City of Albuquerque
P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

June 4, 2002

John Andrews, PE
The Larkin Group, Inc
8500 Menaul Blvd NE, Suite A-440
Albuquerque, NM 87112

Re: TVI NW Campus Drainage Report,
Engineer's Stamp dated 5-21-02 (A10/D3)

Dear Mr. Andrews,

Based upon the information provided in your submittal dated 5-22-02, the above referenced report is approved for Work Order requirements. Any minor corrections to the plans will be addressed at DRC.

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

Sincerely,

Bradley L. Bingham, PE
Sr. Engineer, PWD
Development and Building Services

C: Susan Calongne, BCPW
Lynn Mazur, AMAFCA
file

Albuquerque TVI

TVI Northwest Site
Offsite Improvements
Drainage Report

May, 2002

Prepared By:
Larkin Group NM, Inc.
Consulting Engineers
8500 Menaul Blvd NE
Albuquerque, NM 87112

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1.0 Introduction

Albuquerque TVI proposes to develop an additional educational complex for the citizens of the Albuquerque metropolitan area herein referred to as the TVI Northwest Site. This TVI Northwest Site consists of a 108 acre parcel located in the north west quadrant of the Albuquerque metropolitan area and lies approximately 1300 feet north of Irving Blvd. east-west between proposed Universe Blvd. and proposed Rainbow Blvd. and south of proposed McMahon Blvd. TVI's total development will consist of 5 phases however, with the exception of Phase I, no schedule for construction of the future phases is known. This report will address the drainage improvements required to be provided in conjunction with the proposed roadway improvements to serve the Phase I development, see Figure 1, (Location Map Zone Atlas Map A-10-Z).

The street and related drainage improvements included with this offsite improvement project include the extension of the south one half of Irving Blvd. to be utilized as a two way street, and the extension of the west one half of Universe Blvd also to be utilized as a two way street. This project also provides arroyo grade control drop structures to continue AMAFCA's plan to stabilize the West Branch of the Calabacillas Arroyo to an equilibrium slope.

The agencies involved in the development of this complex include the following:

County of Bernalillo - Portions of access to the site are currently located in the County of Bernalillo, outside the Albuquerque municipal limits, however an easement has been granted to the City of Albuquerque for construction of the proposed improvements.

City of Albuquerque - Portions of access to the site and portions of the offsite drainage facilities are located within the Albuquerque municipal limits.

AMAFCA - AMAFCA's West Branch of the Calabacillas Arroyo is located within the construction area and receives the site drainage.

New Mexico Utilities Inc (NMUI) - The site is within the service area of NMUI therefore, water and sewer service will be provided by NMUI.

2.0 Hydrology Methods

The drainage alnalysis was based on Section 22.2 of the Development Process Manual, Volume 2, Design Criteria for the City of Albuquerque, New Mexico, January 1993.

The TVI Northwest Site is within Precipitation Zone 1 as defined in Section 22.2 of the DPM. The Mussetter Prudent Line Study (see Sec. 3.0 – History of Drainage Analysis) used the 6 hour, 100-year return event storm to calculate peak runoff for existing as well as developed conditions. These values were accepted and used to determine flow rates in the West Branch of the Calabacillas Arroyo. Land treatments for TVI onsite flow rates were taken from Albuquerque TVI Master Drainage Plan December, 2001. AHYMO_97 was used to determine developed conditions flow rates for the larger drainage basins and the recommended values in Table A-5 of DPM Section 22.2 for the smaller drainage basins. These computations can be found in Appendix G.

3.0 History of Drainage Analysis

A draft Prudent Line Study was performed on the West Branch of the Calabacillas Arroyo by Mussetter Engineering, Inc. for The Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA). This draft study was used as a reference for this report. The Mussetter Prudent Line Study predicted fully developed conditions land treatments for this area as 0% A, 40%B, 18%C, and 42%D, pertinent pages of this draft report are included in Appendix F. A Master Drainage Plan (Albuquerque TVI Master Drainage Plan-Northwest Site) was previously prepared by Larkin Group NM. which has been approved by AMAFCA, Bernalillo County and the City of Albuquerque. This Master Drainage Plan has also been used as a reference for this report, pertinent pages of this Plan

are included in Appendix D. Jeff Mortensen & Associates has prepared a grading & drainage plan for the TVI Northwest Site Phase I, this grading & drainage plan has also been used in this report. Bohannan Huston, Inc has prepared The Design Analysis Report For Ventana Ranch Subdivision Drainage Facilities July, 2000, which addresses the area south and west of the TVI site this report also has been referenced for this report, pertinent pages have been included in Appendix C.

4.0 Project Description

The purpose of this project is to construct the necessary infrastructure to provide access and drainage to serve the Northwest TVI site, as described in the following sections This construction includes a 1200 l.f. extension of Irving Blvd. (south side) from the existing pavement at the Ventana Rd. intersection to the Universe Blvd. intersection, and a 2200 l.f. extension of Universe Blvd. (west side) from the Irving Blvd. intersection to the TVI site entrance. This project includes a crossing structure for the West Branch of the Calabacillas Arroyo at Universe Blvd. and grade control drop structures to begin the stabilization of the equilibrium slope of the West Branch of the Calabacillas Arroyo. The street extensions will also include their associated utilities and underlying storm drains required to serve and support fully developed conditions for the surrounding area. This construction area is shown on FIRM Map Number 35001C0103 D Panel 103 of 825 and is determined to be outside the 100-year floodplain except for the portion within the banks of the West Branch of the Calabacillas Arroyo (see FIRM Map in back pocket of this report).

5.0 Street Improvements

The street improvements will include improvements to Irving Blvd. and Universe Blvd. (see typical sections Appendix E). Only one half of these street sections will be improved at this time and utilized as two way traffic. The Irving Blvd. improvements will extend the south lanes of existing

Irving Blvd. west to the intersection of Universe Blvd., a minor arterial. Universe Blvd. improvements will extend from the intersection with Irving Blvd. northerly to the access road for the TVI site. The proposed storm drains to be constructed under these streets are sized for the fully constructed street sections with inlets installed for the street sections being constructed at this time. During construction all SWPPP practices should be maintained.

5.0.a Universe Blvd Street Improvements

These improvements will construct approximately 2160 lf of a 25' face-to-face street width, with curb and gutter for a minor arterial (Detail Appendix E) on the west one half of Universe Blvd. from the intersection with Irving Blvd. to the entrance of the TVI site.

This project will construct the entire crossing structure (Detail, Appendix E) for the full roadway width at the West Branch of the Calabacillas Arroyo. Fill for both north and south bound lanes will be placed over the crossing structure and then tapered back to the necessary fill for the section being constructed.

5.0.b Irving Blvd. Street Improvements

These improvements will extend the existing south one half of Irving Blvd., from the existing pavement at the Ventana Rd. intersection westerly to the Universe Blvd intersection consisting of approximately 1220 l.f. of a 25' face-to-face street width, with curb and gutter (Detail Appendix E).

6.0 Storm Drainage Improvements

All proposed storm drains (Appendix A, P&P sheets 6-1 to 6-5) are sized for fully developed conditions (calculations Appendix A-6 & A-7), with inlets to be installed on the paved portion of the

street and inlet stub outs for future final construction.

6.0.a Universe Blvd. Storm Drainage Improvements

6.0.a.1 Improvements South of the West Branch of the Calabacillas Arroyo

This section of the project is affected by 2 offsite existing conditions drainage basins located generally west of the proposed street improvements (Basins 10 & 20, see Figure 2). These basins will produce a total of 179 cfs (calculations Appendix G). This offsite flow will be directed along Universe Blvd. to the West Branch of the Calabacillas Arroyo. The developed conditions flows from these basins will be collected and diverted to the West Branch of the Calabacillas Arroyo (Figure 2A) as per The Design Analysis Report for Ventana Ranch Subdivision Drainage Facilities (see Appendix C).

Developed runoff impacting the southerly portion of Universe Blvd. south of the West Branch of the Calabacillas Arroyo will be collected and conveyed in 24 inch RCP storm drains (id 207, 206, 205, Plan & Profile Appendix A) from Irving Blvd. to a 66 inch RCP (id 202 Plan & Profile Appendix A) which will discharge to the West Branch of the Calabacillas Arroyo at the outlet of the Universe Blvd. / Arroyo crossing drainage structure (see Appendix A for capacity calculations). This discharge will be controlled by means of a 84 inch ring chamber energy dissipater located on the south side of the Universe Blvd./Arroyo crossing structure. Storm drain ID 203, a 66 inch R.C.P., (See Appendix A-4) will be installed across Universe Blvd. to accept developed flows (330 cfs Appendix C) as per The Design Analysis Report for Ventana Ranch Subdivision Drainage Facilities.

Table 1 Irving Blvd & Universe Blvd South Developed Conditions Runoff Summary

Basin ID	Area (Acres)	Developed Q (cfs)	Cumulative Q (cfs)	Developed 6 hr Vol. (ac-ft)
Irving Blvd St. Flows East of Universe	.90	3.8	3.8	0.14
Irving Blvd St. Flows Inlets East of Universe	.19	0.8	4.6	0.03
Universe Blvd Flows From South of Irving	2.5	10.8		0.37
Irving Blvd St. Flows West of Universe	.11	0.5		0.02
Offsite Flows From Tract A	.72	3.0	18.8	0.11
Universe Blvd St. Flows	1.9	8.1	26.9	0.29

6.0.a.2 Improvements North of the West Branch of the Calabacillas Arroyo

Developed runoff (249.9 cfs) from Universe Blvd north of the West Branch of the Calabacillas Arroyo will be collected and conveyed in a 60 inch RCP storm drain (id 105, 104, 103, & 102 Plan & Profile Appendix A), which will discharge to a 78 inch ring chamber energy dissipater located at the outlet and on the north side of the Universe Blvd. / arroyo crossing structure. The approved Master Drainage Plan called for a 66 inch RCP at 0.7% slope (capacity 281 cfs), with developed conditions runoff from Phase 1 of 70 c.f.s. however the approved grading & drainage plan prepared by Jeff Mortensen and Associates for Phase I has reduced the developed flows to 37 c.f.s., from this phase, this reduction along with the final Universe Blvd. road profile design allows the installation of a 60 inch pipe at 1.17% slope (capacity 282 c.f.s.). This smaller size pipe and steeper slope will still convey all Master Plan developed flows.

Storm drains 105, 104, 103, and 102 (Plan & Profile Appendix A) are sized to ultimately accept developed conditions runoff from OS-1 (93 cfs Appendix D), and OS-5 (13 cfs Appendix D), as shown on Figure 2A.

By the TVI Phase I development, presently under construction, a portion of B-3 will be replaced by Phase I (Figure 2A) and discharge 37 cfs (As per Jeff Mortensen & Associates Inc) to Universe Blvd. while the remainder of B-3 and OS-1 (Plate 1 Appendix D), will produce 46.4 cfs (Appendix D) which will be routed to an interim desilting basin prior to discharge into the Universe Blvd storm drain system.

Future final development of the TVI site will replace existing Basins B-1 through B-4 (Figure 2) with Phase I through Phase V developments (Plate 5 Appendix D). The Phase I interim desilting basin will be removed by the completion of Phase III. Phase I and Phase II developments will drain to the Universe Blvd. storm drain while Phases III, IV, & V will drain directly to the West Branch of the Calabacillas Arroyo, across the TVI site as per Plate 5 Appendix D.

Universe Blvd. and it's storm drain improvements will ultimately convey developed conditions runoff from basins OS-1 (Figure 2A), OS-5 (Figure 2A), Phase I (Plate 1 Appendix D), Phase II (Plate 5 Appendix D), and street flows from McMahon and Universe Blvds totaling 249.9 cfs. (computations, Appendix D) to the West Branch of the Calabacillas Arroyo.

Table 2 Universe Blvd North Developed Conditions Runoff Summary

Basin ID	Area (Acres)	Developed Q (cfs)	Cumulative Q (cfs)	Developed 6 hr Vol. (ac-ft)
OS-1	27.5	93.5	93.5	3.2
OS-5	3.9	13.1	106.6	0.4
McMahon Blvd St. Flows	7.7	30.8	137.4	1.1
Phase II	18.7	59.5	196.9	2.0
Phase I *	15.8	37	234.2	1.7
Universe Blvd St. Flows	3.7	15.7	249.9	0.6

*As per Jeff Mortensen & Associates Inc Grading & Drainage Plan for Phase I

6.0.b Universe Blvd. Crossing Structure at the West Branch of the Calabacillas Arroyo

This section will construct the Universe Blvd., crossing structure for the West Branch of the Calabacillas Arroyo. The full width roadway structure will be built, although only the west half of

Universe Blvd. will be paved under Phase I development.

The Mussetter Prudent Line Study predicted fully developed conditions land treatments for this area as 0% A, 40%B, 18%C, and 42%D. These land treatments will produce developed conditions flow rates of 5290 cfs (bulked) for the Universe Blvd crossing structure (see Appendix F). AMAFCA criteria for this structure is to initially pass 2900 cfs. and ultimately pass 5300 cfs. with back water. The Universe Blvd. storm drain systems will collect and convey 249.9 and 357 cfs of developed conditions flow to the downstream side of the Universe Blvd. crossing structure therefore, the upstream flow rate of 5300 cfs. has been reduced to 4700 cfs to reflect these conditions. Flow rates downstream of the crossing structure will remain at 5300 cfs for all design purposes.

The introduction of each new discharge point, to the arroyo, requires the construction of slope stabilization drop structures downstream. These new drop structures will be of similar material, drop depth, and spacing, used for the existing drop structures east of Kayenta St., to maintain consistency in the West Branch of the Calabacillas Arroyo. With this project, stabilization of the West Branch of the Calabacillas Arroyo will include the installation of 4 riprap grade control drop structures (see profiles & calculations Appendix B). The Seville subdivision located to the east of this site has begun the process of stabilizing the equilibrium slope (0.00032 to 0.00019 ft./ft.) of the West Branch of the Calabacillas Arroyo down stream of Kayenta St. To date this has included the installation of the AMAFCA approved riprap grade control drop structures. As per conversations with AMAFCA these drop structures will be installed to grade then backfilled to provide for equestrian accessibility (see Profile 1, Appendix B). AMAFCA proposes to re-grade and maintain the structures between major storm events (Profile 2, Appendix B) to maintain the arroyo as equestrian accessible. Profiles 3 and 4 (Appendix B) are of the West Branch of the Calabacillas Arroyo with all drop structures in place and a fully developed flow rate of 5300 cfs. Complete future stabilization of

the West Branch of the Calabacillas Arroyo will require the future installation, by others as per AMAFCA, of 3 additional drop structures as shown on Profiles 3 & 4 (Appendix B) as the area develops.

6.0.c Irving Blvd. Storm Drainage Improvements

This project will extend the south half of Irving Blvd. consisting of approximately 1220 l.f. of 25' face to face street, curb and gutter (Detail Appendix E). This portion of Irving Blvd. is bounded by 2 existing conditions off site drainage areas (Tract 1-C, and Tract A1, see Figure 2). In the present condition the basin in Tract 1-C drains north east directly to the West Branch of the Calabacillas Arroyo. One basin A1-a (1.7 acres) drains to the street improvement area, producing 2.2 cfs. for the 100 yr. event. This will be collected in a temporary retention pond (Ventana Ranch Conceptual Grading & Drainage Plan, map pocket). Under developed conditions Tract A1 will drain to the south east through a detention pond to a future storm drain system into the Little Window Dam, as per Ventana Ranch Tract A Conceptual Grading & Drainage Plan (see map pocket). Tract 1-C will continue to drain directly to the West Branch of the Calabacillas Arroyo. Tract A1 will contribute a total of 3 cfs. to the Universe / Irving storm drain system as per the Ventana Ranch Tract A Conceptual Grading & Drainage Plan (see map pocket).

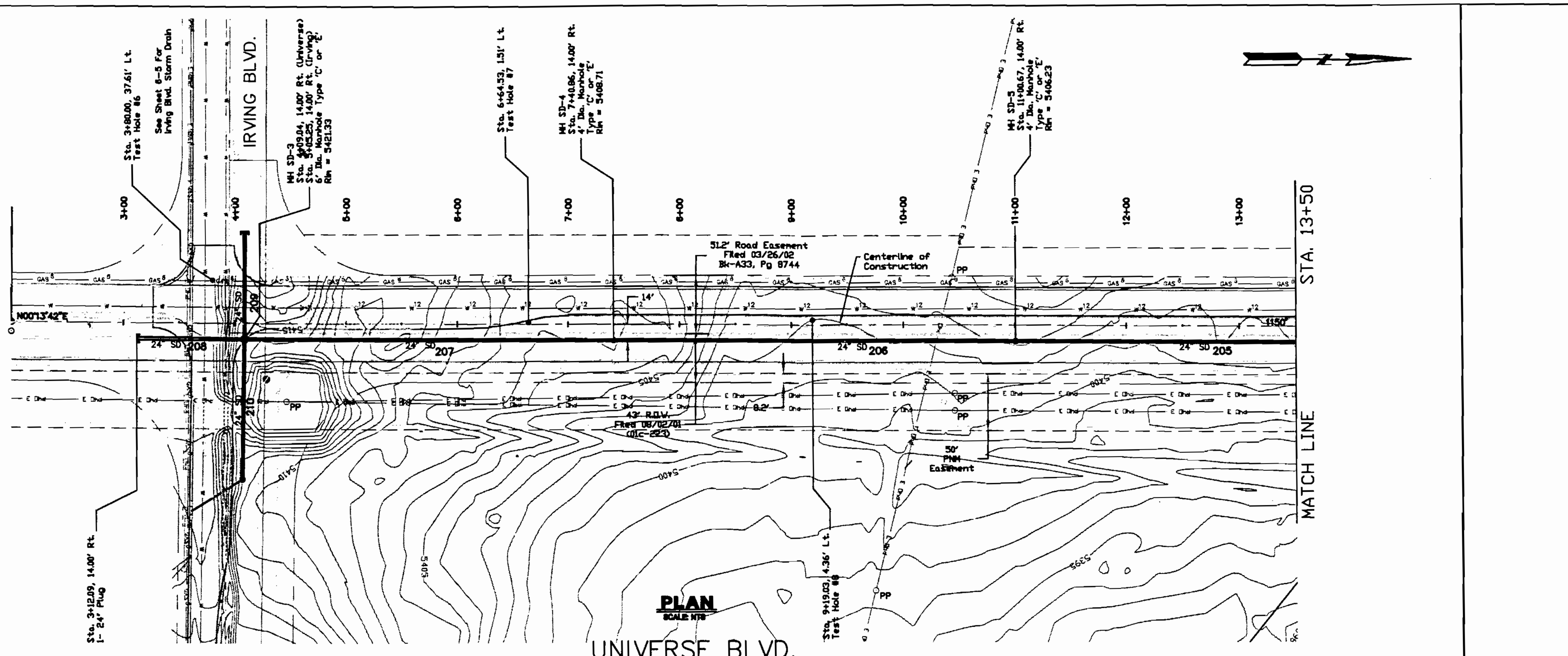
Catch basins located 130 ft. and 300 ft. east of the Universe Blvd intersection (Appendix A P & P) will collect Irving Blvd. runoff from the existing Ventana Road intersection to the Universe Blvd intersection. This runoff will be collected and conveyed in 24 inch RCP storm drains (211, 210, 209, and 208, P & P Appendix A) to discharge in the West Branch of the Calabacillas Arroyo. All proposed storm drains are sized for fully developed conditions (see Table 1), with stub outs to future inlets during final construction of the street section.

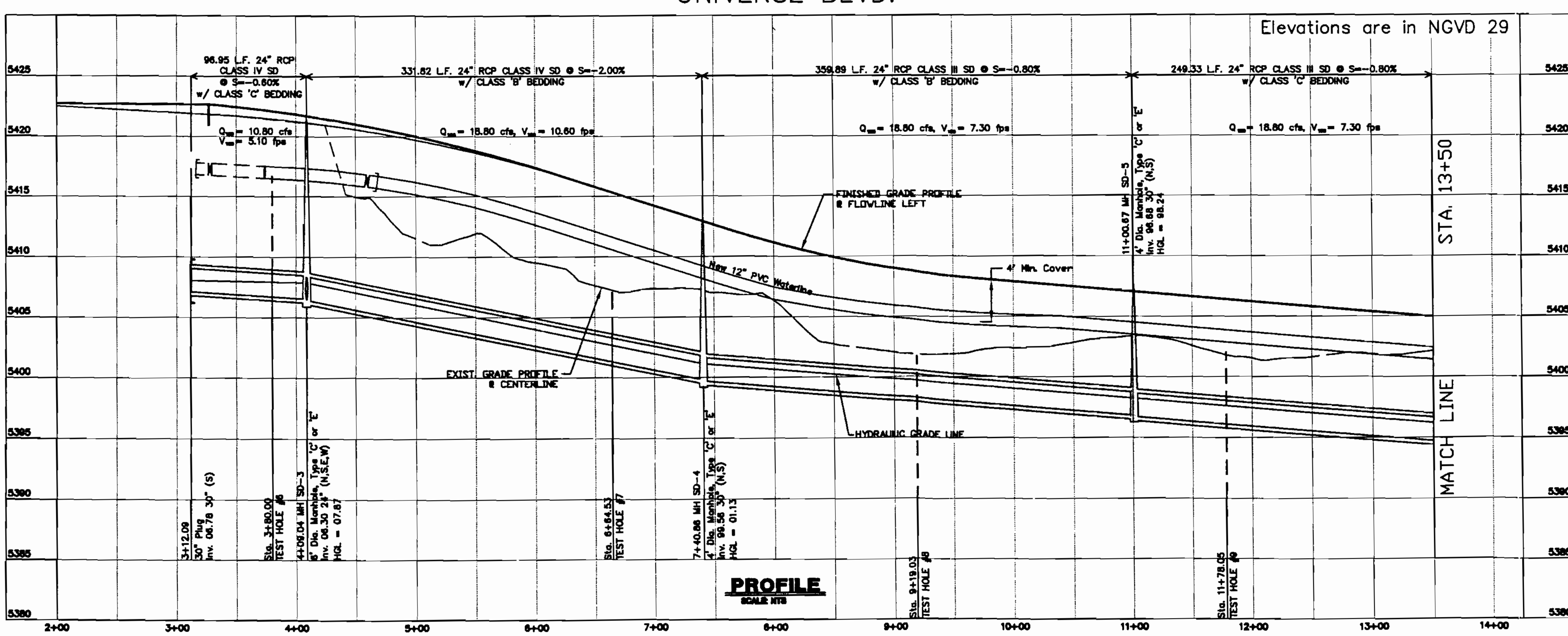
7.0 Utility Improvements

TVI North West Site is within the service area of New Mexico Utilities Inc. (NMUI) therefore, applicable water lines and sanitary sewer lines will be provided by this project and construction coordinated with NMUI.

8.0 Conclusions

The storm drainage improvements described herein will provide all offsite drainage requirements needed to serve Phase I of the TVI site, and provide the initial drainage infrastructure for extension to serve future full development of the upstream watershed as per the Mussetter Engineering Draft West Branch of the Calabacillas Arroyo Prudent Line Study. This project will begin the stabilization of the equilibrium slope, for the West Branch of the Calabacillas Arroyo, as established by the Mussetter Engineering - West Branch of the Calabacillas Arroyo Prudent Line Study prepared for AMAFCA, with the construction of the indicated grade control structures downstream of the discharge point to the arroyo. The type, number and installation of these structures has been approved by AMAFCA. TVI will construct the complete arroyo crossing structure on the West Branch of the Calabacillas Arroyo.





LARKIN GROUP, INC.
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CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

TITLE: TVI NORTHWEST SITE-OFFSITE IMPROVEMENTS
UNIVERSE BLVD.
STORM DRAIN PLAN & PROFILE

Design Review Committee	City Engineer Approval	Mo./Day/Yr.	Mo./Day/Yr.

Last Design Update

City Project No. 6839.81 | Zone Map No. A-10 | Sheet 6-1 Of 6-6

A-1

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REVISIONS
DESIGN
DESIGNED BY: R.W.M.
DRAWN BY: R.J.S.
CHECKED BY: J.A.A

ENGINEER'S SEAL
REGISTERED PROFESSIONAL ENGINEER, STATE OF NEW MEXICO, No. 3960, JOHN A. ANDREWS

SURVEY INFORMATION

FIELD NOTES		
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BENCH MARKS

A.C.S. Station 1-A10 Standard Brass Tablet Set in Concrete Post. From the Intersection of Paradise Blvd. And Universe Blvd. Go North 1.9 Miles along the Overhead Electric Power Line to the Bernalillo County and Sandoval County line, Go East 0.25 Miles and South 260 Feet To Station.
NM State Plane Coordinates: X=358933.85, Y=1534660.24
Elevation = 5415.18 (1929 MSLD)

AS BUILT INFORMATION

CONTRACTOR	
WORK STAKED BY	DATE
INSPECTOR'S ACCEPTANCE BY	DATE
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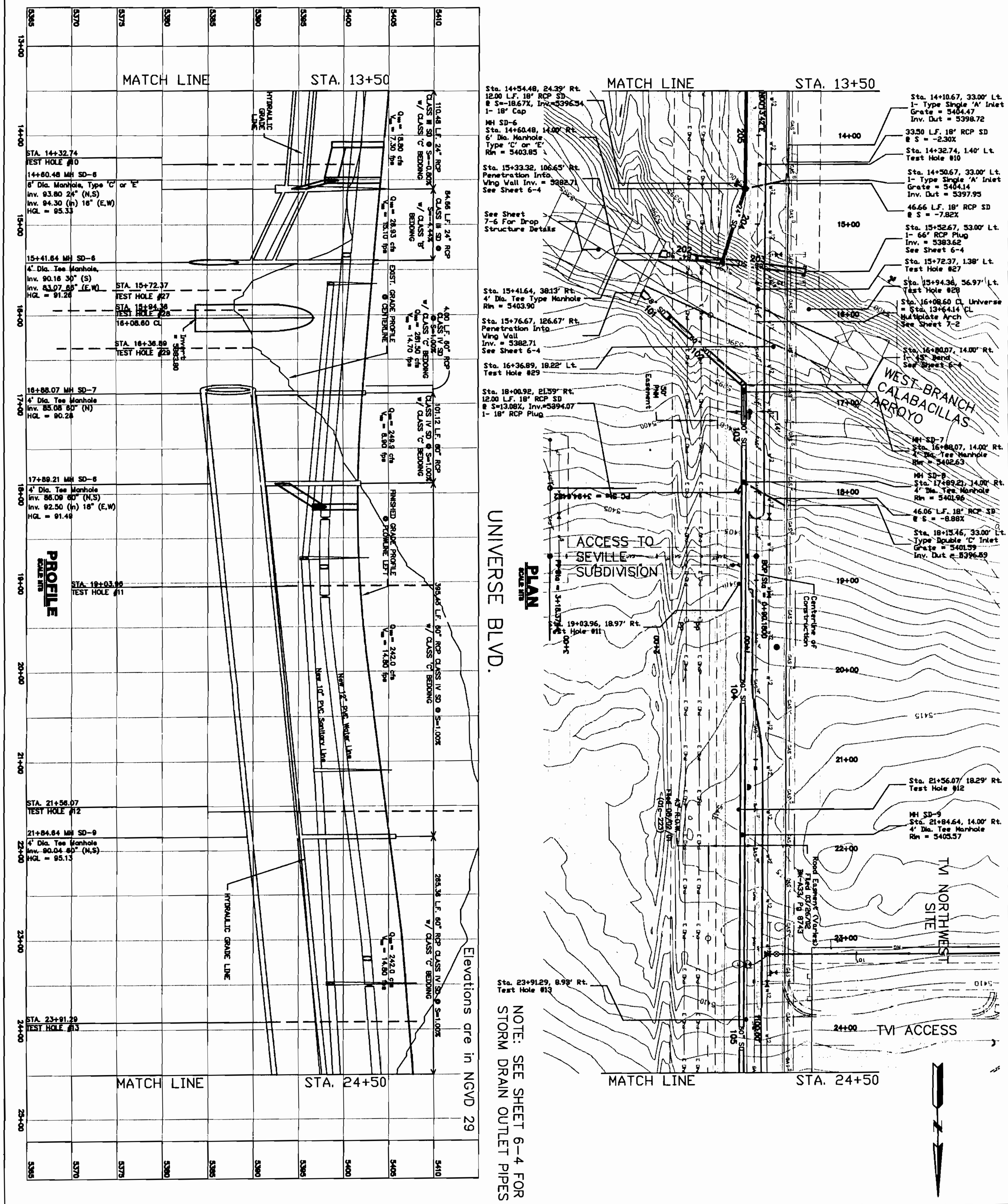

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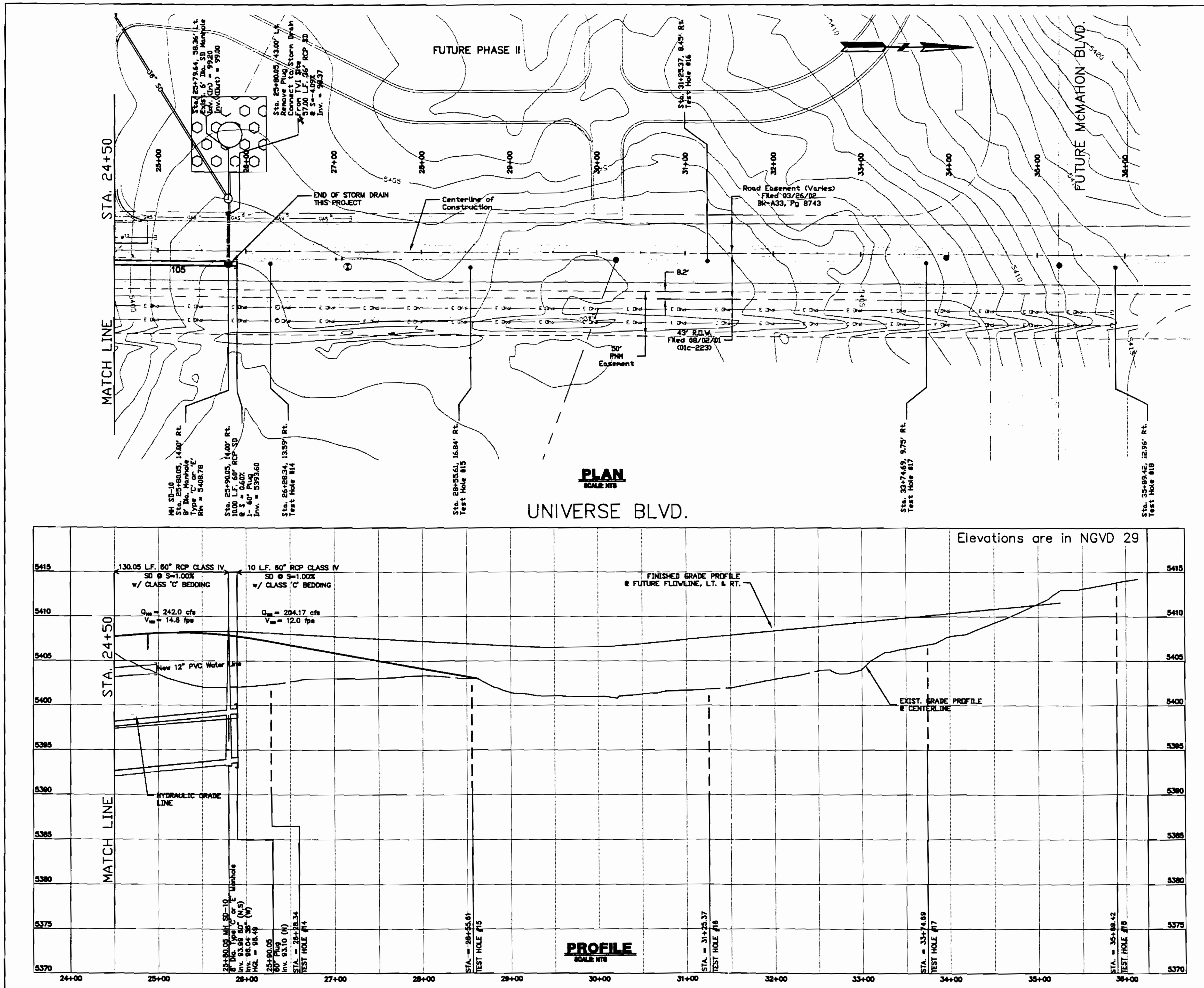

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STORM DRAIN PLAN & PROFILE

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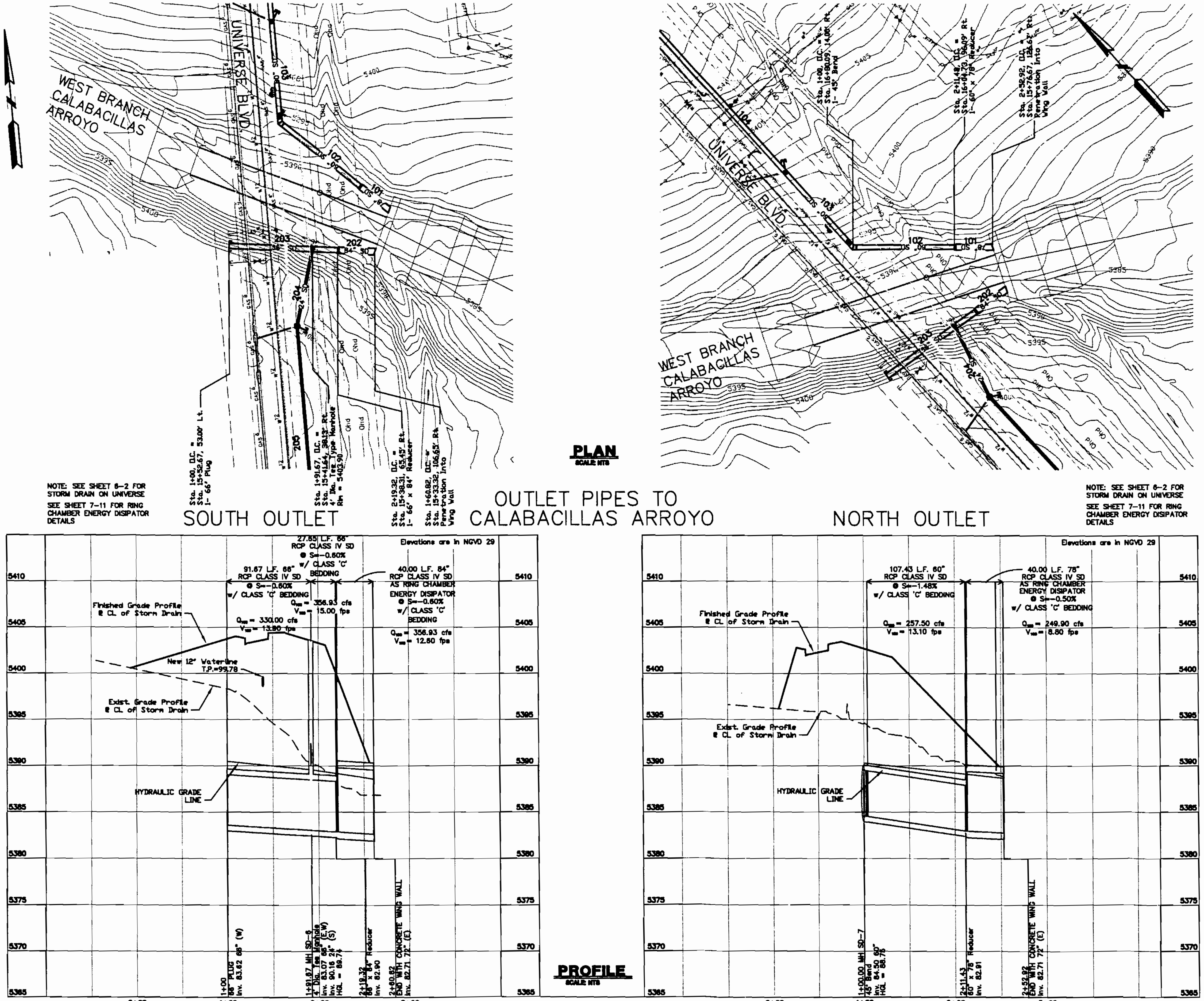
City Project No. 6839.81 | Zone Map No. A-10 | Sheet 6-3 of 6-6

A-3



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OUTLET PIPES TO CALABACILLAS ARROYO
STORM DRAIN PLAN & PROFILE

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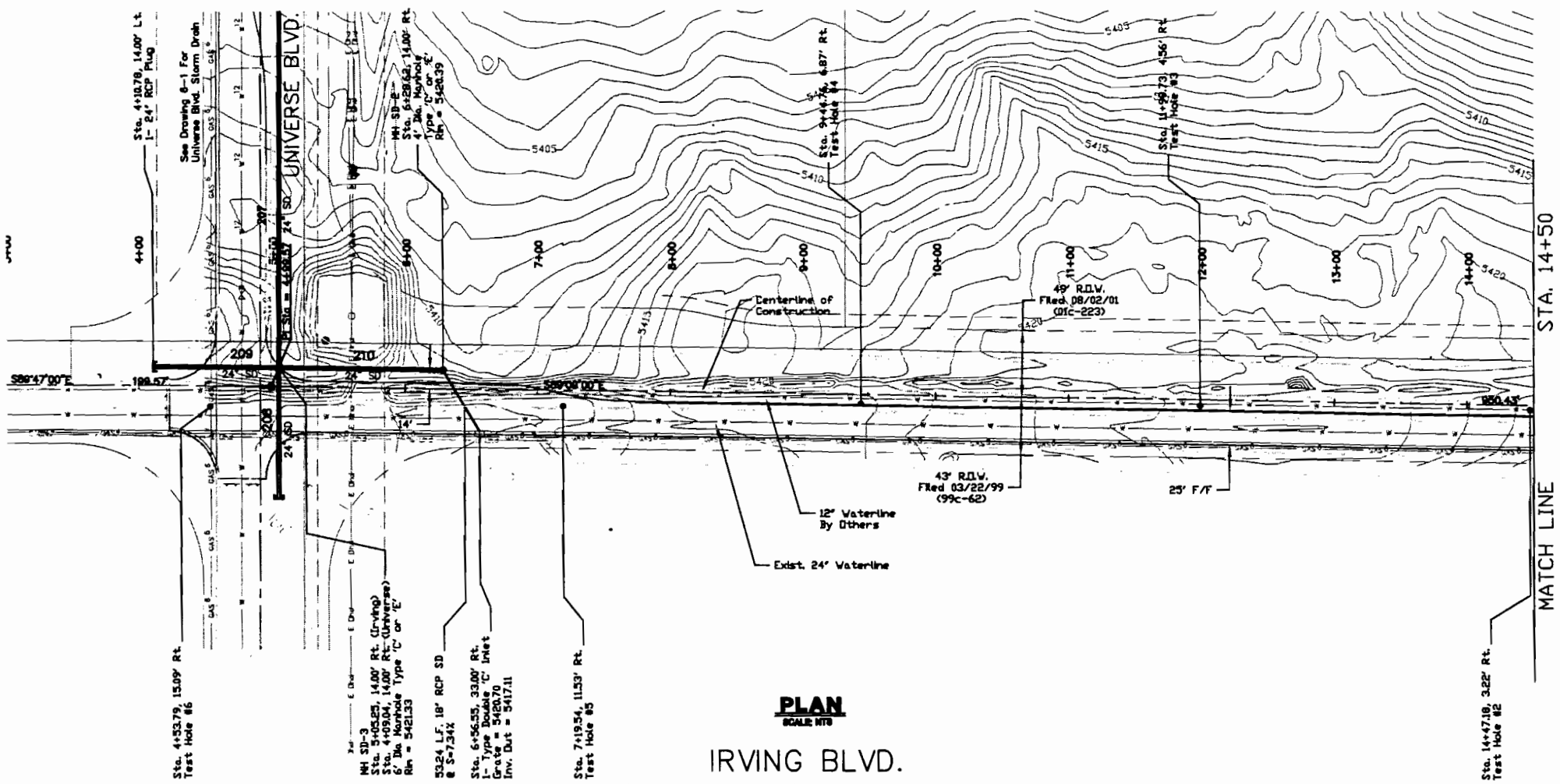
City Project No. 6839.81 | Zone Map No. A-10 | Sheet 6-4 Of 6-6

A-4



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City Project No.	Zone Map No.	Sheet	Of
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Storm Sewer Tabulation

IRVING BLVD / UNIVERSE BLVD. SOUTH.

Line #	Line ID	Incr. Area (ac)	Rnoff coeff (C)	Incr. CA	Sum CA	Tc (min)	Rnfal Inten (in/hr)	Total runoff (cfs)	Add. flow (cfs)	Total flow (cfs)	Capac. @ full (cfs)	Line size (in x in)	Line length (ft)	Line slope (%)	Veloc. up (ft/s)	Veloc. down (ft/s)	HGL up (ft)	HGL down (ft)	Invert up (ft)	Invert down (ft)	Dns line #
1	201	0.00	0.00	0.00	0.00	8.1	0.00	0.0	0.0	356.9	508.0	84 c	10	0.63	9.3	9.3	5389.74	5389.71	5382.77	5382.71	0
2	202	0.00	0.00	0.00	0.00	7.8	0.00	0.0	0.0	356.9	*238.1	66 c	60	0.50	15.0	15.0	5390.48	5389.81	5383.07	5382.77	1
3	203	0.00	0.00	0.00	0.00	0.0	0.00	0.0	330.0	330.0	*260.2	66 c	92	0.60	13.9	13.9	5391.54	5390.66	5383.62	5383.07	2
4	204	0.00	0.00	0.00	0.00	7.3	0.00	0.0	8.1	26.9	46.9	24 c	85	4.30	15.1	15.1	5394.90	5391.26	5393.80	5390.16	2
5	205	0.00	0.00	0.00	0.00	5.3	0.00	0.0	0.0	18.8	20.2	24 c	360	0.80	7.3	7.3	5398.20	5395.33	5396.67	5393.80	4
6	206	0.00	0.00	0.00	0.00	3.3	0.00	0.0	0.0	18.8	20.2	24 c	360	0.80	7.3	7.1	5401.09	5398.24	5399.56	5396.68	5
7	207	0.00	0.00	0.00	0.00	1.5	0.00	0.0	3.7	18.8	32.2	24 c	332	2.03	7.3	7.1	5407.83	5401.13	5406.30	5399.56	6
8	208	0.00	0.00	0.00	0.00	0.0	0.00	0.0	10.8	10.8	15.9	24 c	97	0.50	5.1	4.1	5408.05	5407.87	5406.78	5406.30	7
9	209	0.00	0.00	0.00	0.00	0.0	0.00	0.0	0.5	0.5	22.9	24 c	94	1.03	0.6	0.2	5407.88	5407.87	5407.27	5406.30	7
10	210	0.00	0.00	0.00	0.00	0.8	0.00	0.0	0.8	3.8	34.9	24 c	123	2.38	3.9	1.4	5409.92	5407.87	5409.23	5406.30	7
11	211	0.00	0.00	0.00	0.00	0.0	0.00	0.0	3.0	3.0	32.4	24 c	145	2.05	3.7	2.1	5412.82	5410.16	5412.21	5409.23	10

*Pipe is Pressurized in these segments w/ H.G.L of 1.13% capacity of 357 cfs.

PROJECT FILE: TVI2.STM	I-D-F FILE: SAMPLE.IDF	TOTAL NUMBER OF LINES: 11	RUN DATE: 05-21-2002

NOTES: c = circular; e = elliptical; b = box; Intensity = 112.8269 / (Tc + 14.5) ^ .822151; Return period = 100 Yrs.

Storm Sewer Tabulation

Universe Blvd North

Line #	Line ID	Incr. Area (ac)	Rnoff coeff (C)	Incr. CA	Sum CA	Tc (min)	Rnfal Inten (in/hr)	Total runoff (cfs)	Add. flow (cfs)	Total flow (cfs)	Capac. @ full (cfs)	Line size (in x in)	Line length (ft)	Line slope (%)	Veloc. up (ft/s)	Veloc. down (ft/s)	HGL up (ft)	HGL down (ft)	Invert up (ft)	Invert down (ft)	Dns line #
1	101	0.00	0.00	0.00	0.00	5.8	0.00	0.0	0.0	249.8	455.5	72 c	10	1.16	8.9	8.8	5388.73	5388.71	5382.82	5382.71	0
2	102	0.00	0.00	0.00	0.00	5.0	0.00	0.0	0.0	249.8	363.5	66 c	143	1.17	11.5	10.5	5389.20	5388.79	5384.50	5382.82	1
3	103	0.00	0.00	0.00	0.00	4.4	0.00	0.0	7.8	249.8	257.9	60 c	109	0.98	14.9	14.9	5390.04	5388.97	5386.07	5385.00	2
4	104	0.00	0.00	0.00	0.00	2.2	0.00	0.0	37.3	242.0	259.7	60 c	395	0.99	14.8	14.8	5393.89	5389.96	5390.02	5386.09	3
5	105	0.00	0.00	0.00	0.00	0.0	0.00	0.0	204.7	204.7	260.3	60 c	395	1.00	12.2	12.1	5397.98	5394.06	5393.99	5390.04	4

PROJECT FILE: TVI.STM | I-D-F FILE: SAMPLE.IDF | TOTAL NUMBER OF LINES: 5 | RUN DATE: 05-21-2002

NOTES: c = circular; e = elliptical; b = box; Intensity = 56.76727 / (Tc + 11) ^ .7948174; Return period = 5 Yrs.

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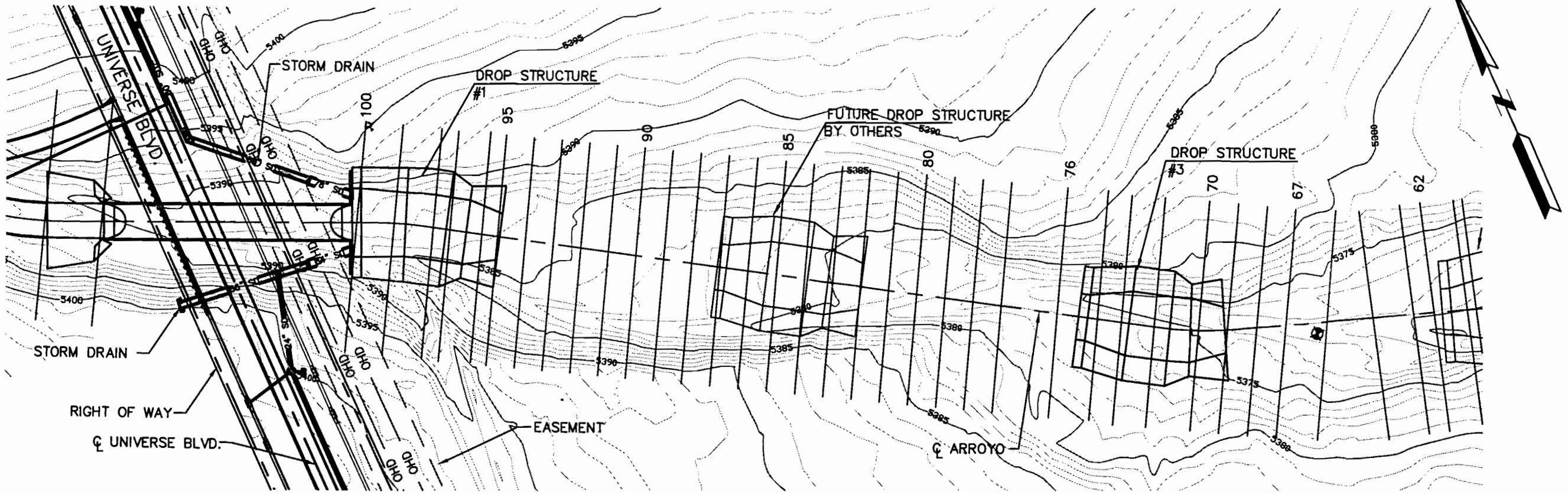
Date 5/02 Page
Client TVI
Job No. A12K0026
Job Title TVI Offsite
Made By KB.
Chkd. By

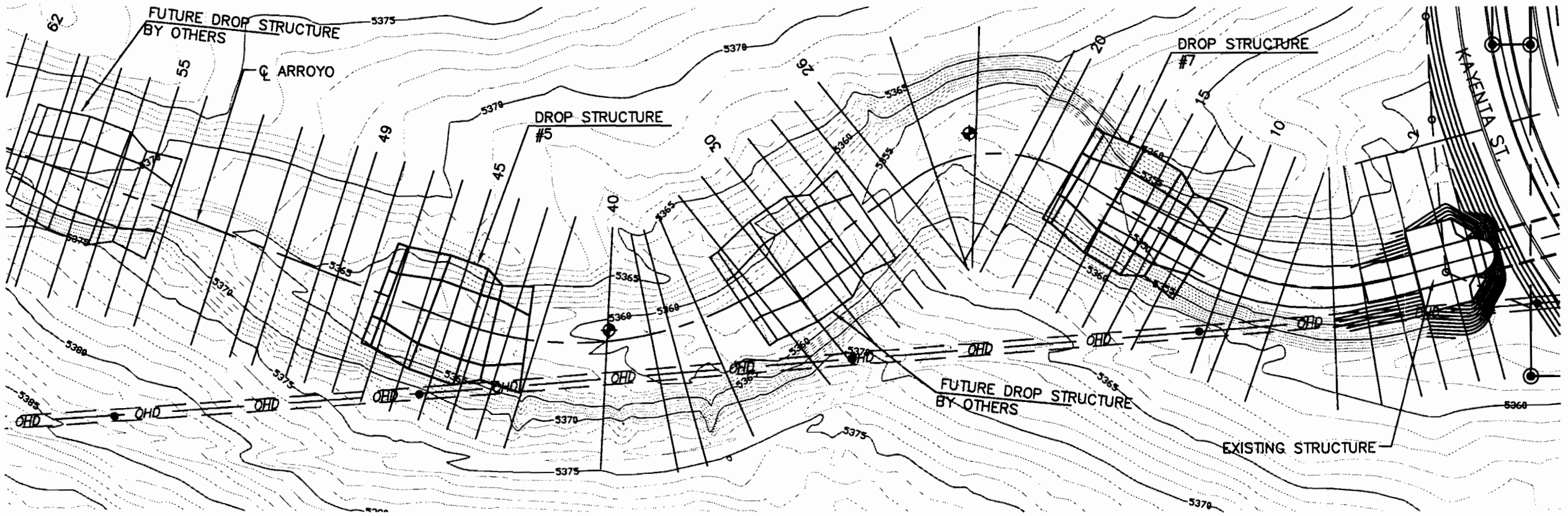
Universe Blvd. North of West Branch of the Calabacillas Arroyo.

	Master Drainage Plan.	Design Values.
Phase I (Dev)	70 cfs.	37.3 cfs *
Phase II (Dev)	59 cfs.	59.5 cfs.
OS-1 (Dev)	93 cfs.	93.5 cfs.
OS-5 (Dev)	13 cfs.	13.1 cfs.
Universe Blvd. street flows.	15.7 cfs.	15.7 cfs.
McMahon Blvd. street flows.	30.8 cfs.	30.8 cfs.
	281.5 cfs.	249.9 cfs.

* This value reduced as per the approved. TVI, Phase I grading & drainage plan by. Jeff. Mortensen & Assoc.



WEST BRANCH OF THE CALABACILLAS ARROYO



LEGEND

HEC-RAS SECTION

5380 EXIST. CONTOURS

0 100

SCALE: 1"=100'

LARKIN GROUP, P.A.
6900 MINAUL NE. SUITE A-440
ALBUQUERQUE, NEW MEXICO 87113
TELEPHONE (505) 275-7600
FAX (505) 275-6748

ALBUQUERQUE TVI
NORTHWEST SITE

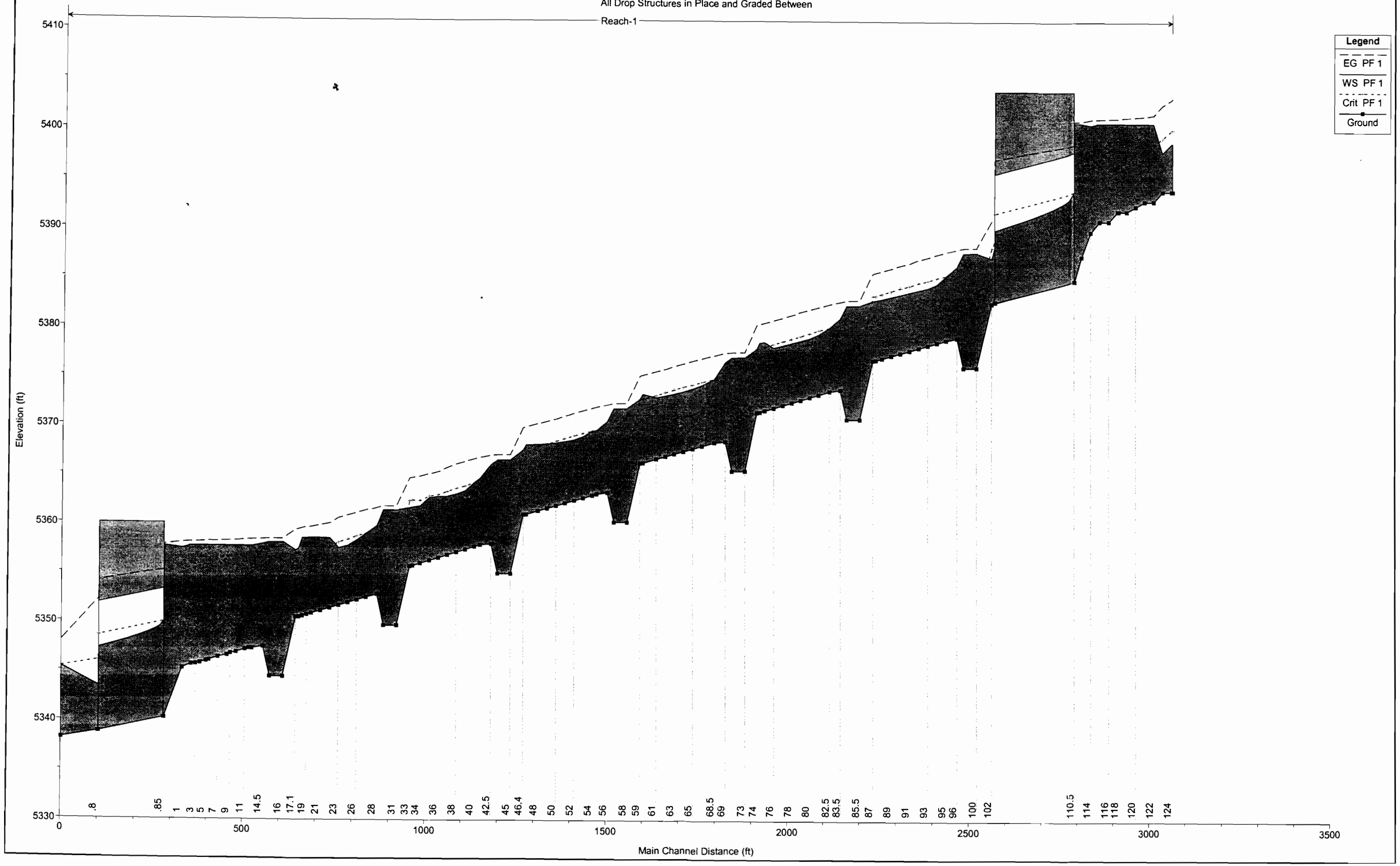
WEST BRANCH OF THE CALABACILLAS ARROYO HEC-RAS SECTIONS

DRAWN BY:	DESIGNED BY:	CHECKED BY:
AMB	KB	JA
DATE: 02/02	SHEET: FIGURE 4	

B-1

West Branch of the Calabacillas Arroyo @ 5300 cfs

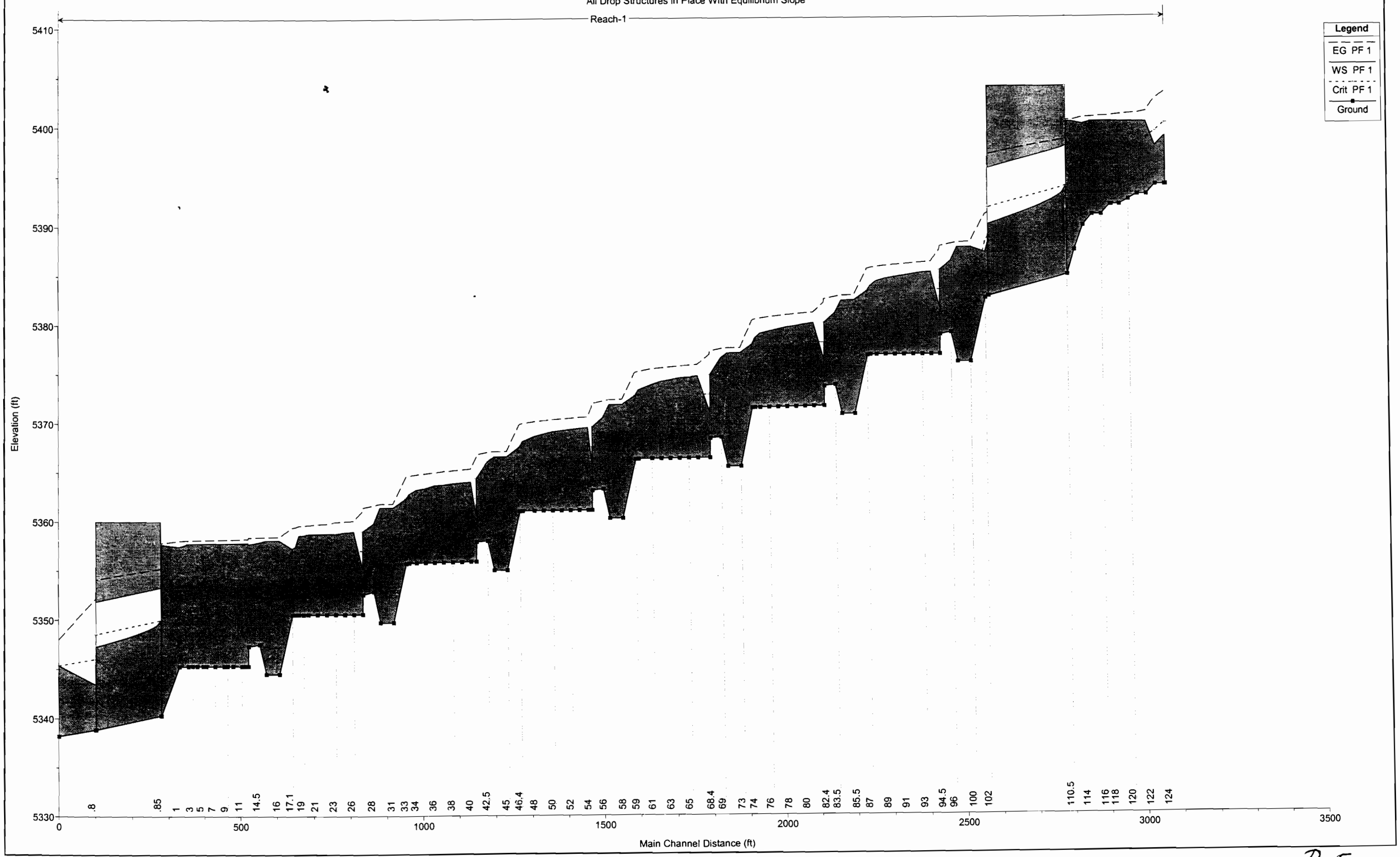
All Drop Structures in Place and Graded Between



B-2

West Branch of the Calabacillas Arroyo @ 5300 cfs

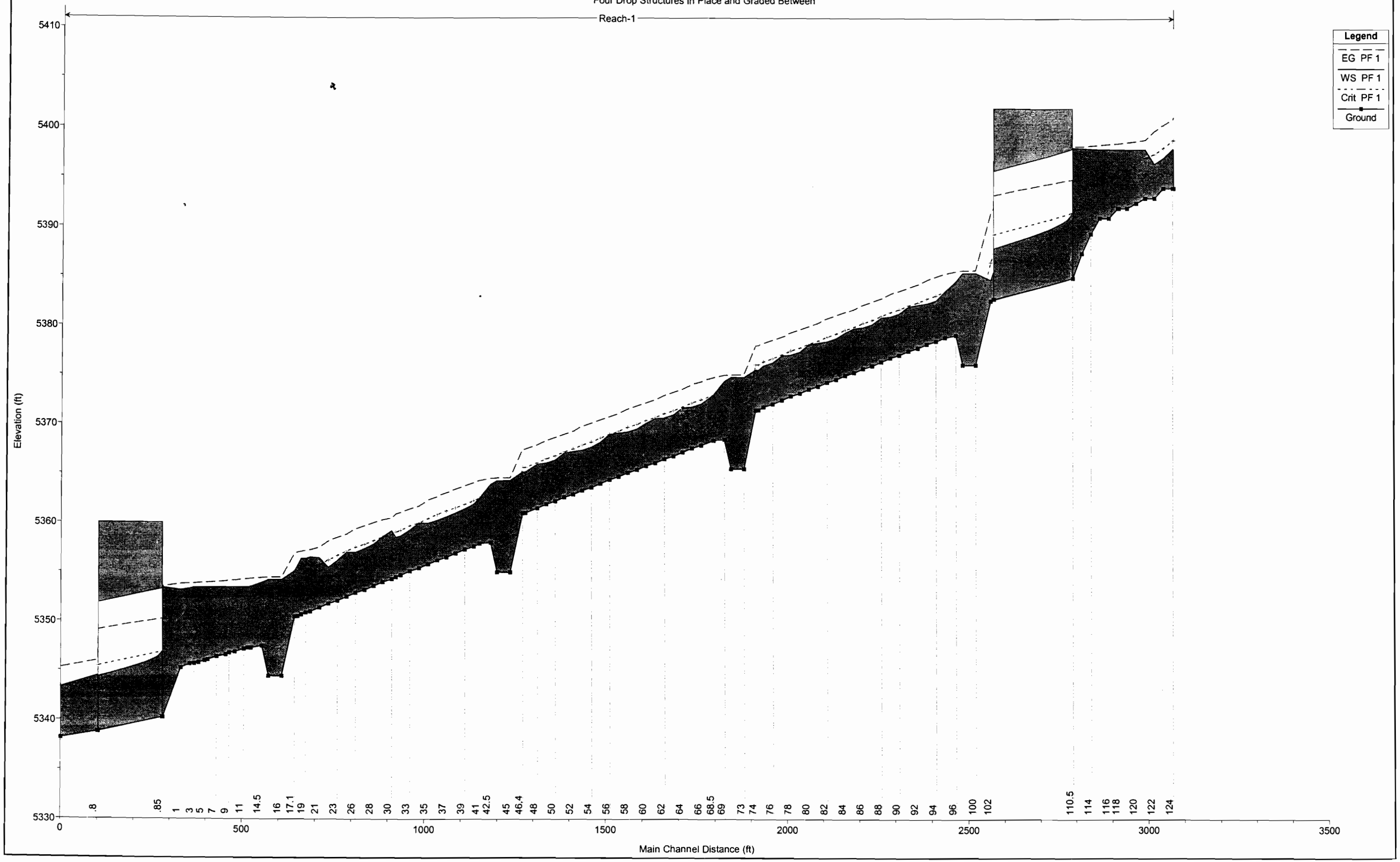
All Drop Structures in Place With Equilibrium Slope



B-5

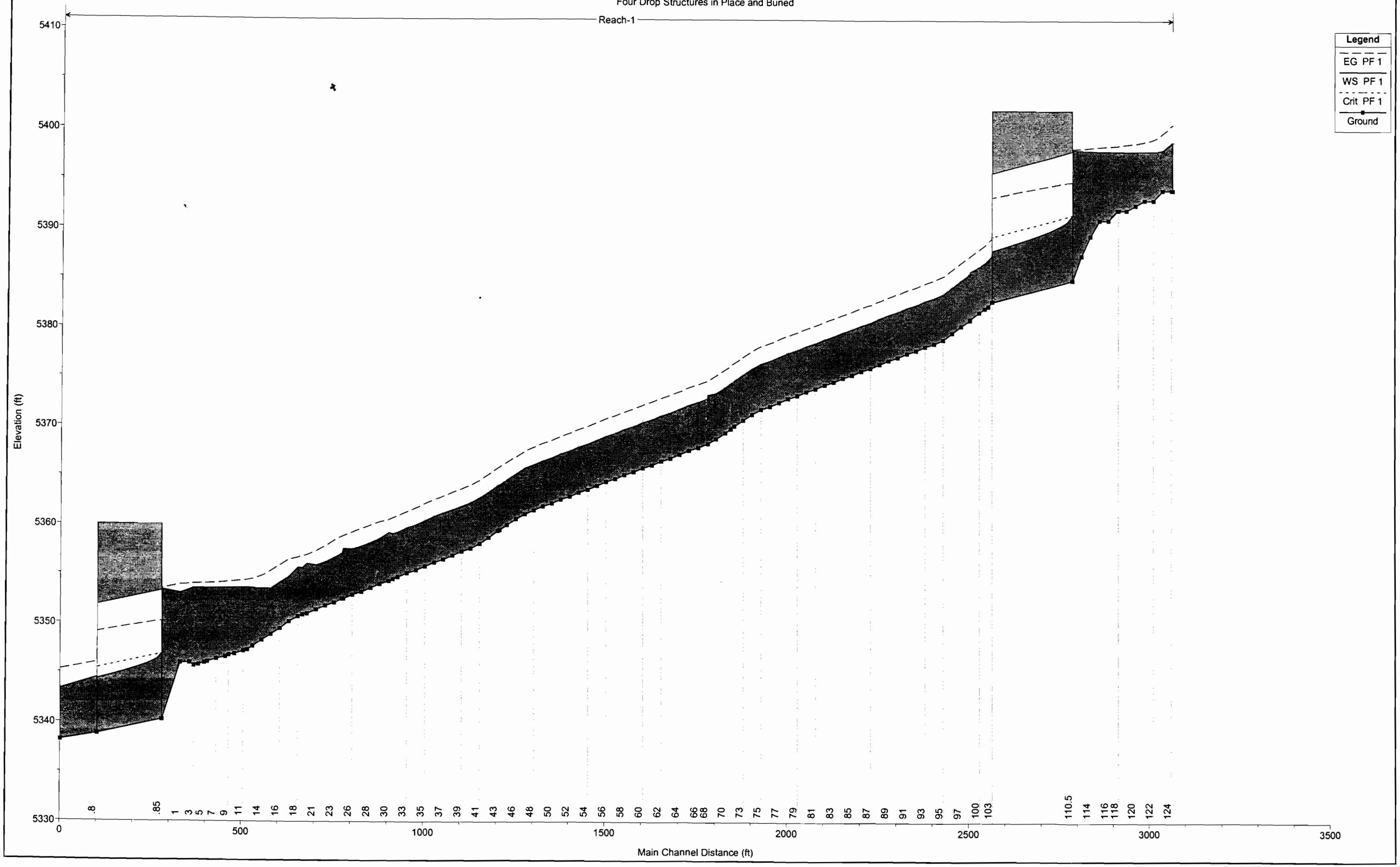
West Branch of the Calabacillas Arroyo @ 2900 cfs

Four Drop Structures in Place and Graded Between



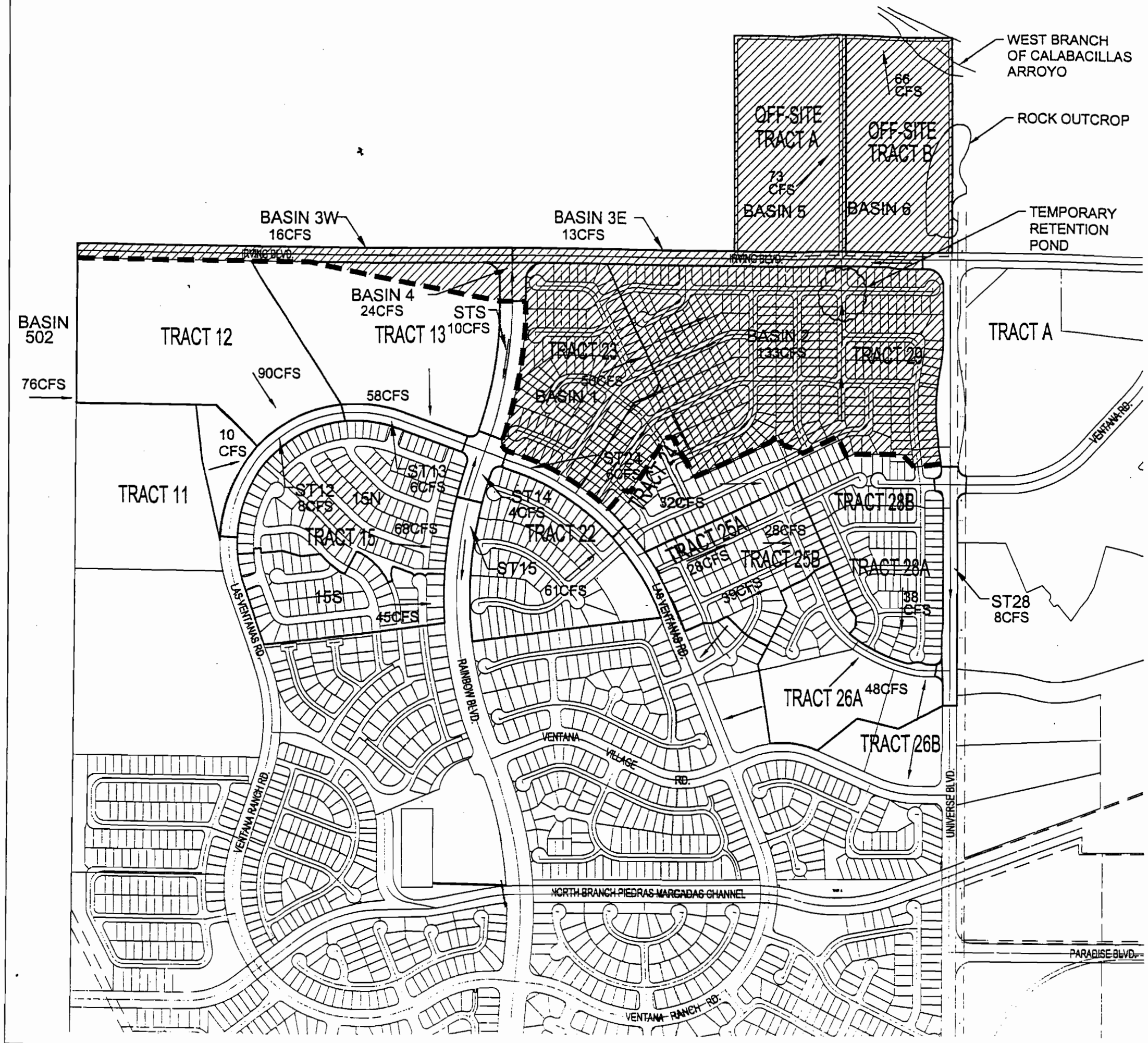
West Branch of the Calabacillas Arroyo @ 2900 cfs

Four Drop Structures in Place and Buried



NOTES:

1. BASINS 1-6 CONTRIBUTE TO THE NORTH OUTFALL. OTHER BASINS CONTRIBUTE TO WEST BRANCH CALABACILLAS STORM DRAIN DIVERSION.
2. BASIN ST15 CONTRIBUTES TO THE PIEDRAS MARCADAS SYSTEM.



LEGEND

- WATERSHED DIVIDE
- BASIN BOUNDARY
- 90CFS → 100-YEAR FLOW RATE AND DIRECTION
- BASINS DRAINING TO NORTH OUTFALL
- TEMPORARY RETENTION POND MAY BE CONSTRUCTED WITHIN TRACT 29 TO CONTROL RUNOFF UNTIL THE NORTH OUTFALL IS CONSTRUCTED

N

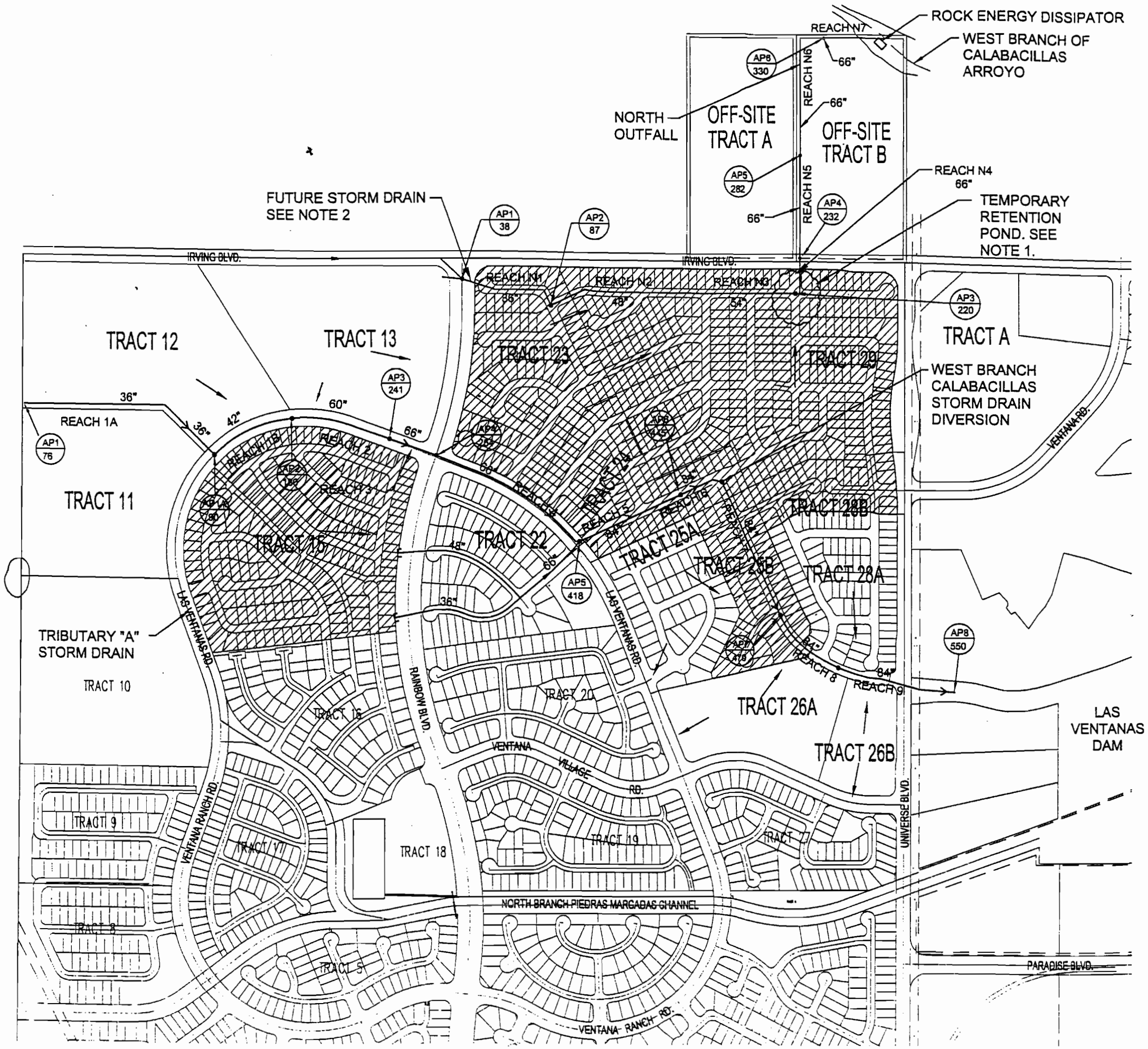
600 300 0 600

SCALE: 1"=600'

Bohannan Huston
Courtyard One 7500 JEFFERSON NE Albuquerque NEW MEXICO 87109
ENGINEERS PLANNERS PHOTOGRAMMETRISTS SURVEYORS SOFTWARE DEVELOPERS

VENTANA RANCH
FIGURE 1
DRAINAGE BASIN MAP
DEVELOPED CONDITIONS
JUNE 2000

A BHI 801.99439.HYDRO.DESIGN.DWGS.ALL-BASIN1.DWG 06.01.00



LEGEND

- WEST BRANCH CALABACILLAS STORM DRAIN DIVERSION AND NORTH OUFALL STORM DRAIN
- FLOW DIRECTION
- AP1 / 76 — ANALYSIS POINT 100-YR FLOW (CFS)
- CONCEPTUAL PROPOSED LOT LAYOUTS

NOTES:

1. A TEMPORARY RETENTION POND MAY BE CONSTRUCTED WITHIN TRACT 29 TO CONTROL RUNOFF UNTIL THE NORTH OUTFALL IS CONSTRUCTED. EASEMENT AND COVENANT IN PLACE - SEE PLAT FOR TRACT X-1-A-1 (APPENDIX C).
2. WITH THE DEVELOPMENT OF TRACTS 23, 24, &29, A STORM DRAIN WILL BE CONSTRUCTED TO CONVEY RUNOFF FROM THE NORTHEAST CORNER OF TRACT 13, IRVING BOULEVARD AND RAINBOW AT IRVING. THIS STORM DRAIN WILL ALSO SERVE TRACTS 23, 24, & 29.
3. ADDENDUM NO. 3 ADDRESSED THE NORTH OUTFALL TO THE WEST BRANCH OF THE CALABACILLAS AND WAS APPROVED BY THE CITY OF ALBUQUERQUE AND BY AMAFCA.

N

600 300 0 600

SCALE: 1"=600'

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VENTANA RANCH
FIGURE 2
PROPOSED DRAINAGE PLAN
DEVELOPED CONDITIONS
JUNE 2000

IRVING BLVD.

RAINBOW BLVD.

UNIVERSE BLVD.

TEMPORARY POND

PHASE 4
FUTURE TRACT 29B
30.0 AC.

PHASE 3
FUTURE TRACT 23
15.2 AC.

TRACT X-1-A-1

TEMPORARY OUTLET PIPE AT LOCATION OF FUTURE NORTH OUTFALL STORM DRAIN

TRACT A-1

PHASE 2
FUTURE TRACT 29A
13.6 AC.

PHASE 1
FUTURE TRACT 24
18.9 AC.

TRACT 28B

LAS VENTANAS RD.

TERRAZAS
SUBD.

BRADFORD HILLS
SUBD.

TRACT 25B-1

COUNTRY
MEADOWS
SUBD.

N

LEGEND

PHASE BOUNDARY

200 100 0 200

SCALE: 1" = 200'

P:\66\DGN\GENERAL\FIGURE-1.DGN

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VENTANA RANCH
FIGURE 3
PHASING PLAN

JUNE 2000

TVI On Site Developed Conditions

Phase I

The Phase I consists of approximately 28.4 acres with the construction area consisting of 19.4 acres as 8 acres impervious, 2.6 acres as landscaped, and 8.8 acres as 50% A and 50% C. An interim diversion berm (Plate 1) shall be constructed to divert 46 c.f.s. (Phase I offsite) of existing runoff from OS-1 and a portion of B-3 through an interim desilting basin to the proposed storm drain in Universe Blvd. The developed runoff for this phase will increase to approx. 69.6 c.f.s..

Phase II

Phase II (Plate 2) consists of approximately 18.7 acres with the construction area as 8 acres impervious, 2.6 acres as landscaped, and 8.8 acres as 50% A and 50% C. The developed runoff for this phase will increase to approx. 59 c.f.s. Phase II will include the construction of the south half of McMahon Blvd along the north side of Phase II to divert existing flows from OS-1 (29 c.f.s.) and OS-5 (5 c.f.s.). Phase II construction will also extend Universe Blvd north and it's storm drain.

Phase III

Phase III will cover approximately 18.4 acres consisting of 8.4 acres as impervious, 1 acre as landscaped, and 4.5 acres as A and 4.5 acres as C. The developed runoff for this phase will increase to approx. 57 c.f.s., which is less than the free discharge of 58 c.f.s. projected by Mussetter's draft Prudent Line Study for the West Branch of the Calabacillas Arroyo for an area of this size. At this time the interim berm and desilting basin between Phase I and Phase II will still be necessary until the construction is complete for Phase III, but landscaping can be installed up to the edge of the berm.

OS-4 Existing Conditions 100 year 6 hr Volume Zone 1

ExA := .44 ExC := .99 AcA := 7.3 AcC := 0.0

ExB := .67 ExD := 1.97 AcB := 0.0 AcD := 0.0

Total := AcA + AcB + AcC + AcD Total = 7.3 Acres

$$\text{WeightedE} := \frac{\text{AcA}\cdot\text{ExA} + \text{AcB}\cdot\text{ExB} + \text{AcC}\cdot\text{ExC} + \text{AcD}\cdot\text{ExD}}{\text{Total}} \qquad \text{Volume} := \frac{\text{WeightedE}\cdot\text{Total}}{12}$$

Volume = 0.27 Acre Feet

Table A-9 C.O.A. DPM

$Q_A := 1.29$ $Q_B := 2.03$ $Q_C := 2.87$ $Q_D := 4.37$

$Q_p := AcA\cdot Q_A + AcB\cdot Q_B + AcC\cdot Q_C + AcD\cdot Q_D$ $Q_p = 9.417$ cfs

OS-5 Existing Conditions 100 year 6 hr Volume Zone 1

ExA := .44 ExC := .99 AcA := 3.9 AcC := 0.0

ExB := .67 ExD := 1.97 AcB := 0.0 AcD := 0.0

Total := AcA + AcB + AcC + AcD Total = 3.9 Acres

$$\text{WeightedE} := \frac{\text{AcA}\cdot\text{ExA} + \text{AcB}\cdot\text{ExB} + \text{AcC}\cdot\text{ExC} + \text{AcD}\cdot\text{ExD}}{\text{Total}} \qquad \text{Volume} := \frac{\text{WeightedE}\cdot\text{Total}}{12}$$

Volume = 0.14 Acre Feet

Table A-9 C.O.A. DPM

$Q_A := 1.29$ $Q_B := 2.03$ $Q_C := 2.87$ $Q_D := 4.37$

$Q_p := AcA\cdot Q_A + AcB\cdot Q_B + AcC\cdot Q_C + AcD\cdot Q_D$ $Q_p = 5.031$ cfs