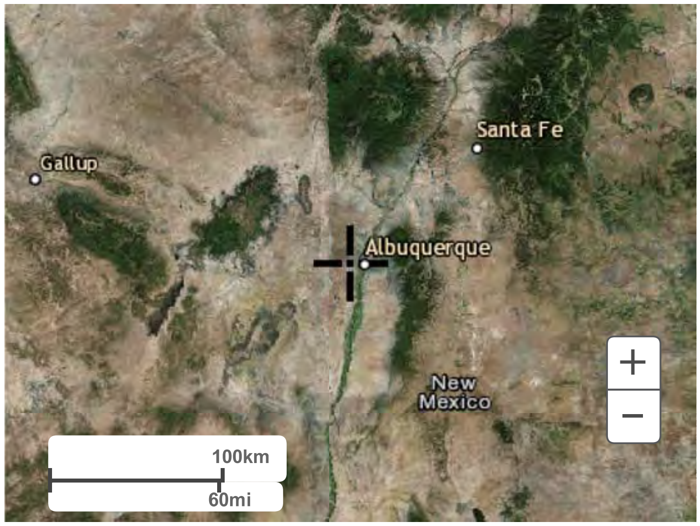


Large scale terrain

Large scale map



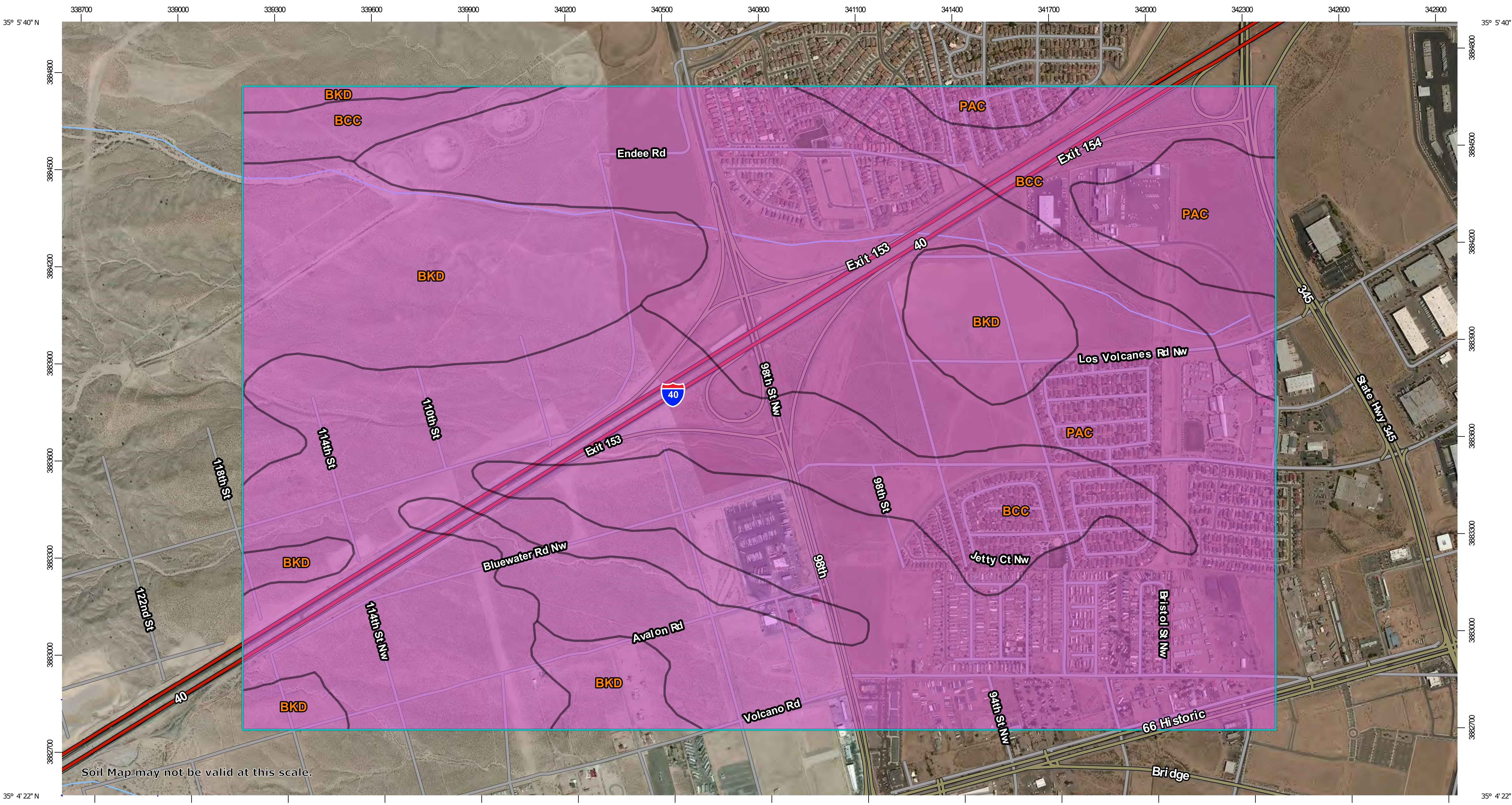
Large scale aerial



Back to Top

US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer



Map Scale: 1:11,700 if printed on B landscape (17" x 11") sheet.

N

Meters: 0, 150, 300, 600, 900

Feet: 0, 500, 1000, 2000, 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico
Survey Area Data: Version 11, Sep 26, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 23, 2011—May 17, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico (NM600)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
BCC	Bluepoint loamy fine sand, 1 to 9 percent slopes MLRA 42	A	526.6	33.3%
BKD	Bluepoint-Kokan association, hilly	A	277.3	17.6%
PAC	Pajarito loamy fine sand, 1 to 9 percent slopes	A	775.7	49.1%
Totals for Area of Interest			**1,579.6**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Weighted Curve Number (CN) Calculations

Westpoint 40 (Avalon Subd. Unit 5) Master Drainage Report

Project No.: *20180059*
Prepared By: *DB/VCS*
Date: *7/19/2017*

Subbasin	Total Area	Impervious Area	Percent Impervious	Hydrologic Soil Group	Land Use												Weighted Pervious CN
					Type 1	Pervious CN 1	Area 1	Percent 1	Type 2	Pervious CN 2	Area 2	Percent 2	Type 3	Pervious CN 3	Area 3	Percent 3	
	(acres)	(acres)	(%)	-	-	-	(acres)	(%)	-	-	(acres)	(%)	-	-	(acres)	(%)	-
EXISTING																	
E-1	12.9	1.7	13	A	ROW- I-40	77	3.73	29%	Vacant- Mass Graded	77	0.68	5%	Vacant- Desert Shrub	55	8.46	66%	**63**
E-2	31.1	0.0	0	A	Vacant- Desert Shrub	55	1.09	4%	Vacant- Mass Graded	77	30.06	96%				0%	**76**
E-3	46.2	0.0	0	A	ROW- I-40	77	0.96	2%	Vacant- Mass Graded	77	11.80	26%	Vacant- Desert Shrub	55	33.42	72%	**61**
E-4	41.7	1.4	3	A	ROW- I-40	77	11.61	28%	Vacant- Desert Shrub	55	30.12	72%				0%	**61**
E-5	5.4	0.0	0	A	ROW- I-40	77	0.09	2%	Vacant- Desert Shrub	55	5.26	98%				0%	**55**
OS-1	6.5	2.6	40	A	ROW- I-40	77	6.49	100%				0%				0%	**77**
OS-2	11.5	2.4	21	A	ROW- I-40	77	11.47	100%				0%				0%	**77**
OS-4	12.3	2.9	24	A	ROW- I-40	77	12.26	100%				0%				0%	**77**
OS-5	14.2	4.7	33	A	ROW- I-40	77	11.16	78%	Vacant- Desert Shrub	55	3.08	22%				0%	**72**
OS-6	1.8	1.8	100	A	ROW- I-40	77	1.80	100%				0%				0%	**77**
OS-7	2.1	2.1	100	A	ROW- I-40	77	2.08	100%				0%				0%	**77**
PROPOSED																	
OS-P1	3.6	1.5	42	A	ROW- I-40	77	3.63	100%									**77**
OS-P2	11.7	1.4	12	A	ROW- I-40	77	11.70	100%									**77**
OS-P3	1.8	0.0	0	A	ROW- I-40	77	1.80	100%									**77**

Notes:
1. Curve numbers (CN) Per TR-55, Tables 2-2a and 2-2d
2. Proposed tracts and ROW assumed to be 90% impervious, with pervious curve number for commercial/industrial land use (CN=63).

Time of Concentration Calculations *(Revised COA DPM procedure)*

Westpoint 40 (Avalon Subd. Unit 5)

Project No.: 20180059
Prepared By: DB/VCS
Date: 6/26/2017

User inputs columns in blue: 1,2,3,5,6,10,11,15,16,19,20

Existing Conditions

Basin	Area	Total Reach L	Overland Reach L1	Overland K K1	Overland Slope	Overland Slope S1	Adj. Overland Slope S1'	Gully Reach L2	Gully K K2	Gully slope	Gully slope S2	Adj. Gully Slope S2'	Arroyo Reach L3	Arroyo K K3	Arroyo Slope	Arroyo Slope S3	Adj. Arroyo Slope S3'	Lca Lca	Base Discharge Qb	Ground Slope S	Adjusted Slope S'	K K	K_w K_w	K' K'	K'' K''	Kn Kn	Orig. TC TC	Adjusted TC TC'	Final TC		Lag Time Lg
	sq ft	Feet	Feet		ft/ft	%	%	Feet		ft/ft	%	%	Feet		ft/ft	%	%	Feet	cfs	%	%						Hrs	Hrs	Hrs	Min	Min
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	-		(30)
E-1	560203	1620.00	400	1	0.008	0.77	0.77	1220	2	0.036	3.56	3.56	0	3	0.00001	0.00	0.00	N/A	25.7	2.87	2.87	1.228	1.228	3.197	0.219	0.021	0.216	0.216	0.216	13.0	7.8
E-2	1356699	2740.00	400	1	0.022	2.18	2.18	1600	2	0.038	3.80	3.80	740	3	0.009	0.92	0.92	N/A	62.3	2.78	2.78	1.749	1.749	3.808	0.261	0.025	0.261	0.261	0.261	15.7	9.4
E-3	2011701	2700.00	400	1	0.013	1.33	1.33	1600	2	0.036	3.56	3.56	700	3	0.029	2.86	2.86	N/A	92.4	3.05	3.05	1.701	1.701	3.906	0.268	0.025	0.253	0.253	0.253	15.2	9.1
E-4	1817855	3050.00	400	1	0.013	1.25	1.25	1600	2	0.029	2.87	2.87	1050	3	0.027	2.66	2.66	N/A	83.5	2.59	2.59	1.816	1.816	4.162	0.285	0.025	0.290	0.290	0.290	17.4	10.4
E-5	233075	960.00	400	1	0.022	2.24	2.24	560	2	0.042	4.23	4.21	0	3	0.00001	0.00	0.00	N/A	10.7	3.40	3.40	1.290	1.289	2.509	0.172	0.021	0.112	0.112	0.200	12.0	7.2
OS-1	282841	2310.00	400	1	0.015	1.50	1.50	1600	2	0.021	2.07	2.07	310	3	0.014	1.35	1.35	N/A	13.0	1.88	1.88	1.736	1.736	3.496	0.240	0.025	0.270	0.270	0.270	16.2	9.7
OS-2	499439	1600.00	400	1	0.015	1.50	1.50	1200	2	0.027	2.67	2.67	0	3	0.00001	0.00	0.00	N/A	22.9	2.38	2.38	1.496	1.496	3.444	0.236	0.025	0.193	0.193	0.200	12.0	7.2
OS-3	345815	1060.00	400	1	0.018	1.75	1.75	660	2	0.032	3.18	3.18	0	3	0.00001	0.00	0.00	N/A	15.9	2.64	2.64	1.338	1.338	3.056	0.210	0.033	0.135	0.135	0.200	12.0	7.2
OS-4	533867	2317.00	400	1	0.015	1.50	1.50	1600	2	0.036	3.63	3.63	317	3	0.025	2.52	2.52	N/A	24.5	3.11	3.11	1.616	1.616	3.047	0.209	0.025	0.226	0.226	0.226	13.6	8.1
OS-5	620670	3400.00	400	1	0.018	1.75	1.75	1600	2	0.062	6.19	5.25	1400	3	0.031	3.14	3.14	N/A	28.5	4.41	4.36	1.824	1.780	2.643	0.181	0.021	0.246	0.248	0.248	14.9	8.9
OS-6	78508	1522.00	400	1	0.030	3.00	3.00	1122	2	0.032	3.21	3.21	0	3	0.00001	0.00	0.00	N/A	3.6	3.15	3.15	1.575	1.575	2.142	0.147	0.021	0.151	0.151	0.200	12.0	7.2
OS-7	90733	1555.00	400	1	0.030	3.00	3.00	1155	2	0.031	3.12	3.12	0	3	0.00001	0.00	0.00	N/A	4.2	3.09	3.09	1.586	1.586	2.222	0.152	0.021	0.155	0.155	0.200	12.0	7.2

Notes:

(1) Basin ID name

(2) Area of basin. Obtained from basin delineation in the following file: P:\20180059\WR\Design\workarea\20180059_DRN_EX.dwg

(3) Length of longest flow path possible in drainage basin, determined using linework In the following file: P:\20180059\WR\Design\workarea\20180059_DRN_EX.dwg

(4) Length for sheet flow. Maximum length of 400 used per COA DPM 22-22.

(5) Conveyance condition for L1. Conditions in COA DPM table B-1 on pg. 22-22.

(6) L1 slope in decimal

(7) L1 slope in percentage

(8) S1 adjustment for slopes considered 'steep' per COA DPM.

* Adjustment should only be used if the slope is greater than 4%, developed channels, or for hydraulic design of channels or channel elements

if S1 is greater than 4
S1' = 5.2467+(0.062627*s1)-(18.197*e^(-0.62375*s1) per DPM 22-26, equation b-10
if S1 is less than or equal to 4
S1' = S1

(9) length assumed for Gully flow.

if L>2000 ft
L2 = 1600
if L<2000 ft
L2 = L-L1

(10) Conveyance condition for L2. Conditions in COA DPM table B-1 on pg. 22-22.

(11) L2 slope in decimal

(12) L2 slope in percentage

(13) adjusted s2

if S2 is greater than 4
S2' = 5.2467+(0.062627*s2)-(18.197*e^(-0.62375*s2) per DPM 22-26, equation b-10
if S2 is less than or equal to 4%
S2' = S2

(14) Length of arroyo flow along L.

L3 = L-(L1+L2)

(15) Conveyance condition for L3. Conditions in COA DPM table B-1 on pg. 22-22.

(16) L3 slope in decimal

(17) L3 slope in percentage

(18) adjusted S3

if S3 is greater than 4%
S3' = 5.2467+(0.062627*s3)-(18.197*e^(-0.62375*s3) per DPM 22-26, equation b-10
If S3 is less than or equal to 4%
S3' = S3

(19) Distance along L from point of concentration to a point opposite centroid of drainage basin (only necessary for basins with reach lengths greater than 4,000 ft).

(20) Basin discharge of the drainage basin

If discharge is unknown:
Undeveloped -assume 0.5-1 cfs/ac **Q = (0.5-1) * A**
Developed- assume 2-3 cfs/ac **Q = (2-3) * A**
If the computed basin discharge is within 10 percent of Q_b the estimate is sufficiently accurate. If not, repeat the process using the computed basin discharge.

(21) Average slope over entire reach length

S = ((L1*S1)+(L2*S2)+(L3*S3))/L per DPM 22-26, equation b-5

(22) Adjusted Slope

if S is greater than 4%
S' = 5.2467+(0.062627*S)-(18.197*e^(-0.62375*S) per DPM 22-26, equation b-10
if S is less than or equal to 4%
S' = S

(23) average K

K = ((L1/(K1*S1^.5))+ (L2/(K2*S2^.5))+(L3/(K3*S3^.5))*(S^.5/L))^-1 per DPM 22-23, equation b-4

(24) K_w

eqn to find K value for the weighted overall slope and reach length **K_w = (L/((S'^.5)*(L1/(K1*(S1^.5)) + L2/(K2*(S2^.5)) + L3/(K3*(S3'^.5)))**

(25) K'

* K' and K'' are calculated for adjusted slopes **K'= 0.302*(S'/100)^-.5*(Qb^0.18)** per DPM 22-26, equation b-11

(26) K''

K''= 0.207*(S'^-.5)*(Qb^0.18) per DPM 22-26, equation b-12

(27) a basin factor based on an estimate of weighted, by stream length, average Manning's n value for the principal watercourses in the drainage basin. For the Albuquerque area, values of Kn may be estimated from COA DPM Table B-2, pg. 22-23

(28) TC

if the total Reach is less than 4000 ft

TC = per DPM 22-22 equation B-1 and B-2

If the total Reach is greater than 12000 ft TC does not apply

If the total reach is greater than 4000 ft and less than 12000 ft

TC = $((12000-L)/(120*K*S^{.5}) + ((L-4000)*Kn*(Lca/L)^{.33})/(4.305*S^{0.165}))/60$

(29) TC'

* variences to compensate for using a non decimal slope

adjusted TC value for natural channels and steep slopes *If the Ground Slope<4* *TC=* $((12000-L)/(72000*K*S^{.5}) + ((L-4000)*Kn*(Lca/L)^{.33})/(552.2*S^{0.165}))$ eq. from DPM 22-23

TC' = TC

If the Ground Slope>4 ***K value determination:*

*if L <4000 **determine which K value* *If K' <Kw*

TC' = $L/(K*S'^{.5})/3600)$ per DPM 22-22 equation B-1 and B-2 *Use K'*

If L>12000 TC' does not apply *If Kw < K''*

Use K''

If L is between 4000 and 12000 ***determine which K value* *If Kw > K' & K''*

TC' = $((12000-L)/(120*K*S'^{.5}) + ((L-4000)*Kn*((Lca/L)^{.33}))/(4.305*S'^{0.165}))/60$ *Use Kw*

* variences from DPM equation to compensate for using a non decimal slope

TC= $((12000-L)/(72000*K*S^{.5}) + ((L-4000)*Kn*(Lca/L)^{.33})/(552.2*S^{0.165}))$ eq. from DPM 22-23

(30) Lag Time

per TR-55 **Lg= 0.6*TC**

Time of Concentration Calculations *(Revised COA DPM procedure)*

Westpoint 40 (Avalon Subd. Unit 5)

Project No.: 20180059
Prepared By: DB/VCS
Date: 8/14/2017

User inputs columns in blue: 1,2,3,5,6,10,11,15,16,19,20

USER DEFINED

Proposed Conditions

Basin	Area	Total Reach L	Overland Reach L1	Overland K K1	Overland Slope	Overland Slope S1	Adj. Overland Slope S1'	Gully Reach L2	Gully K K2	Gully slope	Gully slope S2	Adj. Gully Slope S2'	Arroyo Reach L3	Arroyo K K3	Arroyo Slope
	sq ft	Feet	Feet		ft/ft	%	%	Feet		ft/ft	%	%	Feet		ft/ft
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
BW1	66535	652.21	400.00	1	0.025	2.50	2.50	252	2	0.067	6.74	5.40	0	3	0.00001
BW2	23800	280.00	280.00	1	0.002	0.18	0.18	0	2	0.000	0.00	0.00	0	3	0.00001
BW3	39855	622.15	400.00	1	0.013	1.25	1.25	222	2	0.072	7.20	5.49	0	3	0.00001
DY2	146991	1930.11	400.00	1	0.001	0.13	0.13	1530	2	0.020	1.99	1.99	0	3	0.00001
DY1	62621	1023.15	400.00	1	0.005	0.50	0.50	623	2	0.056	5.62	5.05	0	3	0.00001
OS-P1	158286	1330.00	400.00	1	0.010	1.00	1.00	930	2	0.026	2.58	2.58	0	3	0.00001
OS-P2	509202	1523.51	400.00	1	0.018	1.75	1.75	1124	2	0.012	1.25	1.25	0	3	0.00001
OS-P3	79354	1076.62	400.00	1	0.003	0.25	0.25	677	2	0.018	1.77	1.77	0	3	0.00001
TR1	1423762	1691.18	400.00	1	0.025	2.50	2.50	1291	2	0.027	2.71	2.71	0	3	0.00001
TR2-1	415752	649.69	400.00	1	0.013	1.25	1.25	250	2	0.020	2.00	2.00	0	3	0.00001
TR2-2	185956	749.21	400.00	1	0.008	0.75	0.75	349	2	0.011	1.15	1.15	0	3	0.00001
TR3	246378	710.93	400.00	1	0.006	0.63	0.63	311	2	0.010	0.96	0.96	0	3	0.00001
TR6	636416	1398.76	400.00	1	0.013	1.25	1.25	999	2	0.015	1.50	1.50	0	3	0.00001
TR7	629613	828.46	400.00	1	0.015	1.50	1.50	428	2	0.016	1.63	1.63	0	3	0.00001
TR9	701446	1200.00	400.00	1	0.038	3.75	3.75	800	2	0.049	4.88	4.68	0	3	0.00001
TR10	316272	639.19	400.00	1	0.020	2.00	2.00	239	2	0.021	2.09	2.09	0	3	0.00001
TR11	726074	1084.31	400.00	1	0.030	3.00	3.00	684	2	0.037	3.65	3.65	0	3	0.00001
TR COMBO	1925990	2508.00	400.00	1	0.019	1.93	1.93	1600	2	0.020	1.95	1.95	0	3	0.00001

Basin	Arroyo Slope S3	Adj. Arroyo Slope S3'	Lca Lca	Base Discharge Qb	Ground Slope S	Adjusted Slope S'	K K	K_w K_w	K' K'	K" K"	Kn Kn	Orig. TC TC	Adjusted TC TC'	Final TC		Lag Time Lg
	%	%	Feet	cfs	%	%						Hrs	Hrs	Hrs	Min	Min
(1)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)		(30)
BW1	0.00	0.00	N/A	3.1	4.14	4.13	1.063	1.044	1.817	0.125	0.021	0.084	0.084	0.200	12.0	7.2
BW2	0.00	0.00	N/A	1.1	0.18	0.18	1.000				0.025			0.200	12.0	7.2
BW3	0.00	0.00	N/A	1.8	3.38	3.38	0.848	0.836	1.833	0.126	0.025	0.111	0.111	0.200	12.0	7.2
DY2	0.00	0.00	N/A	6.7	1.61	1.61	0.910	0.910	3.360	0.230	0.025	0.465	0.465	0.465	27.9	16.7
DY1	0.00	0.00	N/A	2.9	3.62	3.62	0.772	0.764	1.921	0.132	0.021	0.194	0.194	0.200	12.0	7.2
OS-P1	0.00	0.00	N/A	7.3	2.11	2.11	1.330	1.330	2.974	0.204	0.025	0.192	0.192	0.200	12.0	7.2
OS-P2	0.00	0.00	N/A	23.4	1.38	1.38	1.611	1.611	4.536	0.311	0.025	0.224	0.224	0.224	13.4	8.1
OS-P3	0.00	0.00	N/A	3.6	1.21	1.21	0.930	0.930	3.468	0.238	0.033	0.293	0.293	0.293	17.6	10.5
TR1	0.00	0.00	N/A	65.4	2.66	2.66	1.607	1.607	3.929	0.269	0.025	0.179	0.179	0.200	12.0	7.2
TR2-1	0.00	0.00	N/A	19.1	1.54	1.54	1.174	1.174	4.139	0.284	0.021	0.124	0.124	0.200	12.0	7.2
TR2-2	0.00	0.00	N/A	8.5	0.93	0.93	1.240	1.240	4.596	0.315	0.021	0.174	0.174	0.200	12.0	7.2
TR3	0.00	0.00	N/A	11.3	0.77	0.77	1.217	1.217	5.313	0.364	0.021	0.185	0.185	0.200	12.0	7.2
TR6	0.00	0.00	N/A	29.2	1.43	1.43	1.529	1.529	4.636	0.318	0.021	0.213	0.213	0.213	12.8	7.7
TR7	0.00	0.00	N/A	28.9	1.57	1.57	1.338	1.338	4.417	0.303	0.021	0.137	0.137	0.200	12.0	7.2
TR9	0.00	0.00	N/A	32.2	4.50	4.43	1.459	1.457	2.681	0.184	0.021	0.108	0.109	0.200	12.0	7.2
TR10	0.00	0.00	N/A	14.5	2.03	2.03	1.226	1.226	3.428	0.235	0.021	0.102	0.102	0.200	12.0	7.2
TR11	0.00	0.00	N/A	33.3	3.41	3.41	1.432	1.432	3.073	0.211	0.021	0.114	0.114	0.200	12.0	7.2
TR COMBO	0.00	0.00	N/A	88.4	1.55	1.55	2.338	2.338	5.433	0.372	0.021	0.239	0.239	0.239	14.4	8.6

Notes:

(1) Basin ID name
(2) Area of basin. Obtained from basin delineation in the following file: P:\20180059\WR\Design\workarea\20180059_DRN_PR.dwg
(3) Length of longest flow path possible in drainage basin, determined using linework In the following file: P:\20180059\WR\Design\workarea\20180059_DRN_PR.dwg
(4) Length for sheet flow. Maximum length of 400 used per COA DPM 22-22.
(5) Conveyance condition for L1. Conditions in COA DPM table B-1 on pg. 22-22.
(6) L1 slope in decimal
(7) L1 slope in percentage
(8) S1 adjustment for slopes considered 'steep' per COA DPM.

* Adjustment should only be used if the slope is greater than 4%, developed channels, or for hydraulic design of channels or channel elements

if S1 is greater than 4
S1' = 5.2467+(0.062627*s1)-(18.197*e^(-0.62375*s1) per DPM 22-26, equation b-10
if S1 is less than or equal to 4
S1' = S1

(9) length assumed for Gully flow.

if L>2000 ft
L2 = 1600
if L<2000 ft
L2 = L-L1

(10) Conveyance condition for L2. Conditions in COA DPM table B-1 on pg. 22-22.
(11) L2 slope in decimal
(12) L2 slope in percentage
(13) adjusted s2

if S2 is greater than 4
S2' = 5.2467+(0.062627*s2)-(18.197*e^(-0.62375*s2) per DPM 22-26, equation b-10
if S2 is less than or equal to 4%
S2' = S2

(14) Length of arroyo flow along L.

L3 = L-(L1+L2)

(15) Conveyance condition for L3. Conditions in COA DPM table B-1 on pg. 22-22.
(16) L3 slope in decimal
(17) L3 slope in percentage
(18) adjusted S3

if S3 is greater than 4%
S3' = 5.2467+(0.062627*s3)-(18.197*e^(-0.62375*s3) per DPM 22-26, equation b-10
If S3 is less than or equal to 4%
S3' = S3

(19) Distance along L from point of concentration to a point opposite centroid of drainage basin (only necessary for basins with reach lengths greater than 4,000 ft).
(20) Basin discharge of the drainage basin

If discharge is unknown:
Undeveloped -assume 0.5-1 cfs/ac **Q = (0.5-1) * A**
Developed- assume 2-3 cfs/ac **Q = (2-3) * A**
If the computed basin discharge is within 10 percent of Q_b the estimate is sufficiently accurate. If not, repeat the process using the computed basin discharge.

(21) Average slope over entire reach length

S = ((L1*S1)+(L2*S2)+(L3*S3))/L per DPM 22-26, equation b-5

(22) Adjusted Slope

if S is greater than 4%
S' = 5.2467+(0.062627*S)-(18.197*e^(-0.62375*S) per DPM 22-26, equation b-10
If S is less than or equal to 4%
S' = S

(23) average K

K = ((L1/(K1*S1^.5))+ (L2/(K2*S2^.5))+(L3/(K3*S3^.5))*(S^.5/L))^-1 per DPM 22-23, equation b-4

(24) K_w

eqn to find K value for the weighted overall slope and reach length

K_w = (L/((S'^.5)*(L1/(K1*(S1^.5)) + L2/(K2*(S2^.5)) + L3/(K3*(S3'^.5)))

(25) K'

* K' and K'' are calculated for adjusted slopes

K'= 0.302*(S'/100)^-.5*(Qb^0.18) per DPM 22-26, equation b-11

(26) K''

K''= 0.207*(S'^-.5)*(Qb^0.18) per DPM 22-26, equation b-12

(27) a basin factor based on an estimate of weighted, by stream length, average Manning's n value for the principal watercourses in the drainage basin. For the Albuquerque area, values of Kn may be estimated from COA DPM Table B-2, pg.

(28) TC

if the total Reach is less than 4000 ft

TC = per DPM 22-22 equation B-1 and B-2

If the total Reach is greater than 12000 ft TC does not apply

If the total reach is greater than 4000 ft and less than 12000 ft

TC = ((12000-L)/(120*K*$S^{.5}$) + ((L-4000)*Kn*$(Lca/L)^{.33}$)/(4.305*$S^{0.165}$))/60

* variences to compensate for using a non decimal slope

(29) TC'

adjusted TC value for natural channels and steep slopes *If the Ground Slope<4* *TC=* *((12000-L)/(72000*K*$S^{.5}$) + ((L-4000)*Kn*$(Lca/L)^{.33}$)/(552.2*$S^{0.165}$))* eq. from DPM 22-23

TC' = TC

If the Ground Slope>4 ***K value determination:*

*if L <4000 **determine which K value* *If K' <Kw*

TC' = L/(K*$S'^{.5)}$/3600) per DPM 22-22 equation B-1 and B-2 *Use K'*

If L>12000 TC' does not apply *If Kw < K''*

Use K''

If L is between 4000 and 12000 ***determine which K value* *If Kw > K' & K''*

TC' = ((12000-L)/(120*K*$S'^{.5}$) + ((L-4000)*Kn*($(Lca/L)^{.33}$))/(4.305*$S'^{0.165}$))/60 *Use Kw*

* variences from DPM equation to compensate for using a non decimal slope

*TC= ((12000-L)/(72000*K*$S^{.5}$) + ((L-4000)*Kn*$(Lca/L)^{.33}$)/(552.2*$S^{0.165}$))* eq. from DPM 22-23

(30) Lag Time

per TR-55 **Lg= 0.6*TC**

APPENDIX B – HYDRAULIC ANALYSIS SUPPORTING DATA

1. Storm Drain Capacity Calculations (Normal Depth)
2. Street Capacity Calculations
3. Storm Drain Inlet Capacity Calculations

EX-Bluewater-36in RCP.txt
36.000 INCH DIAMETER PIPE

MANNING'S N = 0.013   SLOPE = 0.009

FLOW DEPTH INCHES	FLOW AREA SQ FT	DISCHARGE CFS	VELOCITY FPS
2.000	0.154	0.380	2.463
4.000	0.429	1.648	3.838
6.000	0.774	3.821	4.934
8.000	1.170	6.853	5.859
10.000	1.602	10.667	6.658
12.000	2.063	15.169	7.355
14.000	2.543	20.249	7.964
16.000	3.035	25.783	8.494
18.000	3.534	31.638	8.952
20.000	4.033	37.668	9.339
22.000	4.526	43.713	9.658
24.000	5.006	49.601	9.908
26.000	5.466	55.134	10.086
28.000	5.899	60.089	10.186
30.000	6.294	64.190	10.198
32.000	6.639	67.060	10.101
34.000	6.914	68.045	9.842
36.000	7.069	63.276	8.952

EX-Bluewater-42in RCP.txt
42.000 INCH DIAMETER PIPE

MANNING'S N = 0.013   SLOPE = 0.018

FLOW DEPTH INCHES	FLOW AREA SQ FT	DISCHARGE CFS	VELOCITY FPS
3.000	0.305	1.385	4.540
6.000	0.843	5.932	7.036
9.000	1.512	13.588	8.989
12.000	2.268	24.043	10.600
15.000	3.085	36.867	11.952
18.000	3.939	51.545	13.087
21.000	4.811	67.491	14.030
24.000	5.683	84.051	14.791
27.000	6.536	100.495	15.374
30.000	7.353	115.992	15.775
33.000	8.109	129.561	15.977
36.000	8.778	139.938	15.942
39.000	9.316	145.106	15.576
42.000	9.621	134.982	14.030

EX-Bluewater-48in RCP.txt
48.000 INCH DIAMETER PIPE

MANNING'S N = 0.013   SLOPE = 0.029

FLOW DEPTH INCHES	FLOW AREA SQ FT	DISCHARGE CFS	VELOCITY FPS
3.000	0.327	1.890	5.779
6.000	0.907	8.146	8.985
9.000	1.631	18.790	11.520
12.000	2.457	33.508	13.639
15.000	3.355	51.830	15.448
18.000	4.304	73.185	17.003
21.000	5.286	96.920	18.336
24.000	6.283	122.308	19.466
27.000	7.281	148.550	20.404
30.000	8.262	174.766	21.153
33.000	9.211	199.976	21.710
36.000	10.110	223.060	22.064
39.000	10.935	242.672	22.192
42.000	11.660	257.025	22.044
45.000	12.239	263.134	21.499
48.000	12.566	244.616	19.466

EX-Daytona-36in RCP.txt
36.000 INCH DIAMETER PIPE

MANNING'S N = 0.013   SLOPE = 0.011

FLOW DEPTH INCHES	FLOW AREA SQ FT	DISCHARGE CFS	VELOCITY FPS
2.000	0.154	0.421	2.722
4.000	0.429	1.822	4.243
6.000	0.774	4.224	5.455
8.000	1.170	7.576	6.477
10.000	1.602	11.793	7.360
12.000	2.063	16.770	8.131
14.000	2.543	22.386	8.804
16.000	3.035	28.504	9.391
18.000	3.534	34.977	9.896
20.000	4.033	41.643	10.325
22.000	4.526	48.327	10.678
24.000	5.006	54.836	10.954
26.000	5.466	60.953	11.151
28.000	5.899	66.431	11.261
30.000	6.294	70.965	11.275
32.000	6.639	74.138	11.167
34.000	6.914	75.227	10.880
36.000	7.069	69.954	9.896

EX-LosVolcanes-30in RCP.txt
30.000 INCH DIAMETER PIPE

MANNING'S N = 0.013   SLOPE = 0.045

FLOW DEPTH INCHES	FLOW AREA SQ FT	DISCHARGE CFS	VELOCITY FPS
2.000	0.141	0.771	5.487
4.000	0.389	3.314	8.517
6.000	0.699	7.620	10.902
8.000	1.051	13.539	12.884
10.000	1.432	20.859	14.563
12.000	1.834	29.321	15.992
14.000	2.246	38.632	17.199
16.000	2.663	48.465	18.202
18.000	3.075	58.457	19.009
20.000	3.476	68.206	19.620
22.000	3.858	77.252	20.025
24.000	4.210	85.050	20.203
26.000	4.520	90.882	20.108
28.000	4.768	93.582	19.626
30.000	4.909	87.010	17.726

EX-LosVolcanes-36in RCP.txt
36.000 INCH DIAMETER PIPE

MANNING'S N = 0.013   SLOPE = 0.017

FLOW DEPTH INCHES	FLOW AREA SQ FT	DISCHARGE CFS	VELOCITY FPS
2.000	0.154	0.523	3.384
4.000	0.429	2.265	5.275
6.000	0.774	5.251	6.781
8.000	1.170	9.418	8.052
10.000	1.602	14.661	9.150
12.000	2.063	20.848	10.108
14.000	2.543	27.829	10.945
16.000	3.035	35.435	11.674
18.000	3.534	43.482	12.303
20.000	4.033	51.769	12.836
22.000	4.526	60.078	13.274
24.000	5.006	68.170	13.617
26.000	5.466	75.775	13.862
28.000	5.899	82.585	14.000
30.000	6.294	88.221	14.016
32.000	6.639	92.166	13.882
34.000	6.914	93.520	13.526
36.000	7.069	86.964	12.303

PROP-Pond B_OS-P2 outlet-18in RCP@2%.txt
18.000 INCH DIAMETER PIPE

MANNING'S N = 0.013   SLOPE = 0.020

FLOW DEPTH INCHES	FLOW AREA SQ FT	DISCHARGE CFS	VELOCITY FPS
3.000	0.194	0.897	4.633
6.000	0.516	3.561	6.907
9.000	0.884	7.428	8.406
12.000	1.252	11.645	9.305
15.000	1.574	15.070	9.577
18.000	1.767	14.855	8.406

Street Capacity - 60' ROW, 36' Roadway - 0.5% slope

MANNING'S N = 0.017   SLOPE = 0.005

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1.0	-30.0	0.8	4.0	0.0	0.4	7.0	30.0	0.8
2.0	-18.0	0.5	5.0	18.0	0.0			
3.0	-18.0	0.0	6.0	18.0	0.5			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.100	0.100	0.500	0.414	10.202	0.828	10.000	0.111
0.200	0.200	2.000	2.628	20.404	1.314	20.000	0.227
0.300	0.300	4.500	7.748	30.606	1.722	30.000	0.346
0.400	0.400	7.920	17.578	36.807	2.219	36.000	0.477
0.500	0.500	11.520	32.705	37.007	2.839	36.000	0.625
0.600	0.600	15.582	46.503	46.440	2.984	45.231	0.739
0.700	0.700	20.566	65.289	55.873	3.175	54.462	0.857

Street Capacity - 60' ROW, 36' Roadway - 1% Slope

MANNING'S N = 0.017   SLOPE = 0.010

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1.0	-30.0	0.8	4.0	0.0	0.4	7.0	30.0	0.8
2.0	-18.0	0.5	5.0	18.0	0.0			
3.0	-18.0	0.0	6.0	18.0	0.5			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.100	0.100	0.500	0.585	10.202	1.171	10.000	0.121
0.200	0.200	2.000	3.717	20.404	1.858	20.000	0.254
0.300	0.300	4.500	10.958	30.606	2.435	30.000	0.392
0.400	0.400	7.920	24.859	36.807	3.139	36.000	0.553
0.500	0.500	11.520	46.252	37.007	4.015	36.000	0.751
0.600	0.600	15.582	65.764	46.440	4.221	45.231	0.877
0.700	0.700	20.566	92.333	55.873	4.490	54.462	1.014

Street Capacity - 60' ROW, 36' Roadway - 2% Slope

MANNING'S N = 0.017   SLOPE = 0.020

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1.0	-30.0	0.8	4.0	0.0	0.4	7.0	30.0	0.8
2.0	-18.0	0.5	5.0	18.0	0.0			
3.0	-18.0	0.0	6.0	18.0	0.5			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.100	0.100	0.500	0.828	10.202	1.656	10.000	0.143
0.200	0.200	2.000	5.256	20.404	2.628	20.000	0.307
0.300	0.300	4.500	15.497	30.606	3.444	30.000	0.484
0.400	0.400	7.920	35.156	36.807	4.439	36.000	0.706
0.500	0.500	11.520	65.411	37.007	5.678	36.000	1.001
0.600	0.600	15.582	93.005	46.440	5.969	45.231	1.154
0.700	0.700	20.566	130.578	55.873	6.349	54.462	1.327

Street Capacity - 60' ROW, 36' Roadway - 3% Slope

MANNING'S N = 0.017   SLOPE = 0.030

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1.0	-30.0	0.8	4.0	0.0	0.4	7.0	30.0	0.8
2.0	-18.0	0.5	5.0	18.0	0.0			
3.0	-18.0	0.0	6.0	18.0	0.5			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.100	0.100	0.500	1.014	10.202	2.028	10.000	0.164
0.200	0.200	2.000	6.437	20.404	3.219	20.000	0.361
0.300	0.300	4.500	18.979	30.606	4.218	30.000	0.577
0.400	0.400	7.920	43.058	36.807	5.437	36.000	0.860
0.500	0.500	11.520	80.111	37.007	6.954	36.000	1.252
0.600	0.600	15.582	113.907	46.440	7.310	45.231	1.431
0.700	0.700	20.566	159.925	55.873	7.776	54.462	1.641

Street Capacity - 60' ROW, 36' Roadway - 4% Slope

MANNING'S N = 0.017   SLOPE = 0.040

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1.0	-30.0	0.8	4.0	0.0	0.4	7.0	30.0	0.8
2.0	-18.0	0.5	5.0	18.0	0.0			
3.0	-18.0	0.0	6.0	18.0	0.5			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.100	0.100	0.500	1.171	10.202	2.341	10.000	0.185
0.200	0.200	2.000	7.433	20.404	3.717	20.000	0.415
0.300	0.300	4.500	21.915	30.606	4.870	30.000	0.669
0.400	0.400	7.920	49.719	36.807	6.278	36.000	1.013
0.500	0.500	11.520	92.505	37.007	8.030	36.000	1.503
0.600	0.600	15.582	131.529	46.440	8.441	45.231	1.708
0.700	0.700	20.566	184.666	55.873	8.979	54.462	1.954

Street Capacity - 60' ROW, 36' Roadway - 5% Slope

MANNING'S N = 0.017   SLOPE = 0.050

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1.0	-30.0	0.8	4.0	0.0	0.4	7.0	30.0	0.8
2.0	-18.0	0.5	5.0	18.0	0.0			
3.0	-18.0	0.0	6.0	18.0	0.5			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.100	0.100	0.500	1.309	10.202	2.618	10.000	0.207
0.200	0.200	2.000	8.311	20.404	4.155	20.000	0.469
0.300	0.300	4.500	24.502	30.606	5.445	30.000	0.761
0.400	0.400	7.920	55.587	36.807	7.019	36.000	1.166
0.500	0.500	11.520	103.423	37.007	8.978	36.000	1.754
0.600	0.600	15.582	147.054	46.440	9.438	45.231	1.985
0.700	0.700	20.566	206.463	55.873	10.039	54.462	2.268

Street Capacity - 68' ROW, 48' Roadway (Bluewater Rd) - 0.5% slope

MANNING'S N = 0.017 SLOPE = 0.005

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1.0	-34.0	0.7	4.0	0.0	0.5	7.0	34.0	0.7
2.0	-24.0	0.5	5.0	24.0	0.0			
3.0	-24.0	0.0	6.0	24.0	0.5			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.100	0.100	0.500	0.414	10.202	0.828	10.000	0.111
0.200	0.200	2.000	2.628	20.404	1.314	20.000	0.227
0.300	0.300	4.500	7.748	30.606	1.722	30.000	0.346
0.400	0.400	8.000	16.687	40.808	2.086	40.000	0.468
0.500	0.500	12.480	30.990	49.010	2.483	48.000	0.596
0.600	0.600	17.780	49.280	59.212	2.772	58.000	0.719
0.700	0.700	24.080	73.483	69.414	3.052	68.000	0.845

Street Capacity - 68' ROW, 48' Roadway (Bluewater Rd) - 1.0% slope

MANNING'S N = 0.017 SLOPE = 0.010

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1.0	-34.0	0.7	4.0	0.0	0.5	7.0	34.0	0.7
2.0	-24.0	0.5	5.0	24.0	0.0			
3.0	-24.0	0.0	6.0	24.0	0.5			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.100	0.100	0.500	0.585	10.202	1.171	10.000	0.121
0.200	0.200	2.000	3.717	20.404	1.858	20.000	0.254
0.300	0.300	4.500	10.958	30.606	2.435	30.000	0.392
0.400	0.400	8.000	23.599	40.808	2.950	40.000	0.535
0.500	0.500	12.480	43.827	49.010	3.512	48.000	0.692
0.600	0.600	17.780	69.692	59.212	3.920	58.000	0.839
0.700	0.700	24.080	103.920	69.414	4.316	68.000	0.990

Street Capacity - 68' ROW, 48' Roadway (Bluewater Rd) - 2.0% slope

MANNING'S N = 0.017   SLOPE = 0.020

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1.0	-34.0	0.7	4.0	0.0	0.5	7.0	34.0	0.7
2.0	-24.0	0.5	5.0	24.0	0.0			
3.0	-24.0	0.0	6.0	24.0	0.5			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.100	0.100	0.500	0.828	10.202	1.656	10.000	0.143
0.200	0.200	2.000	5.256	20.404	2.628	20.000	0.307
0.300	0.300	4.500	15.497	30.606	3.444	30.000	0.484
0.400	0.400	8.000	33.374	40.808	4.172	40.000	0.671
0.500	0.500	12.480	61.981	49.010	4.966	48.000	0.884
0.600	0.600	17.780	98.560	59.212	5.543	58.000	1.078
0.700	0.700	24.080	146.966	69.414	6.103	68.000	1.279

98th St - Northbound @ exist curb inlets

MANNING'S N = 0.017   SLOPE = 0.027

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1.0	-22.0	0.3	4.0	0.0	0.3	7.0	22.0	0.3
2.0	-20.8	0.0	5.0	20.0	0.0			
3.0	-20.0	0.0	6.0	20.8	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.030	0.030	0.106	0.110	5.463	1.036	5.455	0.047
0.060	0.060	0.327	0.504	9.326	1.540	9.309	0.097
0.090	0.090	0.664	1.302	13.189	1.959	13.164	0.150
0.120	0.120	1.117	2.607	17.053	2.334	17.018	0.205
0.150	0.150	1.685	4.516	20.916	2.680	20.873	0.262
0.180	0.180	2.369	7.117	24.779	3.004	24.727	0.320
0.210	0.210	3.169	10.491	28.642	3.310	28.582	0.380
0.240	0.240	4.084	14.717	32.505	3.603	32.436	0.442
0.270	0.270	5.115	19.871	36.368	3.885	36.291	0.505
0.300	0.300	6.262	26.024	40.231	4.156	40.145	0.569

98th St - Southbound @ exist curb inlets

MANNING'S N = 0.017   SLOPE = 0.027

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1.0	0.0	0.3	3.0	21.0	0.3	5.0	42.0	0.7
2.0	1.2	0.0	4.0	40.8	0.3			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.030	0.030	0.029	0.025	1.913	0.872	21.709	0.042
0.060	0.060	0.115	0.159	3.827	1.385	23.618	0.090
0.090	0.090	0.258	0.468	5.740	1.814	25.527	0.141
0.120	0.120	0.458	1.007	7.654	2.198	27.436	0.195
0.150	0.150	0.716	1.826	9.567	2.551	29.345	0.251
0.180	0.180	1.031	2.969	11.480	2.880	31.255	0.309
0.210	0.210	1.403	4.479	13.394	3.192	33.164	0.368
0.240	0.240	1.833	6.395	15.307	3.489	35.073	0.429
0.270	0.270	2.320	8.754	17.221	3.774	36.982	0.492
0.300	0.300	2.864	11.594	19.134	4.049	38.891	0.555

AVALON UNIT 5 (WESTPOINT40) MASTER DRAINAGE REPORT
BHI PROJECT #: 20180059
DRAINAGE OF ROADWAY PAVEMENTS (HEC-22) METHOD
98TH ST - INTERCEPTION CAPACITY OF EXISTING CURB INLETS

Column requires user input

Inlets:

COF CDI (Std Drawings D-503 & D-504)	L	W
Single (Type I)	2.96	1.48
Double (Type II)	5.92	1.48

Type B Curb Inlet, Serial 623-14	L	W
Single (Type I)	4.50	1.38
Double (Type II)	9.58	1.38
Triple (Type III)	14.67	1.38

Hydrologic Analysis Point / INLET ID	Roadway Description	Max Ponding Depth (ft)	Approx Inlet Station	Basin Q (cfs)	Total Rtd Q (cfs)	Inlet Type	Inlet Width (ft)	Inlet Length (ft)	Sump Yes or No?	Ponding Width (ft)	Pond Depth (ft)	Intercept Q Qi (cfs)	Bypass Q Qb (cfs)	S (ft/ft)	Sx (ft/ft)	Vo (fps)	V (fps)	Eo	Rf	Rs	E	Comments:
Villa View Drive, upstream of Tarry Terrace																						
OS-6 (HALF) N BOUND LANES	Existing 98th St.	0.0	N/A	3.75	3.75	EX NMDOT TYPE I (A CURB)	1.38	4.50	NO	10.9	0.19	1.80	1.95	2.70%	1.70%	10.0	3.7	0.30	1.0	0.3	0.48	2 existing curb inlets in 98th St (each side of northbound lanes) that drains to roadside swale - total interception for 100-yr event is x2.
OS-7 S BOUND LANES	Existing 98th St.	0.0	N/A	8.60	8.60	EX NMDOT TYPE I (A CURB)	1.38	4.50	NO	14.9	0.25	3.22	5.38	2.70%	1.70%	10.0	4.6	0.23	1.0	0.2	0.37	Existing curb inlet on westerly curb of 98th St that drains to roadside swale on east side of road.

Totals

Total Intercepted Q: **6.81** (includes 2x northbound lanes interception Q, accounting for inlets on both sides of road)
Total Bypass Q: **9.29**
Net Efficiency: **42.3%**

NOTES:

1. Design Criteria from *City of Albuquerque DPM*
2. Flows determined using data from HEC-HMS (100yr storm event)
3. Mannings n=0.017 (COA DPM Chp 22, Sect 3.E)
4. Assumes no grate clogging.

APPENDIX C – ALLOWABLE DISCHARGE CALCULATIONS

Allowable Discharge Calculations - Developed Conditions

Westpoint 40 (Avalon Subd. Unit 5) Master Drainage Report

Project No.: *20180059*
Prepared By: *VCS*
Date: *7/25/2017*

Outfall & Portion of Project Site	Drainage Area	Allowable Discharge	Allowable Unit Discharge	Source of Allowable Discharge Criteria
	(AC)	(CFS)	(CFS/AC)	
(1)	-	(2)	(3)	
DAYTONA ROAD STORM DRAIN - TOTAL	-	75	-	Existing Daytona Rd storm drain capacity (75cfs for 36" RCP at 1.06% flowing full). Free dicharge allowed per *I-40 South and Unser Mini Drainage Master Plan* (Easterling Consultants, November 2014), based on UDC capacity.
ROW (Daytona Road)	1.4	5.8	N/A	Free discharge from ROW.
ROW-Offsite (I-40)	10.1	22.3	N/A	Existing offsite flows to be conveyed through project site.
TRACT 2 (North)	9.5	**29.4**	**3.1**	Existing Daytona Rd storm drain capacity, free discharge of ROW, & equal unit discharge between Tracts 2 & 3.
TRACT 3	5.7	**17.5**	**3.1**	Existing Daytona Rd storm drain capacity, free discharge of ROW, & equal unit discharge between Tracts 2 & 3.
LOS VOLCANES ROAD STORM DRAIN - TOTAL	-	93	-	Existing Los Volcanes Rd storm drain capacity (93cfs for 30" RCP at 4.5% flowing full & 93cfs for 36" RCP at 1.7% flowing full). Free dicharge allowed per *I-40 South and Unser Mini Drainage Master Plan* (Easterling Consultants, November 2014), based on UDC capacity.
TR6	14.6	**46.7**	**3.2**	Existing Los Volcanes Rd storm drain capacity & equal unit discharge between Tracts 6 & 7.
TR7	14.5	**46.3**	**3.2**	Existing Los Volcanes Rd storm drain capacity & equal unit discharge between Tracts 6 & 7.
BLUEWATER ROAD STORM DRAIN - TOTAL (OPTIONS A & B)	-	145	-	Existing Bluewater Rd storm drain capacity (145cfs for 42" RCP at 1.8% flowing full). **Maximum** of 2.05cfs/ac per *Drainage Report for West Ridge Mobile Home Park* (Tierra West, October 1997), based on 90th St storm drain capacity
ROW (Bluewater Road & Daytona Roa	6.2	20.0	N/A	Free discharge from ROW.
ROW-Offsite (I-40)	50.4	10	N/A	Portion of offsite flow from I-40 ROW (79cfs) that is allowed to flow to Bluewater Road storm drain.
TRACT 1	32.7	**48.8**	**1.5**	Existing Bluewater Rd storm drain capacity, free discharge of ROW, & equal unit discharge between Tracts 1, 2 (southerly draining portion), 9, 10, & 11.
TRACT 2 (South)	4.3	**6.4**	**1.5**	Existing Bluewater Rd storm drain capacity, free discharge of ROW, & equal unit discharge between Tracts 1, 2 (southerly draining portion), 9, 10, & 11.
TRACT 9	16.1	**24.0**	**1.5**	Existing Bluewater Rd storm drain capacity, free discharge of ROW, & equal unit discharge between Tracts 1, 2 (southerly draining portion), 9, 10, & 11.
TRACT 10	7.3	**10.8**	**1.5**	Existing Bluewater Rd storm drain capacity, free discharge of ROW, & equal unit discharge between Tracts 1, 2 (southerly draining portion), 9, 10, & 11.
TRACT 11	16.7	**24.9**	**1.5**	Existing Bluewater Rd storm drain capacity, free discharge of ROW, & equal unit discharge between Tracts 1, 2 (southerly draining portion), 9, 10, & 11.

BLUEWATER ROAD STORM DRAIN - TOTAL (OPTION C)	-	145	-	Existing Bluewater Rd storm drain capacity (145cfs for 42" RCP at 1.8% flowing full). **Maximum** of 2.05cfs/ac per *Drainage Report for West Ridge Mobile Home Park* (Tierra West, October 1997), based on 90th St storm drain capacity
ROW (Bluewater Road & Daytona Roa	6.2	20.0	N/A	Free discharge from ROW.
ROW-Offsite (I-40)	50.4	79	N/A	Free discharge of offsite flow from I-40 ROW (79cfs) to Bluewater Road storm drain.
TRACT 1	32.7	**19.5**	**0.6**	Existing Bluewater Rd storm drain capacity, free discharge of ROW, & equal unit discharge between Tracts 1, 2 (southerly draining portion), 9, 10, & 11.
TRACT 2 (Soutth)	4.3	**2.6**	**0.6**	Existing Bluewater Rd storm drain capacity, free discharge of ROW, & equal unit discharge between Tracts 1, 2 (southerly draining portion), 9, 10, & 11.
TRACT 9	16.1	**9.6**	**0.6**	Existing Bluewater Rd storm drain capacity, free discharge of ROW, & equal unit discharge between Tracts 1, 2 (southerly draining portion), 9, 10, & 11.
TRACT 10	7.3	**4.3**	**0.6**	Existing Bluewater Rd storm drain capacity, free discharge of ROW, & equal unit discharge between Tracts 1, 2 (southerly draining portion), 9, 10, & 11.
TRACT 11	16.7	**10.0**	**0.6**	Existing Bluewater Rd storm drain capacity, free discharge of ROW, & equal unit discharge between Tracts 1, 2 (southerly draining portion), 9, 10, & 11.

Indicates User Input
Indicates Calculated Value

Notes:

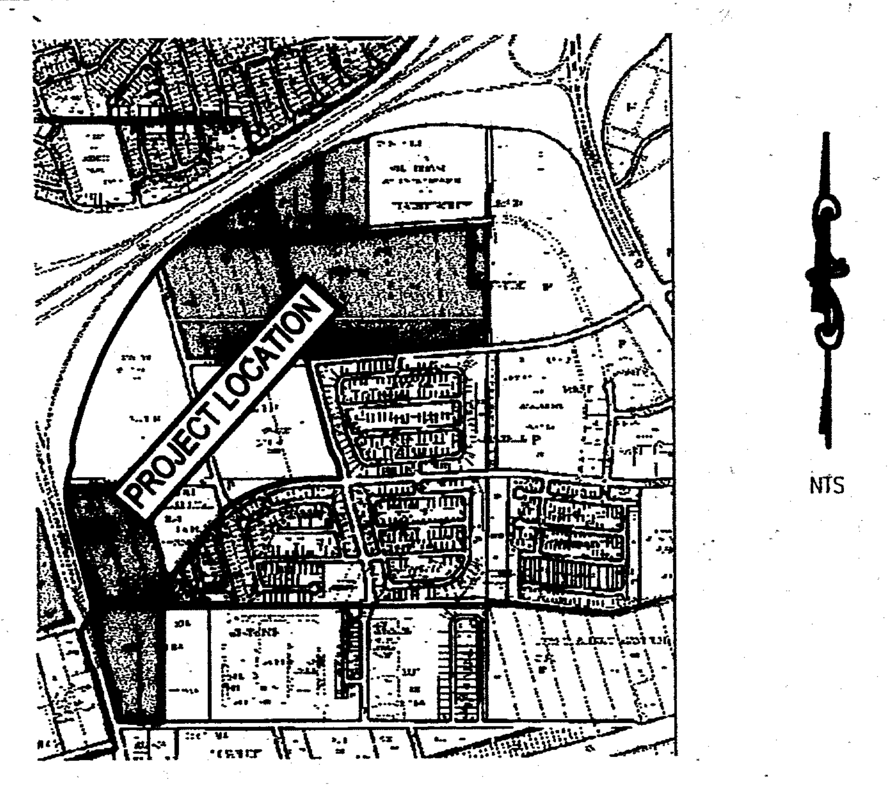
(1) Portions of project site, grouped by outfall location & drainage concept option.

(2) Allowable discharge at project outfalls (based on downstream capacity) & from each tract or ROW area.

(3) Calculated allowable unit discharge for each tract, based on downstream capacity & contributing ROW/offsite flows.

APPENDIX D – REFERENCE DOCUMENTS

1. Plat of Tracts 1 through 12 Avalon Subdivision Unit 5
2. Excerpts from Amole-Hubbell Drainage Master Plan Update (Wilson & Company, 2013)
3. Excerpts from Drainage Report for West Ridge Mobile Home Park (Tierra West, October 1997)
4. Excerpts from I-40 South and Unser Mini Drainage Master Plan (Easterling Consultants, November 2014)



LOCATION MAP

ZONE ATLAS MAP NO. J-9-Z AND K-9-Z

SUBDIVISION DATA

1. PROJECT # 1009438, 12DRB-70371
2. VACATION NO.:
3. ZONE ATLAS INDEX NO.: J-9 AND K-9
4. GROSS SUBDIVISION ACREAGE: 172.4503 ACRES
5. TOTAL NUMBER OF EXISTING TRACTS: 26 TRACTS
6. TOTAL NUMBER OF PROPOSED TRACTS: 12 TRACTS
7. VACATION OF EXISTING ROADWAY EASEMENTS: 7.9864 ACRES
8. VACATION OF ROADWAY R.O.W.: 0.0228 ACRE
9. R.O.W DEDICATION: 4.1238 ACRES
10. EXISTING ROADWAY EASEMENTS DEDICATED AS R.O.W.: 2.8755 ACRES
11. DEDICATED R.O.W. UNCHANGED: 0.1158 ACRE
12. MILEAGE OF STREETS CREATED: 0.54 MILES
13. DATE OF SURVEY: SEPTEMBER 2012
14. ZONING: SU-1 IP AND C-2

DISCLOSURE STATEMENT

THE PURPOSE OF THIS BULK LAND PLAT IS TO ELIMINATE ANTIQUATED EXISTING TRACT LINES (REDUCE NUMBER OF TRACTS FROM 26 TO 12), TO MERGE OWNERSHIP OF VARIOUS PARCELS, TO DEDICATE RIGHTS-OF-WAYS, TO GRANT EASEMENTS, AND TO VACATE RIGHTS-OF-WAYS AND EASEMENTS PER AGREEMENT WITH THE CITY OF ALBUQUERQUE.

NOTES

1. BEARINGS ARE GRID BASED ON NEW MEXICO STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE, NAD83 DATUM. BASIS OF BEARINGS IS BEARING S59°50'57"E BETWEEN CONTROL STATIONS "8_K9" AND "7_K9". DISTANCES ARE GROUND.
2. UNLESS SHOWN OTHERWISE ALL PROPERTY CORNERS ARE MARKED WITH 1/2" REBAR AND CAP MARKED "PS 10464".
3. THE DATA SHOWN HEREON IS FROM AN ACTUAL SURVEY ON THE GROUND.
4. WATER AND SANITARY SEWER SERVICE TO AVALON SUBDIVISION, UNIT 5 MUST BE VERIFIED AND COORDINATED WITH THE ALBUQUERQUE/BERNALILLO COUNTY WATER UTILITY AUTHORITY.
5. THE SUBJECT PROPERTY IS VACANT, THERE ARE NO BUILDINGS OR OTHER STRUCTURES LOCATED ON THE PROPERTY, EXCEPT FOR UTILITY LINES, SOME LOCATED WITHIN EXISTING OR PROPOSED EASEMENTS. OTHER UTILITY LINES MAY EXIST THAT ARE NOT SHOWN.
6. THE SUBJECT PROPERTY LIES WITHIN ZONES "X", "A" AND "AO" AS SHOWN ON FEMA FLOOD INSURANCE RATE MAP NO. 35001C0328H DATED 8/16/2012.
7. THE SUBJECT PROPERTY IS LOCATED WITHIN THE TOWN OF ATRISCO GRANT, WITHIN PROJECTED SECTIONS 16 AND 21, TOWNSHIP 10 NORTH, RANGE 2 EAST, NEW MEXICO PRINCIPAL MERIDIAN.
8. THE PLAT SHOWS ALL EASEMENTS PER RECORDED PLATS AND MADE KNOW TO THE SURVEYOR BY THE OWNERS, UTILITY COMPANIES AND/OR OTHER PARTIES EXPRESSING AN INTEREST.
9. MAINTENANCE OF UTILITY LINES AND OTHER FACILITIES WITHIN EXISTING OR PROPOSED EASEMENTS IS THE RESPONSIBILITY OF THE GRANTEES OF THOSE EASEMENT RIGHTS.
10. NO PROPERTY WITHIN THE AREA OF REQUESTED FINAL ACTION SHALL AT ANY TIME BE SUBJECT TO A DEED RESTRICTION, COVENANT, OR BINDING AGREEMENT PROHIBITING SOLAR COLLECTORS FROM BEING INSTALLED ON BUILDINGS OR ERECTED ON THE LOTS OR PARCELS WITHIN THE AREA OF PROPOSED PLAT. THE FOREGOING REQUIREMENT SHALL BE A CONDITION TO APPROVAL OF THIS PLAT OR SITE DEVELOPMENT PLAN FOR THE SUBDIVISION.
11. BERNALILLO COUNTY BOARD OF COUNTY COMMISSIONERS APPROVED THE ANNEXATION REQUEST OF PORTIONS OF LANDS SHOWN HEREON ON JANUARY 11, 2011, FILE NO. AXBC-2010-03 AND AXBC-2010-04. PRE-ANNEXATION AGREEMENTS BETWEEN THE CITY OF ALBUQUERQUE AND PROPERTY OWNERS WERE RECORDED WITH BERNALILLO COUNTY CLERK ON DECEMBER 27, 2011 AS DOCUMENTS NO. 2011119832 AND 2011119833. ANNEXATION WAS APPROVED BY THE CITY COUNCIL ON NOVEMBER 7, 2011, FILE NO. O-11-67 AND O-11-68.
12. UNTIL A GRADING PLAN IS APPROVED FOR THE PORTION OF 94th STREET N.W. AS SHOWN ON THIS PLAT (BETWEEN LOS VOLCANES ROAD N.W. WESTERLY EXTENSION AND DAYTONA ROAD N.W.) A TEMPORARY SLOPE EASEMENT IS GRANTED BY THIS PLAT TO THE CITY OF ALBUQUERQUE, OF 150 FEET ON EITHER SIDE OF 94th STREET N.W. AND DAYTONA ROAD N.W., AND AT THE TIME THE CITY OF ALBUQUERQUE ACCEPTS A GRADING PLAN FOR SUCH PORTIONS OF 94th STREET N.W. AND DAYTONA ROAD N.W. (DAYTONA LOOP), THE TEMPORARY SLOPE EASEMENT SHALL TERMINATE.

SEE ADDITIONAL NOTES ON SHEET 2

LEGAL DESCRIPTION

BEING THAT CERTAIN PARCEL OF LAND SITUATED WITHIN THE TOWN OF ATRISCO GRANT, WITHIN PROJECTED SECTIONS 16 AND 21, TOWNSHIP 10 NORTH, RANGE 2 EAST, NEW MEXICO PRINCIPAL MERIDIAN, CITY OF ALBUQUERQUE, BERNALILLO COUNTY, NEW MEXICO, AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS;

TRACTS OR PORTIONS OF TRACTS B-11 TROUGH B-13, B-22 THROUGH B-27, B-29 THROUGH B-33, AND VARIOUS ROADWAY EASEMENTS, TOWN OF ATRISCO GRANT UNIT NO. 5, AS SAID TRACTS AND ROADWAY EASEMENTS ARE SHOWN AND DESIGNATED ON THE PLAT TITLED "PLAT SHOWING A PORTION OF TRACTS ALLOTED FROM TOWN OF ATRISCO GRANT IN SCHOOL DISTRICT 28, BERNALILLO COUNTY, NEW MEXICO" FILED IN THE OFFICE OF THE COUNTY CLERK OF BERNALILLO COUNTY, NEW MEXICO, ON DECEMBER 5, 1944 IN VOLUME D, FOLIO 117;

TOGETHER WITH TRACT B-14A, UNSER DIVERSION CHANNEL CORRIDOR, AS SAID TRACT IS SHOWN AND DESIGNATED ON THE PLAT THEREOF FILED IN THE OFFICE OF THE COUNTY CLERK OF BERNALILLO COUNTY, NEW MEXICO, ON FEBRUARY 21, 1996 IN VOLUME 96C, FOLIO 77;

TOGETHER WITH TRACTS A, B AND C, AVALON SUBDIVISION UNIT NO. 4, AS SAID TRACTS ARE SHOWN AND DESIGNATED ON THE PLAT THEREOF, FILED IN THE OFFICE OF THE COUNTY CLERK OF BERNALILLO COUNTY, NEW MEXICO, ON MAY 8, 2003 IN VOLUME 2003C, FOLIO 129;

TOGETHER WITH TRACT C, WESTRIDGE MOBILE HOME PARK PHASE 2, AS SAID TRACT IS SHOWN AND DESIGNATED ON THE PLAT THEREOF FILED IN THE OFFICE OF THE COUNTY CLERK OF BERNALILLO COUNTY, NEW MEXICO, ON MAY 21, 2001 IN VOLUME 2001C, FOLIO 151;

TOGETHER WITH TRACTS 4, 5. 6 AND 7, TOWN OF ATRISCO GRANT, AS SAID TRACTS ARE SHOWN AND DESIGNATED ON THE SURVEY THEREOF FILED IN THE OFFICE OF THE COUNTY CLERK OF BERNALILLO COUNTY, NEW MEXICO, ON SEPTEMBER 27, 2000 IN BOOK 2000S, PAGE 139;

TOGETHER WITH TRACTS 14, 15 AND 16 OF THE WESTERLY EXTENSION OF C.H. HALL SURVEY, AS SAID SURVEY IS SHOWN AND DESIGNATED ON THE PLAT THEREOF FILED IN THE OFFICE OF THE COUNTY CLERK OF BERNALILLO COUNTY, NEW MEXICO, ON DECEMBER 30, 1946 IN VOLUME B1, FOLIO 120.

AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT ON THE WEST SIDE OF THE PARCEL OF LAND HEREIN DESCRIBED BEING A POINT ON THE PRESENT EASTERLY RIGHT-OF-WAY LINE OF 98th STREET N.W., WHENCE THE ALBUQUERQUE CONTROL STATION "8_K9" BEARS S01°37'59"E, 892.61 FEET DISTANCE; THENCE,

NORTHEASTERLY, 1,537.37 FEET DISTANCE ALONG THE ARC OF A CURVE BEARING TO THE RIGHT (SAID ARC HAVING A RADIUS OF 3,543.44 FEET, A CENTRAL ANGLE OF 24°51'31" AND A CHORD WHICH BEARS N24°44'22"E, 1,525.34 FEET DISTANCE) TO A POINT ON CURVE; THENCE,

NORTHEASTERLY, 676.52 FEET DISTANCE ALONG THE ARC OF A CURVE BEARING TO THE RIGHT (SAID ARC HAVING A RADIUS OF 1,637.02 FEET, A CENTRAL ANGLE OF 23°40'42" AND A CHORD WHICH BEARS N46°55'56"E, 671.72 FEET DISTANCE) TO A POINT; THENCE,

N58°48'39"E, 1,117.57 FEET DISTANCE TO A POINT ON CURVE; THENCE,

NORTHEASTERLY, 108.44 FEET DISTANCE ALONG THE ARC OF A CURVE BEARING TO THE RIGHT (SAID ARC HAVING A RADIUS OF 2,291.83 FEET, A CENTRAL ANGLE OF 02°42'40" AND A CHORD WHICH BEARS N60°12'57"E, 108.43 FEET DISTANCE) TO THE MOST NORTHERLY CORNER OF THE PARCEL OF LAND HEREIN DESCRIBED BEING A POINT ON THE SOUTHERLY RIGHT-OF-WAY LINE OF INTERSTATE 40; THENCE,

S00°18'08"W, 652.02 FEET DISTANCE TO A POINT ON THE NORTHERLY LINE OF DAYTONA ROAD N.W EASEMENT; THENCE,
S04°12'32"E, 60.00 FEET DISTANCE TO A POINT ON THE SOUTHERLY LINE OF DAYTONA ROAD N.W. EASEMENT; THENCE, ,
N85°47'28"E, 563.87 FEET DISTANCE TO A POINT; THENCE, N85°51'15"E, 450.34 FEET DISTANCE TO A POINT; THENCE,
N85°47'44"E, 322.60 FEET DISTANCE TO A POINT; THENCE, S00°39'36"W, 510.34 FEET DISTANCE TO A POINT; THENCE,
S89°20'24"E, 130.64 FEET DISTANCE TO A POINT; THENCE, S00°19'40"W, 365.76 FEET DISTANCE TO A POINT; THENCE,
S86°17'40"W, 150.00 FEET DISTANCE TO A POINT; THENCE, S00°19'40"W, 150.00 FEET DISTANCE TO THE POINT ON THE NORTHERLY LINE OF LOS VOLCANES ROAD N.W; THENCE,
S86°17'40"W, 231.70 FEET DISTANCE TO A POINT; THENCE,
S86°22'20"W, 381.37 FEET DISTANCE TO A POINT; THENCE, S86°17'50"W, 763.40 FEET DISTANCE TO THE POINT OF CURVATURE; THENCE,

SOUTHWESTERLY, 76.42 FEET DISTANCE ALONG THE ARC OF A CURVE BEARING TO THE LEFT (SAID ARC HAVING A RADIUS OF 46.40 FEET, A CENTRAL ANGLE OF 94°21'30" AND A CHORD WHICH BEARS S39°07'05"W, 68.07 FEET DISTANCE) TO THE POINT OF TANGENCY; THENCE,

S08°03'40"E, 32.36 FEET DISTANCE TO THE POINT OF CURVATURE ON THE WESTERLY LINE OF 90th STREET N.W.; THENCE,

SOUTHEASTERLY, 82.51 FEET DISTANCE ALONG THE ARC OF A CURVE BEARING TO THE LEFT (SAID ARC HAVING A RADIUS OF 684.00 FEET, A CENTRAL ANGLE OF 06°54'40" AND A CHORD WHICH BEARS S11°31'00"E, 82.46 FEET DISTANCE) TO THE POINT OF TANGENCY; THENCE,

S14°58'20"E, 565.35 FEET DISTANCE TO THE POINT OF CURVATURE; THENCE,

SOUTHEASTERLY, 143.97 FEET DISTANCE ALONG THE ARC OF A CURVE BEARING TO THE LEFT (SAID ARC HAVING A RADIUS OF 684.00 FEET, A CENTRAL ANGLE OF 12°03'34" AND A CHORD WHICH BEARS S21°00'07"E, 143.70 FEET DISTANCE) TO THE POINT OF REVERSE CURVATURE; THENCE,

SOUTHEASTERLY, 196.73 FEET DISTANCE ALONG THE ARC OF A CURVE BEARING TO THE RIGHT (SAID ARC HAVING A RADIUS OF 616.00 FEET, A CENTRAL ANGLE OF 18°17'55" AND A CHORD WHICH BEARS S17°52'57"E, 195.90 FEET DISTANCE) TO THE POINT OF COMPOUND CURVATURE; THENCE,

SOUTHWESTERLY, 43.22 FEET DISTANCE ALONG THE ARC OF A CURVE BEARING TO THE RIGHT (SAID ARC HAVING A RADIUS OF 25.00 FEET, A CENTRAL ANGLE OF 99°03'39" AND A CHORD WHICH BEARS S40°47'50"W, 38.04 FEET DISTANCE) TO THE POINT OF TANGENCY BEING A POINT ON THE NORTHERLY LINE OF BLUEWATER ROAD N.W.; THENCE,

N89°40'20"W, 181.06 FEET DISTANCE TO THE POINT OF CURVATURE; THENCE,

SOUTHWESTERLY, 841.91 FEET DISTANCE ALONG THE ARC OF A CURVE BEARING TO THE LEFT (SAID ARC HAVING A RADIUS OF 1,358.17 FEET, A CENTRAL ANGLE OF 35°31'01" AND A CHORD WHICH BEARS S72°34'10"W, 828.50 FEET DISTANCE TO A POINT; THENCE,

S14°58'20"E, 72.73 FEET DISTANCE TO A THE POINT ON THE SOUTHERLY LINE OF BLUEWATER ROAD N.W.; THENCE,

SOUTHWESTERLY, 65.08 FEET DISTANCE ALONG THE ARC OF A CURVE BEARING TO THE LEFT (SAID ARC HAVING A RADIUS OF 1,290.17 FEET, A CENTRAL ANGLE OF 02°53'25" AND A CHORD WHICH BEARS S52°14'59"W, 65.08 FEET DISTANCE) TO A POINT; THENCE,

N14°58'20"W, 37.19 FEET DISTANCE TO A POINT ON CURVE; THENCE,

SOUTHWESTERLY, 315.99 FEET DISTANCE ALONG THE ARC OF A CURVE BEARING TO THE LEFT (SAID ARC HAVING A RADIUS OF 1,324.17 FEET, A CENTRAL ANGLE OF 13°40'22" AND A CHORD WHICH BEARS S44°37'42"W, 315.24 FEET DISTANCE) TO THE POINT OF TANGENCY; THENCE,

S37°47'31"W, 421.74 FEET DISTANCE TO A POINT; THENCE,
S14°58'20"E, 195.30 FEET DISTANCE TO A POINT; THENCE,
N89°40'20"W, 107.16 FEET DISTANCE TO A POINT; THENCE,
S00°19'40"W, 1,048.69 FEET DISTANCE TO A POINT ON THE NORTHERLY LINE OF VOLCANO ROAD N.W.; THENCE,
N89°40'20"W, 393.34 FEET DISTANCE TO THE SOUTHWEST CORNER OF THE PARCEL OF LAND HEREIN DESCRIBED BEING A POINT ON THE WESTERLY LINE OF 98th STREET N.W.; THENCE,
N14°50'48"W, 785.21 FEET DISTANCE TO A POINT; THENCE,
N02°45'59"W, 305.53 FEET DISTANCE TO A POINT; THENCE,
N14°59'29"W, 726.83 FEET DISTANCE TO A POINT ON CURVE; THENCE,

NORTHEASTERLY, 525.78 FEET DISTANCE ALONG THE ARC OF A CURVE BEARING TO THE RIGHT (SAID ARC HAVING A RADIUS OF 818.51 FEET, A CENTRAL ANGLE OF 36°48'17" AND A CHORD WHICH BEARS N03°25'20"E, 516.79 FEET DISTANCE) TO A POINT; THENCE,

N00°00'00"E, 155.75 FEET DISTANCE TO THE POINT OF BEGINNING OF THE PARCEL OF LAND HEREIN DESCRIBED.

THE ABOVE DESCRIBED PARCEL OF LAND CONTAINS 7,511,937 SQUARE FEET (172.4503 ACRES), MORE OR LESS.

THE PURPOSE OF THE METES AND BOUNDS LEGAL DESCRIPTION IS TO COMPLY WITH THE CITY OF ALBUQUERQUE SURVEY SECTION REQUIREMENT, AND TO SHOWN AN OVERALL EXTENT OF THE BULK LAND PLAT DEVELOPMENT AREA. NOT ALL LANDS INCLUDED IN THE METES AND BOUNDS LEGAL DESCRIPTION ARE OWNED BY THE OWNERS AS SHOWN HEREON, SMALL PORTIONS WERE DEDICATED TO THE CITY OF ALBUQUERQUE BY PREVIOUS PLATTING ACTIONS SHOWN HEREON.

PLAT OF TRACTS 1 THROUGH 12
AVALON SUBDIVISION UNIT 5

ALBUQUERQUE, BERNALILLO COUNTY, NEW MEXICO

JANUARY 2013

TITLE SHEET

APPROVED AND ACCEPTED BY:

PROJECT # 1009438, 12DRB-70371
CASE NO.

DRB CHAIRPERSON, PLANNING DEPARTMENT — DATE 5-21-14

CITY ENGINEER — DATE 5-14-14

AMAFCA — DATE 4-28-14 3-26-14

Carol S. Dumont
PARKS AND RECREATION DEPARTMENT — DATE 5-14-14

ALBUQUERQUE/BERNALILLO COUNTY WATER UTILITY AUTHORITY — DATE 05/14/14

TRAFFIC ENGINEER, TRANSPORTATION DIVISION — DATE 05-14-14

ENVIRONMENTAL HEALTH DEPARTMENT — DATE 05-19-2014

REAL PROPERTY DIVISION — DATE 5-14-14

CITY SURVEYOR — DATE 1/8/14

PNM — DATE 2-13-13 3-18-14 3/12/2014

NEW MEXICO GAS COMPANY — DATE 2/20/2013 3-25-14

Rita Jaramillo Rita Jaramillo
CENTURYLINK — DATE 3-19-13 3/12/14

COMCAST — DATE 2/13/13

THIS IS TO CERTIFY THAT TAXES ARE CURRENT AND
PAID ON UPC # 22 parcels listed
PROPERTY OWNER OF RECORD Multiple owners
5/22/14
BERNALILLO COUNTY TREASURER'S OFFICE

SURVEYOR'S CERTIFICATION

I, VLADIMIR JIRIK, A DULY QUALIFIED PROFESSIONAL SURVEYOR REGISTERED UNDER THE LAWS OF THE STATE OF NEW MEXICO, DO HEREBY CERTIFY THAT THIS PLAT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION, SHOWS ALL EASEMENTS MADE KNOWN TO ME BY THE OWNERS, UTILITY COMPANIES OR OTHER PARTIES EXPRESSING AN INTEREST AND THAT THE SURVEY MEETS THE MINIMUM REQUIREMENTS FOR MONUMENTATION AND SURVEYS OF THE CITY OF ALBUQUERQUE SUBDIVISION ORDINANCE AND MINIMUM STANDARDS FOR LAND SURVEYS IN NEW MEXICO, AND IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

2/12/2013
DATE

VLADIMIR JIRIK, NMPS NO. 10464
PROFESSIONAL SURVEYING LLC
P.O. BOX 94595, ALBUQUERQUE, NM 87199
505.892.4597, professional.surveying@comcast.net

PROFESSIONAL SURVEYOR STATE OF NEW MEXICO NO. 10464 VLADIMIR JIRIK

DOC# 2014040949
05/22/2014 02:52 PM Page: 1 of 6
tyPLAT R:$25.00 B: 2014C P: 0046 M. Toulous Olivere, Bernalillo Cour

PLAT OF TRACTS 1 THROUGH 12
AVALON SUBDIVISION UNIT 5
ALBUQUERQUE, BERNALILLO COUNTY, NEW MEXICO
JANUARY 2013

OWNERS SIGNATURE SHEET, NOTES

FREE CONSENT AND DEDICATION

THE SUBDIVISION SHOWN HEREON IS WITH THE FREE CONSENT AND IN ACCORDANCE WITH THE DESIRES OF THE UNDERSIGNED OWNERS AND/OR PROPRIETORS THEREOF. SAID OWNERS WARRANT THAT THEY HOLD AMONG THEM COMPLETE AND INDEFEASIBLE TITLE IN FEE SIMPLE TO THE LANDS SUBDIVIDED, AND SAID OWNERS AND/OR PROPRIETORS DO HEREBY DEDICATE RIGHTS-OF-WAYS IN FEE SIMPLE WITH WARRANTY COVENANTS TO THE CITY OF ALBUQUERQUE, AND GRANT EASEMENTS AS SHOWN HEREON FOR THE PURPOSES NOTED. SAID OWNERS AND/OR PROPRIETORS DO HEREBY CONSENT TO ALL OF THE FOREGOING AND DO HEREBY CERTIFY THAT THIS SUBDIVISION IS THEIR FREE ACT AND DEED.

Denise Penners
FOR CURB INC., ~~CHARLES A. HAEGELIN~~, PRESIDENT
Denise Penners

ACKNOWLEDGEMENT
STATE OF NEW MEXICO
COUNTY OF BERNALILLO
THIS INSTRUMENT WAS ACKNOWLEDGED BEFORE ME ON 13th DAY OF DECEMBER 2013 BY DENISE PENNERS.
MY COMMISSION EXPIRES:
OFFICIAL SEAL RICHARD J. SQUIRES NOTARY PUBLIC-STATE OF NEW MEXICO My commission expires: 10/2/2015

Denise Penners
FOR BLUEWATER NORTH LLC, ~~CHARLES A. HAEGELIN~~, MANAGING MEMBER
Denise Penners

ACKNOWLEDGEMENT
STATE OF NEW MEXICO
COUNTY OF BERNALILLO
THIS INSTRUMENT WAS ACKNOWLEDGED BEFORE ME ON 13th DAY OF DECEMBER 2013 BY DENISE PENNERS.
MY COMMISSION EXPIRES:
OFFICIAL SEAL RICHARD J. SQUIRES NOTARY PUBLIC-STATE OF NEW MEXICO My commission expires: 10/2/2015

BJSpencer
FOR RPS I-25 & VASSAR LLC, BEN SPENCER, MANAGING MEMBER

ACKNOWLEDGEMENT
STATE OF New Mexico
COUNTY OF Bernalillo
THIS INSTRUMENT WAS ACKNOWLEDGED BEFORE ME ON 27th DAY OF December 2012 BY ~~Theresa Casares~~ BEN SPENCER
MY COMMISSION EXPIRES: 08/02/2016
Theresa Casares
OFFICIAL SEAL Theresa Casares Notary Public State of New Mexico My Commission Expires 08/02/2016

Denise Penners
FOR BLUEWATER 98TH LLC, ~~CHARLES A. HAEGELIN~~, MANAGING MEMBER
Denise Penners

ACKNOWLEDGEMENT
STATE OF NEW MEXICO
COUNTY OF BERNALILLO
THIS INSTRUMENT WAS ACKNOWLEDGED BEFORE ME ON 13th DAY OF DECEMBER 2013 BY DENISE PENNERS.
MY COMMISSION EXPIRES:
OFFICIAL SEAL RICHARD J. SQUIRES NOTARY PUBLIC-STATE OF NEW MEXICO My commission expires: 10/2/2015

Marie S. Baca
FOR MAJEC LLC, MARIE S. BACA, OPERATING MANAGER

ACKNOWLEDGEMENT
STATE OF NEW MEXICO
COUNTY OF BERNALILLO
THIS INSTRUMENT WAS ACKNOWLEDGED BEFORE ME ON 23rd DAY OF DECEMBER 2013 BY MARIE S. BACA
MY COMMISSION EXPIRES:

FOR IVANHOE INVESTMENT LLC, ~~CHARLES A. HAEGELIN~~, MANAGING MEMBER
Bo K. Johnson

ACKNOWLEDGEMENT
STATE OF NEW MEXICO
COUNTY OF BERNALILLO
THIS INSTRUMENT WAS ACKNOWLEDGED BEFORE ME ON 13th DAY OF DECEMBER 2013 BY BO K. JOHNSON.
MY COMMISSION EXPIRES:
OFFICIAL SEAL RICHARD J. SQUIRES NOTARY PUBLIC-STATE OF NEW MEXICO My commission expires: 10/2/2015

FOR I-40 SOUTH LLC, THOMAS KELEHER, MANAGING MEMBER

ACKNOWLEDGEMENT
STATE OF New Mexico
COUNTY OF Bernalillo
THIS INSTRUMENT WAS ACKNOWLEDGED BEFORE ME ON 26th DAY OF December 2012 BY Thomas F. Keleher
MY COMMISSION EXPIRES: 1/22/13
OFFICIAL SEAL Margaret A. Bols NOTARY PUBLIC STATE OF NEW MEXICO My Commission Expires: 1/22/13

Chris Bruckner
FOR BRUCKNER TRUCK SALES INC., CHRISTOPHER BRUCKNER, PRESIDENT

ACKNOWLEDGEMENT
STATE OF New Mexico
COUNTY OF BERNALILLO
THIS INSTRUMENT WAS ACKNOWLEDGED BEFORE ME ON 3RD DAY OF January 2013 BY Chris Bruckner
MY COMMISSION EXPIRES: 11-30-2016
OFFICIAL SEAL CYNTHIA LOUISE ABEYTA NOTARY PUBLIC-STATE OF NEW MEXICO My commission expires: 11-30-2016

OWNERSHIP NOTE

SEE SHEETS 5 AND 6 FOR CURRENT OWNERSHIP OF EXISTING PARCELS AND TRACTS.

BULK LAND VARIANCE NOTE

A VARIANCE OR WAIVER FROM CERTAIN SUBDIVISION REQUIREMENTS HAS BEEN GRANTED BY THE CITY OF ALBUQUERQUE AND ALBUQUERQUE METROPOLITAN FLOOD CONTROL AUTHORITY (A.M.A.F.C.A.) IN CONNECTION WITH THIS PLAT. FUTURE SUBDIVISIONS OF LANDS WITHIN THIS PLAT, ZONING SITE DEVELOPMENT APPROVALS, AND DEVELOPMENT PERMITS MAY BE CONDITIONED UPON DEDICATION OF RIGHTS-OF-WAYS AND EASEMENTS, AND/OR UPON INFRASTRUCTURE IMPROVEMENTS BY THE OWNERS OF WATER, SANITARY SEWER, DRAINAGE, GRADING AND PARKS IN ACCORDANCE WITH CURRENT RESOLUTIONS, ORDINANCES AND POLICIES IN EFFECT AT THE TIME FOR SUCH SPECIFIC PROPOSALS. THE CITY MAY REQUIRE AND/OR PERMIT EASEMENTS TO BE ADDED, MODIFIED OR REMOVED WHEN FUTURE PLATS OR SITE DEVELOPMENT PLANS ARE APPROVED. BY ITS APPROVAL, CITY OF ALBUQUERQUE MAKES NO REPRESENTATION OR WARRANTIES AS TO THE AVAILABILITY OF UTILITIES, OR FINAL APPROVAL OF ALL REQUIREMENTS INCLUDING (BUT NOT LIMITED TO) THE FOLLOWING ITEMS: WATER AND SANITARY SEWER AVAILABILITY; FUTURE STREET DEDICATION AND/OR IMPROVEMENTS; AND EXCAVATION, FILLING OR GRADING REQUIREMENTS. ANY PERSON INTENDING DEVELOPMENT OF LANDS WITHIN THIS SUBDIVISION IS CAUTIONED TO INVESTIGATE THE STATUS OF THESE ITEMS.

ALBUQUERQUE/BERNALILLO COUNTY WATER UTILITY AUTHORITY (ABCWUA) NOTE

WITHIN THE LANDS SHOWN ON THIS PLAT, AND DEPENDING ON FUTURE DEVELOPMENT PLANS, DEVELOPMENT SIZE, PARCEL(S), TRACT LOCATION AND LAND USE; ADDITIONAL UTILITY PLANNING, DESIGN AND CONSTRUCTION ACROSS I-40 MAY BE REQUIRED, ANYONE INTENDING DEVELOPMENT OF ANY OF THESE LANDS OR PORTIONS THEREOF IS ENCOURAGED TO COORDINATE WITH THE ABCWUA.

PUBLIC UTILITY EASEMENTS

PUBLIC UTILITY EASEMENTS SHOWN ON THIS PLAT ARE GRANTED FOR THE COMMON AND JOINT USE OF:

A. PUBLIC SERVICE COMPANY OF NEW MEXICO ("PNM"), A NEW MEXICO CORPORATION, (PNM ELECTRIC) FOR INSTALLATION, MAINTENANCE, AND SERVICE OF OVERHEAD AND UNDERGROUND ELECTRICAL LINES, TRANSFORMERS, AND OTHER EQUIPMENT AND RELATED FACILITIES REASONABLY NECESSARY TO PROVIDE ELECTRICAL SERVICES.

B. NEW MEXICO GAS COMPANY FOR INSTALLATION, MAINTENANCE, AND SERVICE OF NATURAL GAS LINES, VALVES AND OTHER EQUIPMENT AND FACILITIES REASONABLY NECESSARY TO PROVIDE NATURAL GAS SERVICES.

C. CENTURYLINK FOR THE INSTALLATION, MAINTENANCE, AND SERVICE OF SUCH LINES, CABLE, AND OTHER RELATED EQUIPMENT AND FACILITIES REASONABLY NECESSARY TO PROVIDE COMMUNICATION SERVICES.

D. COMCAST FOR THE INSTALLATION, MAINTENANCE, AND SERVICE OF SUCH LINES, CABLE, AND OTHER RELATED EQUIPMENT AND FACILITIES REASONABLY NECESSARY TO PROVIDE CABLE SERVICES.

INCLUDED, IS THE RIGHT TO BUILD, REBUILD, CONSTRUCT, RECONSTRUCT, LOCATE, RELOCATE, CHANGE, REMOVE, REPLACE, MODIFY, RENEW, OPERATE AND MAINTAIN FACILITIES FOR PURPOSES DESCRIBED ABOVE, TOGETHER WITH FREE ACCESS TO, FROM, AND OVER SAID EASEMENTS, WITH THE RIGHT AND PRIVILEGE OF GOING UPON, OVER AND ACROSS ADJOINING LANDS OF GRANTOR FOR THE PURPOSES SET FORTH HEREIN AND WITH THE RIGHT TO UTILIZE THE RIGHT OF WAY AND EASEMENT TO EXTEND SERVICES TO CUSTOMERS OF GRANTEE, INCLUDING SUFFICIENT WORKING AREA SPACE FOR ELECTRIC TRANSFORMERS, WITH THE RIGHT AND PRIVILEGE TO TRIM AND REMOVE TREES, SHRUBS OR BUSHES WHICH INTERFERE WITH THE PURPOSES SET FORTH HEREIN. NO BUILDING, SIGN, POOL (ABOVEGROUND OR SUBSURFACE), HOT TUB, CONCRETE OR WOOD POOL DECKING, OR OTHER STRUCTURE SHALL BE ERECTED OR CONSTRUCTED ON SAID EASEMENTS, NOR SHALL ANY WELL BE DRILLED OR OPERATED THEREON. PROPERTY OWNERS SHALL BE SOLELY RESPONSIBLE FOR CORRECTING ANY VIOLATIONS OF NATIONAL ELECTRICAL SAFETY CODE BY CONSTRUCTION OF POOLS, DECKING, OR ANY STRUCTURES ADJACENT TO OR NEAR EASEMENTS SHOWN ON THIS PLAT.
EASEMENTS FOR ELECTRIC TRANSFORMER/SWITCHGEARS, AS INSTALLED, SHALL EXTEND TEN (10) FEET IN FRONT OF TRANSFORMER/SWITCHGEAR DOORS AND FIVE (5) FEET ON EACH SIDE.

DISCLAIMER

IN APPROVING THIS PLAT, PUBLIC SERVICE COMPANY OF NEW MEXICO (PNM) AND NEW MEXICO GAS COMPANY (NMGC) DID NOT CONDUCT A TITLE SEARCH OF THE PROPERTIES SHOWN HEREON. CONSEQUENTLY, PNM AND NMGC DO NOT WAIVE OR RELEASE ANY EASEMENT OR EASEMENT RIGHTS WHICH MAY HAVE BEEN GRANTED BY PRIOR PLAT, REPLAT OR OTHER DOCUMENT AND WHICH ARE NOT SHOWN ON THIS PLAT.

PLAT OF TRACTS 1 THROUGH 12
AVALON SUBDIVISION UNIT 5
ALBUQUERQUE, BERNALILLO COUNTY, NEW MEXICO
JANUARY 2013

FINAL TRACTS - SHEET 1

CURVE TABLE					
CURVE #	RADIUS	LENGTH	DELTA	CHORD	DISTANCE
C-1	684.00'	82.51'	06°54'40"	S 11°31'00" E	82.46'
C-2	684.00'	143.97'	12°03'34"	S 21°00'07" E	143.70'
C-3	616.00'	196.73'	18°17'55"	S 17°52'57" E	195.90'
C-4	25.00'	43.22'	99°03'39"	S 40°47'50" W	38.04'
C-5	25.00'	38.28'	87°43'15"	N 78°11'19" W	34.65'
C-6	368.99'	339.81'	52°45'51"	S 11°24'35" W	327.93'
C-7	46.40'	19.48'	24°03'12"	S 03°57'56" W	19.34'

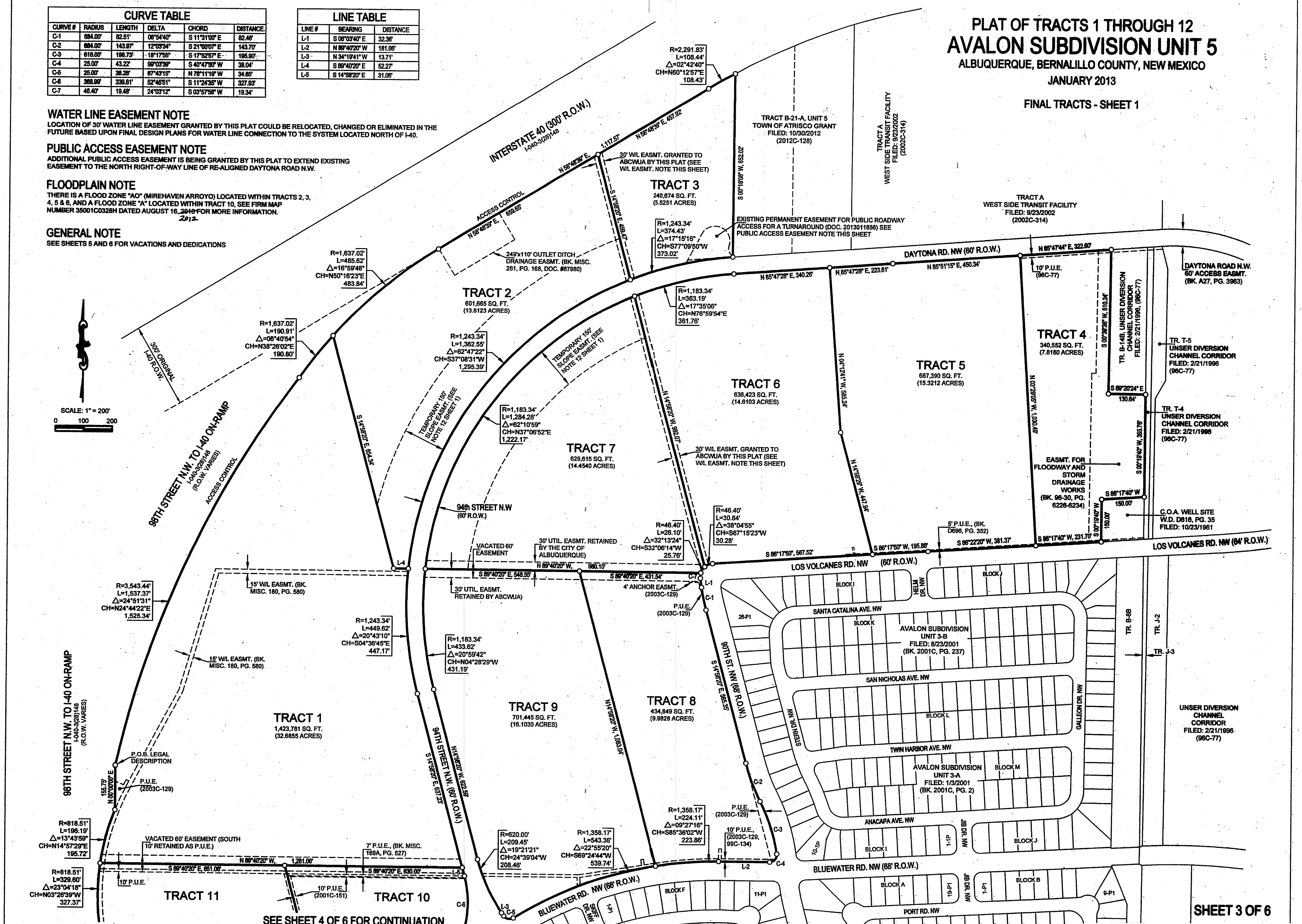
LINE TABLE		
LINE #	BEARING	DISTANCE
L-1	S 08°03'40" E	32.36'
L-2	N 89°40'20" W	181.06'
L-3	N 34°19'41" W	13.71'
L-4	S 89°40'20" E	52.27'
L-5	S 14°58'20" E	31.06'

WATER LINE EASEMENT NOTE
LOCATION OF 30' WATER LINE EASEMENT GRANTED BY THIS PLAT COULD BE RELOCATED, CHANGED OR ELIMINATED IN THE FUTURE BASED UPON FINAL DESIGN PLANS FOR WATER LINE CONNECTION TO THE SYSTEM LOCATED NORTH OF I-40.

PUBLIC ACCESS EASEMENT NOTE
ADDITIONAL PUBLIC ACCESS EASEMENT IS BEING GRANTED BY THIS PLAT TO EXTEND EXISTING EASEMENT TO THE NORTH RIGHT-OF-WAY LINE OF RE-ALIGNED DAYTONA ROAD N.W.

FLOODPLAIN NOTE
THERE IS A FLOOD ZONE "AO" (MIREHAVEN ARROYO) LOCATED WITHIN TRACTS 2, 3, 4, 5 & 6, AND A FLOOD ZONE "A" LOCATED WITHIN TRACT 10, SEE FIRM MAP NUMBER 35001C0328H DATED AUGUST 16, ~~2010~~ 2012 FOR MORE INFORMATION.

GENERAL NOTE
SEE SHEETS 5 AND 6 FOR VACATIONS AND DEDICATIONS

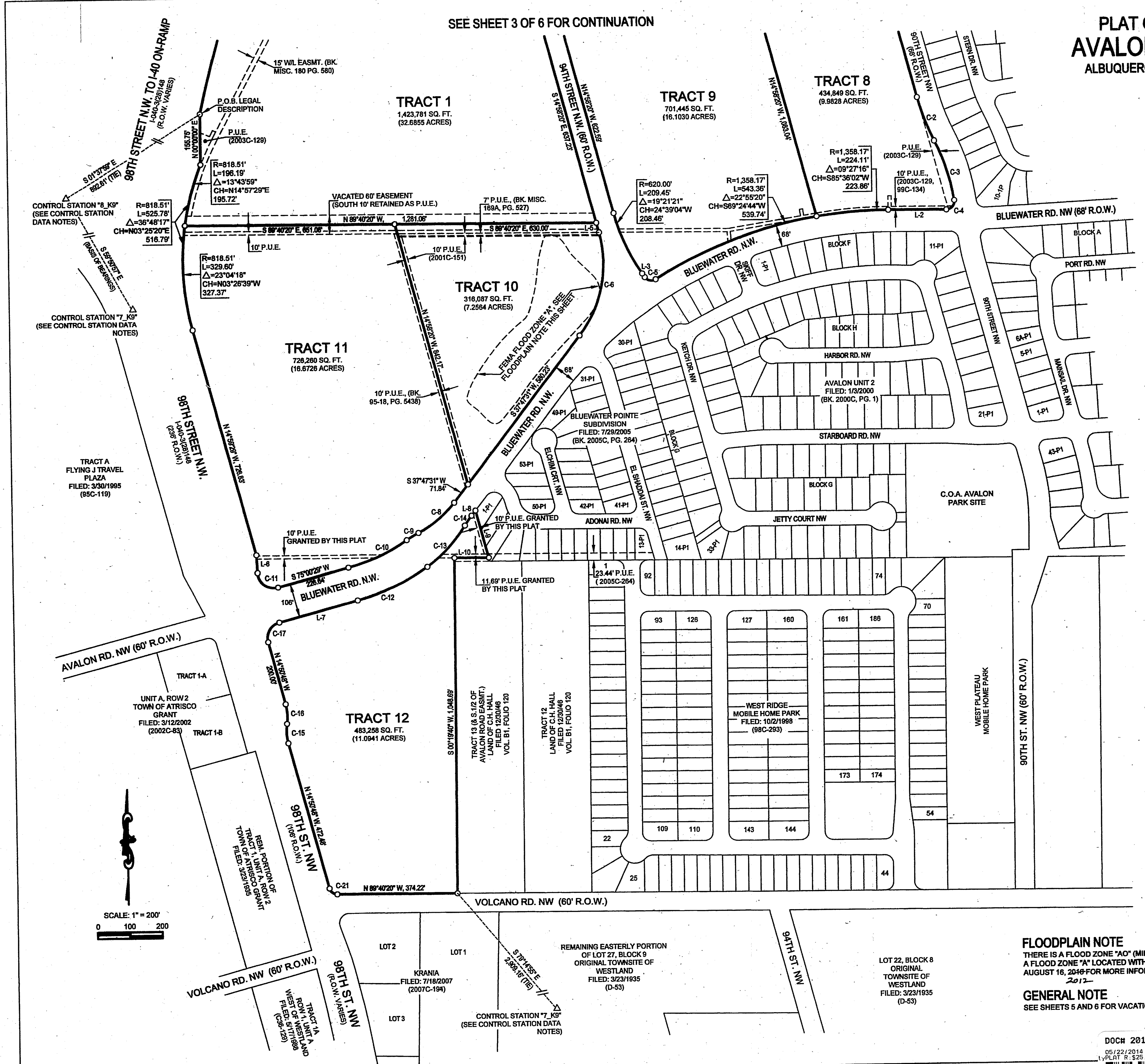


SEE SHEET 4 OF 6 FOR CONTINUATION

PLAT OF TRACTS 1 THROUGH 12
AVALON SUBDIVISION UNIT 5
ALBUQUERQUE, BERNALILLO COUNTY, NEW MEXICO
JANUARY 2013

FINAL TRACTS - SHEET 2

SEE SHEET 3 OF 6 FOR CONTINUATION



CURVE TABLE					
CURVE #	RADIUS	LENGTH	DELTA	CHORD	DISTANCE
C-1	684.00'	82.51'	06°54'40"	S 11°31'00" E	82.46'
C-2	684.00'	143.97'	12°03'34"	S 21°00'07" E	143.70'
C-3	616.00'	196.73'	18°17'55"	S 17°52'57" E	195.90'
C-4	25.00'	43.22'	99°03'39"	S 40°47'50" W	38.04'
C-5	25.00'	38.28'	87°43'15"	N 78°11'19" W	34.65'
C-6	368.99'	339.81'	52°45'51"	S 11°24'35" W	327.93'
C-7	46.40'	19.48'	24°03'12"	S 03°57'56" W	19.34'
C-8	335.00'	147.22'	25°10'44"	S 50°22'53" W	146.04'
C-9	335.00'	43.09'	07°22'11"	S 59°17'10" W	43.06'
C-10	597.00'	202.21'	19°24'25"	S 65°18'17" W	201.25'
C-11	50.00'	89.21'	102°13'32"	N 63°52'53" W	77.84'
C-12	703.00'	242.19'	19°44'20"	N 65°08'19" E	240.99'
C-13	475.00'	175.75'	21°11'58"	N 42°48'02" E	174.75'
C-14	380.20'	37.10'	05°35'29"	N 34°59'47" E	37.09'
C-15	150.00'	61.67'	23°33'23"	N 03°04'07" W	61.24'
C-16	150.00'	61.67'	23°33'23"	N 03°04'07" W	61.24'
C-17	50.00'	78.42'	89°51'53"	N 30°05'08" E	70.63'
C-21	25.00'	32.65'	74°49'32"	N 52°15'34" W	30.38'

LINE TABLE		
LINE #	BEARING	DISTANCE
L-1	S 08°03'40" E	32.36'
L-2	N 89°40'20" W	181.06'
L-3	N 34°19'41" W	13.71'
L-4	S 89°40'20" E	52.27'
L-5	S 14°58'20" E	31.08'
L-6	N 02°45'59" W	57.21'
L-7	N 75°00'29" E	253.02'
L-8	N 37°47'32" E	20.17'
L-9	S 14°58'20" E	152.60'
L-10	N 89°40'20" W	107.16'

CONTROL STATION DATA

C.O.A CONTROL STATION "8_K9"
NM STATE PLANE COORDINATES, CENTRAL ZONE, NAD 83
N=1,484,994.639
E=1,492,463.769
ELEVATION=5,250.166 (NAVD 1988)
GROUND-TO-GRID FACTOR=0.999677891
MAPPING ANGLE=-0°17'03.21"

C.O.A CONTROL STATION "7_K9"
NM STATE PLANE COORDINATES, CENTRAL ZONE, NAD 83
N=1,482,904.725
E=1,496,061.706
ELEVATION=5,140.082 (NAVD 1988)
GROUND-TO-GRID FACTOR=0.999681940
MAPPING ANGLE=-0°16'38.12"

FLOODPLAIN NOTE
THERE IS A FLOOD ZONE "AO" (MIREHAVEN ARROYO) LOCATED WITHIN TRACTS 2, 3, 4, 5 & 6, AND A FLOOD ZONE "A" LOCATED WITHIN TRACT 10, SEE FIRM MAP NUMBER 35001C0328H DATED AUGUST 16, ~~2016~~ 2012 FOR MORE INFORMATION.

GENERAL NOTE
SEE SHEETS 5 AND 6 FOR VACATIONS AND DEDICATIONS

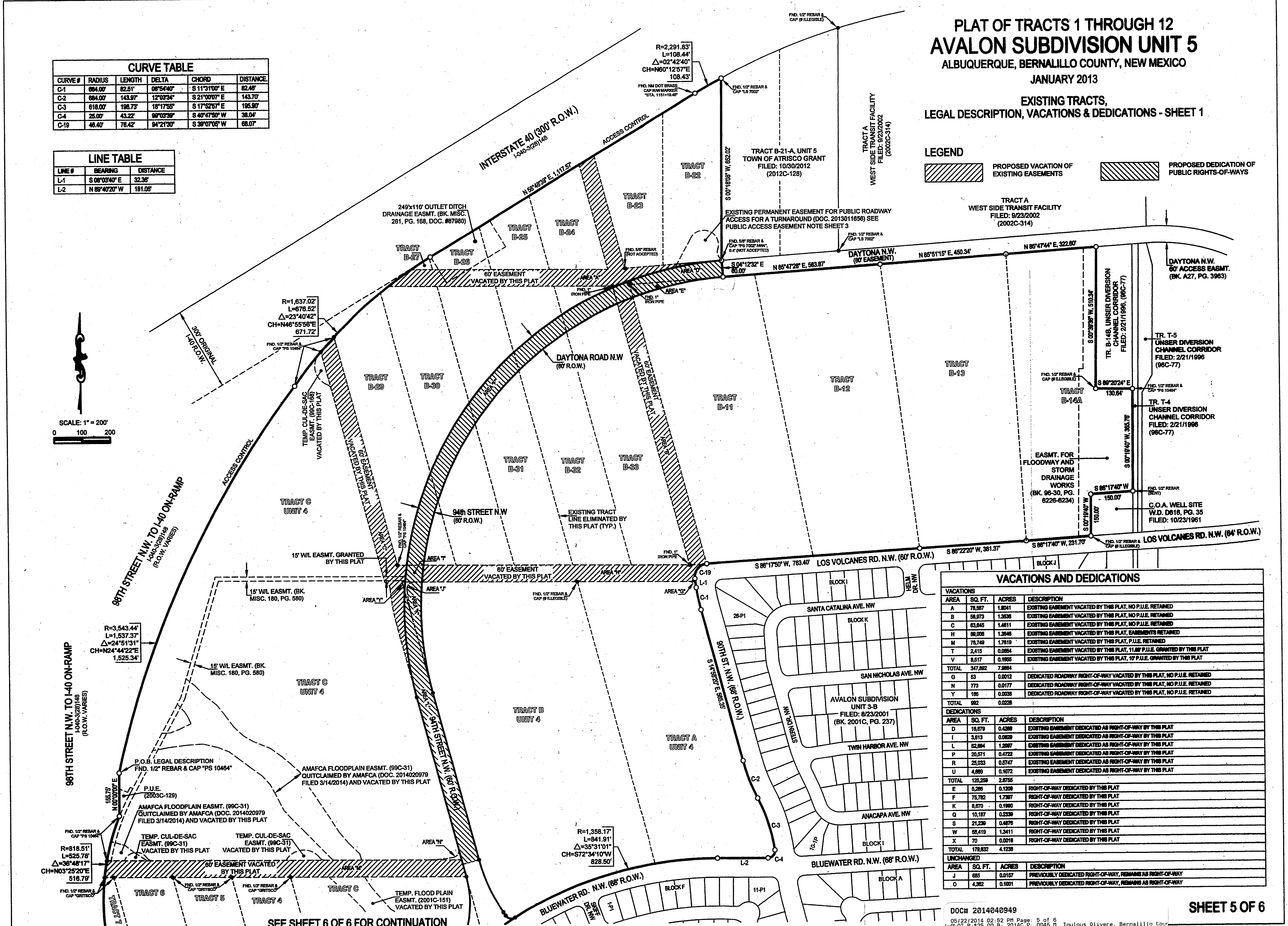
PLAT OF TRACTS 1 THROUGH 12
AVALON SUBDIVISION UNIT 5
ALBUQUERQUE, BERNALILLO COUNTY, NEW MEXICO
JANUARY 2013

EXISTING TRACTS,
LEGAL DESCRIPTION, VACATIONS & DEDICATIONS - SHEET 1

LEGEND

PROPOSED VACATION OF EXISTING EASEMENTS

PROPOSED DEDICATION OF PUBLIC RIGHTS-OF-WAYS



SEE SHEET 6 OF 6 FOR CONTINUATION

CURVE TABLE

CURVE #	RADIUS	LENGTH	DELTA	CHORD	DISTANCE.
C-1	684.00'	82.51'	06°54'40"	S 11°31'00" E	82.46'
C-2	684.00'	143.97'	12°03'34"	S 21°00'07" E	143.70'
C-3	616.00'	196.73'	18°17'55"	S 17°52'57" E	195.90'
C-4	25.00'	43.22'	99°03'39"	S 40°47'50" W	38.04'
C-19	46.40'	76.42'	94°21'30"	S 39°07'05" W	68.07'

LINE TABLE

LINE #	BEARING	DISTANCE
L-1	S 08°03'40" E	32.36'
L-2	N 89°40'20" W	181.06'

VACATIONS AND DEDICATIONS

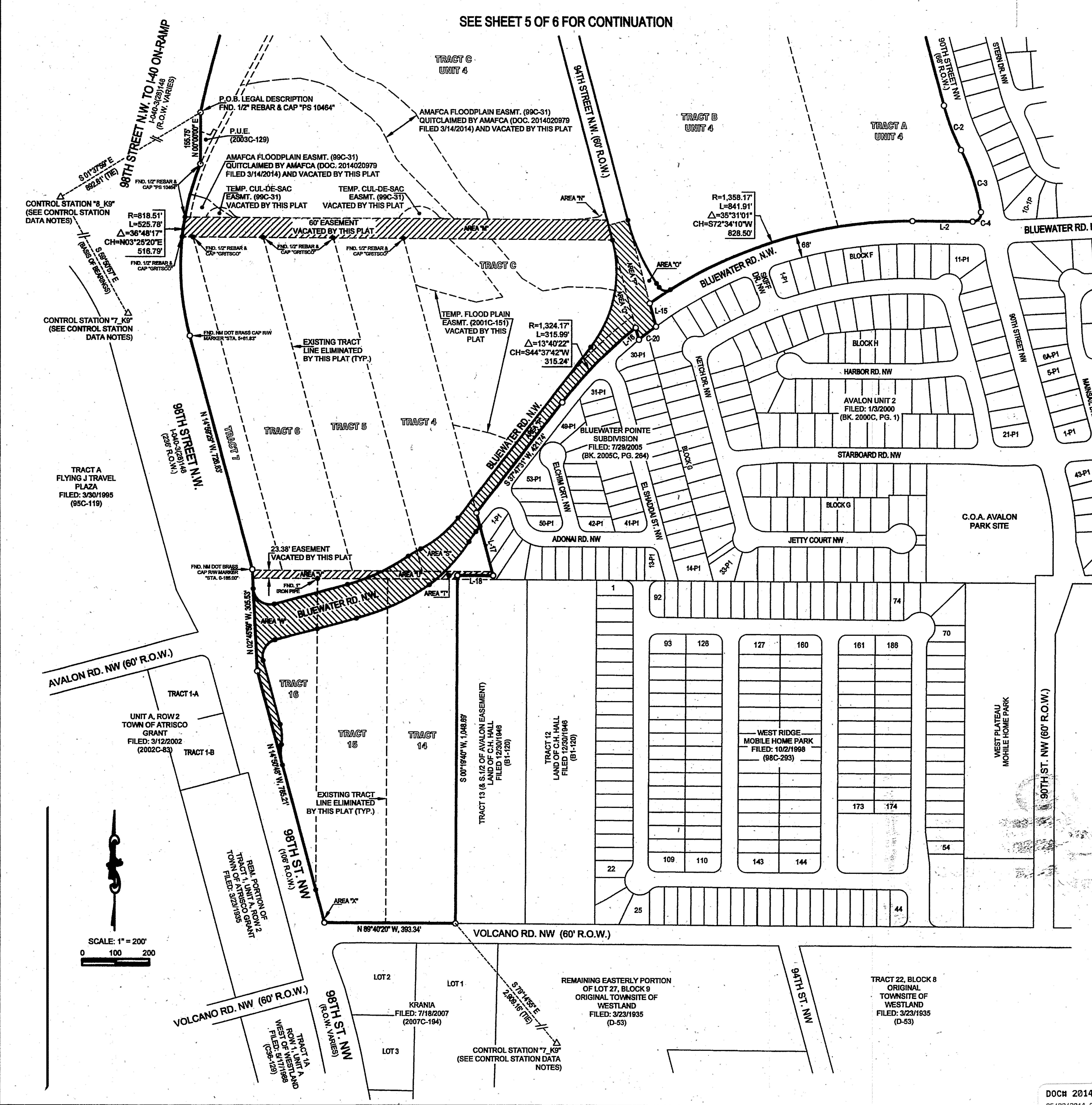
AREA	SQ. FT.	ACRES	DESCRIPTION
VACATIONS			
A	78,587	1.8041	EXISTING EASEMENT VACATED BY THIS PLAT, NO P.U.E. RETAINED
B	58,973	1.3538	EXISTING EASEMENT VACATED BY THIS PLAT, NO P.U.E. RETAINED
C	63,645	1.4611	EXISTING EASEMENT VACATED BY THIS PLAT, NO P.U.E. RETAINED
H	59,006	1.3546	EXISTING EASEMENT VACATED BY THIS PLAT, EASEMENTS RETAINED
M	76,749	1.7619	EXISTING EASEMENT VACATED BY THIS PLAT, P.U.E. RETAINED
T	2,415	0.0554	EXISTING EASEMENT VACATED BY THIS PLAT, 11.69' P.U.E. GRANTED BY THIS PLAT
V	8,517	0.1955	EXISTING EASEMENT VACATED BY THIS PLAT, 10' P.U.E. GRANTED BY THIS PLAT
TOTAL	347,892	7.9864	
G	53	0.0012	DEDICATED ROADWAY RIGHT-OF-WAY VACATED BY THIS PLAT, NO P.U.E. RETAINED
N	773	0.0177	DEDICATED ROADWAY RIGHT-OF-WAY VACATED BY THIS PLAT, NO P.U.E. RETAINED
Y	166	0.0038	DEDICATED ROADWAY RIGHT-OF-WAY VACATED BY THIS PLAT, NO P.U.E. RETAINED
TOTAL	992	0.0228	
DEDICATIONS			
AREA	SQ. FT.	ACRES	DESCRIPTION
D	18,679	0.4288	EXISTING EASEMENT DEDICATED AS RIGHT-OF-WAY BY THIS PLAT
I	3,613	0.0829	EXISTING EASEMENT DEDICATED AS RIGHT-OF-WAY BY THIS PLAT
L	52,694	1.2097	EXISTING EASEMENT DEDICATED AS RIGHT-OF-WAY BY THIS PLAT
P	20,571	0.4722	EXISTING EASEMENT DEDICATED AS RIGHT-OF-WAY BY THIS PLAT
R	25,033	0.5747	EXISTING EASEMENT DEDICATED AS RIGHT-OF-WAY BY THIS PLAT
U	4,669	0.1072	EXISTING EASEMENT DEDICATED AS RIGHT-OF-WAY BY THIS PLAT
TOTAL	125,259	2.8755	
E	5,265	0.1209	RIGHT-OF-WAY DEDICATED BY THIS PLAT
F	75,782	1.7397	RIGHT-OF-WAY DEDICATED BY THIS PLAT
K	8,670	0.1990	RIGHT-OF-WAY DEDICATED BY THIS PLAT
Q	10,187	0.2339	RIGHT-OF-WAY DEDICATED BY THIS PLAT
S	21,239	0.4876	RIGHT-OF-WAY DEDICATED BY THIS PLAT
W	58,419	1.3411	RIGHT-OF-WAY DEDICATED BY THIS PLAT
X	70	0.0016	RIGHT-OF-WAY DEDICATED BY THIS PLAT
TOTAL	179,632	4.1238	
UNCHANGED			
AREA	SQ. FT.	ACRES	DESCRIPTION
J	685	0.0157	PREVIOUSLY DEDICATED RIGHT-OF-WAY, REMAINS AS RIGHT-OF-WAY
O	4,362	0.1001	PREVIOUSLY DEDICATED RIGHT-OF-WAY, REMAINS AS RIGHT-OF-WAY

DOC# 2014040949
05/22/2014 02:52 PM Page: 5 of 6
tyPLAT R:$25.00 B: 2014C P: 0046 M. Toulous Olivere, Bernalillo Cour

PLAT OF TRACTS 1 THROUGH 12
AVALON SUBDIVISION UNIT 5
ALBUQUERQUE, BERNALILLO COUNTY, NEW MEXICO
JANUARY 2013

EXISTING TRACTS, LEGAL DESCRIPTION, VACATIONS & DEDICATIONS - SHEET 2

SEE SHEET 5 OF 6 FOR CONTINUATION



CURVE TABLE					
CURVE #	RADIUS	LENGTH	DELTA	CHORD	DISTANCE
C-2	684.00'	143.97'	12°03'34"	S 21°00'07" E	143.70'
C-3	616.00'	196.73'	18°17'55"	S 17°52'57" E	195.90'
C-4	25.00'	43.22'	99°03'39"	S 40°47'50" W	38.04'
C-20	1,290.17'	65.08'	02°53'25"	S 52°14'59" W	65.08'

LINE TABLE		
LINE #	BEARING	DISTANCE
L-2	N 89°40'20" W	181.08'
L-15	S 14°58'20" E	72.73'
L-16	N 14°58'20" W	37.19'
L-17	S 14°58'20" E	195.30'
L-18	N 89°40'20" W	107.16'

CONTROL STATION DATA

C.O.A CONTROL STATION "8_K9"
NM STATE PLANE COORDINATES, CENTRAL ZONE, NAD 83
N=1,484,994.639
E=1,492,463.769
ELEVATION=5,250.166 (NAVD 1988)
GROUND-TO-GRID FACTOR=0.999677891
MAPPING ANGLE=-0°17'03.21"

C.O.A CONTROL STATION "8_K9"
NM STATE PLANE COORDINATES, CENTRAL ZONE, NAD 83
N=1,488,227.748
E=1,493,809.314
ELEVATION=5,239.390 (NAVD 1988)
GROUND-TO-GRID FACTOR=0.999677951
MAPPING ANGLE=-0°16'54.24"

VACATIONS AND DEDICATIONS			
VACATIONS			
AREA	SQ. FT.	ACRES	DESCRIPTION
A	78,587	1.8041	EXISTING EASEMENT VACATED BY THIS PLAT, NO P.U.E. RETAINED
B	58,973	1.3538	EXISTING EASEMENT VACATED BY THIS PLAT, NO P.U.E. RETAINED
C	63,645	1.4611	EXISTING EASEMENT VACATED BY THIS PLAT, NO P.U.E. RETAINED
H	59,006	1.3546	EXISTING EASEMENT VACATED BY THIS PLAT, EASEMENTS RETAINED
M	76,749	1.7619	EXISTING EASEMENT VACATED BY THIS PLAT, P.U.E. RETAINED
T	2,415	0.0554	EXISTING EASEMENT VACATED BY THIS PLAT, 11.69' P.U.E. GRANTED BY THIS PLAT
V	8,517	0.1955	EXISTING EASEMENT VACATED BY THIS PLAT, 10' P.U.E. GRANTED BY THIS PLAT
TOTAL	347,892	7.9864	
G	53	0.0012	DEDICATED ROADWAY RIGHT-OF-WAY VACATED BY THIS PLAT, NO P.U.E. RETAINED
N	773	0.0177	DEDICATED ROADWAY RIGHT-OF-WAY VACATED BY THIS PLAT, NO P.U.E. RETAINED
Y	166	0.0038	DEDICATED ROADWAY RIGHT-OF-WAY VACATED BY THIS PLAT, NO P.U.E. RETAINED
TOTAL	992	0.0228	
DEDICATIONS			
AREA	SQ. FT.	ACRES	DESCRIPTION
D	18,679	0.4288	EXISTING EASEMENT DEDICATED AS RIGHT-OF-WAY BY THIS PLAT
I	3,613	0.0829	EXISTING EASEMENT DEDICATED AS RIGHT-OF-WAY BY THIS PLAT
L	52,694	1.2097	EXISTING EASEMENT DEDICATED AS RIGHT-OF-WAY BY THIS PLAT
P	20,571	0.4722	EXISTING EASEMENT DEDICATED AS RIGHT-OF-WAY BY THIS PLAT
R	25,033	0.5747	EXISTING EASEMENT DEDICATED AS RIGHT-OF-WAY BY THIS PLAT
U	4,669	0.1072	EXISTING EASEMENT DEDICATED AS RIGHT-OF-WAY BY THIS PLAT
TOTAL	125,259	2.8755	
E	5,265	0.1209	RIGHT-OF-WAY DEDICATED BY THIS PLAT
F	75,782	1.7397	RIGHT-OF-WAY DEDICATED BY THIS PLAT
K	8,670	0.1990	RIGHT-OF-WAY DEDICATED BY THIS PLAT
Q	10,187	0.2339	RIGHT-OF-WAY DEDICATED BY THIS PLAT
S	21,239	0.4876	RIGHT-OF-WAY DEDICATED BY THIS PLAT
W	58,419	1.3411	RIGHT-OF-WAY DEDICATED BY THIS PLAT
X	70	0.0016	RIGHT-OF-WAY DEDICATED BY THIS PLAT
TOTAL	179,632	4.1238	
UNCHANGED			
AREA	SQ. FT.	ACRES	DESCRIPTION
J	685	0.0157	PREVIOUSLY DEDICATED RIGHT-OF-WAY, REMAINS AS RIGHT-OF-WAY
O	4,362	0.1001	PREVIOUSLY DEDICATED RIGHT-OF-WAY, REMAINS AS RIGHT-OF-WAY

LEGEND

PROPOSED VACATION OF EXISTING EASEMENTS

PROPOSED DEDICATION OF PUBLIC RIGHTS-OF-WAYS

DOC# 2014040949
05/22/2014 02:52 PM Page: 6 of 6
tyPLAT R:$25.00 B: 2014C P: 0046 M. Toulous Olivere, Bernalillo Cour

AMOLE-HUBBELL DRAINAGE MASTER PLAN UPDATE
NOVEMBER 2013

I, Tyler J. Ashton, do hereby certify that this report was prepared by me or under my direction and that I am a duly registered Professional Engineer under the laws of the State of New Mexico.

Tyler J. Ashton, P.E.
State of New Mexico P.E. No. 16205

3-26-14
Date

TYLER J. ASHTON NEW MEXICO 16205 LICENSED PROFESSIONAL ENGINEER

Table of Contents

2. Hydrologic Analysis

2.1 Methodology

The Arid-lands Hydrologic Model-S4 (AHYMO) was used to calculate the 100-year peak flow rates and volumetric runoff. The unit hydrograph procedure is utilized in the AHYMO program to compute individual sub-basin runoff hydrographs. AHYMO's hydrologic methodology is discussed in the COA's Development Process Manual (DPM), Chapter 22–Drainage, Flood Control and Erosion Control (July 1997). The basin's physical properties input into the command include sub-basin area, percent of land treatment types, rainfall distribution, and the time to peak. Previous computations for the rainfall distribution and time to peak are linked into the command. The "Rainfall" and "Compute LT TP" commands compute the rainfall distribution and the time to peak, respectively. The AHYMO computations for 24-hour storm will be used for volumes; the 6-hour storm computations will be used for peak flow rates.

Hydrographs were routed using the channel, pipe, and reservoir routing commands. A rating curve command, followed by the computed travel time for channels and pipes, was used to account for the discharge relations based on headwater and slope. Ponds were modeled using the route reservoir command. Input of the route reservoir command requires stage, storage, and discharge for each incremental elevation.

2.2 Hydrologic Characteristics

2.2.1 Watershed Delineation

The Amole-Hubbell Watershed is divided into seven sub-basin for evaluation. The following list outlines the seven basins that were delineated:

1. Powerline Basin (PL)
2. South Powerline Basin (SP)
3. Snow Vista Basin (SV)
4. Amole Basin (A)
5. Amole del Norte Basin
    - 98th & Central Basin (NE)
    - Unser/214 Basin (U)
    - Tierra Bayita Basin (TB)
    - Atrisco Business Park Basin (AB)
    - Tower/Sage Basin (TS)
    - South Amole del Norte Basin (SA)
6. Borrega Basin (B)
7. Rio Bravo Basin (RB)

The basin boundaries vary slightly from the original DMP. Basin variations are due to drainage infrastructure realignments, constructed development since the adopted Amole-Hubbell DMP routed runoff differently, and master plans differing from the original DMP. The basin names were kept the same as those used in the original Amole-Hubbell DMP. The existing sub-basin identifications are 100 series; the proposed sub-basin identifications are 200 series.

Resources used to define sub-basins included 2010 Bernalillo County Light Detection and Ranging (LIDAR) mapping data, 2010 Bernalillo County Orthoimagery, and the latest COA parcel shapefile. LIDAR point and breakline files were provided by AMAFCA. By using the mapping data, contour intervals of 2-ft were generated in AutoCAD.

2.2.2 Precipitation

The precipitation depths for the 0.25-, 1-, 6-, and 24-hour storms, 100-year storm frequency were obtained from the original Amole-Hubbell DMP. Rainfall amounts were gathered from the COA DPM and the National Oceanographic and Atmospheric Administration (NOAA), Atlas 14. Table 2-1 lists the precipitation depths used to determine the rainfall distribution.

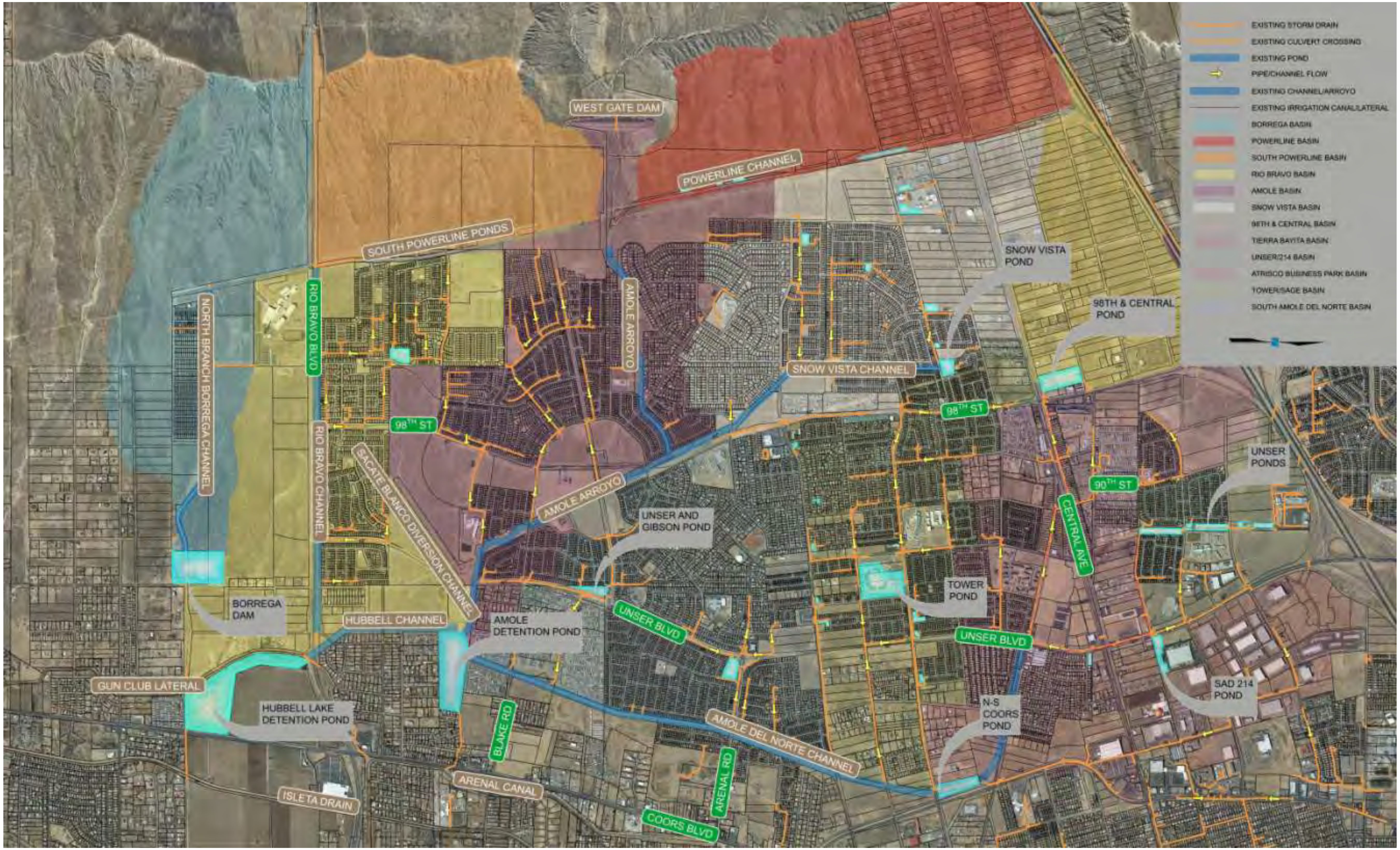


Figure 2-1: Amole-Hubbell Watershed Overall Basin Map

3.5.2 Unser/214 Basin

Existing Conditions

The Unser/214 Area is the smallest sub-basin in the Amole del Norte Basin, with approximately 0.57 sq. mi. It is generally bound by Avalon Road to the south, Unser Boulevard to the east, I-40 to the north, and 98th Street to the west. Off-site runoff enters the sub-area at a peak rate equal to 108 cfs from the culvert crossing on the I-40 Diversion Channel. The hydrograph was obtained from the West I-40 DMP by Bohannon Huston, 2013. Land uses in the sub-area include industrial, residential, undeveloped platted lots, and mass graded platted lots. There are seven regional ponds, six of which are in a series and referred to as the Unser Ponds. The seventh pond is Pond U214. Major storm drain systems are located on Avalon Road and Unser Boulevard.

The off-site runoff is conveyed via an incised arroyo, which discharges into Pond U5. The residential area in Sub-Basin U103 has free discharge to Unser Ponds, while the residential area in Sub-Basin U104 controls runoff via a private pond (Pond U7) prior to releasing runoff to the Unser Ponds. Pond U1 through Pond U3 discharge at the same rate as the inflow; thus, not attenuating the runoff. Pond U6 outlets into a storm drain system on Avalon Road, which is connected to the storm drain system on Unser Boulevard. A storm drain system on Bluewater Road intercepts runoff from the industrial area located in Sub-Basin U106. This system also ties into the storm drain system on Unser Boulevard. The analysis point at the intersection of Unser Boulevard and Bluewater Road seems to be high for the downstream pipe size. The pipe size on Unser Boulevard between Bluewater Road and Avalon Road is 42” diameter. Further analysis is needed to confirm if the peak discharge at the analysis point is correct, or the pipe should be analyzed for its conveyance capacity. The peak discharge may not be correct if the industrial area in Sub-Basin U106 has restricted runoff. Pond U214 accepts water from the storm drain system in Unser Boulevard from north of Avalon Road and basin U209. Refer to Appendix A for hydrologic data and existing hydrologic model diagram.

Proposed Conditions

The off-site runoff is currently conveyed through an incised arroyo discharging into Pond U5. We recommend the offsite flow be cut off and redirected to the La Presa Detention Basin. To accomplish this, the West I-40 channel needs to be completed from 98th St to La Presa Dam. The Dam was designed to take this flow. This diversion will eliminate the need for additional storage volume downstream in the Unser/214 basin. Recommendations for storm drainage ponds and infrastructure can be found below. Refer to Table 3-10 for hydrologic data and Figure 3-12 for proposed hydrologic model diagram.

Recommendations:

Below are the recommendations from 1999 Amole-Hubbell DMP for the basin along with the status of the recommendation.

- No recommendations from the 1999 Amole Hubbell DMP

Additional Recommendations for the basin based on updated basin analysis are below:

- Due to the current zoning of SU-1 in Basin 202.1, Ponds U5 and U6 will need to remain and the basin needs to have a runoff restriction of 2.0 cfs per acre to avoid downstream improvements. Previous reports have modeled the basin as residential and once the basin is developed hydrology should be redone to determine if the runoff restriction is still valid. Developer cost.
- Remove the offsite flow by eliminating the pipe connection north of I-40 and completing the construction of the West I-40 channel to La Presa Dam.
- Install a 30” orifice plate in the outlet structure on pond U1 to restrict flows to the storm drain system.
- Increase Storm drain size in Unser Blvd from a 42” to a 60” from Bluewater Rd to Avalon Rd

Figure 3-11: Unser/214 - Proposed Basin Map

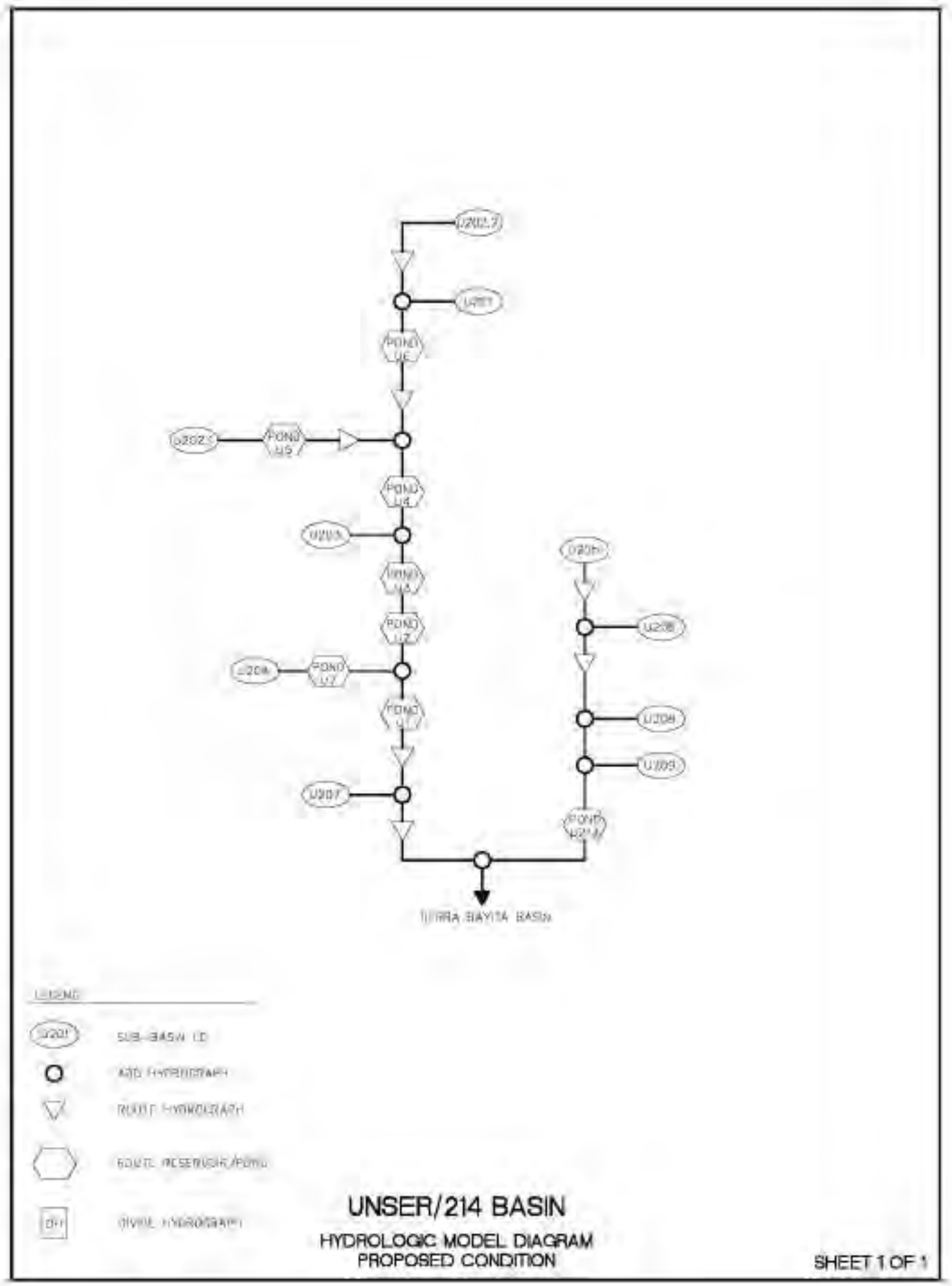


Figure 3-12: Unser/214 Area - Proposed Hydrologic Model Diagram

Table 3-10: Unser/214 Area - Proposed Sub-Basin Peak Discharge and Volumes

Sub-Basin	Area (ac)	$Q_{100yr\text{-}6hr}$ (cfs)	$V_{100yr\text{-}24hr}$ (ac-ft)
U201	23	99.89	4.316
U202.1	43	176.49	7.502
U202.2	30	104.70	4.227
U203	34	124.07	4.784
U204	32	113.17	4.334
U205	51	176.04	8.550
U206	62	189.28	10.116
U207	29	114.77	4.610
U208	25	98.33	3.902
U209	21	85.47	3.341

3.5.3 Tierra Bayita Area

Existing Conditions

The Tierra Bayita Basin is approximately 1.40 sq. mi. and is irregularly shaped with I-40 bounding the north, 98th Street bounding the west, Eucariz Avenue being the most southern boundary, and Coors Boulevard being the most eastern boundary. Several land uses in Tierra Bayita Basin include industrial, commercial, undeveloped platted lots, mass graded platted lots, and residential. Main storm drain systems have been constructed in the Tierra Bayita Basin. Stub-outs have been set along the storm drain portion on Bluewater Road. Most developments are allowed free discharge to the public storm drain. The developments in Sub-Basin TB103 and TB105 were required to construct Pond TB2 and Pond TB3, respectively. There are three major storm drain systems which convey runoff to the Tierra Bayita Channel.

Runoff from Sub-Basin TB101 and Sub-Basin TB102 is retained in Pond TB1. Once these sub-basins are developed, the storm drain on Bluewater Road will intercept its controlled runoff release. From the Bluewater Road and 90th Street intersection, this storm drain system bends 90 degrees and follows 90th Street to Volcano Road, then bends at 90th Street to Bridge, then finally it runs along Bridge Boulevard until outletting into the Tierra Bayita Channel. Pond TB2 and TB3 release a controlled rate into this system. A lateral is extended from 90th Street on Central Avenue to the two cell pond located in the 98th & Central Area.

The second major storm drain in the Tierra Bayita Basin is on Sunset Garden Road, which begins near its intersection with 86th Street and runs east to Unser Boulevard, then north on Unser Boulevard until emptying into the Tierra Bayita Channel. This system receives free discharge from its respective drainage area. The third system begins in the Unser/214 Area. The portion in the Tierra Bayita Basin is in Unser Boulevard from Avalon Road to Tierra Bayita Channel. Refer to Appendix A for hydrologic data and existing hydrologic model diagram.

Proposed Conditions

Per the Bluewater Road near 90th Street Drainage Analysis by Tierra West dated 12-20-01 basins 202.1 and 202.2 have been restricted to 2.05 cfs/ac. To achieve this restriction, ponds were created in AHYMO to reduce runoff to the restricted rate. Also, in the proposed condition TB 101 has been shifted to the 98th & Central Basin. The Coors North South pond in the proposed condition is overtopping. The pond needs to be increased in size to hold 75 ac-ft of runoff. Refer to Table 3-11 for hydrologic data and Figure 3-14 for proposed hydrologic model diagram.

Recommendations:

Below are the recommendations from 1999 Amole-Hubbell DMP for the basin along with the status of the recommendation:

- No recommendations from the 1999 Amole Hubbell DMP

Additional Recommendations for the basin based on updated basin analysis are below:

- Restrict future basin flows to 2.5 cfs/acre for basins 202.1 and 202.2.
- Increase volume of Coors N-S Pond to 75 ac-ft.

Figure 3-13: Tierra Bayita Area - Proposed Basin Map

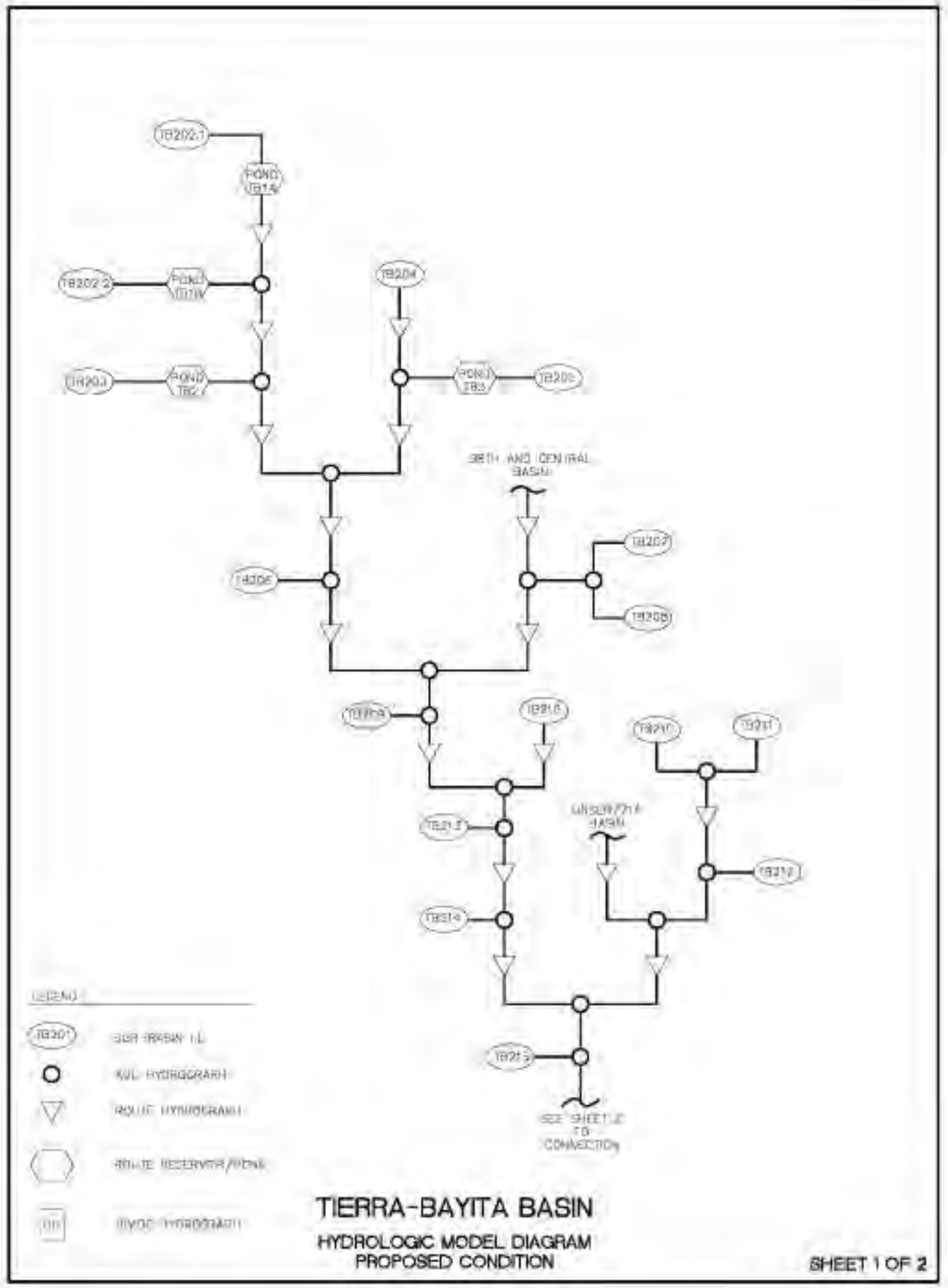


Figure 3-14: Tierra Bayita Basin - Proposed Hydrologic Model Diagram

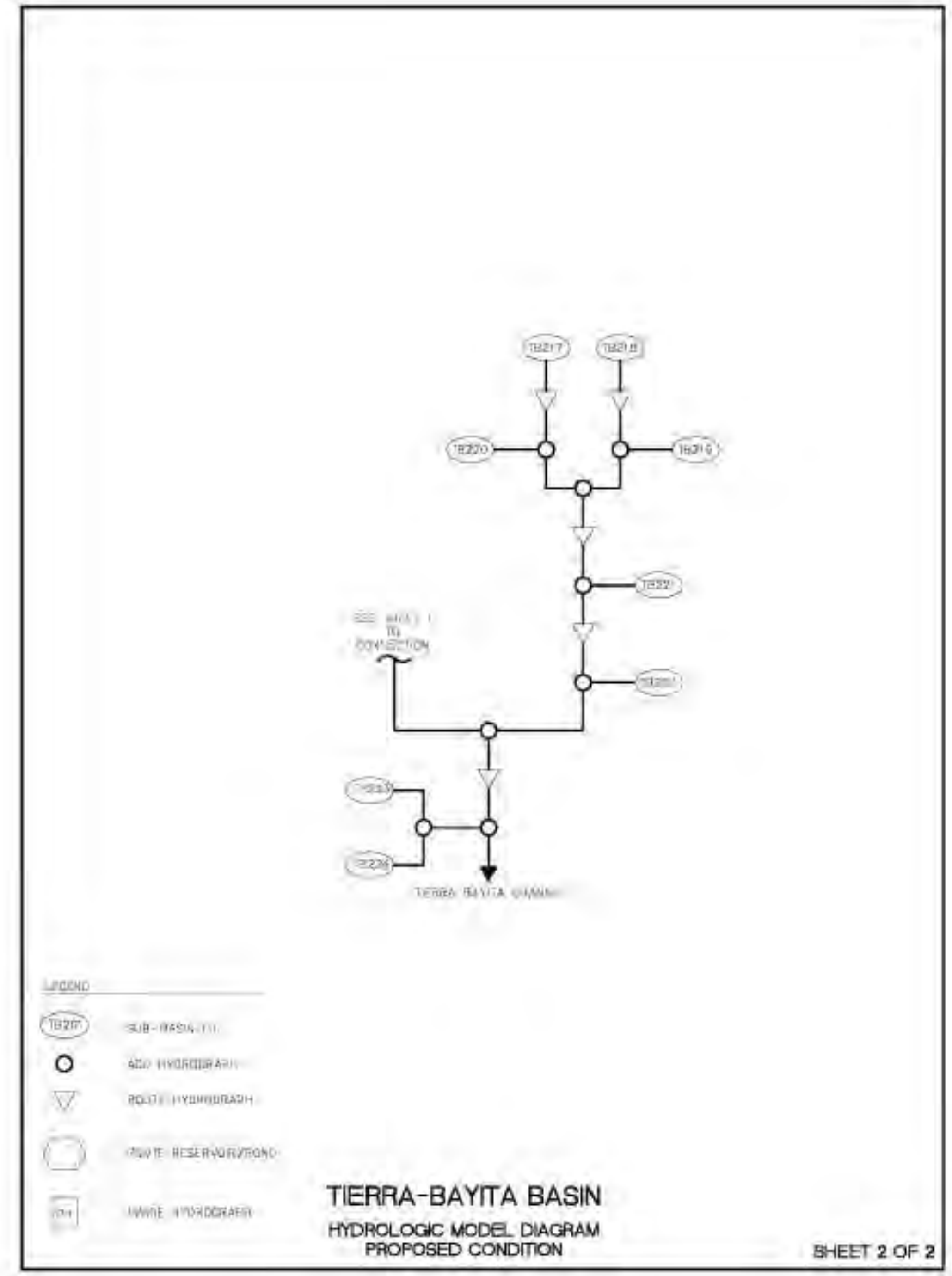


Figure 3-14: Tierra Bayita Basin - Proposed Hydrologic Model Diagram

Table 3-11: Tierra Bayita Area - Proposed Sub-Basin Peak Discharge and Volumes			
Sub-Basin	Area (ac)	$Q_{100yr\text{-}6hr}$ (cfs)	$V_{100yr\text{-}24hr}$ (ac-ft)
TB202.1	88	286.10	11.871
TB202.2	56	234.77	9.208
TB203	32	123.90	4.854
TB204	25	106.80	4.584
TB205	29	115.37	4.583
TB206	16	64.63	2.570
TB207	44	180.99	7.480
TB208	32	125.02	5.303
TB209	20	85.75	3.659
TB210	47	175.08	7.917
TB211	15	66.05	2.870
TB212	44	159.66	7.680
TB213	30	133.59	5.771
TB214	17	68.55	2.713
TB215	72	195.06	9.623
TB216	21	89.82	3.817
TB217	12	50.87	2.147
TB218	23	73.14	2.353
TB219	15	58.43	2.347
TB220	24	96.97	3.995
TB221	37	137.45	5.770
TB222	45	155.17	7.233
TB223	46	129.70	6.937
TB224	102	236.51	15.234
TB202.1	88	286.10	11.871

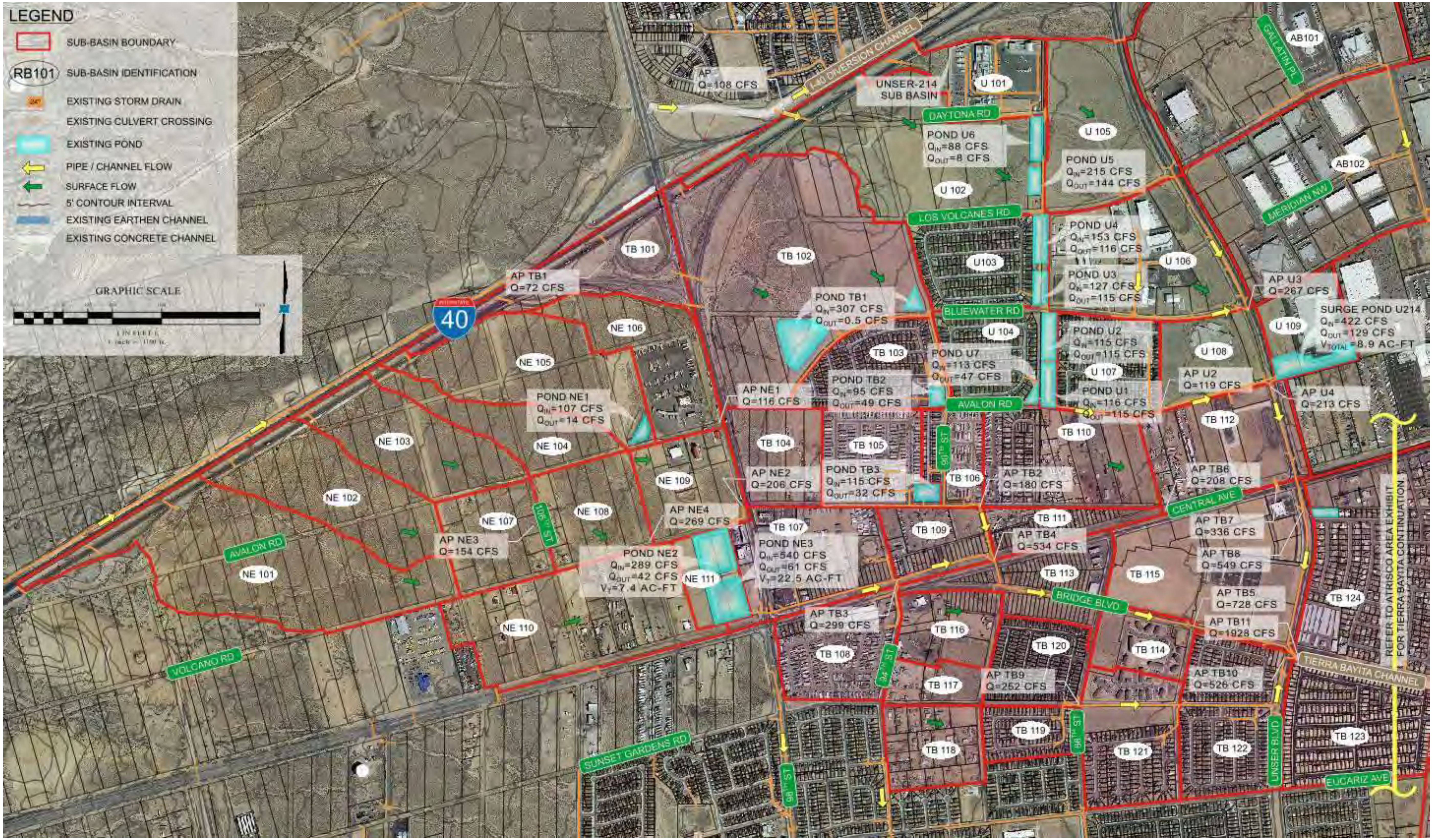


Figure A-11: 98th & Central, Unser/214 and Tierra Bayita Area - Existing Basin Map

CITY OF
Albuquerque

January 20, 1998

Martin J. Chávez, Mayor

Sara McCollam
Tierra West, LLC
4421 McLeod Road NE, Suite D
Albuquerque, New Mexico 87109

RE: Drainage Report and Grading and Drainage Plan for West Ridge Mobile Home Park (K9/D6) Submitted for Preliminary Plat, Site Development Plan, Building Permit and Grading Permit Approval, Engineer's Stamp Dated 1/9/98.

Dear Ms. McCollam:

Based on the information provided in the submittal of January 9, 1998, the above referenced plan and report are approved for Preliminary Plat, Site Development Plan and Building Permit Approval.

As you are aware, Agreement and Covenants are required for each of the proposed ponds prior to Work Order approval. The Grading and Drainage Certification is required prior to release of Financial Guarantees.

If you have any questions, please call me at 924-3982.

Sincerely,

Susan Calongne

Susan M. Calongne, P.E.
City/County Floodplain Administrator

c: Ronald R. Bohannan, P.E.
Fred Seeley, Great Western Realty
File

DRAINAGE REPORT

for

West Ridge Mobile Home Park

Prepared by

Tierra West, LLC
4421 McLeod Road NE, Suite D
Albuquerque, New Mexico 87109

Prepared for

Fred Seeley
Great Western Realty
3511 Carlisle Blvd, NE
Albuquerque, New Mexico 87107

October 1997

RONALD RAY BOHANNAN
NEW MEXICO
7868
REGISTERED PROFESSIONAL ENGINEER
10-14-97
10-29-97
12-5-97

Ronald R. Bohannan P.E. No. 7868

TABLE OF CONTENTS

GRAPHIC SCALE IN FEET

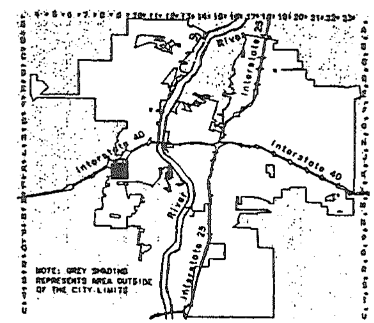
250 0 500 1000

CITY OF Albuquerque

Albuquerque Geographic Information System

PLANNING DEPARTMENT

Map Amended through February 17, 1997



LEGAL DESCRIPTION

T10N
R2E
SEC 21

UNIFORM PROPERTY CODE

1-009-057

K-9-Z

Off-site Drainage Management Plan

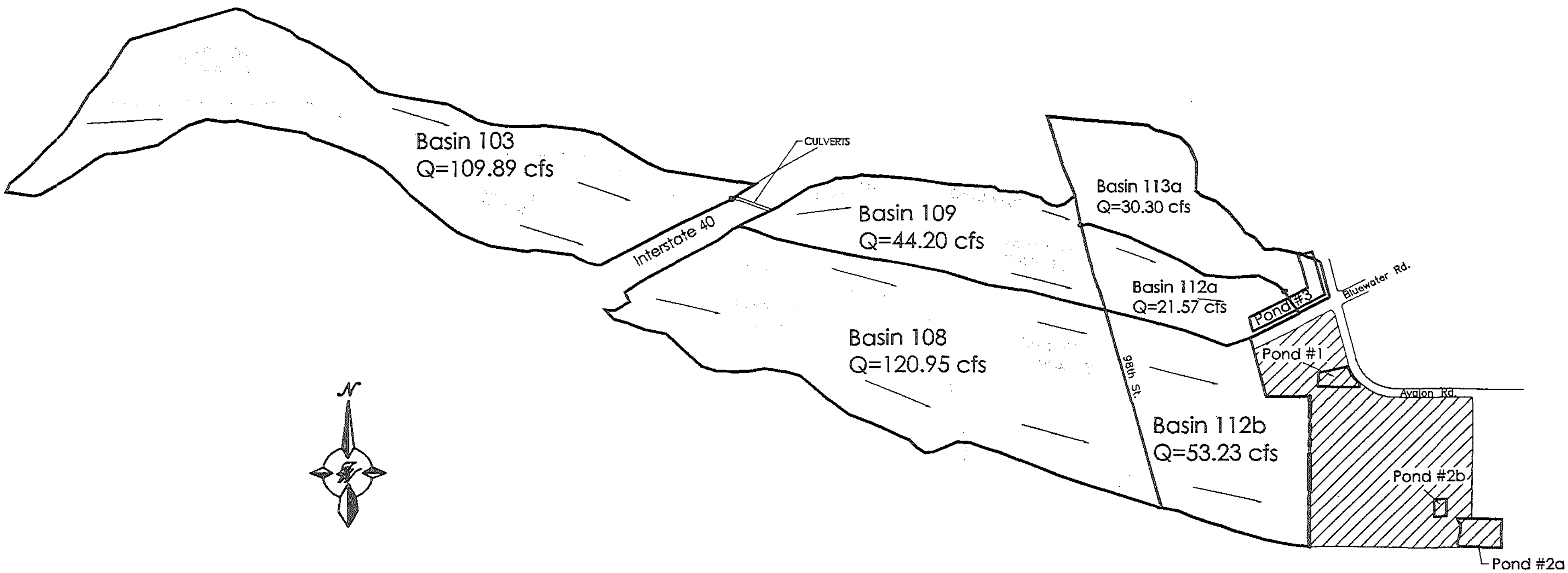
The site is currently undeveloped and drains to the southeast with 44.27 cfs of undeveloped runoff. The offsite undeveloped flows impacting the site have been divided into six basins, Basins 103, 108, 109, 112a, 112b, and 113a. These six basins consist of several smaller basins that were used for ease in computation but are not needed for narrative purposes. Basin 103 consists of basins 103a and 103b. Basin 108 consists of basins 108.1 and 109a. Basin 109 consists of basins 109b and 110. (see attached exhibit). These basins directly impact the site from the northwest.

Undeveloped flows that consist of Basins 103, 109, 112a, 113a will be cut off from the site by Bluewater Road. This undeveloped offsite flow will be ponded in an temporary off-site pond north of Bluewater Road and west of 94th Street (Pond 3). Pond 3 will be designed for the undeveloped upstream runoff. The pond will not have capacity for developed flows and is not intended as an outfall for upstream basins. Offsite Basins 108, and 112b will be captured in a proposed 48" RCP storm sewer in Volcano Road and routed to a proposed retention pond on the mobile home park site (Pond 2a).

In the future, the developed flows from the west will be cut off by Interstate 40 and 98th Street. The temporary retention ponds will be removed and the proposed storm sewer will be designed for the developed flows east of 98th Street.

Interim Solution

Basin 103 consists of the area west of Interstate 40. Basin 103 has an undeveloped runoff of 109.89 cfs . This basin flows southeast and passes under the Interstate through a series of existing culverts. The runoff will be detained in a temporary off-site retention pond located north of Bluewater Road (Pond 3). In the future, the developed runoff from Basin 103 will not affect the site as it will be contained at the Interstate with the I-40 Interceptor Project.



Off-Site Undeveloped Basin Layout

Basins 109 is located between Interstate 40 and 98th Street. Basin 109 has an undeveloped runoff flow of 44.20 cfs. This basin drains southeast towards the site and will be contained in the same temporary off-site retention pond (Pond 3) located north of Bluewater Road (Pond 3). In the future, Basin 109 will be intercepted by 98th Street and will not affect the site.

Basin 112a will have an undeveloped runoff of 21.57 cfs and is located between 98th Street and the site. This runoff will be captured in the temporary retention pond (Pond 3) located north of Bluewater Road.

Basin 113a will have an undeveloped runoff of 30.30 cfs and is located north of basin 112a and east of 98th Street. The basin consists of the northern portion of the floodplain impacting the site. This runoff and the floodplain will be captured in the temporary retention pond (Pond 3) located north of Bluewater Road.

The proposed off-site retention pond (Pond 3) is located north of Bluewater Road. It will collect a total flow of 205.96 cfs. The pond has a capacity of 6.46 ac-ft which is greater than the required capacity of 5.86 ac-ft. In the event of an emergency, the runoff will overflow from a 70.0 foot wide spillway. The pond will be removed after 98th Street is improved and the offsite basins intercepted.

Basin 108 drains east towards the site and is too far south to be captured in the temporary retention pond near Bluewater Road. Basin 108 has an undeveloped runoff of 120.95 cfs. This basin will sheet flow east until it reaches the western edge of the mobile home park and is directed south to Volcano Road via a waterproofed wall. The flows will then be conveyed to Volcano Road and captured in a cattleguard inlet. The proposed 48" RCP storm drain in Volcano Road has been designed to have capacity for the undeveloped flows from west of the site. The 48" RCP storm drain will transport the off-site flows to a proposed on-site temporary retention pond (Pond 2a). In the future, Basin 108 will be intercepted by improvements in 98th Street and will no longer affect the site.

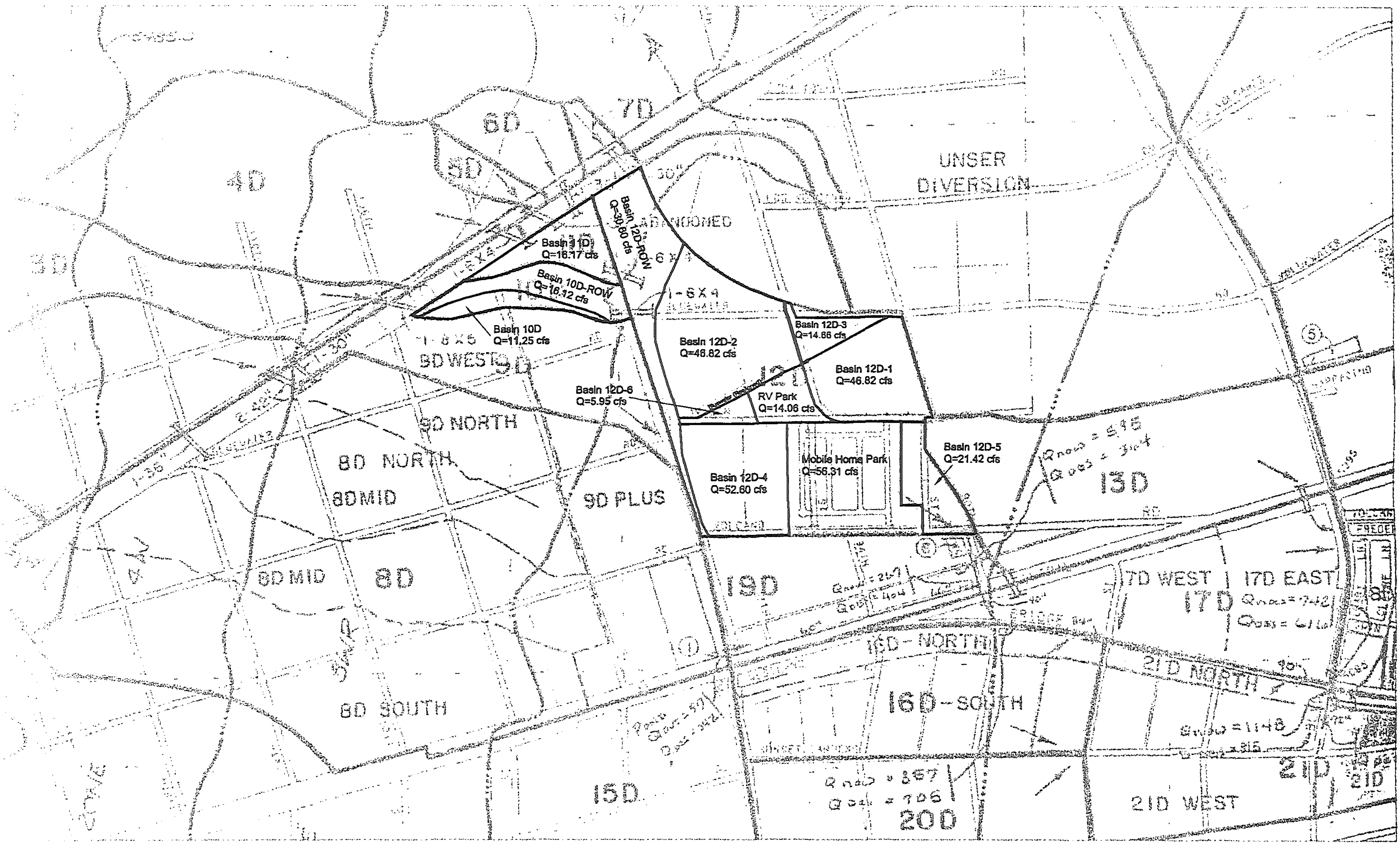
Basin 112b will flow east with an undeveloped runoff of 53.23 cfs. This basin is located between 98th Street and the site, and south of Basin 112a. Basin 112b will be captured by the storm drain in Volcano Road and conveyed to the proposed on-site retention pond (Pond 2a).

Offsite basins 108, and 112b will drain to a proposed on-site retention pond (Pond 2a) located in the southeast corner of the mobile home park. A total of 10.43 ac-ft of volume from the undeveloped off-site flows and the developed on-site flows must be ponded on the site. There will be a large pond (Pond 2a) in the southeast corner of the mobile home park and a second smaller pond (Pond 2b) located near the basketball court in the center of the site. Pond 2a will have a capacity of 9.9813 ac-ft and Pond 2b will have a capacity of 0.49 ac-ft. These two ponds total 10.47 ac-ft which is greater than the 10.43 required. In the event of an emergency, the runoff from Pond 2a will overflow from a 90.0 foot wide spillway.

The proposed 48" RCP storm drain in Volcano Road has been designed to carry the undeveloped flow of 174.18 cfs from the offsite basins to the retention pond (Pond 2a). A cattle guard inlet will capture the offsite flows as they enter Volcano Road at the west end of the mobile home park. In the future, when downstream improvements are constructed, the on-site retention ponds will be removed and a permanent detention pond constructed. The upstream basins will be cut off at 98th Street when upstream improvements are constructed. The storm drain in Volcano Road will be required to convey the offsite developed basin 12D-4 with a developed runoff flow of 52.60 cfs and the controlled discharge from the site of 56.31 cfs, which is a total of 108.91 cfs.

Future Solution

The developed future basins are based on the City of Albuquerque's long range storm sewer plan for the 98th Street and I-40 area. According to this plan, the site is located within



City of Albuquerque Developed Basin Map
Sub-basins for Storm Sewer Analysis

Basin 12D (see attached developed offsite basin map). Basins 10D and 11D are routed through Basin 12D. Basin 10D and 11D are located northwest of the site between 98th Street and I-40. Basin 12D includes the area north of the site all the way to I-40. These three basins flow to a proposed 66" storm drain in 90th Street.

The original hydrology for the proposed storm drain in 90th Street estimated the flow from Basins 10D, 11D, and 12D to be 364 cfs. New hydrology for the area estimates the developed runoff for the area as 595 cfs. The proposed 66" RCP in 90th Steet was designed using the old hydrology and will not have capacity for the new runoff flow of 595 cfs. The City of Albuquerque has made no provisions for the discrepancy. For the purposes of this report, we have assumed each tract will be required to detain the difference in flows onsite. A portion of each basin is right-of-way belonging to the State Highway Department. This ROW is undeveloped with no improvements planned. This land cannot be expected to detain the difference in flows. The undeveloped right-of-way will discharge a total of 63.09 cfs. This leaves 300.70 cfs for the developable portion of the basins to discharge. There is a total of 146.94 developable acres in the three basins. This will be an allowable discharge of 2.05 cfs/acre, not including the ROW which will discharge the existing undeveloped flow rate. The allowable discharge rate includes street flow from streets within and adjacent to each parcel.

This offsite flow must be routed around the site in a storm sewer system located within the public streets. A 48" RCP storm sewer in Bluewater west of 94th Street will collect the offsite flows from the north, which includes Basins 10D, 11D, and 12D-2 and the ROW areas. This is a total developed flow of 152.49 cfs. The storm drain in Bluewater will connect to a proposed 48" RCP storm sewer in 94th Street. The storm drain in 94th Street will connect to a 54" storm drain Avalon. This system will convey the developed flows from the RV Park, Basin 12D-6 and Basin 12D-1, located south of Bluewater Road and north of Avalon Road, and also the incoming flows from the Bluewater storm drain. The Avalon storm sewer will convey a total of 219.32 cfs from the developed upland basins and the RV park. The 54" storm drain in Avalon will flow east to 90th Street. A second storm drain located west of 94th Street in Bluewater will convey the 14.66 cfs from Basin 12D-3 via a 24" pipe to 90th Street. At 90th Street the 60" RCP storm drain will flow south until it connects with the proposed 66" storm sewer located at the intersection of 90th Street and Volcano Road.

The storm sewer in Volcano Road will collect the flow from the west of the site. The developed offsite basin 12D-3 has a developed runoff of 52.60 cfs. A 48" RCP storm drain in Volcano Road will collect the developed flows from Basin 12D-3. This storm drain has been sized for the offsite undeveloped flow rate of 174.18 and will have capacity for the 52.60 of developed future offsite flows.

When the temporary on-site retention pond is removed, the developed flows from the mobile home park will drain to the storm drain in Volcano Road. The 48" RCP storm drain will contain 108.91 cfs at this point. The 60" RCP in north 90th Street will connect to the storm drain in Volcano and a total of 364.31 cfs will continue to drain east in a 66" RCP in Volcano Road to south 90th Street. This storm sewer will connect to the proposed 66" storm sewer in 90th Street and the flows conveyed south to the eventual outfall.

On-Site Drainage Management Plan

The proposed drainage solution is to route the onsite runoff to three temporary retention ponds located onsite. One retention pond (Pond 1) will be located on the future RV park site. The other two ponds (Ponds 2a and 2b) will be located on the proposed mobile home park site. The undeveloped offsite runoff from basins 108 and 112b will be ponded in the mobile home park site in the onsite retention pond (Ponds 2a).

In the future, the developed flows from offsite basins Basin 103, 108, and 109 will be intercepted by Interstate 40 and 98th Street. The offsite developed runoff from basins 112a

CITY OF ALBUQUERQUE

December 2, 2014

Charles Easterling, P.E.
Easterling Consultants
3613 NM 528, Suite E-2
Albuquerque, NM 87114

Re: I40 South and Unser Mini DMP
Engineer's Stamp Date 11-5-14 (K09D026)

Dear Mr. Easterling,

Based upon the information provided in your submittal received 11-5-14, the above referenced report is approved for Drainage Masterplan with the following condition:

> Hydrology's comment that the freeboard for Pond 6 is insufficient at 0.4 feet is still valid. Future drainage reports for basins that drain to Pond 6 will have to address this comment. Most likely it will not be an issue as development will most likely occur at a lower impervious percentage than used in the report and this report was submitted prior to the City's first flush requirement of retaining the runoff from 0.44" storm events.

If you have any questions, you can contact me at 924-3986.

Sincerely,

Curtis Cherne, P.E.
Principal Engineer, Hydrology
Planning Dept.

C: file

PO Box 1293

Albuquerque

New Mexico 87103

www.cabq.gov

Engineer Certification

I, Charles Easterling, do hereby certify that this report and the analyses which were done in its production were prepared by me or under my direction and that I am a duly registered Professional Engineer under the laws of the State of New Mexico.

Charles M. Easterling, P.E. #6411

11-5-14

Date

CHARLES M. EASTERLING
NEW MEXICO
6411
REGISTERED PROFESSIONAL ENGINEER

I-40 South and Unser

Mini Drainage Master Plan

Prepared for:

I-40 SOUTH LLC

c/o Tom Keleher
P.O. Box AA
Albuquerque, NM 87103

Prepared by:
Easterling Consultants LLC
3613 NM 528
Suite E-2
Albuquerque, NM 87114

November 2014
Revision #4

Table of Contents

A. Introduction

Easterling Consultants was commissioned by I-40 South LLC to perform a Mini-Drainage Management Plan for an area bounded by I-40 on the north, on the west by the large sand hill located west of 98th Street, on the east by the Unser Diversion Channel, and on the south by Los Volcanes Road. The watershed area is approximately 119 acres or 0.186 square miles and is largely undeveloped land consistent with the semi-arid environment of suburban Albuquerque's west side. **Figure 1** shows the vicinity map. This watershed drains into a series of 6 ponds known as the Unser Diversion Channel (UDC).

Figure 1- Vicinity Map

B. Background

Historically, this watershed received flows from the north side of I-40 from a tributary of the Mirehaven Arroyo (Trib C). However, after the construction of the I-40 Interceptor on the north side of I-40, the offsite flows from the north are now diverted east via an AMAFCA channel that runs parallel to I-40.

The Unser Diversion Drainage Analysis Report in 1993 by Easterling and Associates (EA) was the foundation for the design of the UDC.

The original EA study modeled fully developed conditions using AHYMO in order to design the UDC system of interconnected ponds. A second drainage master plan was completed in 2001 by Smith Engineering Company (SEC) in support of the City's Westside Transit Center design.

The major premise for developed conditions in both these reports and subsequent construction of facilities was that the West I-40 interceptor would be in place diverting the off-site flows from the north and that Pond 5, which is a temporary sedimentation basin, would no longer be part of the system. Pond 5 of the UDC was constructed as a temporary sediment pond with a reversion clause in the easement that dedicated it. The easement and pond anticipated the removal of flows from north of I-40 and elimination of the pond, easement and resulting flood plain upon completion of the channel north of I-40. Both studies used AHYMO as the primary hydrologic modeling software with developed subbasin zoning conditions assumed to be R-LT (high density residential). Digital copies of these reports are included in **Appendix C**.

However with the construction of the Westside Transit Center and Bruckner's Truck Sales facility on the north side of Daytona Rd and rezoning of the RLT lands to commercial, the watershed is most likely going to develop as commercial/light industrial area. Currently, FedEx is proposing to buy and develop Tracts 4 and 5 as their FedEx Ground service facility.

C. Purpose

In light of the proposed FedEx Ground site and zone changes affecting the watershed, **the primary purpose of this Mini Drainage Master Plan is to analyze and determine an equitable distribution of the downstream capacity of the UDC Ponds 6 and 4 and the final disposition of Pond 5 under fully developed conditions with the assumption that there is no off site flow from north of I-40 and that the watershed develops as a commercial/light industrial area as opposed to R-LT.**

Natural Resources Conservation Service (NRCS) Runoff Curve Number method as described in TR-55 was applied to the hydrologic analysis in conjunction with the Army Corp of Engineers HEC-HMS V.3.5 hydrologic software.

D. Hydrology

Existing Conditions

Subbasins within the watershed were delineated using Bernalillo County LIDAR topography from 2012. **Plate 1** shows the existing conditions subbasins. The Majority of the subbasin boundaries were adopted from The Drainage Master Plan for West Side Transit Facility by Smith Engineering.

E. Results

It is clear that the Unser Diversion Channel System has sufficient capacity to accept the runoff from the existing undeveloped drainage area for all reasonable development scenarios. Very conservative assumptions were used in this effort in order to establish the maximum allowable. DEVEX option 1 had to be simulated because the existing discharge rating curve for Pond 5 was not restricting the peak inflow in the DEVEX 2 model. The peak inflow was 98.2 cfs and the peak outflow was 78.4 cfs meaning the pond only stored 1.59 ac-ft. of water. As a result the rating curve was modified to simulate a 12 inch orifice in order to achieve storage higher efficiency in Pond 5.

The pond routing results for Existing and DEVEX_Option 1 are summarized below. A detailed pond routing summary for all options is included in **Appendix B.3**.

The effects of modifying the discharge rating curve for Pond 5 are quite clear in Table 1. The peak inflow is 98.2 cfs and the peak discharge is 10.5 cfs. Consequently the storage in Pond 5 increases from 1.59 ac-ft. to 3.14 ac-ft. Consequently the storage in Pond 4 goes down from 5.69 ac-ft. to 4.93 ac-ft.

This leaves an excess of 3.58 ac-ft. of capacity in Pond 4.

Table 1

Summary of Pond Routings

Pond	Model Description	Design Volume	100 Yr-24 Hr Peak Storage Volume	100 Yr-24 Hr Inflow Volume	100 Yr-24 Hr Outflow Volume	100 Yr-24 Hr Inflow	100 Yr-24 Hr Outflow	Elevation of Emergency Spillway	100 Yr-24 Hr Peak Water Surface Elevation	Freeboard from Emergency Spillway	Available Storage	Comments
		ac-ft	ac-ft	ac-ft	cfs	cfs	cfs	ft	ft	ft	ac-ft	
		a						a		b		
Pond 4	*Smith DEVEX Conditions Results from Report*	*8.51*	*4.50*	--	--	--	--	*5155.1*	*5152.9*	*2.2*	*4.01*	*All values reported on this table are taken directly from The Master Drainage Plan for the West Side Transit Facility by Smith Engineering Company, 2001.*
Pond 6	"	*9.01*	*6.20*	--	--	--	--	*5177.9*	*5176.7*	*1.2*	*2.81*	
Pond 4	DEVEX Option 1	8.51	4.93	23.5	23.5	147.1	96.4	5155.1	5153.33	1.8	3.58	Watershed modeled as fully developed commercial/business site at 90% impervious, using latest NOAA 14 100-Yr-24Hr rainfall depth of 2.52 in. Basin C-2D.2 drains to Pond 5 with modified outfall restricting discharge using a 12" outlet pipe as principal spillway
Pond 5	DEVEX Option 1	4.73	3.14	5.43	5.43	98.2	10.5	5168.8	5167.66	1.1	1.59	
Pond 6	DEVEX Option 1	9.01	6.90	13.8	13.8	231.4	83.1	5177.9	5177.5	0.4	2.11	

a- All values reported on this table are taken directly from The Master Drainage Plan for the West Side Transit Facility
100 Yr 24 Hr rainfall depth based on lates NOAA Atlas 14 data
b - Freeboard = Elevation of Emergency Spillway - Peak Water Surface Elevation

The peak flow at AP-7 was 72 cfs in the 100-yr-24 hr. storm. This flow was used to size the proposed storm drain in Los Volcanes Road as it was higher than the 100-yr-6 hr. storm. It was determined that a 36 inch storm drain would be sufficient to convey fully developed flows in Los Volcanes Road. See **Appendix B.4** for detailed calculations.

F. Conclusions/Discussion

The general conclusion of this DMP is that the UDC ponds will have sufficient capacity to handle the developed conditions 100-yr-24-Hr runoff volume. In other words, subbasins C-1.D and C-2D.1 should be able to free discharge into Pond 4 without compromising the downstream capacity of the UDC. By making Pond 5 into a permanent pond and modifying its outfall structure to restrict the outflow, the entire system is able to operate well within the bounds of COA guidelines for the design and function of ponds.

The reductions in Pond 5 outflow provide flexibility to the future development of the subbasins C-1 and C-2D.1 as the Smith Master plan as well as this DMP indicates that these subbasins assume to drain to Pond 4.

A recently completed 1 ft. interval topographic survey indicates that the side slopes of Pond 5 are much steeper than the 1V:3H slopes shown on the as-builts. This means that there is more storage available at Pond 5 than what is being modeled. This also provides a lot of flexibility to the final design of Pond 5 in terms of incorporating water quality features (if required or desired) while restricting the discharge in order to maximize the available storage in the pond and minimize the cost of any required modifications to the outlet structure.

Manning's Equation was used to determine the appropriate storm drain pipe size to the developed conditions from C-1, C-2D.1 and fully paved Los Volcanes Rd. A 36 inch RCP will safely convey the 72 cfs. See detailed calculations in Appendix B.4.

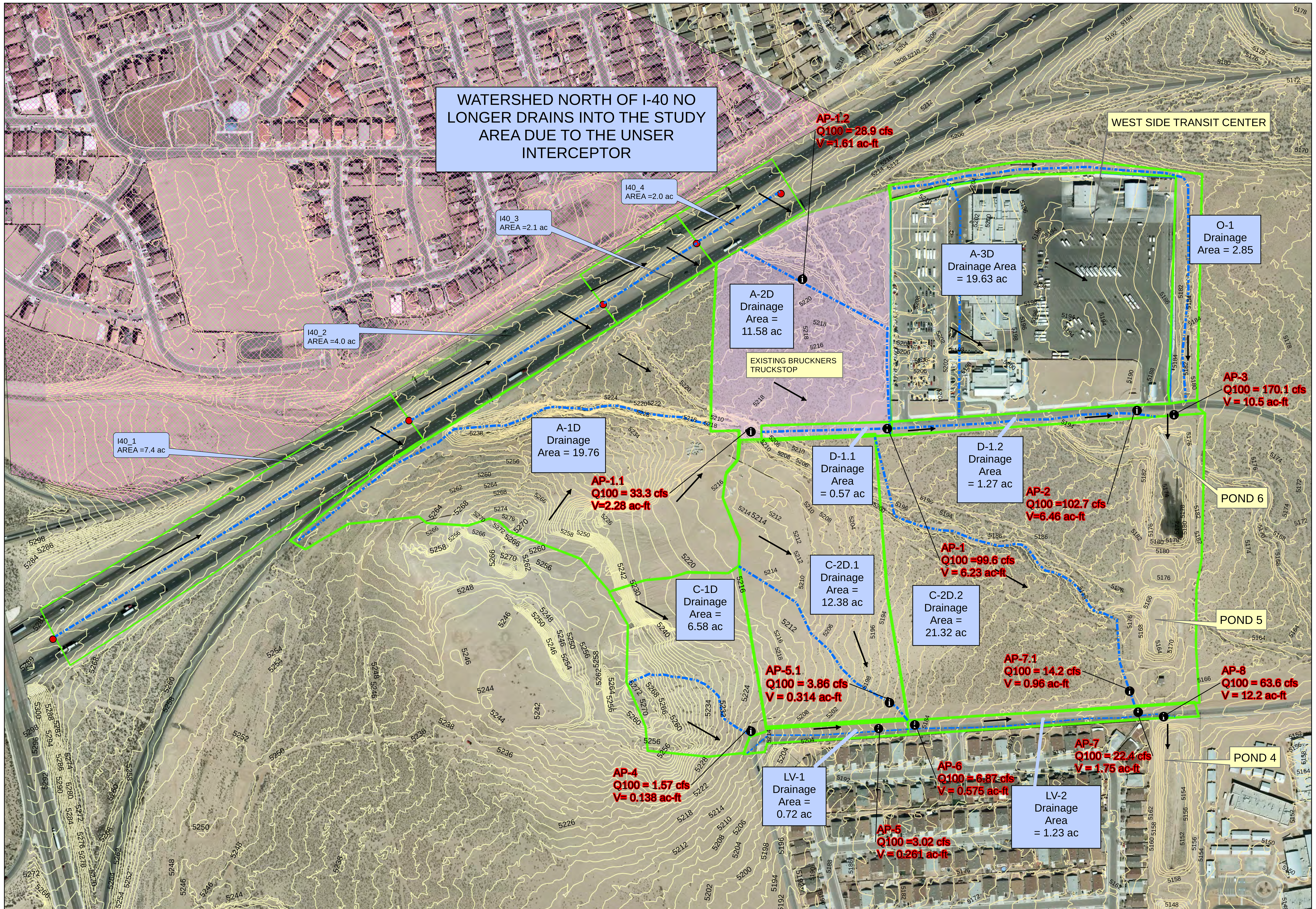
Using HEC-HMS with TR 55 CN hydrology rather than the traditional AHYMO'97 raises the question as to its effect on the modeling results compared to what was previously generated using AHYMO. Referring to **Table 1** , it is clear that the net results are almost identical in terms of the resulting impact on downstream facilities as determined by volumes stored and freeboard retained in Ponds 4 and 6 when compared to the developed conditions Smith Westside Transit Facility model and that any differences found are not significant. **Note that the modeling performed for this study assumed 100% of the runoff from the future impervious areas south of Daytona (assumed at 90% impervious) is an extremely conservative assumption,** particularly given that the proposed FedEx development plans are in the 75% range.

A further consideration is that the Smith DMP simulated only Ponds 4 and 6 with a higher rainfall depth under fully developed conditions.

The most significant impact of this DMP is the demonstration that Ponds 4, 5, and 6 have significant additional capacity when modeled with the lower NOAA 14 rainfall depth. For a volume-bound system like the UDC, using a lower design/evaluation rainfall depth has the effect of increasing downstream capacity for the benefit of the upstream properties, whose owners contributed to the construction of the UDC for that very purpose. The choice of a hydrologic modeling system (HEC-HMS with TR 55 vs AHYMO'97) had a less significant impact.

Appendix D

Full Size Plates 1 and 2



Existing Conditions Summary of Input and Output Parameters											
Sub-basin	Area	Weighted Curve Number	Percent of Hydrologic Soil Group				% Impervious	Tc	Q100	cfs/acre	V100
	(acres)		A	B	C	D	%	(mins)	(cfs)		(ac-ft)
A-1D	19.8	69	58	42	0	0	0	12	9.75	0.49	0.71
A-2D	11.6	90	53	47	0	0	90	12	42.3	3.65	2.33
A-3D	19.6	91	28	72	0	0	90	12	71.4	3.64	3.95
C-1D	6.6	63	100	0	0	0	0	12	1.56	0.24	0.14
C-2D.1	12.4	65	86	14	0	0	0	12	3.86	0.31	0.31
C-2D.2	26.8	69	58	42	0	0	0	12	14.2	0.53	0.96
D-1.1	0.6	87	37	63	0	0	60	12	1.79	3.22	0.10
D-1.2	1.3	87	37	63	0	0	60	12	3.98	3.14	0.22
LV-1	0.7	87	32	68	0	0	60	12	2.25	3.12	0.12
LV-2	1.2	87	32	68	0	0	60	12	3.80	3.10	0.21
O-1	2.9	66	72	27	0	0	0	16	0.10	0.04	0.08
I40_1	7.4	89	0	100	0	0	90	18	21.9	2.97	1.49
I40_2	4.0	89	0	100	0	0	90	12	14.40	3.64	0.80
I40_3	2.1	89	0	100	0	0	90	12	7.55	3.64	0.42
I40_4	2.0	83	100	0	0	0	90	12	7.03	3.56	0.39

Summary of Pond Routings												
Pond	Model Description	Design Volume	100 Yr-24 Hr Peak Storage Volume	100 Yr-24 Hr Inflow Volume	100 Yr-24 Hr Outflow Volume	100 Yr-24 Hr Inflow	100 Yr-24 Hr Outflow	Elevation of Emergency Spillway	100 Yr-24 Hr Peak Water Surface Elevation	Freeboard from Emergency Spillway	Available Storage	Comments
		ac-ft	ac-ft	ac-ft	cfs	cfs	cfs	ft	ft	ft	ac-ft	
			a					a		b		
Pond 4	Ex Conditions HEC-HMS	8.51	3.49	12.2	12.2	63.6	19.6	5155.1	5152.1	3.0	5.02	Model uses current watershed conditions using latest NOAA 14 100 Yr-24 Hr rainfall depth of 2.52 in. Pond 5 not modeled
Pond 6	Ex Conditions HEC-HMS	9.01	5.74	10.5	10.5	170.1	50.4	5177.9	5176.57	1.3	3.27	

a- All values reported on this table are taken directly from The Master Drainage Plan for the West Side Transit Facility
100 Yr 24 Hr rainfall depth based on lates NOAA Atlas 14 data
b - Freeboard = Elevation of Emergency Spillway - Peak Water Surface Elevation

EXISTING CONDITIONS HEC-HMS INPUT PARAMETERS

General Subbasin Data / Time of Concentration (Tc) Data (Upper Reach or Entire Reach (0 to 400-ft length); Middle Reach (400 to1600-ft length)) / Lag Time Results / Tc and tp Results

Sub-basin	Sub-basin Area	Sub-basin Area	Number of Reaches	L Length of Longest Water-course	Lca Centroid Length	Sc Composite Slope	Kc Composite K	Top Elevation at beginning of water course	Bottom Elevation	Length (L_1)	Slope (S_1)	K_{N1}	K_1	V_1	Elevation at lower end of water course	Length (L_2)	Slope (S_2)	K_{N2}	K_2	V_2	Lag Time	Lag Time	Actual Tc	Final Tc	Tp	Composite CN	Sub-basin
	acres	sq mi		ft	ft	ft/ft		ft	ft	ft	ft/ft			ft/sec	ft	ft	ft/ft			ft/sec	(hours)	(minutes)	hours	hours	hours		
a	acres	a		a	a	i	j	a	a	a		d	b	e	a	a		d	b	e	(k)		f	g	h		a
A-1D	19.758	0.0309	2	1,642	NA	0.0292	1.4457	5258	5252	400	0.0150		1.0	1.22	5210	1,242	0.0338		2.0	3.68	0.15	9	0.18	0.20	0.13	69	A-1D
A-2D	11.581	0.0181	2	986	NA	0.0144	1.2671	5221.19	5210	400	0.0280		1.0	1.67	5207	586	0.0051		2.0	1.43	0.15	9	0.18	0.20	0.13	90	A-2D
A-3D	19.628	0.0307	2	878	NA	0.0207	1.4012	5203.2	5193	400	0.0255		1.0	1.60	5185	478	0.0167		2.0	2.59	0.15	9	0.12	0.20	0.13	91	A-3D
C-1D	6.581	0.0103	2	553	NA	0.0651	0.4480	5256	5250	400	0.0150		0.7	0.86	5220	153	0.1961		2.0	8.86	0.15	9	0.13	0.20	0.13	63	C-1D
C-2D.1	12.376	0.0193	2	844	NA	0.0332	0.8183	5216	5210	400	0.0150		0.7	0.86	5188	444	0.0495		2.0	4.45	0.15	9	0.16	0.20	0.13	65	C-2D.1
C-2D.2	26.803	0.0419	2	1,544	NA	0.0233	1.6145	5206	5192	400	0.0350		1.0	1.87	5170	1,144	0.0192		2.0	2.77	0.15	9	0.17	0.20	0.13	69	C-2D.2
D-1.1	0.556	0.0009	2	460	NA	0.0130	1.0571	5212	5207	400	0.0125		1.0	1.12	5206	60	0.0167		2.0	2.58	0.15	9	0.11	0.20	0.13	87	D-1.1
D-1.2	1.268	0.0020	2	953	NA	0.0210	1.3981	5206	5198	400	0.0200		1.0	1.41	5186	553	0.0217		2.0	2.95	0.15	9	0.13	0.20	0.13	87	D-1.2
LV-1	0.721	0.00113	2	607	NA	0.0478	1.2222	5217	5196	400	0.0525		1.0	2.29	5188	207	0.0386		2.0	3.93	0.15	9	0.06	0.20	0.13	87	LV-1
LV-2	1.225	0.00191	2	967	NA	0.0248	1.4428	5188	5175	400	0.0325		1.0	1.80	5164	567	0.0194		2.0	2.79	0.15	9	0.12	0.20	0.13	87	LV-2
O-1	2.852	0.00446	2	1,870	NA	0.0171	1.4742	5214	5200	400	0.0350		0.7	1.31	5182	1,470	0.0122		2.0	2.21	0.20	12	0.27	0.27	0.18	66	O-1
I40_1	7.3624	0.0115	2	1,479	NA	0.0176	1.0249	5276	5273.5	400	0.0063		0.7	0.55	5250	1079	0.0218		2.0	3.0	0.23	14	0.30	0.30	0.20	89	I40_1
I40_2	3.959	0.00619	2	806	NA	0.0199	1.0426	5250	5242	400	0.0200		0.7	0.99	5234	406	0.0197		2.0	3	0.15	9	0.15	0.20	0.13	89	I40_2
I40_3	2.0761	0.00324	2	409	NA	0.0171	0.6681	5234	5228	400	0.0150		0.7	0.86	5227	9	0.1111		2.0	7	0.15	9	0.13	0.20	0.13	89	I40_3
I40_4	1.9764	0.00309	1	341	NA	0.0176	0.7000	5227	5221	341	0.0176		0.7	0.93	5221	1	0.0000		2.0	0	0.15	9	0.10	0.20	0.13	83	I40_4

(a) All measurements were obtained from the Drainage Basin Maps, based on Lidar contour mapping dated 2010.
(b) Obtained from Table F-5 in the DPM, pg. 22-64.
(d) Obtained from Table F-6 in the DPM, , pg. 22-64.
(e) V= 10*K*S^0.5 - determined from V=K * (S*100)^0.5
(f) See DPM, pages 22-63 through 22-65 for following formulas :
If L < 4000 ft, then
Tc= (L1/V1 + L2/V2 + L3/V3)3600 sec/hour
If L is between 4,000 ft and 12,000 ft, then
Tc= ((12,000-L) / (72,000*K*s^0.5)) + ((L-4000)*Kn*(Lca/L)^0.33 / (552.2*s^0.165)) (ignore upper reach K - it is insignificant for long lengths and assume middle reach K for this equation)
If L > 12000 ft, then
Tc= (4/3)*26*Kn*((L*Lca/(5280^2*(s*5280)^0.5))^0.33)
(g) Tc= if Tc is computed to be less than 0.2 hours, then use 0.2 hours DPM pg. 22-37
(h) Tp= (2/3)*Tc per DPM pg. 22-36
(i) Sc= (L1*S1+L2*S2+L3*S3)/L per DPM pg. 22-65
(j) Kc= (L/S^0.5) / (L1/(K1*S1^0.5) + L2/(K2*S2^0.5) + L3/(K3*S3^0.5)) per DPM pg. 22-65

LEGEND

SUBBASIN BOUNDARY
LONGEST FLOWPATH FOR Tc
A-2D SUBBASIN ID
AP-1 ANALYSIS POINT
FLOW DIRECTION
I40 MEDIAN DROP

N

0 50 100 200 Feet

EX POND 6 RATING CURVE		
Elevation	Storage	Disharge
ft.	ac-ft.	cfs
5170	0	0
5171	0.14	4
5172	0.83	6.2
5173	1.77	7.9
5174	2.79	9.2
5175	3.87	10.4
5176	5.04	11.5
5177	6.27	79.5
5178	7.46	86.1
5179	9.01	93.2

DATA FROM MASTER DRAINAGE PLAN FOR THE WEST SIDE TRANSIT FACILITY

EX POND 4 RATING CURVE		
Elevation	Storage	Disharge
ft.	ac-ft.	cfs
5147	0	0
5148	0.08	0
5149	0.51	3
5150	1.3	5.7
5151	2.29	7.5
5151.9	3.26	8.7
5152	3.37	11.7
5152.5	3.94	50.6
5153	4.52	92.5
5154	5.76	104.3
5155	7.18	115.9
5156	8.51	124.6

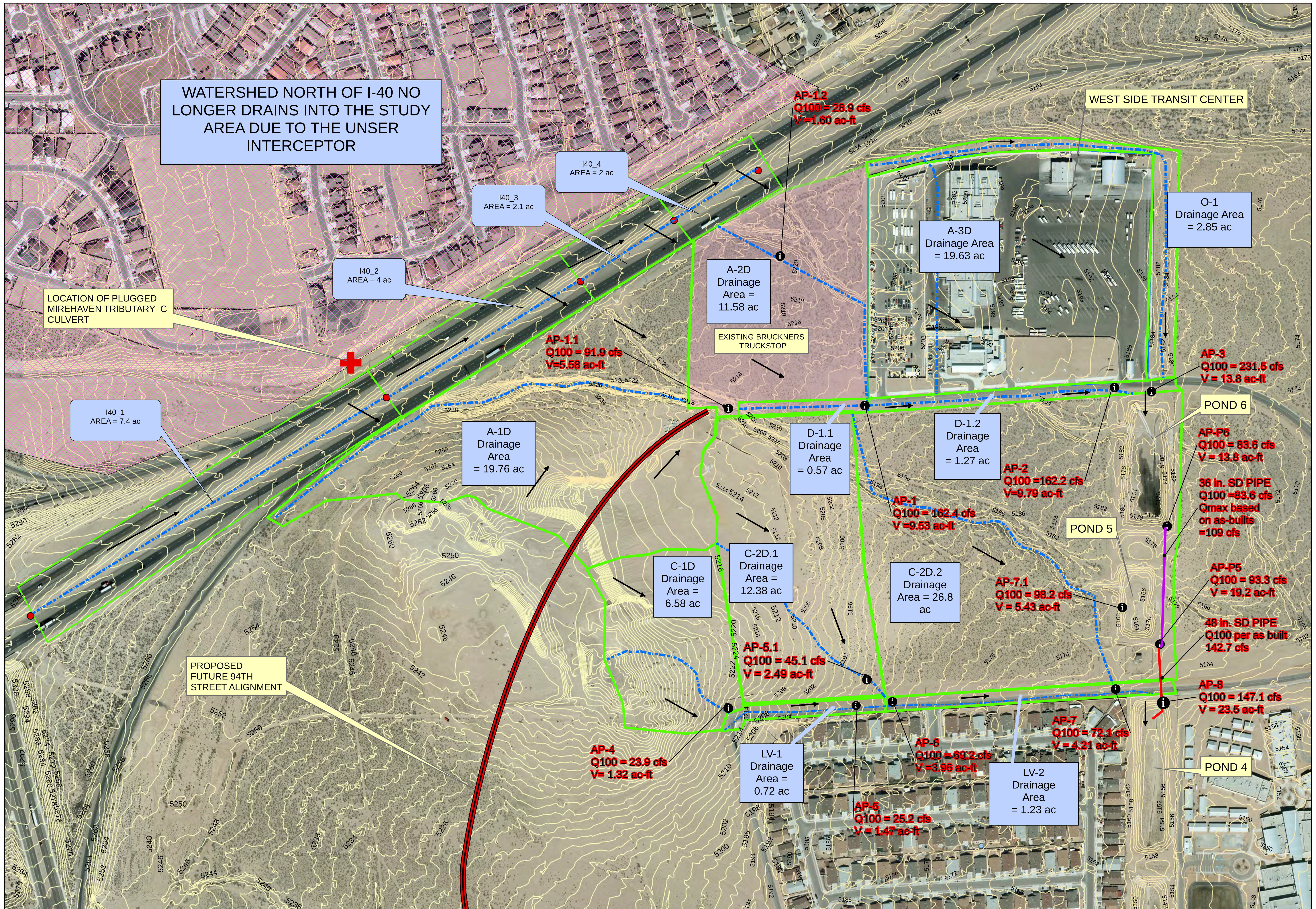
DATA FROM MASTER DRAINAGE PLAN FOR THE WEST SIDE TRANSIT FACILITY

EASTERLING CONSULTANTS

I-40 SOUTH AND UNSER DIVERSION MINI DMP
PLATE 1

EXISTING CONDITIONS DRAINAGE BASIN MAP WITH HEC-HMS INPUT AND OUTPUT SUMMARY
~~JULY, 2014~~
NOVEMBER, 2014

Document Path: G:\177-13-01 Kelleher I-40 South LLC\revDMP\GIS\New Plates 6-9-14\Ex_Cond.mxd



LEGEND

SUBBASIN BOUNDARY

LONGEST FLOWPATH FOR Tc

A-2D SUBBASIN ID

AP-1 ANALYSIS POINT

FLOW DIRECTION

I40 MEDIAN DROP INLETS

N

0 50 100 200 Feet

DEVEX - Option 1 Summary of Input and Output Parameters											
Sub-basin	Area	Weighted Curve Number	Percent of Hydrologic Soil Group				% Impervious	Tc	Q100	cfs/acre	V100
	(acres)		A	B	C	D	%	(mins)	(cfs)		(ac-ft)
A-1D	19.8	90	58	42	0	0	90	12	72.20	3.65	3.99
A-2D	11.6	90	53	47	0	0	90	12	42.30	3.65	2.34
A-3D	19.6	89	28	72	0	0	90	12	71.40	3.64	3.95
C-1D	6.6	89	100	0	0	0	90	12	24.00	3.65	1.33
C-2D.1	12.4	90	86	14	0	0	90	12	45.10	3.64	2.50
C-2D.2	26.8	91	58	42	0	0	90	12	98.20	3.66	5.43
D-1.1	0.6	87	37	63	0	0	90	12	2.10	3.78	0.120
D-1.2	1.3	87	37	63	0	0	90	12	4.62	3.64	0.256
LV-1	0.7	87	32	68	0	0	90	12	2.60	3.61	0.15
LV-2	1.2	87	32	68	0	0	90	12	4.42	3.61	0.25
O-1	2.9	66	72	27	0	0	0	16	1.00	0.35	0.08
I40_1	7.4	89	0	100	0	0	90	18	21.90	2.97	1.49
I40_2	4.0	89	0	100	0	0	90	12	14.40	3.64	0.80
I40_3	2.1	89	0	100	0	0	90	12	7.55	3.64	0.42
I40_4	2.0	83	100	0	0	0	90	12	7.03	3.56	0.39

Summary of Pond Routings												
Pond	Model Description	Design Volume	100 Yr-24 Hr Peak Storage Volume	100 Yr-24 Hr Inflow Volume	100 Yr-24 Hr Outflow Volume	100 Yr-24 Hr Inflow	100 Yr-24 Hr Outflow	Elevation of Emergency Spillway	100 Yr-24 Hr Peak Water Surface Elevation	Freeboard from Emergency Spillway	Available Storage	Comments
		ac-ft	ac-ft	ac-ft	cfs	cfs	cfs	ft	ft	ft	ac-ft	
		a						a		b		
Pond 4	DEVEX 2 Conditions Modeled with most current data using HEC-HMS	8.51	6.07	23.5	23.5	215.9	106.9	5155.1	5154.2	0.9	2.44	Watershed modeled as fully developed commercial/business site at 90% impervious, using latest NOAA 14 100-Yr-24Hr rainfall depth of 2.52 in. Basin C-2D.2 drains to Pond 5 with existing outfall structure
Pond 5	"	4.73	1.59	5.4	5.4	98.2	78.4	5168.8	5164.86	3.9	3.14	
Pond 6	"	9.01	6.90	13.8	13.8	231.4	83.1	5177.9	5177.5	0.4	2.11	
Pond 4	DEVEX Option 1	8.51	4.93	23.5	23.5	147.1	96.4	5155.1	5153.33	1.8	3.58	Watershed modeled as fully developed commercial/business site at 90% impervious, using latest NOAA 14 100-Yr-24Hr rainfall depth of 2.52 in. Basin C-2D.2 drains to Pond 5 with modified outfall restricting discharge using a 12" outlet pipe as principal spillway
Pond 5	DEVEX Option 1	4.73	3.14	5.43	5.4	98.2	10.5	5168.8	5167.66	1.1	1.59	
Pond 6	DEVEX Option 1	9.01	6.90	13.8	13.8	231.4	83.1	5177.9	5177.5	0.4	2.11	

a- All values reported on this table are taken directly from The Master Drainage Plan for the West Side Transit Facility
100 Yr 24 Hr rainfall depth based on lates NOAA Atlas 14 data
b - Freeboard = Elevation of Emergency Spillway - Peak Water Surface Elevation

DEVEX CONDITIONS HEC-HMS INPUT PARAMETERS

General Subbasin Data				Time of Concentration (Tc) Data				Upper Reach or Entire Reach (0 to 400-ft length)						
Sub-basin	Sub-basin Area	Sub-basin Area	Number of Reaches	L Length of Longest Water-course	Lca Centroid Length	Sc Composite Slope	Kc Composite K	Top Elevation at beginning of water course	Bottom Elevation	Length (L_1)	Slope (S_1)	K_{N1}	K_1	V_1
	acres	sq mi		ft	ft	ft/ft		ft	ft	ft	ft/ft			ft/sec
a	acres	a		a	a	i	j	a	a	a		d	b	e
A-1D	19.758	0.0309	2	1,642	NA	0.0292	1.4457	5258	5252	400	0.0150		1.0	1.22
A-2D	11.581	0.0181	2	986	NA	0.0144	1.2671	5221.19	5210	400	0.0280		1.0	1.67
A-3D	19.628	0.0307	2	878	NA	0.0207	1.4012	5203.2	5193	400	0.0255		1.0	1.60
C-1D	6.581	0.0103	2	832	NA	0.0433	0.9790	5256	5250	400	0.0150		1.0	1.22
C-2D.1	12.376	0.0193	2	1,261	NA	0.0222	1.4201	5216	5210	400	0.0150		1.0	1.22
C-2D.2	26.803	0.0419	2	1,544	NA	0.0233	1.6145	5206	5192	400	0.0350		1.0	1.87
D-1.1	0.556	0.0009	2	460	NA	0.0130	1.0571	5212	5207	400	0.0125		1.0	1.12
D-1.2	1.268	0.0020	2	953	NA	0.0210	1.3981	5206	5198	400	0.0200		1.0	1.41
LV-1	0.721	0.0011	2	607	NA	0.0478	1.2222	5217	5196	400	0.0525		1.0	2.29
LV-2	1.225	0.0019	2	967	NA	0.0248	1.4428	5188	5175	400	0.0325		1.0	1.80
O-1	2.852	0.0045	2	1,870	NA	0.0171	1.4742	5214	5200	400	0.0350		0.7	1.31
I40_1	7.3624	0.0115	2	1,479	NA	0.0176	1.0249	5276	5273.5	400	0.0063		0.7	0.55
I40_2	3.959	0.0062	2	806	NA	0.0199	1.0426	5250	5242	400	0.0200		0.7	0.99
I40_3	2.0761	0.0032	2	409	NA	0.0171	0.6681	5234	5228	400	0.0150		0.7	0.86
I40_4	1.9764	0.0031	1	341	NA	0.0176	0.7000	5227	5221	341	0.0176		0.7	0.93

Middle Reach (400 to1600-ft length)						Lag Time Results		Tc and tp Results				
Elevation at lower end of water course	Length (L_2)	Slope (S_2)	K_{N2}	K_2	V_2	Lag Time	Lag Time	Actual Tc	Final Tc	Tp	Composite CN	Sub-basin
ft	ft	ft/ft			ft/sec	(hours)	(minutes)	hours	hours	hours		
a	a		d	b	e	(k)		f	g	h		a
5210	1,242	0.0338		2.0	3.68	0.15	9	0.18	0.20	0.13	90	A-1D
5207	586	0.0051		2.0	1.43	0.15	9	0.18	0.20	0.13	90	A-2D
5185	478	0.0167		2.0	2.59	0.15	9	0.12	0.20	0.13	89	A-3D
5220	432	0.0694		2.0	5.27	0.15	9	0.11	0.20	0.13	89	C-1D
5188	861	0.0256		2.0	3.20	0.15	9	0.17	0.20	0.13	90	C-2D.1
5170	1,144	0.0192		2.0	2.77	0.15	9	0.17	0.20	0.13	91	C-2D.2
5206	60	0.0167		2.0	2.58	0.15	9	0.11	0.20	0.13	87	D-1.1
5186	553	0.0217		2.0	2.95	0.15	9	0.13	0.20	0.13	87	D-1.2
5188	207	0.0386		2.0	3.93	0.15	9	0.06	0.20	0.13	87	LV-1
5164	567	0.0194		2.0	2.79	0.15	9	0.12	0.20	0.13	87	LV-2
5182	1,470	0.0122		2.0	2.21	0.20	12	0.27	0.27	0.18	66	O-1
5250	1079	0.0218		2.0	3.0	0.23	14	0.30	0.30	0.20	89	I40_1
5234	406	0.0197		2.0	3	0.15	9	0.15	0.20	0.13	89	I40_2
5227	9	0.1111		2.0	7	0.15	9	0.13	0.20	0.13	89	I40_3
5221	1	0.0000		2.0	0	0.15	9	0.10	0.20	0.13	83	I40_4

(a) All measurements were obtained from the Drainage Basin Maps, based on Lidar contour mapping dated 2010.
(b) Obtained from Table F-5 in the DPM, pg. 22-64.
(d) Obtained from Table F-6 in the DPM, , pg. 22-64.
(e) V= 10*K*S^0.5 - determined from V=K * (S*100)^0.5
(f) See DPM, pages 22-63 through 22-65 for following formulas :
If L < 4000 ft, then
Tc= (L1/V1 + L2/V2 + L3/V3)3600 sec/hour
If L is between 4,000 ft and 12,000 ft, then
Tc= ((12,000-L) / (72,000*K*s^0.5)) + ((L-4000)*Kn*(Lca/L)^0.33 / (552.2*s^0.165)) (ignore upper reach K - it is insignificant for long lengths and assume middle reach K for this equation)
If L > 12000 ft, then
Tc= (4/3)*26*Kn*((L*Lca/(5280^2*(s*5280)^0.5))^0.33)
(g) Tc= if Tc is computed to be less than 0.2 hours, then use 0.2 hours DPM pg. 22-37
(h) Tp= (2/3)*Tc per DPM pg. 22-36
(i) Sc= (L1*S1+L2*S2+L3*S3)/L per DPM pg. 22-65
(j) Kc= (L/S^0.5) / (L1/(K1*S1^0.5) + L2/(K2*S2^0.5) + L3/(K3*S3^0.5)) per DPM pg. 22-65

EX POND 6 RATING CURVE		
Elevation	Storage	Disharge
ft.	ac-ft.	cfs
5170	0	0
5171	0.14	4
5172	0.83	6.2
5173	1.77	7.9
5174	2.79	9.2
5175	3.87	10.4
5176	5.04	11.5
5177	6.27	79.5
5178	7.46	86.1
5179	9.01	93.2

DATA FROM MASTER DRAINAGE PLAN FOR THE WEST SIDE TRANSIT FACILITY

EX POND 4 RATING CURVE		
Elevation	Storage	Disharge
ft.	ac-ft.	cfs
5147	0	0
5148	0.08	0
5149	0.51	3
5150	1.3	5.7
5151	2.29	7.5
5151.9	3.26	8.7
5152	3.37	11.7
5152.5	3.94	50.6
5153	4.52	92.5
5154	5.76	104.3
5155	7.18	115.9
5156	8.51	124.6

DATA FROM MASTER DRAINAGE PLAN FOR THE WEST SIDE TRANSIT FACILITY

EX POND 5 RATING CURVE		
Elevation	Storage	Disharge
ft.	ac-ft.	cfs
5160	0	0
5161	0.02	4
5162	0.37	6.5
5163	0.76	8.2
5164	1.19	9.7
5164.5	1.42	41.6
5165	1.66	93
5165.5	1.89	106.3
5166	2.12	116.7
5167	2.74	132.6
5168	3.35	146.8
5168.8	3.87	157.2
5169	4.01	160
5170	4.73	172

DATA FROM MASTER DRAINAGE PLANE FOR THE WEST SIDE TRANSIT FACILITY

DEVEX Option 1 POND 5 RATING CURVE WITH 12 IN. ORIFICE		
Elevation	Storage	Discharge
ft.	ac-ft.	cfs
a	a	b
5160	0	0.0
5161	0.02	3.8
5162	0.37	5.3
5163	0.76	6.5
5164	1.19	7.6
5164.5	1.42	8.0
5165	1.66	8.5
5165.5	1.89	8.9
5166	2.12	9.3
5167	2.74	10.0
5168	3.35	10.7
5168.8	3.87	11.2
5169	4.01	11.3
5170	4.73	12.0

a- DATA FROM MASTER DRAINAGE PLAN FOR THE WEST SIDE TRANSIT FACILITY
b- DISCHARGE BASED ON ORIFICE EQN. SEE APPENDIX B.4 FOR COMPUTATION

EASTERLING CONSULTANTS

I-40 SOUTH AND UNSER DIVERSION MINI DMP
PLATE 2

FINAL DEVELOPED CONDITIONS DRAINAGE BASIN MAP
~~JULY, 2014~~
NOVEMBER, 2014

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APPENDIX E – DIGITAL DATA (ON CD)

1. PDF of this Report
2. HEC-HMS Models

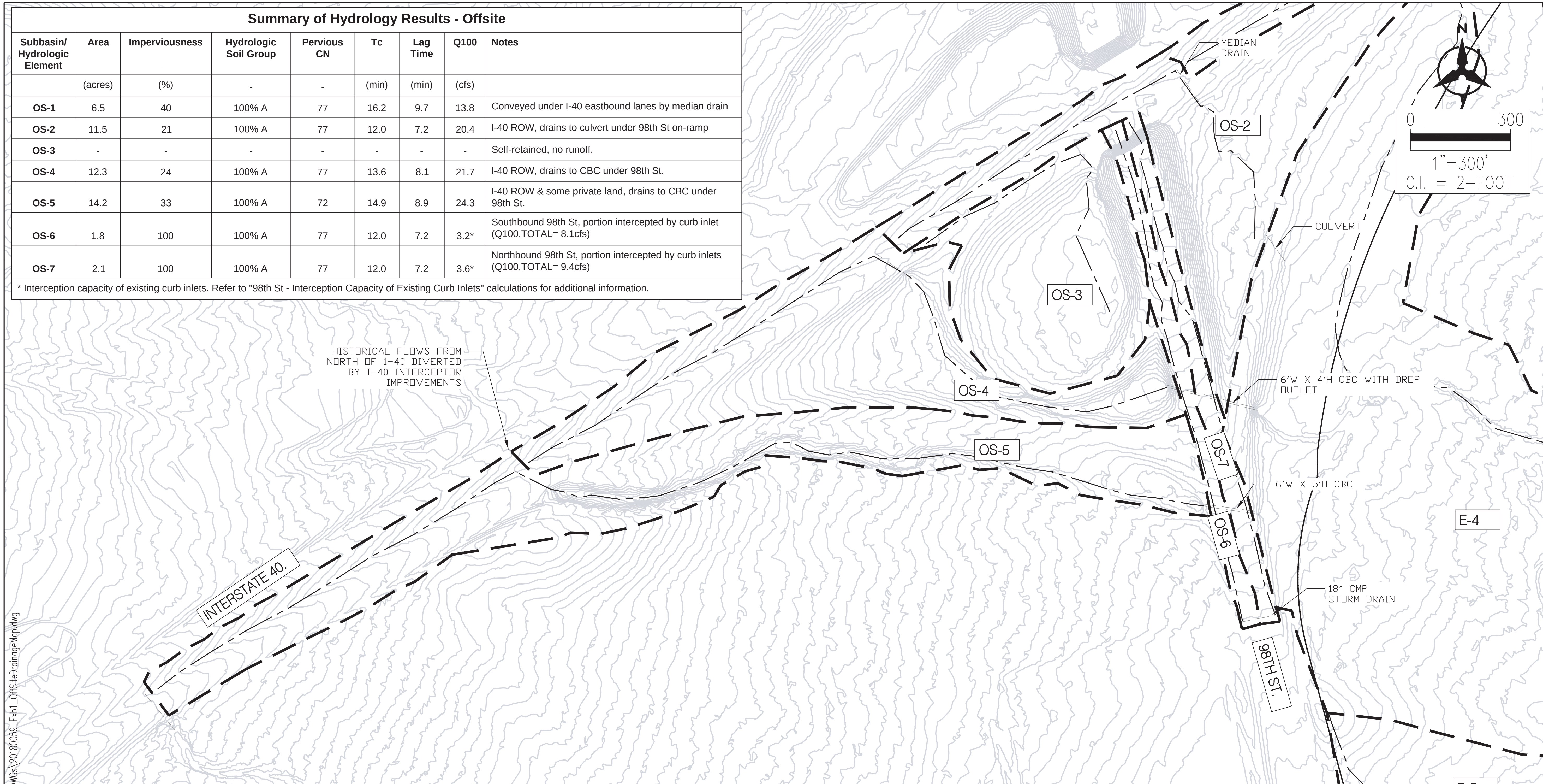
EXHIBIT 1 – OFFSITE DRAINAGE MAP

Bohannan Huston

Summary of Hydrology Results - Offsite

Subbasin/ Hydrologic Element	Area	Imperviousness	Hydrologic Soil Group	Pervious CN	Tc	Lag Time	Q100	Notes
	(acres)	(%)	-	-	(min)	(min)	(cfs)	
OS-1	6.5	40	100% A	77	16.2	9.7	13.8	Conveyed under I-40 eastbound lanes by median drain
OS-2	11.5	21	100% A	77	12.0	7.2	20.4	I-40 ROW, drains to culvert under 98th St on-ramp
OS-3	-	-	-	-	-	-	-	Self-retained, no runoff.
OS-4	12.3	24	100% A	77	13.6	8.1	21.7	I-40 ROW, drains to CBC under 98th St.
OS-5	14.2	33	100% A	72	14.9	8.9	24.3	I-40 ROW & some private land, drains to CBC under 98th St.
OS-6	1.8	100	100% A	77	12.0	7.2	3.2*	Southbound 98th St, portion intercepted by curb inlet (Q100,TOTAL= 8.1cfs)
OS-7	2.1	100	100% A	77	12.0	7.2	3.6*	Northbound 98th St, portion intercepted by curb inlets (Q100,TOTAL= 9.4cfs)

* Interception capacity of existing curb inlets. Refer to "98th St - Interception Capacity of Existing Curb Inlets" calculations for additional information.



NOTES:

1. TOPOGRAPHY FROM 2010 MRCOG LIDAR MAPPING.

LEGEND

DRAINAGE BASIN BOUNDARY

TC FLOWPATH

OS-5 DRAINAGE BASIN

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Bohannan Huston
www.bhinc.com 800.877.5332

WESTPOINT 40			
EXHIBIT 1 OFFSITE DRAINAGE MAP			
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CHECKED BY: VCS		PROJECT NO. 20180059	SHEET NO. 1 OF 1

EXHIBIT 2 – EXISTING CONDITIONS

DRAINAGE MAP

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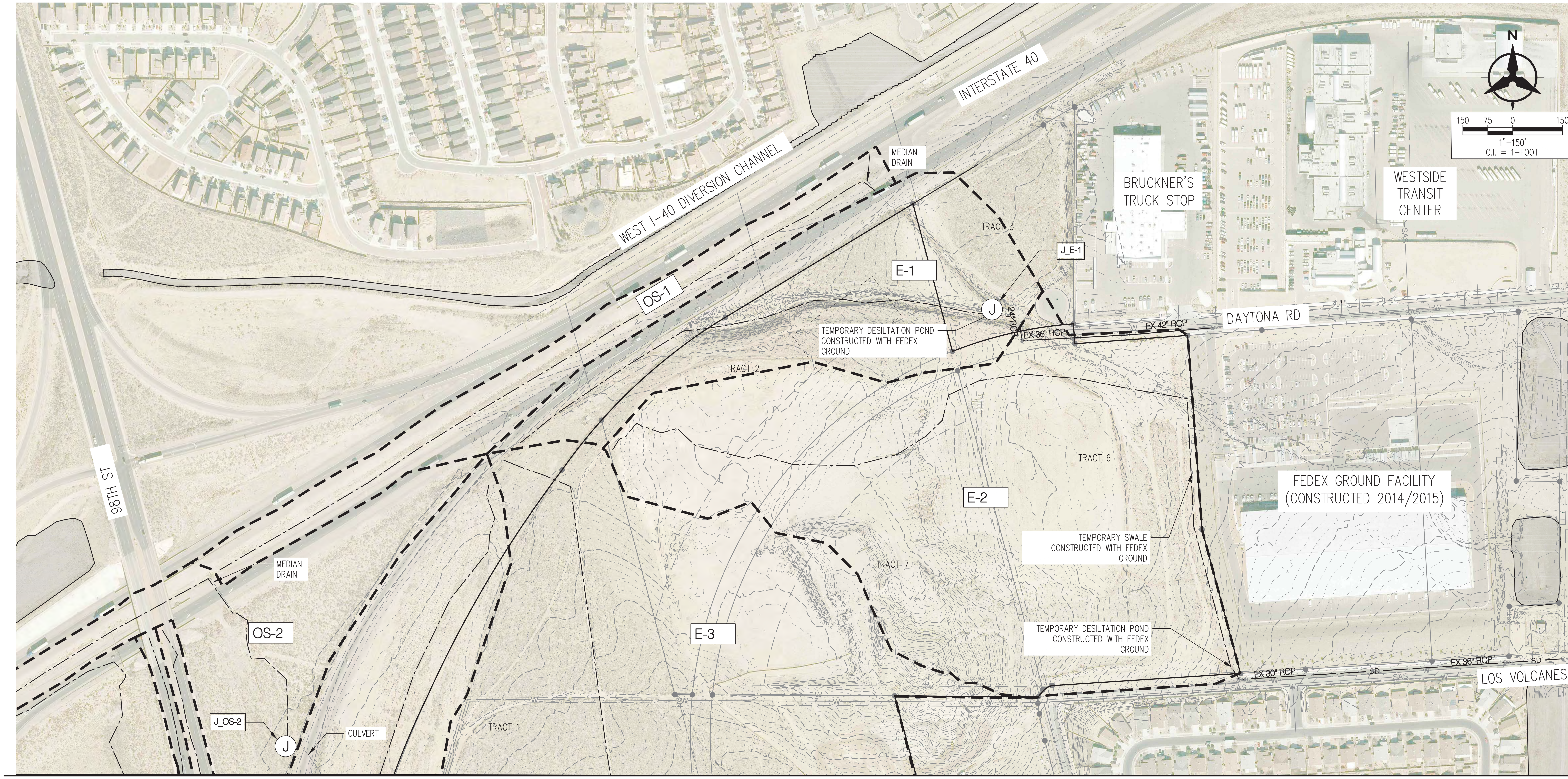

MATCH LINE — SEE SHEET 2

Summary of Hydrology Results - Existing Condition

Subbasin/ Hydrologic Element	Area	Imperviousness	Hydrologic Soil Group	Pervious CN	Tc	Lag Time	Q100	Notes
	(acres)	(%)	-	-	(min)	(min)	(cfs)	
E-1	12.9	13	100% A	63	13.0	7.8	8.3	Drains to temporary desiltation basin & Daytona Rd storm drain
E-2	31.1	0	100% A	76	15.7	9.4	27.9	Drains to temporary desiltation basin & Los Volcanes Rd storm drain
E-3	46.2	0	100% A	61	15.2	9.1	5.7	Drains to temporary desiltation basin & Bluewater Rd storm drain
E-4	41.7	3	100% A	61	17.4	10.4	7.6	Drains to ponding area (FEMA Zone A) on Tract 10
E-5	5.4	0	100% A	55	12.0	7.2	0.2	Drains to Bluewater Rd
OS-1	6.5	40	100% A	77	16.2	9.7	13.8	Conveyed under I-40 eastbound lanes by median drain
OS-2	11.5	21	100% A	77	12.0	7.2	20.4	I-40 ROW, drains to culvert under 98th St on-ramp
OS-3	-	-	-	-	-	-	-	Self-retained, no runoff.
OS-4	12.3	24	100% A	77	13.6	8.1	21.7	I-40 ROW, drains to CBC under 98th St.
OS-5	14.2	33	100% A	72	14.9	8.9	24.3	I-40 ROW & some private land, drains to CBC under 98th St.
OS-6	1.8	100	100% A	77	12.0	7.2	3.2*	Southbound 98th St, portion intercepted by curb inlet ($Q_{100,TOTAL}$= 8.1cfs)
OS-7	2.1	100	100% A	77	12.0	7.2	3.6*	Northbound 98th St, portion intercepted by curb inlets ($Q_{100,TOTAL}$= 9.4cfs)
J_E-1	19.3	-	-	-	-	-	22.2	Total flow to temporary desiltation basin & Daytona Rd storm drain
J_E-4	79.7	-	-	-	-	-	78.9**	Total flow to ponding/retention area (FEMA Zone A) on Tract 10
J_OS-2	38.0	-	-	-	-	-	66.1	Total offsite flow conveyed through subbasin **E-4**
J_OS-6	3.9	-	-	-	-	-	6.8*	Total flow in 98th St intercepted by curb inlets

* Interception capacity of existing curb inlets. Refer to "98th St - Interception Capacity of Existing Curb Inlets" calculations for additional information.

**HEC-HMS results (72.1 csf) plus curb inlet interception capacity (6.8 csf).

LEGEND

DRAINAGE BASIN BOUNDARY

TC FLOWPATH

TRACT BOUNDARY

EXISTING EASEMENT

FEMA SPECIAL FLOOD HAZARD AREA (SFHA)

PROJECT BOUNDARY

TR1 DRAINAGE BASIN LABEL

J HYDROLOGIC MODEL JUNCTION

NOTES:
1. TOPOGRAPHY PREPARED BY AEROTECH MAPPING, DATED MARCH 11, 2014.
2. AERIAL IMAGE FROM 2016 MRCOG REGIONAL ORTHOPHOTOGRAPHY.

Bohannan Huston
www.bhinc.com 800.877.5332

WESTPOINT 40
MASTER DRAINAGE REPORT

EXHIBIT 2
EXISTING CONDITIONS DRAINAGE MAP

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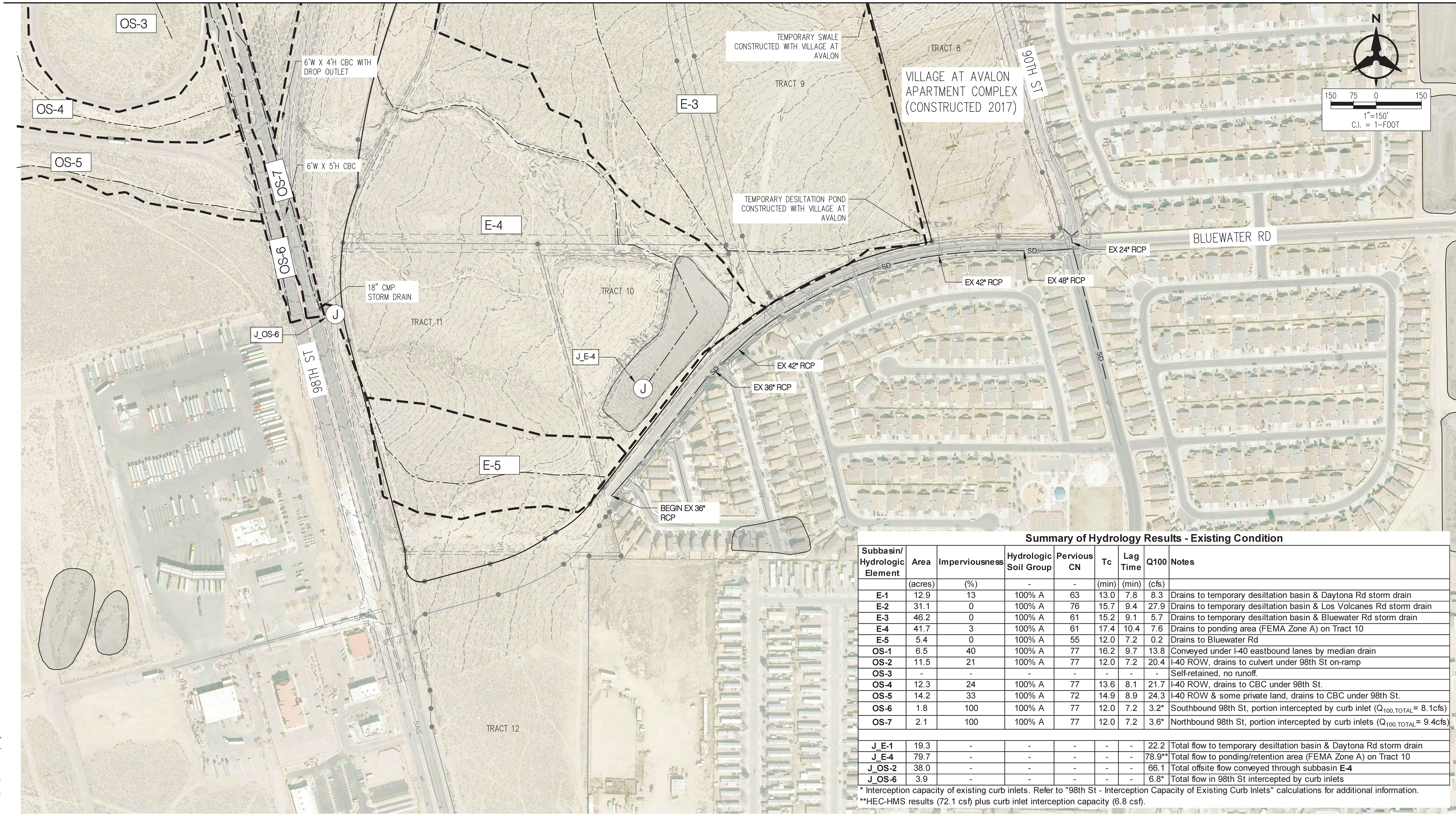
MATCH LINE – SEE SHEET 1



Summary of Hydrology Results - Existing Condition

Subbasin/ Hydrologic Element	Area	Imperviousness	Hydrologic Soil Group	Pervious CN	Tc	Lag Time	Q100	Notes
	(acres)	(%)	-	-	(min)	(min)	(cfs)	
E-1	12.9	13	100% A	63	13.0	7.8	8.3	Drains to temporary desiltation basin & Daytona Rd storm drain
E-2	31.1	0	100% A	76	15.7	9.4	27.9	Drains to temporary desiltation basin & Los Volcanes Rd storm drain
E-3	46.2	0	100% A	61	15.2	9.1	5.7	Drains to temporary desiltation basin & Bluewater Rd storm drain
E-4	41.7	3	100% A	61	17.4	10.4	7.6	Drains to ponding area (FEMA Zone A) on Tract 10
E-5	5.4	0	100% A	55	12.0	7.2	0.2	Drains to Bluewater Rd
OS-1	6.5	40	100% A	77	16.2	9.7	13.8	Conveyed under I-40 eastbound lanes by median drain
OS-2	11.5	21	100% A	77	12.0	7.2	20.4	I-40 ROW, drains to culvert under 98th St on-ramp
OS-3	-	-	-	-	-	-	-	Self-retained, no runoff.
OS-4	12.3	24	100% A	77	13.6	8.1	21.7	I-40 ROW, drains to CBC under 98th St.
OS-5	14.2	33	100% A	72	14.9	8.9	24.3	I-40 ROW & some private land, drains to CBC under 98th St.
OS-6	1.8	100	100% A	77	12.0	7.2	3.2*	Southbound 98th St, portion intercepted by curb inlet ($Q_{100,TOTAL}$= 8.1cfs)
OS-7	2.1	100	100% A	77	12.0	7.2	3.6*	Northbound 98th St, portion intercepted by curb inlets ($Q_{100,TOTAL}$= 9.4cfs)
J_E-1	19.3	-	-	-	-	-	22.2	Total flow to temporary desiltation basin & Daytona Rd storm drain
J_E-4	79.7	-	-	-	-	-	78.9**	Total flow to ponding/retention area (FEMA Zone A) on Tract 10
J_OS-2	38.0	-	-	-	-	-	66.1	Total offsite flow conveyed through subbasin **E-4**
J_OS-6	3.9	-	-	-	-	-	6.8*	Total flow in 98th St intercepted by curb inlets

* Interception capacity of existing curb inlets. Refer to "98th St - Interception Capacity of Existing Curb Inlets" calculations for additional information.

**HEC-HMS results (72.1 csf) plus curb inlet interception capacity (6.8 csf).

NOTES:
1. TOPOGRAPHY PREPARED BY AEROTECH MAPPING, DATED MARCH 11, 2014.
2. AERIAL IMAGE FROM 2016 MRCOG REGIONAL ORTHOPHOTOGRAPHY.

LEGEND

- DRAINAGE BASIN BOUNDARY
- TC FLOWPATH
- TRACT BOUNDARY
- EXISTING EASEMENT
- FEMA SPECIAL FLOOD HAZARD AREA (SFHA)
- TR1 DRAINAGE BASIN LABEL
- J HYDROLOGIC MODEL JUNCTION
- PROJECT BOUNDARY

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Bohannan Huston
www.bhinc.com 800.877.5332

WESTPOINT 40
MASTER DRAINAGE REPORT

EXHIBIT 2
EXISTING CONDITIONS DRAINAGE MAP

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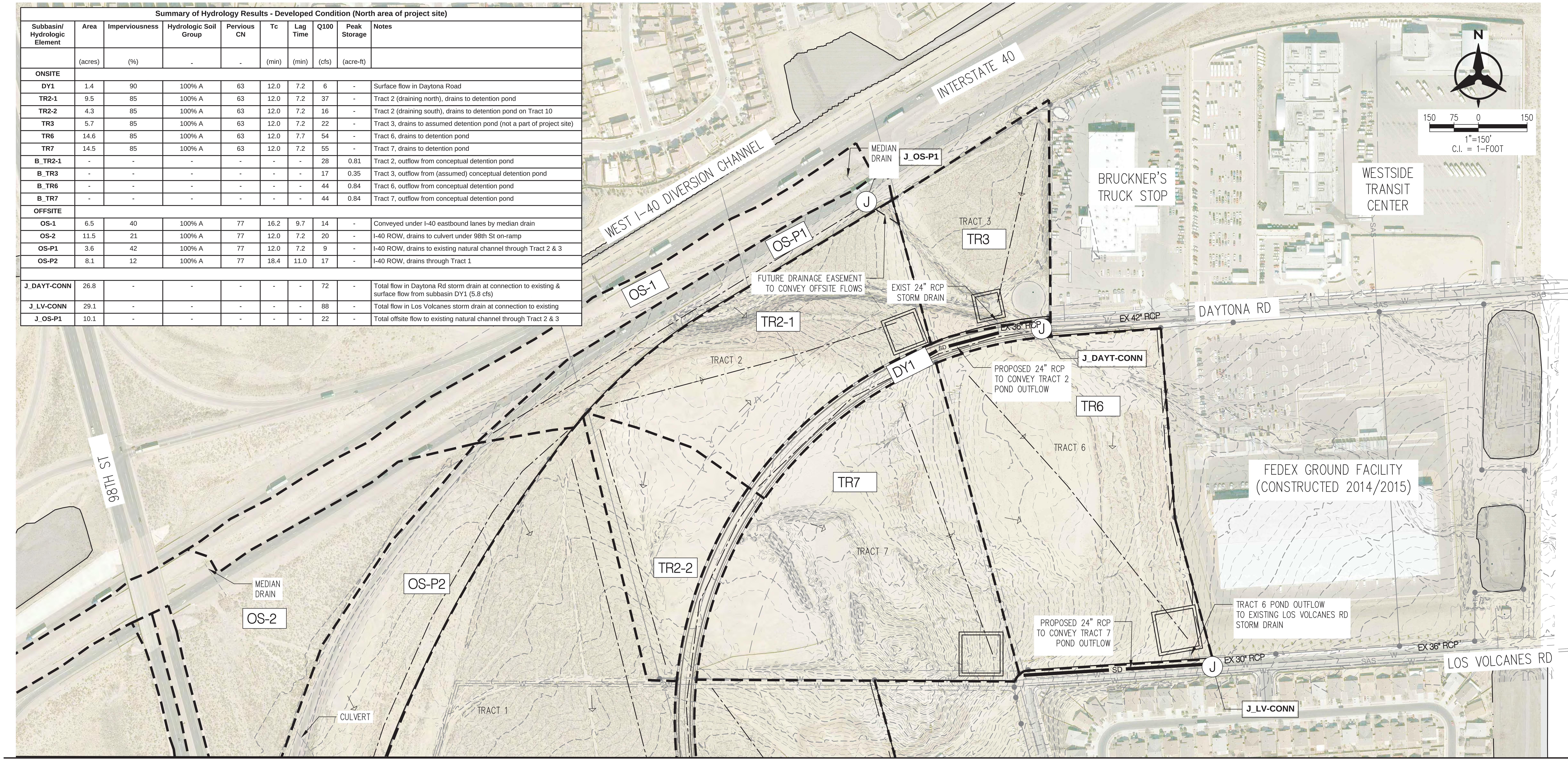
EXHIBIT 3 – DEVELOPED CONDITIONS DRAINAGE MAP

Summary of Hydrology Results - Developed Condition (North area of project site)

Subbasin/ Hydrologic Element	Area	Imperviousness	Hydrologic Soil Group	Pervious CN	Tc	Lag Time	Q100	Peak Storage	Notes
	(acres)	(%)	-	-	(min)	(min)	(cfs)	(acre-ft)	
ONSITE									
DY1	1.4	90	100% A	63	12.0	7.2	6	-	Surface flow in Daytona Road
TR2-1	9.5	85	100% A	63	12.0	7.2	37	-	Tract 2 (draining north), drains to detention pond
TR2-2	4.3	85	100% A	63	12.0	7.2	16	-	Tract 2 (draining south), drains to detention pond on Tract 10
TR3	5.7	85	100% A	63	12.0	7.2	22	-	Tract 3, drains to assumed detention pond (not a part of project site)
TR6	14.6	85	100% A	63	12.0	7.7	54	-	Tract 6, drains to detention pond
TR7	14.5	85	100% A	63	12.0	7.2	55	-	Tract 7, drains to detention pond
B_TR2-1	-	-	-	-	-	-	28	0.81	Tract 2, outflow from conceptual detention pond
B_TR3	-	-	-	-	-	-	17	0.35	Tract 3, outflow from (assumed) conceptual detention pond
B_TR6	-	-	-	-	-	-	44	0.84	Tract 6, outflow from conceptual detention pond
B_TR7	-	-	-	-	-	-	44	0.84	Tract 7, outflow from conceptual detention pond
OFFSITE									
OS-1	6.5	40	100% A	77	16.2	9.7	14	-	Conveyed under I-40 eastbound lanes by median drain
OS-2	11.5	21	100% A	77	12.0	7.2	20	-	I-40 ROW, drains to culvert under 98th St on-ramp
OS-P1	3.6	42	100% A	77	12.0	7.2	9	-	I-40 ROW, drains to existing natural channel through Tract 2 & 3
OS-P2	8.1	12	100% A	77	18.4	11.0	17	-	I-40 ROW, drains through Tract 1
J_DAYT-CONN	26.8	-	-	-	-	-	72	-	Total flow in Daytona Rd storm drain at connection to existing & surface flow from subbasin DY1 (5.8 cfs)
J_LV-CONN	29.1	-	-	-	-	-	88	-	Total flow in Los Volcanes storm drain at connection to existing
J_OS-P1	10.1	-	-	-	-	-	22	-	Total offsite flow to existing natural channel through Tract 2 & 3



MATCH LINE – SEE SHEET 2

NOTES:
1. TOPOGRAPHY PREPARED BY AEROTECH MAPPING, DATED MARCH 11, 2014.
2. AERIAL IMAGE FROM 2016 MRCOG REGIONAL ORTHOPHOTOGRAPHY.
3. PROJECT SITE ASSUMED TO DEVELOP AS COMMERCIAL/INDUSTRIAL WITH 85% IMPERVIOUSNESS.
4. CONCEPTUAL DETENTION PONDS ARE ASSUMED TO OUTLET TO STORM DRAIN IN ADJACENT ROW.

LEGEND
- DRAINAGE BASIN BOUNDARY
- TC FLOWPATH
- PROJECT BOUNDARY
- TRACT BOUNDARY
- EXISTING EASEMENT
- FEMA SPECIAL FLOOD HAZARD AREA (SFHA)
- TR1 DRAINAGE BASIN LABEL
- J HYDROLOGIC MODEL JUNCTION
- CONCEPTUAL DETENTION POND

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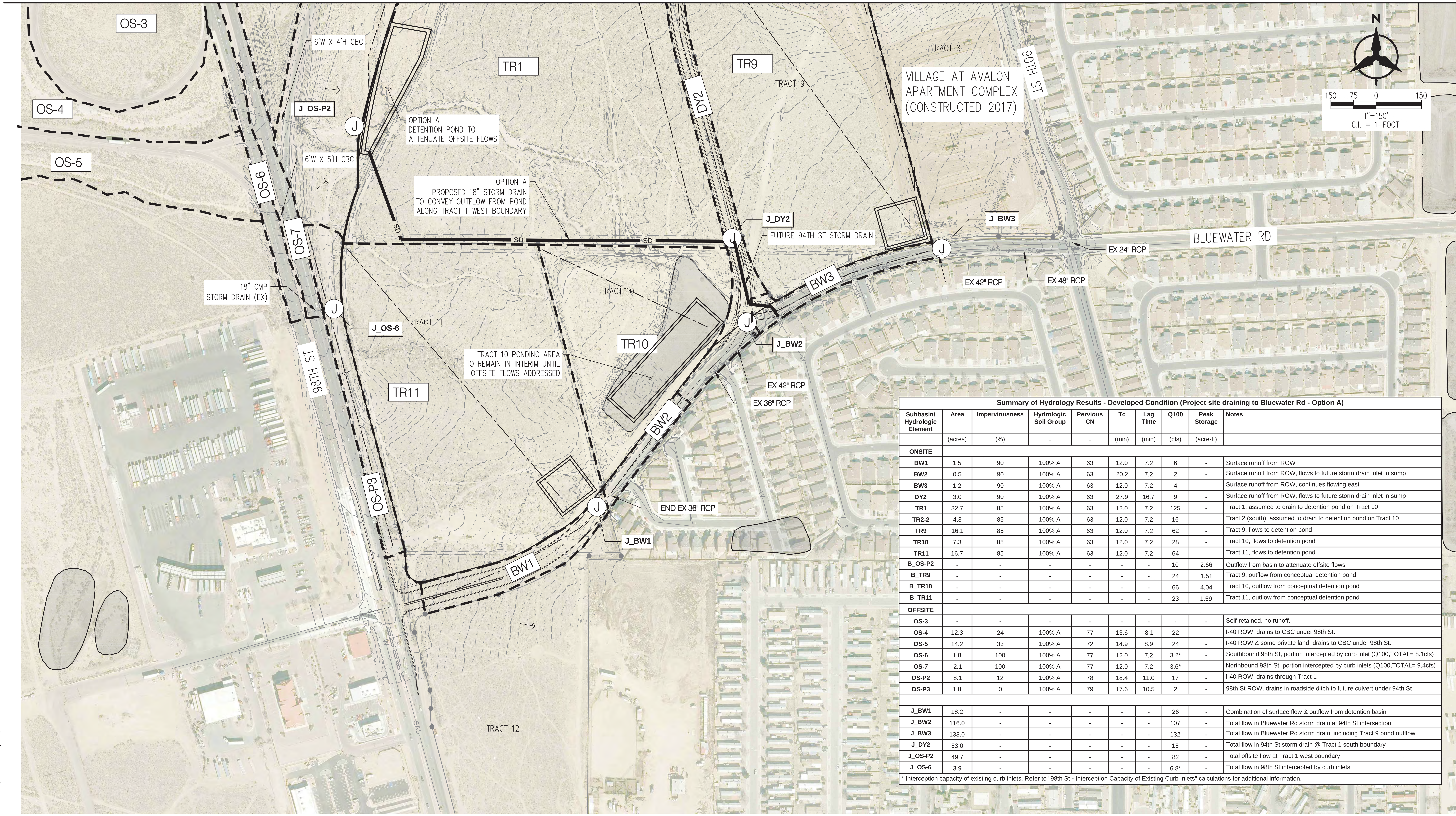
WESTPOINT 40
MASTER DRAINAGE REPORT

EXHIBIT 3
DEVELOPED CONDITIONS DRAINAGE MAP - NORTHERN AREA

DRAWN BY: DB		DATE: 09/20/17	
CHECKED BY: VCS		PROJECT NO. 20180059	SHEET NO. 1 OF 4

MATCH LINE – SEE SHEET 1



Subbasin/ Hydrologic Element	Area	Imperviousness	Hydrologic Soil Group	Pervious CN	Tc	Lag Time	Q100	Peak Storage	Notes
	(acres)	(%)	-	-	(min)	(min)	(cfs)	(acre-ft)	
ONSITE									
BW1	1.5	90	100% A	63	12.0	7.2	6	-	Surface runoff from ROW
BW2	0.5	90	100% A	63	20.2	7.2	2	-	Surface runoff from ROW, flows to future storm drain inlet in sump
BW3	1.2	90	100% A	63	12.0	7.2	4	-	Surface runoff from ROW, continues flowing east
DY2	3.0	90	100% A	63	27.9	16.7	9	-	Surface runoff from ROW, flows to future storm drain inlet in sump
TR1	32.7	85	100% A	63	12.0	7.2	125	-	Tract 1, assumed to drain to detention pond on Tract 10
TR2-2	4.3	85	100% A	63	12.0	7.2	16	-	Tract 2 (south), assumed to drain to detention pond on Tract 10
TR9	16.1	85	100% A	63	12.0	7.2	62	-	Tract 9, flows to detention pond
TR10	7.3	85	100% A	63	12.0	7.2	28	-	Tract 10, flows to detention pond
TR11	16.7	85	100% A	63	12.0	7.2	64	-	Tract 11, flows to detention pond
B_OS-P2	-	-	-	-	-	-	10	2.66	Outflow from basin to attenuate offsite flows
B_TR9	-	-	-	-	-	-	24	1.51	Tract 9, outflow from conceptual detention pond
B_TR10	-	-	-	-	-	-	66	4.04	Tract 10, outflow from conceptual detention pond
B_TR11	-	-	-	-	-	-	23	1.59	Tract 11, outflow from conceptual detention pond
OFFSITE									
OS-3	-	-	-	-	-	-	-	-	Self-retained, no runoff.
OS-4	12.3	24	100% A	77	13.6	8.1	22	-	I-40 ROW, drains to CBC under 98th St.
OS-5	14.2	33	100% A	72	14.9	8.9	24	-	I-40 ROW & some private land, drains to CBC under 98th St.
OS-6	1.8	100	100% A	77	12.0	7.2	3.2*	-	Southbound 98th St, portion intercepted by curb inlet (Q100,TOTAL= 8.1cfs)
OS-7	2.1	100	100% A	77	12.0	7.2	3.6*	-	Northbound 98th St, portion intercepted by curb inlets (Q100,TOTAL= 9.4cfs)
OS-P2	8.1	12	100% A	78	18.4	11.0	17	-	I-40 ROW, drains through Tract 1
OS-P3	1.8	0	100% A	79	17.6	10.5	2	-	98th St ROW, drains in roadside ditch to future culvert under 94th St
J_BW1	18.2	-	-	-	-	-	26	-	Combination of surface flow & outflow from detention basin
J_BW2	116.0	-	-	-	-	-	107	-	Total flow in Bluewater Rd storm drain at 94th St intersection
J_BW3	133.0	-	-	-	-	-	132	-	Total flow in Bluewater Rd storm drain, including Tract 9 pond outflow
J_DY2	53.0	-	-	-	-	-	15	-	Total flow in 94th St storm drain @ Tract 1 south boundary
J_OS-P2	49.7	-	-	-	-	-	82	-	Total offsite flow at Tract 1 west boundary
J_OS-6	3.9	-	-	-	-	-	6.8*	-	Total flow in 98th St intercepted by curb inlets

Summary of Hydrology Results - Developed Condition (Project site draining to Bluewater Rd - Option A)

* Interception capacity of existing curb inlets. Refer to "98th St - Interception Capacity of Existing Curb Inlets" calculations for additional information.

NOTES:
1. TOPOGRAPHY PREPARED BY AEROTECH MAPPING, DATED MARCH 11, 2014.
2. AERIAL IMAGE FROM 2016 MRCOG REGIONAL ORTHOPHOTOGRAPHY.
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4. CONCEPTUAL DETENTION PONDS ARE ASSUMED TO OUTLET TO STORM DRAIN IN ADJACENT ROW.

LEGEND
- DRAINAGE BASIN BOUNDARY
- TC FLOWPATH
- PROJECT BOUNDARY
- TRACT BOUNDARY
- EXISTING EASEMENT
- FEMA SPECIAL FLOOD HAZARD AREA (SFHA)
- TR1 DRAINAGE BASIN LABEL
- J HYDROLOGIC MODEL JUNCTION
- CONCEPTUAL DETENTION POND

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WESTPOINT 40
MASTER DRAINAGE REPORT

EXHIBIT 3
DEVELOPED CONDITIONS DRAINAGE MAP - OPTION A

DRAWN BY: DB
DATE: 09/20/17
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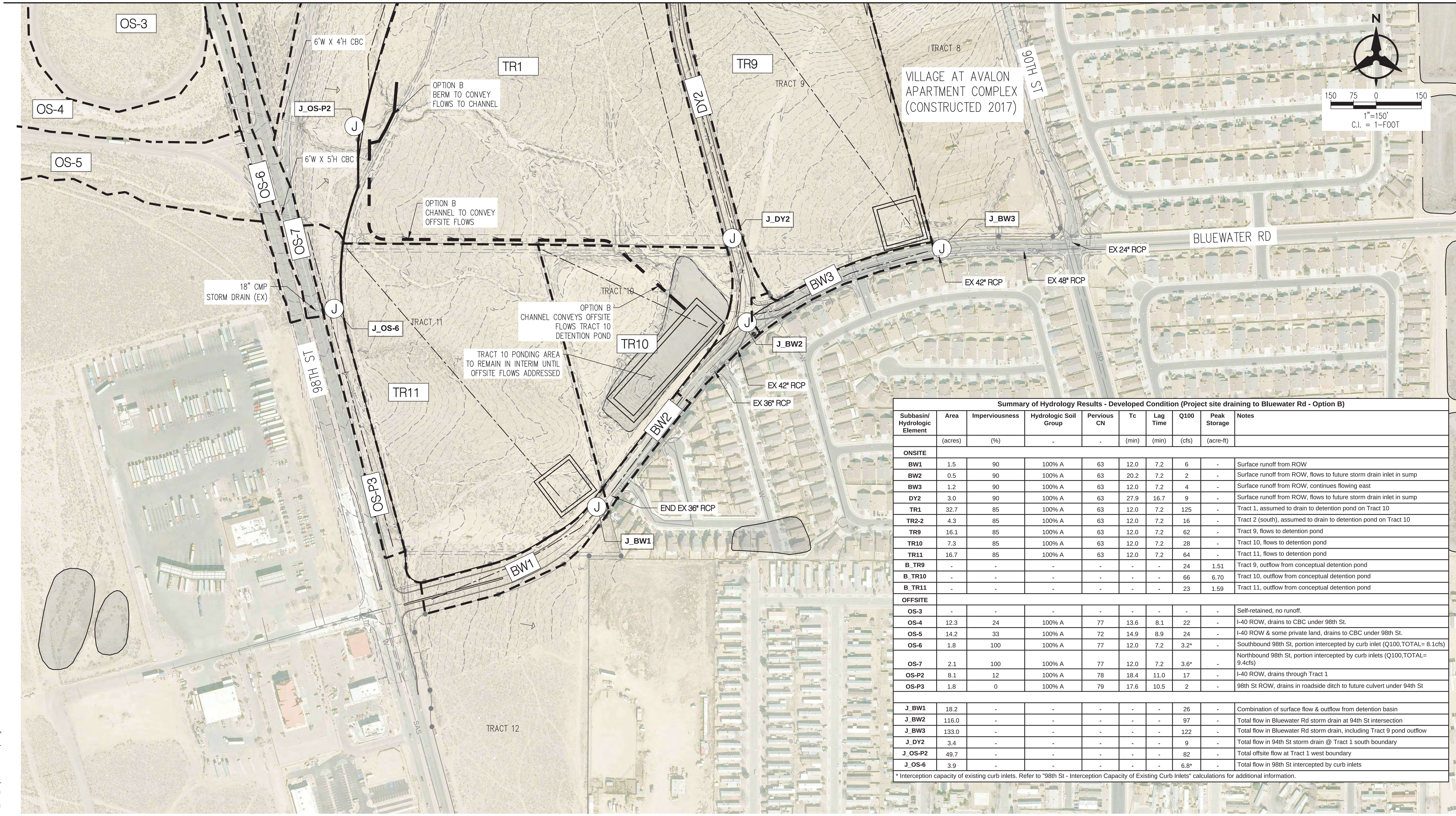
PROJECT NO. 20180059
SHEET NO. 2 OF 4

MATCH LINE – SEE SHEET 1



Summary of Hydrology Results - Developed Condition (Project site draining to Bluewater Rd - Option B)									
Subbasin/ Hydrologic Element	Area	Imperviousness	Hydrologic Soil Group	Pervious CN	Tc	Lag Time	Q100	Peak Storage	Notes
	(acres)	(%)	-	-	(min)	(min)	(cfs)	(acre-ft)	
ONSITE									
BW1	1.5	90	100% A	63	12.0	7.2	6	-	Surface runoff from ROW
BW2	0.5	90	100% A	63	20.2	7.2	2	-	Surface runoff from ROW, flows to future storm drain inlet in sump
BW3	1.2	90	100% A	63	12.0	7.2	4	-	Surface runoff from ROW, continues flowing east
DY2	3.0	90	100% A	63	27.9	16.7	9	-	Surface runoff from ROW, flows to future storm drain inlet in sump
TR1	32.7	85	100% A	63	12.0	7.2	125	-	Tract 1, assumed to drain to detention pond on Tract 10
TR2-2	4.3	85	100% A	63	12.0	7.2	16	-	Tract 2 (south), assumed to drain to detention pond on Tract 10
TR9	16.1	85	100% A	63	12.0	7.2	62	-	Tract 9, flows to detention pond
TR10	7.3	85	100% A	63	12.0	7.2	28	-	Tract 10, flows to detention pond
TR11	16.7	85	100% A	63	12.0	7.2	64	-	Tract 11, flows to detention pond
B_TR9	-	-	-	-	-	-	24	1.51	Tract 9, outflow from conceptual detention pond
B_TR10	-	-	-	-	-	-	66	6.70	Tract 10, outflow from conceptual detention pond
B_TR11	-	-	-	-	-	-	23	1.59	Tract 11, outflow from conceptual detention pond
OFFSITE									
OS-3	-	-	-	-	-	-	-	-	Self-retained, no runoff.
OS-4	12.3	24	100% A	77	13.6	8.1	22	-	I-40 ROW, drains to CBC under 98th St.
OS-5	14.2	33	100% A	72	14.9	8.9	24	-	I-40 ROW & some private land, drains to CBC under 98th St.
OS-6	1.8	100	100% A	77	12.0	7.2	3.2*	-	Southbound 98th St, portion intercepted by curb inlet (Q100,TOTAL= 8.1cfs)
OS-7	2.1	100	100% A	77	12.0	7.2	3.6*	-	Northbound 98th St, portion intercepted by curb inlets (Q100,TOTAL= 9.4cfs)
OS-P2	8.1	12	100% A	78	18.4	11.0	17	-	I-40 ROW, drains through Tract 1
OS-P3	1.8	0	100% A	79	17.6	10.5	2	-	98th St ROW, drains in roadside ditch to future culvert under 94th St
J_BW1	18.2	-	-	-	-	-	26	-	Combination of surface flow & outflow from detention basin
J_BW2	116.0	-	-	-	-	-	97	-	Total flow in Bluewater Rd storm drain at 94th St intersection
J_BW3	133.0	-	-	-	-	-	122	-	Total flow in Bluewater Rd storm drain, including Tract 9 pond outflow
J_DY2	3.4	-	-	-	-	-	9	-	Total flow in 94th St storm drain @ Tract 1 south boundary
J_OS-P2	49.7	-	-	-	-	-	82	-	Total offsite flow at Tract 1 west boundary
J_OS-6	3.9	-	-	-	-	-	6.8*	-	Total flow in 98th St intercepted by curb inlets

* Interception capacity of existing curb inlets. Refer to "98th St - Interception Capacity of Existing Curb Inlets" calculations for additional information.

NOTES:

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4. CONCEPTUAL DETENTION PONDS ARE ASSUMED TO OUTLET TO STORM DRAIN IN ADJACENT ROW.

LEGEND

- DRAINAGE BASIN BOUNDARY
- TC FLOWPATH
- PROJECT BOUNDARY
- TRACT BOUNDARY
- EXISTING EASEMENT
- CONCEPTUAL CHANNEL
- FEMA SPECIAL FLOOD HAZARD AREA (SFHA)
- TR1 DRAINAGE BASIN LABEL
- J HYDROLOGIC MODEL JUNCTION
- CONCEPTUAL DETENTION POND

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WESTPOINT 40
MASTER DRAINAGE REPORT

EXHIBIT 3
DEVELOPED CONDITIONS DRAINAGE MAP - OPTION B

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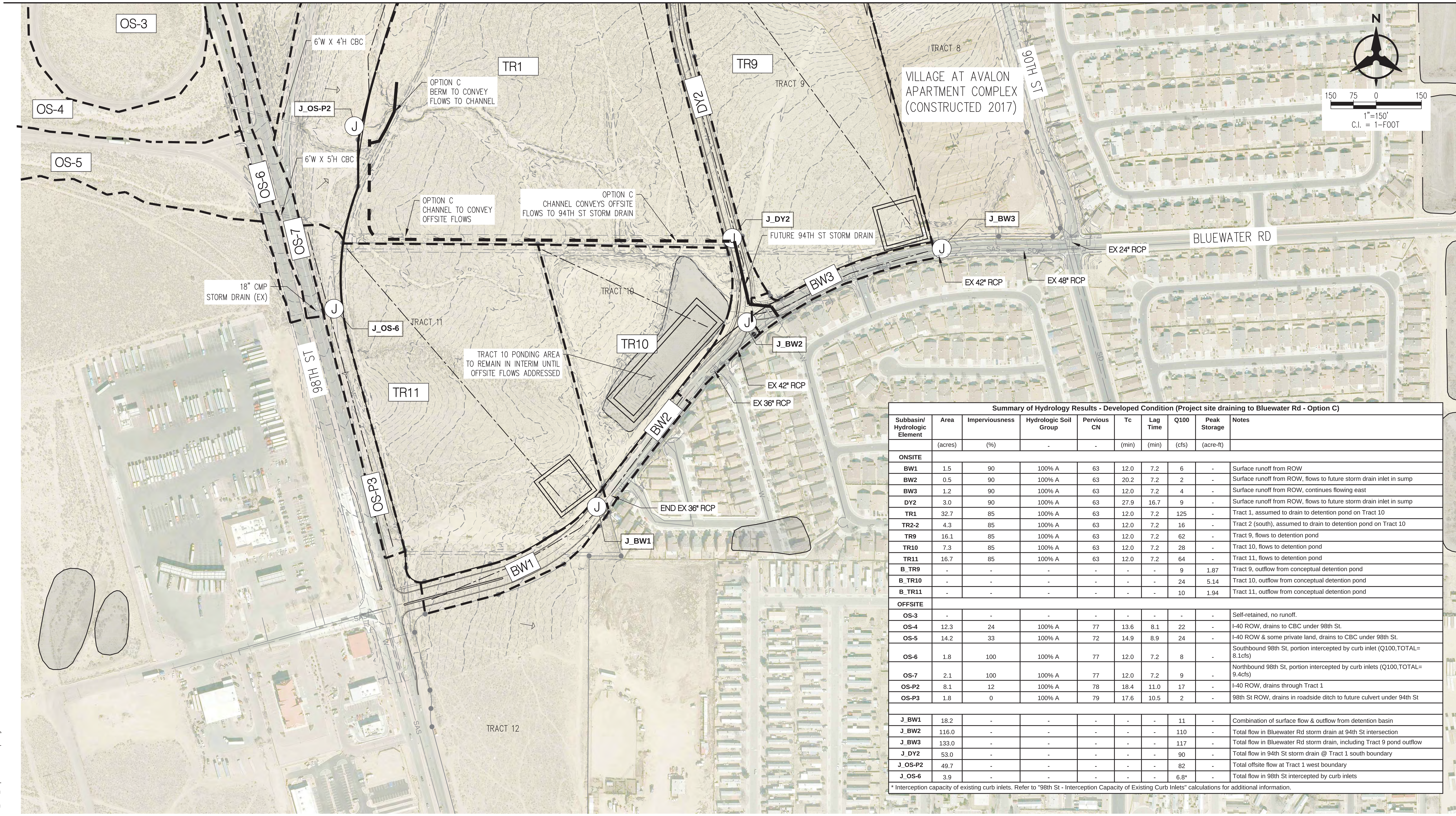
MATCH LINE – SEE SHEET 1



Summary of Hydrology Results - Developed Condition (Project site draining to Bluewater Rd - Option C)									
Subbasin/ Hydrologic Element	Area	Imperviousness	Hydrologic Soil Group	Pervious CN	Tc	Lag Time	Q100	Peak Storage	Notes
	(acres)	(%)	-	-	(min)	(min)	(cfs)	(acre-ft)	
ONSITE									
BW1	1.5	90	100% A	63	12.0	7.2	6	-	Surface runoff from ROW
BW2	0.5	90	100% A	63	20.2	7.2	2	-	Surface runoff from ROW, flows to future storm drain inlet in sump
BW3	1.2	90	100% A	63	12.0	7.2	4	-	Surface runoff from ROW, continues flowing east
DY2	3.0	90	100% A	63	27.9	16.7	9	-	Surface runoff from ROW, flows to future storm drain inlet in sump
TR1	32.7	85	100% A	63	12.0	7.2	125	-	Tract 1, assumed to drain to detention pond on Tract 10
TR2-2	4.3	85	100% A	63	12.0	7.2	16	-	Tract 2 (south), assumed to drain to detention pond on Tract 10
TR9	16.1	85	100% A	63	12.0	7.2	62	-	Tract 9, flows to detention pond
TR10	7.3	85	100% A	63	12.0	7.2	28	-	Tract 10, flows to detention pond
TR11	16.7	85	100% A	63	12.0	7.2	64	-	Tract 11, flows to detention pond
B_TR9	-	-	-	-	-	-	9	1.87	Tract 9, outflow from conceptual detention pond
B_TR10	-	-	-	-	-	-	24	5.14	Tract 10, outflow from conceptual detention pond
B_TR11	-	-	-	-	-	-	10	1.94	Tract 11, outflow from conceptual detention pond
OFFSITE									
OS-3	-	-	-	-	-	-	-	-	Self-retained, no runoff.
OS-4	12.3	24	100% A	77	13.6	8.1	22	-	I-40 ROW, drains to CBC under 98th St.
OS-5	14.2	33	100% A	72	14.9	8.9	24	-	I-40 ROW & some private land, drains to CBC under 98th St.
OS-6	1.8	100	100% A	77	12.0	7.2	8	-	Southbound 98th St, portion intercepted by curb inlet (Q100,TOTAL= 8.1cfs)
OS-7	2.1	100	100% A	77	12.0	7.2	9	-	Northbound 98th St, portion intercepted by curb inlets (Q100,TOTAL= 9.4cfs)
OS-P2	8.1	12	100% A	78	18.4	11.0	17	-	I-40 ROW, drains through Tract 1
OS-P3	1.8	0	100% A	79	17.6	10.5	2	-	98th St ROW, drains in roadside ditch to future culvert under 94th St
J_BW1	18.2	-	-	-	-	-	11	-	Combination of surface flow & outflow from detention basin
J_BW2	116.0	-	-	-	-	-	110	-	Total flow in Bluewater Rd storm drain at 94th St intersection
J_BW3	133.0	-	-	-	-	-	117	-	Total flow in Bluewater Rd storm drain, including Tract 9 pond outflow
J_DY2	53.0	-	-	-	-	-	90	-	Total flow in 94th St storm drain @ Tract 1 south boundary
J_OS-P2	49.7	-	-	-	-	-	82	-	Total offsite flow at Tract 1 west boundary
J_OS-6	3.9	-	-	-	-	-	6.8*	-	Total flow in 98th St intercepted by curb inlets

* Interception capacity of existing curb inlets. Refer to "98th St - Interception Capacity of Existing Curb Inlets" calculations for additional information.

NOTES:

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LEGEND

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WESTPOINT 40
MASTER DRAINAGE REPORT

EXHIBIT 3
DEVELOPED CONDITIONS DRAINAGE MAP - OPTION C

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