LA CUEVA FLOODPLAIN ANALYSIS

Prepared for:

Llave Enterprises, Inc

September 2018

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Introduction

The purpose of this report is to demonstrate that the proposed arroyo improvements associated with the Signal Village Subdivision are adequate to remove the project area from the FEMA floodplain, protect the project from flooding, and that it is adequately protected from scour. The area analyzed is located west of Ventura Road, south of Alameda Boulevard, east of Barstow Street, and north of Signal Avenue. As shown in Appendix A, The La Cueva Arroyo is within a FEMA Floodplain classified as Zone AE. This report uses the hydrologic analysis provided in the North Albuquerque Acres Master Drainage Plan (NAAMDP) by Resource Technology Inc. (RTI) dated October 1998. The NAAMDP should be referenced for general drainage background. The flow rate for the La Cueva Arroyo is 3,048 cfs at Ventura and 3,094 cfs at Barstow according to the NAAMDP, see Appendix B for Hydrology Background..

Existing Conditions

The area within the project limits is mostly undeveloped. There is a small subdivision located north of Signal and west of Ventura and also a single family home located south of Alameda and west of Ventura. There is a concrete channel that begins shortly after the La Cueva Arroyo crosses Alameda and flows northwest. An earthen berm was constructed south of the concrete channel to direct the flows in the arroyo into the channel. The surrounding area generally slopes at 3% from east to west. The arroyo was previously studied by Weston Solutions in 2012, which was used to create the existing floodplain. This analysis uses more current topographic data to model the floodplain.

Methodology

Flood Plain Modeling

The La Cueva arroyo was modeled using HEC-RAS 5.0.1 for both existing and proposed conditions. The manning's coefficient for the natural arroyo was assumed to be 0.025 for the stream bed and 0.035 for the banks. Concrete box culverts for the road crossings at Ventura and Alameda were modeled to have capacity for the 100-yr storm. Due to soil type and sediments load this type of the arroyo would typically run supercritial until it reaches a point where velocity is high enough for it to transport enough sediment to cause it to run critical. In this case the bed material is a course material and the arroyo in this area based on anlaysis and observation of flows in the channel would appear able to maintain subcritical flow. Weston's model from 2012 the arroyo ran in a mixed flow regime. This model was set to a mixed flow regime. By allowing supercritical flow in the upstream portion of the arroyo, a worst case velocity scenario is created to be able to design the scour wall depth. See model results in appendix C and full run included electronically.

Sediment Analysis

A sediment analysis was completed following the methods described in the AMAFCA Sediment and Erosion Design Guide. Basins were identified from the North Albuquerque Acres Master Drainage Plan. The project site is included in Basin 111.1. Basins 108, 109, and 110 upstream of the project site were also included in the analysis. The MUSLE equation was used to calculate the wash load from each basin. The bed load was calculated follow the MPM-Woo method described in the AMAFCA Guide. Basins 108 and 109, which drain to Basin 110, contributes a total of 4.02 acre-feet of sediment to Basin 110. Basin 110, which drains to Basin 111.1 contributes 1.30 acre-feet of sediment to Basin 111.1. And a total of 0.67 acre-feet of sediment is produced in Basin 111.1. Please refer to the Basin Map and Sediment Analysis spreadsheet in Appendix D.

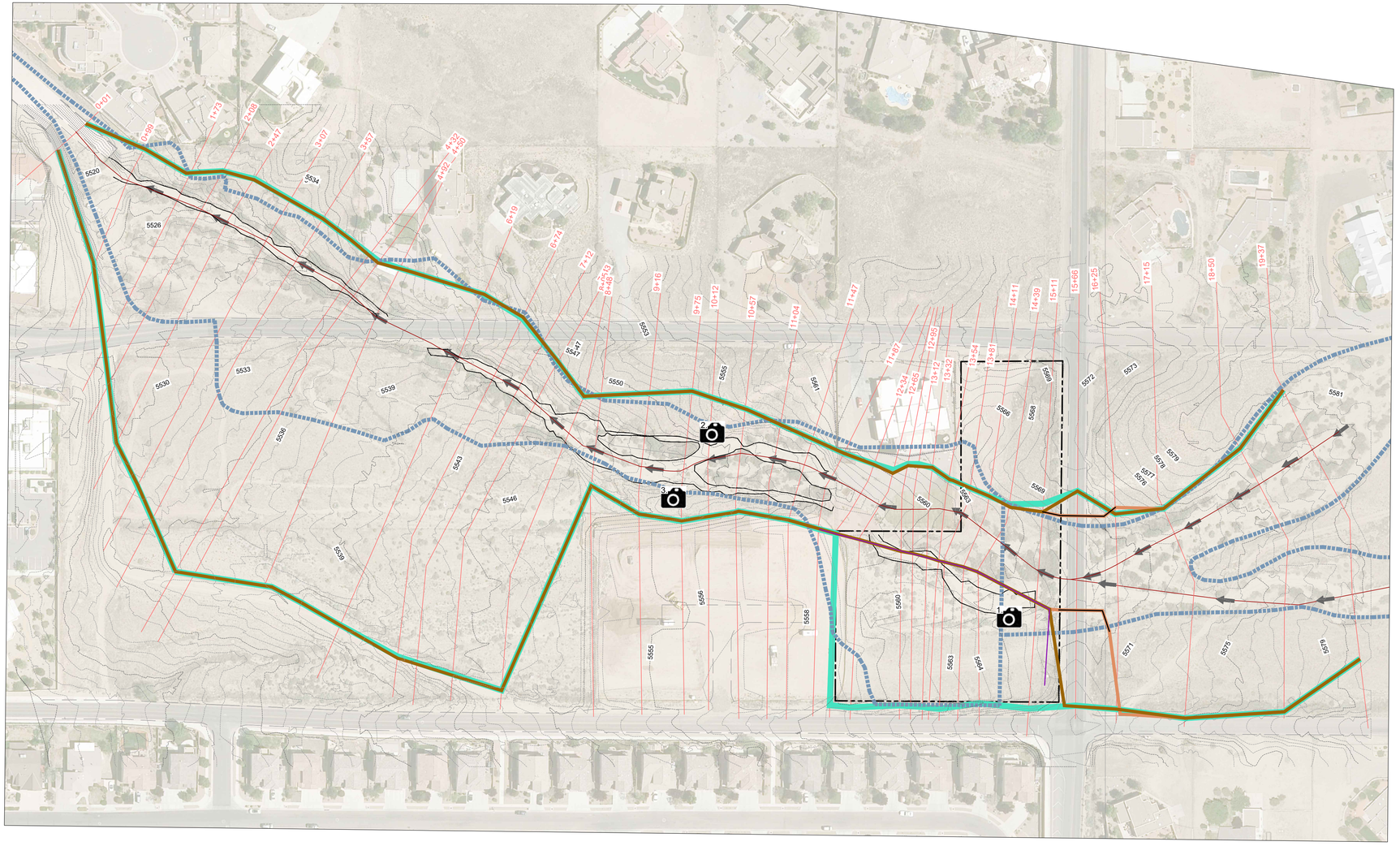
Scour Analysis

The proposed scour wall along the north side of the proposed Signal Village Subdevision was analyzed per AMAFCA's Sediment and Erosion Design Guide from 1994. Using HECRAS results, the scour analysis was completed to determine the scour wall depth and height for the worst case assuming a box culvert under Ventura.

Proposed Design

A Scour Wall is proposed beginning at Ventura and will connect to the existing scour wall for the adjacent subdivision to the west. The purpose of the Scour Wall is to contain the incoming arroyo flows from the east, thus removing the floodplain and protecting the future development for this specific location. The proposed length of the scour wall is 420 feet starting near the northwest corner of the Ventura and Signal intersection. From there, it continues north and west following along the left bank of the arroyo until connecting to the existing wall. As shown in the scour analysis included in Appendix B, the total wall height varies from 14.99 to 19.44 ft and the estimated scour varies from 6.71 to 10.36 ft. The model run indicates that the scour wall reduces the floodplain on the property as shown in the attached Exhibit A. The proposed floodplain is mostly within the current floodplain boundary. See grading design in Appendix E.

MANNING'S OBSERVATION



WATER SURFACE ELEVATION DIFFERENCES BETWEEN EXISTING AND PROPOSED CONDITIONS

Model Scenario			
	Existing Water Surface (RESPEC Model)	Existing with Proposed Wall	Existing with Proposed Wall and Culvert @ Ventura
Cross Section	**W.S Elevation**	**ΔW.S Elevation**	**ΔW.S Elevation**
1937.32	5580.75	0	0
1849.64	5578.18	0	0
1714.73	5574.42	0	0
1625.11	5571.82	0	0
1565.71	5570.65	0	0.71
1565 (Culvert)			
1511.28	5567.91	0.09	0.11
1438.58	5565.53	0.46	0.46
1410.93	5564.72	0.61	0.61
1380.76	5563.87	0.79	0.79
1354.24	5563.39	0.49	0.49
1332.33	5562.92	0.03	0.03
1311.52	5562.38	-0.11	-0.11
1295.47	5561.87	-0.07	-0.07
1264.68	5560.95	-0.23	-0.23
1233.92	5561.03	-0.56	-0.43
1187.49	5559.39	-0.03	0
1146.73	5557.03	0	0
1104.38	5555.56	0	0
1056.97	5554.19	0	0
1011.94	5553.05	0	0
975.03	5552.37	0	0
916.13	5550.02	0	0
848.23	5547.96	0	0
804.54	5547.29	0	0
742.87	5545.55	0	0
711.63	5544.34	0	0
674.15	5543.75	0	0
618.69	5541.31	0	0
491.87	5538.41	0	0
450.17	5536.7	0	0
432.04	5535.95	0	0
356.79	5533.66	0	0
306.95	5532.38	0	0
247.1	5530.83	0	0
208.39	5529.99	0	0
172.73	5528.92	0	0
98.74	5527.5	0	0
1.24	5525.15	0	0

LEGEND

- PROPERTY LINE
- ARROYO CENTER LINE
- FEMA CURRENT FLOODPLAIN ZONE AH/AE
- 15+79 PROPOSED HECRAS CROSS SECTIONS
- EXIST WATER SURFACE MODEL - SUBCRITICAL FLOW REGIME
- PROPOSED WATER SURFACE - SUBCRITICAL FLOW REGIME WITH PROPOSED WALL, NO CULVERT
- PROPOSED WATER SURFACE - SUBCRITICAL FLOW REGIME WITH PROPOSED WALL, WITH CULVERT
- PROPOSED SCOUR WALL
- USACE OHWM
- PROPOSED STRUCTURE

N

SURVEY SHOWN IS 1FT INTERVAL CONTOURS TAKEN FROM ALDRICH SURVEY PREFORMED ON APRIL 2018.

Thompson Engineering Consultants, Inc.

STAMP

DATE: 09.10.2018

LA CUEVA ARROYO
FLOODPLAIN ANALYSIS

EXHIBIT A

SHEET NUMBER:

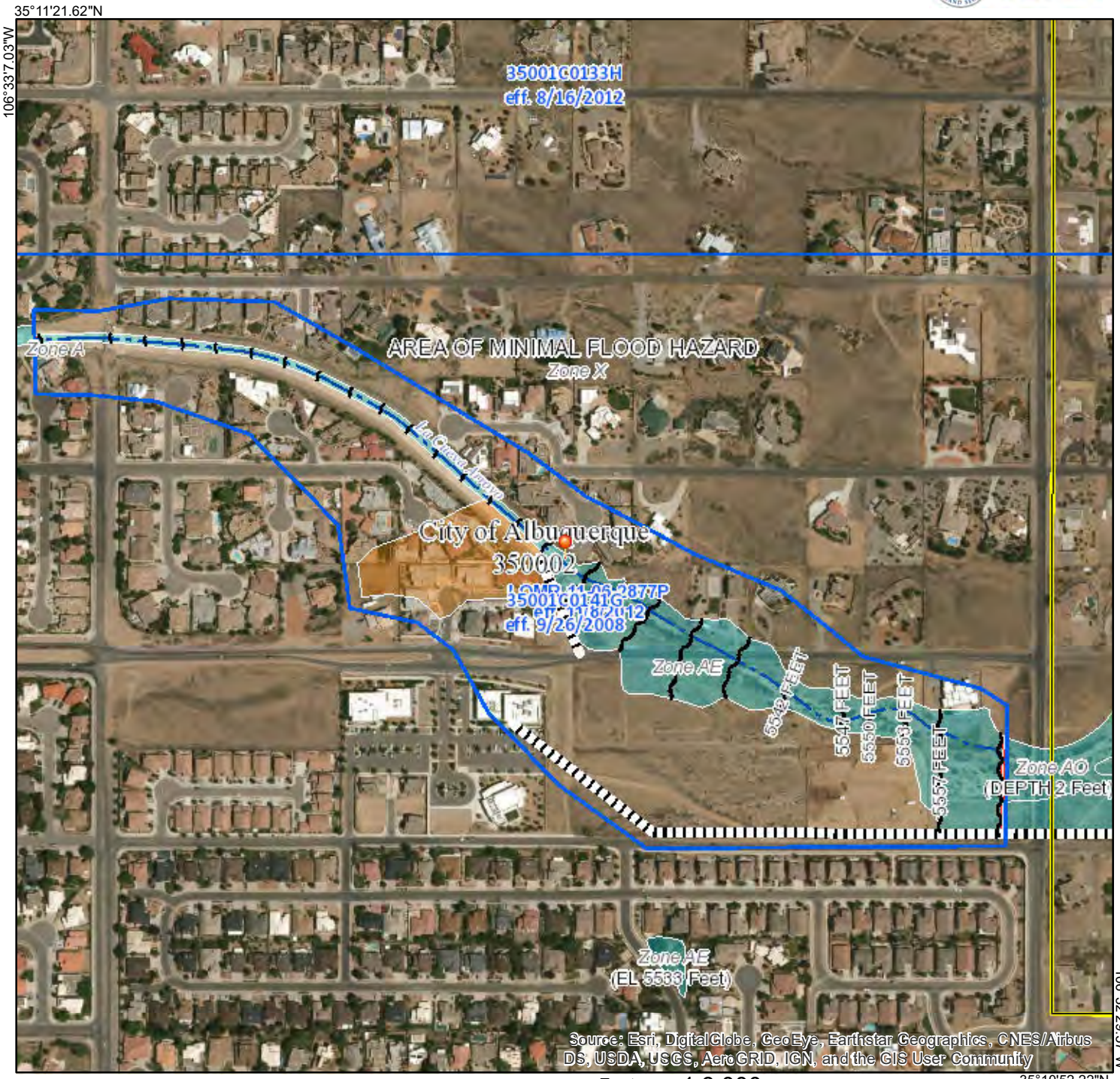
1 OF 1

NAME: L:\Active Projects\033884 La Cueva Arroyo\3. DWG\La Cueva - HECRAS Model\SUB_9.2018.dwg PLOT DATE: Sep 10, 2018 7:43pm

Appendix A

National Flood Hazard Layer FIRMette

FEMA



Feet

0 250 500 1,000 1,500 2,000

1:6,000

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth
- Regulatory Floodway *Zone AE, AO, AH, VE, AR*

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN — Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 — Cross Sections with 1% Annual Chance
- 17.5 — Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The base map shown complies with FEMA's base map accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/30/2018 at 1:12:52 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: base map imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Appendix B

D. Proposed Condition Hydrology Results

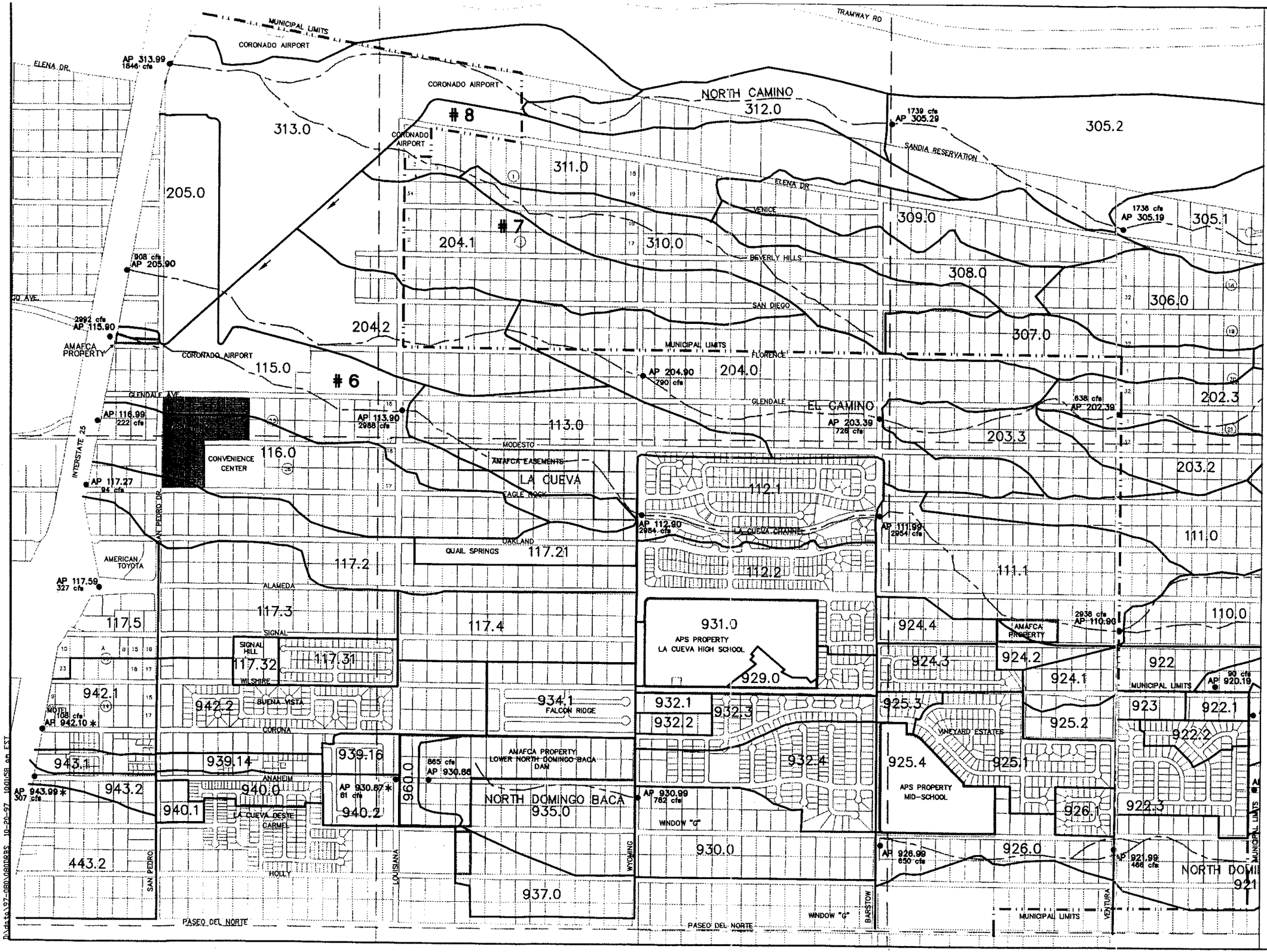
Proposed condition flow rates for future fully developed conditions from the hydrology models incorporating the above facilities are reported in Table 6. All of the interim detention ponds have been eliminated. A comparison with the hydrology results from the **1996 AMAFCA Hydrology Report** for future fully developed conditions without storm drainage or channel improvements for selected points on the main arroyos is made in Tables 7a and 7b. Except where specifically labeled as "worst case" all flow rates reported assume avulsion control.

TABLE 6a

FUTURE CONDITIONS HYDROLOGY SUMMARY (BULKED FLOW RATES)

	AREA (Sq mi)	AP #	VOL-10-YR (ac-ft)	Qp 10-YR (cfs)	VOL-100-YR (ac-ft)	Qp 100-YR (cfs)
NORTH DOMINGO BACA ARROYO						
Holbrook	3.166	919.99	129.0	305	231.1	616
Ventura	3.446	921.99	142.4	609	255.7	1171
Barstow	3.562	926.99	149.2	758	267.5	1813
Wyoming	3.870	930.99	167.4	1096	298.8	1984
Inflow to LNDB Dam	4.259	930.86	189.5	1313	337.0	2442
Out flow from LNDB Dam	4.259	930.87	189.5	170	337.0	200
I-25	4.526	943.99	205.7	400	364.7	731
LA CUEVA ARROYO[1]						
Ventura	3.766	110.90	130.0	1359	265.8	3048
Barstow	4.017	111.99	140.5	1374	284.5	3094
Wyoming	4.189	112.90	150.3	1383	301.0	3128
Louisiana	5.462	113.90	194.5	1632	390.1	3908
I-25	5.582	115.9	202.1	1640	402.6	3923
North Diversion Channel	6.871	128.90	270.8	2901	519.8	5551

[1]La Cueva and El Camino Arroyo Flow Rates reflect diversion of El Camino to the La Cueva west of Wyoming.



LEGEND

107.1	SUBBASIN DESIGNATION
	SUBBASIN BOUNDARY
	EXISTING PLATTING
	EXISTING ARROYO FLOW PATH
AP 107.29 ● 2756 cfs	ANALYSIS POINT AND EXISTING CONDITION FLOW RATE
*	FLOW RATE NOT BULKED FOR SEDIMENT
# 2	POTENTIAL AVULSION LOCATION
	MUNICIPAL LIMITS

NORTH ALBUQUERQUE ACRES
MASTER DRAINAGE PLAN

EXISTING CONDITION

FIGURE 3A

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT

CITY OF Albuquerque

Resource Technology, Inc.
Civil Engineering
Environmental Sciences
Water Resources
Landscape Architecture
Planning
1720 – B Randolph Road SE
Albuquerque, New Mexico 87106
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Facsimile: (505) 243-7400

LA Cueva 100-YR FUTURE

-(s16.67h8.5v0T-&18D
AHYMO SUMMARY TABLE (AHYMO194) - AMAFCA Hydrologic Model - January, 1994 RUN DATE (MON/DAY/YR) =06/30/1998
INPUT FILE = a:lcwyo100.fut USER NO.= RSTECHNM.STE

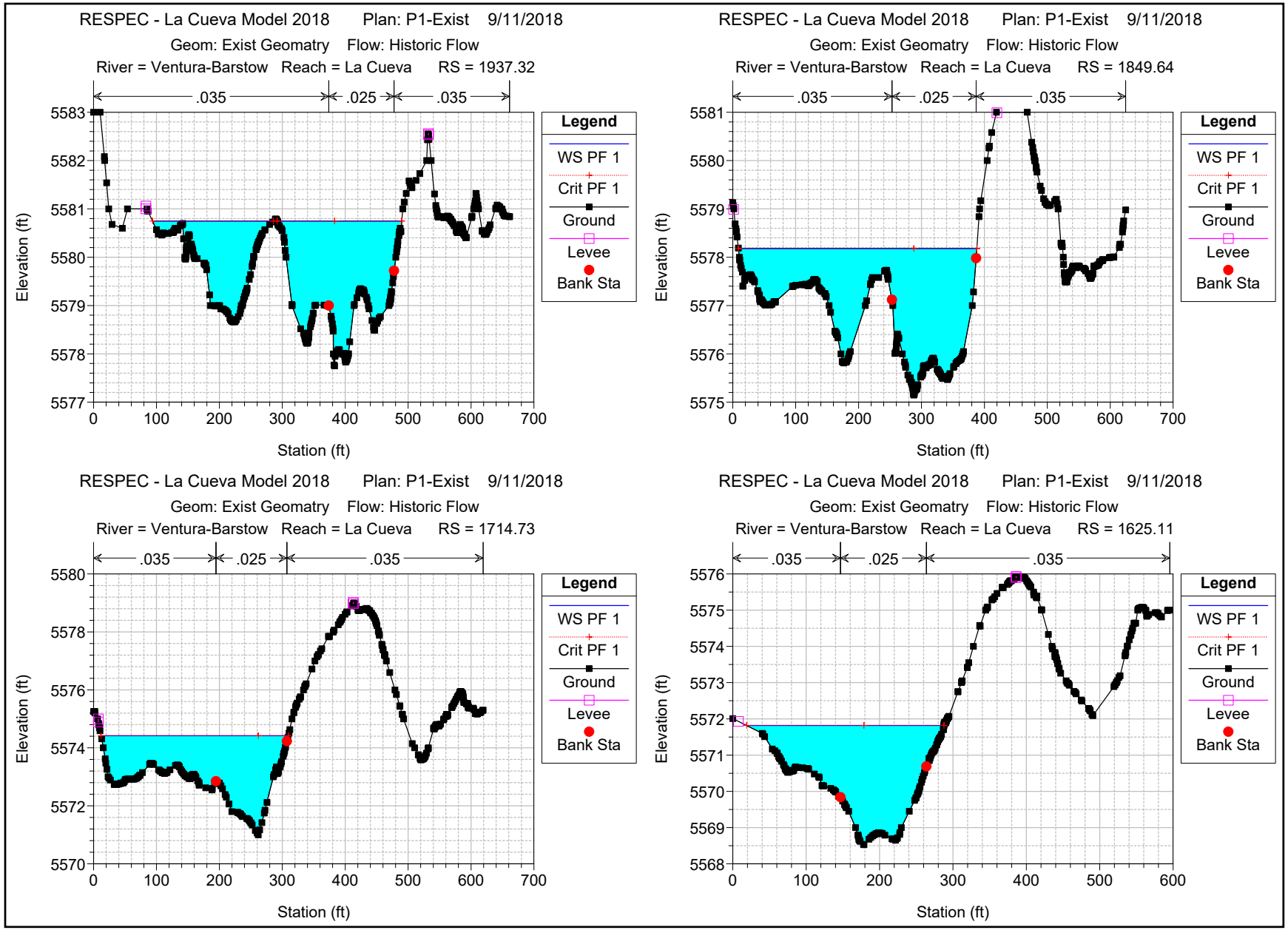
COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 1 NOTATION	
START										TIME=	.00
RAINFALL TYPE= 2										RAIN24=	4.050
COMPUTE NM HYD	101.00	-	1	.60700	953.84	45.841	1.41600	1.650	2.455	PER IMP=	.00
ROUTE MCUNGE	101.80	1	2	.60700	912.90	45.469	1.40451	1.850	2.350	CCODE =	.1
RAINFALL TYPE= 2										RAIN24=	4.200
COMPUTE NM HYD	100.00	-	1	1.21400	1201.70	87.881	1.35730	1.850	1.547	PER IMP=	.00
ROUTE MCUNGE	100.80	1	3	1.21400	1177.21	87.700	1.35451	2.100	1.515	CCODE =	.1
ADD HYD	101.88	3& 2	5	1.82100	1882.13	133.168	1.37117	1.950	1.615		
RAINFALL TYPE= 2										RAIN24=	3.650
COMPUTE NM HYD	102.00	-	1	.87500	1033.60	54.313	1.16386	1.700	1.846	PER IMP=	.00
ADD HYD	102.90	1& 5	5	2.69600	2554.30	187.482	1.30389	1.900	1.480		
*S LA CUEVA TRIBUTARY ARROYO @ TRAMWAY BLVD. (102.9)											
ROUTE MCUNGE	102.80	5	2	2.69600	2515.07	187.100	1.30123	2.050	1.458	CCODE =	.1
RAINFALL TYPE= 2										RAIN24=	3.370
COMPUTE NM HYD	107.20	-	1	.17200	325.87	13.591	1.48157	1.550	2.960	PER IMP=	17.00
ADD HYD	107.29	1& 2	4	2.86800	2575.01	200.690	1.31205	2.050	1.403		
*S NORTH LA CUEVA AT GLENDALE AND BROWNING (107.29)											
RAINFALL TYPE= 2										RAIN24=	3.500
COMPUTE NM HYD	102.10	-	1	.09300	149.17	4.457	.89867	1.500	2.506	PER IMP=	.00
*S LA CUEVA TRIBUTARY @ TRAMWAY BLVD.											
ROUTE MCUNGE	102.18	1	2	.09300	136.20	4.395	.88600	1.700	2.288	CCODE =	.1
RAINFALL TYPE= 2										RAIN24=	3.380
COMPUTE NM HYD	107.10	-	1	.18080	399.38	14.303	1.48327	1.500	3.452	PER IMP=	17.00
ADD HYD	107.19	1& 2	5	.27380	399.38	18.697	1.28040	1.500	2.279		
*S NORTH LA CUEVA (TRIB) AT FLORENCE AND BROWNING (107.19)											
ADD HYD	107.90	5& 4	3	3.14180	2666.73	219.388	1.30929	2.000	1.326		
RAINFALL TYPE= 2										RAIN24=	3.400
COMPUTE NM HYD	106.00	-	1	.04360	95.85	3.448	1.48281	1.500	3.435	PER IMP=	17.00
ROUTE MCUNGE	106.80	1	2	.04360	86.06	3.396	1.46043	1.700	3.084	CCODE =	.1
RAINFALL TYPE= 2										RAIN24=	3.340
COMPUTE NM HYD	106.10	-	1	.11160	238.47	8.685	1.45925	1.500	3.339	PER IMP=	17.00
ADD HYD	106.19	1& 2	6	.15520	257.25	12.081	1.45958	1.550	2.590		
*S LA CUEVA TRIBUTARY ARROYO @ BROWNING (106.19)											
ADD HYD	107.99	3& 6	5	3.29700	2733.21	231.469	1.31636	2.000	1.295		
ROUTE MCUNGE	107.80	5	2	3.29700	2713.95	231.319	1.31551	2.100	1.286	CCODE =	.1
RAINFALL TYPE= 2										RAIN24=	3.230
COMPUTE NM HYD	109.00	-	1	.10060	216.30	7.552	1.40751	1.500	3.359	PER IMP=	17.00
ADD HYD	109.90	1& 2	5	3.39760	2736.13	238.871	1.31823	2.100	1.258		
RAINFALL TYPE= 2										RAIN24=	3.250
COMPUTE NM HYD	108.00	-	7	.20550	404.63	15.573	1.42091	1.550	3.077	PER IMP=	17.00
ADD HYD	109.99	5& 7	5	3.60310	2789.17	254.444	1.32409	2.100	1.210		
*S LA CUEVA ARROYO @ EUBANK (MAIN) (109.99)											
ROUTE MCUNGE	109.88	5	2	3.60310	2763.62	254.113	1.32237	2.200	1.198	CCODE =	.1
RAINFALL TYPE= 2										RAIN24=	3.130
COMPUTE NM HYD	110.00	-	1	.16340	275.61	11.738	1.34689	1.550	2.636	PER IMP=	17.00
ADD HYD	110.90	1& 2	5	3.76650	2796.05	265.851	1.32343	2.200	1.160		
*S LA CUEVA ARROYO @ VENTURA (MAIN) (110.90)- FINAL											
*S ROUTE TO BARSTOW											
ROUTE MCUNGE	110.88	5	2	3.76650	2792.08	263.889	1.31366	2.219	1.158	CCODE =	.1
RAINFALL TYPE= 2										RAIN24=	3.020
COMPUTE NM HYD	111.00	-	1	.05330	108.83	3.739	1.31526	1.500	3.190	PER IMP=	17.00
COMPUTE NM HYD	111.40	-	4	.01410	28.80	.989	1.31527	1.500	3.192	PER IMP=	17.00
*S COMBINE HYD.'S	111.0	AND	111.4	AS 111.49							
ADD HYD	111.49	1& 4	4	.06740	137.63	4.728	1.31525	1.500	3.191		
*S ROUTE TO LA CUEVA CHANEL @ OAKLAND											
*S PIPE ROUTING											
ROUTE	111.48	4	5	.06740	133.79	4.728	1.31527	1.550	3.102		
RAINFALL TYPE= 2										RAIN24=	3.050
COMPUTE NM HYD	111.10	-	1	.09690	195.97	7.699	1.48968	1.500	3.160	PER IMP=	26.00
RAINFALL TYPE= 2										RAIN24=	3.050
COMPUTE NM HYD	111.30	-	6	.04200	107.90	4.348	1.94094	1.500	4.014	PER IMP=	50.00
ADD HYD	111.39	1& 6	1	.13890	303.87	12.046	1.62612	1.500	3.418		
*S COMBINE HYD.'S	111.48	AND	111.39	AS 111.88							
ADD HYD	111.88	1& 5	1	.20630	436.39	16.774	1.52456	1.500	3.305		
*S LA CUEVA CHANNEL AT BARSTOW (111.89)-NOT FINAL											
ADD HYD	111.89	1& 2	5	3.97280	2827.78	280.143	1.32216	2.194	1.112		
*S DIVERSION FROM NDB ABOVE CARRINGTON											
COMPUTE NM HYD	924.10	-	6	.02500	64.23	2.588	1.94094	1.500	4.015	PER IMP=	50.00
COMPUTE NM HYD	924.20	-	7	.01900	48.82	1.967	1.94094	1.500	4.015	PER IMP=	50.00
*S COMBINE HYD.'S	924.10	AND	924.20	AS 924.22							

Appendix C

Existing Conditions

HEC-RAS Plan: P1-Exist River: Ventura-Barstow Reach: La Cueva Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
La Cueva	1937.32	PF 1	3090.00	5577.75	5580.75	5580.75	5581.52	0.007905	8.49	520.20	390.25	1.05
La Cueva	1849.64	PF 1	3090.00	5575.15	5578.18	5578.18	5578.86	0.005312	7.48	559.84	379.10	0.87
La Cueva	1714.73	PF 1	3090.00	5571.00	5574.42	5574.42	5575.20	0.006559	8.18	498.30	297.75	0.97
La Cueva	1625.11	PF 1	3090.00	5568.53	5571.82	5571.82	5572.79	0.005525	8.47	456.96	268.86	0.92
La Cueva	1565.71	PF 1	3090.00	5567.46	5570.65	5570.65	5571.65	0.005453	8.40	437.13	240.76	0.91
La Cueva	1511.28	PF 1	3090.00	5565.36	5567.91	5567.91	5568.71	0.008347	7.97	458.55	282.91	1.05
La Cueva	1438.58	PF 1	3090.00	5562.99	5565.53	5565.53	5566.34	0.010458	8.88	460.43	290.16	1.18
La Cueva	1410.93	PF 1	3090.00	5562.06	5564.72	5564.72	5565.51	0.010994	7.93	444.53	289.47	1.16
La Cueva	1380.76	PF 1	3090.00	5560.98	5563.87	5563.87	5564.65	0.010280	8.46	466.51	304.67	1.15
La Cueva	1354.24	PF 1	3090.00	5560.91	5563.39	5563.39	5564.15	0.008639	8.11	483.21	319.37	1.07
La Cueva	1332.33	PF 1	3090.00	5559.87	5562.92	5562.92	5563.67	0.006482	7.94	513.40	329.72	0.95
La Cueva	1311.52	PF 1	3090.00	5558.99	5562.38	5562.38	5563.13	0.006143	7.78	516.03	334.01	0.93
La Cueva	1295.47	PF 1	3090.00	5558.66	5561.87	5561.87	5562.65	0.005189	7.86	525.90	333.25	0.88
La Cueva	1264.68	PF 1	3090.00	5557.15	5560.95		5561.51	0.003404	7.05	625.76	338.54	0.73
La Cueva	1233.92	PF 1	3090.00	5555.38	5561.03		5561.31	0.001141	5.02	902.09	369.49	0.44
La Cueva	1187.49	PF 1	3090.00	5554.00	5559.39	5559.39	5560.85	0.006843	9.70	319.75	116.85	1.02
La Cueva	1146.73	PF 1	3090.00	5552.95	5557.03	5557.03	5558.39	0.007467	9.36	330.07	123.79	1.01
La Cueva	1104.38	PF 1	3090.00	5551.33	5555.56	5555.56	5556.88	0.006689	9.24	334.57	128.11	1.01
La Cueva	1056.97	PF 1	3090.00	5550.42	5554.19	5554.19	5555.61	0.007123	10.30	330.98	122.65	0.99
La Cueva	1011.94	PF 1	3090.00	5548.91	5553.05	5553.05	5554.54	0.005560	9.92	331.33	125.78	0.95
La Cueva	975.03	PF 1	3090.00	5547.84	5552.37	5552.37	5553.69	0.004434	9.42	373.61	179.46	0.86
La Cueva	916.13	PF 1	3090.00	5546.08	5550.02	5550.02	5551.26	0.007613	9.08	366.90	162.62	0.94
La Cueva	848.23	PF 1	3090.00	5543.83	5547.96	5547.96	5549.43	0.006180	9.75	322.31	118.12	0.99
La Cueva	804.54	PF 1	3090.00	5542.34	5547.29	5547.29	5548.23	0.003850	8.66	533.57	334.36	0.80
La Cueva	742.87	PF 1	3090.00	5540.82	5545.55	5545.55	5546.24	0.003047	7.50	647.08	461.93	0.71
La Cueva	711.63	PF 1	3090.00	5540.27	5544.34	5544.34	5545.11	0.005125	7.82	541.27	436.19	0.87
La Cueva	674.15	PF 1	3090.00	5538.78	5543.75	5543.75	5544.33	0.003327	8.03	737.10	506.26	0.74
La Cueva	618.69	PF 1	3090.00	5537.00	5541.31	5541.31	5542.19	0.004911	8.76	533.90	353.42	0.88
La Cueva	491.87	PF 1	3090.00	5533.46	5538.41	5538.41	5539.08	0.003589	7.68	653.45	473.47	0.76
La Cueva	450.17	PF 1	3090.00	5531.00	5536.70	5536.70	5537.33	0.004206	8.90	673.83	452.95	0.83
La Cueva	432.04	PF 1	3090.00	5530.99	5535.95	5535.95	5536.58	0.005290	8.03	618.73	440.66	0.89
La Cueva	356.79	PF 1	3090.00	5528.87	5533.66	5533.66	5534.28	0.004595	7.70	646.34	466.93	0.83
La Cueva	306.95	PF 1	3090.00	5528.01	5532.38	5532.38	5533.03	0.005150	8.12	622.76	444.36	0.88
La Cueva	247.1	PF 1	3090.00	5526.33	5530.83	5530.83	5531.53	0.004044	8.19	621.67	405.44	0.81
La Cueva	208.39	PF 1	3090.00	5525.00	5529.99	5529.99	5530.92	0.004653	9.61	545.83	321.98	0.88
La Cueva	172.73	PF 1	3090.00	5524.41	5528.92	5528.92	5529.95	0.005146	8.95	442.89	210.75	0.90
La Cueva	98.74	PF 1	3090.00	5521.70	5527.50		5527.99	0.001482	6.42	647.57	226.40	0.52
La Cueva	1.24	PF 1	3090.00	5518.52	5525.15	5525.15	5527.54	0.005708	12.42	248.98	53.21	0.99


RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1937.32
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1849.64
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.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1714.73
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.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1625.11
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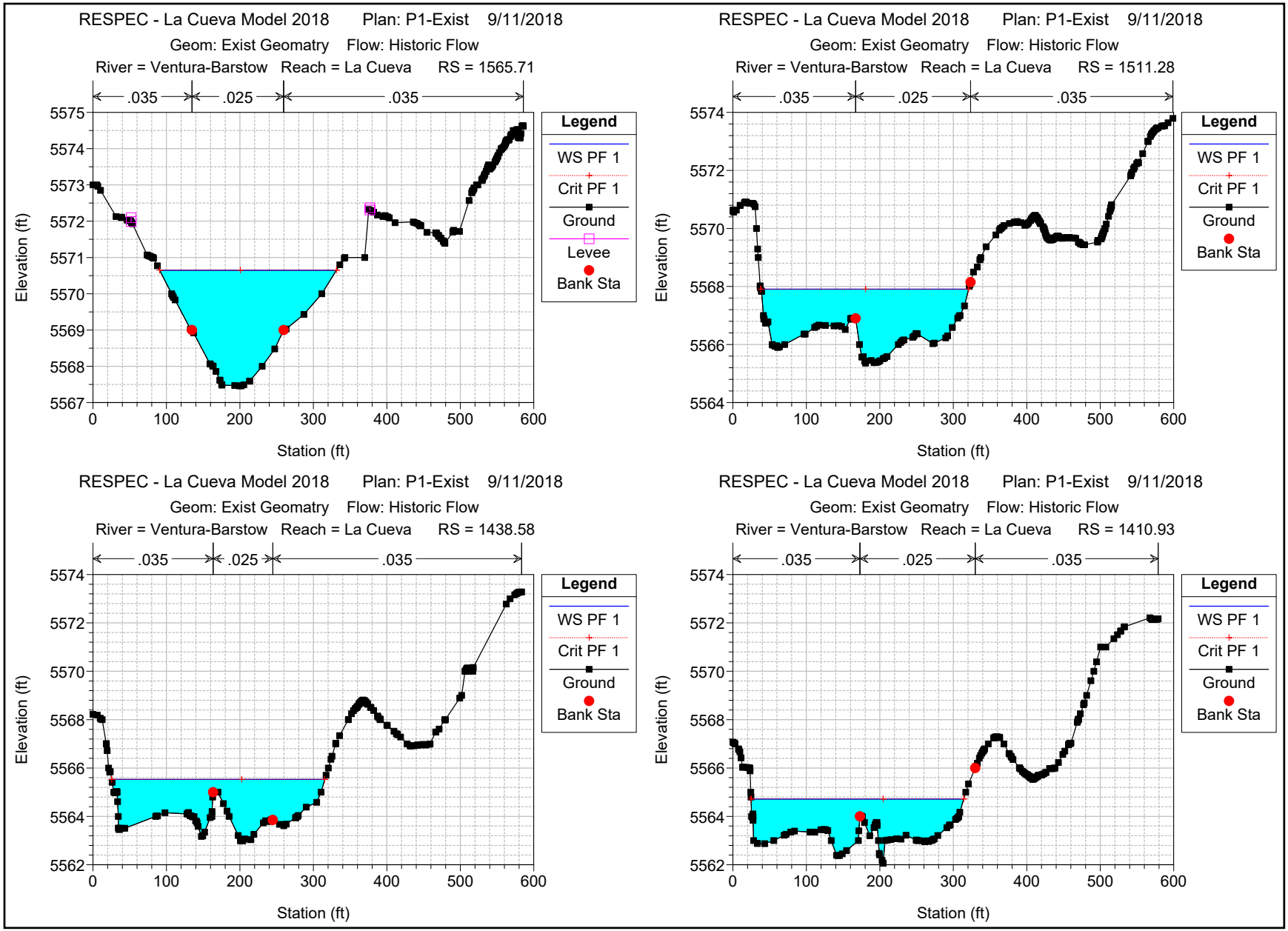
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta


RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1565.71
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Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1511.28
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.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1438.58
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.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1410.93
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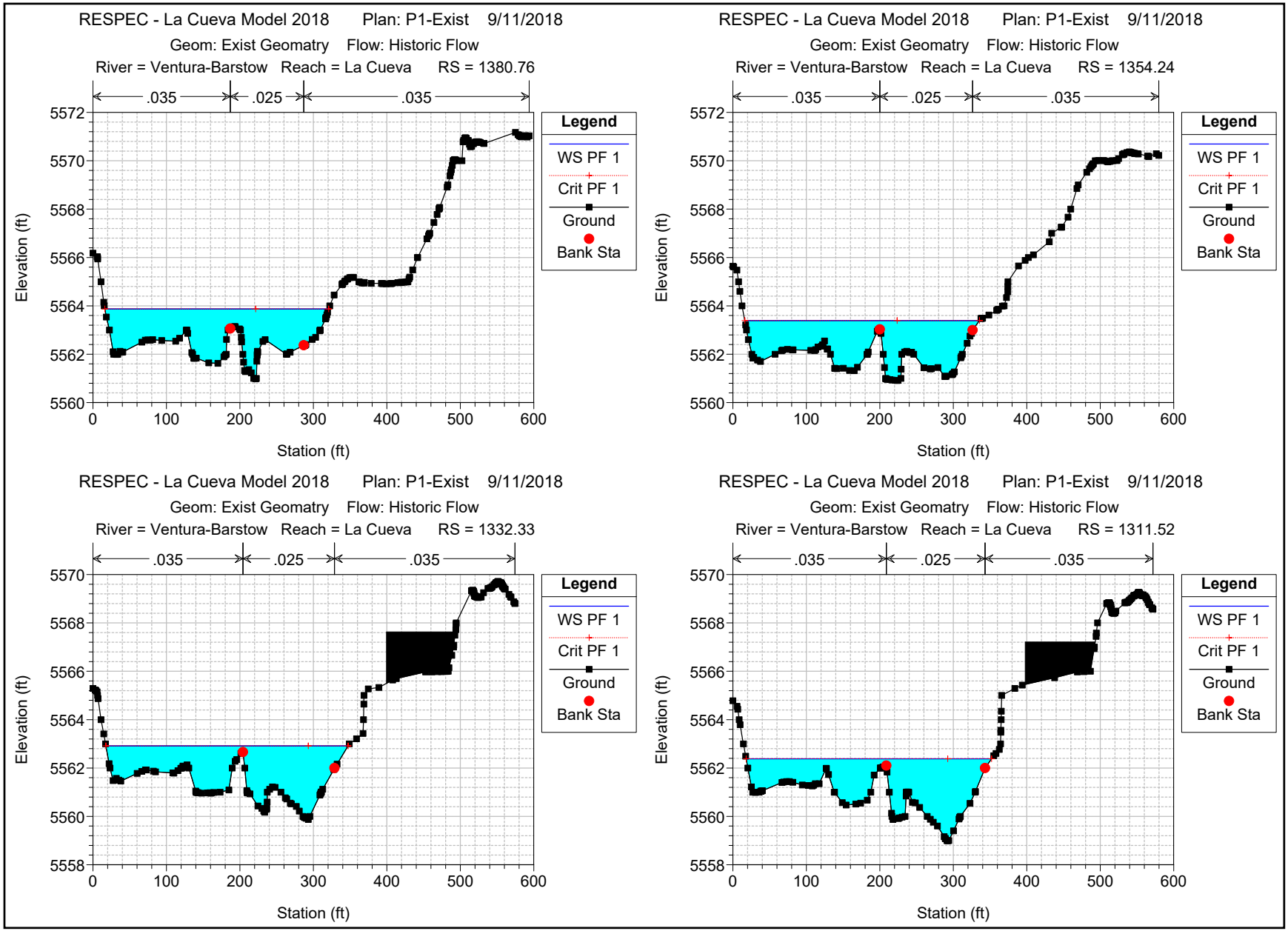
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta


RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1380.76
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.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1354.24
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.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1332.33
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.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1311.52
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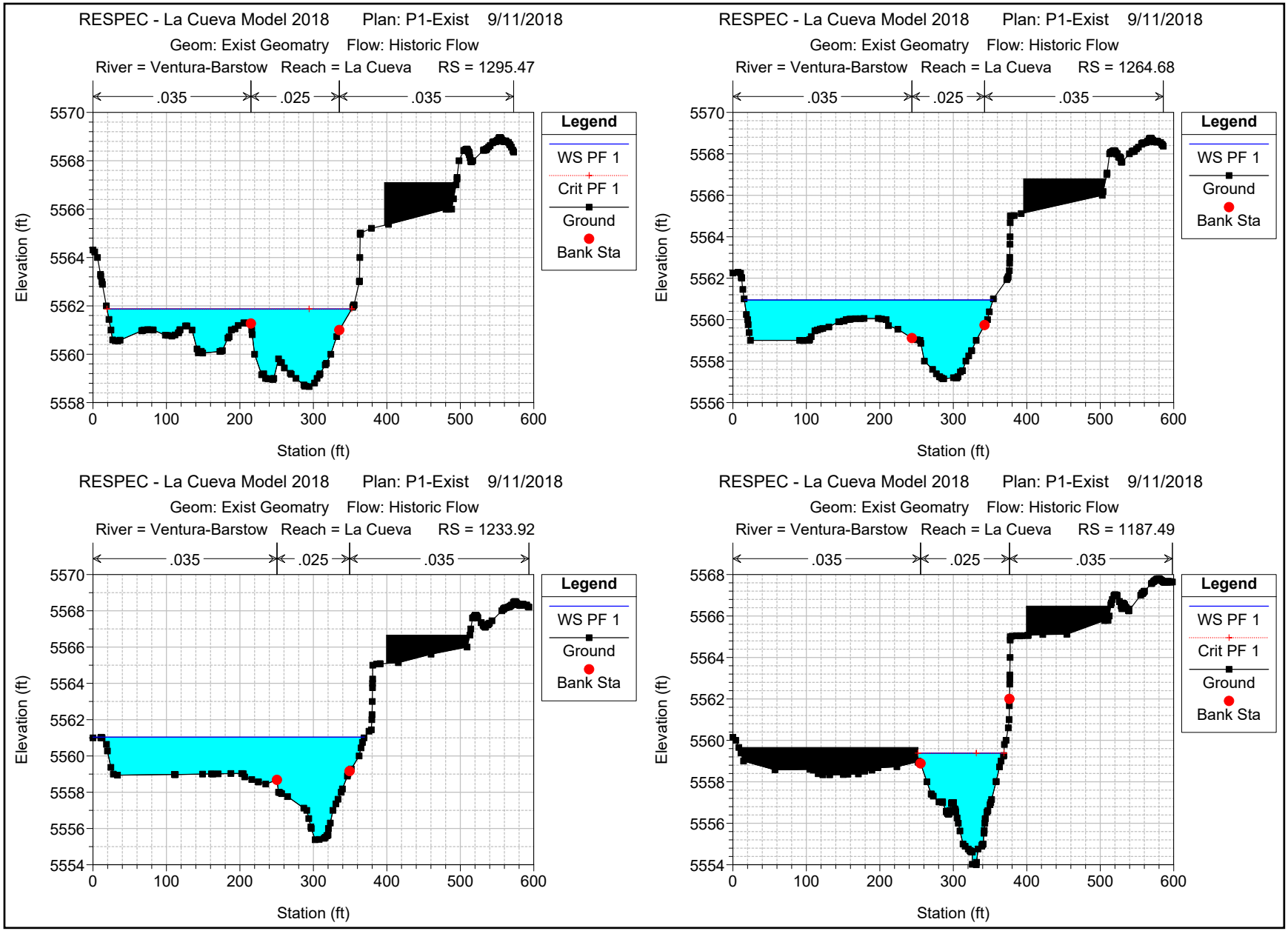
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta


RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1295.47
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.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1264.68
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.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1233.92
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.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1187.49
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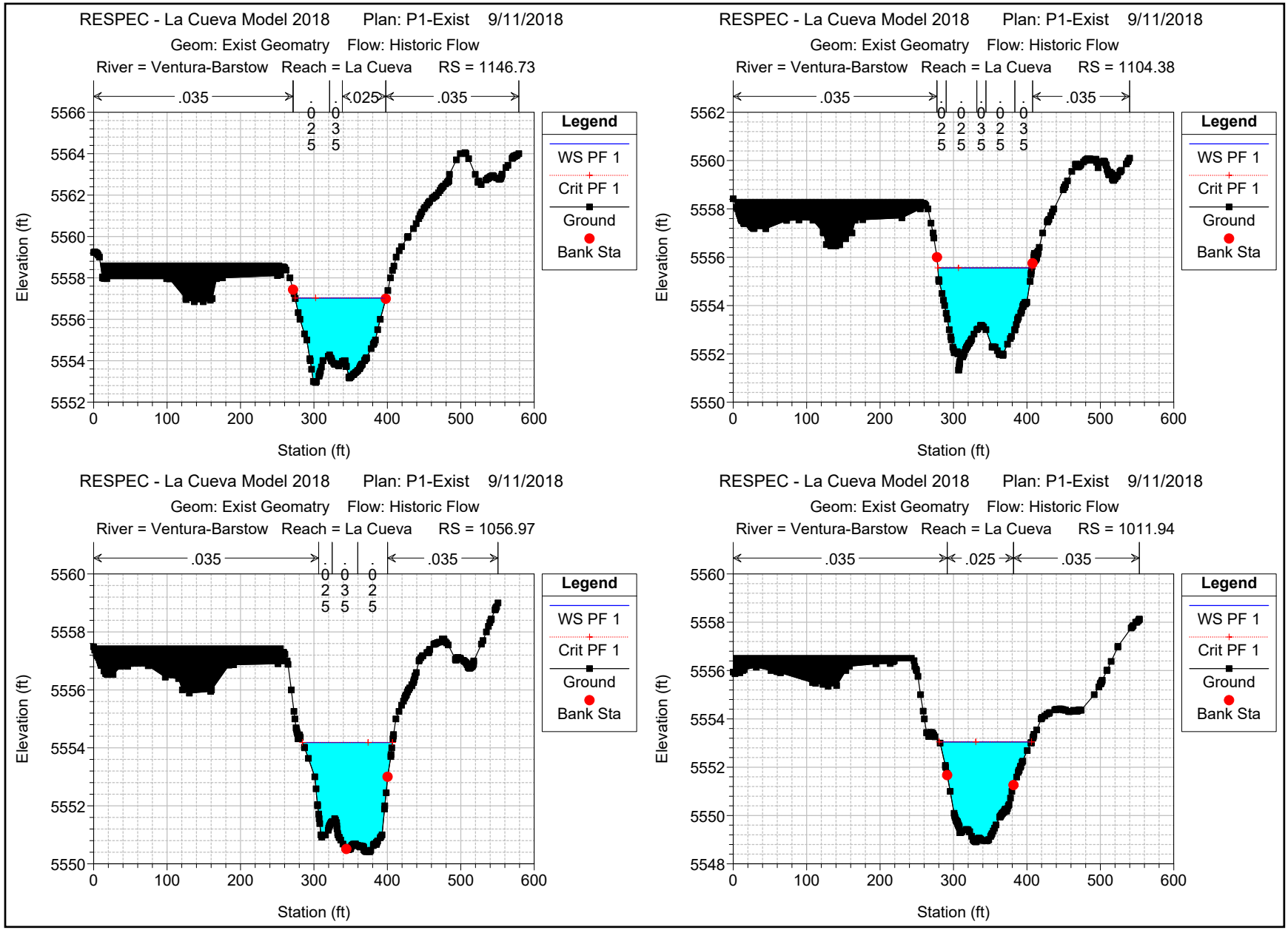
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta


RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1146.73
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.025
.035
.025
.035
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1104.38
.035
.025
.035
.025
.035
.025
.035
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1056.97
.035
.025
.035
.025
.035
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1011.94
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.025
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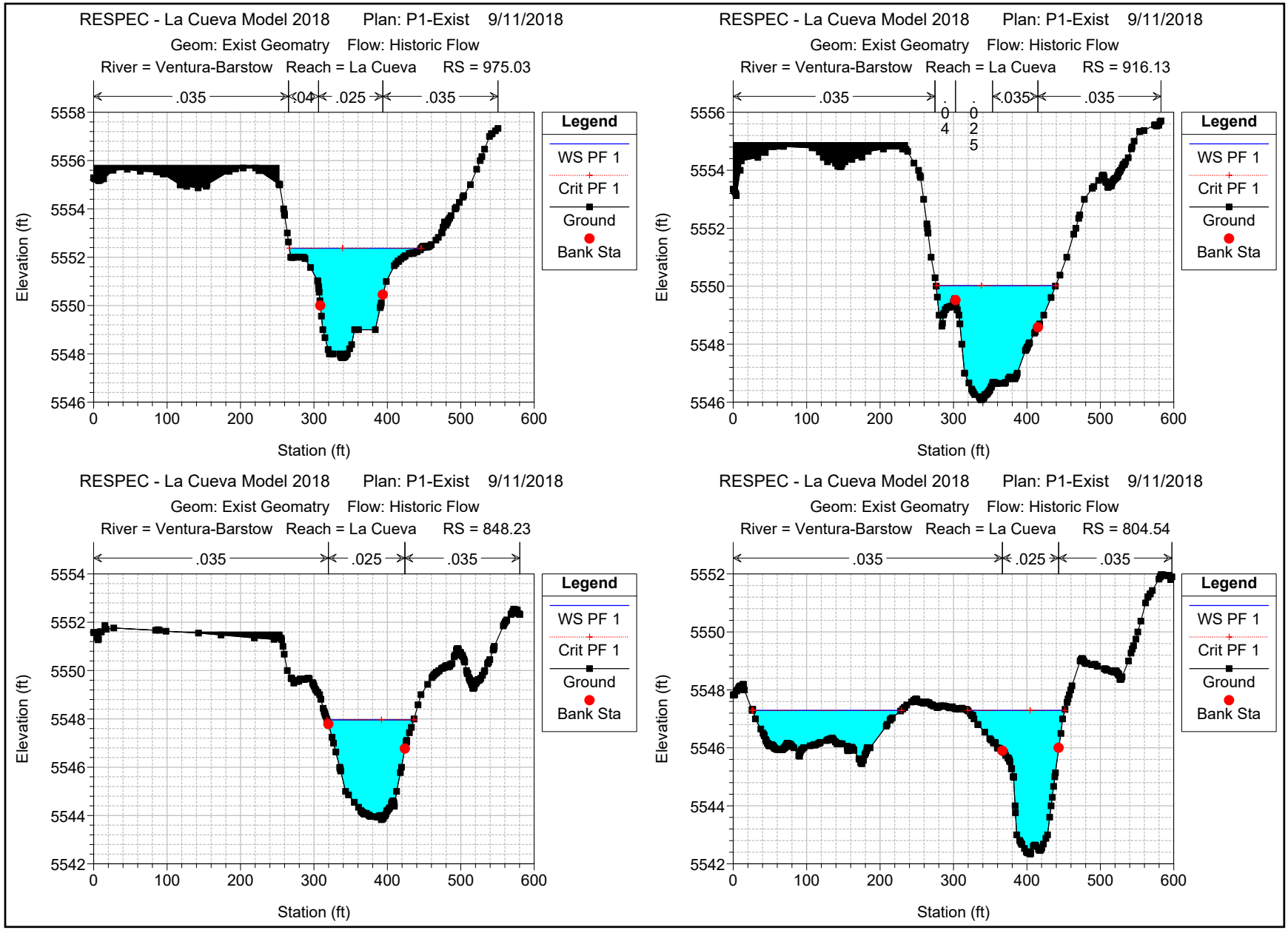
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 975.03
.035
.04
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 916.13
.035
.04
.025
.035
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 848.23
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 804.54
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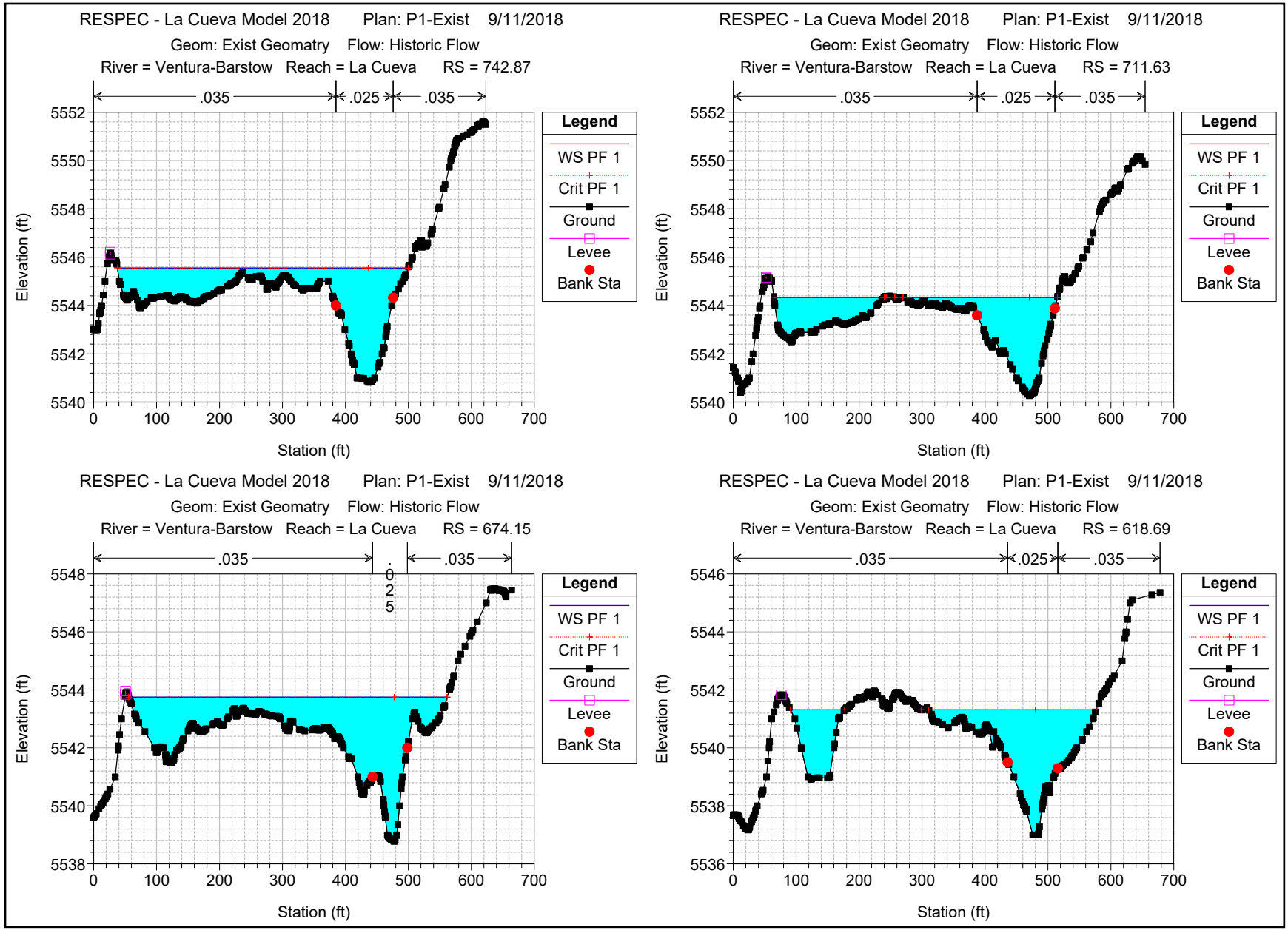
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta


RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 742.87
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 711.63
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 674.15
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 618.69
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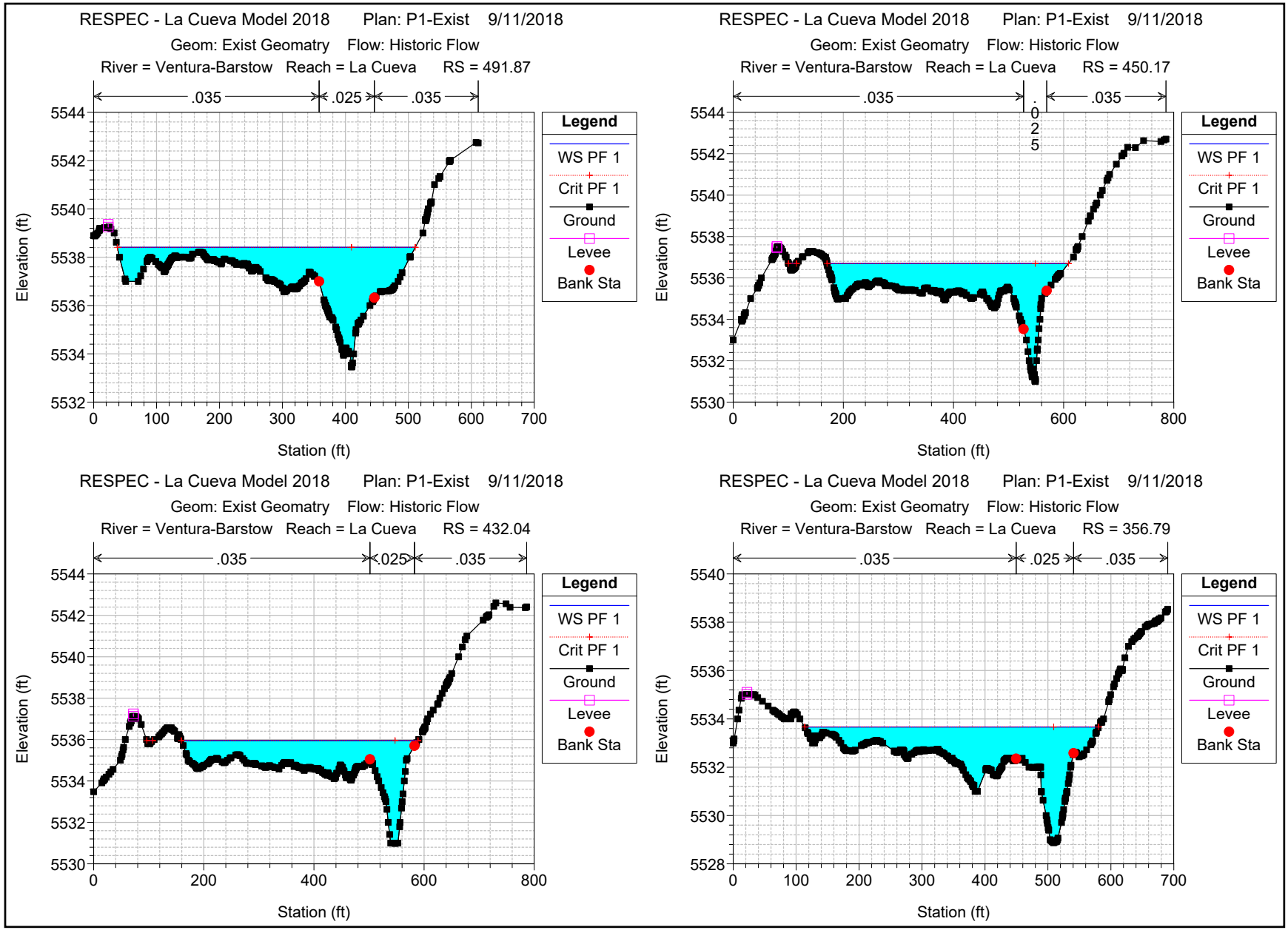
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta


RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 491.87
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 450.17
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 432.04
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 356.79
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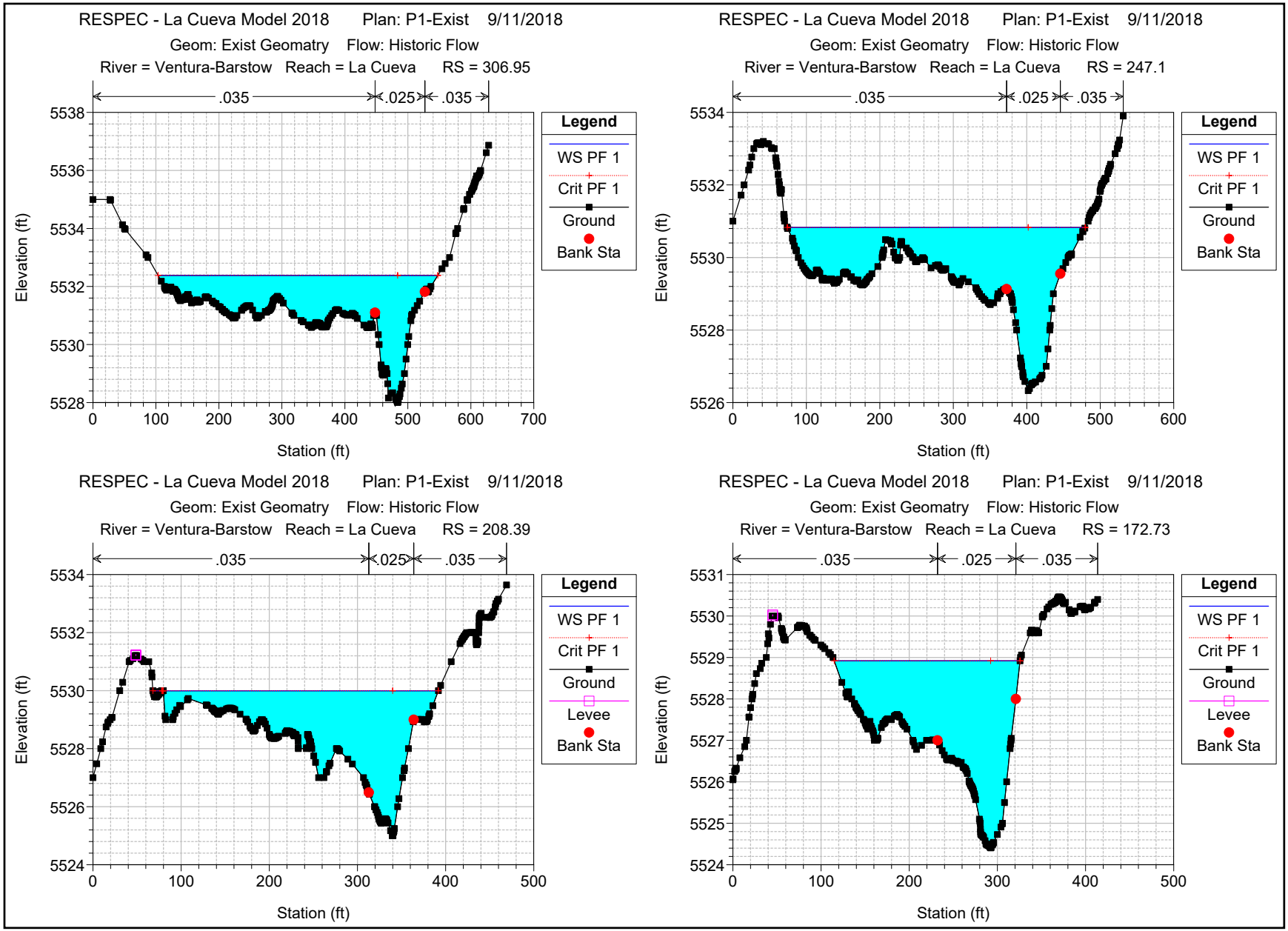
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta


RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 306.95
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.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 247.1
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 208.39
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 172.73
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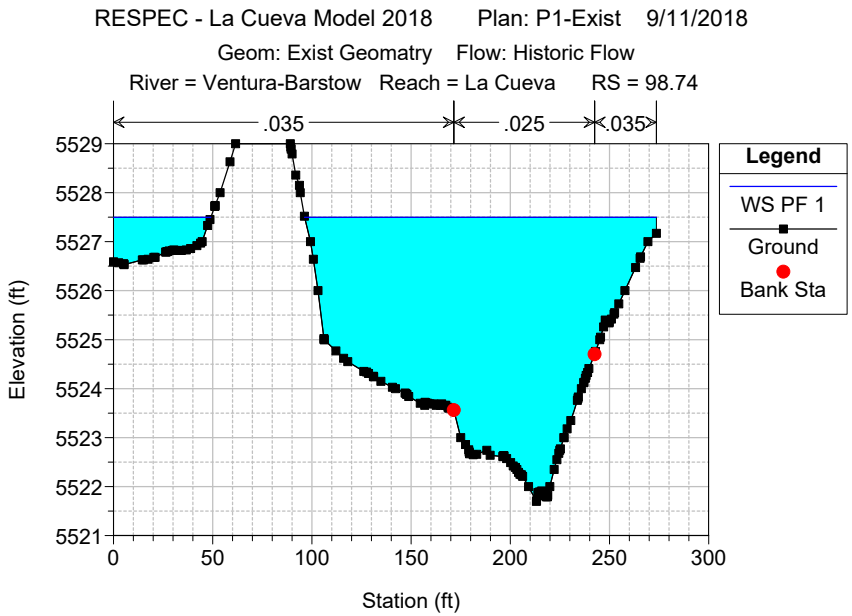
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta


RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 98.74
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.025
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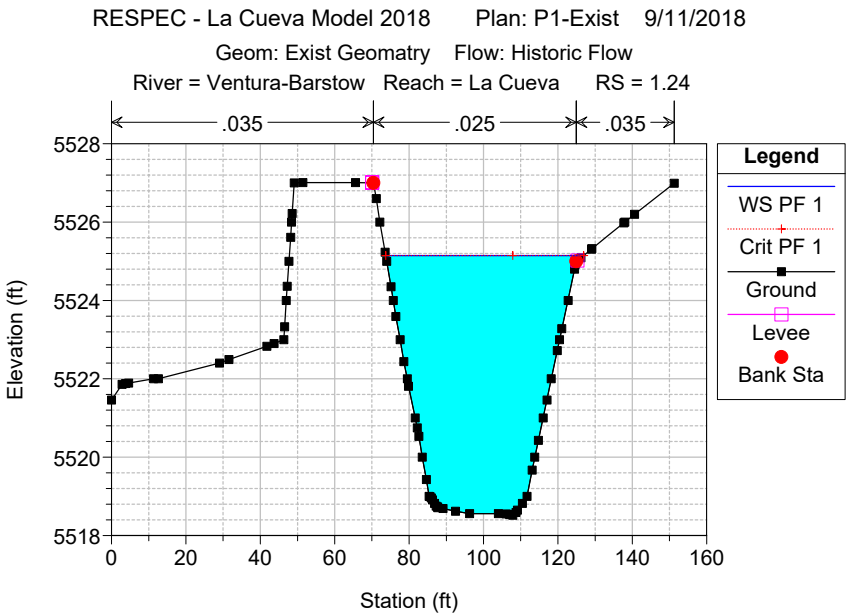
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta

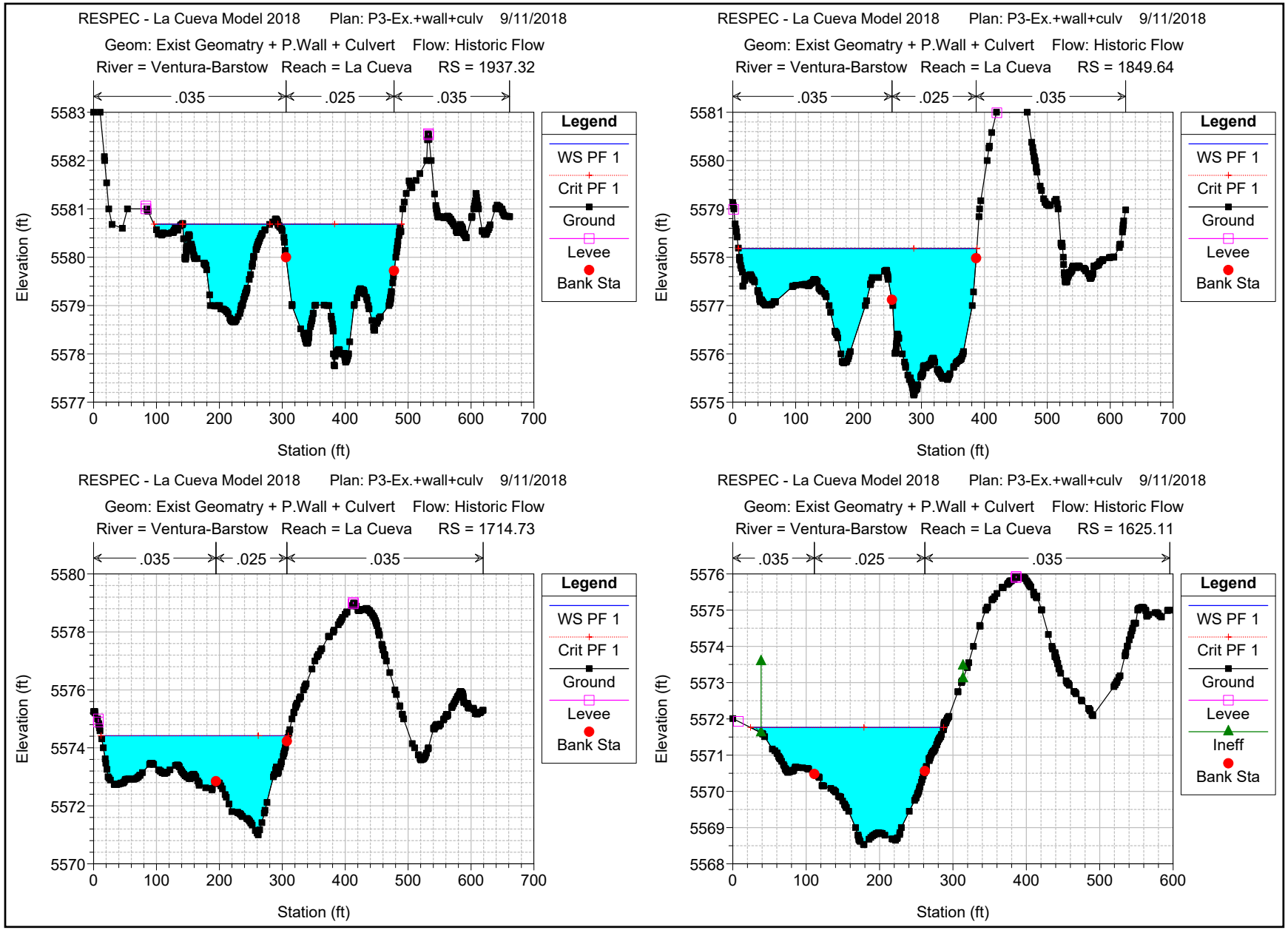

RESPEC - La Cueva Model 2018 Plan: P1-Exist 9/11/2018
Geom: Exist Geomatry Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1.24
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta

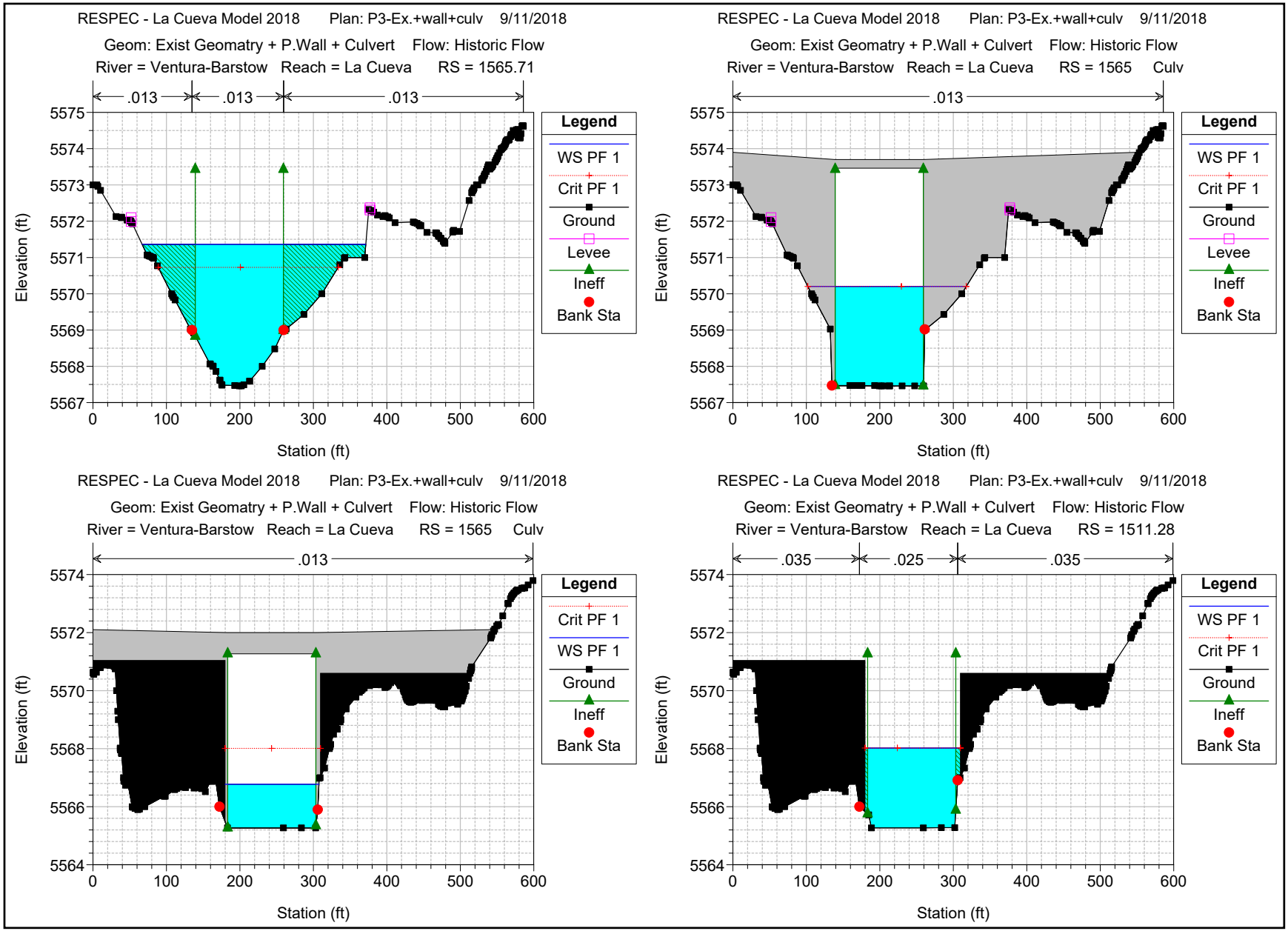
HEC-RAS Plan: P3-Ex.+wall+culv River: Ventura-Barstow Reach: La Cueva Profile: PF 1

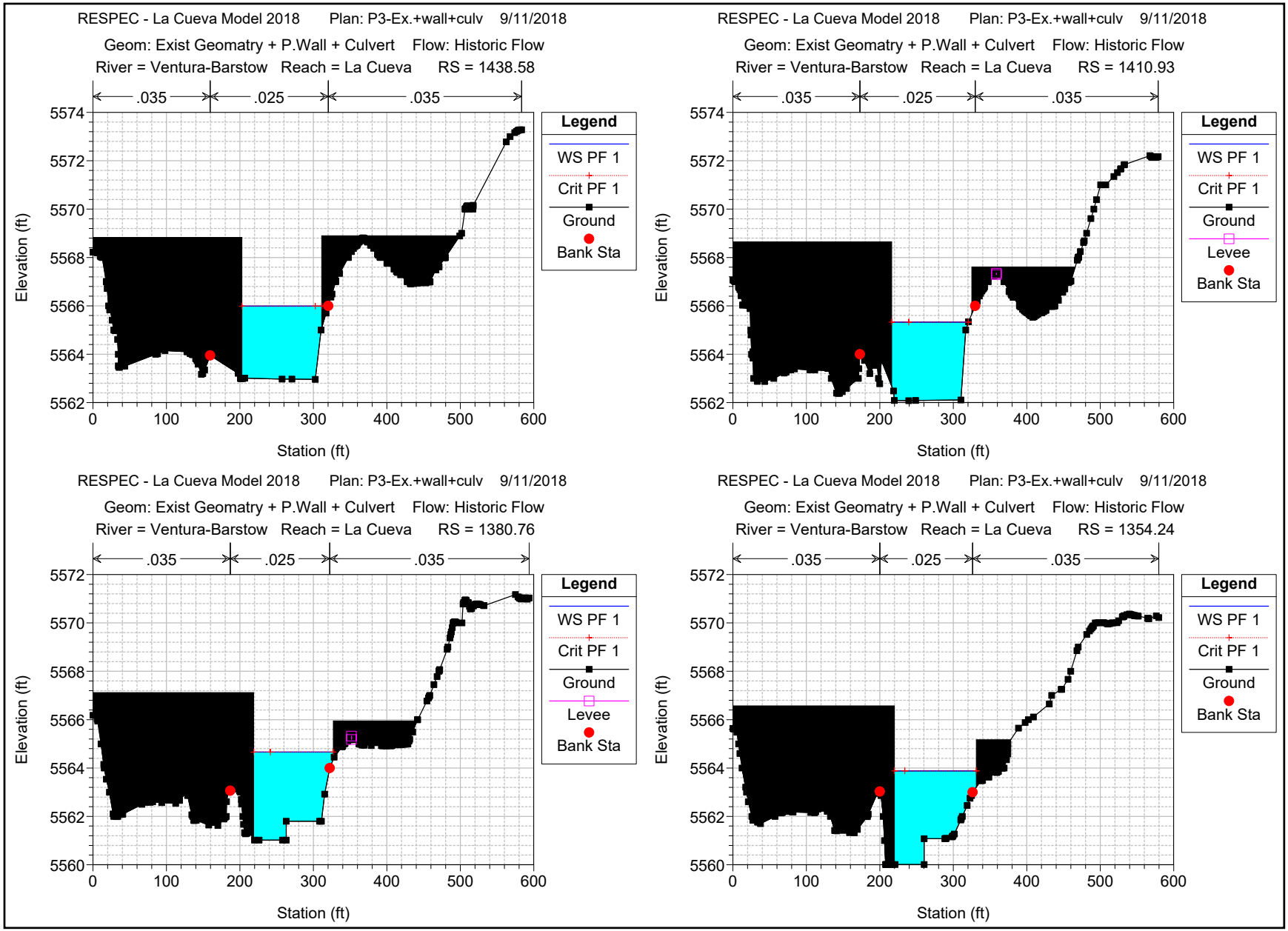
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
La Cueva	1937.32	PF 1	3090.00	5577.75	5580.68	5580.68	5581.45	0.006873	7.60	495.54	380.14	0.97
La Cueva	1849.64	PF 1	3090.00	5575.15	5578.18	5578.18	5578.86	0.005312	7.48	559.84	379.10	0.87
La Cueva	1714.73	PF 1	3090.00	5571.00	5574.42	5574.42	5575.20	0.006559	8.18	498.30	297.75	0.97
La Cueva	1625.11	PF 1	3090.00	5568.53	5571.76	5571.76	5572.68	0.005578	7.94	441.60	263.16	0.90
La Cueva	1565.71	PF 1	3090.00	5567.46	5571.36	5570.73	5572.26	0.000864	7.59	407.37	304.38	0.73
La Cueva	1565		Culvert									
La Cueva	1511.28	PF 1	3090.00	5565.27	5568.02	5568.02	5569.40	0.006598	9.43	327.80	129.80	1.01
La Cueva	1438.58	PF 1	3090.00	5562.96	5565.99	5565.99	5567.46	0.006790	9.75	316.88	108.64	1.01
La Cueva	1410.93	PF 1	3090.00	5562.08	5565.33	5565.33	5566.82	0.006504	9.80	315.16	104.39	0.99
La Cueva	1380.76	PF 1	3090.00	5561.02	5564.66	5564.66	5566.13	0.006422	9.75	318.83	108.31	0.98
La Cueva	1354.24	PF 1	3090.00	5560.01	5563.88	5563.88	5565.36	0.006773	9.78	318.91	111.53	1.00
La Cueva	1332.33	PF 1	3090.00	5559.18	5562.95	5562.95	5564.40	0.006421	9.66	327.31	124.97	0.98
La Cueva	1311.52	PF 1	3090.00	5558.38	5562.27	5562.27	5563.68	0.006749	9.51	325.61	121.14	1.00
La Cueva	1295.47	PF 1	3090.00	5557.77	5561.80	5561.80	5563.27	0.006546	9.73	322.45	120.27	0.99
La Cueva	1264.68	PF 1	3090.00	5556.60	5560.72	5560.72	5562.27	0.006168	10.02	314.72	106.97	0.99
La Cueva	1233.92	PF 1	3090.00	5555.00	5560.60		5561.05	0.001078	5.42	581.32	135.31	0.44
La Cueva	1187.49	PF 1	3090.00	5554.00	5559.39	5559.39	5560.85	0.006843	9.70	319.75	116.85	1.02
La Cueva	1146.73	PF 1	3090.00	5552.95	5557.03	5557.03	5558.39	0.007467	9.36	330.07	123.79	1.01
La Cueva	1104.38	PF 1	3090.00	5551.33	5555.56	5555.56	5556.88	0.006689	9.24	334.57	128.11	1.01
La Cueva	1056.97	PF 1	3090.00	5550.42	5554.19	5554.19	5555.61	0.007123	10.30	330.98	122.65	0.99
La Cueva	1011.94	PF 1	3090.00	5548.91	5553.05	5553.05	5554.54	0.005560	9.92	331.33	125.78	0.95
La Cueva	975.03	PF 1	3090.00	5547.84	5552.37	5552.37	5553.69	0.004434	9.42	373.61	179.46	0.86
La Cueva	916.13	PF 1	3090.00	5546.08	5550.02	5550.02	5551.26	0.007613	9.08	366.90	162.62	0.94
La Cueva	848.23	PF 1	3090.00	5543.83	5547.96	5547.96	5549.43	0.006180	9.75	322.31	118.12	0.99
La Cueva	804.54	PF 1	3090.00	5542.34	5547.29	5547.29	5548.23	0.003850	8.66	533.57	334.36	0.80
La Cueva	742.87	PF 1	3090.00	5540.82	5545.55	5545.55	5546.24	0.003047	7.50	647.08	461.93	0.71
La Cueva	711.63	PF 1	3090.00	5540.27	5544.34	5544.34	5545.11	0.005125	7.82	541.27	436.19	0.87
La Cueva	674.15	PF 1	3090.00	5538.78	5543.75	5543.75	5544.33	0.003327	8.03	737.10	506.26	0.74
La Cueva	618.69	PF 1	3090.00	5537.00	5541.31	5541.31	5542.19	0.004911	8.76	533.90	353.42	0.88
La Cueva	491.87	PF 1	3090.00	5533.46	5538.41	5538.41	5539.08	0.003589	7.68	653.45	473.47	0.76
La Cueva	450.17	PF 1	3090.00	5531.00	5536.70	5536.70	5537.33	0.004206	8.90	673.83	452.95	0.83
La Cueva	432.04	PF 1	3090.00	5530.99	5535.95	5535.95	5536.58	0.005290	8.03	618.73	440.66	0.89
La Cueva	356.79	PF 1	3090.00	5528.87	5533.66	5533.66	5534.28	0.004595	7.70	646.34	466.93	0.83
La Cueva	306.95	PF 1	3090.00	5528.01	5532.38	5532.38	5533.03	0.005150	8.12	622.76	444.36	0.88
La Cueva	247.1	PF 1	3090.00	5526.33	5530.83	5530.83	5531.53	0.004044	8.19	621.67	405.44	0.81
La Cueva	208.39	PF 1	3090.00	5525.00	5529.99	5529.99	5530.92	0.004653	9.61	545.83	321.98	0.88
La Cueva	172.73	PF 1	3090.00	5524.41	5528.92	5528.92	5529.95	0.005146	8.95	442.89	210.75	0.90
La Cueva	98.74	PF 1	3090.00	5521.70	5527.46	5526.20	5528.00	0.001587	6.61	606.35	185.85	0.54

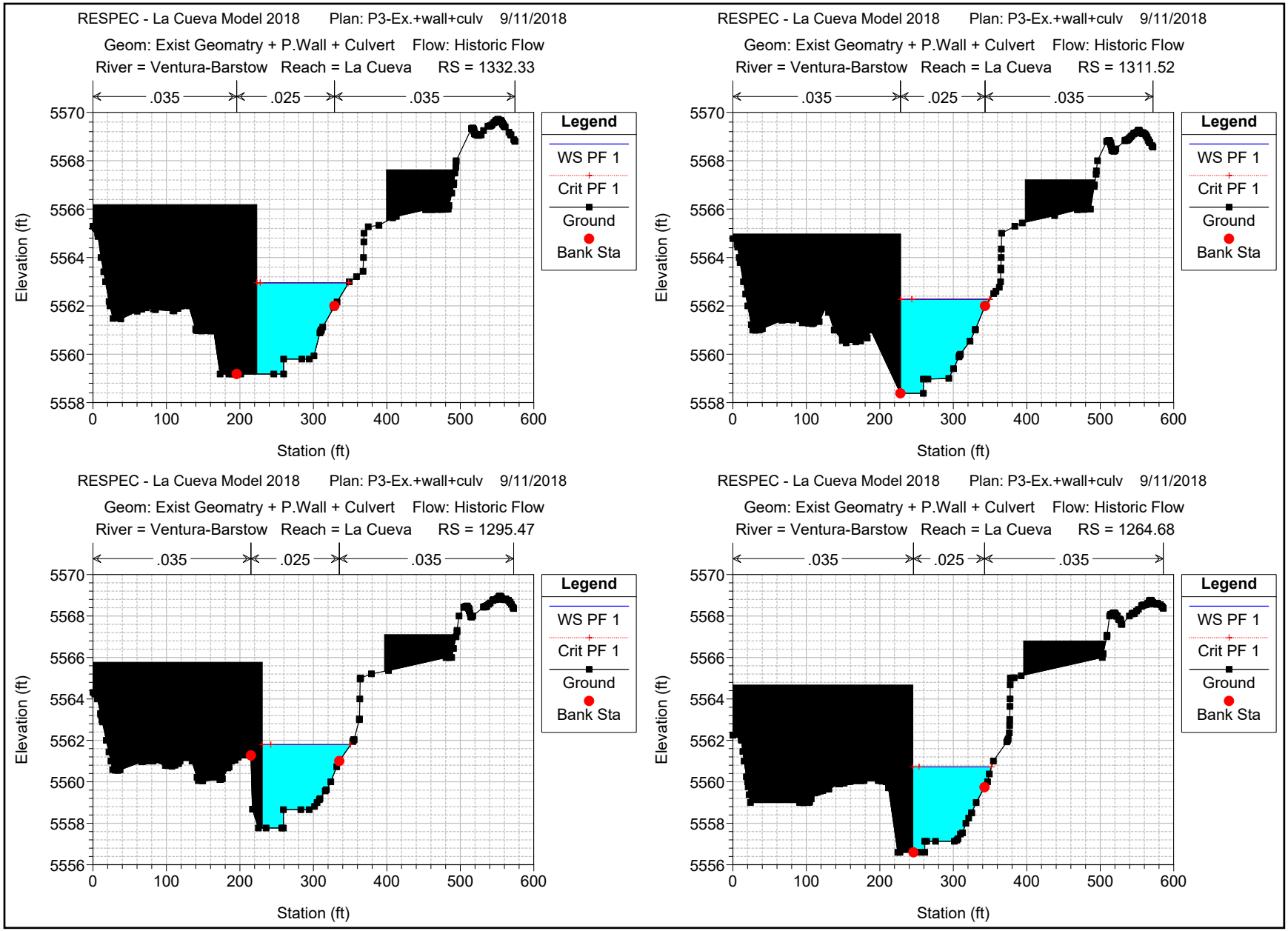
HEC-RAS Plan: P3-Ex.+wall+culv River: Ventura-Barstow Reach: La Cueva Profile: PF 1 (Continued)

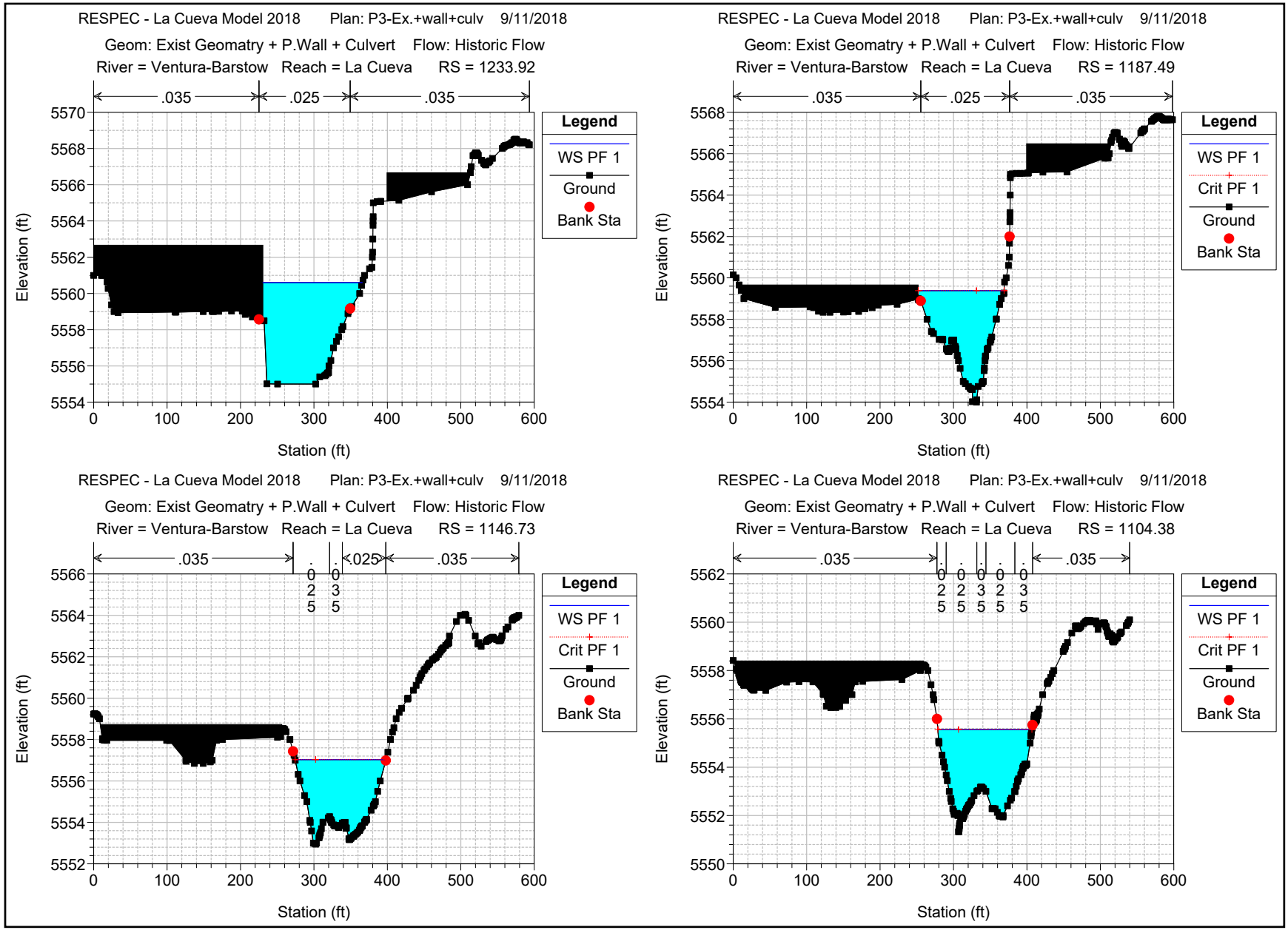
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
La Cueva	1.24	PF 1	3090.00	5518.52	5525.15	5525.15	5527.54	0.005708	12.42	248.98	53.21	0.99


RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1937.32
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1849.64
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1714.73
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1625.11
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Ineff
Bank Sta


RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1565.71
.013
.013
.013
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Ineff
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1565 Culv
.013
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Ineff
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1565 Culv
.013
Elevation (ft)
Station (ft)
Legend
Crit PF 1
WS PF 1
Ground
Ineff
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1511.28
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta


RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1438.58
.035
.025
.035
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1410.93
.035
.025
.035
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1380.76
.035
.025
.035
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1354.24
.035
.025
.035
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1332.33
.035
.025
.035
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1311.52
RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1295.47
RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1264.68


RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1233.92
.035
.025
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1187.49
.035
.025
.035
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1146.73
.035
.025
.035
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1104.38
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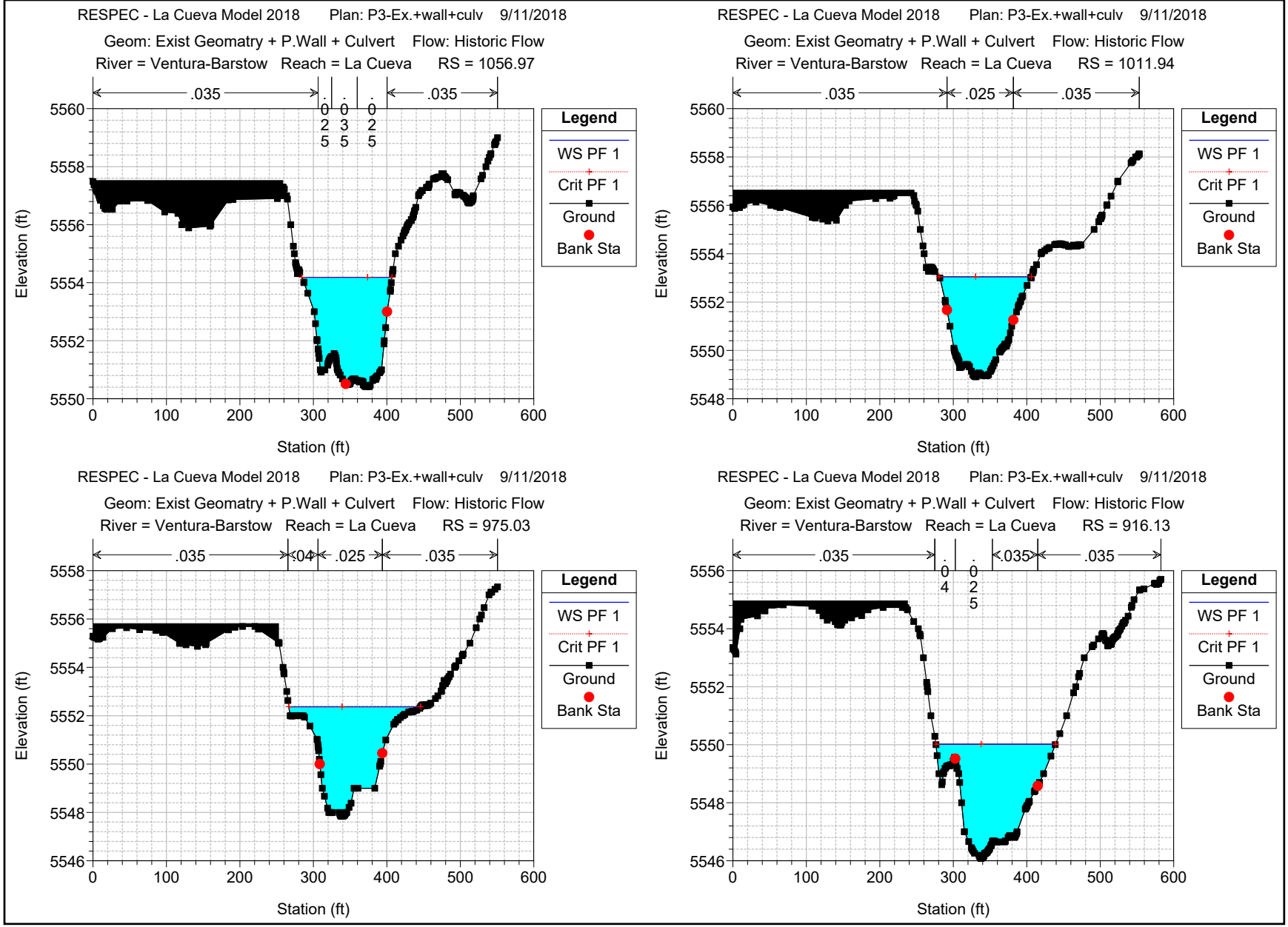
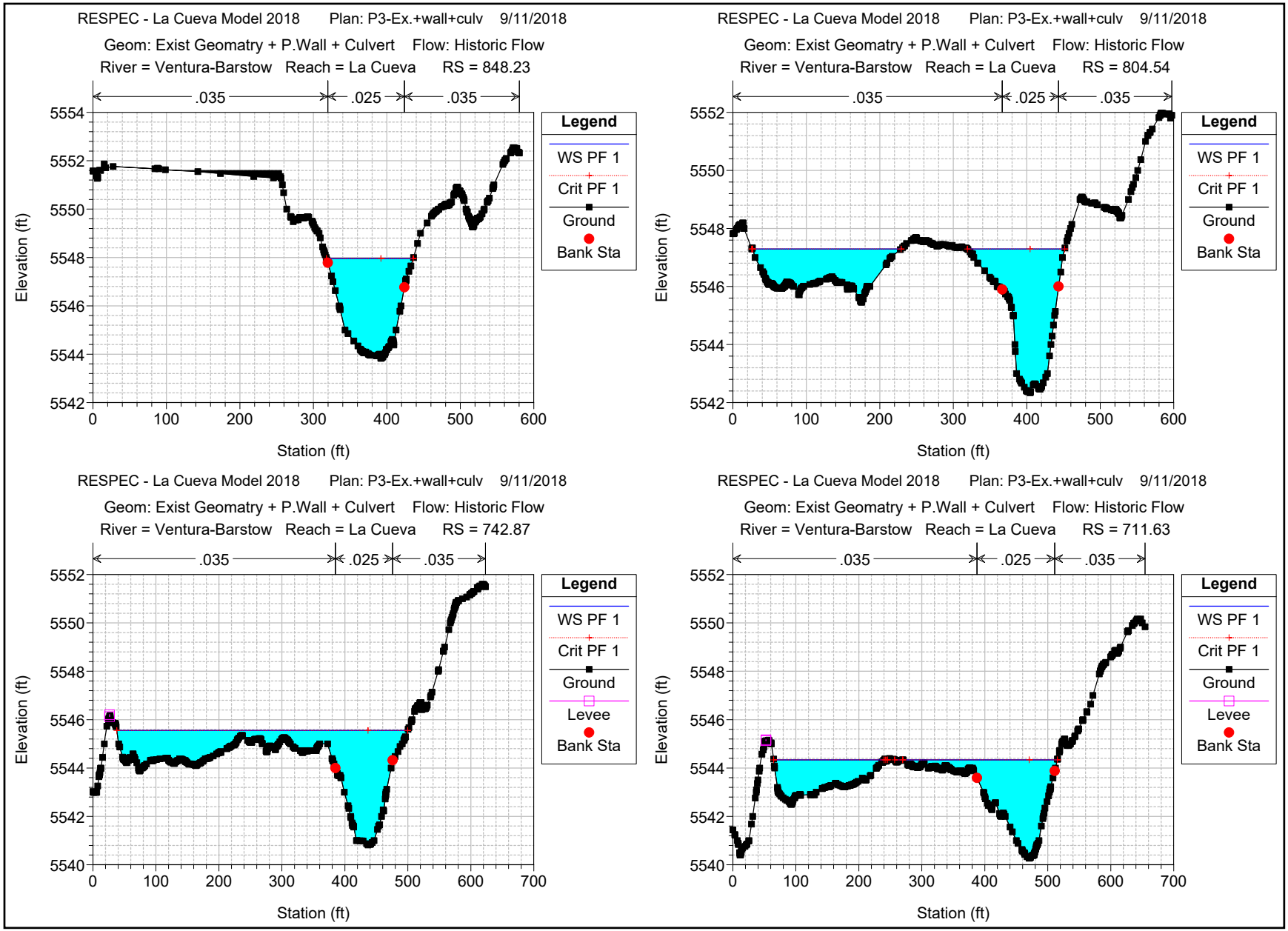
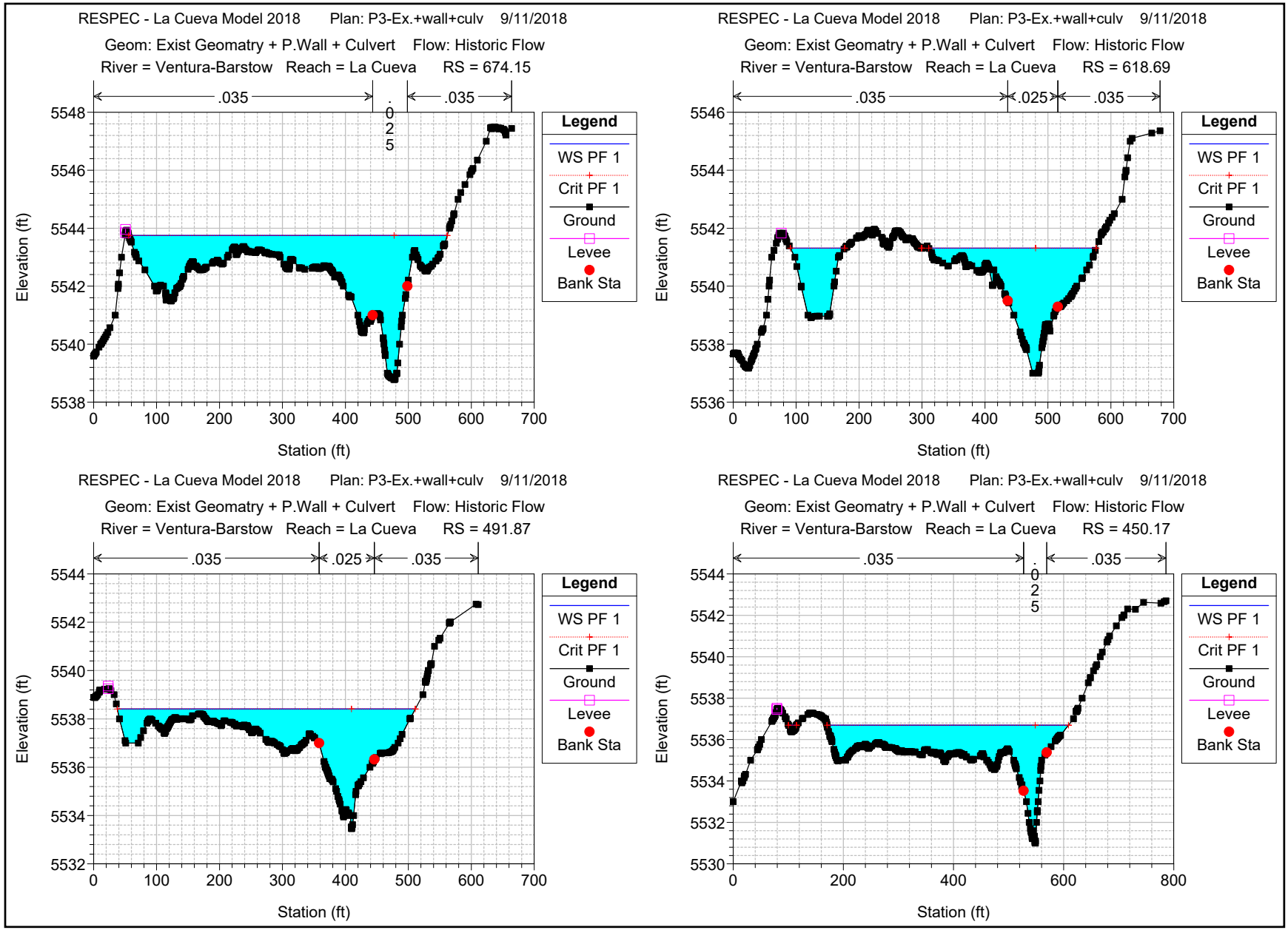
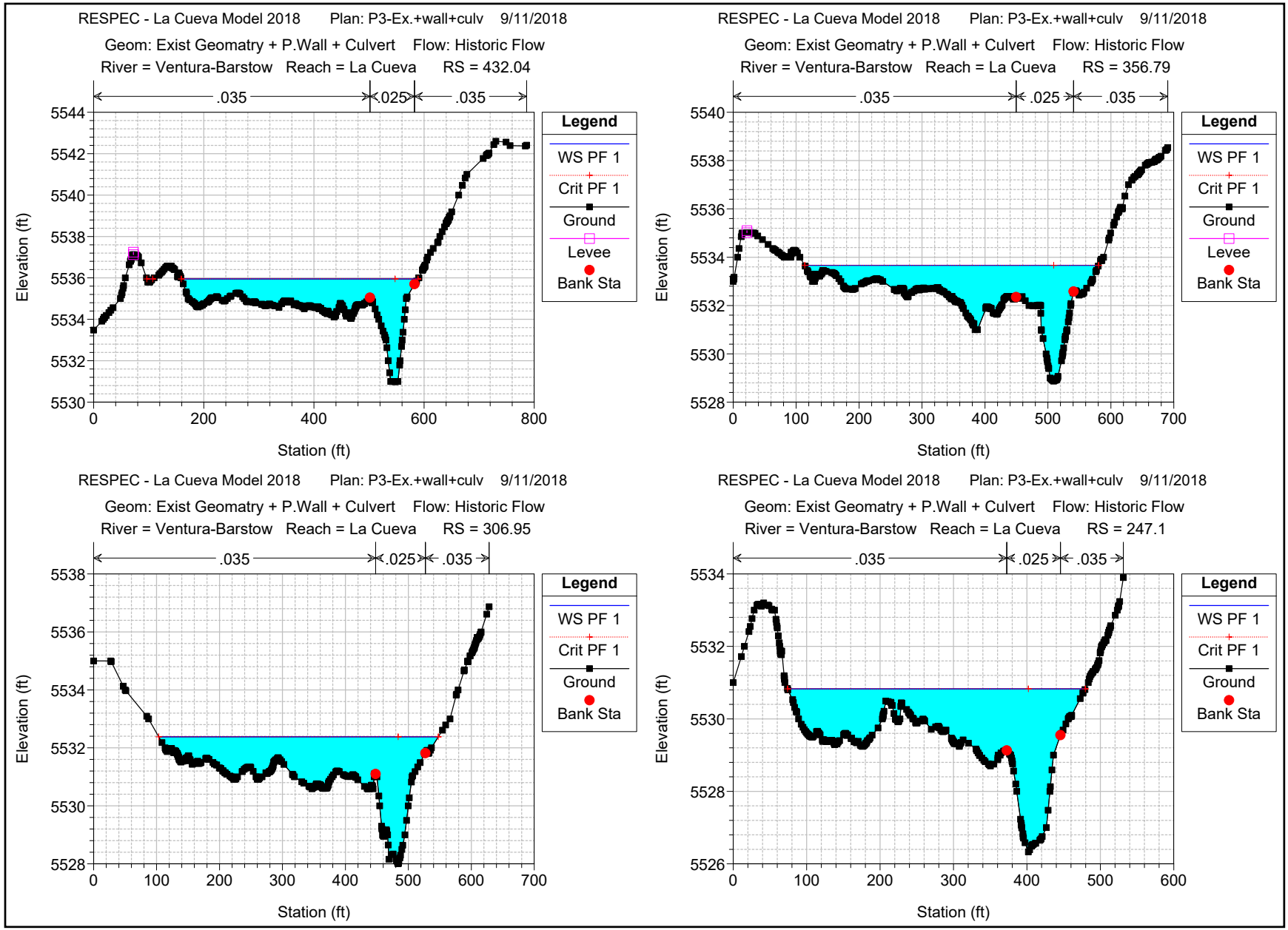
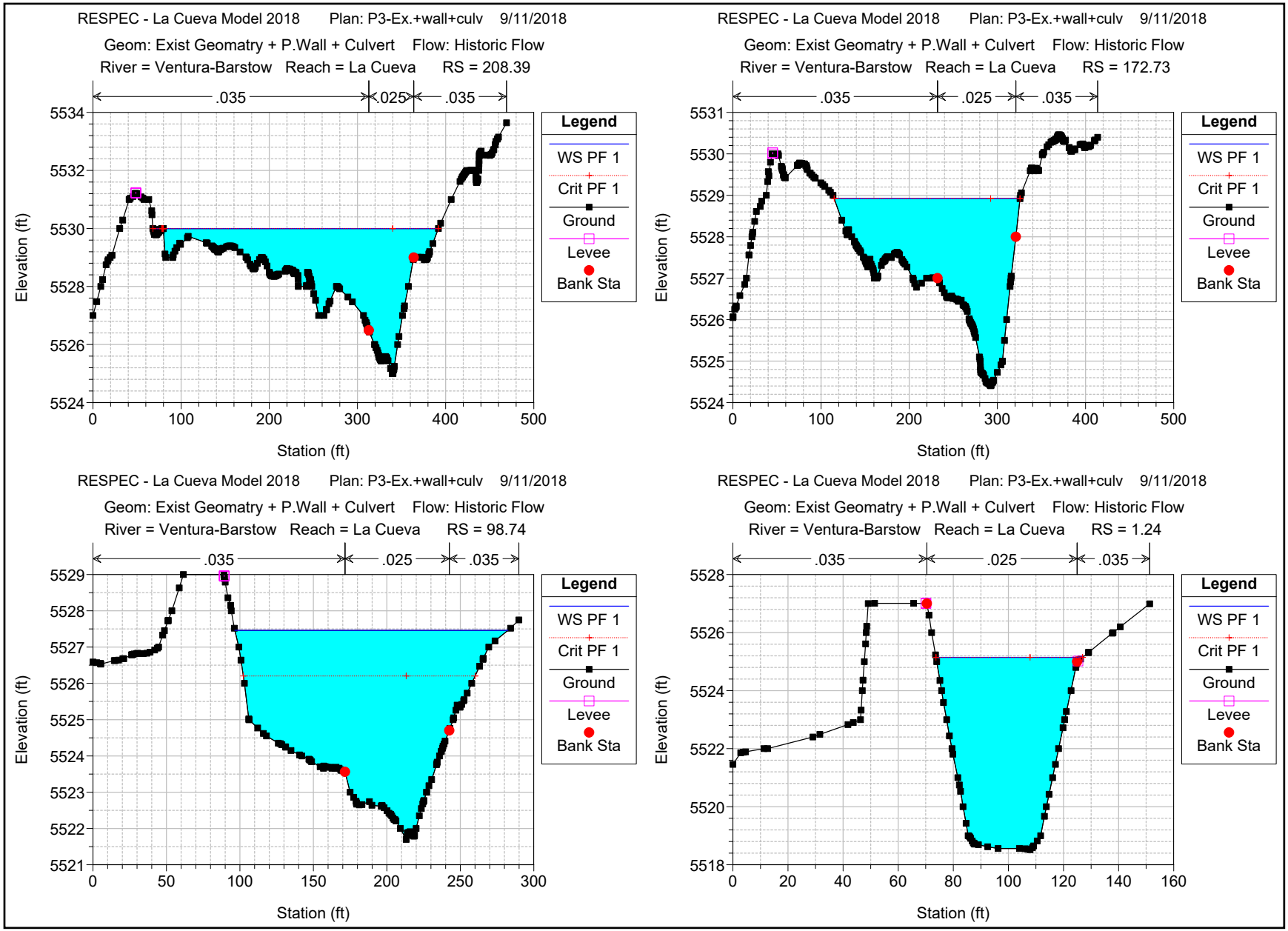
.035
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1056.97
.035
.025
.035
.035
.025
.035
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1011.94
.035
.025
.035
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 975.03
.035
.04
.025
.035
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 916.13
.035
.035
.035
.035
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 848.23
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 804.54
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 742.87
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 711.63
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta


RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 674.15
.035
.025
.035
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 618.69
.035
.025
.035
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 491.87
.035
.025
.035
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 450.17
.035
.025
.035
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

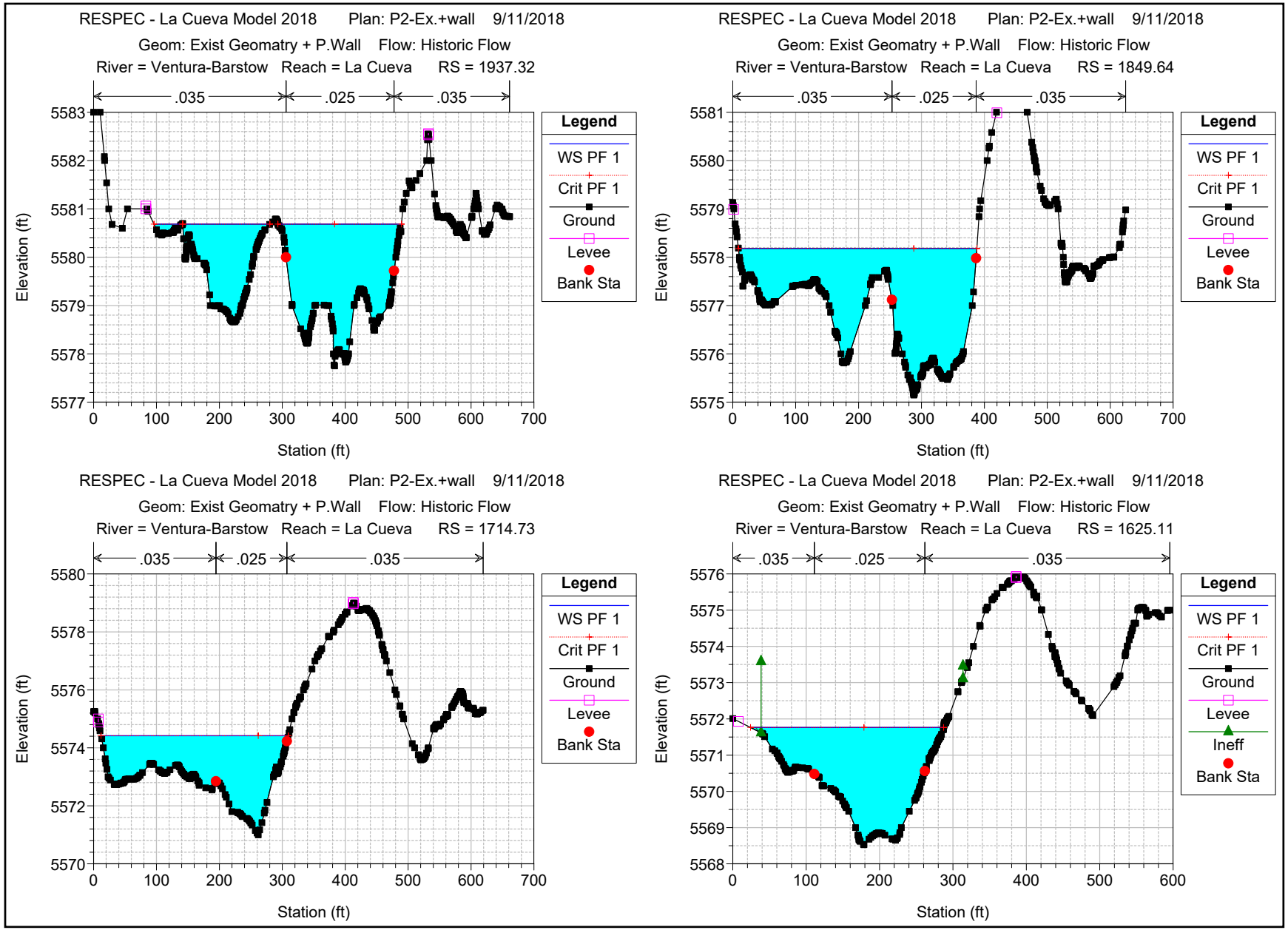

RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 432.04
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 356.79
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 306.95
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 247.1
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta


RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 208.39
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 172.73
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 98.74
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P3-Ex.+wall+culv 9/11/2018
Geom: Exist Geomatry + P.Wall + Culvert Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1.24
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta

Proposed Scour wall and Culvert @ Ventura

HEC-RAS Plan: P2-Ex.+wall River: Ventura-Barstow Reach: La Cueva Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
La Cueva	1937.32	PF 1	3090.00	5577.75	5580.68	5580.68	5581.45	0.006873	7.60	495.54	380.14	0.97
La Cueva	1849.64	PF 1	3090.00	5575.15	5578.18	5578.18	5578.86	0.005312	7.48	559.84	379.10	0.87
La Cueva	1714.73	PF 1	3090.00	5571.00	5574.42	5574.42	5575.20	0.006559	8.18	498.30	297.75	0.97
La Cueva	1625.11	PF 1	3090.00	5568.53	5571.76	5571.76	5572.68	0.005578	7.94	441.60	263.16	0.90
La Cueva	1565.71	PF 1	3090.00	5567.46	5570.60	5570.60	5571.55	0.001448	8.21	414.04	237.89	0.90
La Cueva	1511.28	PF 1	3090.00	5565.27	5568.00	5568.00	5569.29	0.006567	9.15	340.37	129.80	0.99
La Cueva	1438.58	PF 1	3090.00	5562.96	5565.99	5565.99	5567.46	0.006790	9.75	316.88	108.64	1.01
La Cueva	1410.93	PF 1	3090.00	5562.08	5565.33	5565.33	5566.82	0.006504	9.80	315.16	104.39	0.99
La Cueva	1380.76	PF 1	3090.00	5561.02	5564.66	5564.66	5566.13	0.006422	9.75	318.83	108.31	0.98
La Cueva	1354.24	PF 1	3090.00	5560.01	5563.88	5563.88	5565.36	0.006773	9.78	318.91	111.53	1.00
La Cueva	1332.33	PF 1	3090.00	5559.18	5562.95	5562.95	5564.40	0.006421	9.66	327.31	124.97	0.98
La Cueva	1311.52	PF 1	3090.00	5558.38	5562.27	5562.27	5563.68	0.006749	9.51	325.61	121.14	1.00
La Cueva	1295.47	PF 1	3090.00	5557.77	5561.80	5561.80	5563.27	0.006546	9.73	322.45	120.27	0.99
La Cueva	1264.68	PF 1	3090.00	5556.60	5560.72	5560.72	5562.27	0.006168	10.02	314.72	106.97	0.99
La Cueva	1233.92	PF 1	3090.00	5555.38	5560.47		5561.10	0.001652	6.36	495.10	124.81	0.53
La Cueva	1187.49	PF 1	3090.00	5554.00	5559.36	5559.36	5560.87	0.007049	9.85	313.62	110.91	1.03
La Cueva	1146.73	PF 1	3090.00	5552.95	5557.03	5557.03	5558.39	0.007467	9.36	330.07	123.79	1.01
La Cueva	1104.38	PF 1	3090.00	5551.33	5555.56	5555.56	5556.88	0.006689	9.24	334.57	128.11	1.01
La Cueva	1056.97	PF 1	3090.00	5550.42	5554.19	5554.19	5555.61	0.007123	10.30	330.98	122.65	0.99
La Cueva	1011.94	PF 1	3090.00	5548.91	5553.05	5553.05	5554.54	0.005560	9.92	331.33	125.78	0.95
La Cueva	975.03	PF 1	3090.00	5547.84	5552.37	5552.37	5553.69	0.004434	9.42	373.61	179.46	0.86
La Cueva	916.13	PF 1	3090.00	5546.08	5550.02	5550.02	5551.26	0.007613	9.08	366.90	162.62	0.94
La Cueva	848.23	PF 1	3090.00	5543.83	5547.96	5547.96	5549.43	0.006180	9.75	322.31	118.12	0.99
La Cueva	804.54	PF 1	3090.00	5542.34	5547.29	5547.29	5548.23	0.003850	8.66	533.57	334.36	0.80
La Cueva	742.87	PF 1	3090.00	5540.82	5545.55	5545.55	5546.24	0.003047	7.50	647.08	461.93	0.71
La Cueva	711.63	PF 1	3090.00	5540.27	5544.34	5544.34	5545.11	0.005125	7.82	541.27	436.19	0.87
La Cueva	674.15	PF 1	3090.00	5538.78	5543.75	5543.75	5544.33	0.003327	8.03	737.10	506.26	0.74
La Cueva	618.69	PF 1	3090.00	5537.00	5541.31	5541.31	5542.19	0.004911	8.76	533.90	353.42	0.88
La Cueva	491.87	PF 1	3090.00	5533.46	5538.41	5538.41	5539.08	0.003589	7.68	653.45	473.47	0.76
La Cueva	450.17	PF 1	3090.00	5531.00	5536.70	5536.70	5537.33	0.004206	8.90	673.83	452.95	0.83
La Cueva	432.04	PF 1	3090.00	5530.99	5535.95	5535.95	5536.58	0.005290	8.03	618.73	440.66	0.89
La Cueva	356.79	PF 1	3090.00	5528.87	5533.66	5533.66	5534.28	0.004595	7.70	646.34	466.93	0.83
La Cueva	306.95	PF 1	3090.00	5528.01	5532.38	5532.38	5533.03	0.005150	8.12	622.76	444.36	0.88
La Cueva	247.1	PF 1	3090.00	5526.33	5530.83	5530.83	5531.53	0.004044	8.19	621.67	405.44	0.81
La Cueva	208.39	PF 1	3090.00	5525.00	5529.99	5529.99	5530.92	0.004653	9.61	545.83	321.98	0.88
La Cueva	172.73	PF 1	3090.00	5524.41	5528.92	5528.92	5529.95	0.005146	8.95	442.89	210.75	0.90
La Cueva	98.74	PF 1	3090.00	5521.70	5527.46	5526.20	5528.00	0.001587	6.61	606.35	185.85	0.54
La Cueva	1.24	PF 1	3090.00	5518.52	5525.15	5525.15	5527.54	0.005708	12.42	248.98	53.21	0.99


RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1937.32
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1849.64
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1714.73
.035
.025
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Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1625.11
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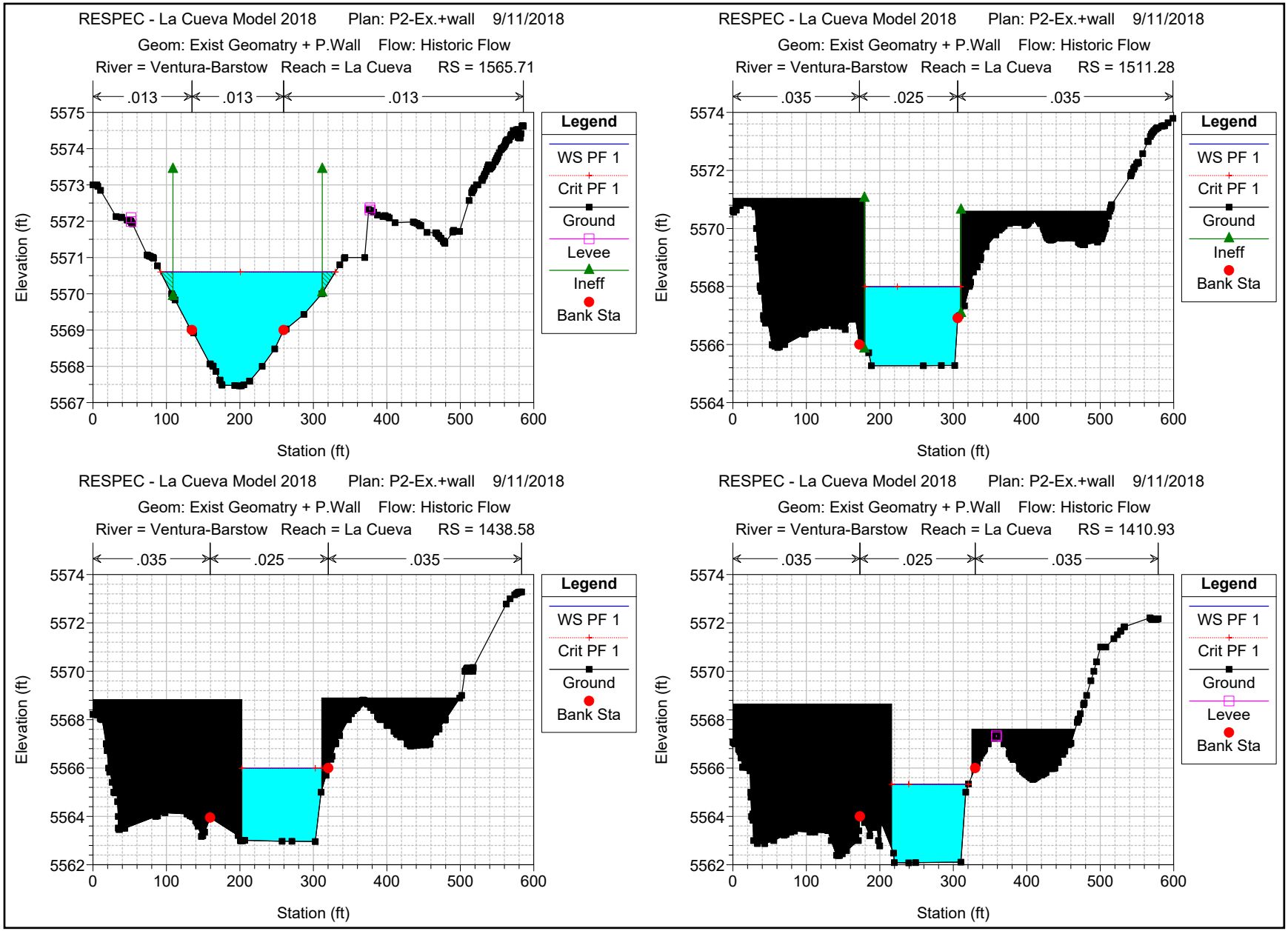
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Ineff
Bank Sta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Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1565.71
.013
.013
.013
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Ineff
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1511.28
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1438.58
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.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1410.93
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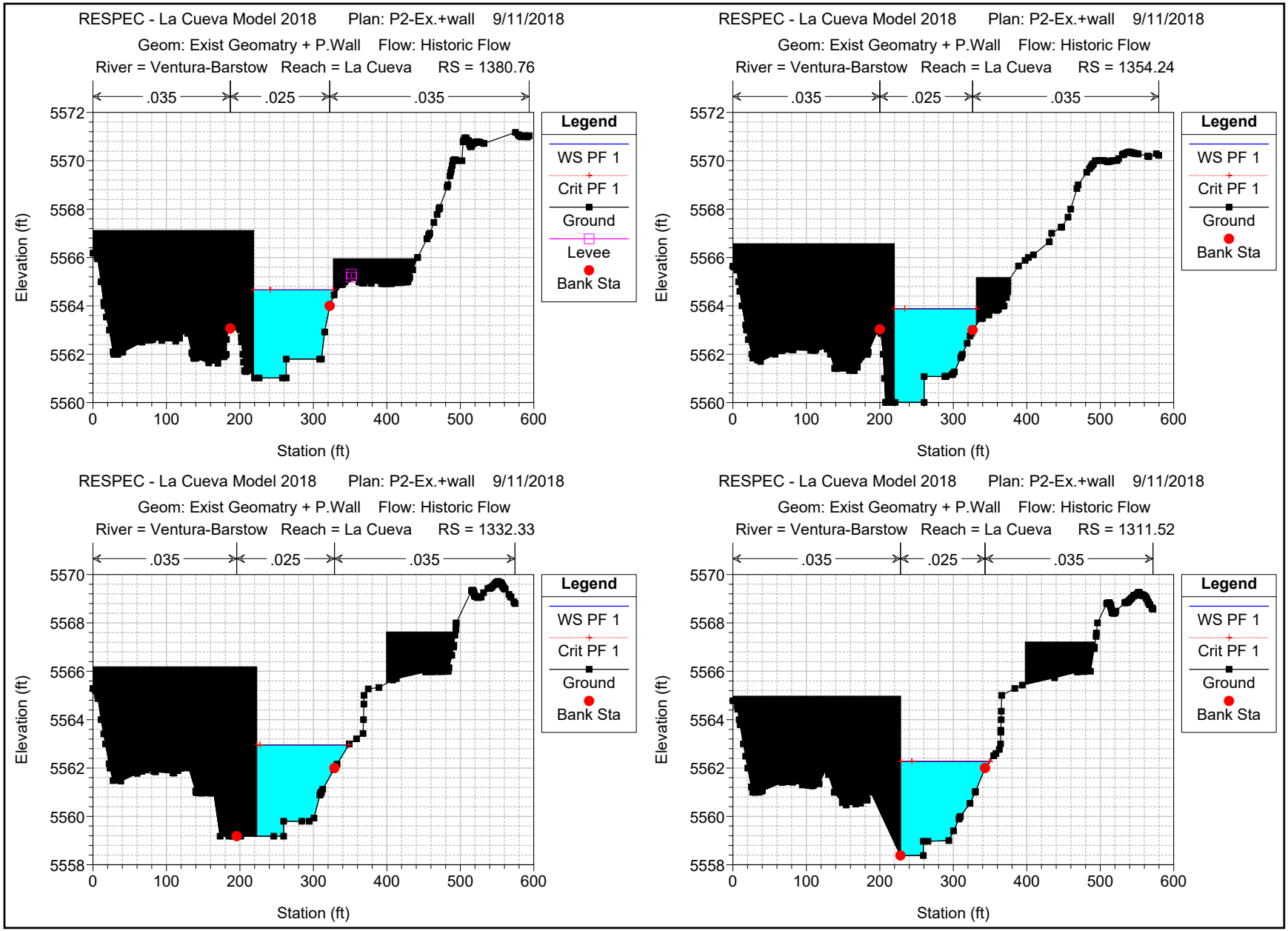
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta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Geom: Exist Geomatry + P.Wall Flow: Historic Flow
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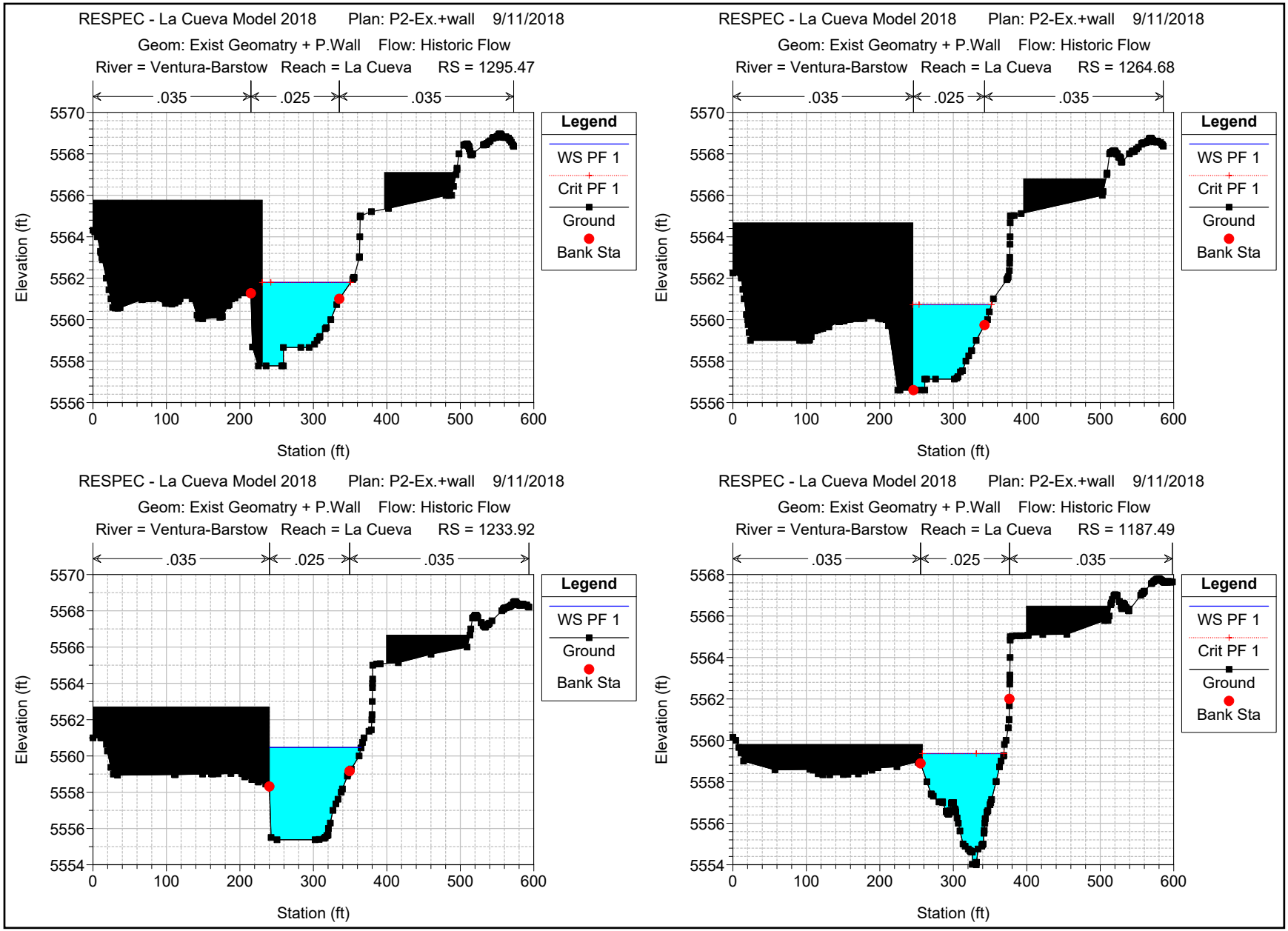
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1354.24
RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1332.33
RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1311.52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Geom: Exist Geomatry + P.Wall Flow: Historic Flow
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.035
.025
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Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1264.68
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.025
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Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1233.92
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.025
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Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1187.49
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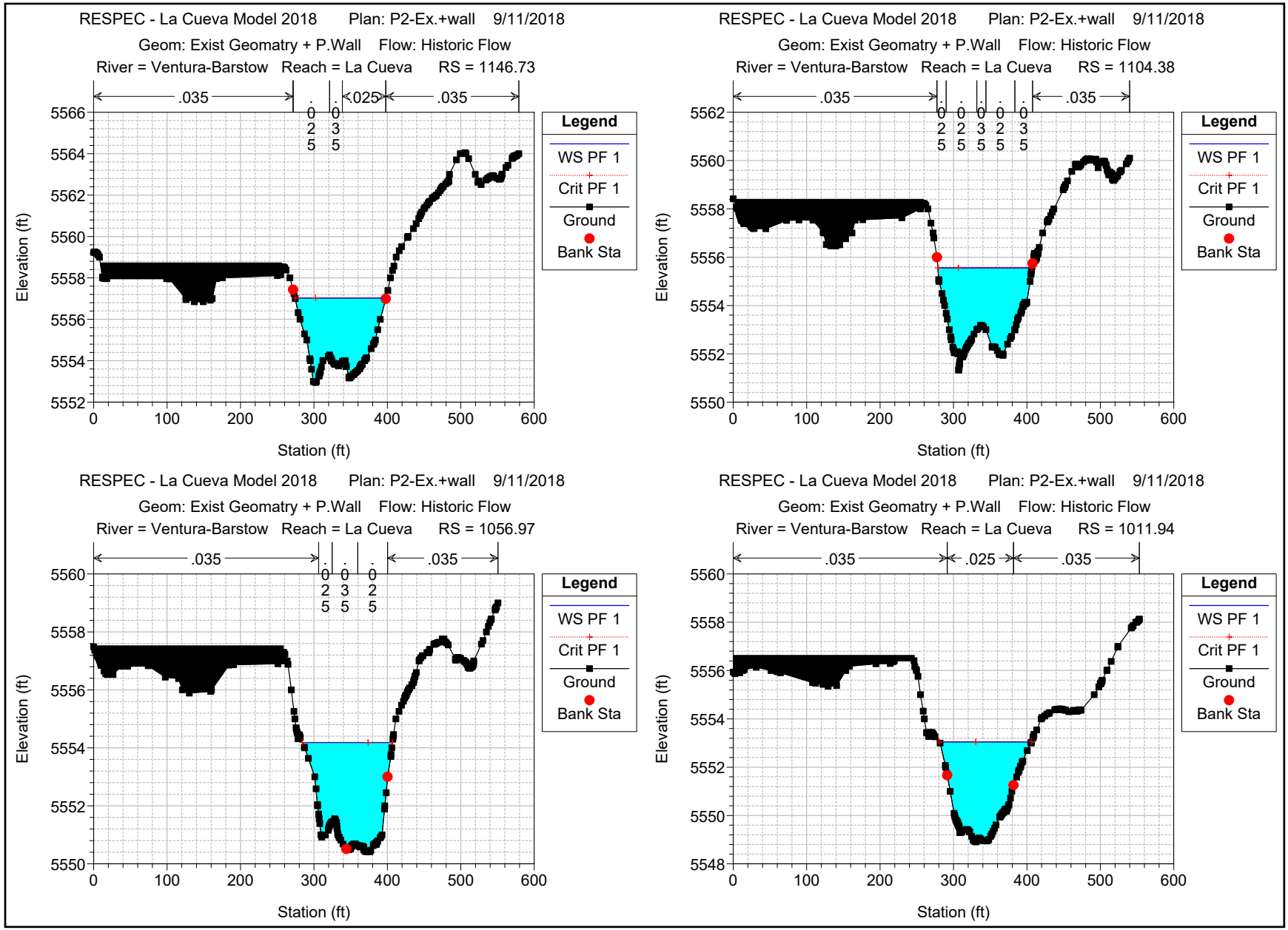
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Exist Geomatry + P.Wall Flow: Historic Flow
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.035
.025
.035
.025
.035
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1104.38
.035
.025
.035
.025
.035
.025
.035
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1056.97
.035
.025
.035
.025
.035
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1011.94
.035
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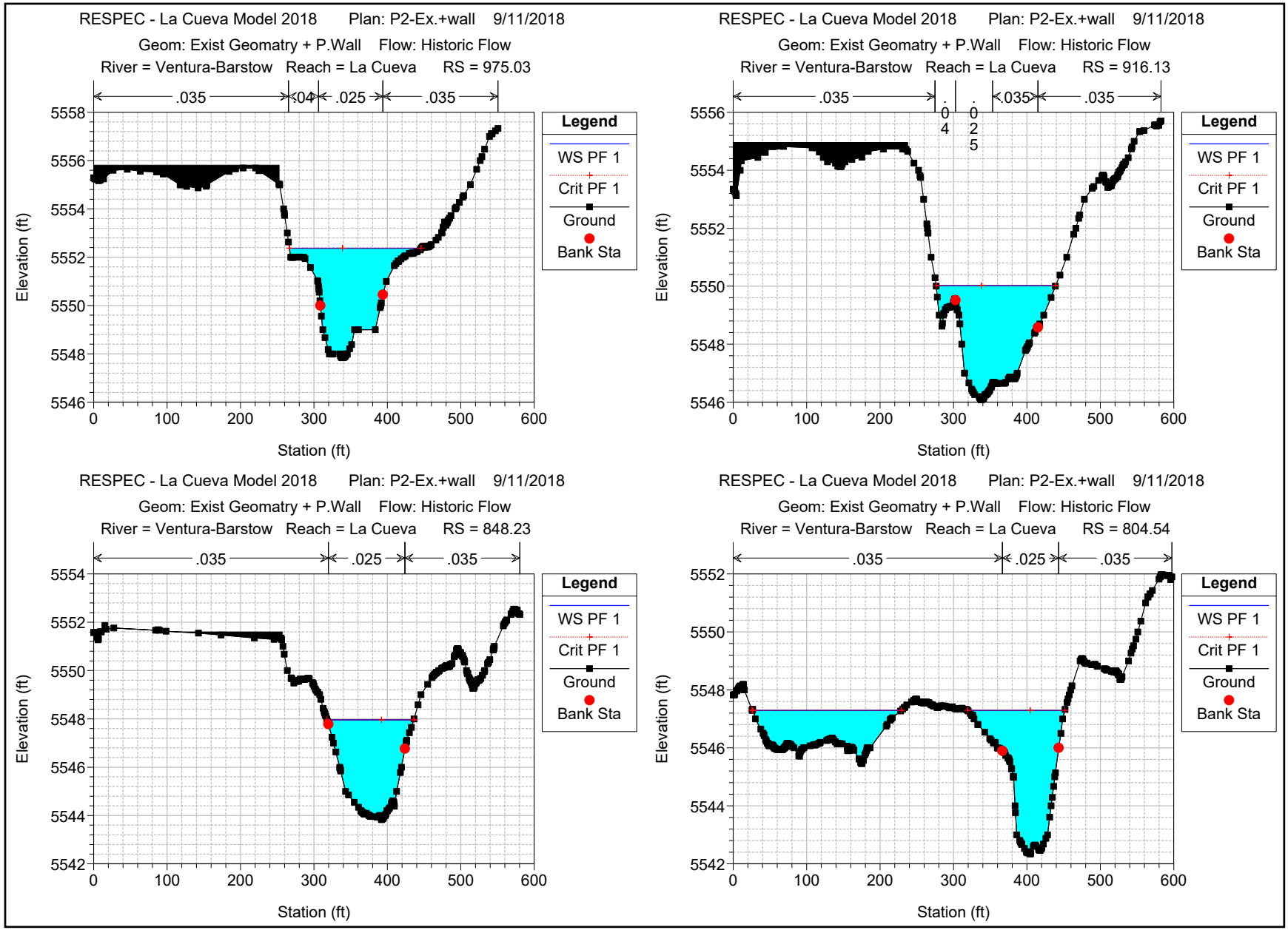
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Exist Geomatry + P.Wall Flow: Historic Flow
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.035
.04
.025
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Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 916.13
.035
.04
.025
.035
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 848.23
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.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 804.54
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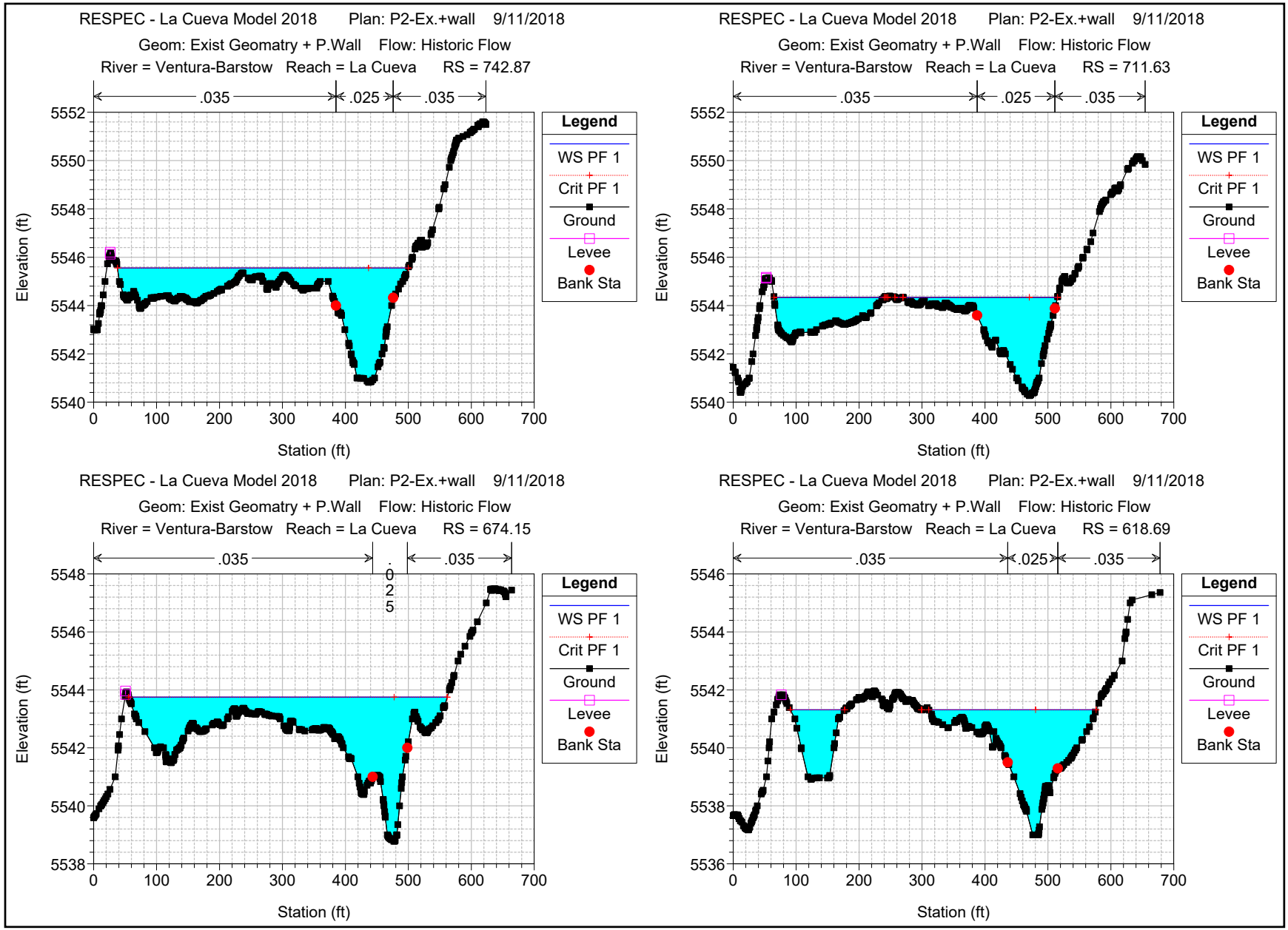
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta


RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 742.87
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 711.63
.035
.025
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Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 674.15
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.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 618.69
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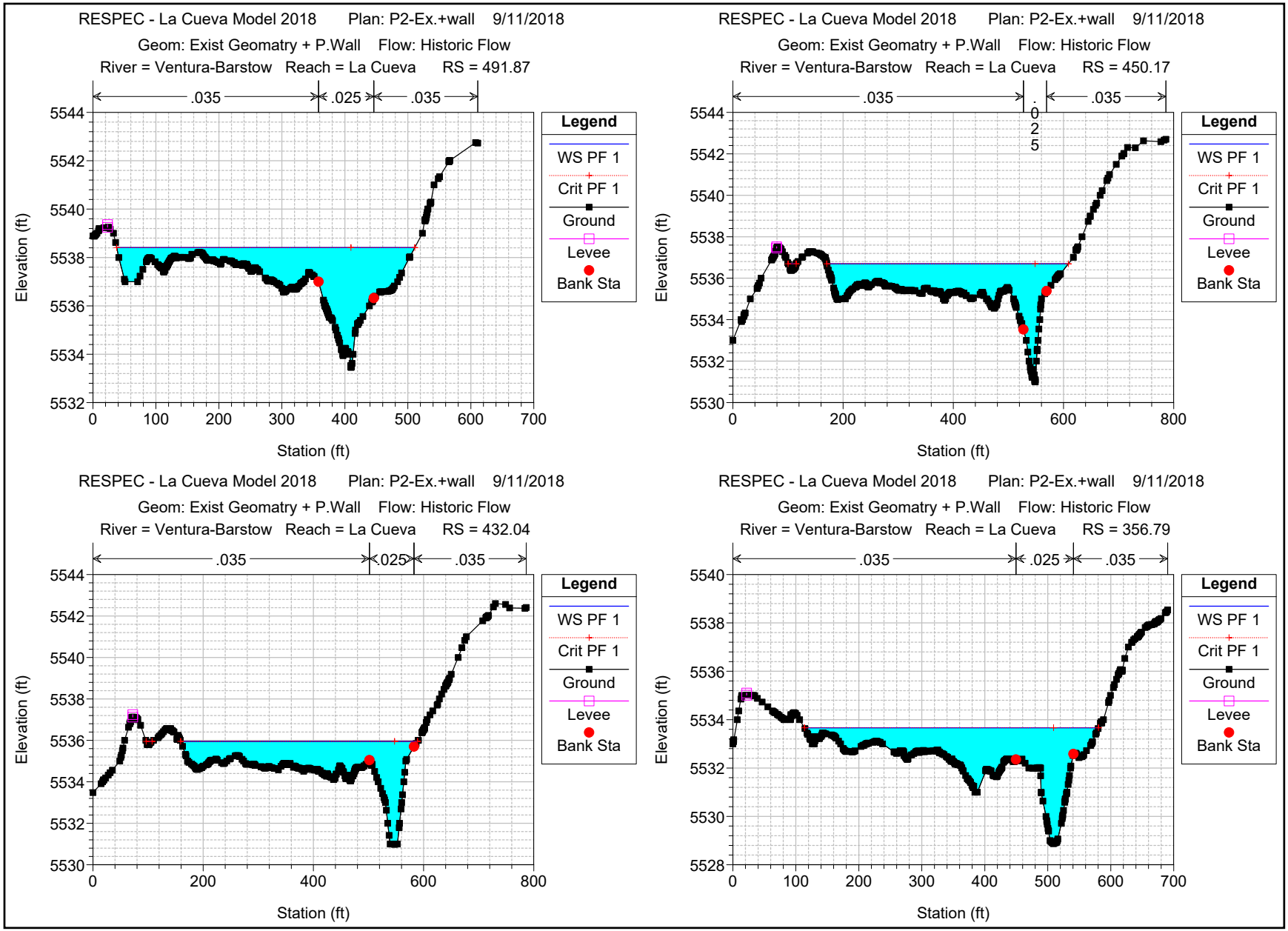
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta


RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 491.87
.035
.025
.035
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 450.17
.035
.025
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Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 432.04
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.025
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Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 356.79
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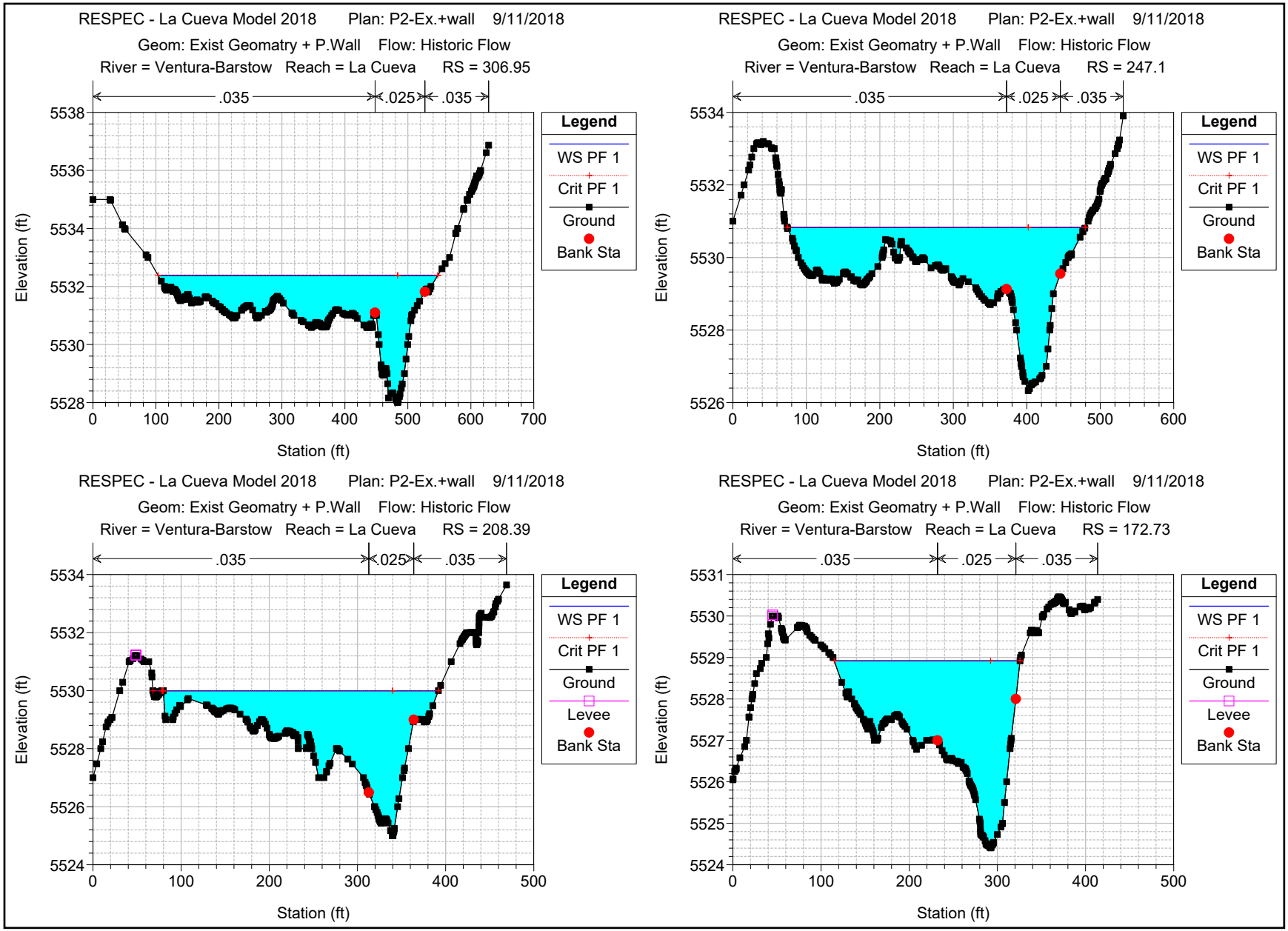
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)


RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 306.95
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Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 247.1
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.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 208.39
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 172.73
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Station (ft)
Legend
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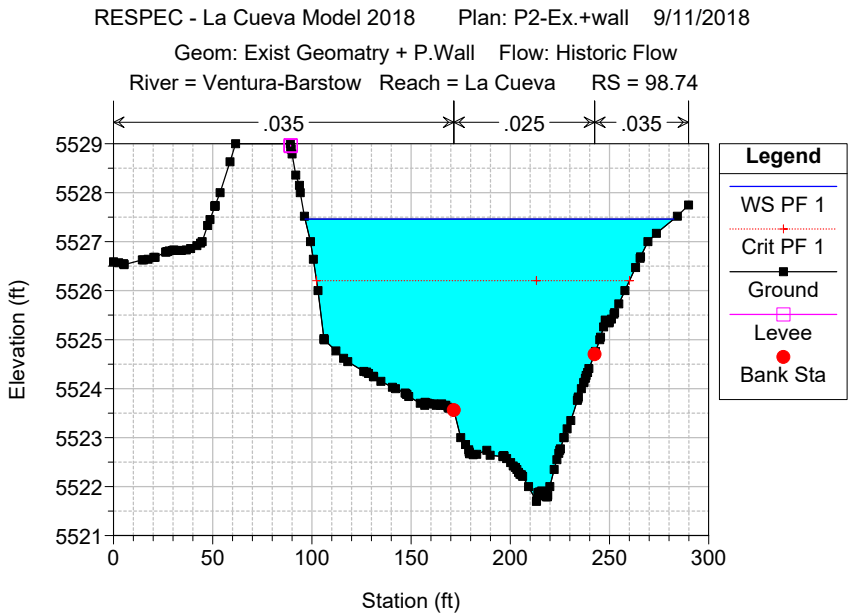
Crit PF 1
Ground
Levee
Bank Sta


RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 98.74
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.025
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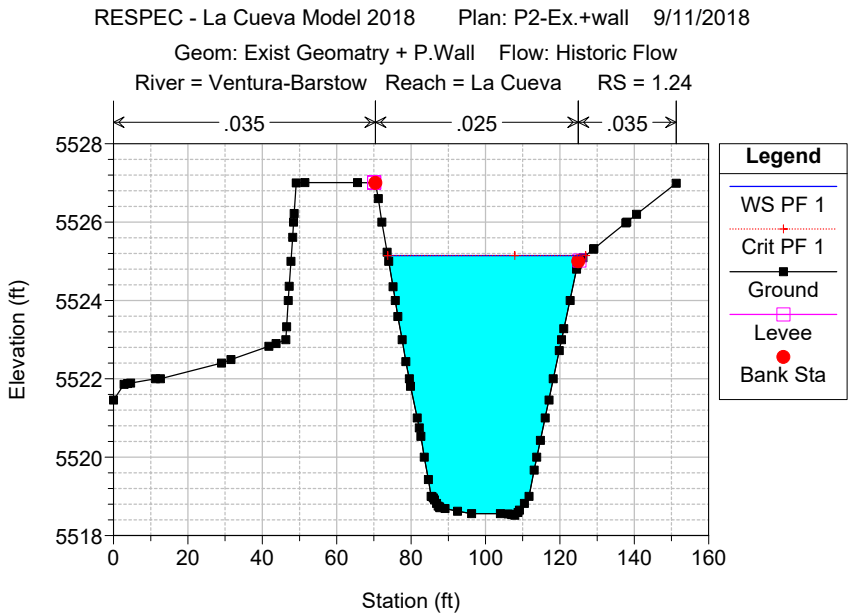
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta


RESPEC - La Cueva Model 2018 Plan: P2-Ex.+wall 9/11/2018
Geom: Exist Geomatry + P.Wall Flow: Historic Flow
River = Ventura-Barstow Reach = La Cueva RS = 1.24
.035
.025
.035
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta

Appendix D

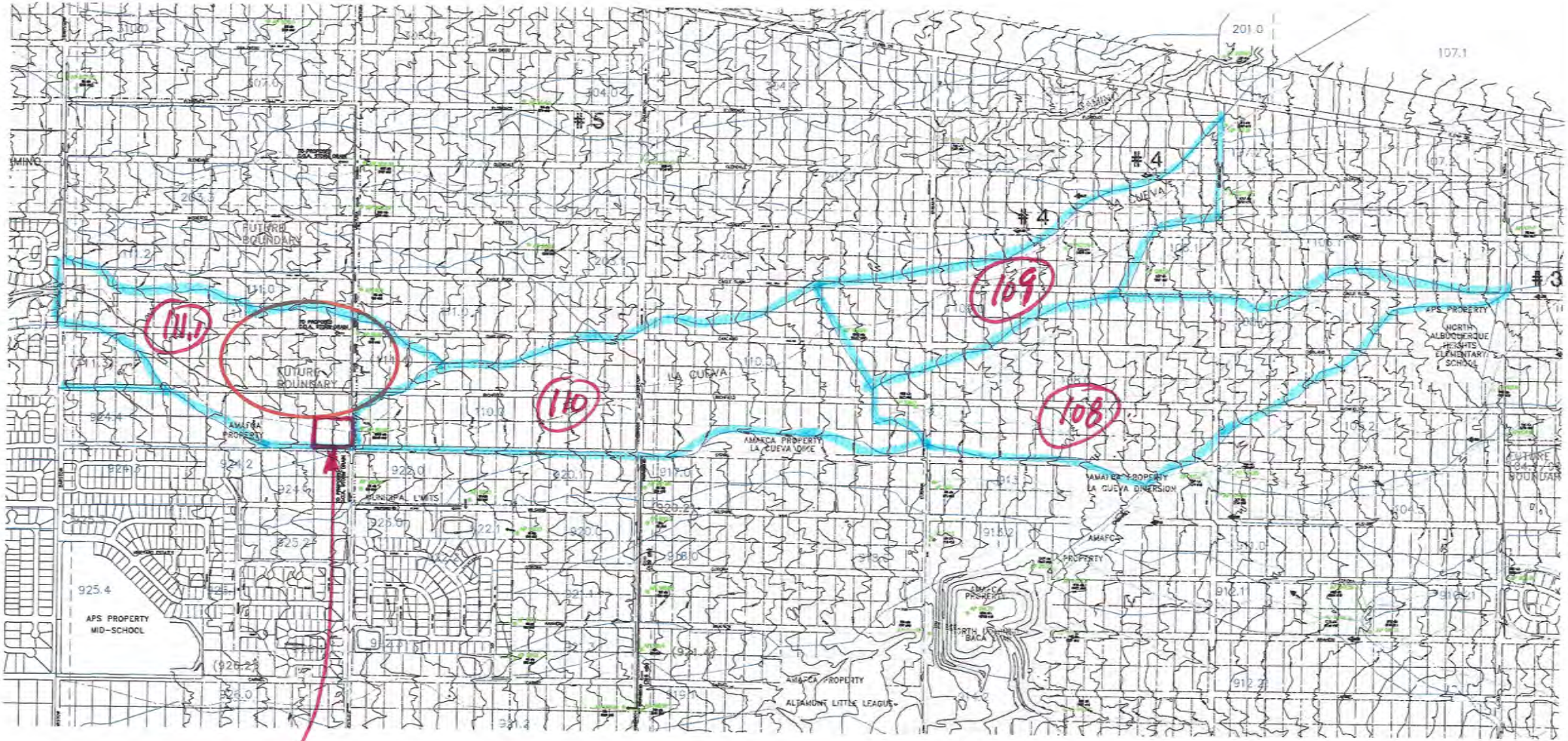
SIGNAL VILLAGE FINE SEDIMENT YIELD ANALYSIS USING MUSLE EQUATION

BASIN	AREA AC				PERCENT IMPERV	QP CFS	VOL AC-FT	WGHTD K	C	GAMMA	SLOPE %	N	LS	YS TONS	YS' TONS	CS PPM	QFS WASH LOAD
108	131.50				17%	404.63	15.57	0.150	0.20	400	4	0.4	0.69	795.91	660.60	30273	4.77
109	64.38				17%	216.30	7.55	0.150	0.20	400	4	0.4	0.69	373.69	310.16	29340	2.47
110	104.00				17%	275.61	11.74	0.150	0.20	400	4	0.4	0.69	548.03	454.87	27718	2.96
111.1	62.00				26%	195.97	7.70	0.150	0.20	400	4	0.4	0.69	357.51	264.56	24657	1.87

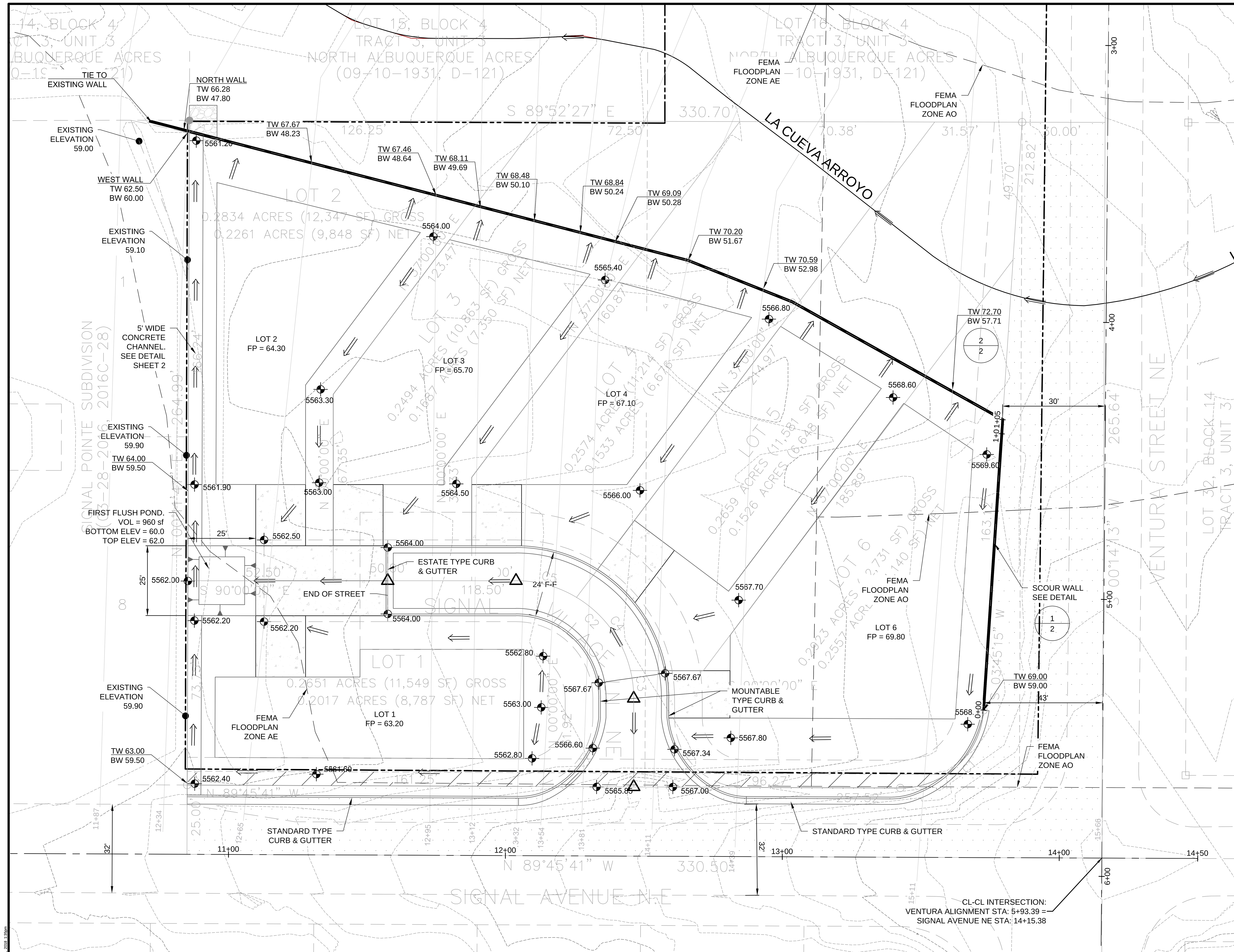
BED MATERIAL AND TOTAL SEDIMENT YIELD ANALYSIS USING MPM-WOO METHOD

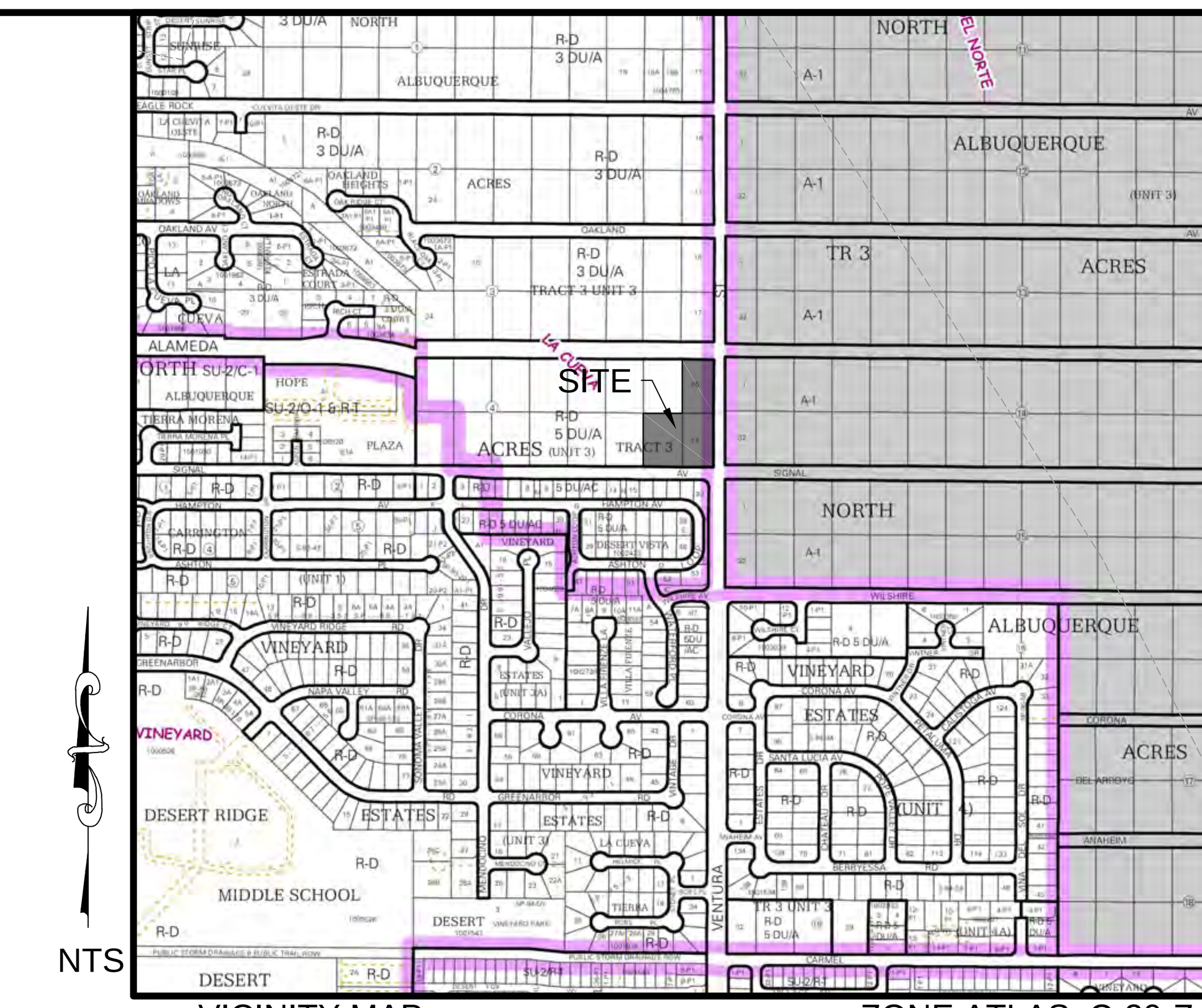
a = 5.00E-04 n= 0.04
b = 3.85
c = 0.30
d = -2.50

BASIN	AREA AC	QP CFS	VOL AC-FT	YS' TONS	SED. VOL. AC-FT	Cfs PPM	q unit width	AVG. SLOPE	VEL	DEPTH	WD	qs (unit width bed load)	QS BED LOAD	QS TOTAL	BF	Q BULK	SED VOL AC-FT
108	131.50	404.63	15.57	660.60	0.3033	30273	6.74	0.050	7.64	0.88	60.0	1.31	78.46	83.22	1.21	487.85	3.20
109	64.38	216.30	7.55	310.16	0.1424	29340	3.61	0.040	5.56	0.65	60.0	0.35	21.02	23.48	1.11	239.78	0.82
110	104.00	275.61	11.74	454.87	0.2088	27718	4.59	0.035	5.89	0.78	60.0	0.46	27.54	30.51	1.11	306.12	1.30
111.1	62.00	195.97	7.70	264.56	0.1215	24657	3.27	0.035	5.14	0.64	60.0	0.25	15.20	17.07	1.09	213.04	0.67


#5
#4
#4
#3
111
110
109
108
LA CUEVA
FUTURE BOUNDARY
FUTURE BOUNDARY
MUNICIPAL LIMITS
AMAFCA PROPERTY
AMAFCA PROPERTY
LA CUEVA OUTFALL
AMAFCA PROPERTY
LA CUEVA DIVERSION
AMAFCA PROPERTY
AMAFCA PROPERTY
ALTAMONT LITTLE LEAGUE
APS PROPERTY
MID-SCHOOL
APS PROPERTY
NORTH ALBUQUERQUE HEIGHTS ELEMENTARY SCHOOL
FUTURE BOUNDARY
925.4
201.0
107.1
SIGNAL VILLAGE
NAA MDP
BASIN MAP

Appendix E





VICINITY MAP

ZONE ATLAS: C-20-Z

LEGAL DESCRIPTION: LOTS 17 & 18, BLOCK 4, TRACT 3, UNIT 3, NAA

SITE AREA: 1.6135 ACRES (TOTAL SITE), 1.2020 ACRES (DEVELOPED AREA)

FLOOD HAZARD STATEMENT: F.E.M.A. FLOODWAY BOUNDARY AND FLOODWAY MAP DATED AUGUST 16, 2012 (PANEL NO. 35001C0141H) INDICATES A FLOOD HAZARD ZONE AE WHICH IS AN AREA DETERMINED TO BE INSIDE THE 100-YEAR FLOODPLAIN WITH BASE FLOOD ELEVATIONS.

EXISTING DRAINAGE CONDITIONS:

THE DRAINAGE ANALYSIS FOR THIS SUBDIVISION IS IN ACCORDANCE WITH SETION 22 OF THE CITY OF ALBUQUERQUE DEVELOPMENT PROCESS MANUAL (DPM), ENTITLED "DRAINAGE, FLOOD CONTROL, AND EROSION CONTROL." THE DESIGN STORM USED FOR BOTH UNDEVELOPED AND DEVELOPED CONDITIONS IS THE 100-YEAR, 6-HOUR STORM EVENT FOR RUNOFF. THE SITE IS LOCATED IN ZONE 3 SO THE 100-YEAR, 6-HOUR STORM EVENT IS 2.60 INCHES.

LOTS 17 & 18 ARE LOCATED IN NORTH ALBUQUERQUE ACRES, AT THE NORTHWEST CORNER OF THE VENTURA STREET/SIGNAL AVENUE INTERSECTION. THE LOTS DRAIN FROM SOUTHEAST TO NORTHWEST TO THE LA CUEVA ARROYO. THE PEAK RUNOFF FROM THE LOTS UNDER EXISTING CONDITIONS IS 2.25 CFS DURING A 100-YEAR, 6-HOUR STORM. THE MAJORITY IS CURRENTLY ENCUMBERED BY A FLOOD HAZARD ZONE AE.

DEVELOPED DRAINAGE CONDITIONS:

THIS PROJECT INVOLVES THE CONSTRUCTION OF A RESIDENTIAL SUBDIVISION WITH 6 LOTS. THE SUBDIVISION WILL DRAIN FROM EAST TO WEST IN THE PRIVATE STREET TO A 5-FOOT WIDE CONCRETE CHANNEL ALONG THE WEST PROPERTY BOUNDARY. THIS CONCRETE CHANNEL WILL DRAIN SOUTH TO A 24-INCH WIDE SIDEWALK CULVERT TO SIGNAL AVENUE. THE TOTAL DISCHARGE FROM THE SUBDIVISION DURING A 100-YEAR, 6-HOUR STORM IS 5.19 CFS. THE FIRST FLUSH VOLUME FROM THE SUBDIVISION FOR A 0.44-INCH RAIN IS 960 CUBIC-FEET. ON EACH LOT THE AREA BEHIND THE BASK OF THE CURB WILL BE DEPRESSED TO ALLOW FOR THE RETENTION OF THE FIRST FLUSH VOLUME.

ALONG THE EASTERN AND NORTHERN BOUNDARY OF THE DEVELOPED AREA WILL BE A SCOUR WALL TO PROTECT THE SUBDIVISION FROM UPSTREAM FLOWS IN THE LA CUEVA ARROYO. THE SCOUR WALL WILL BE AS DEEP AS 8 FEET BELOW THE ARROYO BOTTOM TO PROTECT THE SUBDIVISION AGAINST SCOUR DURING STORM EVENTS. A HEC-RAS ANALYSIS IS CURRENTLY BEING PERFORMED TO DETERMINE THE IMPROVEMENTS WITHIN THE LA CUEVA ARROYO TO BE CONSTRUCTED TO BOTH PROTECT THE SUBDIVISION AND TO REMOVE THE FLOOD HAZARD ZONE THROGH A LOMR TO FEMA. THIS ANALYSIS WILL BE SUBMITTED AS A SUPPLEMENT TO THIS GRADING AND DRAINAGE PLAN.

FIRST FLUSH CALCULATIONS:
(0.34in÷12in/ft) x (1.2ac x 43,560sf/ac x 0.647) = 960 cf

LEGEND

CONCRETE DRIVEWAY	PROPERTY LINE
FLOW ARROW	HECRAS CROSS SECTIONS
EXISTING MAJOR CONTOUR	ARROYO CENTER LINE
EXISTING MINOR CONTOUR	PROPOSED SCOUR WALL
CURB & GUTTER	
FEMA FLOODPLAIN BOUNDARY	

BENCHMARKS
AGRS Aluminum Cap stamped "7-C19 1995"
From the intersection of I-25 and Paseo Del Norte NE travel east on Paseo Del Norte 1.87 miles to Barstow Street NE. Turn left and travel north on Barstow Street 0.65 miles to Signal Avenue NE. The station is located on the NNW curb return.
Geographic Position, in feet (NAD83)
N.M. State Plane Coordinates (Central Zone)
N=1522068.520, E=1550417.138, G-G=0.999650745, DA=-00°10'24.78"
Elevation, in feet (NAVD88) = 5485.723

BASIN #	AREA (acre)	LAND TREATMENT A (%)	B (%)	C (%)	D (%)	WEIGHTED E (in)	100-YEAR PRECIPITATION V (6-hr) (acre-ft)	V (6-hr) (cu-ft)	V(24-hr) (acre-ft)	V(24-hr) (cu-ft)	Q (cfs)
EXISTING CONDITIONS											
SITE	1.2020	100.00	0.00	0.00	0.00	0.66	0.07	2,880	0.07	2,880	2.25
TOTAL RUNOFF	1.20						0.07	2,880	0.07	2,880	2.25
PROPOSED CONDITIONS											
SITE	1.2020	0.00	17.60	17.70	64.70	1.92	0.19	8,365	0.22	9,777	5.19
TOTAL RUNOFF	1.20						0.19	8,365	0.22	9,777	5.19
EXCESS PRECIP.		0.66	0.92	1.29	2.36	E_i (in)					
PEAK DISCHARGE		1.87	2.6	3.45	5.02	Q_{Pi} (cfs)					

WEIGHTED E (in) = $(E_A)(\%A) + (E_B)(\%B) + (E_C)(\%C) + (E_D)(\%D)$
$V_{6\text{-}HR}$ (acre-ft) = (WEIGHTED E)(AREA)/12
V_{10DAY} (acre-ft) = $V_{6\text{-}HR} + (A_D)(P_{10DAY} - P_{6\text{-}HR})/12$
Q (cfs) = $(Q_{PA})(A_A) + (Q_{PB})(A_B) + (Q_{PC})(A_C) + (Q_{PD})(A_D)$

ZONE = 3
$P_{6\text{-}HR}$ (in.) = 2.60
$P_{24\text{-}HR}$ (in.) = 3.10
P_{10DAY} (in.) = 4.90

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FAX: (505) 830-9246
tecnm@yahoo.com

NO.	REVISION	BY	DATE

PROJECT: LA CUEVA
DATE: 09/10/2018
HORIZ. SCALE:
VERT. SCALE:
DRAWN BY: DEM
CHECKED BY:
APPROVED BY:
FILE:

SIGNAL VILLAGE

GRADING AND DRAINAGE PLAN

CITY/COUNTY REVIEW

DEPARTMENT	SIGN-OFF	DATE
WASTEWATER MGMT. DIV.		
WATER SERVICES		
SUBDIVISION ENG.		
STREETS		
TRAFFIC		

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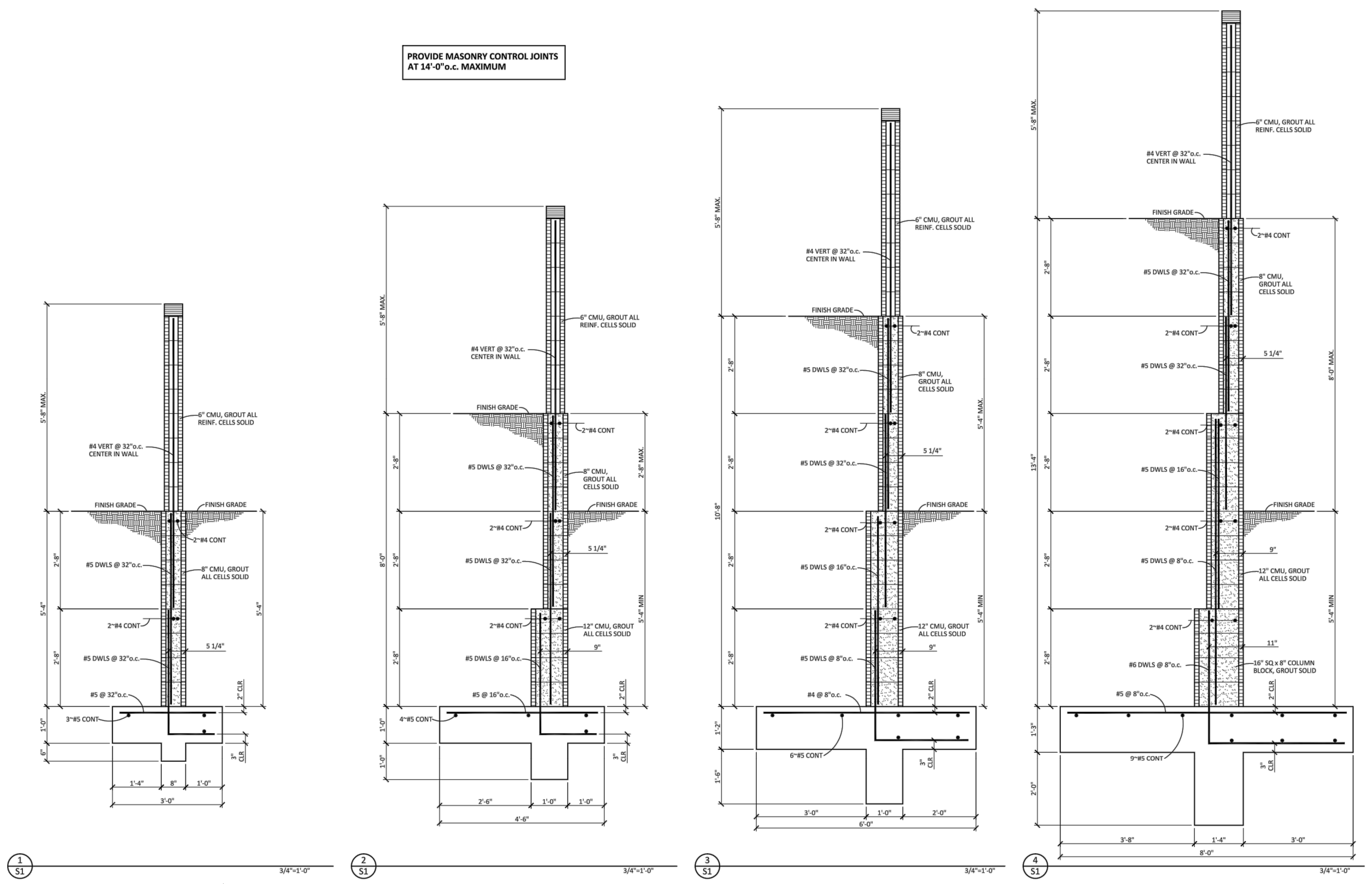
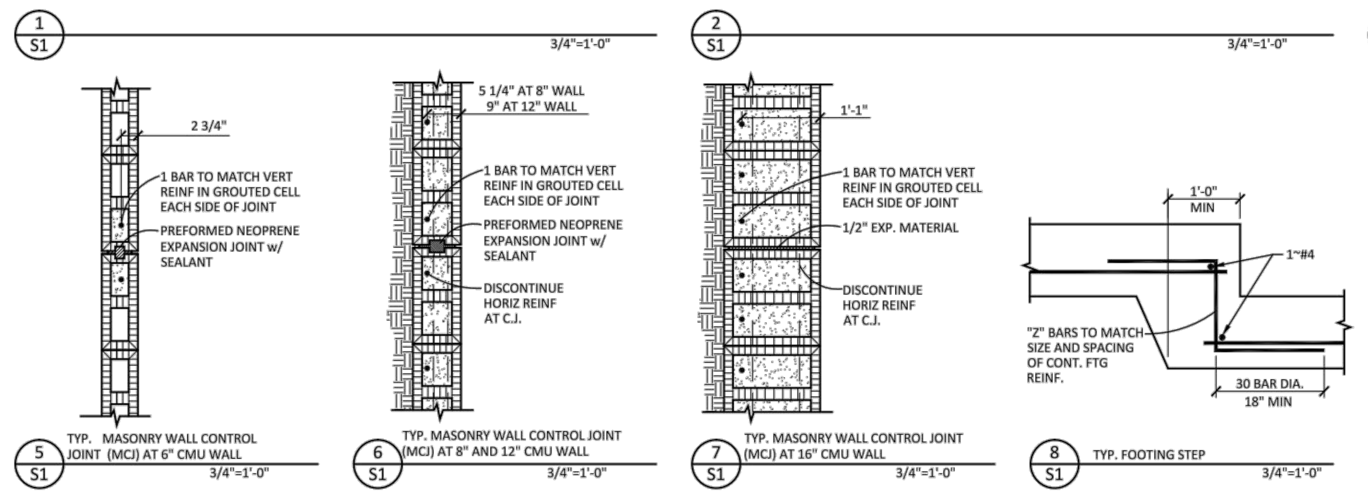
1 OF 5

PROVIDE MASONRY CONTROL JOINTS AT 14'-0"o.c. MAXIMUM





GENERAL STRUCTURAL NOTES

1. CODES AND MANUALS:
   International Building Code, 2009 Edition
   ACI 318-05
2. DESIGN LOADS:
   A. Equivalent Fluid Pressure = 35 pcf/ft
   B. Maximum allowable soil bearing pressure: 2,00psf
3. GENERAL:
   A. The Contractor shall verify all dimensions in the field.
   B. The Contractor shall be responsible for providing safe and adequate shoring for all parts of the structure during construction.
4. MATERIALS:
   A. Cast-in-place Concrete:
      1. All concrete shall conform to the Specifications for Structural Concrete, ACI 301
      2. Normal Weight Concrete:
         a. 3,000 psi @ 28 days
      3. The sides of all footings shall be FORMED. The use of earth forms is NOT allowed.
   B. Reinforcing Steel:
      1. All reinforcing steel shall conform to ASTM A615 Grade 60.
      2. Reinforcing steel shall be fabricated and placed in accordance with the Building Code Requirements for Reinforced Concrete ACI 318 and the Standard Manual ACI 315.
      3. Bar supports and spacers for rebar shall be provided in accordance with ACI 315.
      4. Where lapped splices in reinforcing occur, the minimun lap shall be made as follows:
         a. Vertical reinforcing: 40 bar dia. or 24" minimum.
         b. Horizontal reinforcing: 30 bar dia. or 18" minimum.
         c. Horizontal corner bars: 30 bar dia. or 18" minimum.
      5. Concrete cover for reinforcing shall be as follows:
         a. Concrete cast against and permanently exposed to earth............................3"
         b. Concrete exposed to earth or weather
            1. Bars larger than No. 5 ....2"
            2. Bars No. 5 or smaller ....1 1/2"
      6. The Contractor shall be responsible to see that all rebar is properly aligned and tied in place before placing concrete. All wall dowels and vertical steel shall be accurately located and secured in place so that it remains in the position during the concrete placing operation. Any rebar found to be improperly installed shall be removed and replaced at no additional cost to the Owner.
   C. Masonry:
      1. All masonry units shall have an average compressive strength of 1500 psi @ 28 days.
      2. All mortar shall be Type S with a strength of 2000 psi at 28 days.
      3. Grout shall have a minimum compressive strength of 2000 psi at 28 days.
      4. All hollow masonry to be reinforced shall be marked with keel at the bottom of the wall at the cells where dowels occur or rebar is to be placed and grouted.
      5. Cells containing rebar shall be grouted solid from the bottom to the top of the wall in accordance with IBC regulations. Cleanouts shall be provided at the bottom of walls at all cells to be grouted where the grout pour exceeds 4' in height.
      6. Lap all bars 40 diameters or 2'-0" minimum unless otherwise noted.
5. SITE GRADING AND EARTHWORK
   A. Foundation Preparation:
      Building areas shall be completely stripped of vegetation, existing construction and debris, and soft or muddy areas.
   B. Foundations:
      Over excavate beneath bottom elevation of all footings a minimum of three feet. The excavation shall extend a minimum of three feet laterally beyond the edge of all footings.
      The bottoms of excavations shall be scarified to a depth of 8", moistened within optimum moisture, +/-3%, and compacted to a minimum of 95% of standard proctor as determined by ASTM D698. The structural fill shall be thoroughly mixed within optimum moisture, +/-3%, placed in thin horizontal lifts, 8" max. loose depth, and compacted to a minimum of 95% of standard proctor as determined by ASTM D698.
   C. Backfills:
      All backfills should be thoroughly mixed within optimum moisture, +/-3%, placed in thin horizontal lifts, 8" max. loose depth, and compacted to a minimum of 95% of standard proctor, ASTM D698.
   D. Site Drainage:
      Provide positive surface drainage away from foundation excavations during construction.

DONALD A. MacCORNACK NEW MEXICO 8638 REGISTERED PROFESSIONAL ENGINEER 10-26-15

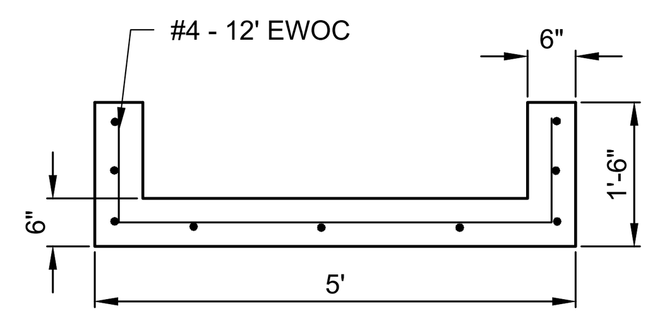
MacCORNACK ENGINEERING
2001 Carlisle Blvd. NE, STE. C
ALBUQUERQUE, NEW MEXICO

CLIENT: **RBK REALTY INC**
8830 Keeran Lane NE
Albuquerque, New Mexico

PROJECT: SIGNAL POINTE SUBDIVISION
North Albuquerque Acres
Albuquerque, New Mexico

DRAWING: RETAINING WALL SECTIONS AND GENERAL STRUCTURAL NOTES

JOB NO:	DATE:	SHEET NO:
R37-001	10/26/15	S1



5' WIDE CONCRETE CHANNEL DETAIL
NTS

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NO.	REVISION	BY	DATE

PROJECT: LA CUEVA
DATE: 09/10/18
HORIZ. SCALE:
VERT. SCALE:
DRAWN BY: DEM
CHECKED BY:
APPROVED BY:
FILE:

9677 PROFESSIONAL ENGINEER 9-10-18

SIGNAL VILLAGE

MISCELLANEOUS DETAILS

CITY/COUNTY REVIEW

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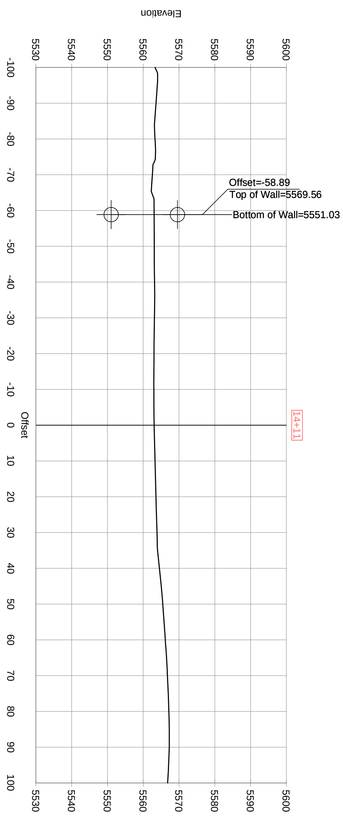
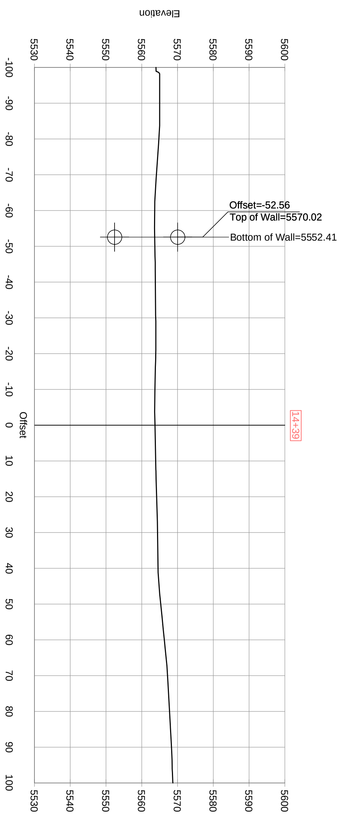
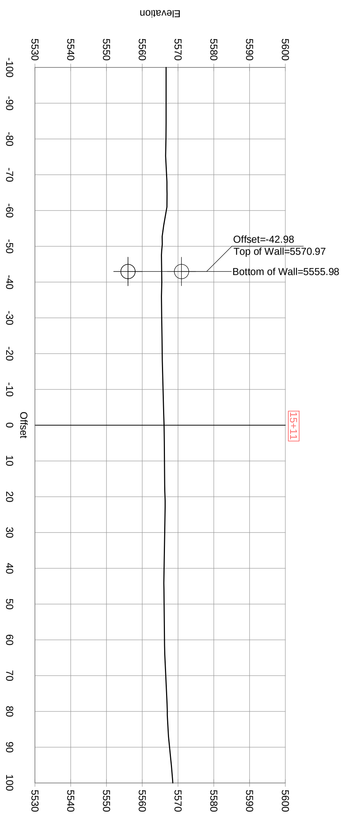
2 OF 5

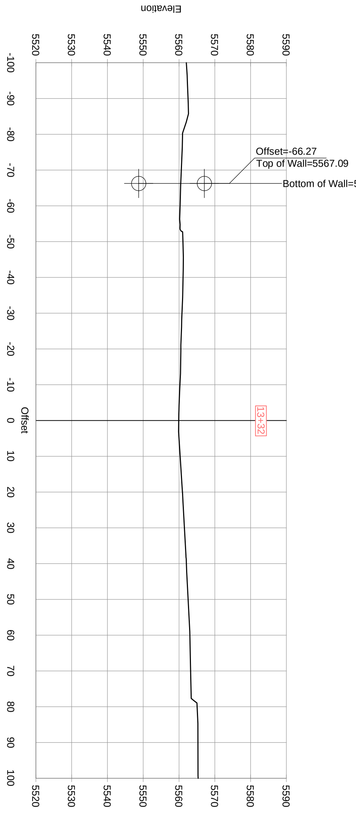
HORIZ 0 20
VERT 0 20
SCALE IN FEET

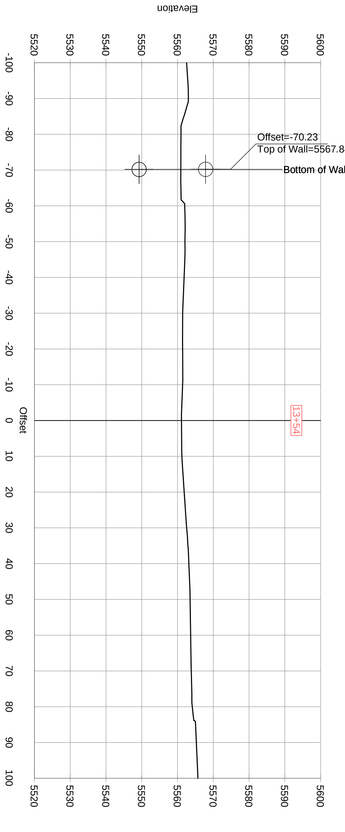
Scour Wall Cross Sections

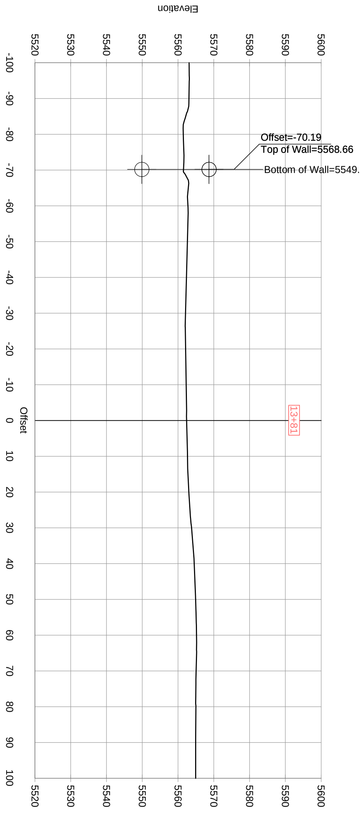












SHEET No.
3 OF 5

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WATER SERVICES		
SUBDIVISION ENG.		
STREETS		
TRAFFIC		
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SIGNAL VILLAGE

CROSS SECTIONS
15+11 to 13+32

NO.	REVISION	BY	DATE

PROJECT: LA CUEVA	DRAWN BY: DEM
DATE: 09/10/2018	CHECKED BY:
HORIZ. SCALE:	APPROVED BY:
VERT. SCALE:	FILE:

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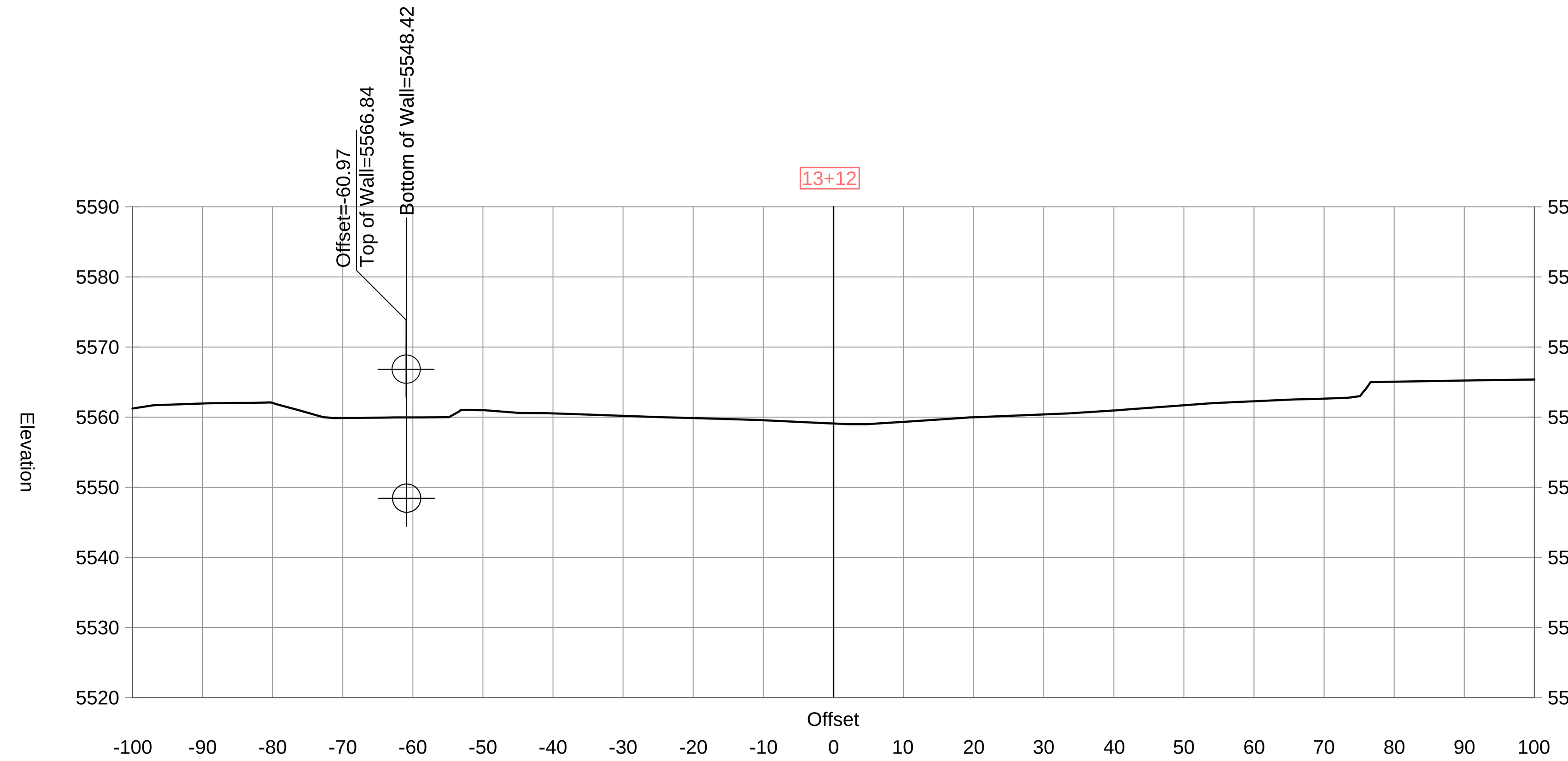

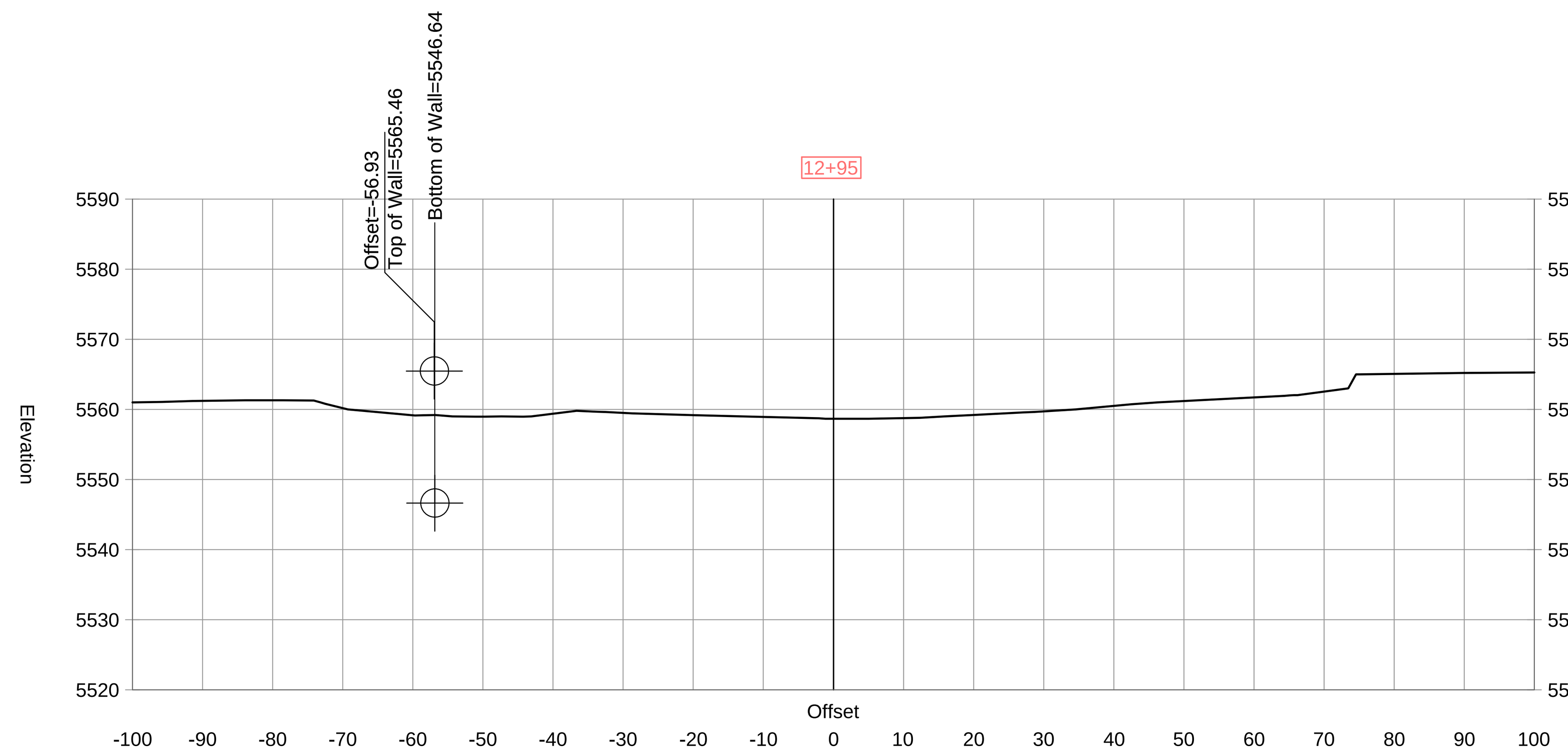

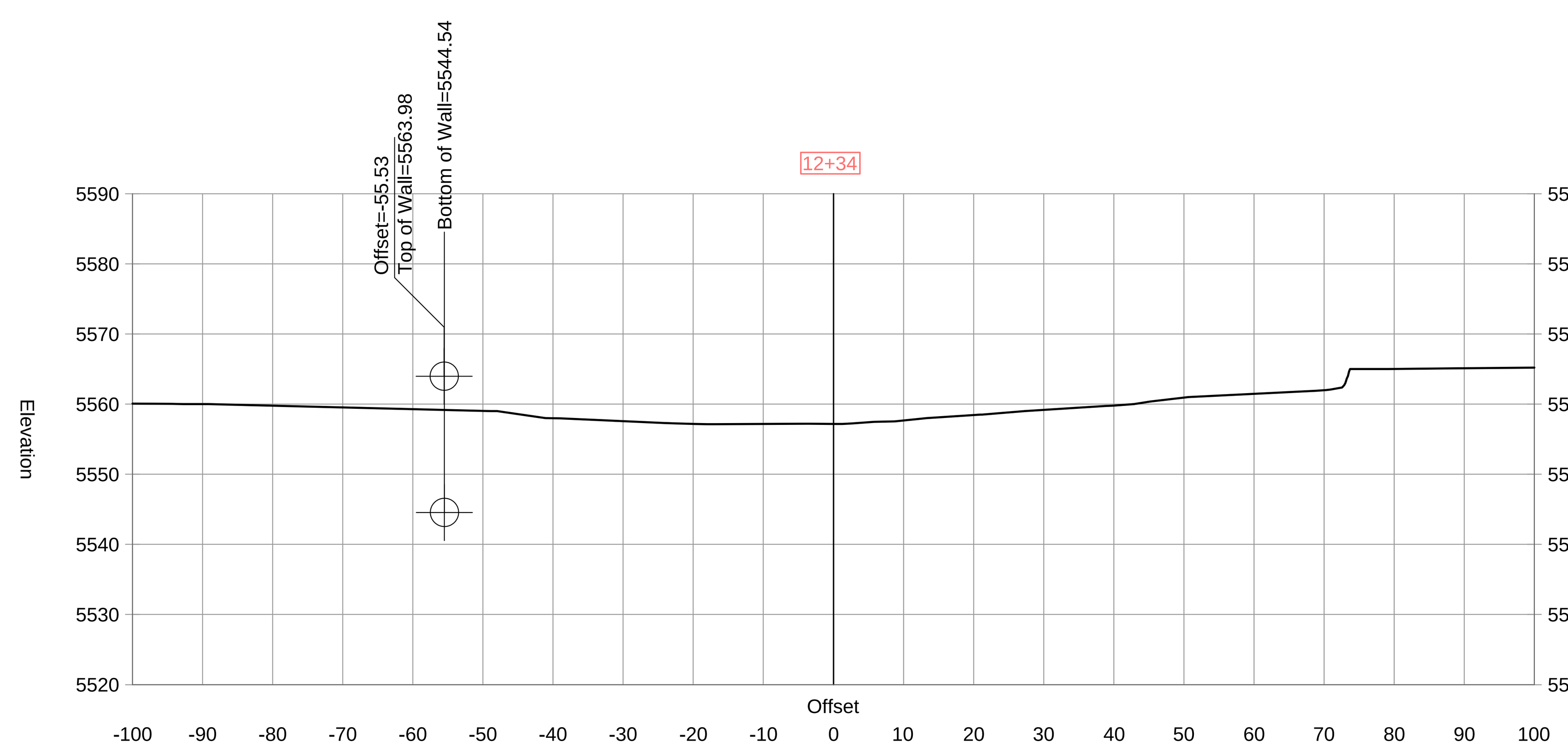

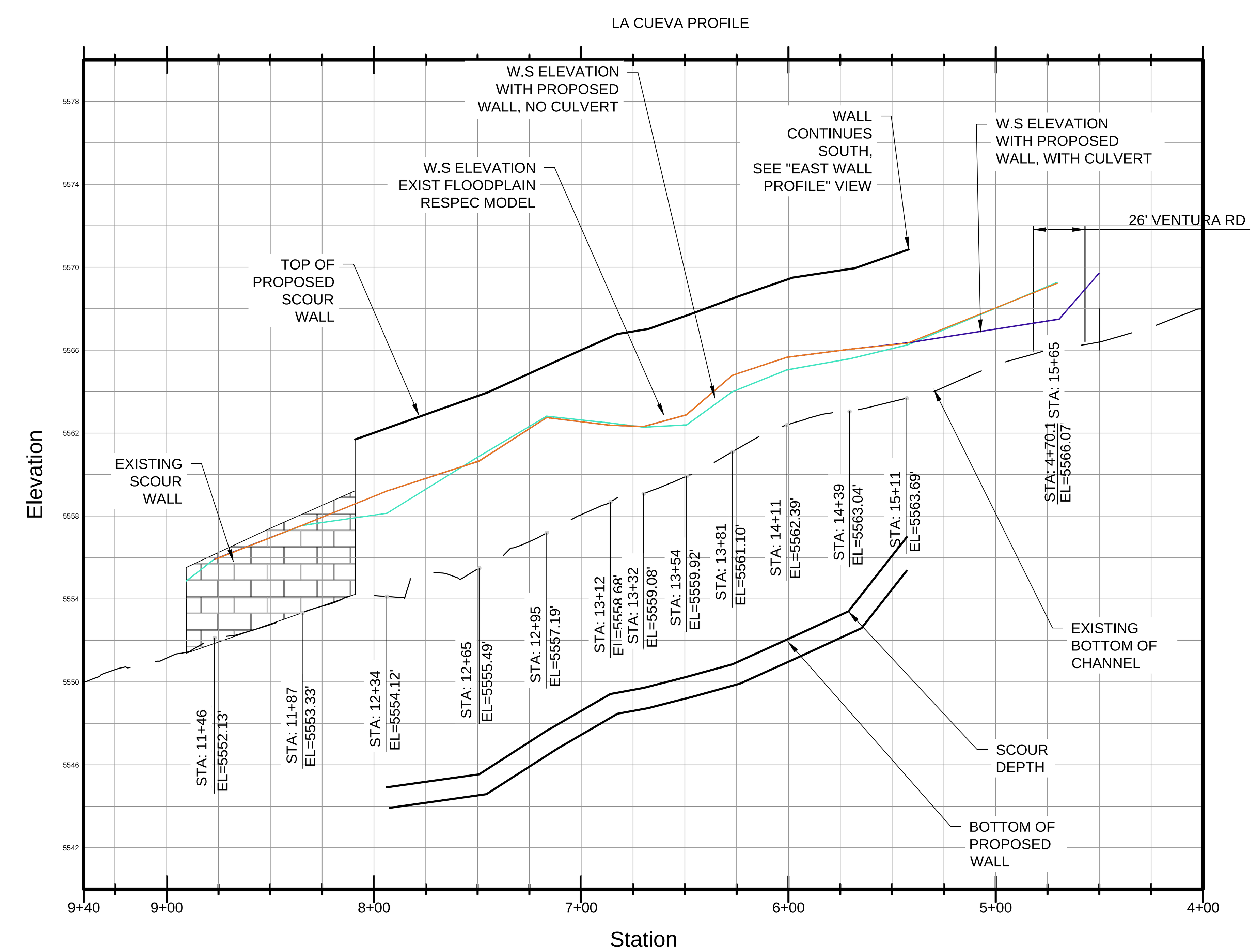

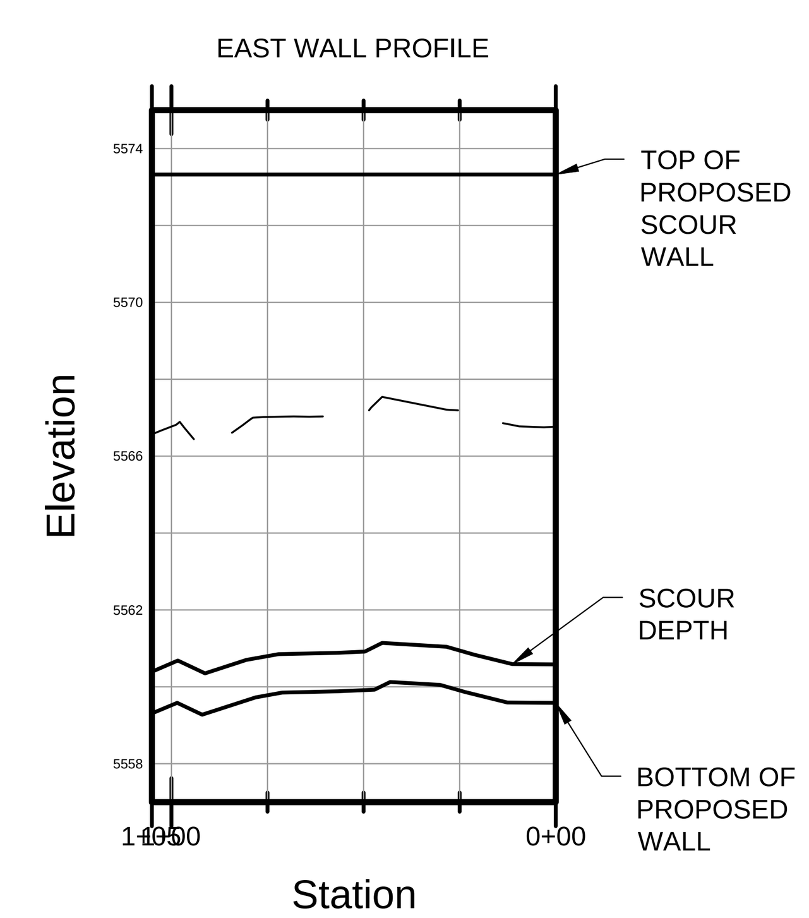

SCALE:
HORIZONTAL: 1" = 50'
VERTICAL: 1" = 5'

HORZ 0 20
VERT 0 2
SCALE IN FEET

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FILE:

SIGNAL VILLAGE

CROSS SECTIONS
13+12 to 12+34
PROFILE VIEW 3+00 - 9+00

CITY/COUNTY REVIEW

DEPARTMENT	SIGN-OFF	DATE
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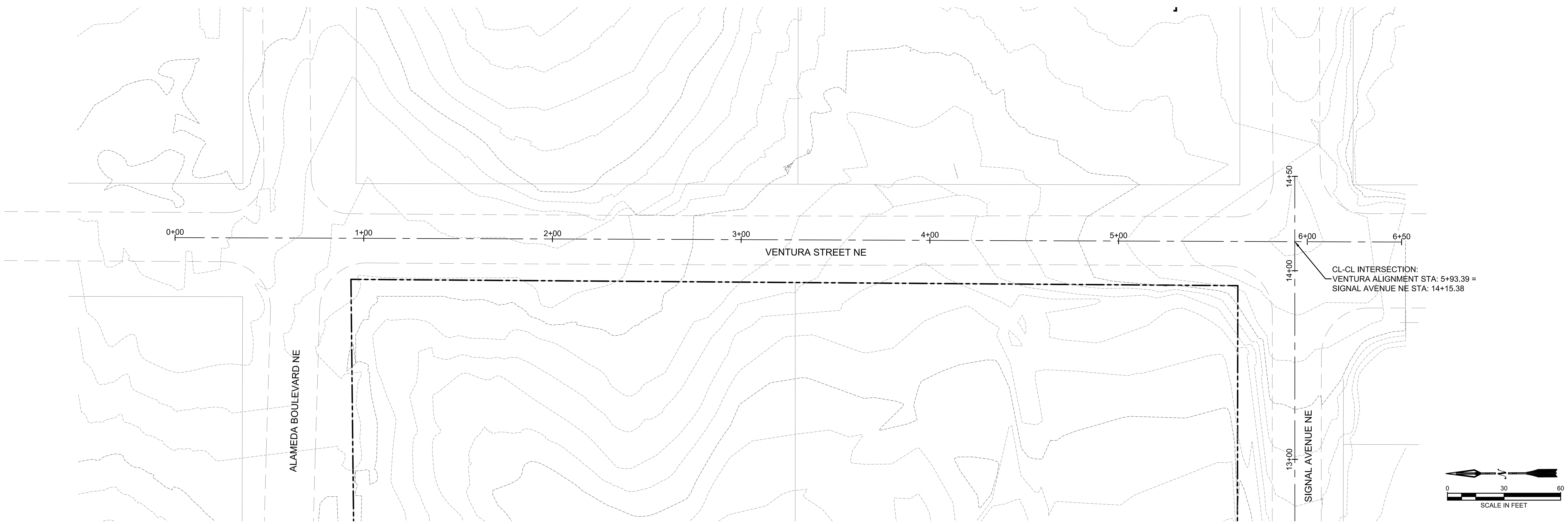
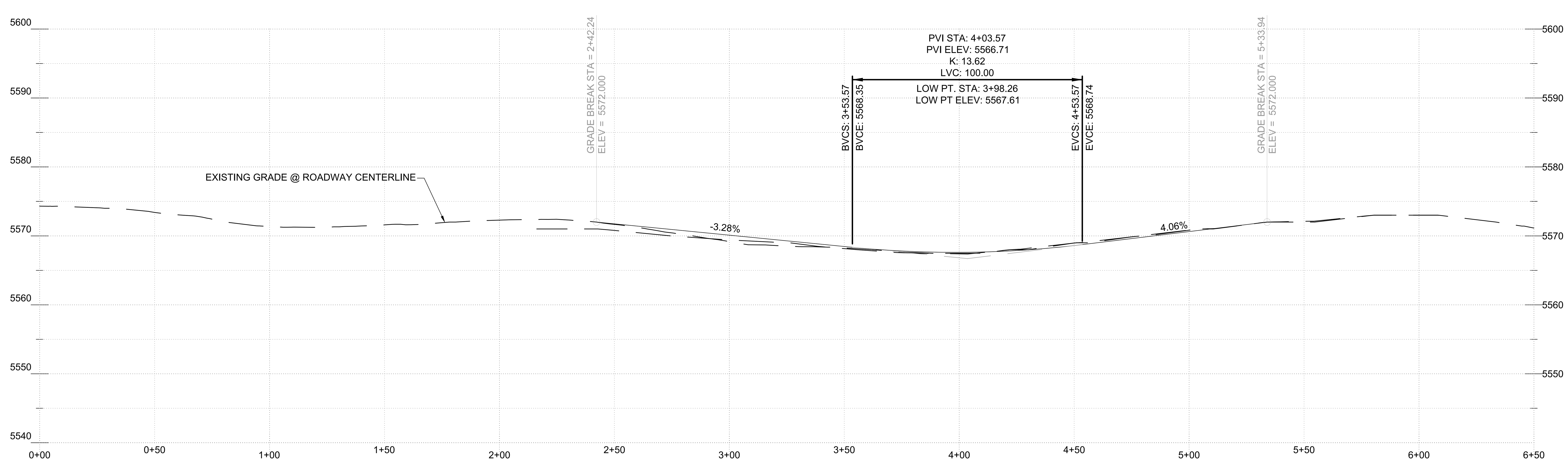
4 OF 5





SCALE:
HORIZONTAL: 1" = 30'
VERTICAL: 1" = 10'

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HORIZ. SCALE:
VERT. SCALE:
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APPROVED BY:
FILE:

SIGNAL VILLAGE

VENTURA PROFILE VIEW 1+00 - 6+50

CITY/COUNTY REVIEW

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WATER SERVICES		
SUBDIVISION ENG.		
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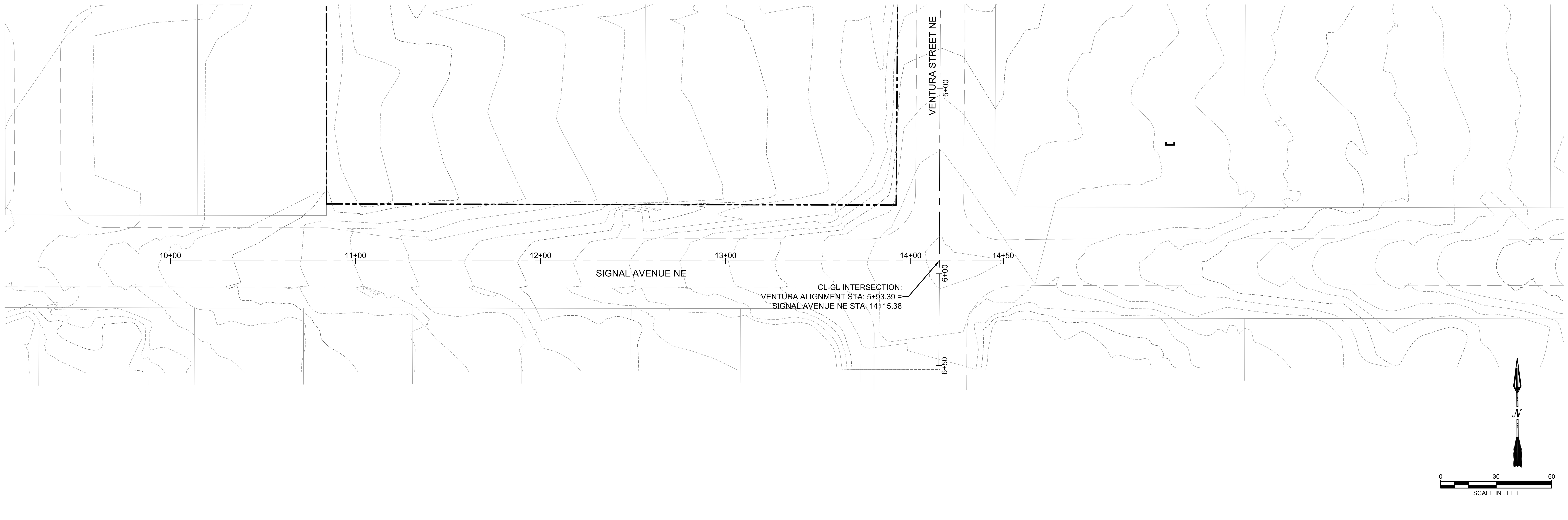
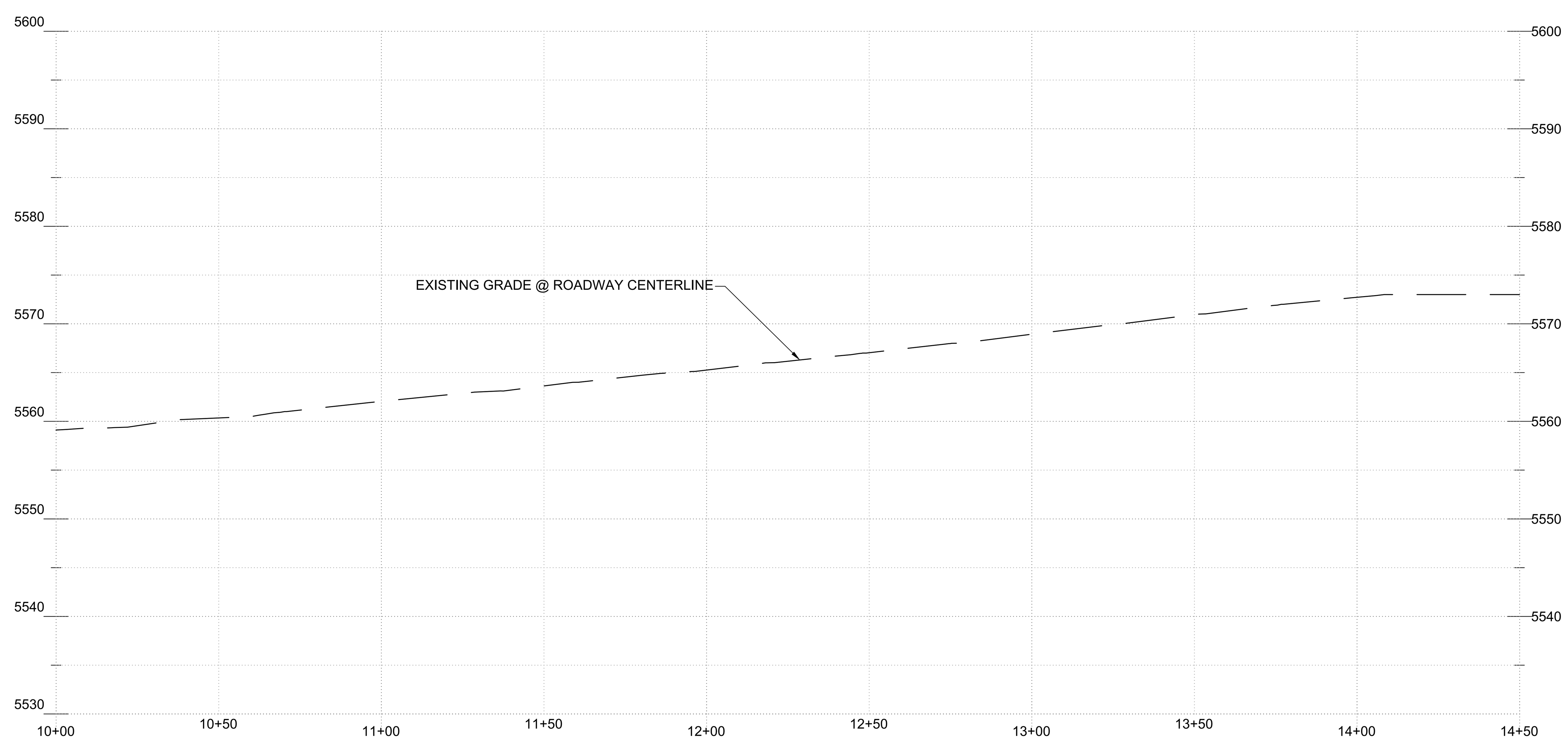
5.1 OF 5





SCALE:
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PROJECT:
DATE:
HORIZ. SCALE:
VERT. SCALE:
DRAWN BY: DEM
CHECKED BY:
APPROVED BY:
FILE:

9677
9-10-18

SIGNAL VILLAGE

SIGNAL PROFILE VIEW
10+00 - 14+50

CITY/COUNTY REVIEW

DEPARTMENT	SIGN-OFF	DATE
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WATER SERVICES		
SUBDIVISION ENG.		
STREETS		
TRAFFIC		

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SHEET No.

5.2 OF 5

Appendix F

LA CUEVA ARROYO SCOUR ANALYSIS INCLUDING CHANNEL EXCAVATION WITH VERTICAL CONCRETE SCOUR WALL WITH VENTURA CULVERT

COL 1	COL 2	COL 3	COL 4	COL 5	COL 6	COL 7	COL 8	COL 9	COL 10	COL 11	COL 12	COL 13	COL 14	COL 15	COL 16	COL 17	COL 18	COL 19	COL 20	COL 21	COL 22	COL 23	COL 24	COL 25	COL 26
SEC. NO.	HEC-RAS STA.		Q100 (CFS)	QD (CFS)	SC (FT/FT)	SAVG (FT/FT)	WD (FT)	LAMDA	LV (FT)	DELTA MAX (FT)	EROS. SET. (FT)	VEL (FPS)	FROUDE	AREA (SF)	TOP WID (FT)	HYD DEP (FT)	UVW (FT)	UVW/WD	YS/Y	YS (FT)	HECRAS DEPTH (FT)	HECRAS FROUDE	SEQ DEP (FT)	FRBRD (FT)	WALL HT (FT)
1	1565.71		3090	618.0	0.0157	0.0348	60.1	841.9	421.0	210.5	240.6	14.07	2.20	233.68	183.28	1.27	481.1	8.00	4.85	6.18	2.24	1.91	3.83	1.72	13.74
2	1511.28		3090	618.0	0.0157	0.0348	60.1	841.9	421.0	210.5	240.6	17.78	2.66	173.81	125.66	1.38	481.1	8.00	4.85	6.71	1.47	2.60	4.53	1.75	14.99
3	1438.58		3090	618.0	0.0157	0.0348	60.1	841.9	421.0	210.5	240.6	14.39	1.80	214.67	108.17	1.98	481.1	8.00	4.85	9.63	2.09	1.80	4.26	1.72	17.61
4	1410.93		3090	618.0	0.0157	0.0348	60.1	841.9	421.0	210.5	240.6	14.58	1.76	211.95	99.23	2.14	481.1	8.00	4.85	10.36	2.22	1.76	4.44	1.73	18.53
5	1380.76		3090	618.0	0.0157	0.0348	60.1	841.9	421.0	210.5	240.6	14.42	1.75	214.23	101.38	2.11	481.1	8.00	4.85	10.25	2.65	1.75	4.82	1.75	18.81
6	1354.24		3090	618.0	0.0157	0.0348	60.1	841.9	421.0	210.5	240.6	14.68	1.83	210.44	105.42	2.00	481.1	8.00	4.85	9.68	2.89	1.83	5.16	1.77	18.60
7	1332.33		3090	618.0	0.0157	0.0348	60.1	841.9	421.0	210.5	240.6	15.61	1.98	198.00	102.53	1.93	481.1	8.00	4.85	9.37	2.64	1.98	5.24	1.78	18.38
8	1311.52		3090	618.0	0.0157	0.0348	60.1	841.9	421.0	210.5	240.6	15.75	2.01	196.22	102.81	1.91	481.1	8.00	4.85	9.26	2.73	2.01	5.38	1.79	18.42
9	1295.47		3090	618.0	0.0157	0.0348	60.1	841.9	421.0	210.5	240.6	15.63	1.96	197.64	100.38	1.97	481.1	8.00	4.85	9.55	2.89	1.96	5.48	1.79	18.82
10	1264.68		3090	618.0	0.0157	0.0348	60.1	841.9	421.0	210.5	240.6	16.09	1.98	193.52	94.32	2.05	481.1	8.00	4.85	9.95	2.93	1.98	5.69	1.80	19.44
11	1233.92		3090	618.0	0.0157	0.0348	60.1	841.9	421.0	210.5	240.6	17.80	2.28	173.63	91.49	1.90	481.1	8.00	4.85	9.20	2.13	2.28	5.48	1.80	18.48

COL 1	CHANNEL CROSS-SECTION NUMBER
COL 2	HEC-RAS CHANNEL STATION
COL 3	NOT USED
COL 4	100-YEAR PEAK DISCHARGE, Q (CFS)
COL 5	DOMINANT DISCHARGE, QD = 0.2 Q100 (CFS)
COL 6	CRITICAL SLOPE, SC = 0.037 QD (^-0.133) (FT/FT)
COL 7	AVERAGE SLOPE OF THE CHANNEL (FT/FT)
COL 8	DOMINANT CHANNEL WIDTH, WD = 4.6QD(^0.4) (FT)
COL 9	MEANDER WAVELENGTH, LAMDA = (014)WD (FT) FOR QD > 2000 CFS
COL 10	DOWN-VALLEY LENGTH, LV = LAMDA/2 (FT)
COL 11	MAXIMUM LATERAL EROSION, DELTA MAX = (16.1)QD(^0.4) (FT) FOR QD > 2000 CFS
COL 12	EROSION SETBACK = WD/2 + DELTA MAX (FT)
COL 13	CHANNEL VELOCITY FROM HECRAS (FT/SEC)
COL 14	FROUDE NUMBER CALCULATED USING HYDRAULIC DEPTH
COL 15	CROSS-SECTIONAL AREA FROM HECRAS (SQ. FT)
COL 16	TOP WIDTH FROM HECRAS (FT)
COL 17	HYDRAULIC DEPTH, HD = A/TW (FT)
COL 18	UNCONSTRAINED VALLEY WIDTH, UVW = 2 X EROSION SETBACK (FT)
COL 19	RATIO OF UNCONSTRAINED VALLEY WIDTH TO DOMINANT CHANNEL WIDTH, UVW/WD
COL 20	RATIO OF SCOUR DEPTH TO FLOW DEPTH, YS/Y (FIGURE 3.31 AMAFCA SEDIMENT AND EROSION DESIGN GUIDE)
COL 21	ESTIMATED SCOUR (FT)
COL 22	DEPTH OF FLOW FROM HECRAS (FT)
COL 23	FROUDE NUMBER FROM HECRAS
COL 24	SEQUENT DEPTH (FT)
COL 25	FREEBOARD (FT)
COL 26	SCOUR WALL HEIGHT = SCOUR DEPTH + SEQUENT DEPTH +FREEBOARD+ TWO FOOT FACTOR OF SAFTEY (FT)