Juan Tabo Hills Estates
Onsite Drainage Analysis Report
Volume 1 of 4

Prepared For:

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9-20-2014

Contents

1. Purpose of Report

The purpose of this report is for Preliminary Plat approval for the Juan Tabo Hills Estates subdivision. To this effect, the report will provide final design hydrology analysis, the transition from mountable curb to standard curb and gutter, the location of inlets, and preliminary storm drain pipe sizes. The final pipe design and hydraulic grade lines will be shown later on the subdivision construction plans.

2. Project Description

The Juan Tabo Hills Estates project site covers an area of 78 acres. The site was annexed into the City of Albuquerque (COA) in 2007. This project proposes to develop about 350 single family residential lots with all public streets and will provide HOA tracts for landscaping and trails. This project will also dedicate 40 acres of the Tijeras Arroyo to the COA.

The project will tie into existing roads and underground infrastructure located in Juan Tabo Hills Units 1 and 2. A 3.0ac-ft SWQ pond will be constructed in the southwest corner of the site. Since the site is bounded on the west by the Tijeras Arroyo, discharge into the arroyo will refer to the *Tijeras Arroyo Drainage Management Plan, Phase II;* August 1990 performed by Leedshill-Herkenhoff, Inc. and the COA *Facility Plan for Arroyos, Multiple Use of Albuquerque's Arroyos and Their Flood Plains*, by City of Albuquerque, 1985.

Due to the nature of this site, the project also requires bank protection of the Tijeras Arroyo, a CLOMR and a 404 Permit. These are addressed in separate volumes of this Drainage Analysis Report as listed below:

1. *Volume 2: Bank Protection*. This volume addresses the bank protection to prevent lateral migration of the Tijeras Arroyo.
2. *Volume 3: CLOMR.* This volume addresses the fill to remove the FEMA floodplain from within the development.
3. *Volume 4: 404 Permit.* This volume addresses the fill of the 4.2 acres of the Tributary Waters of the U.S. and the protection of the 12 acres of the Tijeras Arroyo Waters of the U.S.

3. Vicinity Map & Legal Description

Figure 1 below shows the location of the project site. The site is located on Zone Atlas Map M-21.

Legal Description: *Tract of land situated within Sections 33 and 34, Township 10 North, Range 4 East, New Mexico Principal Meridian, City of Albuquerque, Bernalillo County, New Mexico being all of TRACT A, JUAN TABO HILLS WEST, as the same is shown and designated on said plat filed for record in the office of the County Clerk of Bernalillo County, New Mexico on June 14, 2007 in Book 2007C, Page 161 and TRACT 1-A-1, JUAN TABO HILLS, UNIT 2, as the same is shown and designated on said plat filed for record in the office of County Clerk of Bernalillo County, New Mexico on February 20, 2008 in Book 2008C, Page 30.*

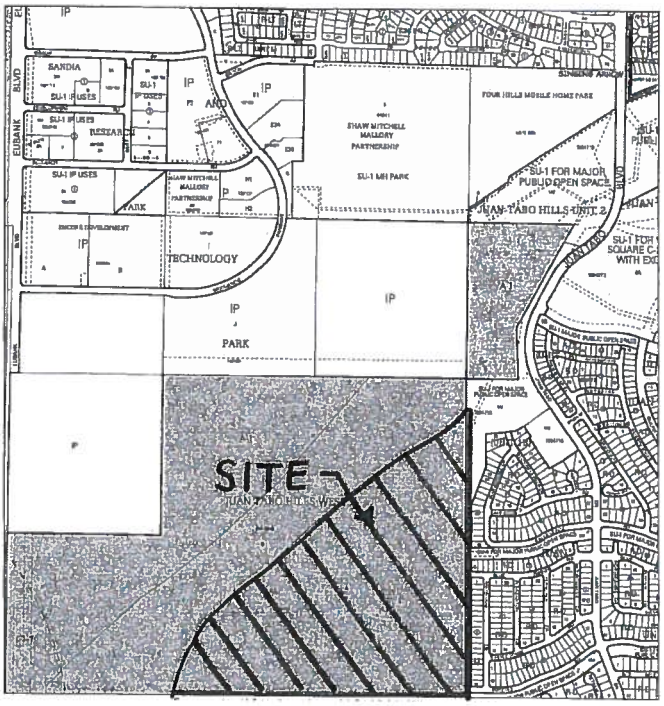


Figure 1: Vicinity Map

4. Floodplain

FEMA Special Flood Hazard Zones AO, AE and X exist on or near this site as shown on Flood Insurance Rate Map Number 35001C0367H dated August 16, 2012.

The Drainage Analysis Report: CLOMR Volume 3 of 4 addresses the fill required to remove the FEMA floodplain from within the development.

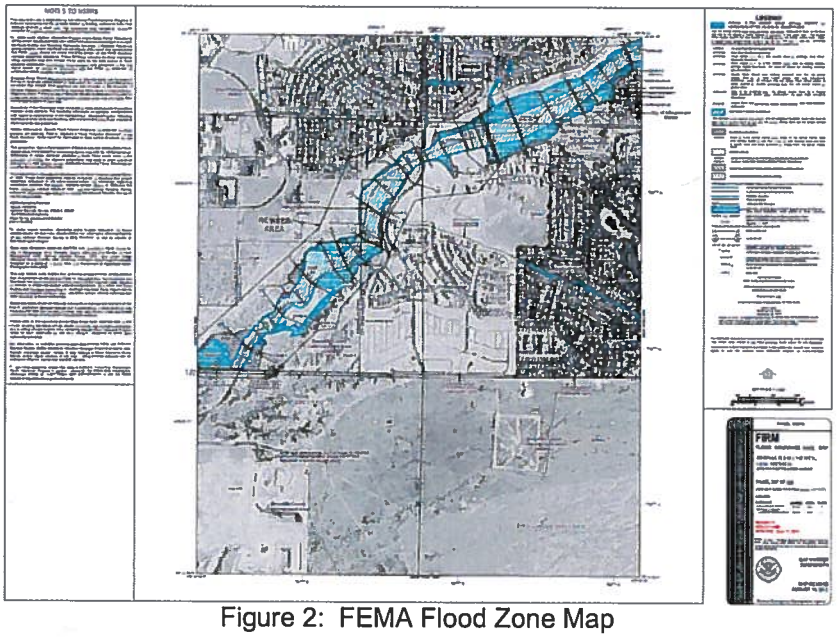


Figure 2: FEMA Flood Zone Map

5. Storm Water Management Plan

5.1 Overview

The peak 100 year storm water runoff rate from this site will be freely discharged into the Tijeras Arroyo in accordance to Tijeras Arroyo Drainage Management Plan, Phase II.

An onsite SWQ pond in the southwest corner of the site will be constructed to provide the required storm water quality volume and to allow discharge of the 100yr peak flow from the SWQ pond into the Tijeras Arroyo in a non-erosive manner.

Offsite flows enter the site from two locations on its eastern border: (1) an existing 84" storm drain just south of Gallant Fox Road and (2) from Pocono Road from Juan Tabo Hills Unit 2. The 84" storm drain south of Gallant Fox Road captures all the offsite basin flows totaling 848.57cfs. The storm drain system for the project site will connect to this existing 84" storm drain. From Pocono Road, 163.36cfs is captured in the existing storm drain, but 9.23cfs enters the project site on Pocono Road as surface runoff.

Onsite runoff will be conveyed as surface flow in the street section until the runoff water surface depth exceeds the capacity of the street. At this point, inlets will be constructed to remove part of the flow until the all the runoff can be captured in sump conditions in Rocky Top Dr., Rock Squirrel Ave., Manzano Vista Ave., and Running Bear Ave. Onsite storm drains will then route the runoff to the SWQ pond before free discharging (Q_{100} = 1291.92cfs) into the Tijeras Arroyo.

5.2 Hydrology

Appendix A contains the Basin Boundary Maps that were used to determine both onsite and offsite flows. The maps include both the AHYMO basin boundaries and sub-basin boundaries.

The hydrology calculations were determined using AHYMO S4 and are included in Appendix B. The input and output results are summarized in Table 1 below. The 100 year 6 hour storm event was used to calculate the flows. Precipitation values from City of Albuquerque Development Process Manual (DPM) Volume II, Chapter 22 for Zone 3 were used where P(1hr)=2.14in, P(6 hr)=2.60in and P(24hr)=3.10in. The onsite Land Treatment Values used were based on Table A-5 in the DPM.

Sub-basin boundaries were determined by the area at which one of the following conditions were met: (1) the street met at an intersection and the flow was equally split between the intersecting streets or (2) the streets reached their flow capacity and inlets were required. The sub-basin flows were calculated based on proration of the area of the main AHYMO basin. These values are shown on a spreadsheet in Appendix D and the Summary Tables are included on the respective Drainage Basin Maps in Appendix A.

Table 1: HYDROLOGY SUMMARY TABLE

AHYMO BASIN ID	Location	AREA		Ground Cover (%)				Q_{100} (cfs)	Water Quality Volume (Ac-Ft)	
		(Ac)	(Sq mi)	A	B	C	D	Increment	Increment	Sub Total
100	Four Hills	89.10	0.13922	8	18	35	38.7	328.22	1.3218	1.3218
101	Juan Tabo Hills	66.80	0.10438	0	19	39	42	282.50	1.0755	1.0755
200	Four Hills	9.00	0.01406	0	20	40	40	37.61	0.1380	**1.4598**
201	Kirtland	76.30	0.01828	100	0	0	0	27.64	0.0000	**0.0000**
203	Juan Tabo Hills	42.50	0.06641	0	22	45	33	172.59	0.5376	1.6131
300	Juan Tabo Hills	22.30	0.03484	0	14	29	57	99.75	0.4873	**2.1004**
400	JTH Estates	77.70	0.12141	0	9	41	50	343.61	1.4893	**1.4893**
TOTALS:		383.70	0.50					1291.92		5.0494

5.3 Hydraulic Calculations

The onsite street and storm drains will convey all onsite drainage to the onsite SWQ pond in the southwest corner of the site. The storm drains are designed to remove a portion of the surface drainage from the streets as necessary to limit the peek 100yr flow depths in the streets to the top of curb and to limit the energy grade elevations so that they do not exceed the right of way elevations at the back of the sidewalk. Appendix D shows the table of street flow depths and inlet inception rates. Hydraulic capacity of the streets and inlets were determined using the *Street Capacity Plate 22.3 D-1* and *the Grating Capacities Plate D-5* respectively of the City Of Albuquerque DPM. The plates are located in Appendix C.

The storm drains were initially sized using Manning's equation. However, when the velocity in the pipe exceeded 18 ft/sec, the pipe sizes were increased until the velocity reached between 15ft/sec-18ft/sec. The overall storm drain design is located in Appendix A; Sheet 6.

5.4 Storm Water Quality Control

A SWQ pond in the southwest corner of the site will be constructed to provide the required storm water quality volume. The storm water quality treatment volume is a function of the percentage of impervious land use as shown in the COA DPM, Volume 11, Chapter 22, Section 9, Table 2. The storm water quality storm event runoff depth for 100% impervious (Land Treatment Type D) used was 0.46in. The total required volume is summarized in the above Table 1.

The SQW pond volumes were computed using the Pond-2 program as listed in Table 2. Volumes are based on the conic equation. The SWQ pond is designed with a 170ft wide weir that will discharge the 100yr flow rate of the site freely into the Tijeras Arroyo.

Table 2: SQW Pond Volume Calculations

Volume File → JTHE Scale (ft/in) → 1 Screen No. 1

Titles: Juan Tabo Hills Estates Storm Water Quality Pond

	Elevation (ft)	Planimeter (sq.in.)	Area (acres)	(acres) A1+A2+√A1*A2	Volume (acre-ft)	ΣVolume (acre-ft)
	80	5827	0.13	0.00	0.00	0.00
	90	22797	0.52	0.92	3.08	3.08
	92	26037	0.60	1.68	1.12	4.20

The required storm water quality control volume for the site is 1.4893 ac-ft (see Table 1; Basin 400). However, the SWQ pond was increased to hold 4.2 ac-ft so that it would provide storage of the existing Tributary Waters of the U.S. running through the site and to mitigate the volume of the surface storage of these tributaries. Further details can be found in *The Drainage Analysis Report: 404 Permit Volume 4 of 4* and in Appendix I of this report.

6. Army Corps of Engineers 404 Permit

The project includes an application for a 404 Permit which can be found in *The Drainage Analysis Report: 404 Permit Volume 4 of 4.* The project aims to stay out of the Waters of the U.S. in the Tijeras Arroyo, but it will replace the minor Tributary Waters of the U.S. within the project site with a storm drain system and the SWQ pond.

In summary, the impact site consists of 4.2 acres Tributary Waters of US, which is to be mitigated by

1. the 0.5 acre SWQ pond that functions an average of 16 times better than the mitigation site (see Comparison of Functions Table in Appendix I),
2. the increased conveyance of 1.83 acres in the Tijeras Arroyo, and
3. the preservation of 12 acres… 9 ac in COA tract and 3 ac in HOA tract. (see Site Summary Table and Areas in Appendix I)

7. Tijeras Arroyo Master Drainage Management Plan

According to the Tijeras Arroyo Drainage Management Plan and the Facility Plan for Arroyos, the policy for preserving the existing floodplain (within the prudent line) suggests that where appropriate, the entire prudent line of the arroyo be purchased by the City as a Major Public Open Space. Since the City of Albuquerque is unable to purchase the land in the project site, development of the land within the prudent line is acceptable assuming adequate bank protection is provided.

Discharge into the arroyo will comply with the intent of the Tijeras Arroyo Drainage Management Plan, Phase II; August 1990 performed by Leedshill-Herkenhoff, Inc. In this report, the assumptions were made that future development along the Tijeras Arroyo would cause

increased flows within the arroyo near the project site and that these flows would impact the arroyo. The report suggested different types of "arroyo treatments" that would be effective in maintaining the Tijeras Arroyo that would be consistent with the COA criteria outlined in the Facility Plan for Arroyos.

One arroyo treatment was the delineation of prudent lines along the arroyo. Future development could be allowed beyond the prudent line if specific drainage improvements were implemented with the development. Since this project proposes development beyond the prudent line, the lateral migration of the arroyo will be prevented by constructing a shotcrete bank protection wall along the arroyo. See *The Drainage Analysis Report: Bank Protection, Volume 2 of 4* for a more detailed report.

A second arroyo treatment outlined in the Tijeras Arroyo Drainage Management Plan is the construction of outfall structures to reduce the erosion along the escarpment face and in the arroyo. This project uses the SQW pond to detain the developed runoff before discharging the flow over a weir to a rip rap channel that routes the flow to the Tijeras Arroyo in a non-erosive manner. See the Grading and Drainage Plan in Appendix G.

When the Tijeras Arroyo was studied for the 1990 DMP, the 100yr flow at the point of the project site's outfall was 22,600cfs. The recommendations for the management of the Tijeras Arroyo were based on this flow. Since this report, additional analysis by FEMA (Flood Insurance Study) calculated the actual 100yr flow to be 18,065cfs. In addition land development projects in this part of the Tijeras Arroyo Watershed are not required to limit the peak rates of the runoff because that would delay the peak flow from the development causing it to add directly to the much slower upstream peak. Based on this information, this project has no significant adverse impact to the overall management plan of the Tijeras Arroyo.

8. Survey

The existing conditions as shown on the plans were surveyed by Aldrich Land Surveying, August 2012.

9. Benchmark

AGRS Monument "5-M22" Elevation = 5594.518 (NGVD29)

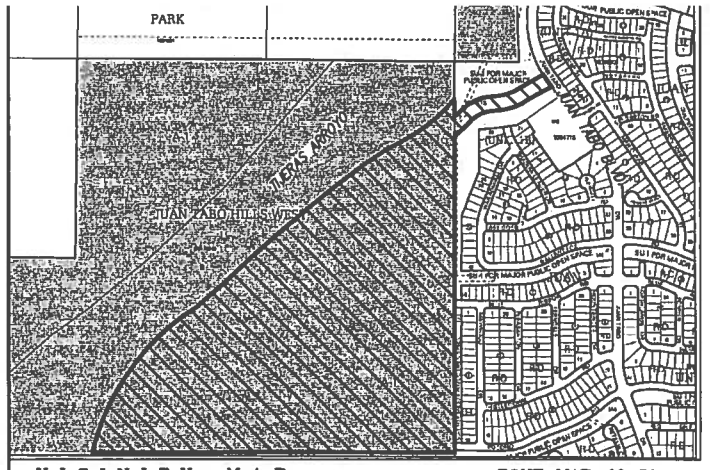
10. References

1. *Tijeras Arroyo Drainage Management Plan, Phase II*, Leedshill-Herkenhoff Inc., August 1990.

2. *Facility Plan for Arroyos, Multiple Use of Albuquerque's Arroyos and Their Flood Plain,* City of Albuquerque, New Mexico, August 1985.

3. *Investigation of Lower Tijeras Arroyo flow Capacities*, Resource Technologies, Inc. March 2008.

Appendix A: Basin Boundary Maps



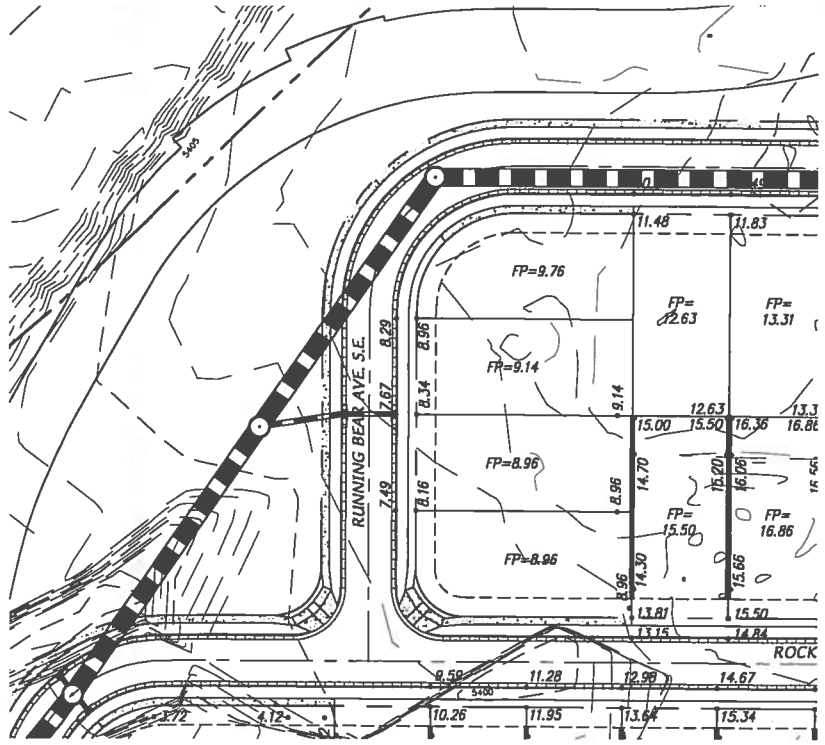
VICINITY MAP ZONE MAP: M-21

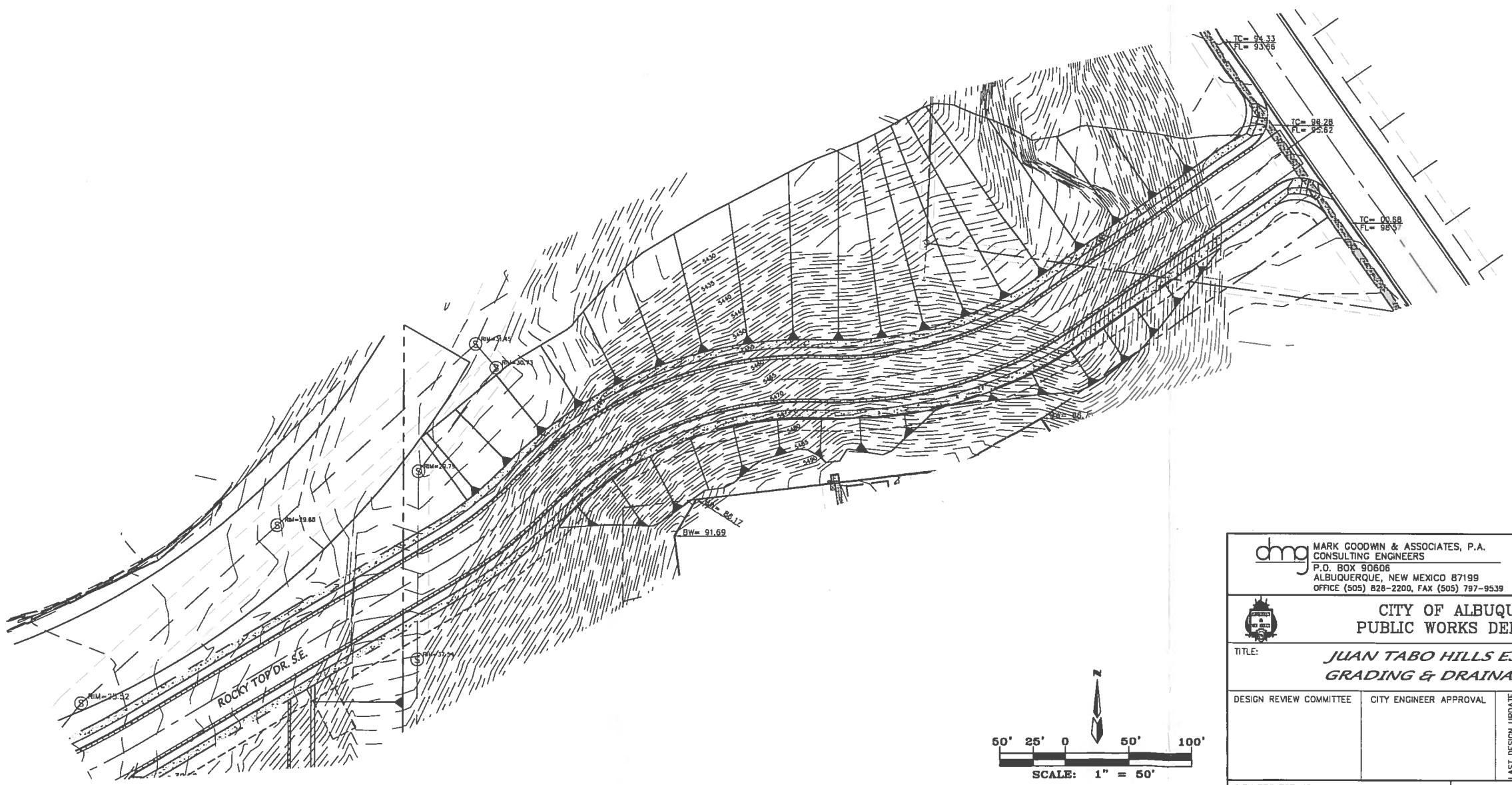
LEGEND

- EXIST. HANDRAIL
- EXIST. CONCRETE CURB
- EXIST. CONCRETE/SIDEWALK
- EXIST. WALL OR HEAD WALL
- TC= / FL= EXIST. TOP CURB/FLOWLINE
- x 00.00 EXIST. SPOT ELEV.
- EXIST. BOLLARD
- EXIST. BENCH
- EXIST. CONDUIT
- EXIST. CABLE MARKER/ T.V. PEDESTAL
- EXIST. DROP INTEL
- EXIST. ELECTRIC SERVICE/PEDESTAL
- EXIST. ELECTRIC TRANSFORMER
- EXIST. ELECTRIC METER
- EXIST. FIRE HYDRANT
- EXIST. GAS VALVE
- EXIST. GAS MARKER
- EXIST. GAS METER
- EXIST. GUY WIRE
- EXIST. FIBER OPTIC MARKER
- EXIST. IRRIGATION MANHOLE
- EXIST. MONITOR WELL
- —E— EXIST. OVERHEAD ELECTRIC
- EXIST. POWER POLE
- EXIST. PETRO PIPELINE MARKER
- EXIST. POST
- EXIST. SIGN
- EXIST. SANITARY SEWER MANHOLE
- EXIST. STORM DRAIN MANHOLE
- EXIST. SPRINKLER CONTROL VALVE
- EXIST. TRAFFIC SIGNAL
- EXIST. TREE
- EXIST. TELEPHONE PEDESTAL
- EXIST. UTILITY PULLBOX
- EXIST. EG TELEPHONE MARKER
- EXIST. UG GAS MARKER
- EXIST. WATER SPIGOT
- EXIST. WATER MANHOLE
- EXIST. WATER VALVE
- EXIST. WATER METER
- • 29.29 NEW SPOT ELEVATIONS
- 5390 NEW CONTOUR (MAJOR)
- 5386 NEW CONTOUR (MINOR)
- NEW BOUNDARY LINE
- NEW RIGHT-OF-WAY LINE
- NEW LOT LINE
- NEW CENTERLINE
- NEW EASEMENT
- NEW STANDARD CURB & GUTTER
- NEW MOUNTABLE CURB & GUTTER
- NEW SIDEWALK
- NEW RETAINING WALL THIS PROJECT
- NEW RETAINING WALL DEFERRED TO THE HOME BUILDERS

GRADING NOTES:

1. THE CONTRACTOR(S) MUST COMPLY WITH NPDES TEMPORARY CONSTRUCTION REQUIREMENTS AND OBTAIN A PERMIT. CONTRACTOR SHALL ALSO PROVIDE A COPY OF THE APPLICATION FOR PERMIT AND NOTICE OF TERMINATION TO THE OWNER.
2. THE CONTRACTOR(S) IS RESPONSIBLE FOR PREPARING AND MAINTAINING A SWPPP FOR THE DURATION OF INFRASTRUCTURE CONSTRUCTION AND UNTIL THE CITY OF ALBUQUERQUE ACCEPTS THE PUBLIC INFRASTRUCTURE. CONTRACTOR SHALL PROVIDE THE OWNER WITH A COPY OF THE SWPPP AT THE BEGINNING OF THE PROJECT AND AT THE TIME OF NOTICE OF TERMINATION.
3. THE CONTRACTOR(S) IS RESPONSIBLE FOR CONSTRUCTING AND MAINTAINING EROSION CONTROLS FOR THE DURATION OF THE CONSTRUCTION OF THE PUBLIC INFRASTRUCTURE AND FOR THE REMOVAL OF THE EROSION CONTROLS WHERE DIRECTED TO DO SO BY THE OWNER AT THE TIME OF NOTICE OF TERMINATION.
4. THE CONTRACTOR IS RESPONSIBLE FOR CONSTRUCTION STAKING AND IS TO PROVIDE AN AS-BUILT SURVEY CERTIFIED BY A REGISTERED PROFESSIONAL SURVEYOR TO THE OWNER UPON COMPLETION OF THE CONSTRUCTION. THE EARTHWORK CONTRACTOR IS TO PROVIDE EARTHWORK SURVEY, AND THE WALL BUILDER IS TO PROVIDE WALL SURVEY.
5. EARTHWORK CONTRACTOR SHALL PREPARE ROUGH SUBGRADE FOR THE RETAINING WALL CONSTRUCTION AND PROVIDE SUFFICIENT BACKFILL MATERIAL STOCKPILED ON THE HIGH SIDE OF EACH WALL FOR THE WALL BUILDER TO COMPLETELY BACKFILL THE WALLS.
6. RETAINING WALLS ARE SHOWN FOR GRADING PURPOSES ONLY. RETAINING WALL DESIGN IS TO BE PERFORMED BY OTHERS, AND SHALL BE SUBMITTED TO THE CITY OF ALBUQUERQUE FOR REVIEW, APPROVAL, PERMIT, AND INSPECTION
7. EARTHWORK CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL INVESTIGATION BY GEOTEST, INC. DATED JUNE 29, 2012.
8. TOPOGRAPHIC AND BOUNDARY SURVEY ARE BY ALDRICH LAND SURVEYING NOVEMBER 2011.
9. BENCHMARK USED IS AGRS BRASS CAP STAMPED "7-M21" HAVING AN ELEVATION OF 5498.07 (NGVD29).
10. FEMA SPECIAL FLOOD HAZARD ZONE ON THIS PROPERTY AS SHOWN ON CASE NO. 13-06-1053P EFFECTIVE JUNE 17, 2013.





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AS BUILT INFORMATION

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	WORK PERFORMED BY	DATE
	INSPECTION'S ACCEPTANCE BY	DATE
	AS-BUILT VERIFICATION BY	DATE
	DRAWINGS CORRECTED BY	DATE

BENCH MARKS

STATION "5-M22" IS LOCATED 0.7 MI. SE OF DOWNTOWN ALBUQUERQUE ON THE EAST SIDE OF THE MUNICIPAL LIMITS LINE IN THE FOUR HILLS SUBDIVISION AREA. STATION IS 600 FT. EAST OF MUNICIPAL LIMITS LINE, 77.9' SE OF POWER POLE #2537 & 186.0' NW OF POWER POLE #60. STATION IS A STANDARD AGS BRASS DISK SET IN A CONCRETE MONUMENT IN THE GROUND. STATION IS STAMPED "5-M22, 1975AGS". MICRO-FILM INFORMATION

SURVEY INFORMATION

FIELD NOTES

NO.	BY	DATE

ENGINEER'S SEAL

NO.	DATE	REMARKS	BY
		REVISIONS	
		DESIGN	

DESIGNED BY

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CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT

TITLE: JUAN TABO HILLS ESTATES
GRADING & DRAINAGE PLAN

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

CITY PROJECT NO. | ZONE MAP NO. M-21-Z | SHEET 1 OF

SANDIA SUNSET AVE. S.E.

ROCKY TOP DRIVE

DUKE CITY ST. S.E.

POPEJOY ST. S.E.

RODEY AVE. N.E.

SUNSET ST. S.E.

SCALE: 1" = 50'

50' 25' 0 50' 100'

CITY OF ALBUQUERQUE
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dmg
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CITY PROJECT NO.

ZONE MAP NO. M-21-Z

SHEET 2 OF

DESIGN REVIEW COMMITTEE

CITY ENGINEER APPROVAL

LAST DESIGN UPDATE

MO./DAY/YR.

MO./DAY/YR.

NO.	DATE	REMARKS	BY
		REVISIONS	
		DESIGN	

DESIGNED BY KDH DATE 06/14

ENGINEER'S SEAL

SURVEY INFORMATION

FIELD NOTES

NO.	BY	DATE

BENCH MARKS

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AS BUILT INFORMATION

CONTRACTOR

WORK STAKED BY DATE

INSPECTOR'S ACCEPTANCE BY DATE

FIELD VERIFICATION BY DATE

DRAWINGS CORRECTED BY DATE

MICRO-FILM INFORMATION

RECORDED BY DATE

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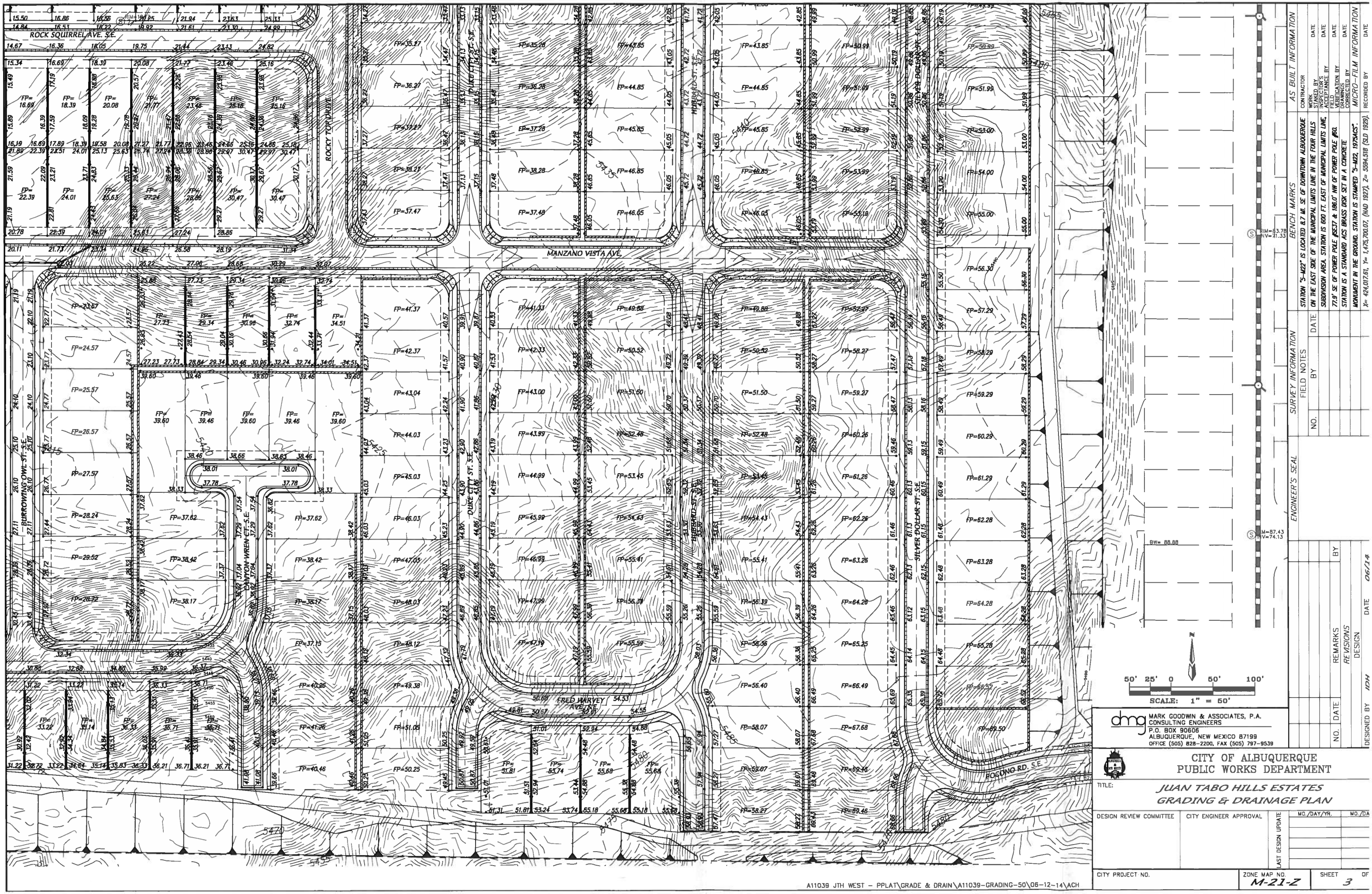

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MICRO-FILM INFORMATION

RECORDED BY — DATE

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NO.	DATE	REMARKS	BY
		REVISIONS	
		DESIGN	

DESIGNED BY JDH — DATE 06/14

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CITY PROJECT NO.	ZONE MAP NO.	SHEET	OF
	M-21-Z	3	

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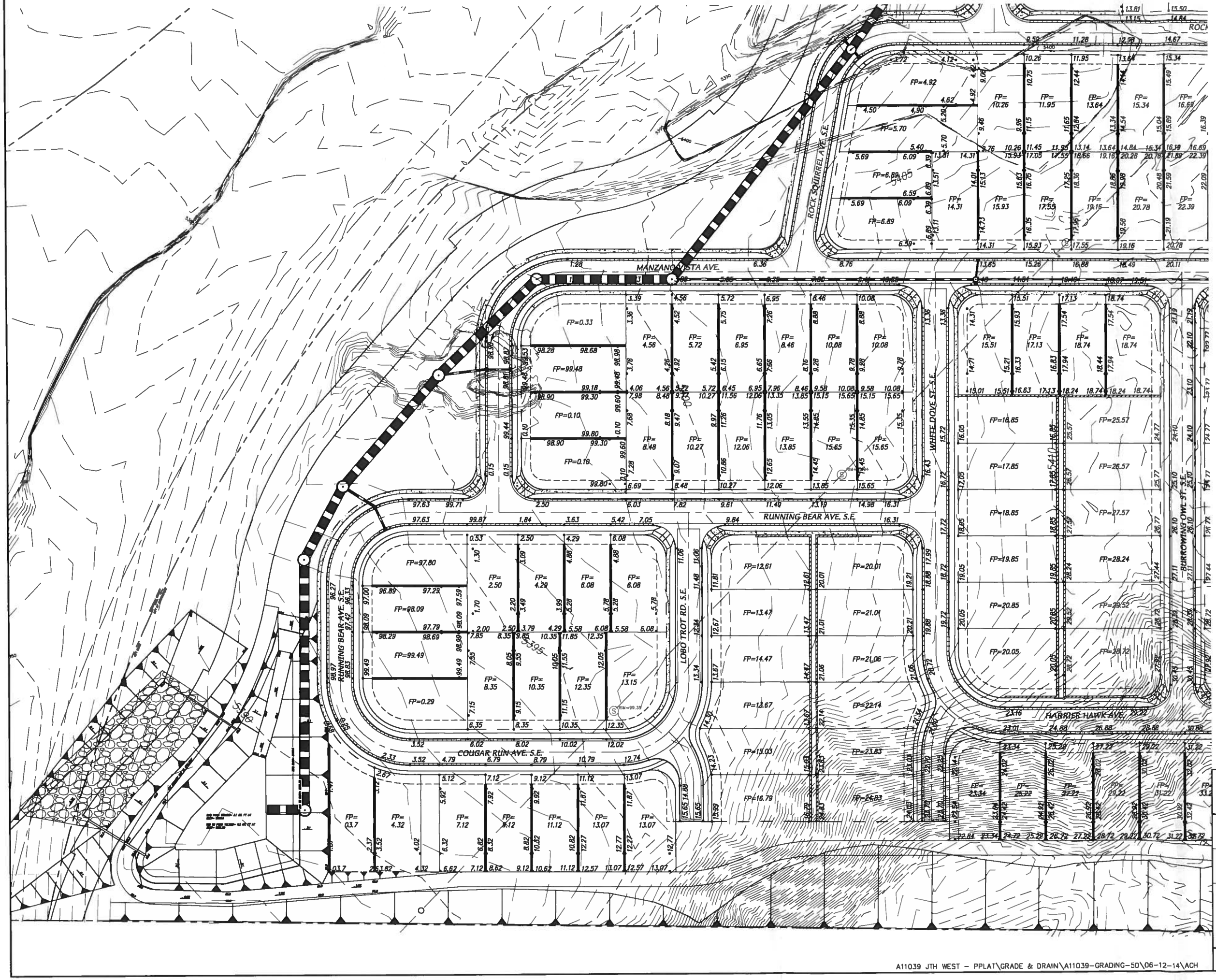

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AS BUILT INFORMATION

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INSPECTOR'S ACCEPTANCE BY — DATE

FIELD VERIFICATION BY — DATE

DRAWING CORRECTED BY — DATE

MICRO-FILM INFORMATION

RECORDED BY — DATE

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		REVISIONS	
		DESIGN	

N

50' 25' 0 50' 100'

SCALE: 1" = 50'

dmg
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CITY PROJECT NO.

ZONE MAP NO. M-21-Z

SHEET 4

A11039 JTH WEST – PPLAT\GRADE & DRAIN\A11039-GRADING-50\06-12-14\ACH

Volume File ⟶ JTHE Scale (ft/in) ⟶ 1 Screen No. 1

Title: Juan Tabo Hills Estates Storm Water Quality Pond

Elevation (ft)	Planimeter (sq.in.)	Area (acres)	Incremental Volume (acres) (A1+A2)*(E1-E2)/2	Volume (acre-ft)	Volume (acre-ft)
88	5877	0.13	0.00	0.00	0.00
90	22297	0.52	0.72	3.06	3.06
92	26837	0.64	1.16	1.12	4.20

HYDROLOGY SUMMARY TABLE

AHYMO BASIN ID	SUB-BASIN ID	AREA (Ac)	AREA (Sq mi)	Ground Cover (%) A	B	C	D	Peak 100-YR Flow Q_{100} (cfs) Incremental	Surface	Water Quality Volume (Ac-Ft) Inc	Location	Sub Total
100		89.10	0.13922	8	18	35	39	328.22		1.3218	Four Hills	1.3218
	100.1	ROUTED in 54" pipe						327.86				
101		66.80	0.10438	0	19	39	42	282.50	0.00	1.0755	Juan Tabo Hills	1.0755
200		9.00	0.01406	0	20	40	40	37.61	0.00	0.1380	**Four Hills**	**1.4598**
201		76.30	0.01828	100	0	0	0	27.64	11.64	0.0000	**Kirtland**	**0.0000**
203		42.50	0.06641	0	22	45	33	172.59		0.5376	Juan Tabo Hills	1.6131
300		22.30	0.03484	0	14	29	57	99.75		0.4873	**Juan Tabo Hills**	**2.1004**
400		77.70	0.12141	0	9	41	50	343.61		1.4893	**JTH Estates**	**1.4893**
											Total	**5.0494**

BERNALILLO COUNTY
CITY OF ALBUQUERQUE
CITY LIMITS
170' PRIMARY 100 YR SPILLWAY
SWQ POND VOLUME= 3.1 AC. FT AT ELEV= 5390.0
100 YR POND VOLUME= 4.2 AC. FT AT ELEV= 5391.99
SWQ ELEV= 5390.0
100 YR ELEV= 5391.99
RUNNING BEAR AVE. S.E.
FP=98.09
FP=99.49
FP=0.29
FP= 03.7
FP= 4.32
SCALE: 1" = 50'

A11039 JTH WEST – PPLAT\GRADE & DRAIN\A11039-GRADING-50\06-12-14\ACH

AS BUILT INFORMATION
CONTRACTOR
WORK STAKED BY — DATE
INSPECTOR'S ACCEPTANCE BY — DATE
FIELD VERIFICATION BY — DATE
DRAWINGS CORRECTED BY — DATE
MICRO-FILM INFORMATION — DATE

BENCH MARKS
STATION "5-A22" IS LOCATED 8.7 MI. SE OF DOWNTOWN ALBUQUERQUE ON THE EAST SIDE OF THE MUNICIPAL LIMITS LINE IN THE FOUR HILLS SUBDIVISION AREA. STATION IS 600 FT. EAST OF MUNICIPAL LIMITS LINE. 77.9' SE OF POWER POLE #5637 & 186.0' NW OF POWER POLE #60. STATION IS A STANDARD ACS BRASS DISK SET IN A CONCRETE MONUMENT IN THE GROUND. STATION IS STAMPED "5-A22, 1975ACS". Ye= 494 017.61 Xe= 1 475 780.07 (NAD 1927) Ze= 5594.508 (GD 1929)

SURVEY INFORMATION
FIELD NOTES
NO. | BY | DATE

ENGINEER'S SEAL

REMARKS / REVISIONS / DESIGN — NO. | BY | DATE

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ALBUQUERQUE, NEW MEXICO 87199
OFFICE (505) 828-2200, FAX (505) 797-9539

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT

TITLE: JUAN TABO HILLS ESTATES GRADING & DRAINAGE PLAN POND DETAIL

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

CITY PROJECT NO. | ZONE MAP NO. M-21-Z | SHEET 5 OF

Table 1: HYDROLOGY SUMMARY TABLE

AHYMO BASIN ID	Location	AREA (Ac)	AREA (Sq mi)	Ground Cover (%) A	B	C	D	Q_{100} (cfs) Increment	Water Quality Volume (Ac-Ft) Increment	Sub Total
100	Four Hills	89.10	0.13922	8	18	35	38.7	328.22	1.3218	1.3218
101	Juan Tabo Hills	66.80	0.10438	0	19	39	42	262.50	1.0755	1.0755
200	Four Hills	9.00	0.01406	0	20	40	40	37.61	0.1380	**1.4898**
201	Kirtland	76.30	0.01828	100	0	0	0	27.64	0.0000	**0.0000**
203	Juan Tabo Hills	42.50	0.06641	0	22	45	33	172.59	0.5376	1.6131
300	Juan Tabo Hills	22.30	0.03484	0	14	29	57	99.75	0.4873	**2.1004**
400	JTH Estates	77.70	0.12141	0	9	41	50	343.61	1.4893	**1.4893**
TOTALS:		383.70	0.50					1291.92		5.05

LEGEND

- AHYMO BASIN BOUNDARY
- SUB-BASIN BOUNDARY
- NEW RCP STORM DRAIN
- (400) AHYMO BASIN NUMBER

N

500' 250' 0 500' 1000'

SCALE: 1" = 500'

ENGINEER'S SEAL

SURVEY INFORMATION

FIELD NOTES

NO.	BY	DATE

BENCH MARKS

STATION "5-M22" IS LOCATED 8.7 MI. SE OF DOWNTOWN ALBUQUERQUE ON THE EAST SIDE OF THE MUNICIPAL LIMITS LINE IN THE FOUR HILLS SUBDIVISION AREA. STATION IS 600 FT. EAST OF MUNICIPAL LIMITS LINE, 77.9' SE OF POWER POLE #3637 & 186.0' NW OF POWER POLE #80. STATION IS A STANDARD ACS BRASS DISK SET IN A CONCRETE MONUMENT IN THE GROUND. STATION IS STAMPED "5-M22, 1975ACS". X= 474,017.61, Y= 1,475,700.07, (NAD 1927), Z= 5594.518 (SEA 1929)

AS BUILT INFORMATION

CONTRACTOR

WORK STAKED BY ____ DATE

INSPECTOR'S ACCEPTANCE BY ____ DATE

FIELD VERIFICATION BY ____ DATE

DRAWING CORRECTED BY ____ DATE

MICRO-FILM INFORMATION

RECORDED BY ____ DATE

NO.	DATE	REMARKS	BY
		REVISIONS	
		DESIGN	

dmg MARK GOODWIN & ASSOCIATES, P.A.
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CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT

TITLE: JUAN TABO HILLS ESTATES
DRAINAGE BASIN MAP

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

CITY PROJECT NO

ZONE MAP NO. M-21-Z

SHEET 6 OF

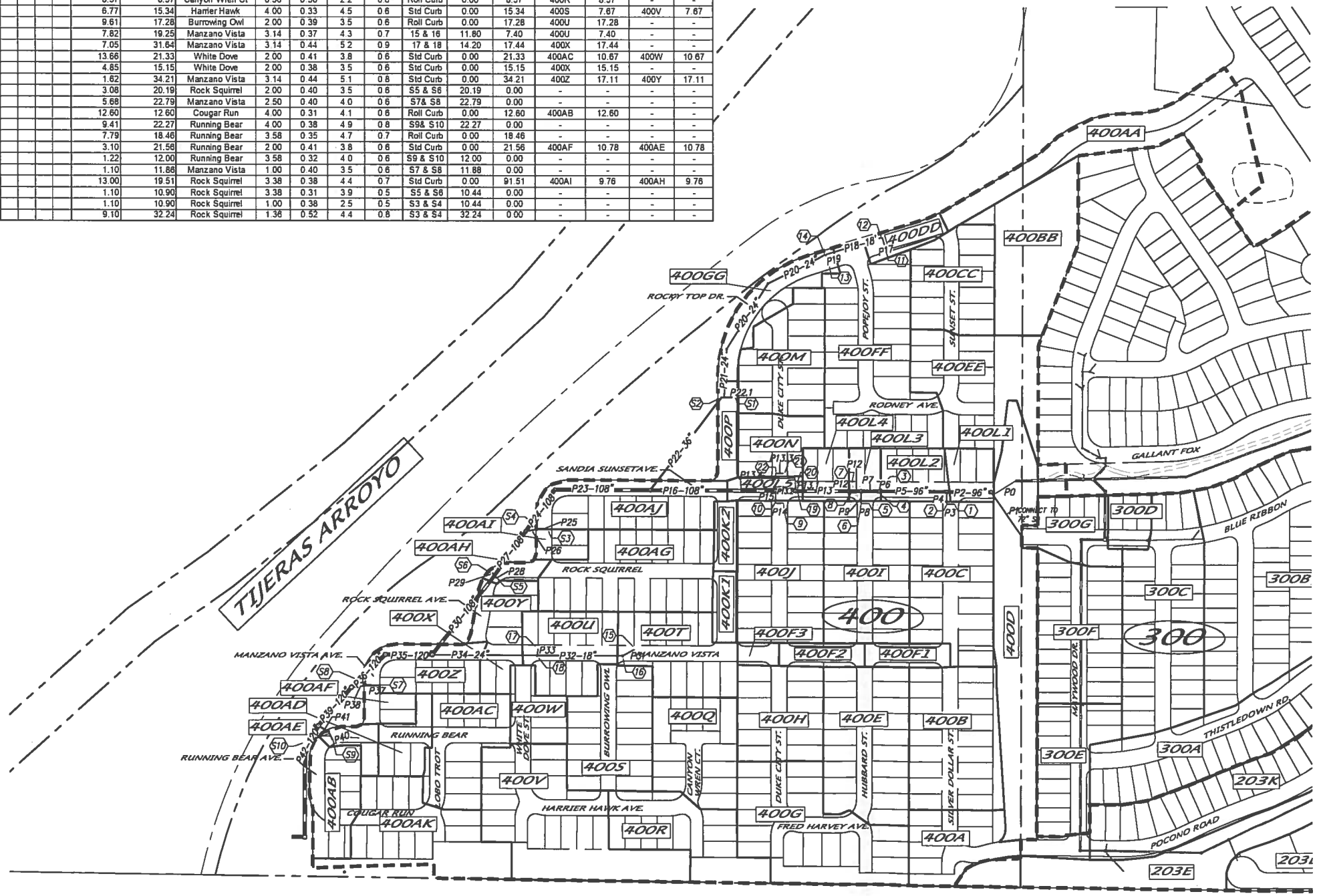
A11039 JTH WEST – PPLAT/GRADE N DRAIN/BASIN MAP/A11039-DRAINAGE-BASIN/07-18-14/ACH

HYDROLOGY SUMMARY TABLE

AHYMO BASIN ID	SUB-BASIN ID	AREA (Ac)	AREA (Sq mi)	Ground Cover (%) A	B	C	D	Peak 100-YR Flow Q_{100} (cfs) Incremental	Surface	Location	Street flows Slope (%)	Depth (ft)	Velocity (fps)	Energy (ft)	Inlet Calcs Inlet ID #	Intercepted (cfs)	By-pass (cfs)	Split Flows Path 1 Downstrm ID	Path 1 Flow (cfs)	Path 2 Downstrm ID	Path 2 Flow (cfs)
400		77.70	0.12141	0	9	41	50	343.61													
	400AA	2.80						12.70	12.70	Rocky Top	8.00	0.29	5.5	0.8	Std Curb	0.00	12.70	400DD	12.70		
	400BB	2.13						9.42	9.42	trail	-	-	-	-	-	-	-	400DD	9.42	-	-
	400CC	2.06						9.10	9.10	Sunset St	3.60	0.29	3.8	0.5	Roll Curb	0.00	9.10	400DD	9.10	-	-
	400DD	0.44						1.95	33.17	Sunset St	2.15	0.05	4.5	0.4	11&12	11.80	21.37	400FF	21.37	-	-
	400EE	2.87						12.70	12.70	Sunset St	1.00	0.04	2.5	0.1	Roll Curb	0.00	12.70	400FF	12.70	-	-
	400FF	4.05						17.87	(30.57)	Popejoy	3.52	0.52	4.1	0.8	Std Curb	-	-	-	-	-	-
									51.94	Rockytop	1.25	0.58	4.7	0.9	13 &14	16.00	35.97	400GG	35.97		
	400GG	1.16						5.14	41.11	Rocky Top	1.25	0.55	sump	sump	SUMP 1&2	41.11	0.00	-	-	-	-
	400A	1.90						8.34	17.57	Silver Dollar St	2.00	0.40	3.6	0.6	Roll Curb	0.00	17.57	400B	17.57	-	-
	400B	2.98						12.67	30.24	Silver Dollar St	2.00	0.35	4.4	0.7	Std Curb	0.00	30.24	400F1	15.12	400C	15.12
	400C	2.78						12.26	27.39	Silver Dollar St	2.00	0.45	4.1	0.7	1 & 2	14.00	13.90	400L2	13.90	-	-
	400D	3.86						17.04	17.04	Eastern Bndry	-	-	-	-	-	0.00	17.04	400L1	17.04	-	-
	400L1	0.39						1.70	18.74	Sandia Sunset	1.00	0.43	2.8	0.6	Std Curb	0.00	18.74	400L2	18.74	-	-
	400L2	0.98						4.30	36.45	Sandia Sunset	3.24	0.45	4.6	0.8	3 & 4	15.80	20.65	400L3	20.85	-	-
	400L3	0.39						1.73	36.90	Sandia Sunset	3.24	0.46	5.5	0.9	7 & 8	16.40	20.50	400L4	20.50	-	-
	400L4	0.88						3.79	24.29	Sandia Sunset	3.24	0.39	4.8	0.7	19&20	11.80	12.49	400L5	12.49	-	-
	400L5	0.22						0.10	38.18	Sandia Sunset	3.24	0.45	5.4	0.9	Std Curb	0.00	56.98	400 AJ	19.09	400P	19.09
	400E	3.10						13.70	13.70	Hubbard	2.00	0.36	3.4	0.5	Roll Curb	0.00	13.70	400F2	6.85	400I	6.85
	400F1	0.45						1.98	17.10	Manzano Vista	3.24	0.36	4.3	0.6	Std Curb	0.00	17.10	400F2	8.55	400I	8.55
	400F2	0.46						2.03	17.43	Manzano Vista	3.24	0.36	4.3	0.6	Std Curb	0.00	17.43	400F3	8.72	400J	8.72
	400F3	0.26						1.14	22.86	Manzano Vista	3.14	0.40	4.5	0.7	Std Curb	0.00	22.86	400K1	11.43	400T	11.43
	400G	4.05						17.87	17.87	Duke City	2.00	0.40	3.6	0.6	Std Curb	0.00	17.87	400H	17.87	-	-
	400H	1.86						8.21	26.08	Duke City	2.00	0.40	5.0	0.8	Std Curb	0.00	26.08	400F3	13.04	400J	13.04
	400I	2.79						12.30	27.70	Hubbard	4.00	0.40	5.0	0.8	5 & 6	13.20	14.50	400L3	14.50	-	-
	400J	2.79						12.30	34.06	Duke City	4.00	0.42	5.4	0.9	9 & 10	15.60	18.46	400L5	18.46	-	-
	400K1	0.36						1.59	13.02	Rocky Top	2.40	0.35	3.4	0.5	Std Curb	0.00	13.02	400K2	6.51	400AG	6.51
	400K2	0.36						1.59	8.10	Rocky Top	4.38	0.29	3.9	0.5	Std Curb	0.00	8.10	400P	4.05	400AJ	4.05
	400M	1.83						8.10	8.10	Duke City	0.50	0.39	1.9	0.4	Roll Curb	0.00	8.10	400N	8.10	-	-
	400N	1.16						5.13	14.13	Duke City	0.50	0.44	2.0	0.5	21&22	7.00	7.13	400L5	7.13	-	-
	400P	0.44						1.98	21.07	Rocky Top	1.70	0.38	4.5	0.7	S1 & S2	21.07	0.00	-	-	-	-
	400Q	1.93						8.57	8.57	Canyon Wren Ct	0.50	0.50	2.2	0.6	Roll Curb	0.00	8.57	400R	8.57	-	-
	400R	1.50						6.77	15.34	Harrier Hawk	4.00	0.33	4.5	0.6	Std Curb	0.00	15.34	400S	7.67	400V	7.67
	400S	2.17						9.61	17.28	Burrowing Owl	2.00	0.39	3.5	0.6	Roll Curb	0.00	17.28	400U	17.28	-	-
	400T	1.77						7.82	19.25	Manzano Vista	3.14	0.37	4.3	0.7	15 & 16	11.80	7.40	400U	7.40	-	-
	400U	1.80						7.05	31.64	Manzano Vista	3.14	0.44	5.2	0.9	17 & 18	14.20	17.44	400X	17.44	-	-
	400V	3.09						13.66	21.33	White Dove	2.00	0.41	3.8	0.6	Std Curb	0.00	21.33	400AC	10.67	400W	10.67
	400W	1.10						4.85	15.15	White Dove	2.00	0.38	3.5	0.6	Std Curb	0.00	15.15	400X	15.15	-	-
	400X	0.37						1.62	34.21	Manzano Vista	3.14	0.44	5.1	0.8	Std Curb	0.00	34.21	400Z	17.11	400Y	17.11
	400Y	0.70						3.08	20.19	Rock Squirrel	2.00	0.40	3.5	0.6	S5 & S6	20.19	0.00	-	-	-	-
	400Z	1.29						5.68	22.79	Manzano Vista	2.50	0.40	4.0	0.6	S7& S8	22.79	0.00	-	-	-	-
	400AK	2.86						12.60	12.60	Cougar Run	4.00	0.31	4.1	0.6	Roll Curb	0.00	12.60	400AB	12.60	-	-
	400AB	2.13						9.41	22.27	Running Bear	4.00	0.38	4.9	0.8	S9& S10	22.27	0.00	-	-	-	-
	400AC	1.76						7.79	18.46	Running Bear	3.58	0.35	4.7	0.7	Roll Curb	0.00	18.46	-	-	-	-
	400AD	0.70						3.10	21.56	Running Bear	2.00	0.41	3.8	0.6	Std Curb	0.00	21.56	400AF	10.78	400AE	10.78
	400AE	0.28						1.22	12.00	Running Bear	3.58	0.32	4.0	0.6	S9 & S10	12.00	0.00	-	-	-	-
	400AF	0.25						1.10	11.88	Manzano Vista	1.00	0.40	3.5	0.6	S7 & S8	11.88	0.00	-	-	-	-
	400AG	2.93						13.00	19.51	Rock Squirrel	3.38	0.38	4.4	0.7	Std Curb	0.00	91.51	400AI	9.76	400AH	9.76
	400AH	0.24						1.10	10.90	Rock Squirrel	3.38	0.31	3.9	0.5	S5 & S6	10.44	0.00	-	-	-	-
	400AI	0.24						1.10	10.90	Rock Squirrel	1.00	0.38	2.5	0.5	S3 & S4	10.44	0.00	-	-	-	-
	400AJ	2.06						9.10	32.24	Rock Squirrel	1.38	0.52	4.4	0.8	S3 & S4	32.24	0.00	-	-	-	-

LEGEND

- AHYMO BASIN BOUNDARY
- SUB-BASIN BOUNDARY
- NEW RCP STORM DRAIN
- (400) AHYMO BASIN NUMBER
- 400Q SUB-BASIN NUMBER
- (15) NEW INLET NUMBER
- (51) EXISTING INLET NUMBER
- P1 NEW RCP PIPE NUMBER



SEE SHEET 8 OF 8

Storm Drain System Design

STREET NAME	INLET #	PIPE #	SLOPE %	Q IN PIPE (cfs)	PIPE DIA Based on Velocity	AREA of PIPE	VELOCITY (ft/sec)
Blue Ribbon	TD						
		P1	2.00	24.89	24	3.14	7.92
Gallant Fox		Existing	2.12	848.57	84	38.48	22.05
		P2	3.42	890.50	96	50.27	17.72
Sandia Sunset	1	P3	2.00	7.00	18	1.77	3.96
Sandia Sunset	2	P4	2.00	14.00	18	1.77	7.92
Sandia Sunset		P5	3.42	904.50	96	50.27	17.99
Sandia Sunset	3	P6	2.00	7.90	18	1.77	4.47
Sandia Sunset	4	INLET		7.90			
Sandia Sunset		P7	3.42	920.30	108	63.62	14.47
Sandia Sunset	5	P8	2.00	6.60	18	1.77	3.73
Sandia Sunset	6	P9	2.00	13.20	18	1.77	7.47
Sandia Sunset		P10	3.42	933.50	108	63.62	14.67
Sandia Sunset	7	P12	2.00	8.20	18	1.77	4.64
Sandia Sunset	8	INLET		8.20			
Sandia Sunset		P13	3.42	949.90	108	63.62	14.93
Sandia Sunset	19	P13.1	2.00	5.90	18	1.77	3.34
Sandia Sunset	20	INLET	3.45	5.90			
Sandia Sunset		P13.2	3.45	961.70	108	63.62	15.12
Duke City	21	P13.3	0.50	3.50	18	1.77	1.98
Duke City	22	P13.4	0.50	7.00	18	1.77	3.96
Sandia Sunset	9	P14	2.00	6.80	18	1.77	3.73
Sandia Sunset	10	P15	2.00	13.20	18	1.77	7.47
Sandia Sunset		P16	3.42	981.90	108	63.62	15.43
Rocky Top	11	P17	1.50	5.90	18	1.77	3.34
Rocky Top	12	INLET		5.90			
Rocky Top		P18	2.00	11.80	18	1.77	6.68
Rocky Top	13	P19	2.00	8.00	18	1.77	4.53
Rocky Top	14	INLET		8.00		0.00	
Rocky Top		P20	1.25	27.80	24	3.14	8.85
Rocky Top		P21	2.15	27.80	24	3.14	8.85
Rocky Top	S1	P22.1	2.00	31.09	30	4.91	6.33
Rocky Top	S2	SUMP		31.09			
parallel to arroyo		P22	3.70	89.98	36	7.07	12.73
Manzano Vista		P23	1.36	1071.88	108	63.62	16.85
parallel to arroyo		P24	1.00	1071.88	108	63.62	16.85
parallel to arroyo	S3	P25	2.00	21.34	24	3.14	6.79
parallel to arroyo	S4	P26	2.00	42.68	30	4.91	8.69
parallel to arroyo		P27	1.00	1114.56	108	63.62	17.52
parallel to arroyo	S5	P28	2.00	15.55	24	3.14	4.95
parallel to arroyo	S6	P29	2.00	15.55	24	3.14	4.95
Manzano Vista		P30	1.00	1145.68	108	63.62	18.01
Manzano Vista	15	P31	2.00	7.80	18	1.77	4.41
Manzano Vista	16	INLET		7.80			
Manzano Vista		P32	3.14	15.60	18	1.77	8.83
Manzano Vista	17	P33	2.00	7.10	18	1.77	4.02
Manzano Vista	18	INLET		7.10			
Manzano Vista		P34	3.14	29.80	24	3.14	9.49
Manzano Vista		P35	3.14	1175.46	120	78.54	14.97
parallel to arroyo		P36	1.00	1175.46	120	78.54	14.97
Manzano Vista	S7	P37	2.00	8.67	18	1.77	4.91
Manzano Vista	S8	P38	2.00	17.34	24	3.14	5.52
parallel to arroyo		P39	1.00	1192.80	120	78.54	15.19
Running Bear	S9	P40	2.00	17.14	24	3.14	5.46
Running Bear	S10	P41	2.00	34.27	30	4.91	6.98
outlet to pond		P42	1.00	1227.07	120	78.54	15.62

AS BUILT INFORMATION

CONTRACTOR — DATE
WORK STAKED BY
INSPECTED BY — DATE
FIELD DRAWINGS BY
FIELD VERIFICATION BY — DATE
DRAWINGS BY
CORRECTED BY — DATE

MICRO-FILM INFORMATION

RECORDED BY — DATE

BENCH MARKS

STATION "5-M22" IS LOCATED 0.7 MI. SE OF DOWNTOWN ALBUQUERQUE ON THE EAST SIDE OF THE MUNICIPAL LIMITS LINE IN THE FOUR HILLS SUBDIVISION AREA. STATION IS 600 FT. EAST OF MUNICIPAL LIMITS LINE, 77.9' SE OF POWER POLE #2637 & 186.0' NW OF POWER POLE #62. STATION IS A STANDARD ACS BRASS DISK SET IN A CONCRETE MONUMENT IN THE GROUND. STATION IS STAMPED "5-M22, 1975ACS". X= 424,017.61, Y= 1,475,700.07, (NAD 1927), Z= 5594.51ft (SID 1929).

SURVEY INFORMATION

FIELD NOTES

NO.	BY	DATE

ENGINEER'S SEAL

NO.	DATE	REMARKS	BY
		REVISIONS	
		DESIGN	JDH
		DATE	06/14

DESIGNED BY JDH

200 100 0 200 400
SCALE: 1" = 200'

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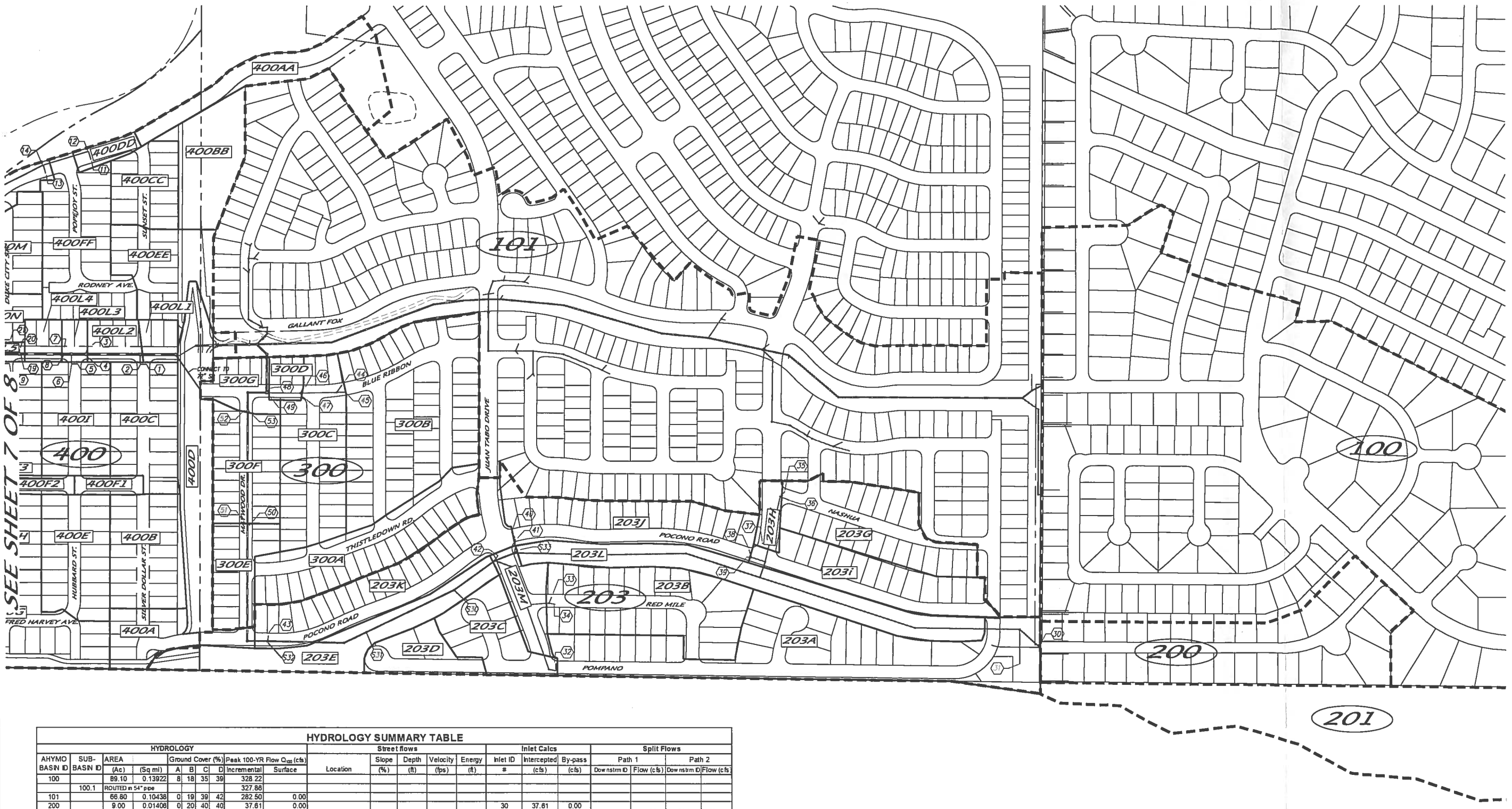
OFFICE (505) 828-2200, FAX (505) 797-9539

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT

TITLE: JUAN TABO HILLS ESTATES
ONSITE DRAINAGE BASIN MAP

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

CITY PROJECT NO. | ZONE MAP NO. M-21-Z | SHEET 7 OF



HYDROLOGY SUMMARY TABLE

HYDROLOGY										Street flows				Inlet Calcs			Split Flows			
AHYMO	SUB-	AREA		Ground Cover (%)				Peak 100-YR Flow Q_{100} (cfs)			Slope	Depth	Velocity	Energy	Inlet ID	Intercepted	By-pass	Path 1		Path 2	
BASIN ID	BASIN ID	(Ac)	(Sq mi)	A	B	C	D	Incremental	Surface	Location	(%)	(ft)	(fps)	(ft)	#	(cfs)	(cfs)	Downstrm ID	Flow (cfs)	Downstrm ID	Flow (cfs)
100		89.10	0.13922	8	18	35	39	328.22													
	100.1	ROUTED in 54" pipe						327.86													
101		66.80	0.10438	0	19	39	42	282.50	0.00												
200		9.00	0.01406	0	20	40	40	37.61	0.00						30	37.61	0.00				
201		76.30	0.01828	100	0	0	0	27.64	11.64						31	16.00	11.64	203A	11.64	PIPE	16.00
203		42.50	0.06641	0	22	45	33	172.59													
	203A	8.73						35.45	47.09	Pompano Pl SE	2.13	0.51	5.1	0.9	32	16.00	31.09	203M	15.54	203C	15.54
	203B	5.05						20.50	20.50	Red Mile	3.00	0.38	4.3	0.7	33 & 34	11.80	17.10	203M	17.10	-	-
	203C	2.19						8.89	16.66	Retama Ct	2.00	0.49	sump	sump	S30	16.66	0.00	-	-	-	-
	203D	1.40						5.90	13.67	Pompano Pl	4.00	0.40	sump	sump	S31	13.67	0.00	-	-	-	-
	203E	3.33						13.51	0.00	trail	-	-	sump	sump	S32	13.51	0.00	-	-	-	-
	203G	3.95						16.00	16.00	Nashua	3.00	0.36	4.0	0.6	35 & 36	9.80	6.20	203H	16.20	-	-
	203H	0.50						2.03	8.26	Timonium	1.40	0.40	3.0	0.5	37	5.10	3.16	203J	3.16	-	-
	203I	3.30						13.50	16.66	Pocono	2.00	0.39	3.5	0.6	38 & 39	13.60	3.06	203J	3.06	-	-
	203J	4.04						16.40	19.46	Pocono	4.00	0.36	4.5	0.7	40 & 41	14.00	5.46	203K	5.46	-	-
	203L	4.00						16.25	20.18	trail	-	-	sump	sump	S33	16.25	0.00	-	-	-	-
	203M	1.25						5.07	22.10	Juan Tabo Drive	1.00	0.58	4.0	0.8	42	9.80	12.30	203K	12.30		
	203K	4.40						17.90	35.66	Pocono	1.00	0.46	3.2	0.6	43	17.20	18.46	300E	9.23	400A	9.23
300		22.30	0.03484	0	14	29	57	99.75													
	300A	4.13						18.47	18.47	Thistledown Rd	3.00	3.50	4.0	3.7		0.00	17.47	300E	18.47	-	-
	300B	8.00						35.78	35.78	Blue Ribbon Rd	2.00	0.49	4.6	0.8	44 & 45	18.00	17.78	300C	17.78	-	-
	300C	3.96						17.70	35.50	Pleasanton Dr	1.88	0.49	4.5	0.8	46 & 47	18.00	17.50	300D	17.50	-	-
	300D	0.52						2.33	19.80	Blue Ribbon Rd	3.43	0.38	4.5	0.7	48 & 49	16.80	3.00	300G	3.00	-	-
	300E	1.84						8.21	35.91	Maywood Dr	1.00	0.51	3.7	0.7	50 & 51	15.20	20.71	300F	20.71	-	-
	300F	2.69						12.02	32.73	Maywood Dr	1.00	0.50	3.7	0.7	52 & 53	16.00	16.73	300G	16.73	-	-
	300G	1.15						5.16	24.89	Out To Basin 400	-	-	-	-		0.00	24.89	400.00	24.89	-	-

LEGEND

- AHYMO BASIN BOUNDARY
- SUB-BASIN BOUNDARY
- NEW RCP STORM DRAIN
- (400) AHYMO BASIN NUMBER
- [400Q] SUB-BASIN NUMBER
- (15) NEW INLET NUMBER
- (51) EXISTING INLET NUMBER
- P1 NEW RCP PIPE NUMBER

N

200' 100' 0 200' 400'

SCALE: 1" = 200'

A11039 JTH WEST – PPLAT/GRADE N DRAIN/BASIN MAP/A11039-DRAINAGE-BASIN/07-18-14/ACH

AS BUILT INFORMATION

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

MICRO-FILM INFORMATION

RECORDED BY ____ DATE ____

BENCH MARKS

STATION "S-422" IS LOCATED 8.7 MI. SE OF DOWNTOWN ALBUQUERQUE ON THE EAST SIDE OF THE MUNICIPAL LIMITS LINE IN THE FOUR HILLS SUBDIVISION AREA. STATION IS 600 FT. EAST OF MUNICIPAL LIMITS LINE, 77.9' SE OF POWER POLE #5637 & 186.0' NW OF POWER POLE #80. STATION IS A STANDARD AGS BRASS DISK SET IN A CONCRETE MONUMENT IN THE GROUND. STATION IS STAMPED "S-422, 1975AGS". Y= 424 017.61 X= 1 475 700.17 (NAD 1927) Z= 5594.518 (GVD 1929)

SURVEY INFORMATION

FIELD NOTES

NO.	BY	DATE

ENGINEER'S SEAL

NO.	DATE	REMARKS	BY
		REVISIONS	
		DESIGN	
		DRAWN	
		CHECKED	

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

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT

TITLE: JUAN TABO HILLS ESTATES OFF-SITE DRAINAGE SUB-BASINS 1

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

CITY PROJECT NO. ____ ZONE MAP NO. M-21-Z SHEET 8 OF

Appendix B: AHYMO

□(s16.67h8.5v0T□&l8D

AHYMO PROGRAM SUMMARY TABLE (AHYMO-S4) - Ver. S4.01a, Rel: 01a RUN DATE (MON/DAY/YR) =06/27/2014

INPUT FILE = y\Desktop\Juan Tabo Hills West\AHYMO IN S-4 100 yr Offsite Basins 6 hr 1.txt USER NO.= M-GoodwinNMSiteA90075759

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
START										TIME= 0.00
*S	JUAN TABO HILLS WEST OFFSITE BASINS 100-YR, 6-HR DEVELOPED									
LOCATION	ALBUQUERQUE									
RAINFALL TYPE= 1 NOAA 14										RAIN6= 2.600
COMPUTE NM HYD	100.00	-	1	0.13922	328.22	12.170	1.63898	1.570	3.684	PER IMP= 39.00
ROUTE MCUNGE	100.10	1	2	0.13922	327.86	12.168	1.63884	1.600	3.680	CCODE = 0.2
COMPUTE NM HYD	101.00	-	3	0.10438	282.50	9.518	1.70969	1.530	4.229	PER IMP= 42.00
ADD HYD	101.10	2& 3	4	0.24360	586.61	21.686	1.66920	1.570	3.763	
COMPUTE NM HYD	200.00	-	5	0.01406	37.61	1.265	1.68662	1.530	4.179	PER IMP= 40.00
COMPUTE NM HYD	201.00	-	7	0.01828	27.64	0.841	0.86305	1.540	2.363	PER IMP= 0.00
COMPUTE NM HYD	203.00	-	8	0.06641	172.59	5.704	1.61051	1.530	4.061	PER IMP= 33.00
COMPUTE NM HYD	300.00	-	9	0.03484	99.75	3.484	1.87498	1.530	4.474	PER IMP= 57.00
COMPUTE NM HYD	400.00	-	10	0.12141	343.61	11.783	1.81977	1.530	4.422	PER IMP= 50.00
FINISH										

□(s0p10h4099T□&l6D

```
                                AHYMO IN S-4 100 yr Offsite Basins 6 hr 1
START                 0.0 HRS  PUNCH CODE=0  PRINT LINES=-6
*******************************************************************************
*S                    JUAN TABO HILLS WEST OFFSITE BASINS 100-YR, 6-HR DEVELOPED CONDITIONS
LOCATION              ALBUQUERQUE
RAINFALL              TYPE=1  RAIN QUARTER=0.0  RAIN ONE=2.14
                      RAIN SIX=2.60      RAIN DAY=3.10      DT=.01
*******************************************************************************
*                                 Basin 100*
*******************************************************************************
COMPUTE LT TP         LCODE=1  NK=3  ISLOPE=-1
                      LENGTH=200 FT   SLOPE=0.051  K=0.7
                      LENGTH=1800 FT  SLOPE=0.051  K=1
                      LENGTH=3015 FT  SLOPE=0.036  K=3
                      KN=0.021        CENTROID DISTANCE = 3638 FT
*
COMPUTE NM HYD        ID=1 HYD=100 DA=0.13922 SQ MI
                      PER A=8 B=18 C=35 D=39
                      TP=0.0 HRS RAIN=-1
PRINT HYD             ID=1 CODE=1
*
COMPUTE RATING CURVE  CID=1  VS NO=101 CODE=-1 SLP =0.04
                      DIA=54 FT N=0.013
*
ROUTE MCUNGE          ID=2  HYD NO=100.1  INFLOW ID=1  DT=0.005
                      LENGTH=3420 FT  NS=0  SLOPE = 0.04
PRINT HYD             ID=2 CODE=1
*
*******************************************************************************
*                                 Basin 101*
*******************************************************************************
COMPUTE NM HYD        ID=3 HYD=101 DA=0.10438 SQ MI
                      PER A=0 B=19 C=39 D=42
                      TP=0.133333 HRS RAIN=-1
PRINT HYD             ID=3 CODE=1
*
*******************************************************************************
*                                 ADD BASINS 100 and 102 at AP5
*******************************************************************************
ADD HYD               ID=4 HYD=101.1 IDS= 2 & 3
*
*******************************************************************************
*                                 Basin 200*
*******************************************************************************
COMPUTE NM HYD        ID=5 HYD=200 DA=0.01406 SQ MI
                      PER A=0 B=20 C=40 D=40
                      TP=0.133333 HRS RAIN=-1
PRINT HYD             ID=5 CODE=1
*
*COMPUTE RATING CURVE  CID=1  VS NO=200 CODE=-1 SLP =0.036
*                      DIA=24 FT N=0.013
*
*ROUTE MCUNGE          ID=6  HYD NO=200.1  INFLOW ID=1  DT=0.005
*                      LENGTH=0000 FT  NS=0  SLOPE = 0.036
*PRINT HYD             ID=6 CODE=1
*******************************************************************************
*                                 Basin 201*
*******************************************************************************
COMPUTE LT TP         LCODE=1  NK=3  ISLOPE=-1
                      LENGTH=100 FT   SLOPE=0.056  K=0.7
                      LENGTH=2265 FT  SLOPE=0.056  K=1
                      LENGTH=5117 FT  SLOPE=0.047  K=3
                      KN=0.021        CENTROID DISTANCE = 7339.79 FT
*
COMPUTE NM HYD        ID=7 HYD=201 DA=0.01828 SQ MI
                      PER A=100 B=0 C=0 D=0
                      TP=0.133333 HRS RAIN=-1
PRINT HYD             ID=7 CODE=1
*
*******************************************************************************
*                                 Basin 203*
*******************************************************************************
COMPUTE NM HYD        ID=8 HYD=203 DA=0.06641 SQ MI
                      PER A=0 B=22 C=45 D=33
                      TP=0.133333 HRS RAIN=-1
```

```
PRINT HYD             ID=8 CODE=1
*
*******************************************************************************
*                                Basin 300*
*******************************************************************************
COMPUTE NM HYD        ID=9 HYD=300 DA=0.03484 SQ MI
                      PER A=0 B=14 C=29 D=57
                      TP=0.133333 HRS RAIN=-1
PRINT HYD             ID=9 CODE=1
*
*******************************************************************************
*                                Basin 400*
*******************************************************************************
COMPUTE NM HYD        ID=10 HYD=400 DA=0.12141 SQ MI
                      PER A=0 B=9 C=41 D=50
                      TP=0.133333 HRS RAIN=-1
PRINT HYD             ID=10 CODE=1
*
FINISH
```

□(s16.67h8.5v0T□&l8D

```
        AHYMO PROGRAM (AHYMO-S4)                    - Version: S4.01a - Rel: 01a
             RUN DATE (MON/DAY/YR) = 06/27/2014
             START TIME (HR:MIN:SEC) = 14:38:59     USER NO.= M-GoodwinNMSiteA90075759
             INPUT FILE = kelly\Desktop\Juan Tabo Hills West\AHYMO IN S-4 100 yr Offsite Basins 6 hr
1.txt

    START                0.0 HRS  PUNCH CODE=0  PRINT LINES=-6
□
    ********************************************************************************
    *S                   JUAN TABO HILLS WEST OFFSITE BASINS 100-YR, 6-HR DEVELOPED
    LOCATION             ALBUQUERQUE
         City of Albuquerque soil infiltration values (LAND FACTORS) used for computations.
         Land Treatment     Initial Abstr.(in)    Unif. Infilt.(in/hour)
               A            0.65                  1.67
               B            0.50                  1.25
               C            0.35                  0.83
               D            0.10                  0.04

    RAINFALL             TYPE=1  RAIN QUARTER=0.0  RAIN ONE=2.14
                         RAIN SIX=2.60      RAIN DAY=3.10      DT=.01

                    6-HOUR RAINFALL DIST. - BASED ON NOAA ATLAS 14 FOR CONVECTIVE AREAS (NM & AZ) - D1
                    DT =    0.010000 HOURS       END TIME =     6.000000 HOURS
                      0.0000  0.0006  0.0012  0.0018  0.0025  0.0031  0.0037
                      0.0043  0.0049  0.0056  0.0062  0.0069  0.0076  0.0083
                      0.0090  0.0096  0.0103  0.0110  0.0118  0.0125  0.0133
                      0.0141  0.0148  0.0156  0.0163  0.0171  0.0180  0.0188
                      0.0197  0.0206  0.0214  0.0223  0.0232  0.0240  0.0256
                      0.0274  0.0293  0.0312  0.0331  0.0349  0.0368  0.0387
                      0.0407  0.0428  0.0449  0.0470  0.0491  0.0512  0.0533
                      0.0554  0.0575  0.0598  0.0621  0.0644  0.0667  0.0690
                      0.0713  0.0736  0.0759  0.0783  0.0807  0.0831  0.0855
                      0.0879  0.0903  0.0927  0.0951  0.0976  0.1001  0.1027
                      0.1052  0.1077  0.1102  0.1128  0.1153  0.1178  0.1207
                      0.1235  0.1263  0.1291  0.1320  0.1348  0.1376  0.1404
                      0.1435  0.1467  0.1499  0.1531  0.1563  0.1595  0.1627
                      0.1659  0.1701  0.1763  0.1825  0.1887  0.1949  0.2011
                      0.2072  0.2134  0.2196  0.2279  0.2362  0.2445  0.2528
                      0.2611  0.2694  0.2777  0.2860  0.2965  0.3081  0.3197
                      0.3313  0.3429  0.3545  0.3661  0.3777  0.3913  0.4087
                      0.4261  0.4435  0.4610  0.4784  0.4958  0.5132  0.5307
                      0.5607  0.5908  0.6209  0.6510  0.6811  0.7111  0.7412
                      0.7713  0.8347  0.9149  0.9950  1.0751  1.1553  1.2354
                      1.3155  1.3957  1.4639  1.5083  1.5527  1.5971  1.6416
                      1.6860  1.7304  1.7748  1.8192  1.8416  1.8639  1.8862
                      1.9085  1.9308  1.9532  1.9755  1.9978  2.0146  2.0287
                      2.0427  2.0568  2.0708  2.0849  2.0989  2.1130  2.1256
                      2.1354  2.1451  2.1549  2.1646  2.1744  2.1841  2.1938
                      2.2036  2.2107  2.2179  2.2250  2.2321  2.2393  2.2464
                      2.2535  2.2607  2.2666  2.2720  2.2774  2.2828  2.2883
                      2.2937  2.2991  2.3045  2.3091  2.3121  2.3151  2.3181
                      2.3211  2.3241  2.3271  2.3301  2.3331  2.3357  2.3384
                      2.3411  2.3437  2.3464  2.3491  2.3518  2.3544  2.3568
                      2.3590  2.3612  2.3634  2.3656  2.3678  2.3700  2.3722
                      2.3743  2.3763  2.3784  2.3804  2.3824  2.3844  2.3864
                      2.3885  2.3905  2.3924  2.3944  2.3963  2.3983  2.4002
                      2.4022  2.4041  2.4061  2.4073  2.4083  2.4092  2.4101
                      2.4111  2.4120  2.4129  2.4139  2.4148  2.4157  2.4166
                      2.4175  2.4184  2.4193  2.4202  2.4211  2.4219  2.4228
                      2.4236  2.4245  2.4253  2.4261  2.4270  2.4278  2.4286
                      2.4295  2.4303  2.4311  2.4319  2.4327  2.4335  2.4343
                      2.4351  2.4359  2.4367  2.4375  2.4383  2.4391  2.4398
                      2.4406  2.4414  2.4422  2.4429  2.4437  2.4444  2.4451
                      2.4459  2.4466  2.4474  2.4481  2.4488  2.4495  2.4502
                      2.4510  2.4517  2.4524  2.4531  2.4538  2.4545  2.4552
                      2.4559  2.4566  2.4573  2.4580  2.4587  2.4594  2.4601
                      2.4608  2.4614  2.4621  2.4628  2.4634  2.4641  2.4647
                      2.4654  2.4661  2.4667  2.4673  2.4680  2.4686  2.4693
                      2.4699  2.4706  2.4712  2.4718  2.4725  2.4731  2.4737
                      2.4743  2.4750  2.4756  2.4762  2.4768  2.4774  2.4780
                      2.4786  2.4792  2.4798  2.4804  2.4810  2.4816  2.4822
```

2.4828	2.4834	2.4840	2.4845	2.4851	2.4857	2.4863
2.4869	2.4874	2.4880	2.4886	2.4892	2.4897	2.4903
2.4909	2.4914	2.4920	2.4926	2.4931	2.4937	2.4942
2.4948	2.4954	2.4959	2.4965	2.4970	2.4976	2.4981
2.4986	2.4992	2.4997	2.5003	2.5008	2.5014	2.5019
2.5024	2.5030	2.5035	2.5040	2.5046	2.5051	2.5056
2.5062	2.5067	2.5072	2.5077	2.5083	2.5088	2.5093
2.5098	2.5103	2.5109	2.5114	2.5119	2.5124	2.5129
2.5134	2.5139	2.5144	2.5149	2.5155	2.5160	2.5165
2.5170	2.5175	2.5180	2.5185	2.5190	2.5195	2.5200
2.5205	2.5209	2.5214	2.5219	2.5224	2.5229	2.5234
2.5239	2.5244	2.5249	2.5253	2.5258	2.5263	2.5268
2.5273	2.5277	2.5282	2.5287	2.5292	2.5296	2.5301
2.5306	2.5311	2.5315	2.5320	2.5325	2.5329	2.5334
2.5339	2.5343	2.5348	2.5352	2.5357	2.5362	2.5366
2.5371	2.5375	2.5380	2.5385	2.5389	2.5394	2.5398
2.5403	2.5407	2.5412	2.5416	2.5421	2.5425	2.5430
2.5434	2.5438	2.5443	2.5447	2.5452	2.5456	2.5461
2.5465	2.5469	2.5474	2.5478	2.5482	2.5487	2.5491
2.5495	2.5500	2.5504	2.5508	2.5513	2.5517	2.5521
2.5526	2.5530	2.5534	2.5538	2.5542	2.5547	2.5551
2.5555	2.5559	2.5564	2.5568	2.5572	2.5576	2.5580
2.5584	2.5589	2.5593	2.5597	2.5601	2.5605	2.5609
2.5613	2.5617	2.5622	2.5626	2.5630	2.5634	2.5638
2.5642	2.5646	2.5650	2.5654	2.5658	2.5662	2.5666
2.5670	2.5674	2.5678	2.5682	2.5686	2.5690	2.5694
2.5698	2.5702	2.5706	2.5710	2.5713	2.5717	2.5721
2.5725	2.5729	2.5733	2.5737	2.5741	2.5745	2.5748
2.5752	2.5756	2.5760	2.5764	2.5768	2.5772	2.5775
2.5779	2.5783	2.5787	2.5791	2.5794	2.5798	2.5802
2.5806	2.5809	2.5813	2.5817	2.5821	2.5824	2.5828
2.5832	2.5835	2.5839	2.5843	2.5847	2.5850	2.5854
2.5858	2.5861	2.5865	2.5869	2.5872	2.5876	2.5880
2.5883	2.5887	2.5890	2.5894	2.5898	2.5901	2.5905
2.5909	2.5912	2.5916	2.5919	2.5923	2.5926	2.5930
2.5933	2.5937	2.5941	2.5944	2.5948	2.5951	2.5955
2.5958	2.5962	2.5965	2.5969	2.5972	2.5976	2.5979
2.5983	2.5986	2.5990	2.5993	2.5997	2.6000	

```
*******************************************************************************
*                               Basin 100*
*******************************************************************************
COMPUTE LT TP            LCODE=1  NK=3  ISLOPE=-1
                    LENGTH=200 FT   SLOPE=0.051  K=0.7
                    LENGTH=1800 FT  SLOPE=0.051  K=1
                    LENGTH=3015 FT  SLOPE=0.036  K=3
                    KN=0.021        CENTROID DISTANCE = 3638 FT

     Tc AND Tp COMPUTED BY UPLAND/LAG TIME PROCEDURE

     SCS UPLAND METHOD FACTORS
          NOTE: Upland factor input values have been adjusted to meet Upland/Lag Time requirements.
                              LENGTH (FT)      SLOPE (FT/FT)       COMPOSITE K
     SHEET FLOW PORTION          400.0           0.051000            0.8235
     SHALLOW FLOW PORTION          0.0           0.000000            0.0000
     CHANNEL FLOW PORTION       4615.0           0.041200            2.9688
     TOTAL BASIN                5015.0           0.041982            2.4952


     LAG EQUATION FACTORS:     Kn=  0.0210     TOTAL BASIN LENGTH (FT)=      5015.0
     TOTAL BASIN SLOPE (FT/FT)=   0.041982     CENTROUD LENGTH (FT)=         3638.0


     TIME OF CONCENTRATION (HRS)=  0.2483     TIME TO PEAK (HRS)=  0.1656     LAG TIME (HRS)=  0.1863

*
COMPUTE NM HYD       ID=1 HYD=100 DA=0.13922 SQ MI
                     PER A=8 B=18 C=35 D=39
                     TP=0.0 HRS RAIN=-1
     TIME TO PEAK (hrs)=  0.1656

     K =  0.090995HR    TP =  0.165561HR    K/TP RATIO =  0.549616     SHAPE CONSTANT, N =  7.030138
```

UNIT PEAK = 171.41 CFS UNIT VOLUME = 1.000 B = 522.68 P60 = 2.1400
AREA = 0.054296 SQ MI IA = 0.10000 INCHES INF = 0.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.010000

K = 0.146602HR TP = 0.165561HR K/TP RATIO = 0.885490 SHAPE CONSTANT, N = 4.006592
UNIT PEAK = 182.41 CFS UNIT VOLUME = 0.9999 B = 355.61 P60 = 2.1400
AREA = 0.084924 SQ MI IA = 0.43361 INCHES INF = 1.06410 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.010000

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 100.00

RUNOFF VOLUME = 1.63898 INCHES = 12.1695 ACRE-FEET
PEAK DISCHARGE RATE = 328.22 CFS AT 1.570 HOURS BASIN AREA = 0.1392 SQ. MI.

*
COMPUTE RATING CURVE CID=1 VS NO=101 CODE=-1 SLP =0.04
DIA=54 FT N=0.013

RATING CURVE PIPE SECTION101.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	MAX WIDTH FT
0.00	0.00	0.00	0.00
0.23	0.32	2.06	2.00
0.47	0.88	8.96	2.75
0.70	1.59	20.82	3.27
0.94	2.40	37.45	3.66
1.17	3.30	58.47	3.95
1.41	4.25	83.42	4.17
1.64	5.25	111.76	4.33
1.88	6.28	142.89	4.44
2.11	7.32	176.15	4.49
2.35	8.38	210.81	4.50
2.58	9.43	246.12	4.50
2.81	10.46	281.21	4.50
3.05	11.47	315.18	4.50
3.28	12.43	347.00	4.50
3.52	13.34	375.47	4.50
3.75	14.17	399.16	4.50
3.99	14.90	416.11	4.50
4.22	15.50	423.07	4.50
4.50	15.90	423.07	4.50

*
ROUTE MCUNGE ID=2 HYD NO=100.1 INFLOW ID=1 DT=0.005
LENGTH=3420 FT NS=0 SLOPE = 0.04

INFLOW END= 774 TABLE PTS= 19
DT= 0.005000 QMED= 164.11 CKMED= 31.7372
WIDTH MED= 4.47 NREACH= 12 DX= 285.00

DEPTH (FT)	AREA (SQ FT)	Q (CFS)	TRAVEL TIME(HR)	WIDTH (FT)	ck (FPS)	VEL (FPS)	C	D	C1	C2	C3	Q-M (CFS)	C1-M	C2-M	C3-M
0.00	0.0	0.0	0.198	0.0	15.83	3.08	1.000	0.000	1.000	0.000	0.000	0.0	1.000	0.000	0.000
0.23	0.3	2.1	0.146	2.0	15.74	6.53	0.994	0.006	0.994	0.000	0.006	0.3	0.999	0.000	0.001
0.47	0.9	9.0	0.093	2.7	15.54	10.18	0.982	0.018	0.982	0.000	0.018	4.9	0.989	0.000	0.011
0.70	1.6	20.8	0.072	3.3	18.76	13.11	1.185	0.030	0.973	0.097	-0.070	14.4	0.976	0.041	-0.017
0.94	2.4	37.4	0.061	3.7	22.09	15.59	1.395	0.041	0.967	0.179	-0.145	28.7	0.969	0.141	-0.110
1.17	3.3	58.5	0.054	4.0	24.92	17.74	1.574	0.052	0.960	0.238	-0.199	47.5	0.963	0.211	-0.174
1.41	4.2	83.4	0.048	4.2	27.32	19.63	1.726	0.064	0.954	0.283	-0.237	70.6	0.957	0.263	-0.220
1.64	5.2	111.8	0.045	4.3	29.34	21.30	1.853	0.077	0.947	0.318	-0.265	97.3			

```
 0.951  0.302 -0.253
       1.88    6.3    142.9   0.042    4.4    31.00  22.76    1.958  0.091  0.940  0.344 -0.284    127.1
 0.944  0.333 -0.276
       2.11    7.3    176.1   0.040    4.5    32.31  24.05    2.040  0.106  0.932  0.364 -0.297    159.3
 0.937  0.356 -0.292
       2.35    8.4    210.8   0.038    4.5    33.21  25.16    2.098  0.124  0.923  0.379 -0.302    193.3
 0.928  0.373 -0.302
       2.58    9.4    246.1   0.036    4.5    33.42  26.10    2.111  0.144  0.912  0.385 -0.297    228.3
 0.918  0.384 -0.302
       2.81   10.5    281.2   0.035    4.5    32.80  26.88    2.072  0.167  0.897  0.382 -0.279    263.5
 0.905  0.386 -0.291
       3.05   11.5    315.2   0.035    4.5    31.25  27.48    1.973  0.197  0.876  0.369 -0.245    298.1
 0.888  0.378 -0.265
       3.28   12.4    347.0   0.034    4.5    28.64  27.91    1.809  0.236  0.845  0.343 -0.188    331.1
 0.863  0.359 -0.221
       3.52   13.3    375.5   0.034    4.5    24.78  28.15    1.565  0.295  0.793  0.301 -0.094    361.2
 0.824  0.325 -0.149
       3.75   14.2    399.2   0.034    4.5    19.29  28.17    1.219  0.403  0.692  0.237  0.070    387.4
 0.756  0.274 -0.029
       3.99   14.9    416.1   0.034    4.5    11.30  27.93    0.714  0.718  0.410  0.177  0.413    407.7
 0.606  0.203  0.191
       4.22   15.5    423.1   0.035    4.5     6.44  27.30    0.407  1.281  0.047  0.256  0.697    419.6
 0.067  0.247  0.686
      Hydrograph incermental time change from DT=  0.010000 hours to DT=  0.005000 hours
   MAXIMUM NO. ITERATIONS FOR SOLUTION (KKMAX) =   2 OCCURRED    3258 TIMES.  AVERAGE NUMBER ITERATIONS
=  1.0702
   Equations solved using the Ponce correction to C2
      Hydrograph incermental time change from DT=  0.005000 hours to DT=  0.010000 hours
   PRINT HYD            ID=2 CODE=1

                                    PARTIAL HYDROGRAPH   100.10


      RUNOFF VOLUME =     1.63884 INCHES     =      12.1684 ACRE-FEET
      PEAK DISCHARGE RATE =     327.86 CFS  AT   1.600 HOURS   BASIN AREA =  0.1392 SQ. MI.



   *
   ********************************************************************************
   *                               Basin 101*
   ********************************************************************************
   COMPUTE NM HYD       ID=3 HYD=101 DA=0.10438 SQ MI
                        PER A=0 B=19 C=39 D=42
                        TP=0.133333 HRS RAIN=-1

      K =  0.073002HR    TP =  0.133333HR    K/TP RATIO =  0.547520     SHAPE CONSTANT, N =  7.064578
      UNIT PEAK =   172.39    CFS   UNIT VOLUME =   0.9999       B =   524.31      P60 = 2.1400
      AREA =     0.043840 SQ MI    IA =   0.10000 INCHES    INF =   0.04000 INCHES PER HOUR
      RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  0.010000


      K =  0.114932HR    TP =  0.133333HR    K/TP RATIO =  0.861994     SHAPE CONSTANT, N =  4.124501
      UNIT PEAK =   165.00    CFS   UNIT VOLUME =   0.9999       B =   363.39      P60 = 2.1400
      AREA =     0.060540 SQ MI    IA =   0.39914 INCHES    INF =   0.96759 INCHES PER HOUR
      RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  0.010000

   PRINT HYD            ID=3 CODE=1

                                    PARTIAL HYDROGRAPH   101.00


      RUNOFF VOLUME =     1.70969 INCHES     =       9.5177 ACRE-FEET
      PEAK DISCHARGE RATE =     282.50 CFS  AT   1.530 HOURS   BASIN AREA =  0.1044 SQ. MI.



   *
   ********************************************************************************
   *                              ADD BASINS 100 and 102 at AP5
```

```
**************************************************************************
ADD HYD              ID=4 HYD=101.1 IDS= 2 & 3
*

**************************************************************************
*                              Basin 200*

**************************************************************************
COMPUTE NM HYD       ID=5 HYD=200 DA=0.01406 SQ MI
                     PER A=0 B=20 C=40 D=40
                     TP=0.133333 HRS RAIN=-1

     K =  0.072666HR    TP =  0.133333HR    K/TP RATIO =  0.545000     SHAPE CONSTANT, N =  7.106428
     UNIT PEAK =   22.198    CFS   UNIT VOLUME =   0.9994       B =   526.28      P60 = 2.1400
     AREA =     0.005624 SQ MI    IA =   0.10000 INCHES    INF =   0.04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  0.010000


     K =  0.117189HR    TP =  0.133333HR    K/TP RATIO =  0.878921     SHAPE CONSTANT, N =  4.038851
     UNIT PEAK =   22.635    CFS   UNIT VOLUME =   0.9994       B =   357.75      P60 = 2.1400
     AREA =     0.008436 SQ MI    IA =   0.40000 INCHES    INF =   0.97000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  0.010000

PRINT HYD            ID=5 CODE=1

                                  PARTIAL HYDROGRAPH   200.00


    RUNOFF VOLUME =     1.68662 INCHES     =       1.2647 ACRE-FEET
    PEAK DISCHARGE RATE =      37.61 CFS  AT   1.530 HOURS   BASIN AREA =  0.0141 SQ. MI.



*
*COMPUTE RATING CURVE  CID=1  VS NO=200 CODE=-1 SLP =0.036
*                      DIA=24 FT N=0.013
*
*ROUTE MCUNGE         ID=6  HYD NO=200.1  INFLOW ID=1  DT=0.005
*                     LENGTH=0000 FT  NS=0  SLOPE = 0.036
*PRINT HYD            ID=6 CODE=1

**************************************************************************
*                              Basin 201*

**************************************************************************
COMPUTE LT TP            LCODE=1  NK=3  ISLOPE=-1
                     LENGTH=100 FT   SLOPE=0.056  K=0.7
                     LENGTH=2265 FT  SLOPE=0.056  K=1
                     LENGTH=5117 FT  SLOPE=0.047  K=3
                     KN=0.021        CENTROID DISTANCE = 7339.79 FT

     Tc AND Tp COMPUTED BY UPLAND/LAG TIME PROCEDURE

     SCS UPLAND METHOD FACTORS
          NOTE: Upland factor input values have been adjusted to meet Upland/Lag Time requirements.
                               LENGTH (FT)      SLOPE (FT/FT)       COMPOSITE K
     SHEET FLOW PORTION            400.0          0.056000            0.9032
     SHALLOW FLOW PORTION            0.0          0.000000            0.0000
     CHANNEL FLOW PORTION         7082.0          0.049497            2.9930
     TOTAL BASIN                  7482.0          0.049845            2.6795


     LAG EQUATION FACTORS:     Kn=  0.0210     TOTAL BASIN LENGTH (FT)=      7482.0
     TOTAL BASIN SLOPE (FT/FT)=   0.049845     CENTROUD LENGTH (FT)=         7339.8


     TIME OF CONCENTRATION (HRS)=  0.3207     TIME TO PEAK (HRS)=  0.2138     LAG TIME (HRS)=  0.2405

*
COMPUTE NM HYD       ID=7 HYD=201 DA=0.01828 SQ MI
                     PER A=100 B=0 C=0 D=0
                     TP=0.133333 HRS RAIN=-1

     K =  0.158439HR    TP =  0.133333HR    K/TP RATIO =  1.188293     SHAPE CONSTANT, N =  2.987883
```

```
     UNIT PEAK =   38.503     CFS   UNIT VOLUME =   0.9996       B =   280.84      P60 = 2.1400
     AREA =     0.018280 SQ MI    IA =   0.65000 INCHES    INF =   1.67000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  0.010000

PRINT HYD            ID=7 CODE=1

                                   PARTIAL HYDROGRAPH   201.00


    RUNOFF VOLUME =     0.86305 INCHES     =       0.8414 ACRE-FEET
    PEAK DISCHARGE RATE =      27.64 CFS  AT   1.540 HOURS   BASIN AREA =  0.0183 SQ. MI.



*
*******************************************************************************
*                                Basin 203*
*******************************************************************************
COMPUTE NM HYD       ID=8 HYD=203 DA=0.06641 SQ MI
                     PER A=0 B=22 C=45 D=33
                     TP=0.133333 HRS RAIN=-1

     K =  0.072698HR    TP =  0.133333HR    K/TP RATIO =  0.545235     SHAPE CONSTANT, N =  7.102499
     UNIT PEAK =   86.471     CFS   UNIT VOLUME =   0.9999       B =   526.09      P60 = 2.1400
     AREA =     0.021915 SQ MI    IA =   0.10000 INCHES    INF =   0.04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  0.010000


     K =  0.116869HR    TP =  0.133333HR    K/TP RATIO =  0.876516     SHAPE CONSTANT, N =  4.050767
     UNIT PEAK =   119.65     CFS   UNIT VOLUME =   0.9999       B =   358.54      P60 = 2.1400
     AREA =     0.044495 SQ MI    IA =   0.39925 INCHES    INF =   0.96791 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  0.010000

PRINT HYD            ID=8 CODE=1

                                   PARTIAL HYDROGRAPH   203.00


    RUNOFF VOLUME =     1.61051 INCHES     =       5.7042 ACRE-FEET
    PEAK DISCHARGE RATE =     172.59 CFS  AT   1.530 HOURS   BASIN AREA =  0.0664 SQ. MI.



*
*******************************************************************************
*                                Basin 300*
*******************************************************************************
COMPUTE NM HYD       ID=9 HYD=300 DA=0.03484 SQ MI
                     PER A=0 B=14 C=29 D=57
                     TP=0.133333 HRS RAIN=-1

     K =  0.072666HR    TP =  0.133333HR    K/TP RATIO =  0.545000     SHAPE CONSTANT, N =  7.106428
     UNIT PEAK =   78.384     CFS   UNIT VOLUME =   0.9999       B =   526.28      P60 = 2.1400
     AREA =     0.019859 SQ MI    IA =   0.10000 INCHES    INF =   0.04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  0.010000


     K =  0.116997HR    TP =  0.133333HR    K/TP RATIO =  0.877482     SHAPE CONSTANT, N =  4.045970
     UNIT PEAK =   40.250     CFS   UNIT VOLUME =   0.9997       B =   358.22      P60 = 2.1400
     AREA =     0.014981 SQ MI    IA =   0.39884 INCHES    INF =   0.96674 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  0.010000

PRINT HYD            ID=9 CODE=1

                                 HYDROGRAPH FROM AREA   300.00


    RUNOFF VOLUME =     1.87498 INCHES     =       3.4839 ACRE-FEET
    PEAK DISCHARGE RATE =      99.75 CFS  AT   1.530 HOURS   BASIN AREA =  0.0348 SQ. MI.
```

```
*
□
*******************************************************************************
*                               Basin 400*
□
*******************************************************************************
COMPUTE NM HYD       ID=10 HYD=400 DA=0.12141 SQ MI
                     PER A=0 B=9 C=41 D=50
                     TP=0.133333 HRS RAIN=-1

     K =  0.073139HR    TP =  0.133333HR    K/TP RATIO =  0.548544     SHAPE CONSTANT, N =  7.047701
     UNIT PEAK =   238.35    CFS   UNIT VOLUME =    1.000       B =   523.51      P60 = 2.1400
     AREA =     0.060705 SQ MI    IA =   0.10000 INCHES    INF =   0.04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  0.010000


     K =  0.110812HR    TP =  0.133333HR    K/TP RATIO =  0.831091     SHAPE CONSTANT, N =  4.292336
     UNIT PEAK =   170.37    CFS   UNIT VOLUME =   0.9999       B =   374.21      P60 = 2.1400
     AREA =     0.060705 SQ MI    IA =   0.37700 INCHES    INF =   0.90560 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  0.010000

PRINT HYD            ID=10 CODE=1

                                       HYDROGRAPH FROM AREA   400.00


    RUNOFF VOLUME =     1.81977 INCHES     =      11.7833 ACRE-FEET
    PEAK DISCHARGE RATE =     343.61 CFS  AT   1.530 HOURS   BASIN AREA =  0.1214 SQ. MI.



*
FINISH

    NORMAL PROGRAM FINISH          END TIME (HR:MIN:SEC) = 14:38:59
□(s0p10h4099T□&l6D
```

Appendix C: Street Capacity and Grate Capacities for Hydraulic Design

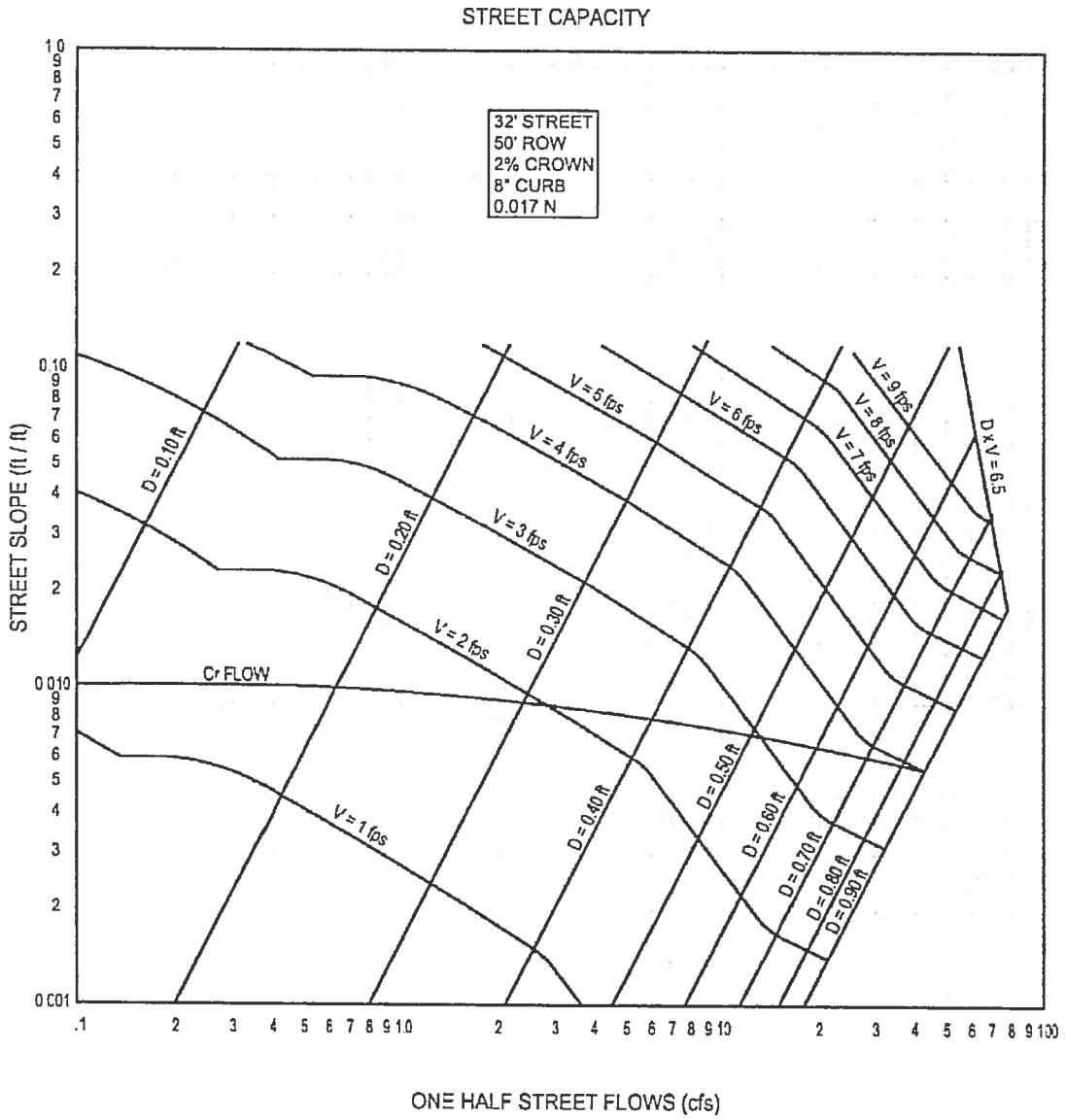
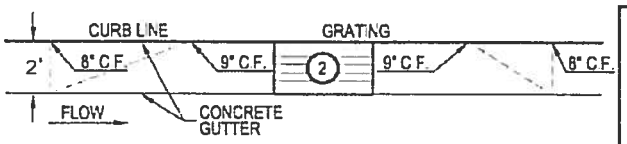
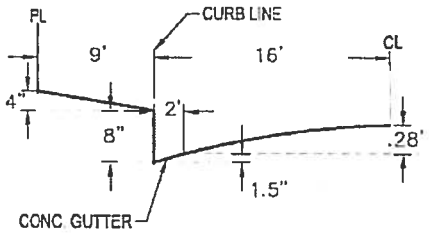

STREET CAPACITY
32' STREET
50' ROW
2% CROWN
8" CURB
0.017 N
STREET SLOPE (ft / ft)
ONE HALF STREET FLOWS (cfs)
Cr FLOW
D = 0.10 ft
D = 0.20 ft
D = 0.30 ft
D = 0.40 ft
D = 0.50 ft
D = 0.60 ft
D = 0.70 ft
D = 0.80 ft
D = 0.90 ft
V = 1 fps
V = 2 fps
V = 3 fps
V = 4 fps
V = 5 fps
V = 6 fps
V = 7 fps
V = 8 fps
V = 9 fps
D x V = 6.5

PLATE 22.3 D-1

GRATING CAPACITIES FOR TYPE "A", "C" AND "D"



GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION (ABOVE BASIN)

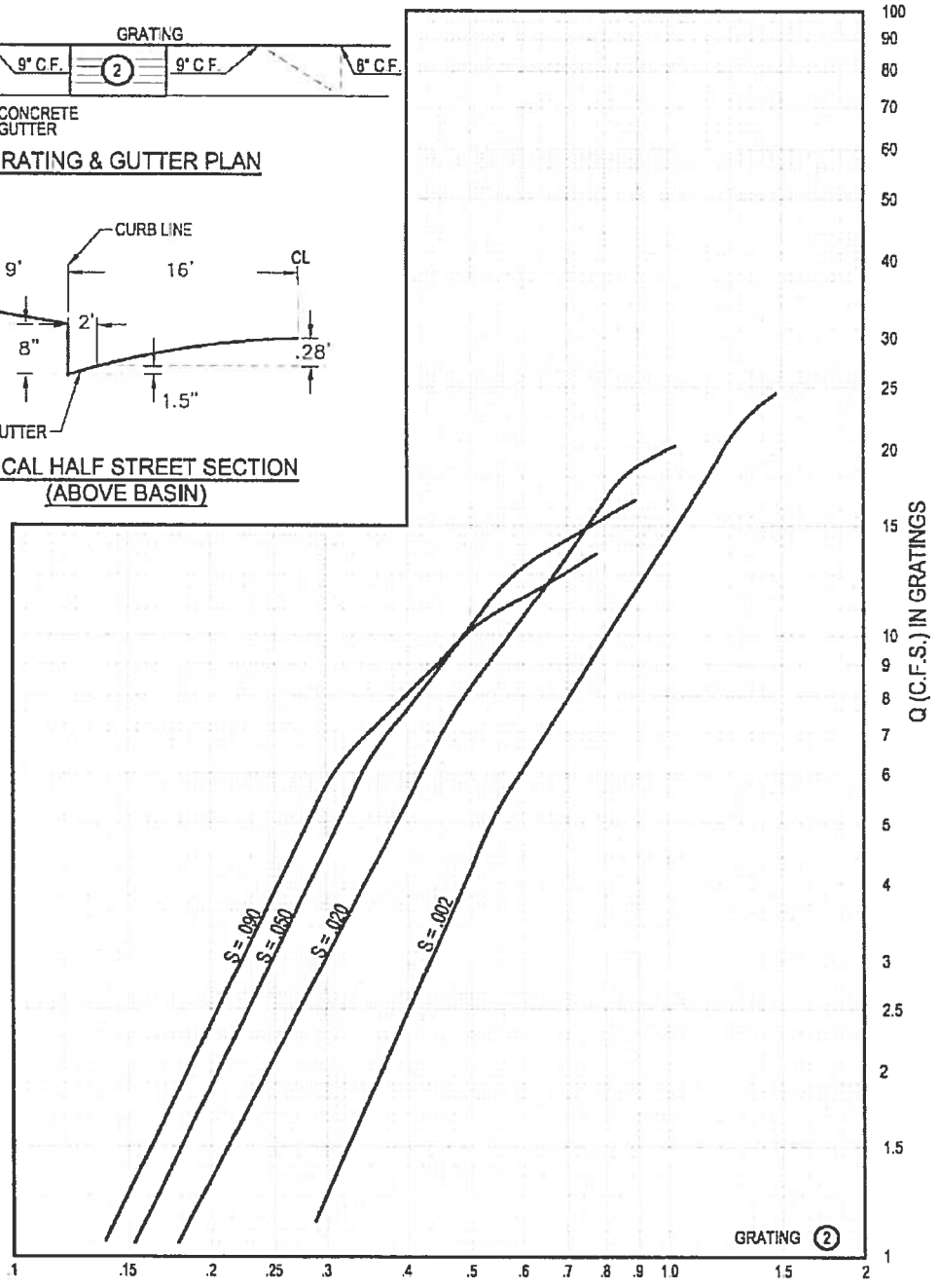


PLATE 22.3 D-5

Appendix D: Street Flow Depths and Inlet Interception Rates

HYDROLOGY SUMMARY TABLE

HYDROLOGY										Street flows					Inlet Calcs			Split Flows			
AHYMO BASIN ID	SUB-BASIN ID	AREA (Ac)	AREA (Sq mi)	Ground Cover (%) A	B	C	D	Peak 100-YR Flow Q_{100} (cfs) Incremental	Surface	Location	Slope (%)	Depth (ft)	Velocity (fps)	Energy (ft)	Inlet ID #	Intercepted (cfs)	By-pass (cfs)	Path 1 Downstrm ID	Path 1 Flow (cfs)	Path 2 Downstrm ID	Path 2 Flow (cfs)
100		89.10	0.13922	8	18	35	39	328.22													
	100.1	ROUTED in 54" pipe						327.86													
101		66.80	0.10438	0	19	39	42	282.50	0.00												
200		9.00	0.01406	0	20	40	40	37.61	0.00						30	37.61	0.00				
201		76.30	0.01828	100	0	0	0	27.64	11.64						31	16.00	11.64	203A	11.64	PIPE	16.00
203		42.50	0.06641	0	22	45	33	172.59													
	203A	8.73						35.45	47.09	Pompano Pl SE	2.13	0.51	5.1	0.9	32	16.00	31.09	203M	15.54	203C	15.54
	203B	5.05						20.50	20.50	Red Mile	3.00	0.38	4.3	0.7	33 & 34	11.80	17.10	203M	17.10	-	-
	203C	2.19						8.89	16.66	Retama Ct	2.00	0.49	sump	sump	S30	16.66	0.00	-	-	-	-
	203D	1.40						5.90	13.67	Pompano Pl	4.00	0.40	sump	sump	S31	13.67	0.00	-	-	-	-
	203E	3.33						13.51	0.00	trail	-	-	sump	sump	S32	13.51	0.00	-	-	-	-
	203G	3.95						16.00	16.00	Nashua	3.00	0.36	4.0	0.6	35 & 36	9.80	6.20	203H	16.20	-	-
	203H	0.50						2.03	8.26	Timonium	1.40	0.40	3.0	0.5	37	5.10	3.16	203J	3.16	-	-
	203I	3.30						13.50	16.66	Pocono	2.00	0.39	3.5	0.6	38 & 39	13.60	3.06	203J	3.06	-	-
	203J	4.04						16.40	19.46	Pocono	4.00	0.36	4.5	0.7	40 & 41	14.00	5.46	203K	5.46	-	-
	203L	4.00						16.25	20.18	trail	-	-	sump	sump	S33	16.25	0.00	-	-	-	-
	203M	1.25						5.07	22.10	Juan Tabo Drive	1.00	0.58	4.0	0.8	42	9.80	12.30	203K	12.30		
	203K	4.40						17.90	35.66	Pocono	1.00	0.46	3.2	0.6	43	17.20	18.46	300E	9.23	400A	9.23
300		22.30	0.03484	0	14	29	57	99.75													
	300A	4.13						18.47	18.47	Thistledown Rd	3.00	3.50	4.0	3.7		0.00	17.47	300E	18.47	-	-
	300B	8.00						35.78	35.78	Blue Ribbon Rd	2.00	0.49	4.6	0.8	44 & 45	18.00	17.78	300C	17.78	-	-
	300C	3.96						17.70	35.50	Pleasanton Dr	1.88	0.49	4.5	0.8	46 & 47	18.00	17.50	300D	17.50	-	-
	300D	0.52						2.33	19.80	Blue Ribbon Rd	3.43	0.38	4.5	0.7	48 & 49	16.80	3.00	300G	3.00	-	-
	300E	1.84						8.21	35.91	Maywood Dr	1.00	0.51	3.7	0.7	50 & 51	15.20	20.71	300F	20.71	-	-
	300F	2.69						12.02	32.73	Maywood Dr	1.00	0.50	3.7	0.7	52 & 53	16.00	16.73	300G	16.73	-	-
	300G	1.15						5.16	24.89	Out To Basin 400	-	-	-	-		0.00	24.89	400.00	24.89	-	-
400		77.70	0.12141	0	9	41	50	343.61													
	400AA	2.80						12.70	12.70	Rocky Top	8.00	0.29	5.5	0.8	Std Curb	0.00	12.70	400DD	12.70		
	400BB	2.13						9.42	9.42	trail	-	-	-	-	-	-	-	400DD	9.42	-	-
	400CC	2.06						9.10	9.10	Sunset St	3.60	0.29	3.8	0.5	Roll Curb	0.00	9.10	400DD	9.10	-	-
	400DD	0.44						1.95	33.17	Sunset St	2.15	0.05	4.5	0.4	11&12	11.80	21.37	400FF	21.37	-	-
	400EE	2.87						12.70	12.70	Sunset St	1.00	0.04	2.5	0.1	Roll Curb	0.00	12.70	400FF	12.70	-	-
	400FF	4.05						17.87	(30.57)	Popejoy	3.52	0.52	4.1	0.8	Std Curb	-	-	-	-	-	-
									51.94	Rockytop	1.25	0.58	4.7	0.9	13 &14	16.00	35.97	400GG	35.97		
	400GG	1.16						5.14	41.11	Rocky Top	1.25	0.55	sump	sump	SUMP 1&2	41.11	0.00	-	-	-	-
	400A	1.90						8.34	17.57	Silver Dollar St	2.00	0.40	3.6	0.6	Roll Curb	0.00	17.57	400B	17.57	-	-
	400B	2.98						12.67	30.24	Silver Dollar St	2.00	0.35	4.4	0.7	Std Curb	0.00	30.24	400F1	15.12	400C	15.12
	400C	2.78						12.26	27.39	Silver Dollar St	2.00	0.45	4.1	0.7	1 & 2	14.00	13.90	400L2	13.90	-	-
	400D	3.86						17.04	17.04	Eastern Bndry	-	-	-	-	-	0.00	17.04	400L1	17.04	-	-
	400L1	0.39						1.70	18.74	Sandia Sunset	1.00	0.43	2.8	0.6	Std Curb	0.00	18.74	400L2	18.74	-	-
	400L2	0.98						4.30	36.45	Sandia Sunset	3.24	0.45	4.6	0.8	3 & 4	15.80	20.65	400L3	20.65	-	-
	400L3	0.39						1.73	36.90	Sandia Sunset	3.24	0.46	5.5	0.9	7 & 8	16.40	20.50	400L4	20.50	-	-
	400L4	0.86						3.79	24.29	Sandia Sunset	3.24	0.39	4.8	0.7	19&20	11.80	12.49	400L5	12.49	-	-
	400L5	0.22						0.10	38.18	Sandia Sunset	3.24	0.45	5.4	0.9	Std Curb	0.00	56.98	400 AJ	19.09	400P	19.09
	400E	3.10						13.70	13.70	Hubbard	2.00	0.36	3.4	0.5	Roll Curb	0.00	13.70	400F2	6.85	400I	6.85
	400F1	0.45						1.98	17.10	Manzano Vista	3.24	0.36	4.3	0.6	Std Curb	0.00	17.10	400F2	8.55	400I	8.55

HYDROLOGY SUMMARY TABLE

HYDROLOGY										Street flows					Inlet Calcs			Split Flows			
AHYMO BASIN ID	SUB-BASIN ID	AREA		Ground Cover (%)				Peak 100-YR Flow Q_{100} (cfs)			Slope	Depth	Velocity	Energy	Inlet ID	Intercepted	By-pass	Path 1		Path 2	
		(Ac)	(Sq mi)	A	B	C	D	Incremental	Surface	Location	(%)	(ft)	(fps)	(ft)	#	(cfs)	(cfs)	Downstrm ID	Flow (cfs)	Downstrm ID	Flow (cfs)
	400F2	0.46						2.03	17.43	Manzano Vista	3.24	0.36	4.3	0.6	Std Curb	0.00	17.43	400F3	8.72	400J	8.72
	400F3	0.26						1.14	22.86	Manzano Vista	3.14	0.40	4.5	0.7	Std Curb	0.00	22.86	400K1	11.43	400T	11.43
	400G	4.05						17.87	17.87	Duke City	2.00	0.40	3.6	0.6	Std Curb	0.00	17.87	400H	17.87	-	-
	400H	1.86						8.21	26.08	Duke City	2.00	0.40	5.0	0.8	Std Curb	0.00	26.08	400F3	13.04	400J	13.04
	400I	2.79						12.30	27.70	Hubbard	4.00	0.40	5.0	0.8	5 & 6	13.20	14.50	400L3	14.50	-	-
	400J	2.79						12.30	34.06	Duke City	4.00	0.42	5.4	0.9	9 & 10	15.60	18.46	400L5	18.46	-	-
	400K1	0.36						1.59	13.02	Rocky Top	2.40	0.35	3.4	0.5	Std Curb	0.00	13.02	400K2	6.51	400AG	6.51
	400K2	0.36						1.59	8.10	Rocky Top	4.38	0.29	3.9	0.5	Std Curb	0.00	8.10	400P	4.05	400AJ	4.05
	400M	1.83						8.10	8.10	Duke City	0.50	0.39	1.9	0.4	Roll Curb	0.00	8.10	400N	8.10	-	-
	400N	1.16						5.13	14.13	Duke City	0.50	0.44	2.0	0.5	21&22	7.00	7.13	400L5	7.13	-	-
	400P	0.44						1.98	21.07	Rocky Top	1.70	0.38	4.5	0.7	S1 & S2	21.07	0.00	-	-	-	-
	400Q	1.93						8.57	8.57	Canyon Wren Ct	0.50	0.50	2.2	0.6	Roll Curb	0.00	8.57	400R	8.57	-	-
	400R	1.50						6.77	15.34	Harrier Hawk	4.00	0.33	4.5	0.6	Std Curb	0.00	15.34	400S	7.67	400V	7.67
	400S	2.17						9.61	17.28	Burrowing Owl	2.00	0.39	3.5	0.6	Roll Curb	0.00	17.28	400U	17.28	-	-
	400T	1.77						7.82	19.25	Manzano Vista	3.14	0.37	4.3	0.7	15 & 16	11.80	7.40	400U	7.40	-	-
	400U	1.60						7.05	31.64	Manzano Vista	3.14	0.44	5.2	0.9	17 & 18	14.20	17.44	400X	17.44	-	-
	400V	3.09						13.66	21.33	White Dove	2.00	0.41	3.8	0.6	Std Curb	0.00	21.33	400AC	10.67	400W	10.67
	400W	1.10						4.85	15.15	White Dove	2.00	0.38	3.5	0.6	Std Curb	0.00	15.15	400X	15.15	-	-
	400X	0.37						1.62	34.21	Manzano Vista	3.14	0.44	5.1	0.8	Std Curb	0.00	34.21	400Z	17.11	400Y	17.11
	400Y	0.70						3.08	20.19	Rock Squirrel	2.00	0.40	3.5	0.6	S5 & S6	20.19	0.00	-	-	-	-
	400Z	1.29						5.68	22.79	Manzano Vista	2.50	0.40	4.0	0.6	S7& S8	22.79	0.00	-	-	-	-
	400AK	2.86						12.60	12.60	Cougar Run	4.00	0.31	4.1	0.6	Roll Curb	0.00	12.60	400AB	12.60	-	-
	400AB	2.13						9.41	22.27	Running Bear	4.00	0.38	4.9	0.8	S9& S10	22.27	0.00	-	-	-	-
	400AC	1.76						7.79	18.46	Running Bear	3.58	0.35	4.7	0.7	Roll Curb	0.00	18.46	-	-	-	-
	400AD	0.70						3.10	21.56	Running Bear	2.00	0.41	3.8	0.6	Std Curb	0.00	21.56	400AF	10.78	400AE	10.78
	400AE	0.28						1.22	12.00	Running Bear	3.58	0.32	4.0	0.6	S9 & S10	12.00	0.00	-	-	-	-
	400AF	0.25						1.10	11.88	Manzano Vista	1.00	0.40	3.5	0.6	S7 & S8	11.88	0.00	-	-	-	-
	400AG	2.93						13.00	19.51	Rock Squirrel	3.38	0.38	4.4	0.7	Std Curb	0.00	91.51	400AI	9.76	400AH	9.76
	400AH	0.24						1.10	10.90	Rock Squirrel	3.38	0.31	3.9	0.5	S5 & S6	10.44	0.00	-	-	-	-
	400AI	0.24						1.10	10.90	Rock Squirrel	1.00	0.38	2.5	0.5	S3 & S4	10.44	0.00	-	-	-	-
	400AJ	2.06						9.10	32.24	Rock Squirrel	1.36	0.52	4.4	0.8	S3 & S4	32.24	0.00	-	-	-	-

Appendix E: Storm Drain Pipe Design

Storm Drain System Design

STREET NAME	INLET #	PIPE #	SLOPE (ft/ft)	SLOPE %	Q IN PIPE (cfs)	K(calculated from Q in pipe)	K (from Plate 22.3 B-5)	Mannings Q Q=Ks1/2	PIPE DIA Based on K - Mannings	PIPE DIA Based on Velocity	AREA of PIPE	VELOCITY (ft/sec)
Blue Ribbon	TD											
		P1	0.02	2.00	24.89	176	226.2	31.99		24	3.14	7.92
Gallant Fox		Existing	0.0212	2.12	848.57	5,828	6388	930.11		84	38.48	22.05
		P2	0.0342	3.42	890.50	4,815	5244	969.79	78	96	50.27	17.72
Sandia Sunset	1	P3	0.02	2.00	7.00	49	105	14.85	18	18	1.77	3.96
Sandia Sunset	2	P4	0.02	2.00	14.00	99	105	14.85	18	18	1.77	7.92
Sandia Sunset		P5	0.0342	3.42	904.50	4,891	5244	969.79	78	96	50.27	17.99
Sandia Sunset	3	P6	0.02	2.00	7.90	56	105	14.85	18	18	1.77	4.47
Sandia Sunset	4	INLET			7.90							
Sandia Sunset		P7	0.0342	3.42	920.30	4,976	5244	969.79	78	108	63.62	14.47
Sandia Sunset	5	P8	0.02	2.00	6.60	47	105	14.85	18	18	1.77	3.73
Sandia Sunset	6	P9	0.02	2.00	13.20	93	105	14.85	18	18	1.77	7.47
Sandia Sunset		P10	0.0342	3.42	933.50	5,048	5244	969.79	78	108	63.62	14.67
Sandia Sunset	7	P12	0.02	2.00	8.20	58	105	14.85	18	18	1.77	4.64
Sandia Sunset	8	INLET	0.02		8.20							
Sandia Sunset		P13	0.0342	3.42	949.90	5,136	5244	969.79	78	108	63.62	14.93
Sandia Sunset	19	P13.1	0.02	2.00	5.90	42	105	14.85	18	18	1.77	3.34
Sandia Sunset	20	INLET	0.0345	3.45	5.90							
Sandia Sunset		P13.2	0.0345	3.45	961.70	5,178	5244	974.03	78	108	63.62	15.12
Duke City	21	P13.3	0.005	0.50	3.50	49	105	7.42	18	18	1.77	1.98
Duke City	22	P13.4	0.005	0.50	7.00	99	105	7.42	18	18	1.77	3.96
Sandia Sunset	9	P14	0.02	2.00	6.60	47	105	14.85	18	18	1.77	3.73
Sandia Sunset	10	P15	0.02	2.00	13.20	93	105	14.85	18	18	1.77	7.47
Sandia Sunset		P16	0.0342	3.42	981.90	5,310	6388	1181.35	84	108	63.62	15.43
Rocky Top	11	P17	0.015	1.50	5.90	48	105	12.86	18	18	1.77	3.34
Rocky Top	12	INLET			5.90							
Rocky Top		P18	0.02	2.00	11.80	83	105	14.85	18	18	1.77	6.68
Rocky Top	13	P19	0.02	2.00	8.00	57	105	14.85	18	18	1.77	4.53
Rocky Top	14	INLET			8.00							
Rocky Top		P20	0.0125	1.25	27.80	249	410	45.84	24	24	3.14	8.85
Rocky Top		P21	0.0215	2.15	27.80	190	226.2	33.17	18	24	3.14	8.85
Rocky Top	S1	P22.1	0.02	2.00	31.09	220	410.1	58.00	30	30	4.91	6.33
Rocky Top	S2	SUMP			31.09							
parallel to arroyo		P22	0.037	3.70	89.98	468	666.9	128.28	36	36	7.07	12.73
Manzano Vista		P23	0.0136	1.36	1071.88	9,191	12487	1456.22	108	108	63.62	16.85
parallel to arroyo		P24	0.01	1.00	1071.88	10,719	12487	1248.70	108	108	63.62	16.85
parallel to arroyo	S3	P25	0.02	2.00	21.34	151	226.2	31.99	24	24	3.14	6.79
parallel to arroyo	S4	P26	0.02	2.00	42.68	302	410.1	58.00	30	30	4.91	8.69
parallel to arroyo		P27	0.01	1.00	1114.56	11,146	12487	1248.70	108	108	63.62	17.52
parallel to arroyo	S5	P28	0.02	2.00	15.55	110	226.2	31.99	24	24	3.14	4.95
parallel to arroyo	S6	P29	0.02	2.00	15.55	110	226.2	31.99	24	24	3.14	4.95
Manzano Vista		P30	0.01	1.00	1145.66	11,457	12487	1248.70	108	108	63.62	18.01
Manzano Vista	15	P31	0.02	2.00	7.80	55	105	14.85	18	18	1.77	4.41
Manzano Vista	16	INLET			7.80							
Manzano Vista		P32	0.0314	3.14	15.60	88	105	18.61	18	18	1.77	8.83
Manzano Vista	17	P33	0.02	2.00	7.10	50	105	14.85	8	18	1.77	4.02
Manzano Vista	18	INLET			7.10							
Manzano Vista		P34	0.0314	3.14	29.80	168	226.2	40.08	24	24	3.14	9.49
Manzano Vista		P35	0.0314	3.14	1175.46	6,634	7677	1360.37	90	120	78.54	14.97
parallel to arroyo		P36	0.01	1.00	1175.46	11,755	12487	1248.70	108	120	78.54	14.97
Manzano Vista	S7	P37	0.02	2.00	8.67	61	105	14.85	18	18	1.77	4.91
Manzano Vista	S8	P38	0.02	2.00	17.34	123	226.2	31.99	24	24	3.14	5.52
parallel to arroyo		P39	0.01	1.00	1192.80	11,928	12487	1248.70	108	120	78.54	15.19
Running Bear	S9	P40	0.02	2.00	17.14	121	226.2	31.99	24	24	3.14	5.46
Running Bear	S10	P41	0.02	2.00	34.27	242	410.1	58.00	30	30	4.91	6.98
outlet to pond		P42	0.01	1.00	1227.07	12,271	16538	1653.80	120	120	78.54	15.62

indicates pipe sized increased to reduce velocity rate in pipe

Design Size

Appendix F: Floodplain Map

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	City of Albuquerque Bernalillo County New Mexico	BRIDGE FILL	BASE MAP CHANGES FLOODWAY HYDRAULIC ANALYSIS NEW TOPOGRAPHIC DATA
	COMMUNITY NO.: 350002		
IDENTIFIER	Juan Tabo Hills Tijeras Arroyo	APPROXIMATE LATITUDE AND LONGITUDE: 35.055, -106.515 SOURCE: Precision Mapping Streets DATUM: NAD 83	

ANNOTATED MAPPING ENCLOSURES	ANNOTATED STUDY ENCLOSURES
TYPE: FIRM NO.: 35001C0367H DATE: August 16, 2012	DATE OF EFFECTIVE FLOOD INSURANCE STUDY: August 16, 2012 PROFILE: 75P AND 76P FLOODWAY DATA TABLE: 15

Enclosures reflect changes to flooding sources affected by this revision.
* FIRM - Flood Insurance Rate Map;

FLOODING SOURCE AND REVISED REACH

Tijeras Arroyo- from a point approximately 6,420 feet downstream of Juan Tabo Boulevard to a point approximately 1,430 feet upstream of Juan Tabo Boulevard

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Tijeras Arroyo	Zone AE	Zone AE	NONE	YES
	BFEs*	BFEs	YES	YES
	Floodway	Floodway	YES	YES

* BFEs - Base Flood Elevations

DETERMINATION

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the Engineering Library, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our Web site at http://www.fema.gov/business/nfip.

Stuart W. Rooney, CFM, PMP, Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

OTHER COMMUNITIES AFFECTED BY THIS REVISION

CID Number: 350001 **Name:** Unincorporated Areas of Bernalillo County, New Mexico

AFFECTED MAP PANELS	AFFECTED PORTIONS OF THE FLOOD INSURANCE STUDY REPORT
TYPE: FIRM* NO.: 35001C0366H DATE: August 16, 2012 TYPE: FIRM* NO.: 35001C0367H DATE: August 16, 2012	DATE OF EFFECTIVE FLOOD INSURANCE STUDY: August 16, 2012 PROFILE: 75P AND 76P FLOODWAY DATA TABLE: 15

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the Engineering Library, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our Web site at http://www.fema.gov/business/nfip.

Stuart W. Rooney, CFM, PMP, Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION

APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

NFIP regulations Subparagraph 60.3(b)(7) requires communities to ensure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained. This provision is incorporated into your community's existing floodplain management ordinances; therefore, responsibility for maintenance of the altered or relocated watercourse, including any related appurtenances such as bridges, culverts, and other drainage structures, rests with your community. We may request that your community submit a description and schedule of maintenance activities necessary to ensure this requirement.

We provide the floodway designation to your community as a tool to regulate floodplain development. Therefore, the floodway revision we have described in this letter, while acceptable to us, must also be acceptable to your community and adopted by appropriate community action, as specified in Paragraph 60.3(d) of the NFIP regulations.

COMMUNITY REMINDERS

We based this determination on the 1-percent-annual-chance flood discharges computed in the FIS for your community without considering subsequent changes in watershed characteristics that could increase flood discharges. Future development of projects upstream could cause increased flood discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on flood discharges subsequent to the publication of the FIS report for your community and could, therefore, establish greater flood hazards in this area.

Your community must regulate all proposed floodplain development and ensure that any permits required by Federal or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

This revision has met our criteria for removing an area from the 1-percent-annual-chance floodplain to reflect the placement of fill. However, we encourage you to require that the lowest adjacent grade and lowest floor (including basement) of any structure placed within the subject area be elevated to or above the Base (1-percent-annual-chance) Flood Elevation.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the Engineering Library, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our Web site at http://www.fema.gov/business/nfip.

Stuart W. Rooney, CFM, PMP, Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Mr. Frank Pagano
Director, Mitigation Division
Federal Emergency Management Agency, Region VI
Federal Regional Center, Room 206
800 North Loop 288
Denton, TX 76209
(940) 898-5127

STATUS OF THE COMMUNITY NFIP MAPS

We will not physically revise and republish the FIRM for your community to reflect the modifications made by this LOMR at this time. When changes to the previously cited FIRM panel warrant physical revision and republication in the future, we will incorporate the modifications made by this LOMR at that time.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the Engineering Library, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our Web site at http://www.fema.gov/business/nfip.

Stuart W. Rooney, CFM, PMP, Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

PUBLIC NOTIFICATION OF REVISION

PUBLIC NOTIFICATION

A notice of changes will be published in the *Federal Register*. A short notice will also be published in your local newspaper on or about the dates listed below. Please refer to FEMA's Web site at https://www/floodmaps.fema.gov/fhm/Scripts/bfe_main.asp.

LOCAL NEWSPAPER Name: *The Albuquerque Journal*
Dates: 02/08/2013 and 02/15/2013

Within 90 days of the second publication in the local newspaper, a citizen may request that we reconsider this determination. Any request for reconsideration must be based on scientific or technical data. Therefore, this letter will be effective only after the 90-day appeal period has elapsed and we have resolved any appeals that we receive during this appeal period. Until this LOMR is effective, the revised BFEs presented in this LOMR may be changed.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the Engineering Library, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our Web site at http://www.fema.gov/business/nfip.

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Engineering Management Branch
Federal Insurance and Mitigation Administration

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE-FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
TIJERAS ARROYO (Continued)								
U	23,785	200	965	17.0	5,115.9	5,115.9	5,115.9	0.0
V	24,345	400	1,718	9.5	5,122.2	5,122.2	5,123.2	1.0
W	24,930	400	1,793	9.1	5,127.2	5,127.2	5,127.3	0.1
X	26,060	400	1,515	10.8	5,132.0	5,132.0	5,132.3	0.3
Y	26,725	120	997	16.4	5,135.8	5,135.8	5,135.8	0.0
Z	27,070	131	1,015	16.1	5,137.9	5,137.9	5,137.9	0.0
AA	28,430	118	973	16.8	5,147.3	5,147.3	5,147.3	0.0
AB	29,130	135	975	16.8	5,152.2	5,152.2	5,152.2	0.0
AC	30,820	244	1,190	13.8	5,168.5	5,168.5	5,168.5	0.0
AD-AL[2]								
AM	57,692	263	1,381	13.1	5,393.5	5,393.5	5,393.5	0.0
AN	58,701	234	1,327	13.6	5,405.5	5,405.5	5,405.5	0.0
AO	59,737	360	1,613	12.3	5,418.6	5,418.6	5,418.9	0.3
AP	60,559	313	1,652	14.0	5,431.0	5,431.0	5,431.5	0.5
AQ	61,262	441	1,766	14.0	5,440.7	5,440.7	5,440.7	0.0
AR	61,987	530	2,684	7.3	5,446.4	5,446.4	5,446.4	0.0
AS	63,079	310	1,515	13.7	5,457.9	5,457.9	5,458.1	0.2
AT	64,069	409	1,644	12.5	5,475.0	5,475.0	5,475.4	0.4
AU	65,650	500	1,747	10.3	5,490.3	5,490.3	5,491.0	0.7

[1]Feet above confluence with Rio Grande
[2]Floodway not computed (Kirtland Air Force Base)

REVISED DATA

REVISED TO REFLECT LOMR EFFECTIVE: June 17, 2013

TABLE 15

FEDERAL EMERGENCY MANAGEMENT AGENCY

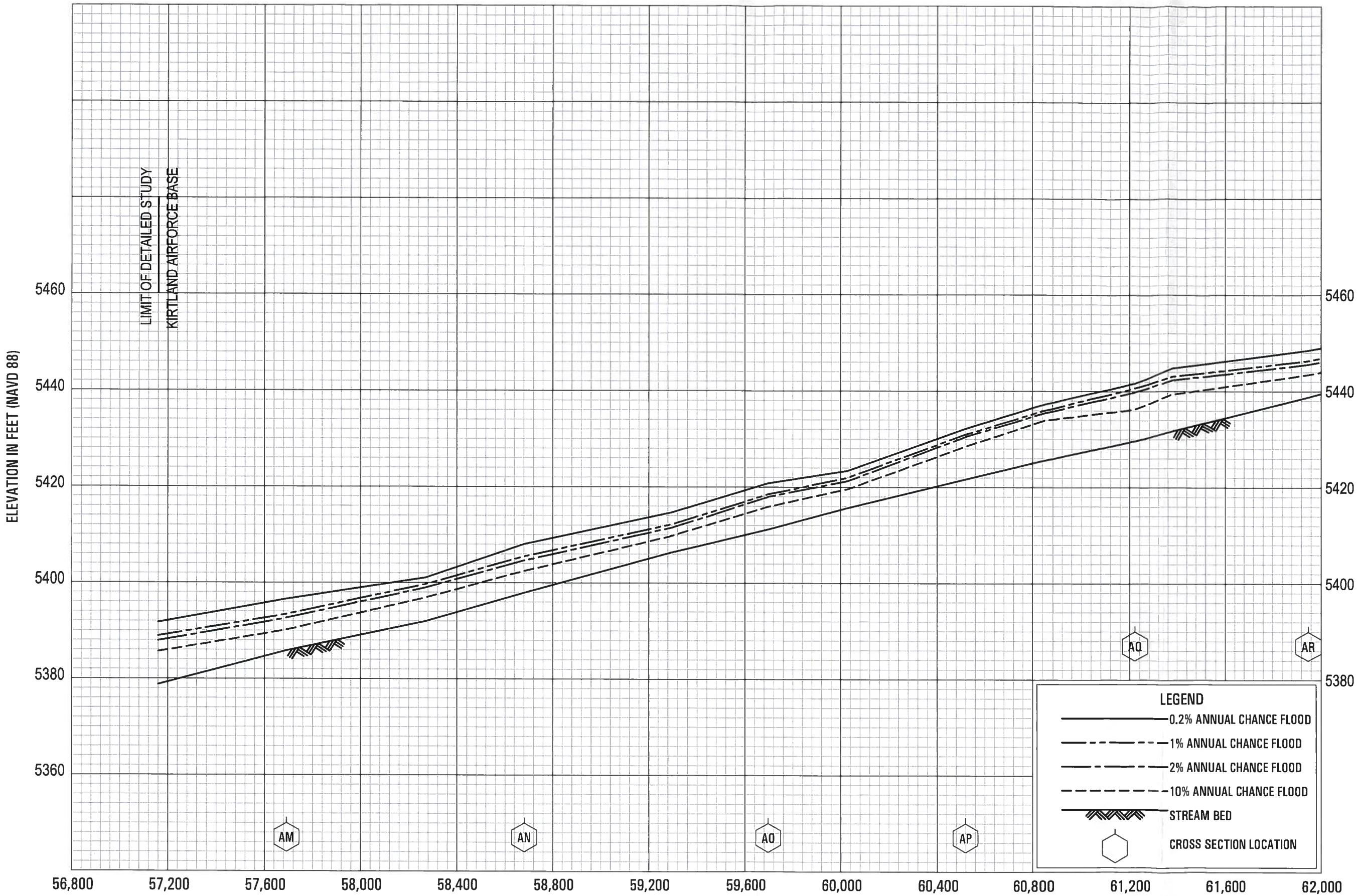
BERNALILLO COUNTY, NM
AND INCORPORATED AREAS

FLOODWAY DATA

TIJERAS ARROYO

FLOOD PROFILES

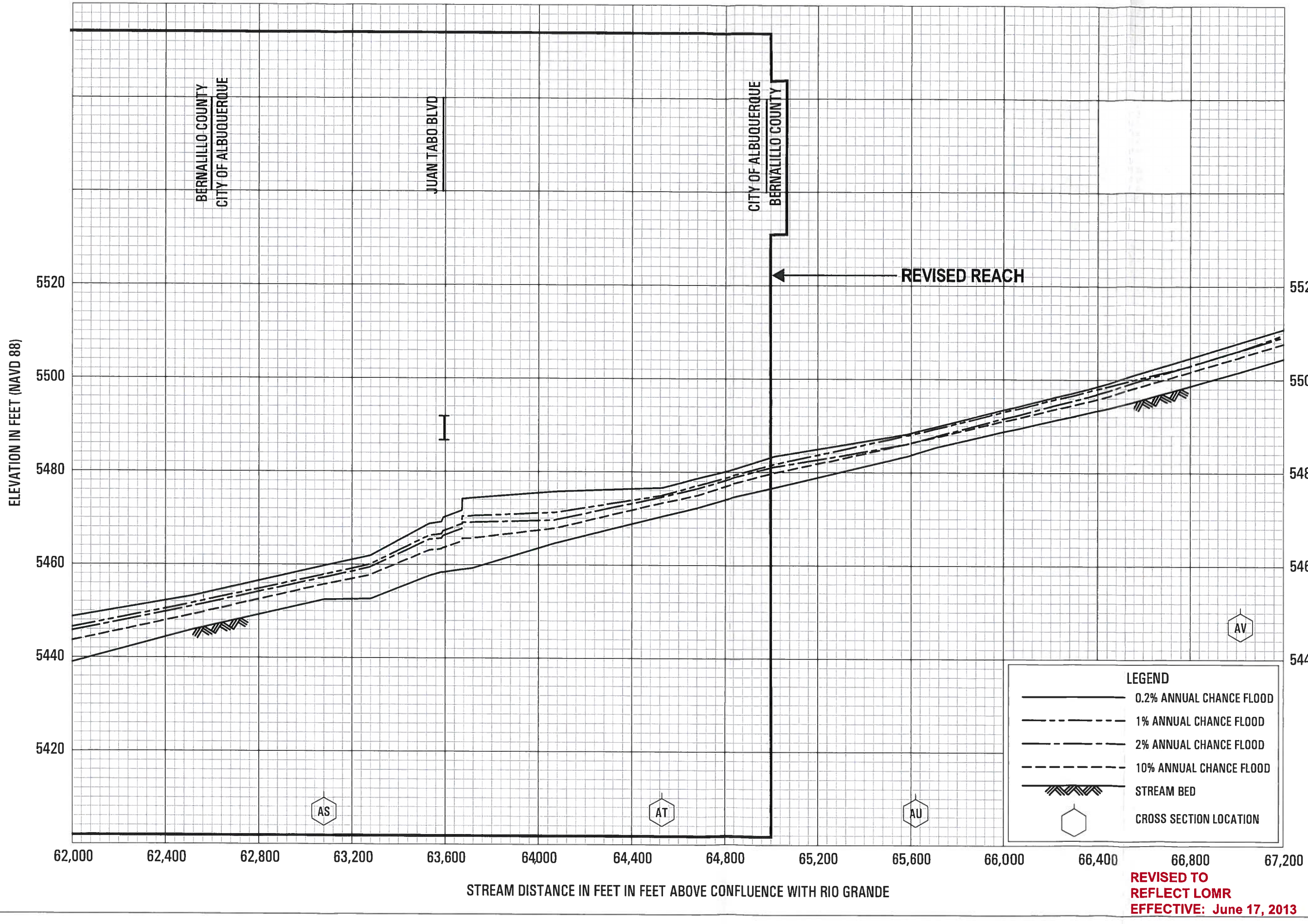
TIJERAS ARROYO



REVISED TO
REFLECT LOMR
EFFECTIVE: June 17, 2013

FEDERAL EMERGENCY MANAGEMENT AGENCY

BERNALILLO COUNTY, NM
AND INCORPORATED AREAS



REVISED TO
REFLECT LOMR
EFFECTIVE: June 17, 2013

FLOOD PROFILES

TIJERAS ARROYO

FEDERAL EMERGENCY MANAGEMENT AGENCY

BERNALILLO COUNTY, NM

AND INCORPORATED AREAS

76P

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where Base Flood Elevations (BFEs) and/or floodways have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The projection used in the preparation of this map was New Mexico State Plane, Central Zone (FIPS 3002). The horizontal datum was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey, SSMC-3 #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for bench marks shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was provided in digital format by City of Albuquerque, 2010, Bernalillo County, 2004 and 2010, Bureau of Land Management, 2003, National Geodetic Survey, 2003, and United States Geological Survey (USGS), 1999. Additional information was photogrammetrically compiled at a scale of 1:12,000 from U.S. Department of Agriculture aerial photography dated 2009.

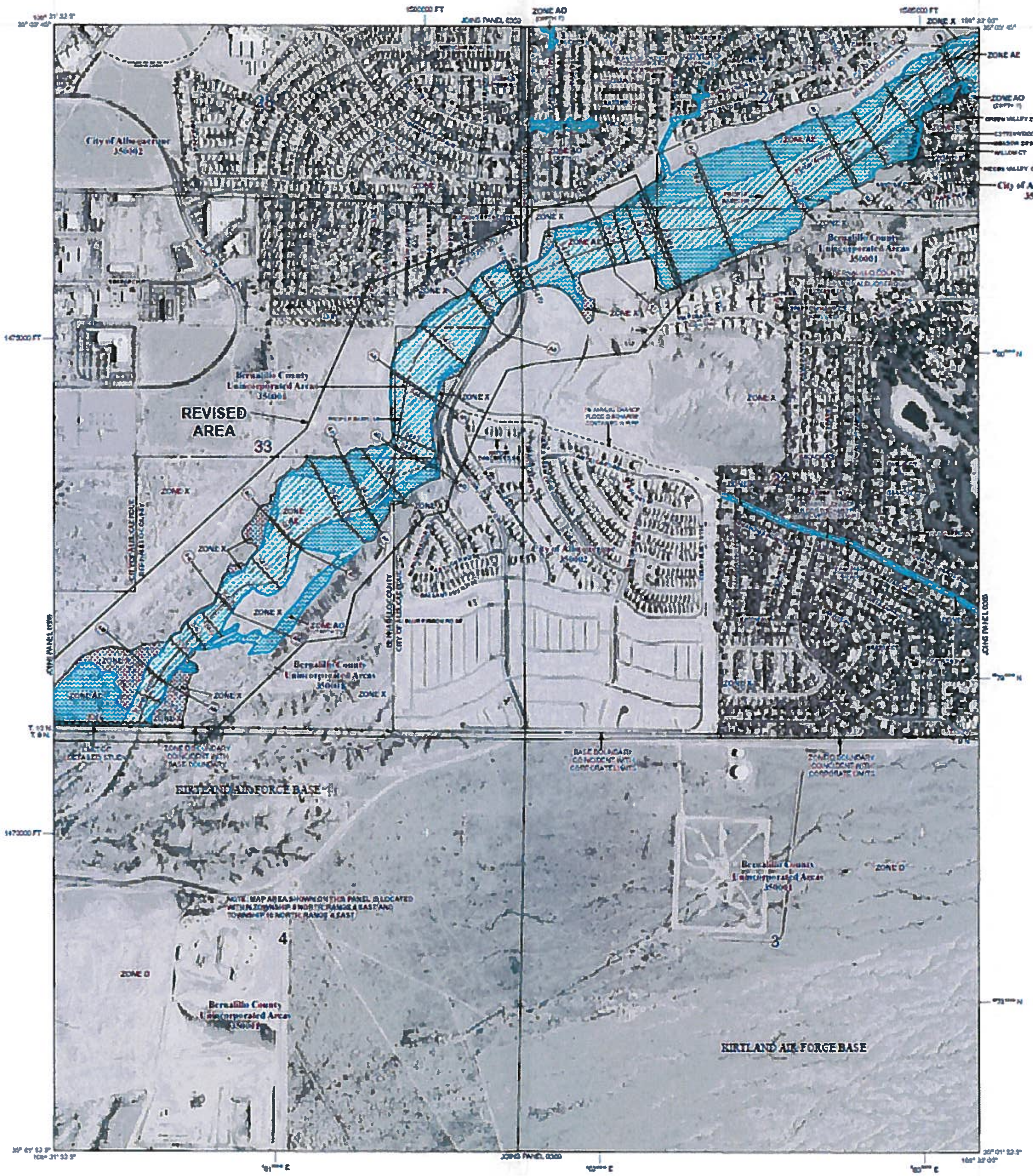
This map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed Map Index for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the Map Service Center (MSC) website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have questions about this map or questions concerning the National Flood Insurance Program in general, please call the FEMA Map Information eXchange (FMIX) at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

[illegible]

FLOODWAY AREAS IN ZONE AE

[illegible]

OTHER FLOOD AREAS

[illegible]

OTHER AREAS

[illegible]

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

[illegible]

MAP SCALE 1" = 500'

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0367H

FIRM
FLOOD INSURANCE RATE MAP

BERNALILLO COUNTY,
NEW MEXICO
AND INCORPORATED AREAS

PANEL 367 OF 825

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

[illegible]

REVISED TO
REFLECT LOMR
EFFECTIVE: June 17, 2013

[illegible]

MAP NUMBER
35001C0367H

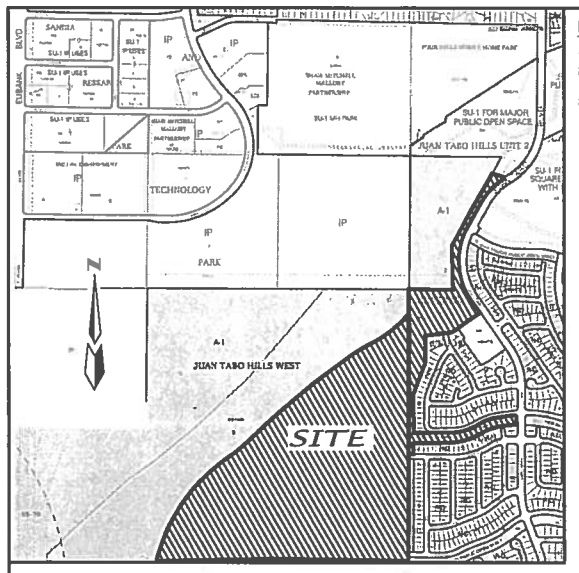
MAP REVISED
AUGUST 16, 2012

Federal Emergency Management Agency

Appendix G: Grading and Drainage Plan

Appendix H: Preliminary Plat

PRELIMINARY PLAT FOR
JUAN TABO HILLS WEST ESTATES
WITHIN
SECTION 33
TOWNSHIP 10 NORTH, RANGE 4 EAST, NMPM
CITY OF ALBUQUERQUE
BERNALILLO COUNTY, NEW MEXICO
August, 2012



VICINITY MAP (NTS) ZONE ATLAS MAP M-21

SUBDIVISION DATA

GROSS ACREAGE	98.4699 Ac.
ZONE ATLAS NO.	M-21-Z
NO. OF LOTS CREATED	352 LOTS
NO. OF TRACTS CREATED	12 TRACTS
RIGHT-OF-WAY AREA DEDICATED TO CITY.	18.2552 Ac
DATE OF SURVEY.	DECEMBER, 2003

PURPOSE OF PLAT

1. SUBDIVIDE TRACT "A" JUAN TABO HILLS WEST INTO 399 RESIDENTIAL LOTS AND 5 TRACTS.
2. DEDICATE RIGHT-OF-WAY AS SHOWN.
3. GRANT NEW EASEMENTS AS SHOWN.
4. VACATE EASEMENTS AS SHOWN.

NOTES

1. UNLESS OTHERWISE NOTED, ALL BOUNDARY CORNERS SHOWN THUS ○ SHALL BE MARKED BY A #5 REBAR W/CAP STAMPED PS#77192.
2. ALL STREET CENTERLINE MONUMENTATION SHALL BE INSTALLED AT ALL CENTERLINE PC'S, PT'S, ANGLE POINTS, AND STREET INTERSECTIONS AND SHOWN THUS ▲, WILL BE MARKED BY A FOUR INCH (4") ALUMINUM CAP STAMPED:
   "CITY OF ALBUQUERQUE CENTERLINE MONUMENTATION"
   "DO NOT DISTURB"
   PS#7719"
3. BOUNDARY SHALL BE TIED TO THE NEW MEXICO STATE PLANE COORDINATE SYSTEM AS SHOWN.
4. BASIS OF BEARING SHALL BE NEW MEXICO STATE PLANE GRID BEARINGS.
5. ALL DISTANCES SHALL BE GROUND DISTANCES
6. MANHOLES WILL BE OFFSET AT ALL POINTS OF CURVATURE, POINTS OF TANGENCY, STREET INTERSECTIONS, AND ALL OTHER ANGLE POINTS TO ALLOW USE OF CENTERLINE MONUMENTATION.

APPROVED

JUAN TABO HILLS WEST LLC OWNER "TRACT A JUAN TABO HILLS WEST"

ITS MEMBER SANDIA EAST TECHNOLOGY PARK, LLC DATE
REX P. WILSON, MANAGING MEMBER

ITS MEMBER GRIP HOLDINGS, LLC DATE
SCOTT GRADY, MANAGING MEMBER

CITY OF ALBUQUERQUE OWNER "TRACT 1-A-1, JUAN TABO HILLS, UNIT 2"

ROBERT J. PERRY, CHIEF ADMINISTRATIVE OFFICER DATE

CITY SURVEYOR, CITY OF ALBUQUERQUE, N.M. DATE

LEGAL DESCRIPTION

Tract of land situate within Sections 33 and 34, Township 10 North, Range 4 East, New Mexico Principal Meridian, City of Albuquerque, Bernalillo County, New Mexico being all of TRACT A, JUAN TABO HILLS WEST, as the same is shown and designated on said plat filed for record in the office of the County Clerk of Bernalillo County, New Mexico on June 14, 2007 in Book 2007C, Page 161 and TRACT 1-A-1, JUAN TABO HILLS, UNIT 2, as the same is shown and designated on said plat filed for record in the office of County Clerk of Bernalillo County, New Mexico on February 20, 2008 in Book 2008C, Page 30 and contains 98.4699 acres more or less.

EASEMENTS

- (A) EXISTING 30 FOOT SANITARY SEWER EASEMENT FOR THE CITY OF ALBUQUERQUE, FILED MARCH 22, 1979 IN MISC. 677 IN PAGES 777-780 AND FEBRUARY 14, 1979 IN BOOK MISC. 676 IN BOOK 46-49 AND THE TEMPORARY 10' EASEMENT IS FOR CONSTRUCTION. TO BE VACATED
- (B) EXISTING 100' DRAINAGE EASEMENT FILED AUGUST 8, 2005, IN BK A122, PAGE 9354. TO BE VACATED
- (C) EXIST. 20' WATERLINE EASEMENT FILED DECEMBER 12, 2005 IN BOOK 2005C, PAGE 406.
- (D) EXIST. 20' SANITARY SEWER EASEMENT FILED DECEMBER 12, 2005 IN BOOK 2005C, PAGE 406.
- (E) EXISTING 50' PRIVATE ACCESS EASEMENT JUNE 14, 2007, BOOK 2007C PAGE 161. TO BE VACATED
- (F) AN EXISTING BLANKET DRAINAGE EASEMENT ON TRACT 1-A-1 FILED JANUARY 19, 2005 IN BOOK 2005C, PAGE 22.
- (G) EXISTING 150' PUBLIC SERVICE COMPANY OF NEW MEXICO EASEMENT (10-04-57, BK. D401, PG. 235)
- (H) EXISTING PUBLIC SERVICE COMPANY OF NEW MEXICO EASEMENT (12-22-2005, BK-2005C, PG-406)
- (I) EXISTING 10' P.U.E. (02/20/2008, BK-2008C, PG-30)
- (J) EXISTING 30' C.O.A. PERMANENT UTILITY & DRAINAGE EASEMENT (01-26-78, BK. 583, PGS. 804-806)
- (K) EXISTING 10' C.O.A. TEMPORARY UTILITY & DRAINAGE EASEMENT (01-26-78, BK. 583, PGS. 804-806)
- (L) EXISTING 15'x40' PNM EASEMENT (02/20/2008, BK-2008C, PG-30)

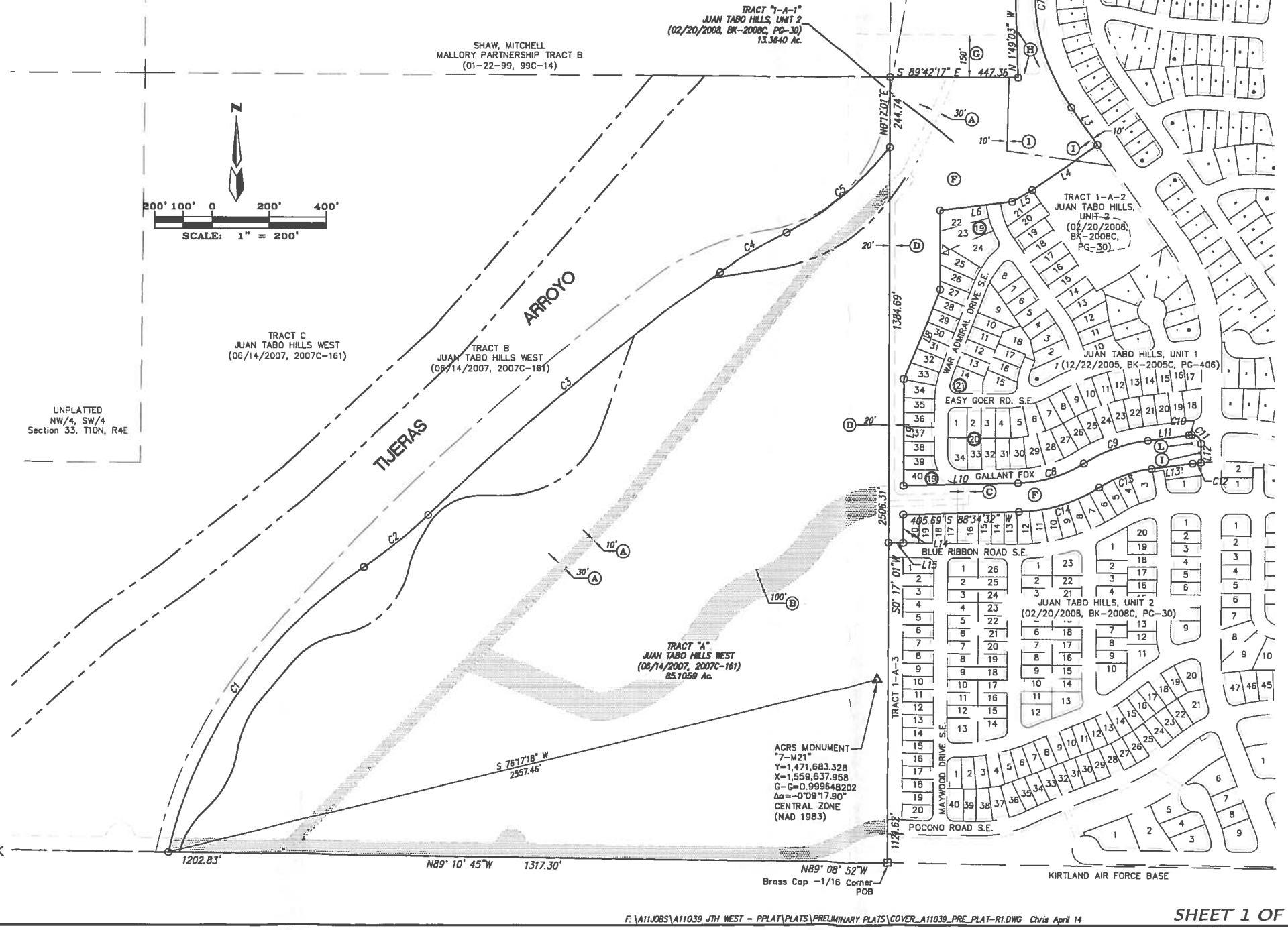
NEW STORM DRAIN EASEMENT

CURVE TABLE

CURVE #	RADIUS	LENGTH	DELTA	TANGENT	CHORD BEARING	CHORD DISTANCE
C1	1647.00'	1241.69'	43°11'45"	652.02'	N34°31'12"E	1212.49'
C2	1628.00'	290.15'	10°12'41"	145.46'	N51°00'43"E	289.76'
C3	8872.00'	1330.26'	8°35'27"	666.38'	N50°12'06"E	1329.01'
C4	1772.00'	268.65'	8°41'11"	134.58'	N58°50'26"E	268.38'
C5	1128.00'	478.38'	24°17'57"	242.84'	S51°02'03"W	474.80'
C6	690.00'	374.54'	31°06'02"	192.01'	S43°52'25"W	369.95'
C7	686.00'	771.51'	64°26'17"	432.32'	S02°46'51"E	731.49'
C8	450.00'	242.23'	30°50'29"	124.13'	N73°09'19"E	239.31'
C9	550.00'	239.72'	24°58'22"	121.79'	N70°13'15"E	237.82'
C10	1050.00'	9.52'	0°31'09"	4.76'	N82°58'00"E	9.51'
C11	30.00'	50.82'	97°03'26"	33.94'	S48°14'42"E	44.95'
C12	950.00'	30.14'	1°49'05"	15.07'	S83°36'58"W	30.14'
C13	450.00'	196.13'	24°58'22"	99.65'	S70°13'15"W	194.58'
C14	550.00'	296.06'	30°50'29"	151.71'	S73°09'18"W	292.49'

Line Table

Line #	Bearing	DISTANCE
L1	S74°16'53"E	142.42'
L2	S28°19'24"W	198.88'
L3	S35°00'00"E	159.38'
L4	S55°00'00"W	276.00'
L5	S60°26'38"W	81.23'
L6	S83°19'19"W	258.71'
L7	S0°00'00"E	276.99'
L8	S21°42'32"W	337.11'
L9	S0°17'01"W	374.51'
L10	N88°34'33"E	402.72'
L11	N82°42'26"E	145.51'
L12	S0°17'01"W	67.07'
L13	S82°42'26"W	145.51'
L14	S0°17'01"W	99.76'
L15	N89°19'34"W	50.00'



ENGINEERS

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

SURVEYOR

ALDRICH LAND SURVEY
P.O. BOX 30701
ALBUQUERQUE, N.M. 87190-0701
(505) 884-1990

OWNERS

JUAN TABO HILLS WEST LLC
P.O. BOX 9470
ALBUQUERQUE, NEW MEXICO 87119
(505) 899-6768

SITE BENCHMARK

AGRS MONUMENT
"5-M22"
ELEVATION=5594.518
(NAVD 1929)

F:\A11JOBS\A11039 JTH West - PPLAT\PLATS\PRELIMINARY PLATS\cover_A11039_PRE_PLAT-R1.dwg, 4/22/2014 9:48:14 AM, CutePDF Writer, CHRIS

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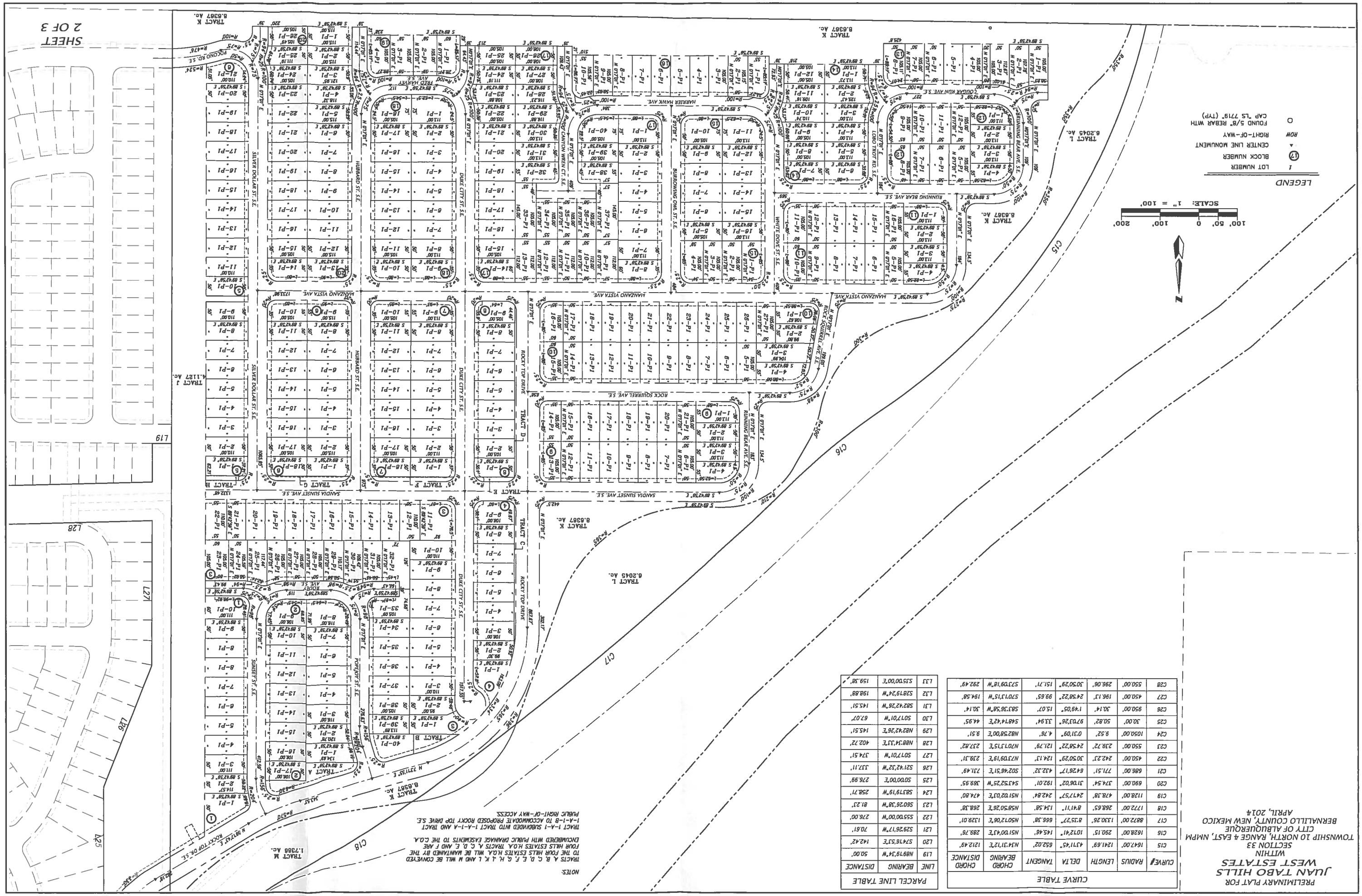
PRELIMINARY PLAT FOR
JUAN TABO HILLS WEST ESTATES
WITHIN
SECTION 33
TOWNSHIP 10 NORTH, RANGE 4 EAST, NMPM
CITY OF ALBUQUERQUE
BERNALILLO COUNTY, NEW MEXICO
APRIL, 2014



NOTES:

TRACTS A, B, C, D, E, F, G, H, I, K, L AND M WILL BE CONVEYED TO THE FOUR HILLS ESTATES H.O.A. WILL BE MAINTAINED BY THE FOUR HILLS ESTATES H.O.A. TRACTS A, C, D, E AND F ARE ENCUMBERED WITH PUBLIC DRAINAGE EASEMENTS TO THE C.O.A.

TRACT I-A-1 SUBDIVIDED INTO TRACT I-A-1-A AND TRACT I-A-1-B TO ACCOMMODATE PROPOSED ROCKY TOP DRIVE S.E. PUBLIC RIGHT-OF-WAY ACCESS.

CURVE TABLE

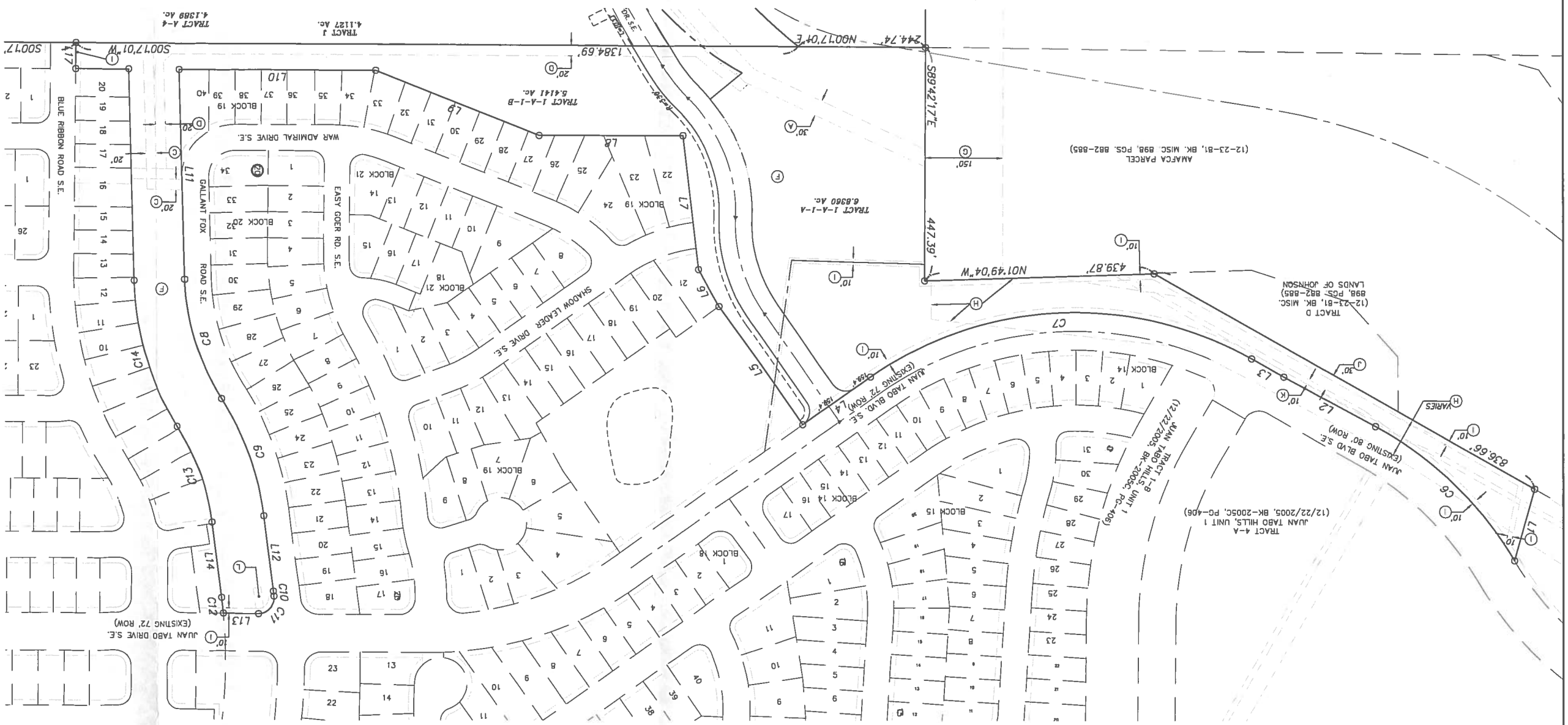
CURVE#	RADIUS	LENGTH	DELTA	TANGENT	CHORD BEARING	CHORD DISTANCE
C15	1642.00'	1241.69'	43°19'45"	652.02'	N34°31'12"E	1212.49'
C16	1626.00'	290.15'	10°12'41"	145.46'	N51°00'43"E	289.76'
C17	8872.00'	1330.26'	8°35'27"	666.38'	N50°12'06"E	1329.01'
C18	1772.00'	268.65'	8°41'11"	134.58'	N58°50'26"E	268.38'
C19	1128.00'	478.38'	24°17'57"	242.84'	N51°02'03"E	474.80'
C20	690.00'	374.54'	31°06'02"	192.01'	S43°52'25"W	369.95'
C21	686.00'	771.51'	64°26'17"	432.32'	S02°46'51"E	731.49'
C22	450.00'	242.23'	30°50'29"	124.13'	N73°09'19"E	239.31'
C23	550.00'	239.72'	24°58'22"	121.79'	N70°13'15"E	237.82'
C24	1050.00'	9.52'	0°31'09"	4.76'	N82°58'00"E	9.51'
C25	30.00'	50.82'	97°03'26"	33.94'	S48°14'42"E	44.95'
C26	950.00'	30.14'	1°49'05"	15.07'	S83°36'58"W	30.14'
C27	450.00'	196.13'	24°58'22"	99.65'	S70°13'15"W	194.58'
C28	550.00'	296.06'	30°50'29"	151.71'	S73°09'18"W	292.49'

PARCEL LINE TABLE

LINE	BEARING	DISTANCE
L19	N89°19'34"W	50.00'
L20	S74°16'53"E	142.42'
L21	S29°26'17"W	70.61'
L22	S55°50'00"W	276.00'
L23	S60°26'38"W	81.23'
L24	S83°19'19"W	258.71'
L25	S0°00'00"E	276.99'
L26	S21°42'32"W	337.11'
L27	S07°17'01"W	374.51'
L28	N88°34'33"E	402.72'
L29	N82°42'26"E	145.51'
L30	S07°17'01"W	67.07'
L31	S82°42'26"W	145.51'
L32	S26°19'24"W	198.88'
L33	S15°00'00"E	159.38'

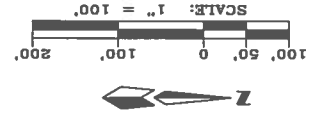
SHEET
3 OF 3

PRELIMINARY PLAT FOR
JUAN TABO HILLS WEST ESTATES
WITHIN
SECTION 33
TOWNSHIP 10 NORTH, RANGE 4 EAST, NMPM
CITY OF ALBUQUERQUE
BERNALILLO COUNTY, NEW MEXICO
APRIL, 2014



CURVE TABLE						
CURVE#	RADIUS	LENGTH	DELTA	TANGENT	CHORD BEARING	CHORD DISTANCE
C1	1128.00'	478.38'	24°17'57"	242.84'	N51°02'03"E	474.80'
C2	1772.00'	268.65'	8°41'11"	134.58'	N58°30'26"E	268.38'
C3	8872.00'	1330.26'	8°35'27"	666.38'	N50°12'06"E	1329.01'
C4	1628.00'	290.15'	10°12'41"	145.46'	N51°00'43"E	289.76'
C5	1647.00'	1241.69'	43°11'45"	652.02'	N34°31'12"E	1212.49'
C6	690.00'	374.54'	31°06'02"	192.01'	S43°52'25"W	369.95'
C7	686.00'	771.51'	64°26'17"	432.32'	S02°46'51"E	731.49'
C8	450.00'	242.21'	30°50'29"	124.13'	N73°09'19"E	239.31'
C9	550.00'	239.72'	24°58'22"	121.79'	N70°13'15"E	237.82'
C10	1050.00'	9.52'	0°31'09"	4.76'	N82°58'00"E	9.51'
C11	30.00'	50.82'	97°03'26"	33.94'	S48°14'42"E	44.95'
C12	950.00'	30.14'	1°49'05"	15.07'	S83°36'58"W	30.14'
C13	450.00'	196.13'	24°58'22"	99.65'	S70°13'15"W	194.58'
C14	550.00'	296.06'	30°50'29"	151.71'	S73°09'18"W	292.49'

PARCEL LINE TABLE		
LINE	BEARING	DISTANCE
L1	S74°16'53"E	142.42'
L2	S28°19'24"W	198.88'
L3	S29°26'17"W	70.61'
L4	S35°00'00"E	159.38'
L5	S55°00'00"W	276.00'
L6	S60°26'38"W	81.23'
L7	S83°19'19"W	258.71'
L8	S0°00'00"E	276.99'
L9	S21°42'32"W	337.11'
L10	S0°17'01"W	374.51'
L11	N88°34'33"E	402.72'
L12	N82°42'26"E	145.51'
L13	S0°17'01"W	67.07'
L14	S82°42'26"W	145.51'
L17	N89°19'34"W	50.00'

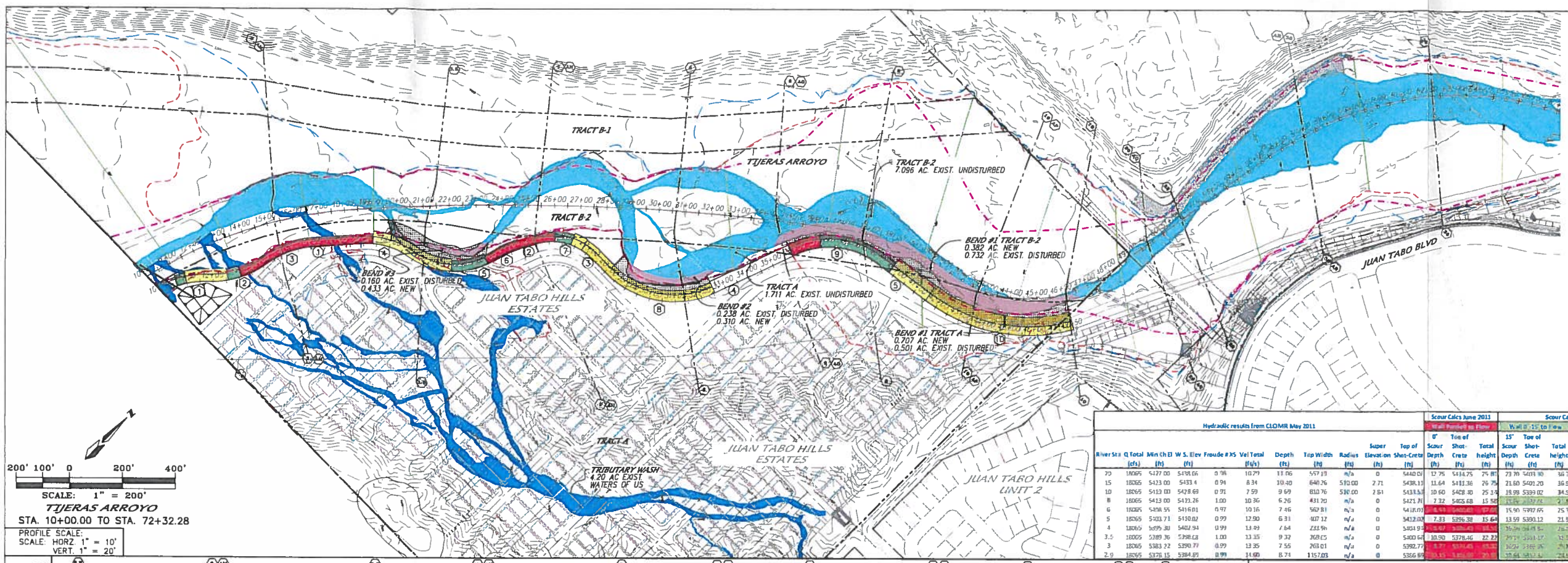


LEGEND

J	LOT NUMBER
(17)	BLOCK NUMBER
▲	CENTER LINE MONUMENT
ROW	RIGHT-OF-WAY

PROPERTY CORNERS
○ FOUND 5/8" REBAR WITH CAP "LS 7719" (TYP)

Appendix I: 404 Permit Exhibits



CURVE DATA – TOP OF SHOTCRETE

① Δ=30°08'26" L=184.12 R=350.00 Tan=94.24	② Δ=37°55'34" L=231.68 R=350.00 Tan=120.26	③ Δ=32°21'15" L=197.64 R=350.00 Tan=101.53
④ Δ=38°49'36" L=186.36 R=275.00 Tan=96.92	⑤ Δ=68°09'28" L=356.87 R=300.00 Tan=202.95	⑥ Δ=17°51'44" L=93.53 R=300.00 Tan=47.15
⑦ Δ=60°36'42" L=222.15 R=210.00 Tan=122.74	⑧ Δ=70°27'14" L=448.82 R=365.00 Tan=257.74	⑨ Δ=61°33'59" L=322.21 R=302.32 Tan=178.31
⑩ Δ=51°24'24" L=581.35 R=647.95 Tan=311.88		

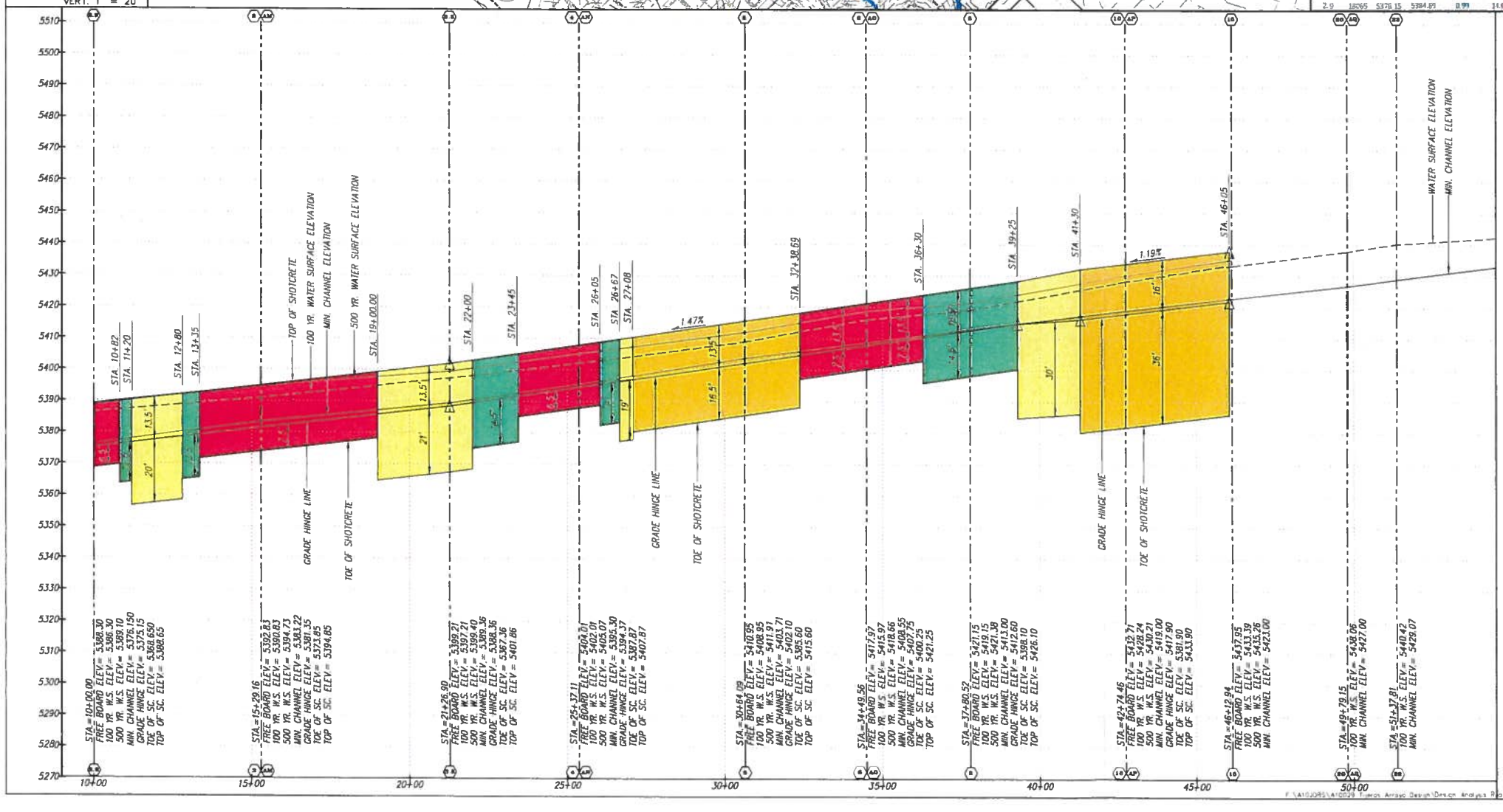
LINE DATA – TOP OF SHOTCRETE

① N41°08'27"E 185.211'	② N29°40'19"E 69.74'	③ S89°42'59"E 79.46'
④ N19°49'46"E 338.81'	⑤ N81°09'26"E 251.53'	

Hydraulic results from CLOMR May 2011

River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Froude # Chl	Vel Total (ft/s)	Depth (ft)	Top Width (ft)	Radius (ft)	Super Elevation (ft)	Top of Shot-Crete (ft)
20	18065	5427.00	5438.66	0.96	10.29	11.66	567.13	n/a	0	5440.00
15	18065	5423.00	5433.4	0.94	8.34	10.40	640.76	5310.00	2.71	5438.13
10	18065	5413.00	5428.68	0.91	7.59	9.69	810.76	5300.00	2.61	5433.53
8	18065	5413.00	5413.26	1.00	10.36	6.26	431.20	n/a	0	5421.26
6	18065	5398.55	5416.01	0.97	10.16	7.46	567.81	n/a	0	5418.01
5	18065	5403.71	5410.02	0.99	12.90	6.31	407.12	n/a	0	5412.00
4	18065	5395.80	5402.94	0.99	13.49	7.64	233.96	n/a	0	5403.94
3.5	18065	5389.76	5398.66	1.00	13.35	9.32	368.25	n/a	0	5403.66
3	18065	5383.22	5390.77	0.99	13.35	7.55	263.01	n/a	0	5392.77
2.9	18065	5378.15	5384.85	0.99	14.60	8.74	1157.03	n/a	0	5386.85

Scour Calcs June 2011			Scour Calcs Dec. 2013			Scour Calcs Oct. 2013					
Wall Parallel to Flow			Wall 0° to Flow			Wall 15° to Flow			Wall Perpendicular to Flow		
0° Scour Depth (ft)	Toe of Shot-Crete (ft)	Total height (ft)	15° Scour Depth (ft)	Toe of Shot-Crete (ft)	Total height (ft)	30° Scour Depth (ft)	Toe of Shot-Crete (ft)	Total height (ft)	90° Scour Depth (ft)	Toe of Shot-Crete (ft)	Total height (ft)
12.75	5434.75	25.87	23.39	5429.30	36.76	19.97	5903.99	46.07	18.05	5392.05	47.91
11.64	5431.36	26.75	21.60	5429.20	36.91	20.46	5392.54	45.57	20.76	5392.24	47.91
10.60	5428.30	25.14	19.98	5399.02	34.51	17.97	5391.03	42.56	17.57	5381.53	47.12
7.32	5405.68	15.58	15.06	5394.18	27.12	18.65	5394.18	27.12	25.04	5387.96	33.30
8.43	5405.43	17.66	15.90	5397.65	25.96	22.16	5386.99	31.62	29.54	5379.01	39.62
7.33	5396.38	15.64	13.59	5390.12	21.96	18.92	5381.79	27.73	25.16	5378.55	33.47
8.43	5405.43	17.66	15.90	5397.65	25.96	22.16	5386.99	31.62	29.54	5379.01	39.62
12.90	5416.46	22.23	19.79	5399.17	33.51	27.91	5387.39	37.55	37.28	5382.08	48.64
10.90	5398.46	22.23	19.08	5401.28	35.54	26.91	5390.17	37.55	37.28	5382.08	48.64
8.93	5398.46	22.23	16.94	5401.28	35.54	24.91	5390.17	37.55	34.07	5385.39	45.85
8.93	5398.46	22.23	16.94	5401.28	35.54	24.91	5390.17	37.55	30.10	5382.12	39.82
8.93	5398.46	22.23	16.94	5401.28	35.54	24.91	5390.17	37.55	31.84	5381.31	45.51



NOTES

1. CONCEPTUAL DESIGN IS BASED ON HEC-RES MODEL OF REVISED FEMA FLOOD PLAINS FOR THIS PROJECT WITH FLOW RATES: FEMA Q_{100}= 18,065 cfs, FEMA Q_{100}= 30,500 cfs AND FUTURE Q_{100}= 35,853 cfs.
2. CURRENT EFFECTIVE FEMA FLOOD PLAINS ARE BASED ON A INFORMATION CONTAINED IN A LETTER OF MAP REVISION, LOMR, DATED FEB 1, 2013 THAT BECAME EFFECTIVE JUNE 17, 2013.
3. CONCEPTUAL SCOUR DEPTHS ARE CALCULATED IN ACCORDANCE WITH AMAFCA'S EROSION DESIGN GUIDE BY RESOURCE CONSULTANTS & ENGINEERS, INC. MARCH 1994, EQUATION (3.90) $Ys / Y = (0.73 + 0.14\ \pi\ Fr)^{cos\ \theta + 4Fr0.33\ sin\ \theta}$
4. THE BANK PROTECTION IS LOCATED AS CLOSE TO THE ARROYO AS POSSIBLE WITHOUT PLACING ANY FILL IN FEMA'S REGULATORY FLOODWAY AND WITHOUT ANY OF THE BANK PROTECTION INSIDE THE TIJERAS ARROYO JURISDICTIONAL WATERS OF THE UNITED STATES.
5. THE LOCATION OF THE WATERS OF THE UNITED STATES ARE FROM A DELINEATION REPORT BY ECOSYSTEM MANAGEMENT INC. FEB. 2014 AS SUBMITTED TO THE CORPS OF ENGINEERS FOR APPROVED JURISDICTIONAL DETERMINATION MARCH 7, 2014

LEGEND

- LIMITS 100 YEAR FLOOD PLAIN
- LIMITS 500 YEAR FLOOD PLAIN
- LIMITS OF FLOODWAY
- LIMITS AO ZONE
- BANK PROTECTION WITH IMPINGING FLOW ANGLE OF = 30° TO 45°
- BANK PROTECTION WITH IMPINGING FLOW ANGLE OF = 30° TO 15°
- BANK PROTECTION WITH IMPINGING FLOW ANGLE OF = 15° TO 0°
- BANK PROTECTION WITH PARALLEL FLOW
- PERMANENT WATERS OF THE U.S. ADDED THIS PROJECT
- EXISTING TIJERAS ARROYO WATERS OF U.S. TEMPORARILY IMPACTED THIS PROJECT
- EXISTING TIJERAS ARROYO WATERS OF U.S. NOT IMPACTED THIS PROJECT
- EXISTING TRIBUTARY ARROYO WATERS OF U.S. TO BE FILLED THIS PROJECT

JUAN TABO HILLS WEST - MARCH 2014

CONCEPTUAL TIJERAS ARROYO BANK PROTECTION

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

Designed: JDH	Drawn: ACH	Checked: DMG	Sheet 1 of 1
Scale: 1" = 100'	Date: 07/30/14	Job: A10029	

F:\A10029\A10029 Tijeras Arroyo Design\Design Analysis Report\CONSTRUCTION PLANS\A10029 Map Drainage Base-4 dwg, 8/7/2014 9:27:04 AM, PDF Complete, CHRIS

Comparison of Functions

Function	Impact Site	Mitigation Site	Ratio	Comments
Short- or long- term surface water storage	6" x 4.2 ac = **2.1 ac-ft**	**3.0 ac-ft**	**1.4**	
Subsurface water storage (infiltration)	(4.2 ac) x (2 in/hr) x (0.5 hr) / (12in/ft) = **0.35 ac-ft**	(0.5 ac) x (2 in/hr) x (24 hr) / (12 in/ft) = **2.00 ac-ft**	**5.7**	
Moderation of ground water flow or discharge	N/A	N/A	N/A	Zero discharge of ground water for both sites
Disipation of energy	Highly erosive	Non-erosive	+++	
Cycling of nutriants (Carbon cycle)	Aerobic	Mostly aerobic with brief periods of anaerobic	-	
Removal of Elements and Compounds (Nitrogen)	**82.7 lb/yr**	**9.0 lb/yr**	**9.2**	
Retention of Particulates (Sediment)	**33.1 ton/yr**	**0.4 ton/yr**	**82.8**	The impact site increases sediment rather than reducing it
Export of organic carbon (BOD)	**5161 lb/yr**	**664 lb/yr**	**7.8**	
Maintenance of plant and animal communities				The impact site is chariacterized by a sand bottom with no vegitation and does not provide habitat that is prefered over the adjacent uplands for either plans or animals.
Site Area	**4.2 ac**	**0.5 ac**	**-8.4**	

Mitigation Site Summary

			Tract A (HOA Owned)	Tract B-2 (City Owned)	Total
Tributary		Tributary Impact Site	4.200	0.000	4.2
		Pond Mitigation Site	0.500	0.000	
Tijeras		Preserved Site (undisturbed)	7.096	1.711	
	Bend 1	Preserved Site (temp disturbance)	0.501	0.732	1.233
		New Site (graded w/cursher fines)	0.707	0.382	1.089
	Bend 2	Preserved Site (temp disturbance)	0.238	0.000	0.238
		New Site (graded w/cursher fines)	0.310	0.000	0.31
	Bend 3	Preserved Site (temp disturbance)	0.160	0.000	0.16
		New Site (graded w/cursher fines)	0.433	0.000	0.433
	Subtotal Bend 1-3	Preserved Site (temp disturbance)	0.899	0.732	1.631
		New Site (graded w/cursher fines)	1.450	0.382	1.832
		TOTALS:	9.445	2.825	**12.270**