CITY OF ALBUQUERQUE

December 27, 2005

Mr. Shahab Biazar, P.E.
ADVANCED ENGINEERING AND CONSULTING, LLC
4416 Anaheim Ave. NE
Albuquerque, NM 87113

Re: TEXAS ROAD HOUSE (LOT 1, SAN MATEO DEL NORTE)
5900 Pan American Freeway NE
Approval of Permanent Certificate of Occupancy (C.O.)
Engineer's Stamp dated 06/24/2005 (E-17/D32A)
Certification dated 12/13/2005

Dear Shahab:

Based upon the information provided in your submittal received 12/27/2005, the above referenced certification is approved for release of Permanent Certificate of Occupancy by Hydrology.

If you have any questions, you can contact me at 924-3982.

Sincerely,

Arlene V. Portillo
Plan Checker, Planning Dept. - Hydrology
Development and Building Services

C: CO Clerk
File

P.O. Box 1293
Albuquerque
New Mexico 87103
www.cabq.gov

CITY OF ALBUQUERQUE

July 14, 2005

Shahab Biazar, P.E.
Advanced Engineering & Consulting, LLC
4416 Anaheim Ave. NE
Albuquerque, NM 87113

Re: Texas Roadhouse, Lot 1, San Mateo Del Norte, Grading & Drainage Plan Engineer's Stamp dated 6-24-05 (E17-D32A)

Dear Mr. Biazar,

Based upon the information provided in your submittal dated 6-24-05, the above referenced plan is approved for Building Permit. Please attach a copy of this approved plan to the construction sets prior to sign-off by Hydrology. Additionally, prior to release of the Certificate of Occupancy an Engineer's Certification of the grading plan per the DPM checklist will be required.

This project requires a National Pollutant Discharge Elimination System (NPDES) permit. Refer to the attachment that is provided with this letter for details. If you have any questions please feel free to call the Municipal Development Department Hydrology section at 768-3654 (Charles Carusø).

If you have any questions, you can contact me at 924-3990.

Sincerely,

Phillip J. Lovato, E.I., C.F.M.
Engineering Associate, Hydrology,
Development and Building Services,
Planning Department

cc: Charles Caruso, DMD
file

P.O. Box 1293

Albuquerque

New Mexico 87103

www.cabq.gov

DRAINAGE REPORT
FOR

LOT 1, SAN MATEO DEL NORTE

Prepared by:

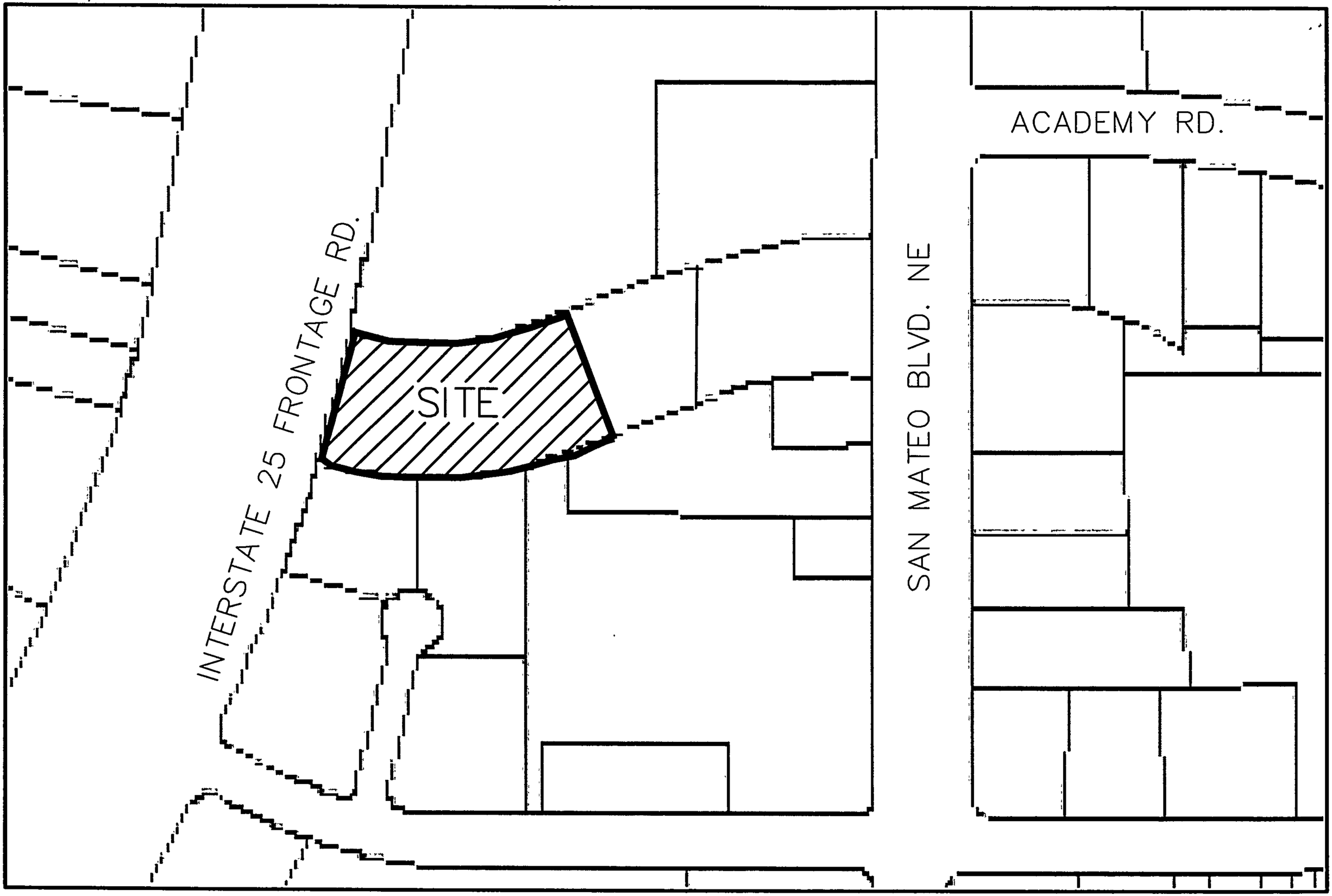
ADVANCED
ENGINEERING
and CONSULTING, LLC

4416 Anaheim Ave., NE
Albuquerque, New Mexico 87113

June, 2005

Shahab Biazar
PE NO. 13479

RECEIVED
JUN 24 2005
HYDROLOGY SECTION



VICINITY MAP:

E-17-Z ****

Location

Lot 1, San Mateo Del Norte is located between San Mateo and Interstate 25 Frontage Road, approximately 800' north of Osuna Road. See attached Zone Atlas page number E-17 for exact location.

Purpose

The purpose of this drainage report is to present a drainage solution for the proposed restaurant building.

Existing and Proposed Conditions

The site falls within the Floodplain Zone AO (Depth 2) based on the FIRM Map # 35001C0139. A drainage study under the City Drainage number E17-D32A was submitted in order to remove the floodplain from this site. A box culvert is being constructed under the City Project number 723681 to carry the runoff across the property. The overall offsite runoff from the north and south has also been analyzed under the City Drainage number E17-D32A and copy of the basin map and runoff summary table is submitted with this report. The offsite runoff to the south will be intercepted by the storm sewer pipe being built under the City Project number 723681. The offsite runoff to the north and east will be intercepted by the storm sewer pipes being proposed with this submittal. Lots 2 and 3 are located to the east of this project and is being designed by Isaacson & Arfman. We will coordinate the drainage design with them. A copy of their plan is enclosed with this submittal. Their grades appear to be different due to difference in elevation for the datum used in the topography survey (1988 and 1929 datum). A desilting pond is also shown on our plan incase the

project to the east does not get constructed the same time our project is consturcted.

Calculations

City of Albuquerque, Development Process Manuel, Section 22.2, Hydrology Section was used for runoff calculations. See the following pages for calculations.

RUNOFF CALCULATION RESULTS

BASIN	AREA (SF)	AREA (AC)	AREA (MI^2)
PARCEL ~~1 & 2~~ 1 & 2	100770.86	2.3134	0.00361
PARCEL 3	78726.28	1.8073	0.00282

1 & 3

PROPOSED

BASIN	Q-100 CFS	Q-10 CFS	TREATMENT A, B, C, D
~~1 & 2~~ 1	10.22	6.61	0%, 5%, 5%, 90%
PARCEL ~~3~~	7.99	5.16	0%, 5%, 5%, 90%

2 & 3

EXISTING

BASIN	Q-100 CFS	Q-10 CFS	TREATMENT A, B, C, D
~~1 & 2~~ 1	3.60	0.86	100%, 0%, 0%, 0%
PARCEL ~~3~~	2.82	0.67	100%, 0%, 0%, 0%

2 & 3

Lots 2 & 3 are located to the East.

RUNOFF CALCULATIONS

(INPUT DATA FOR AHYMO CALCULATIONS)

The site is @ Zone 2 ✓

DEPTH (INCHES) @ 100-YEAR STORM

P_{60} = 2.01 inches ✓

P_{360} = 2.35 inches ✓

P_{1440} = 2.75 inches ✓

DEPTH (INCHES) @ 10-YEAR STORM

P_{60} = 2.01 x 0.667
= 1.34 inches

P_{360} = 1.57

P_{1440} = 1.83

See the summary output from AHYMO calculations.

Also see the following summary tables.

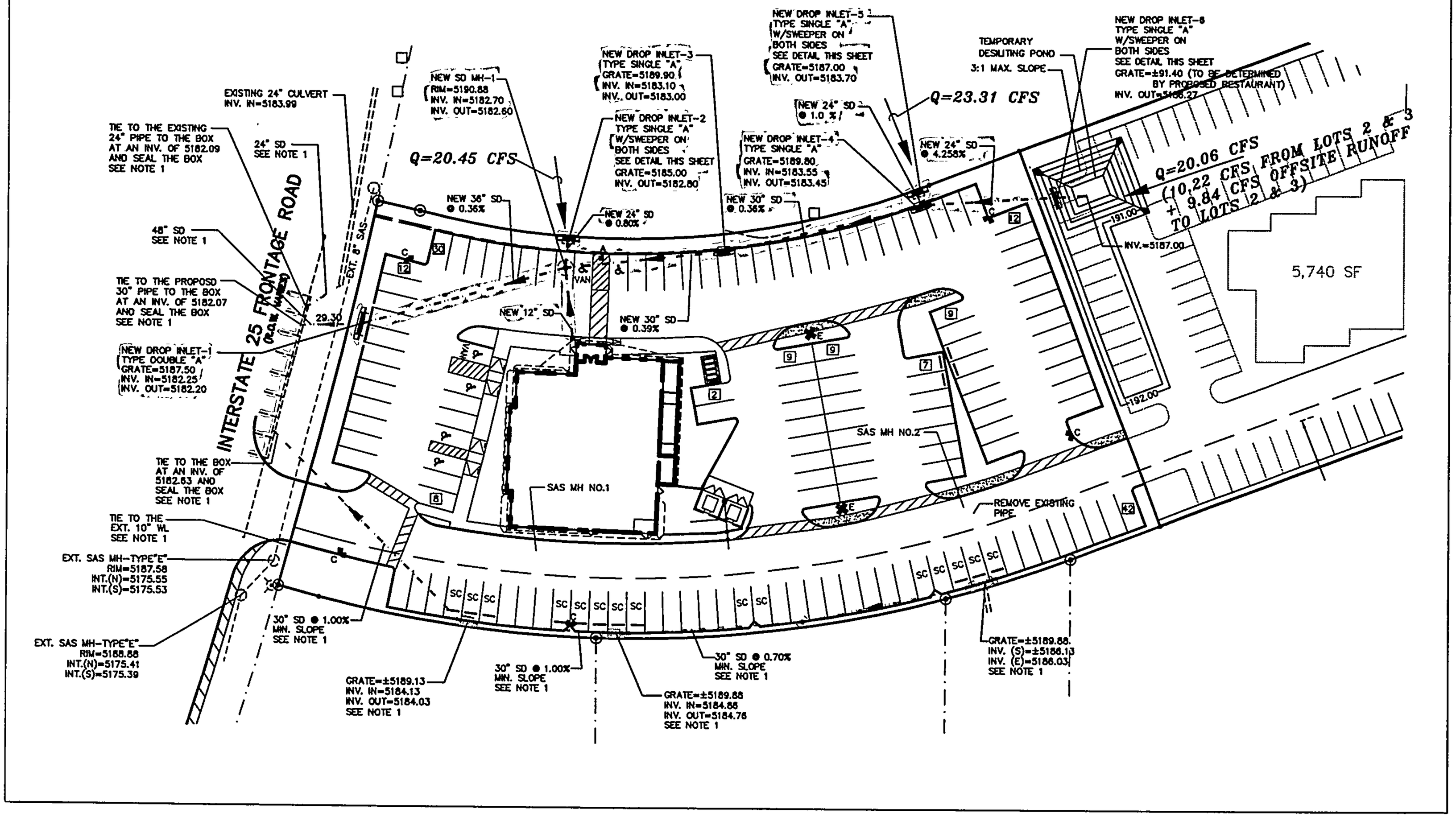
SUMMARY OUTPUT FILE

AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) - - VERSION: 1997.02d RUN DATE (MON/DAY/YR) =06/23/2005
INPUT FILE = 200454 USER NO.= AHYMO-I-9702c01000R31-AH

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION	
										PAGE =	1
START										TIME=	.00
RAINFALL TYPE= 1										RAIN6=	2.350
EXIST 100YR6HR COMPUTE NM HYD 1&2	100.00	-	1	.00361	3.60	.102	.53121	1.533	1.559	PER IMP=	.00
EXIST 100YR6HR COMPUTE NM HYD 3	101.00	-	1	.00282	2.82	.080	.53121	1.533	1.560	PER IMP=	.00
START										TIME=	.00
RAINFALL TYPE= 1										RAIN6=	1.570
EXIST. 10 YR 6HR COMPUTE NM HYD 1&2	110.00	-	1	.00361	.86	.024	.12517	1.533	.373	PER IMP=	.00
EXIST. 10 YR 6HR COMPUTE NM HYD 3	111.00	-	1	.00282	.67	.019	.12517	1.533	.373	PER IMP=	.00
START										TIME=	.00
RAINFALL TYPE= 1										RAIN6=	2.350
PROPOSED 100YR 6HR COMPUTE NM HYD 1&2	120.00	-	1	.00361	10.22	.379	1.96829	1.500	4.424	PER IMP=	90.00
PROPOSED 100YR 6HR COMPUTE NM HYD 3	121.00	-	1	.00282	7.99	.296	1.96829	1.500	4.426	PER IMP=	90.00
START										TIME=	.00
RAINFALL TYPE= 1										RAIN6=	1.570
PROPOSED 10YR 6HR COMPUTE NM HYD 1&2	121.00	-	1	.00361	6.61	.236	1.22343	1.500	2.859	PER IMP=	90.00
PROPOSED 10YR 6HR COMPUTE NM HYD 3	122.00	-	1	.00282	5.16	.184	1.22343	1.500	2.860	PER IMP=	90.00
FINISH											

7.99 - 2.82 = 5.17 CFS INCREASE

****



STORM SEWER EXHIBIT

NTS

****

STORM DROP INLET DRAINAGE CAPACITY

Single 'A' (in ponding conditions)

Area at the grate:

L = 44 3/8" - 2(6"$_{ends}$) - 7(½ $_{middle\ bars}$)
= 28 7/8"
= 2.41'

W = 25 ½" - 13(½"$_{middle\ bars}$)
= 19"
= 1.58'

Area = 2.41' x 1.58'
= 3.81 ft^2

Effective Area = 3.81- 3.81 (0.5 $_{clogging\ factor}$)
= 1.91 ft^2 at the grate

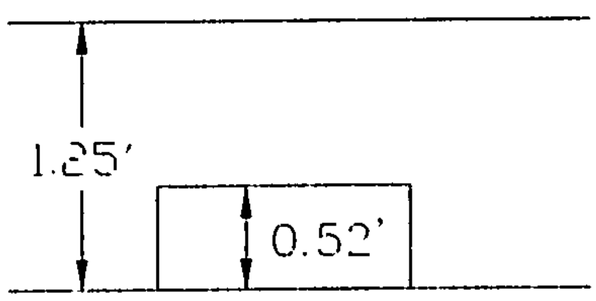
Area at the throat:

L = 7.45'

H = 10 ¾" - 4 ½"
= 6 ¼"
= 0.5208'

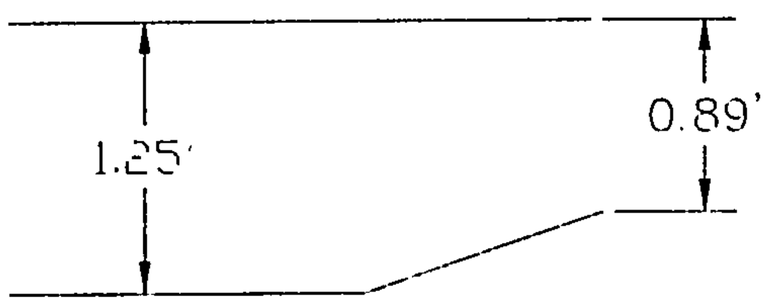
Area = 7.45' x 0.5208'
= 3.88 ft^2 at the throat

THROAT



$H=1.25$
$Q=CA\sqrt{2gH}$
$Q=0.60(3.88)\sqrt{2(32.2)(1.25)}$
$Q=20.89$ CFS

GRATE



$H=(1.25+0.89)/2=1.08$
$Q=CA\sqrt{2gH}$
$Q=0.60(1.91)\sqrt{2(32.2)(1.08)}$
$Q=9.56$ CFS

TOTAL

$Q=20.89+9.56=30.45$ CFS

The maximum runoff intercepted by an inlet is 23.21 cfs

PIPE FLOW CAPACITY TABLE

(PIPE CAPACITY RESULTS USING ORIFICE EQUATION)

LOCATTION	SIZE in	H (HEAD) ft	DISCHARGE (ACTUAL) cfs	DISCHARGE (CAPACITY) cfs
INLET-1 TO EXISTING BOX CULVERT	48	6.20	67.82	150.66
MH-1 TO INLET-1	36	8.18	63.82	97.34
INLET-2 TO MH-1	24	4.20	20.45	31.00
INLET-3 TO MH-1	30	7.80	43.37	66.01
INLET-4 TO INLET-3	30	7.25	43.37	63.64
INLET-5 TO INLET-4	24	4.20	23.31	31.00
INLET-6 TO INLET-4	24	6.03	20.06	37.15

Orifice Eq:

$$Q = CA\sqrt{2gh}$$

$C = 0.60$

$A = \pi R^2$

$g = 32.2$

h = head @ the pipe

***

RUNOFF CALCULATION RESULTS

BASIN	AREA (SF)	AREA (AC)	AREA (MI^2)
ON-SITE	179364.97	4.1177	0.006434
OS-A	95950.10	2.2027	0.003442
OS-B	227646.80	5.2261	0.008166
OS-C	199714.99	4.5848	0.007164
OS-D	96270.34	2.2101	0.003453
OS-E	348978.14	8.0114	0.012518

EXISTING

BASIN	Q-100 CFS	Q-10 CFS
ON-SITE	6.42	1.53
OS-A	9.84	6.37
OS-B	23.31	15.09
OS-C	20.45	13.24
OS-D	9.87	6.39
OS-E	35.72	23.13

PROPOSED

BASIN	Q-100 CFS	Q-10 CFS
ON-SITE	18.37	11.89

From City Drainage # E-17 / D32 A

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

April 9, 2004

Shahab Biazar PE
Advanced Engineering and Consulting
4416 Anaheim Ave NE
Albuquerque, NM 87113

Re: Bear Canyon Box Culvert Updated Drainage Report
Engineer's Stamp dated 1-20-04 (E17/D32A)

Dear Mr. Biazar,

Based upon the information provided in your submittal dated 1-27-04, the above referenced report is approved for Work Order.

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

Sincerely,

Bradley L. Bingham, PE
Principal Engineer, Planning Dept.
Development and Building Services

C: file

THE CITY OF ALBUQUERQUE IS AN EQUAL OPPORTUNITY/REASONABLE ACCOMMODATION EMPL

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

December 19, 2003

Shahab Biazar PE
Advanced Engineering and Consulting
10205 Snowflake Ct NW
Albuquerque, NM 87114

Re: Bear Canyon Box Culvert Extension Drainage Report
Engineer's Stamp dated 10-20-03 (E17/D32A)

Dear Mr. Biazar,

Based upon the information provided in your submittal dated 10-31-03, the above referenced report is approved for Work Order once the CLOMR is granted by FEMA. Please continue to work with FEMA and forward copies of any correspondence. Keep in mind that NMDOT approval is still required.

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

Sincerely,

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

C: file

THE CITY OF ALBUQUERQUE IS AN EQUAL OPPORTUNITY/REASONABLE ACCOMMODATION EMPLOYER

CLOMR
FOR
BEAR CANYON
BOX CULVERT EXTENSION

Prepared by:

ADVANCED
ENGINEERING
and CONSULTING, LLC

10205 Snowflake Ct. NW
Albuquerque, New Mexico 87114

October, 2003

Shahab Biazar
PE NO. 13479

Location

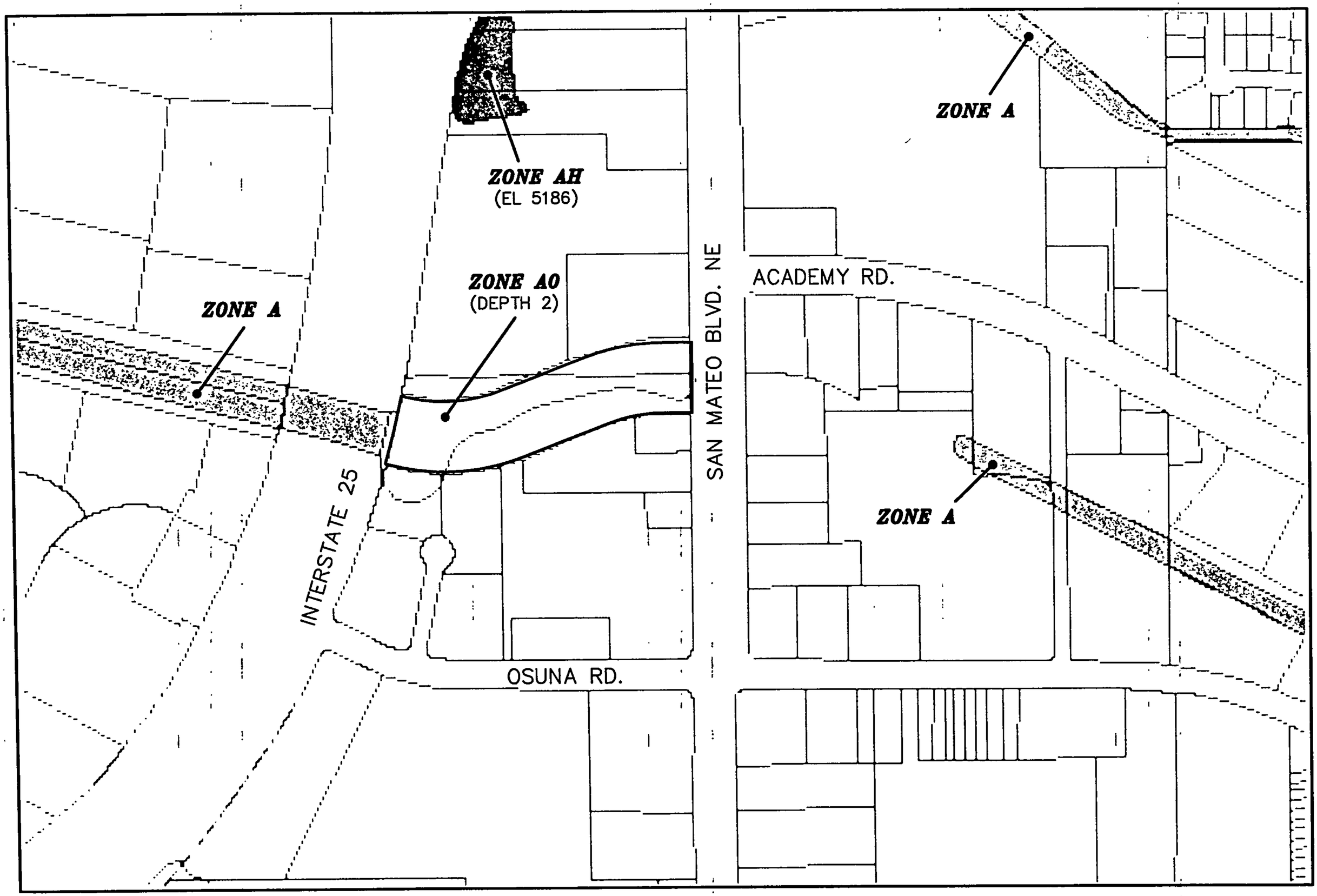
Bear Arroyo Canyon Arroyo is located between San Mateo and Interstate 25 Frontage Road, approximately 800' north of Osuna Road. See attached Zone Atlas page number E-17 for exact location.

Purpose

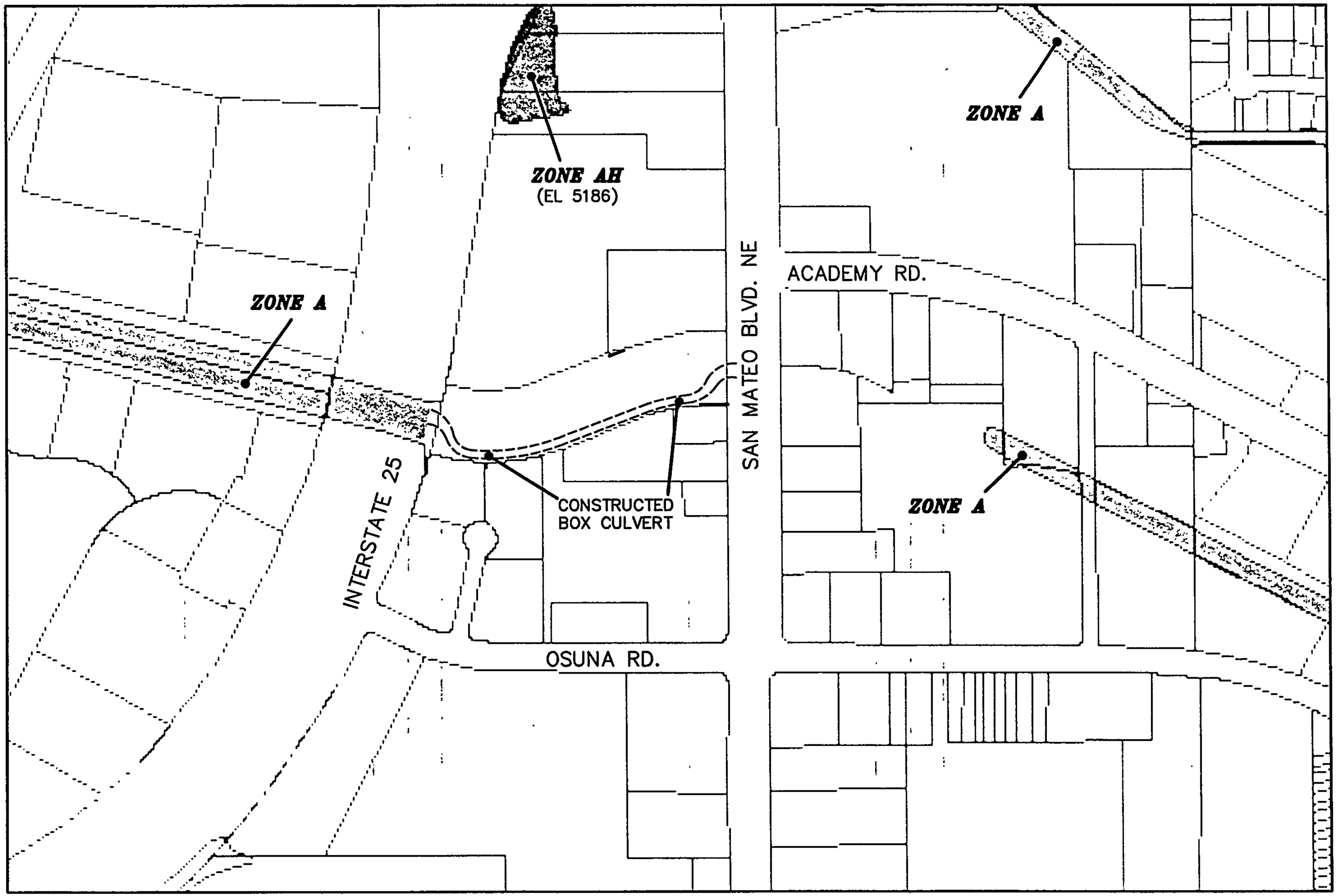
The purpose of this drainage report is to present a drainage solution in order to remove the site from the floodplain. We are requesting rough grading approval, Preliminary and Final Plat approval. We have submitted the CLOMR package to FEMA. We are in the process of modifying the construction plans for the extension of the box culvert as well as the additional storm sewer structures. The storm sewer culvert box will be designed and built per State Highway Department Standards. The site will not be fully graded (for ultimate conditions) until specific users are determined for each Lot.

Existing Drainage Conditions

The site falls within the Floodplain Zone AO (Depth 2) based on the FIRM Map # 35001C0139. The Floodplain is created by the offsite runoff from the Box culvert crossings from the east. Runoff of 1,801 cfs drains from the east to this site. We have used The "Far Northeast Height Master Drainage Plan" in order to determine the runoff in Bear Canyon Arroyo. The site falls within Basin 174 of the mater plan. Two analysis points 174A and 174 with runoffs of 1801 and 1804 cfs was considered for our analysis. See attached portion of the map for the location of our site in relation to basin map and the analysis points. There is a total offsite runoff of 99.19 cfs which contributes to this site both from the north and from east. See

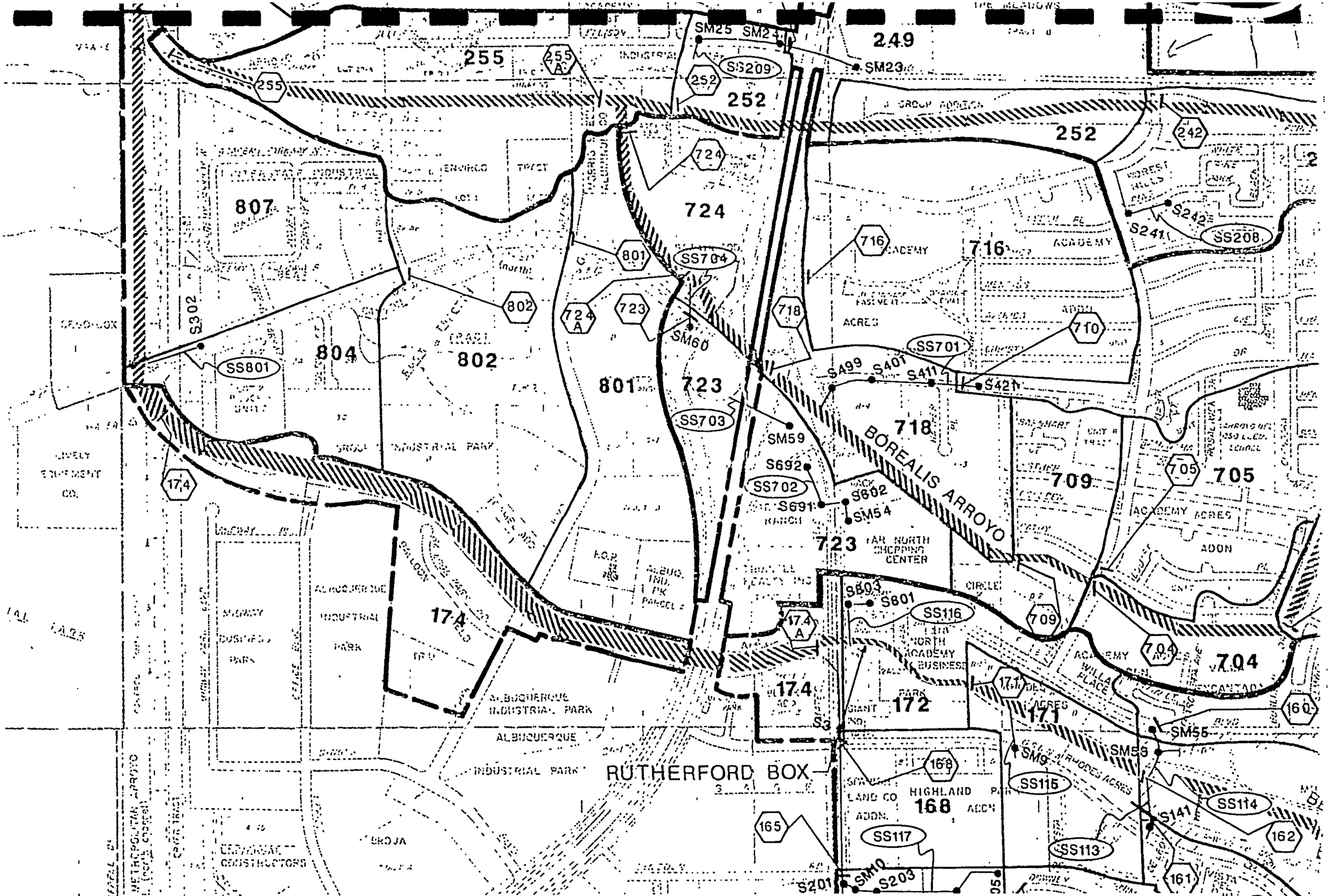


FIRM MAP: 35001C0139 D****



FLOODPLAIN MAP AFTER CONSTRUCTION OF THE BOX CULVERT 1"=±400

****



SECTION OF THE "MODELING MAP"

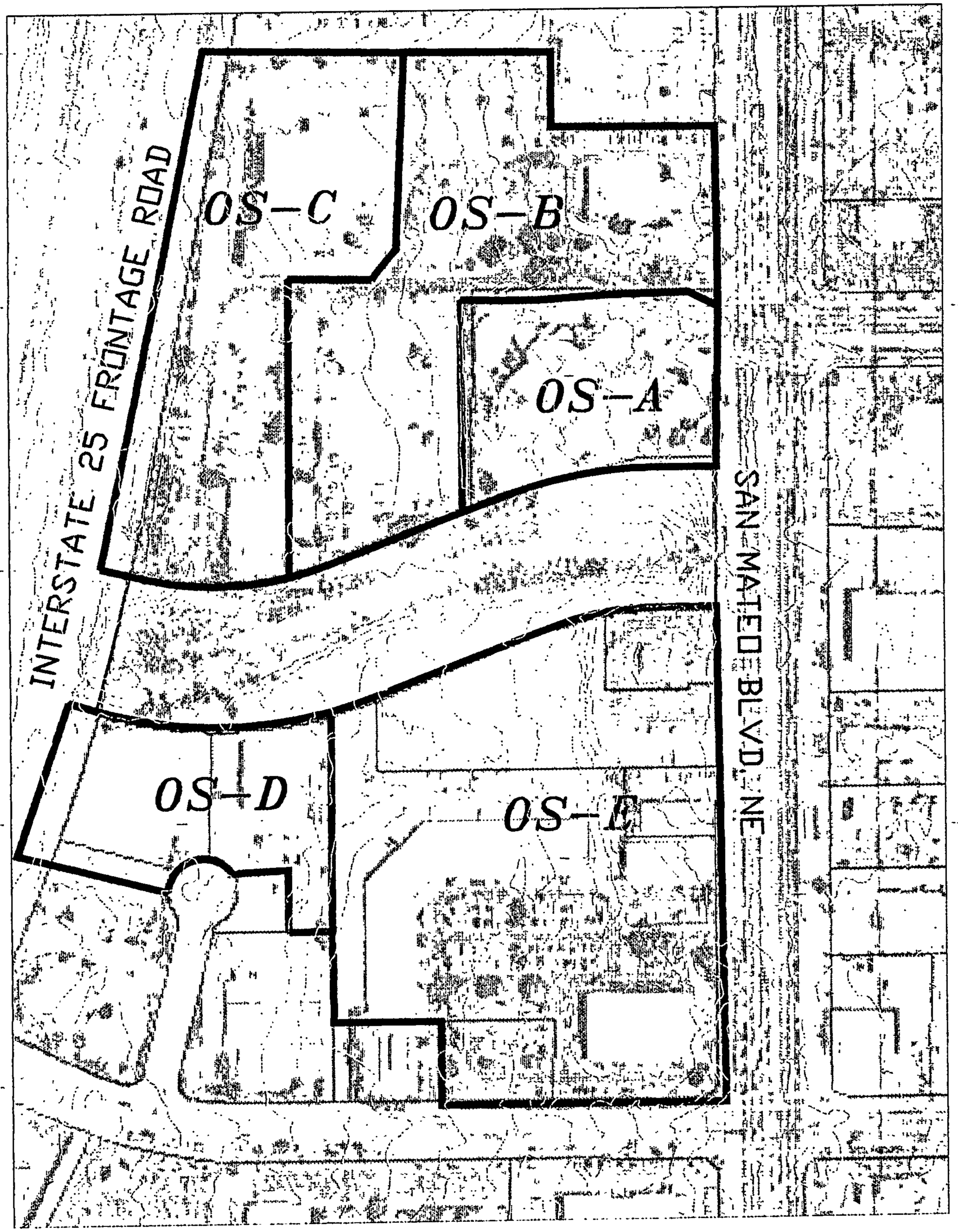
(FROM THE FAR NORTHEAST HEIGHTS MASTER DRAINAGE PLAN)

SCALE 1"=1000'(±)

attached map for the offsite basin layout. See also attached Basin Runoff Summary Table for the amount of runoff. The existing 100-year water surface elevation and energy grade line were analyzed using the HEC-Ras program. See section V of this report for the HEC-Ras output files. Also see plan sheet 4 of 5 for plotted 100-year water surface elevation and energy grade line under the existing conditions using the HEC-Ras output file.

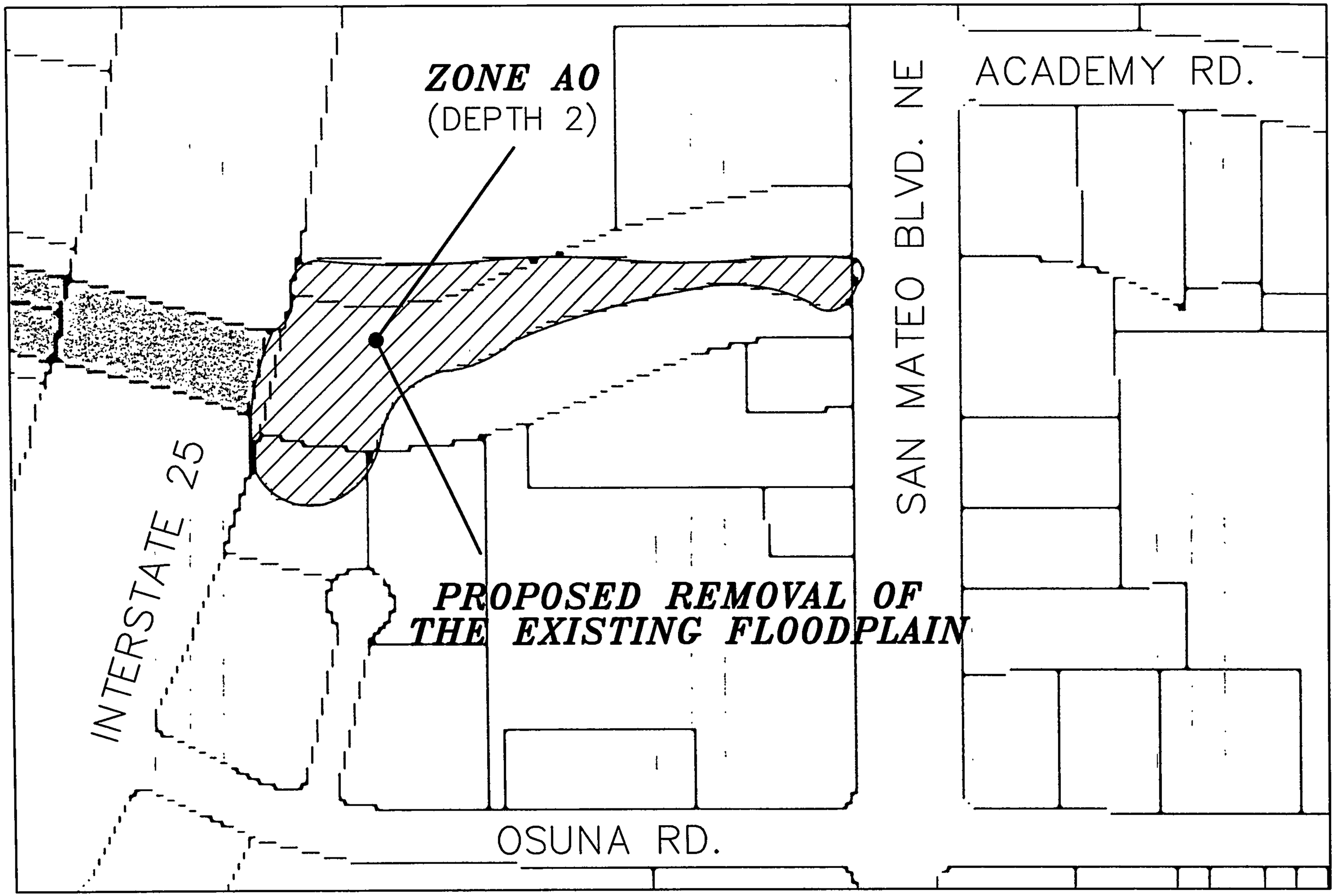
Proposed Conditions and On-Site Drainage Management Plan

We are proposing to extend 2-10'x5' Box culvert from east end of the property to west end of the property in order to remove the flood plain from this site. Based on a drainage report by Bohannan-Houston Inc. for Bear Arroyo Canyon, dated September, 1986, a 100' transition was recommended from the 4-10x4 culverts to 2-10x5 culverts at San Mateo discharge point (east connection). We have provided a 180' transition. HEC-Ras program was used to provide hydrology analysis of the channel. The HEC-Ras analysis was preformed ±219' east of easterly connection at San Mateo and ±280' west of the westerly connection at I-25 Frontage Road. Since there were no as-builts nor any City records for the existing box under and east of San Mateo Boulevard, we had to measure the box in the field to confirm the sizes of the culverts under the San Mateo and east of San Mateo as well as the approximate location of the box transition from the 4-10x4 to 2-15x5 box culverts. A digital level also was used to obtain the slope of the culvert. Therefore, the field data was used to preform the HEC-Ras analysis on the east side of our connection. The measurements from the filed were approximate measurements. See this report for the HEC-Ras calculations. The offsite runoff from the south will partially enter this site via surface and then it will continue to the west end of the project to the proposed desilting pond on-site. The remaining portion of the offsite runoff, which physically will not be able to surface



1"=200'

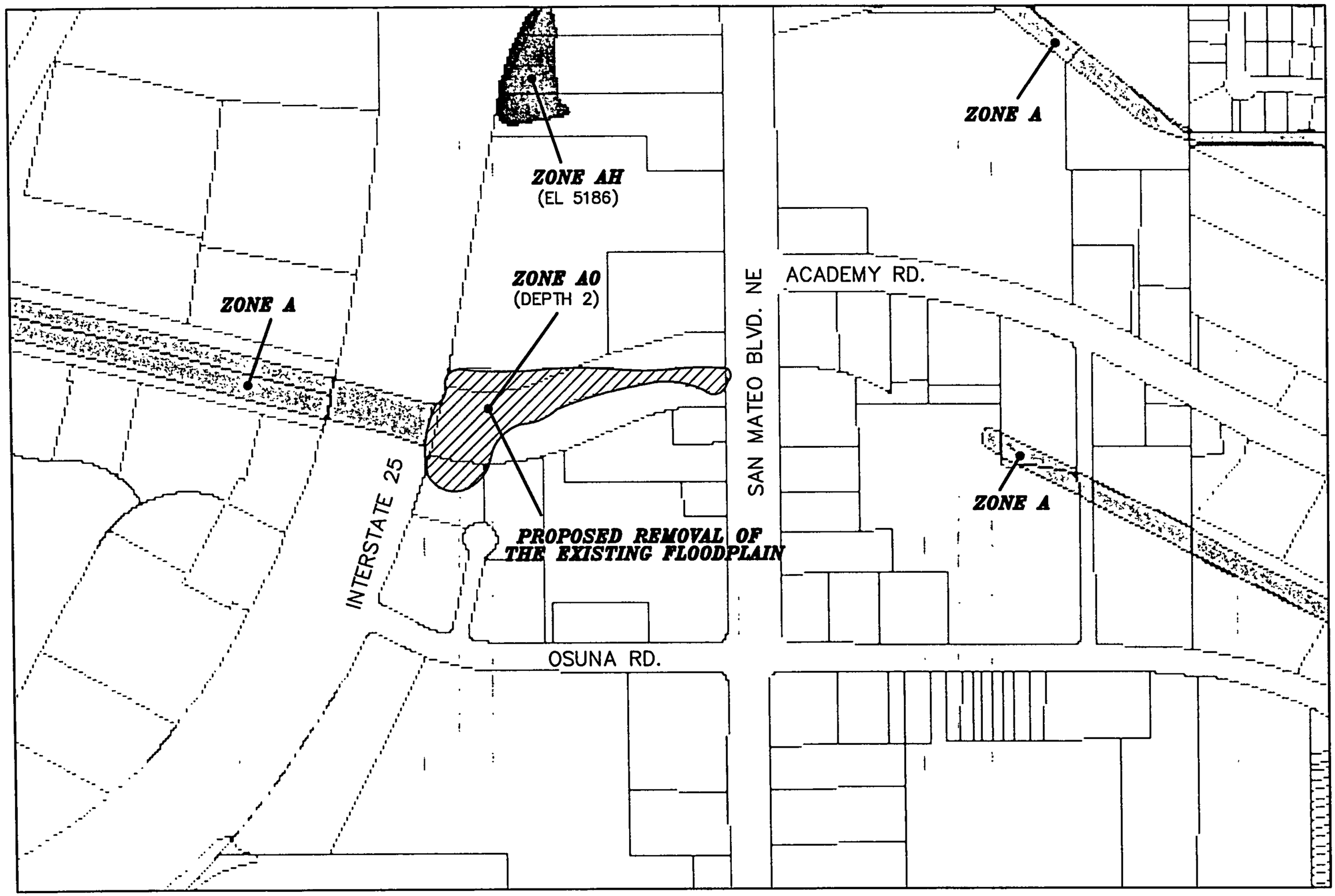
OFFSITE BASIN LAYOUT



FLOODPLAIN REMOVAL EXHIBIT

1"=±200

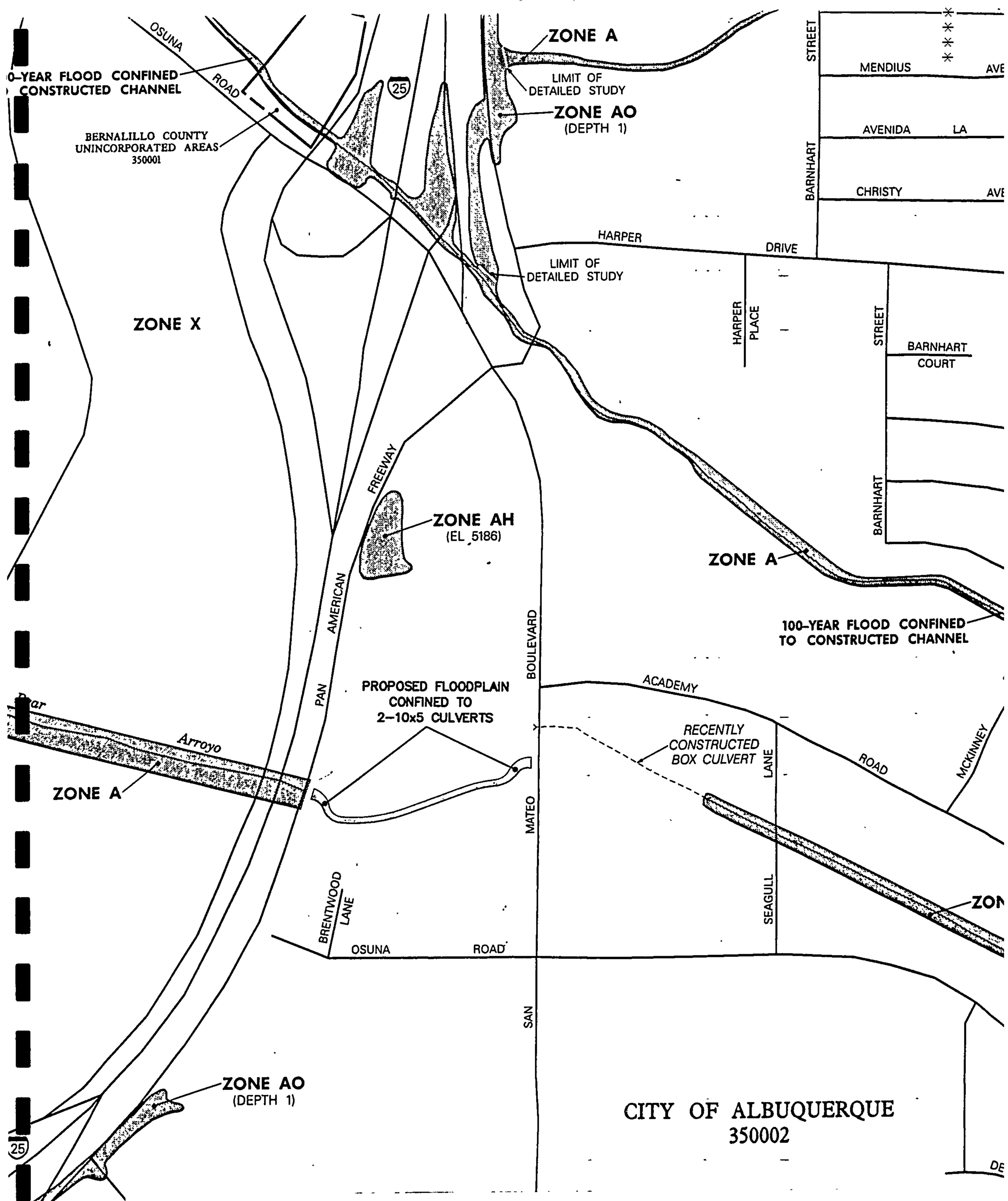
****



FLOODPLAIN REMOVAL EXHIBIT

1"=±400

****



PORTION OF THE FIRM MAP NUMBER 35001C0139D

PROPOSED FLOODPLAIN (CONFINED IN THE PROPOSED BOX CULVERT)

flow into the site, will be intercepted by storm sewer inlets and then routed to the west end of the project where it will be tied into the box culvert. The runoff from the north will surface flow into the site and will continue west to a proposed desilting pond, and from there to the exiting box culvert via 30" pipe (for the interim conditions). See enclosed Plans in the map pocket of this report for Culvert Box Extension Plan as well as Storm Drain and HEC-Ras section locations. Once the storm sewer improvements are in place, we will submit the LOMR to FEMA for removal of the floodplain. See the following exhibits for the removal of the floodplain limits.

Future Conditions

We also have prepared a conceptual future extension of the storm sewer pipe for Lots 1, 2 and 3. Under the developed conditions the site generates a runoff of 18.37 cfs which is 6.69 cfs from Lot 3, 3.65 cfs from Lot 2, and 8.03 cfs from Lot 1. As part of this plan we are proposing to extend storm sewer pipe to intercept all the on-site runoff and the offsite runoff to the north. The runoff can also surface flow to the west depending the future grading and site layouts. Small portion of the runoff from the State Highway right-of-way, for the portion that fronts the site, will drain partially to the site. This runoff from the right-of-way is fairly small, and the future on-site storm sewer structure will be adequate to handle this additional runoff. See conceptual Future Storm Sewer Layout located in the map pocket of this report.

Calculations

City of Albuquerque, Development Process Manuel, Section 22.2, Hydrology Section, revised January, 1993, was used for runoff calculations. HEC-Ras program was used to analyze the box culvert extension. See this report for all the calculations.

RUNOFF CALCULATION RESULTS

BASIN	AREA (SF)	AREA (AC)	AREA (MI^2)
ON-SITE	179364.97	4.1177	0.006434
OS-A	95950.10	2.2027	0.003442
OS-B	227646.80	5.2261	0.008166
OS-C	199714.99	4.5848	0.007164
OS-D	96270.34	2.2101	0.003453
OS-E	348978.14	8.0114	0.012518

EXISTING

BASIN	Q-100 CFS	Q-10 CFS
ON-SITE	6.42	1.53
OS-A	9.84	6.37
OS-B	23.31	15.09
OS-C	20.45	13.24
OS-D	9.87	6.39
OS-E	35.72	23.13

PROPOSED

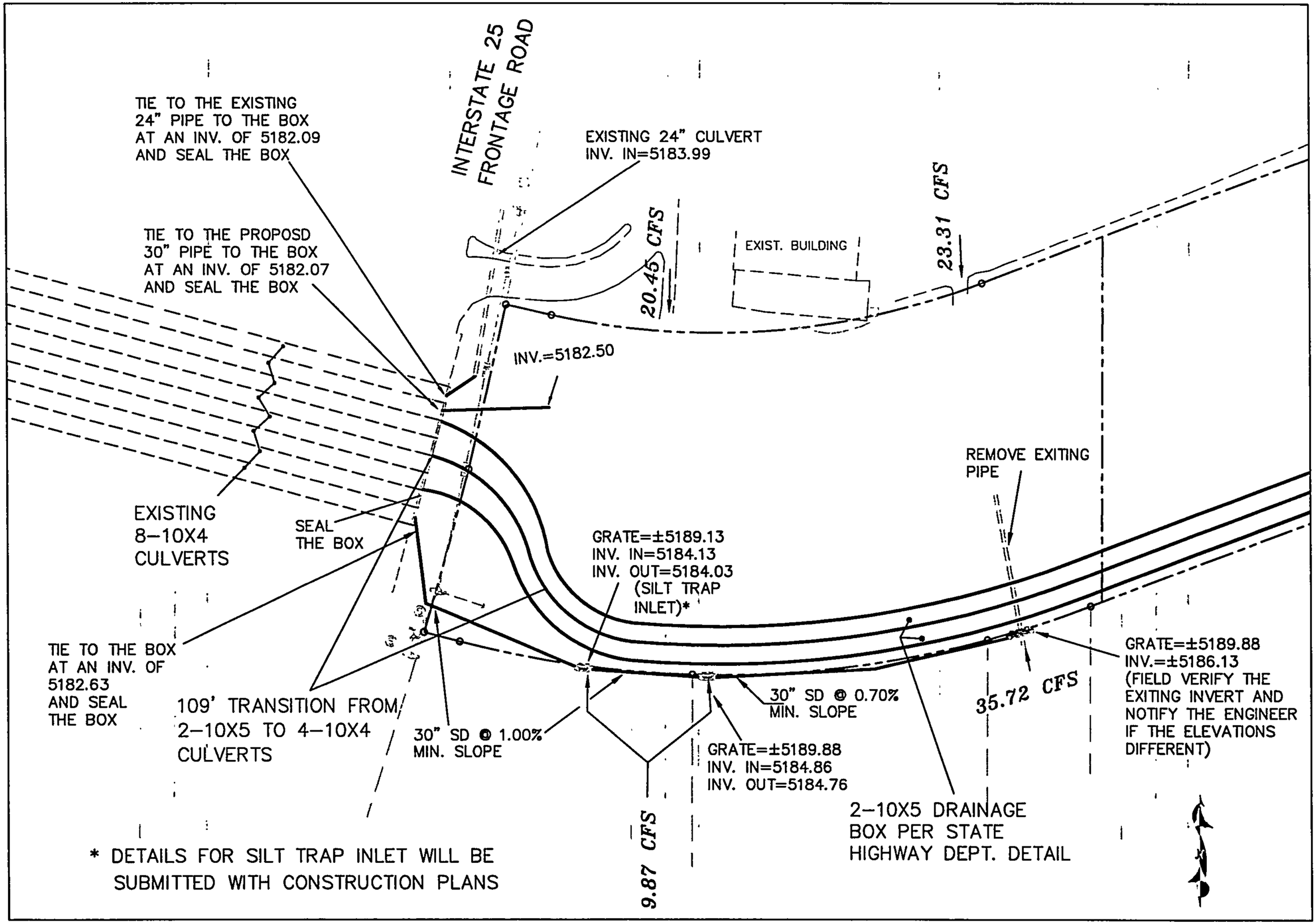
BASIN	Q-100 CFS	Q-10 CFS
ON-SITE	18.37	11.89

SUMMARY OUTPUT FILE

AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) - - VERSION: 1997.02d RUN DATE (MON/DAY/YR) =02/04/2003
INPUT FILE = 200244 USER NO.= AHYMO-I-9702c01000R31-AH

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION	
START										TIME=	.00
RAINFALL TYPE= 1										RAIN6=	2.350
COMPUTE NM HYD	100.00	-	1	.00643	6.42	.182	.53121	1.533	1.558	PER IMP=	.00
COMPUTE NM HYD	101.00	-	1	.00344	9.84	.364	1.98165	1.500	4.465	PER IMP=	90.00
COMPUTE NM HYD	102.00	-	1	.00817	23.31	.863	1.98165	1.500	4.460	PER IMP=	90.00
COMPUTE NM HYD	103.00	-	1	.00716	20.45	.757	1.98165	1.500	4.461	PER IMP=	90.00
COMPUTE NM HYD	104.00	-	1	.00345	9.87	.365	1.98165	1.500	4.465	PER IMP=	90.00
COMPUTE NM HYD	105.00	-	1	.01252	35.72	1.323	1.98165	1.500	4.459	PER IMP=	90.00
START										TIME=	.00
RAINFALL TYPE= 1										RAIN6=	1.570
COMPUTE NM HYD	110.00	-	1	.00643	1.53	.043	.12517	1.533	.373	PER IMP=	.00
COMPUTE NM HYD	111.00	-	1	.00344	6.37	.226	1.23171	1.500	2.891	PER IMP=	90.00
COMPUTE NM HYD	112.00	-	1	.00817	15.09	.536	1.23172	1.500	2.888	PER IMP=	90.00
COMPUTE NM HYD	113.00	-	1	.00716	13.24	.471	1.23172	1.500	2.888	PER IMP=	90.00
COMPUTE NM HYD	114.00	-	1	.00345	6.39	.227	1.23171	1.500	2.891	PER IMP=	90.00
COMPUTE NM HYD	115.00	-	1	.01252	23.13	.822	1.23172	1.500	2.887	PER IMP=	90.00
START										TIME=	.00
RAINFALL TYPE= 1										RAIN6=	2.350
COMPUTE NM HYD	100.10	-	1	.00643	18.37	.680	1.98165	1.500	4.461	PER IMP=	90.00
START										TIME=	.00
RAINFALL TYPE= 1										RAIN6=	1.570
COMPUTE NM HYD	110.10	-	1	.00643	11.89	.423	1.23172	1.500	2.888	PER IMP=	90.00
FINISH											

****



200244-SD-EXHIBIT.DWG

STORM SEWER LAYOUT

NTS

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STORM DROP INLET DRAINAGE CAPACITY

Single 'A' (in ponding conditions)

Area at the grate:

L = 44 3/8" - 2(6"$_{ends}$) - 7(½ $_{middle\ bars}$)
= 28 7/8"
= 2.41'

W = 25 ½" - 13(½"$_{middle\ bars}$)
= 19"
= 1.58'

Area = 2.41' x 1.58'
= 3.81 ft^2

Effective Area = 3.81- 3.81 (0.5 $_{clogging\ factor}$)
= 1.91 ft^2 at the grate

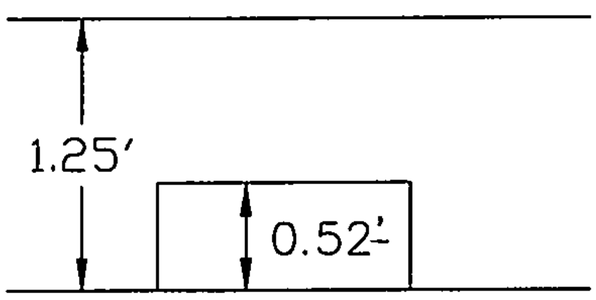
Area at the throat:

L = 7.45'

H = 10 ¾" - 4 ½"
= 6 ¼"
= 0.5208'

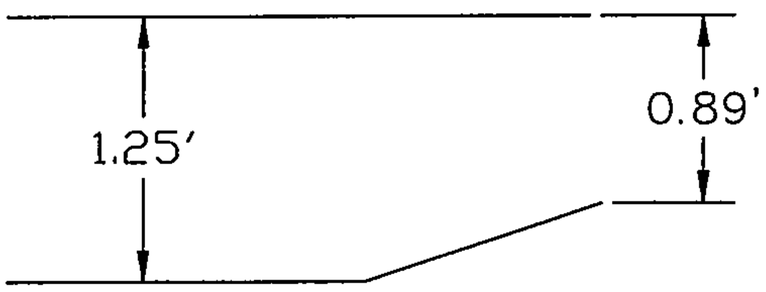
Area = 7.45' x 0.5208'
= 3.88 ft^2 at the throat

THROAT



H=1.25
$Q=CA\sqrt{2gH}$
$Q=0.60(3.88)\sqrt{2(32.2)(1.25)}$
Q=20.89 CFS

GRATE



H=(1.25+0.89)/2=1.08
$Q=CA\sqrt{2gH}$
$Q=0.60(1.91)\sqrt{2(32.2)(1.08)}$
Q=9.56 CFS

TOTAL

Q=20.89+9.56=30.45 CFS

All the inlet will be in ponding conditions and runoff intercepted by the inlets are all less than 30.45 cfs.

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name:

Comment: 30" PIPE FLOW CAPACITY

Solve For Actual Depth

Given Input Data:

Diameter.....	2.50 ft
Slope.....	0.0070 ft/ft
Manning's n.....	0.013
Discharge.....	35.72 cfs

Computed Results:

Depth.....	2.16 ft
Velocity.....	7.94 fps
Flow Area.....	4.50 sf
Critical Depth....	2.03 ft
Critical Slope....	0.0077 ft/ft
Percent Full.....	86.21 %
Full Capacity.....	34.32 cfs
QMAX-@.94D.....	36.92 cfs
Froude Number.....	0.87 (flow is Subcritical)

Open Channel Flow Module, Version 3.12 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name:

Comment: 30" PIPE FLOW CAPACITY

Solve For Actual Depth

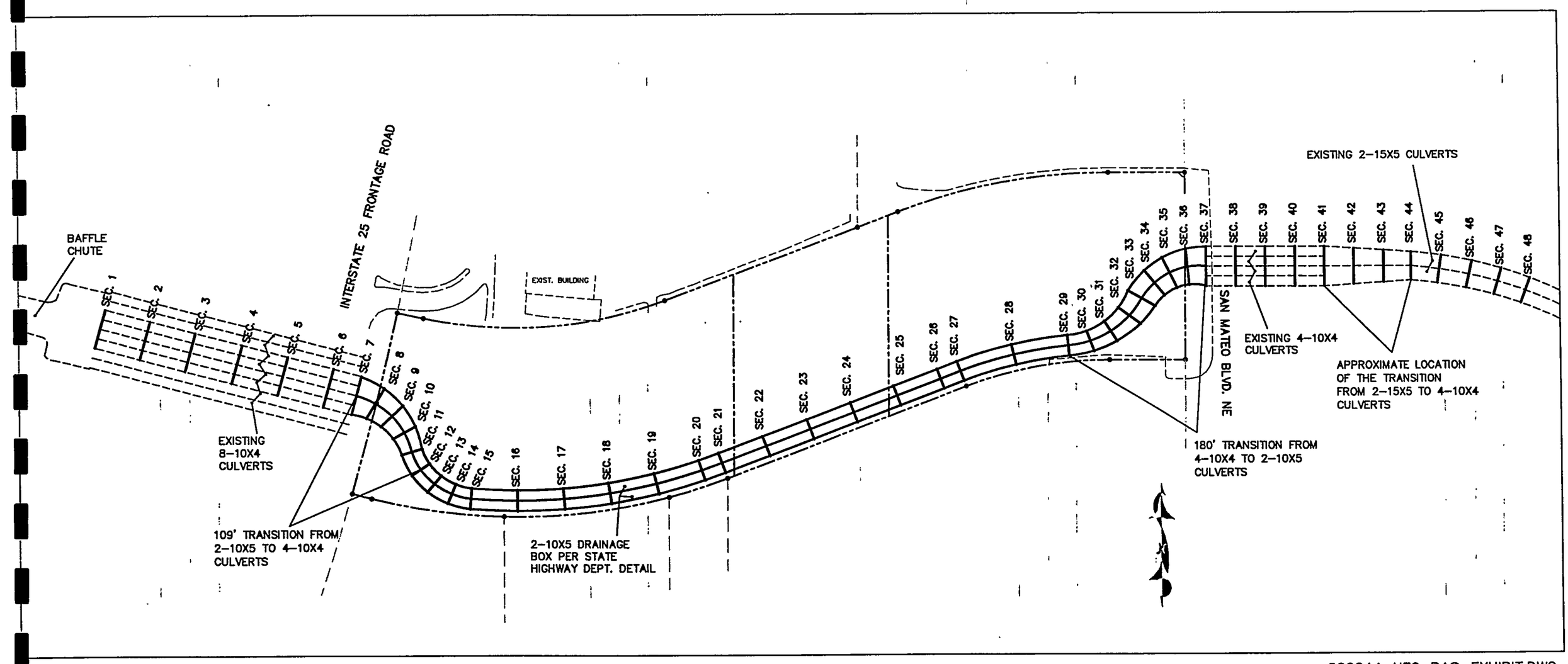
Given Input Data:

Diameter.....	2.50 ft
Slope.....	0.0100 ft/ft
Manning's n.....	0.012
Discharge.....	44.59 cfs

Computed Results:

Depth.....	2.06 ft
Velocity.....	10.32 fps
Flow Area.....	4.32 sf
Critical Depth....	2.22 ft
Critical Slope....	0.0090 ft/ft
Percent Full.....	82.28 %
Full Capacity.....	44.44 cfs
QMAX @.94D.....	47.80 cfs
Froude Number.....	1.21 (flow is Supercritical)

Open Channel Flow Module, Version 3.12 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury,



200244–HEC–RAS–EXHIBIT.DWG

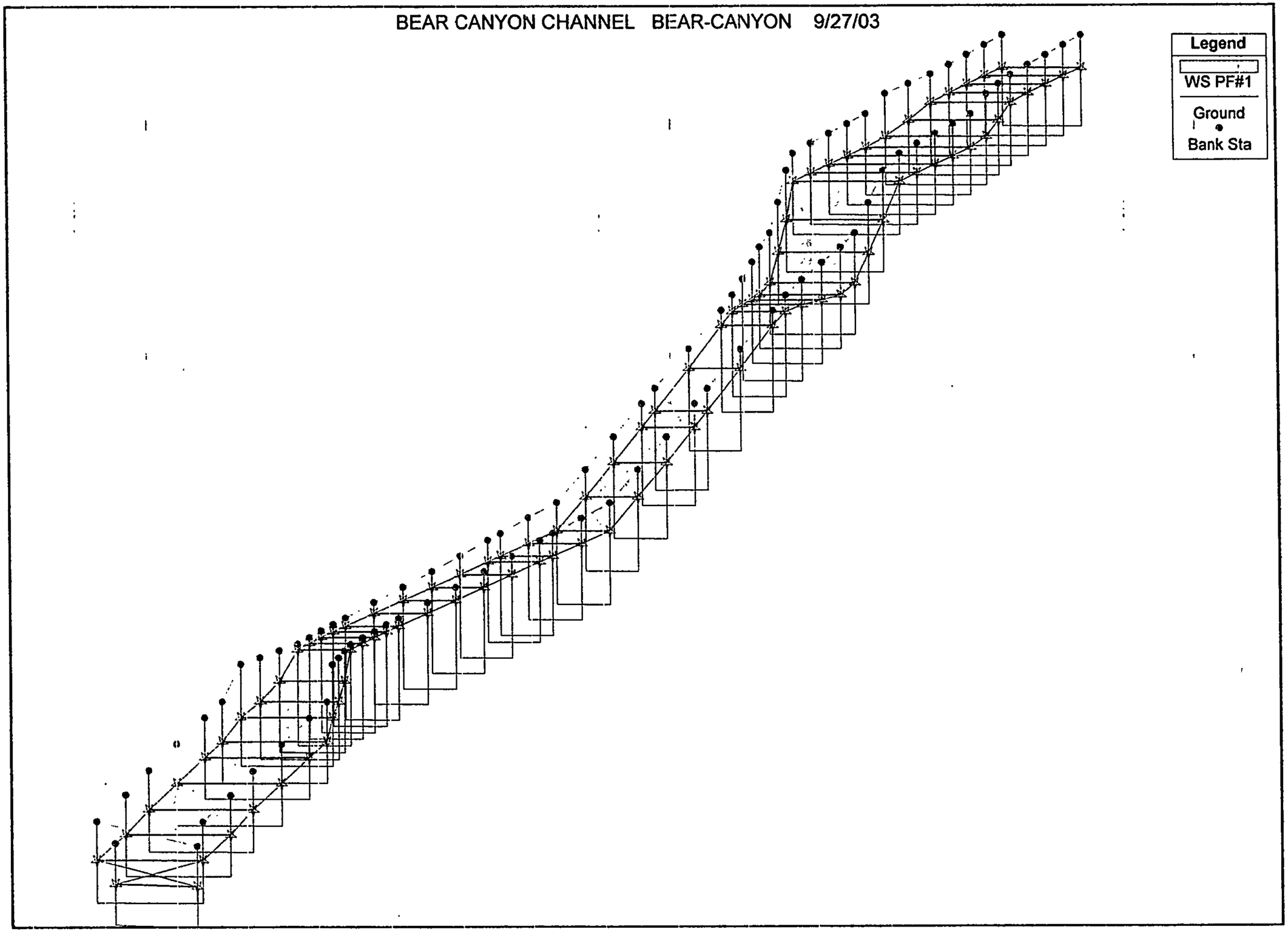
HEC-RAS SECTION LAYOUT

NTS

HEC-RAS OUTPUT FILE

HEC-RAS Plan: BEAR River: BEAR CANYON Reach: CHANNEL

River Sta.	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (sq ft)	Froude # Chl (ft)
48	1915.00	5200.01	5202.90	5205.05	5210.45	0.01	22.05	86.85	30.00	2.28
47	1915.00	5199.85	5202.82	5204.89	5210.01	0.01	21.52	89.00	30.00	2.20
46	1915.00	5199.69	5202.72	5204.73	5209.60	0.01	21.03	91.04	30.00	2.13
45	1915.00	5199.53	5202.63	5204.57	5209.21	0.01	20.58	93.05	30.00	2.06
44	1915.00	5199.38	5202.49	5204.36	5208.86	0.01	20.26	94.54	30.40	2.02
43	1915.00	5199.23	5201.93	5203.82	5208.55	0.01	20.65	92.76	34.34	2.21
42	1915.00	5199.07	5201.46	5203.31	5208.19	0.01	20.81	92.02	38.47	2.37
41	1915.00	5198.91	5201.26	5203.06	5207.72	0.01	20.41	93.83	40.00	2.35
40	1915.00	5198.75	5201.17	5202.90	5207.26	0.01	19.81	96.66	40.00	2.25
39	1915.00	5198.60	5201.09	5202.75	5206.84	0.01	19.24	99.53	40.00	2.15
38	1915.00	5198.44	5200.99	5202.59	5206.46	0.01	18.77	102.03	40.00	2.07
37	1915.00	5198.28	5200.89	5202.43	5206.12	0.01	18.35	104.38	40.00	2.00
36	1915.00	5196.66	5199.22	5201.05	5205.75	0.01	20.50	93.41	36.43	2.26
35	1915.00	5195.29	5197.85	5199.91	5205.40	0.01	22.05	86.84	33.92	2.43
34	1915.00	5194.00	5196.55	5198.79	5205.04	0.01	23.38	81.92	32.09	2.58
33	1915.00	5193.53	5196.17	5198.44	5204.72	0.01	23.47	81.61	30.87	2.54
32	1915.00	5193.03	5196.16	5198.48	5204.32	0.01	22.92	83.54	26.69	2.28
31	1915.00	5192.46	5196.20	5198.50	5203.92	0.01	22.29	85.90	22.94	2.03
30	1915.00	5191.93	5196.11	5198.38	5203.65	0.01	22.03	86.94	20.78	1.90
29	1915.00	5191.39	5195.67	5198.01	5203.46	0.01	22.40	85.50	20.00	1.91
28	1915.00	5190.10	5194.16	5196.72	5202.80	0.01	23.59	81.17	20.00	2.06
27	1915.00	5188.80	5192.69	5195.42	5202.10	0.01	24.61	77.80	20.00	2.20
26	1915.00	5188.29	5192.13	5194.91	5201.77	0.01	24.92	76.86	20.00	2.24
25	1915.00	5187.19	5190.93	5193.81	5201.09	0.01	25.57	74.88	20.00	2.33
24	1915.00	5186.10	5189.76	5192.72	5200.37	0.01	26.13	73.29	20.00	2.41
23	1915.00	5185.00	5188.61	5191.62	5199.55	0.01	26.55	72.13	20.00	2.46
22	1915.00	5184.76	5188.51	5191.38	5198.63	0.01	25.53	75.01	20.00	2.32
21	1915.00	5184.52	5188.41	5191.14	5197.81	0.01	24.60	77.86	20.00	2.20
20	1915.00	5184.41	5188.37	5191.03	5197.45	0.01	24.19	79.18	20.00	2.14
19	1915.00	5184.17	5188.27	5190.79	5196.75	0.01	23.38	81.91	20.00	2.04
18	1915.00	5183.93	5188.16	5190.55	5196.12	0.01	22.64	84.57	20.00	1.94
17	1915.00	5183.69	5188.05	5190.31	5195.55	0.01	21.98	87.11	20.00	1.86
16	1915.00	5183.46	5187.95	5190.08	5195.02	0.01	21.34	89.72	20.00	1.78
15	1915.00	5183.22	5187.82	5189.84	5194.54	0.01	20.81	92.03	20.00	1.71
14	1915.00	5183.12	5187.77	5189.74	5194.35	0.01	20.59	92.99	20.00	1.68
13	1915.00	5183.02	5187.71	5189.64	5194.18	0.01	20.40	93.87	20.00	1.66
12	1915.00	5182.92	5187.64	5189.54	5194.04	0.01	20.30	94.34	20.00	1.65
11	1915.00	5182.81	5187.54	5189.43	5193.90	0.01	20.22	94.70	20.00	1.64
10	1915.00	5182.71	5186.24	5188.44	5193.64	0.01	21.84	87.69	24.86	2.05
9	1915.00	5182.60	5185.45	5187.60	5193.33	0.01	22.52	85.02	29.84	2.35
8	1915.00	5182.50	5184.90	5187.03	5193.00	0.01	22.85	83.82	34.94	2.60
7	1915.00	5181.90	5183.93	5186.05	5192.58	0.02	23.60	81.15	40.00	2.92
6	1915.00	5181.43	5183.48	5185.58	5191.95	0.02	23.35	82.01	40.00	2.87
5	1915.00	5180.65	5182.72	5184.80	5191.00	0.02	23.08	82.97	40.00	2.82
4	1915.00	5179.87	5181.96	5184.02	5190.09	0.02	22.88	83.71	40.00	2.79
3	1915.00	5179.08	5181.16	5183.23	5189.40	0.02	23.03	83.14	40.00	2.82
2	1915.00	5178.30	5180.40	5182.45	5188.49	0.02	22.83	83.87	40.00	2.78
1	1915.00	5177.52	5179.63	5181.67	5187.61	0.02	22.66	84.49	40.00	2.75


BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
Legend
WS PF#1
Ground
Bank Sta

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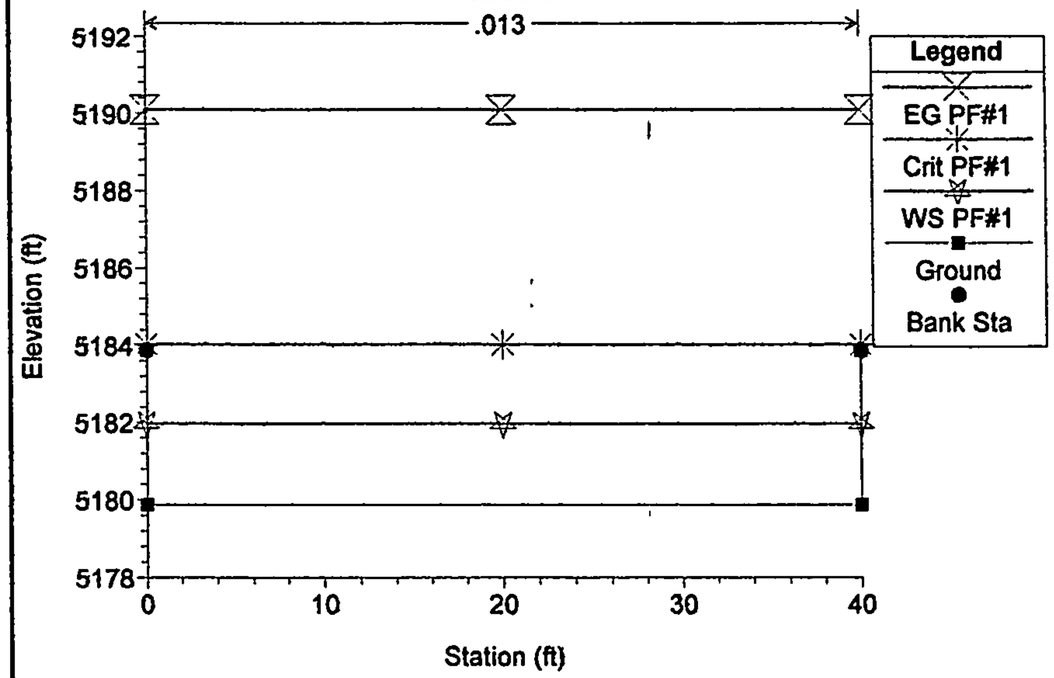
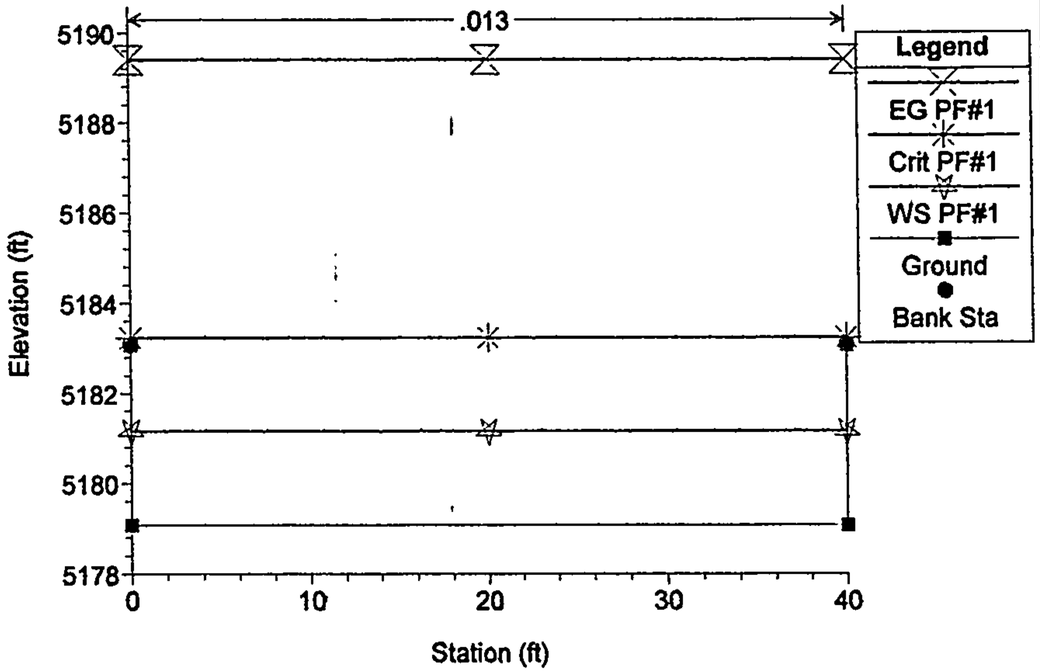
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03

SECTION 4



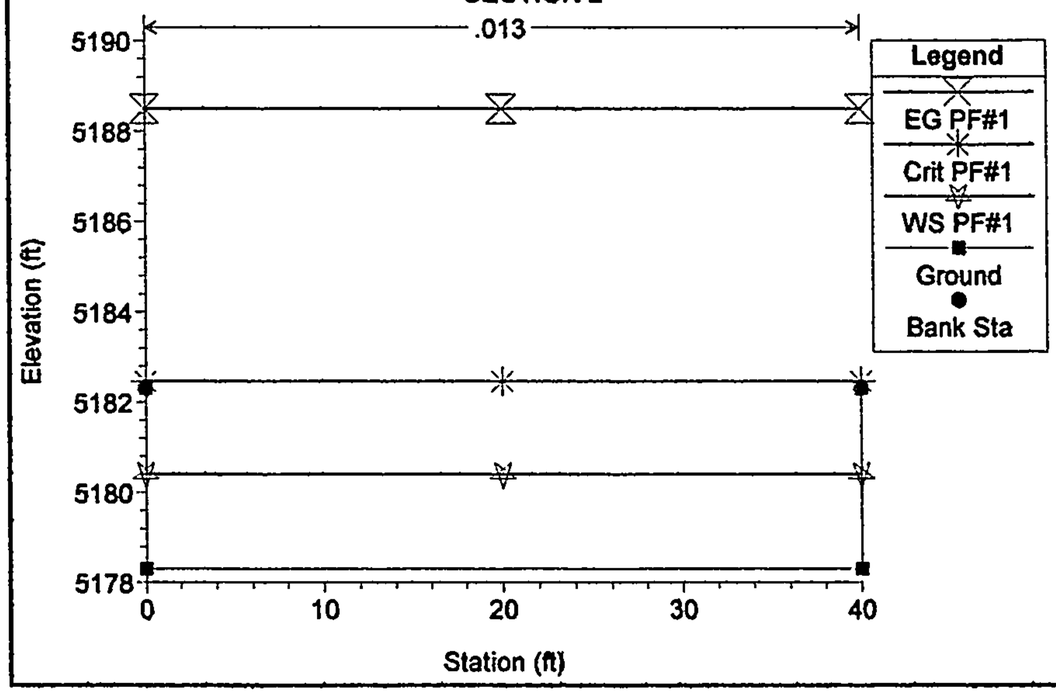
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03

SECTION 3



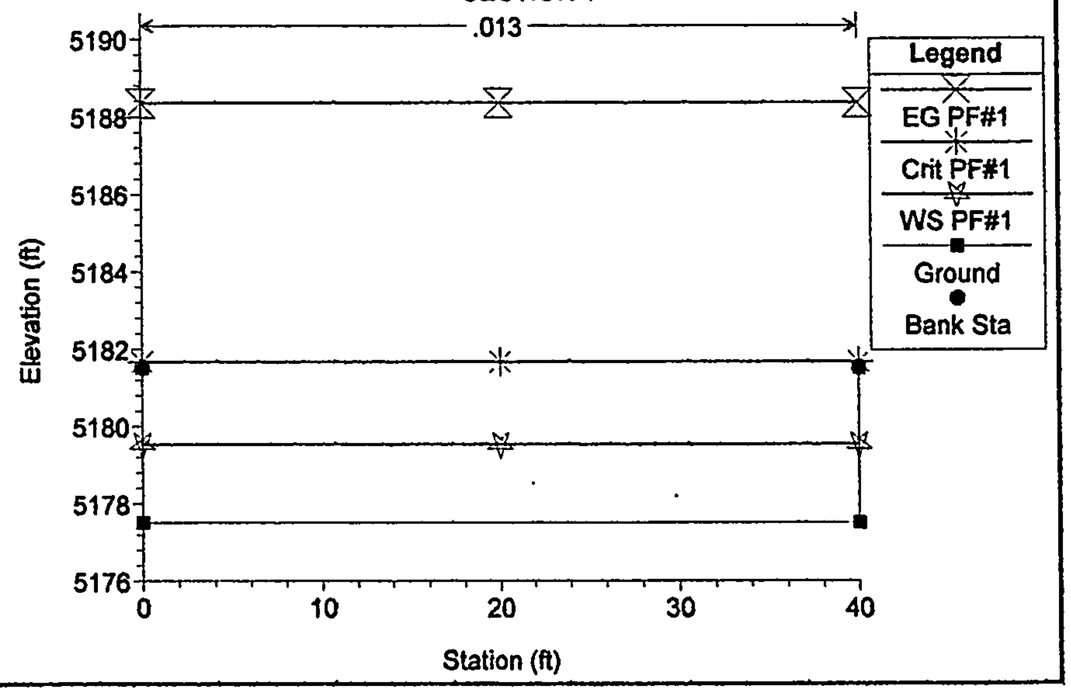
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03

SECTION 2



BEAR CANYON CHANNEL BEAR-CANYON 9/27/03

SECTION 1



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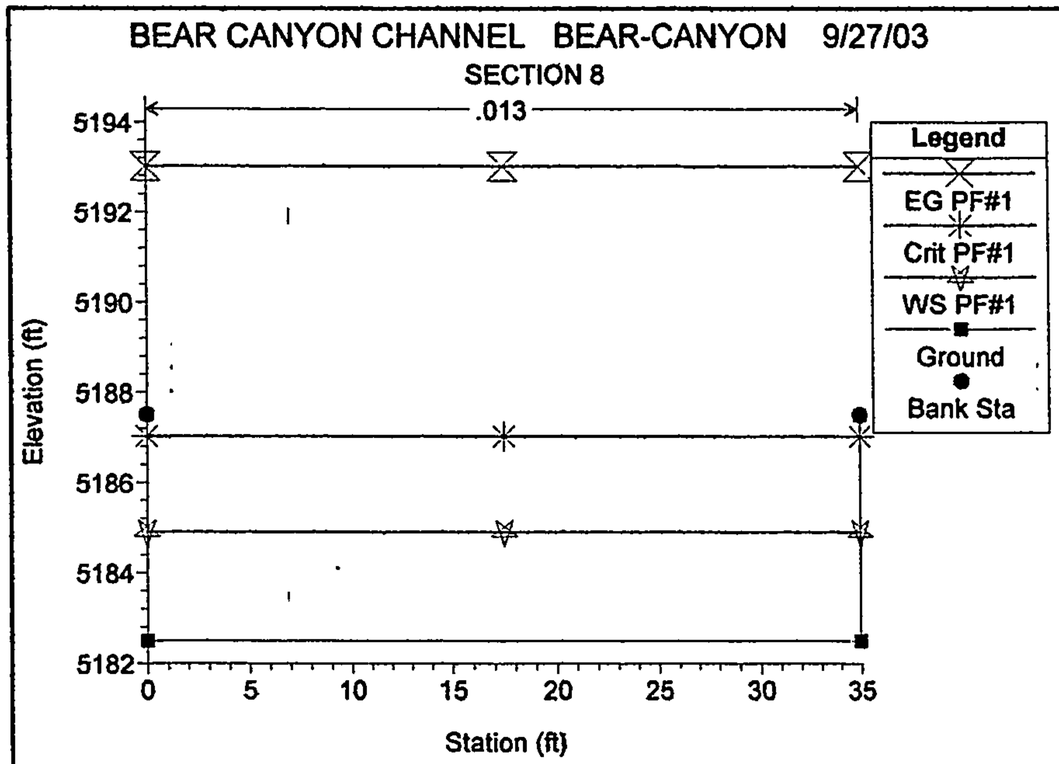
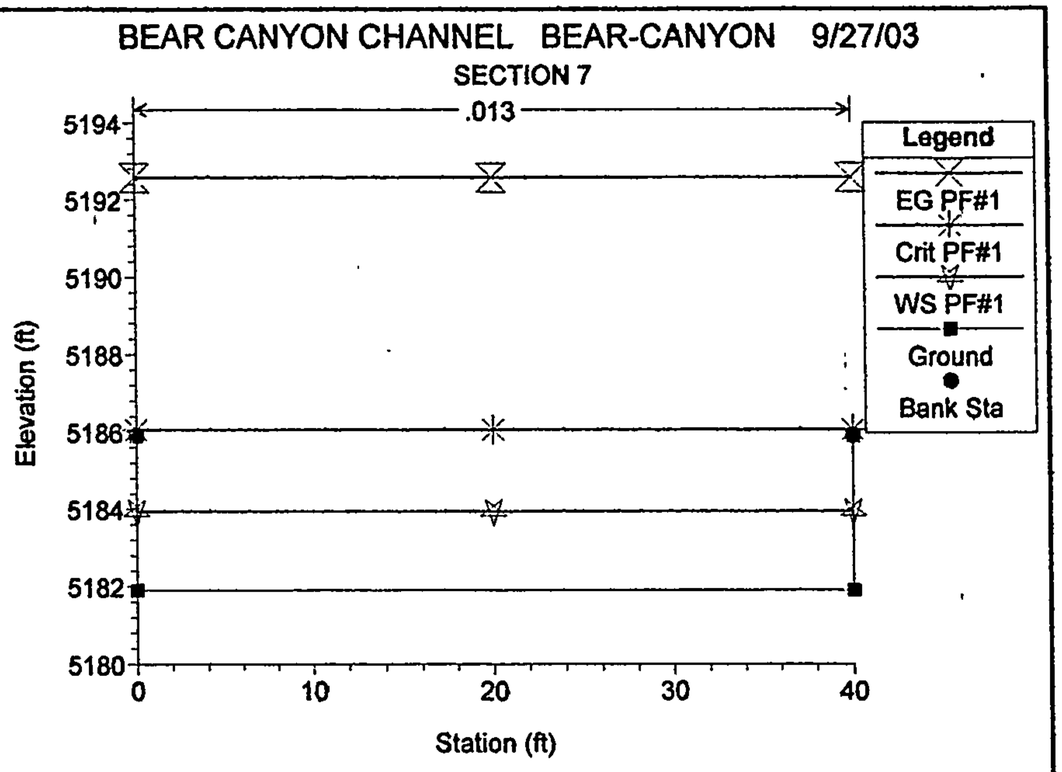

BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 8
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5194
5192
5190
5188
5186
5184
5182
0
5
10
15
20
25
30
35


BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 7
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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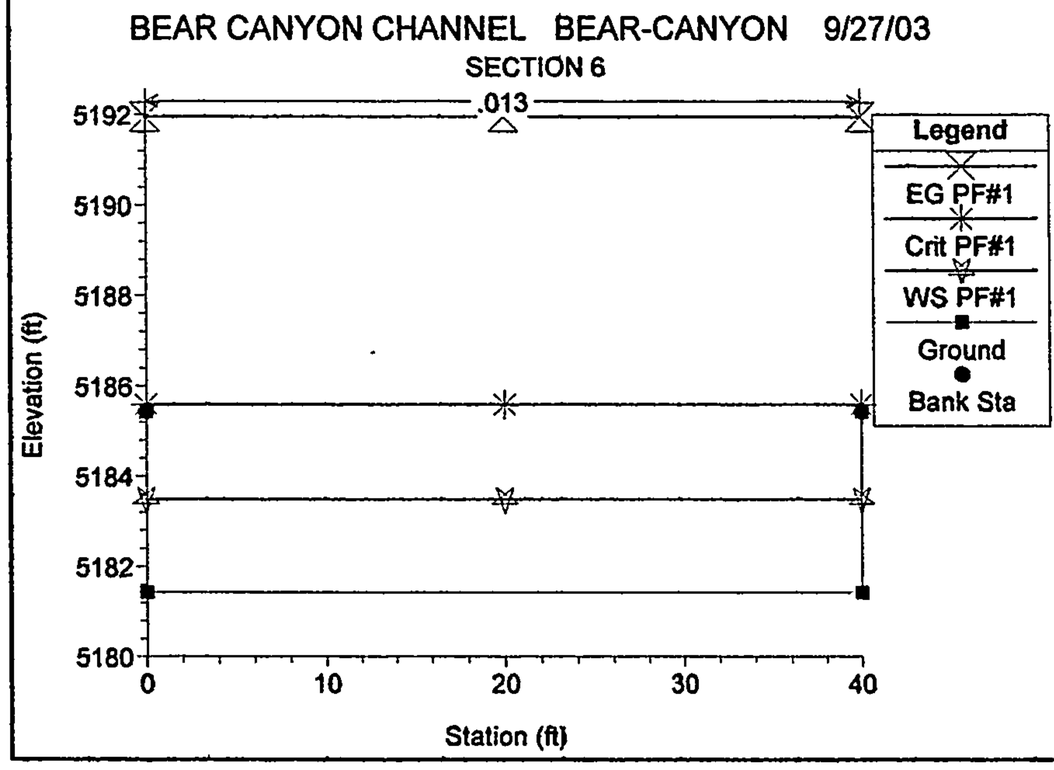
5188
5186
5184
5182
5180
0
10
20
30
40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SECTION 6
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Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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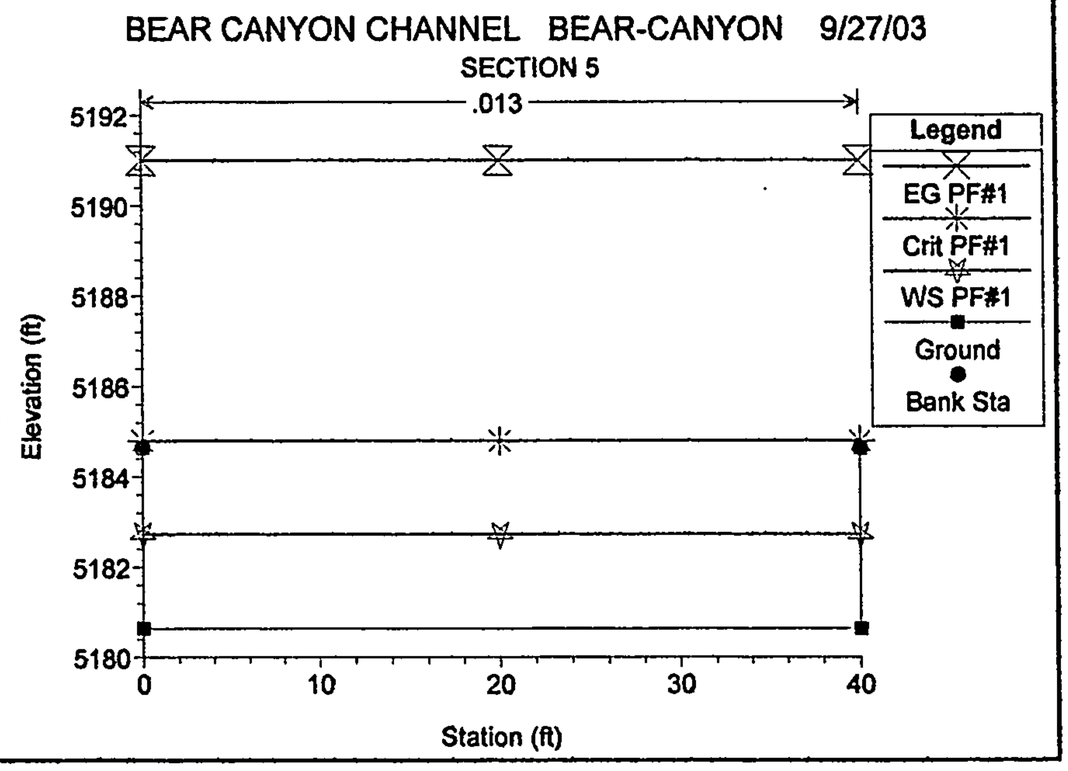
5188
5186
5184
5182
5180
0
10
20
30
40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SECTION 5
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5192
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5188
5186
5184
5182
5180
0
10
20
30
40

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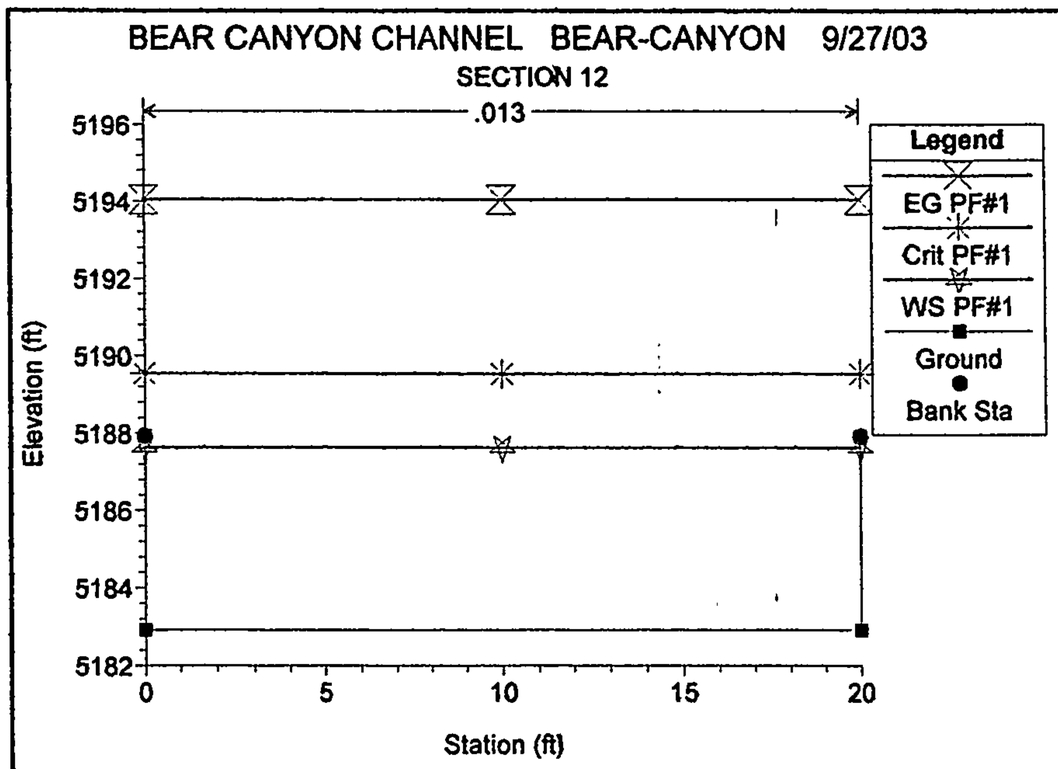
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SECTION 12
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Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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5186
5184
5182
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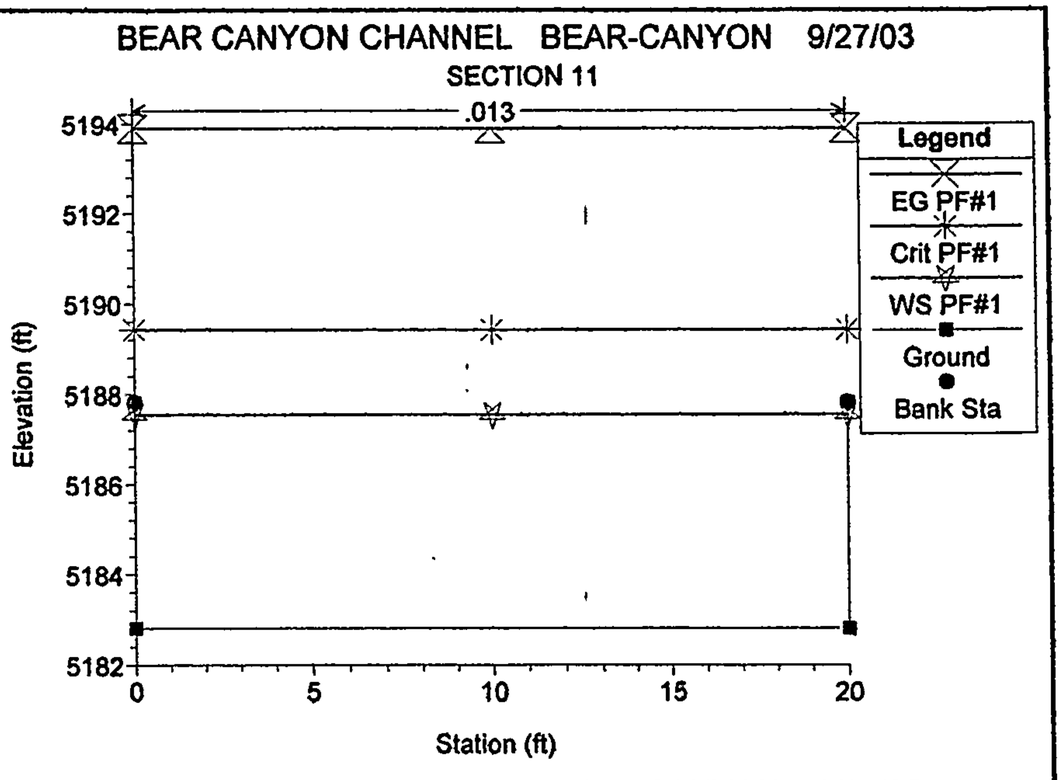
5
10
15
20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SECTION 11
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Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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5188
5186
5184
5182
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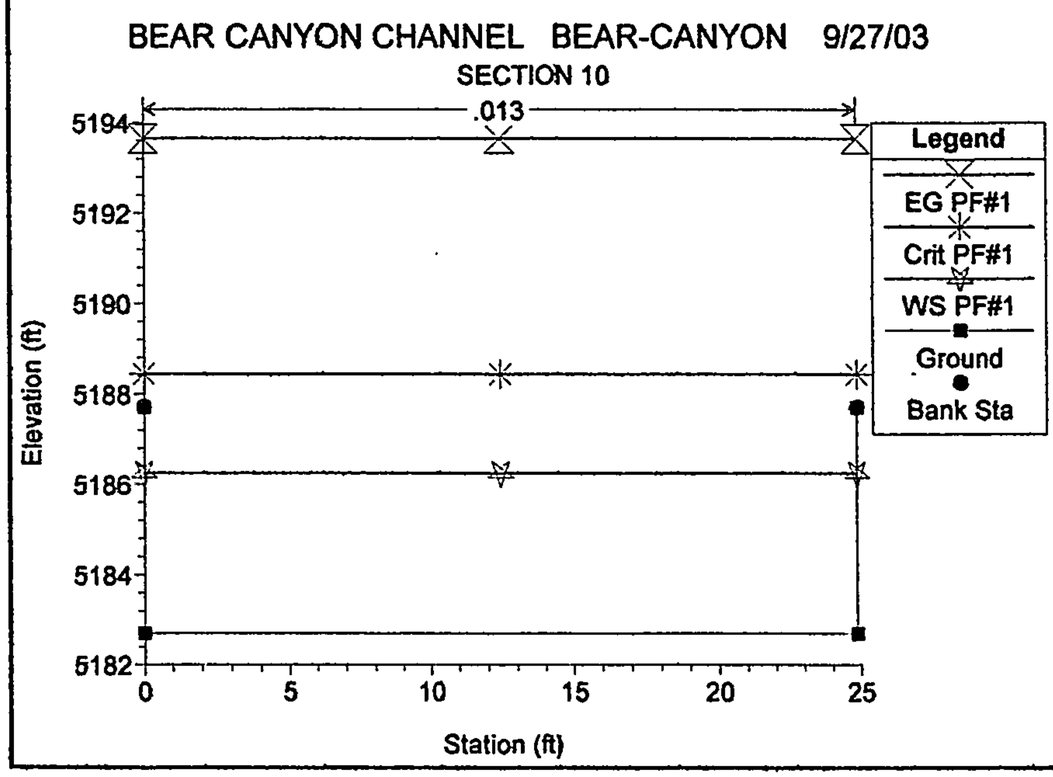
5
10
15
20


BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 10
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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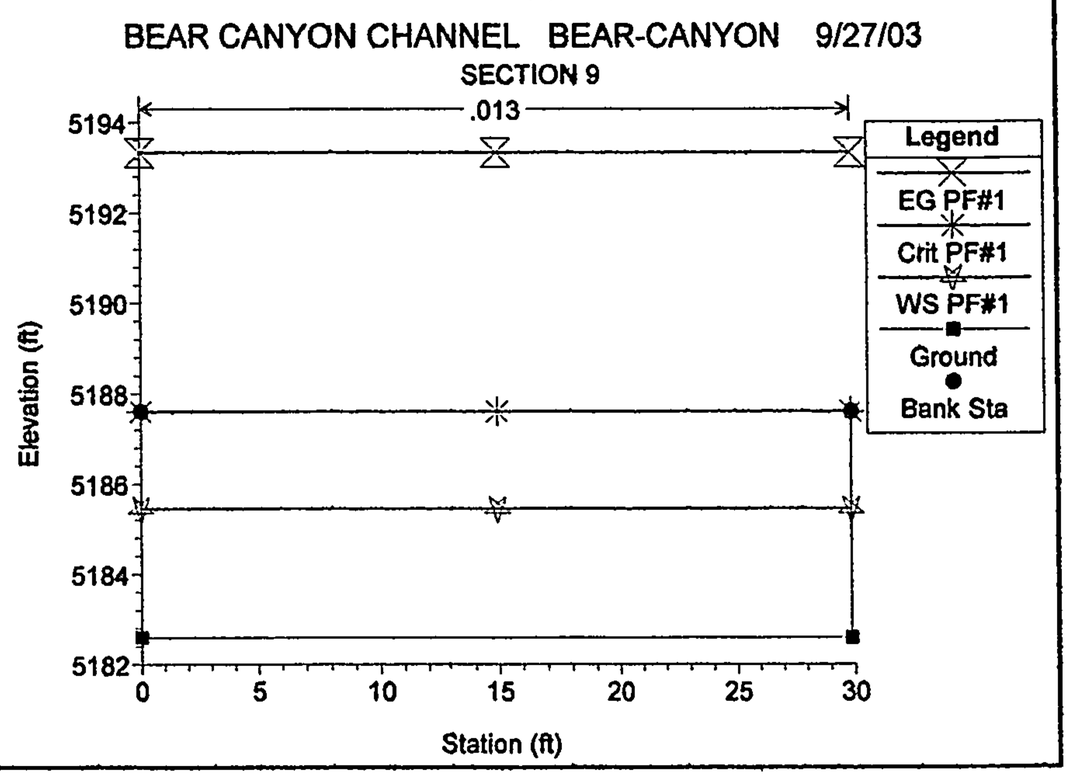
5190
5188
5186
5184
5182
0
5
10
15
20
25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SECTION 9
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Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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5192
5190
5188
5186
5184
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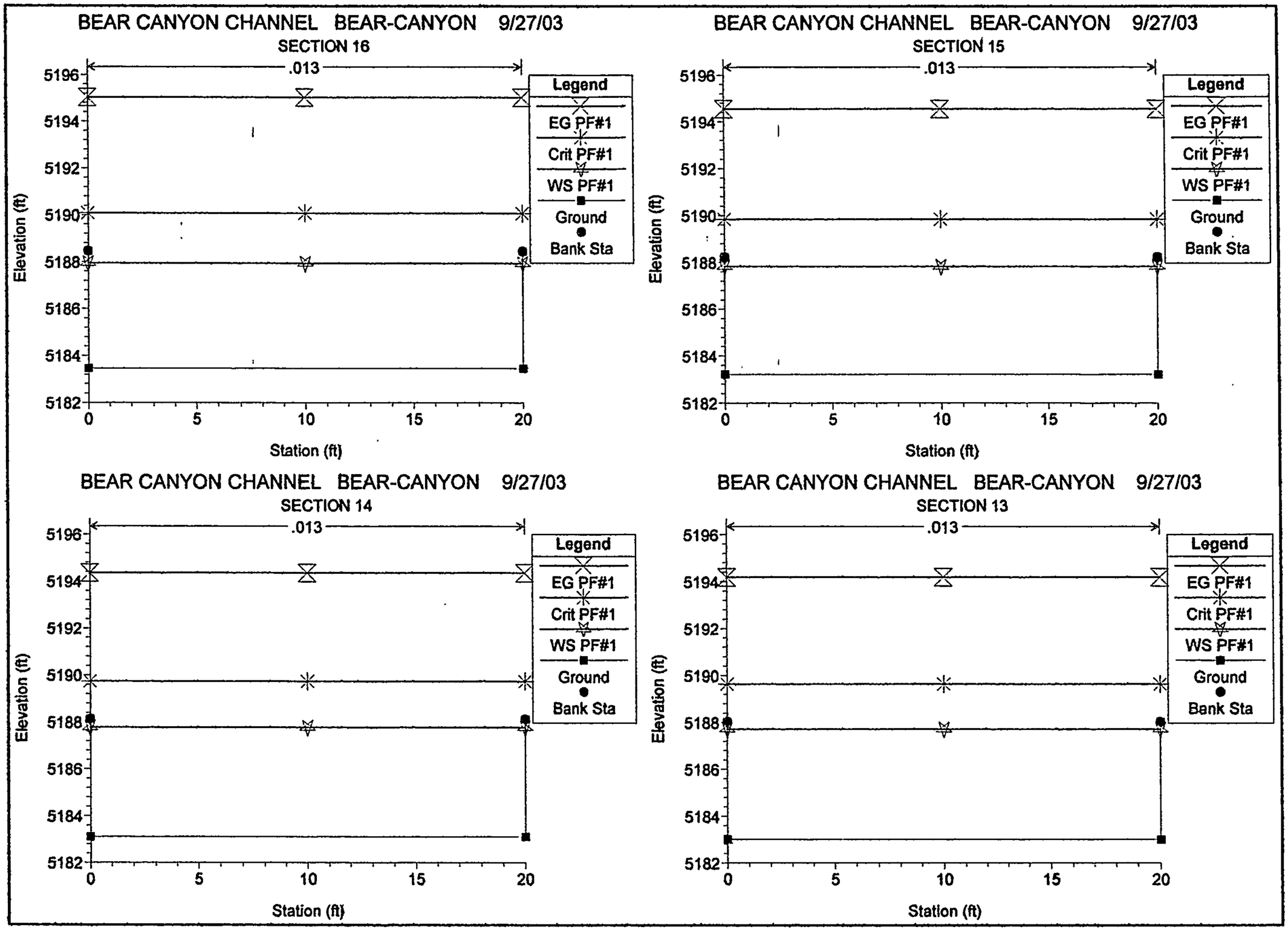
5
10
15
20
25
30

****


BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 16
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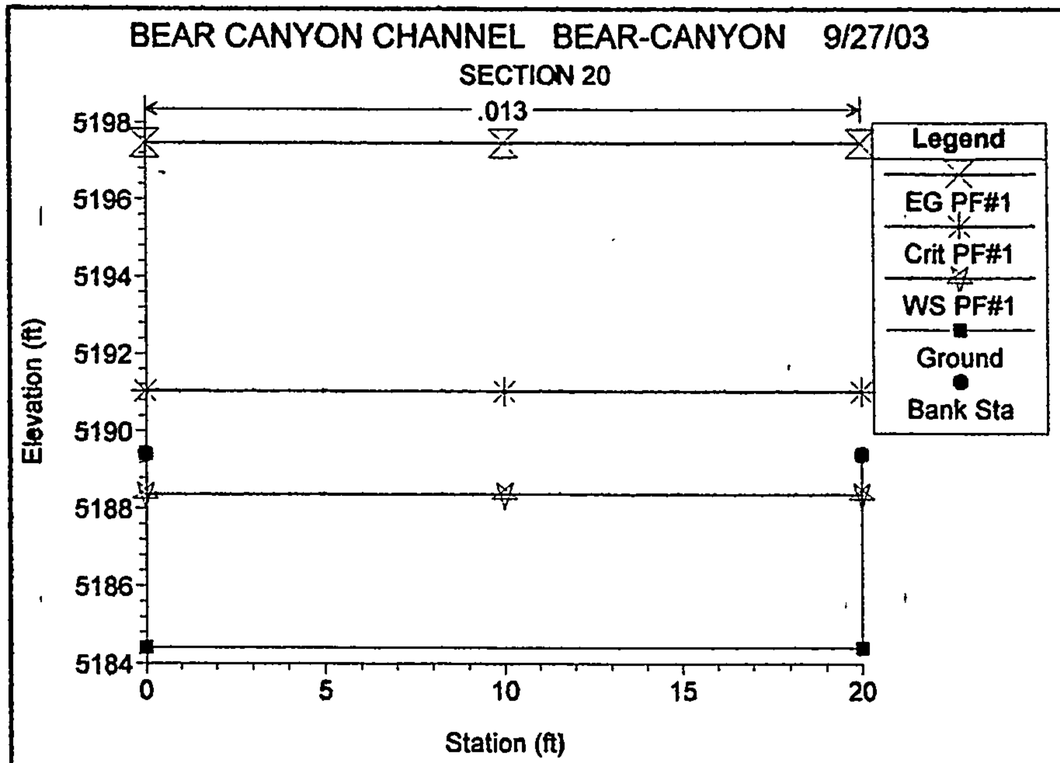
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 15
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 14
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 13
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)

****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SECTION 20
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Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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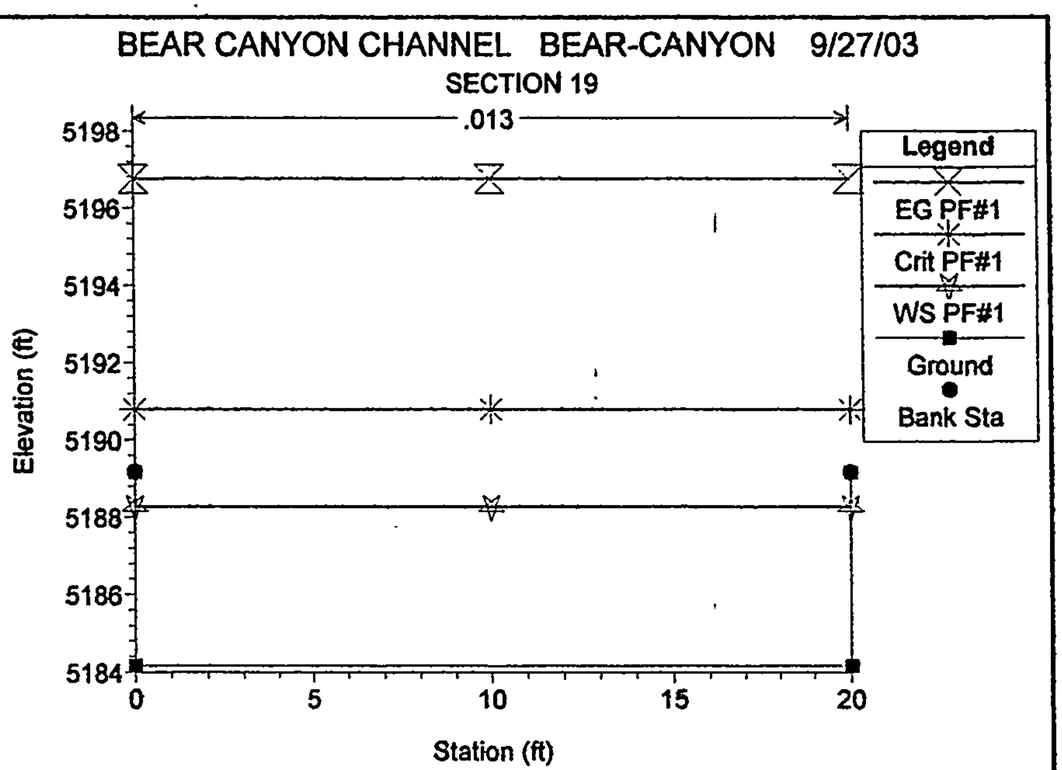
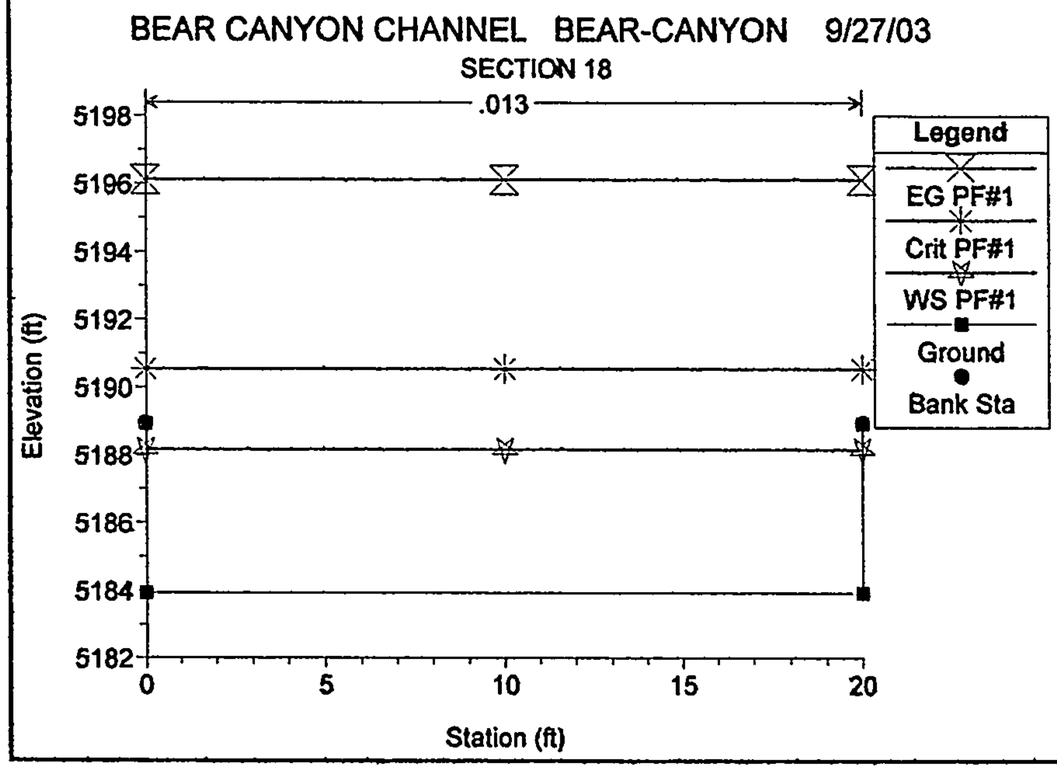
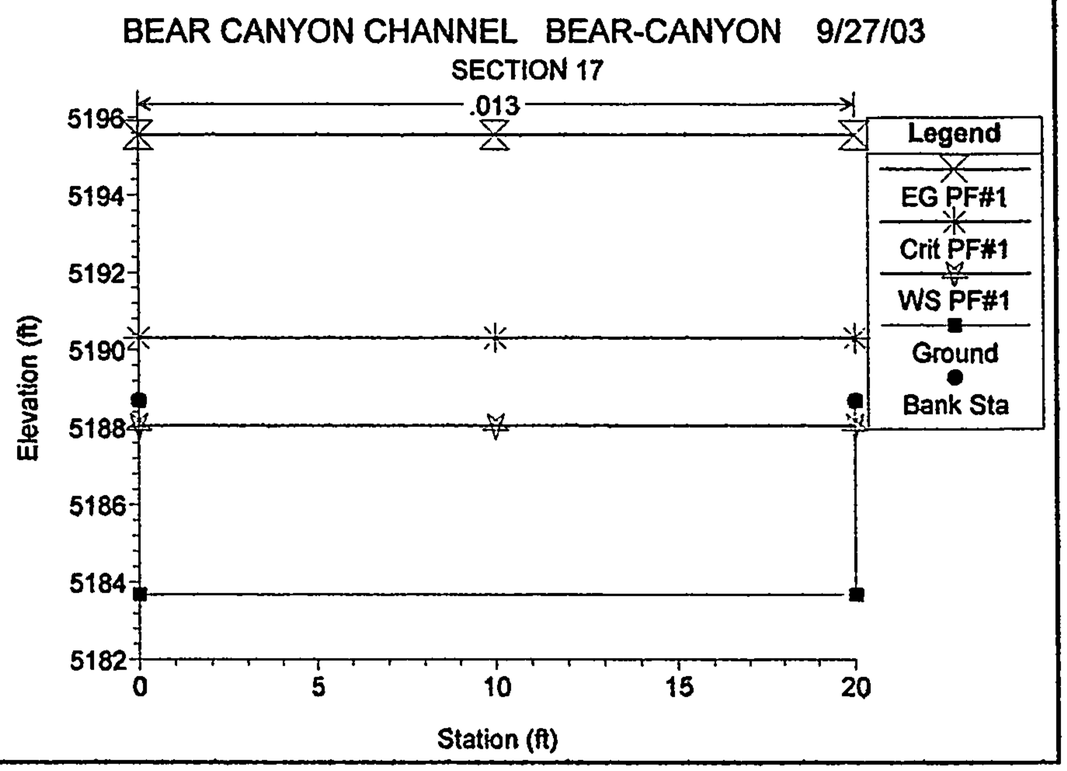
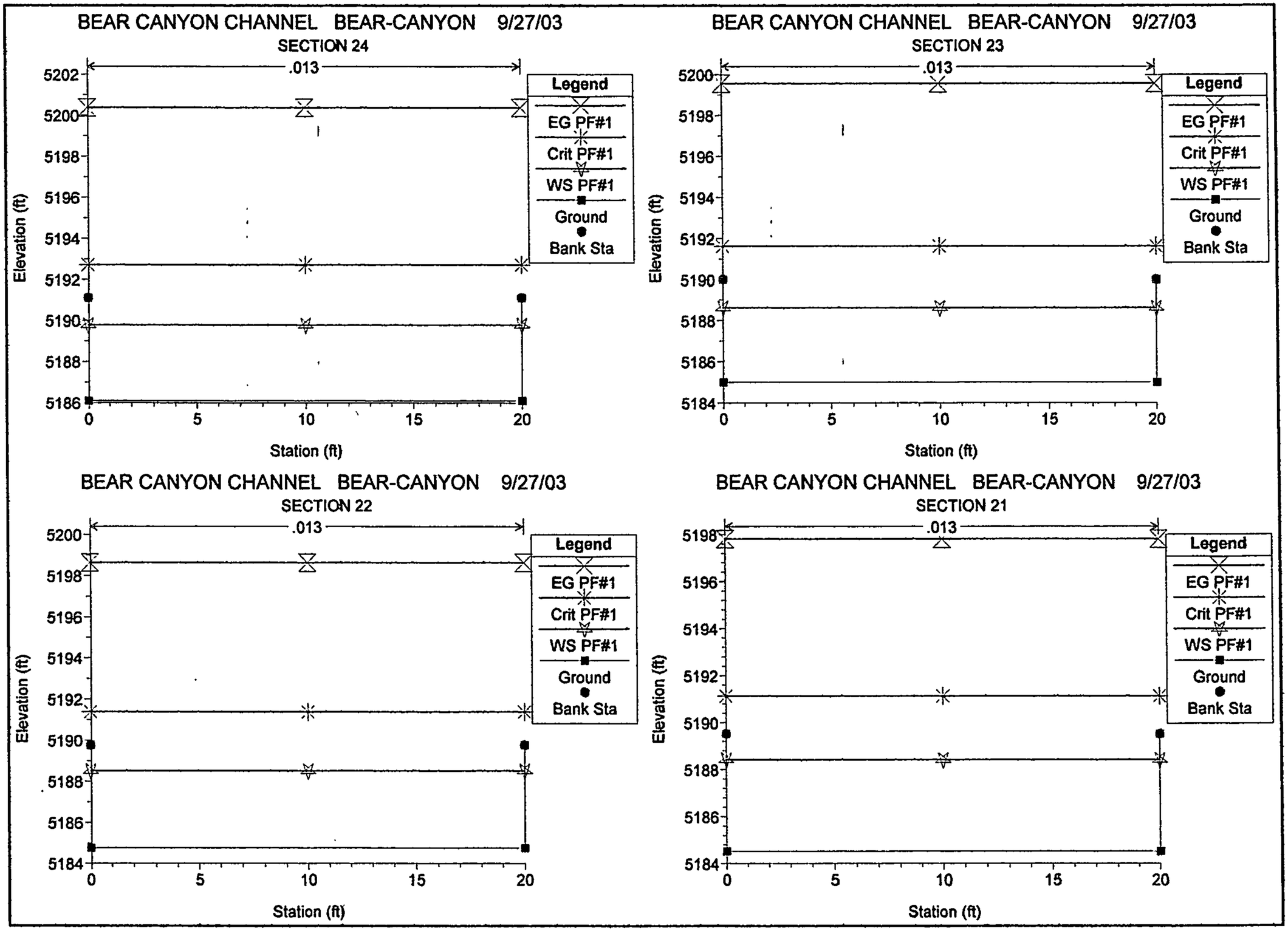
5196
5194
5192
5190
5188
5186
5184
0
5
10
15
20


BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 19
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5198
5196
5194
5192
5190
5188
5186
5184
0
5
10
15
20


BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 18
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5198
5196
5194
5192
5190
5188
5186
5184
5182
0
5
10
15
20


BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 17
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5196
5194
5192
5190
5188
5186
5184
5182
0
5
10
15
20

****


BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 24
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 23
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 22
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 21
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)

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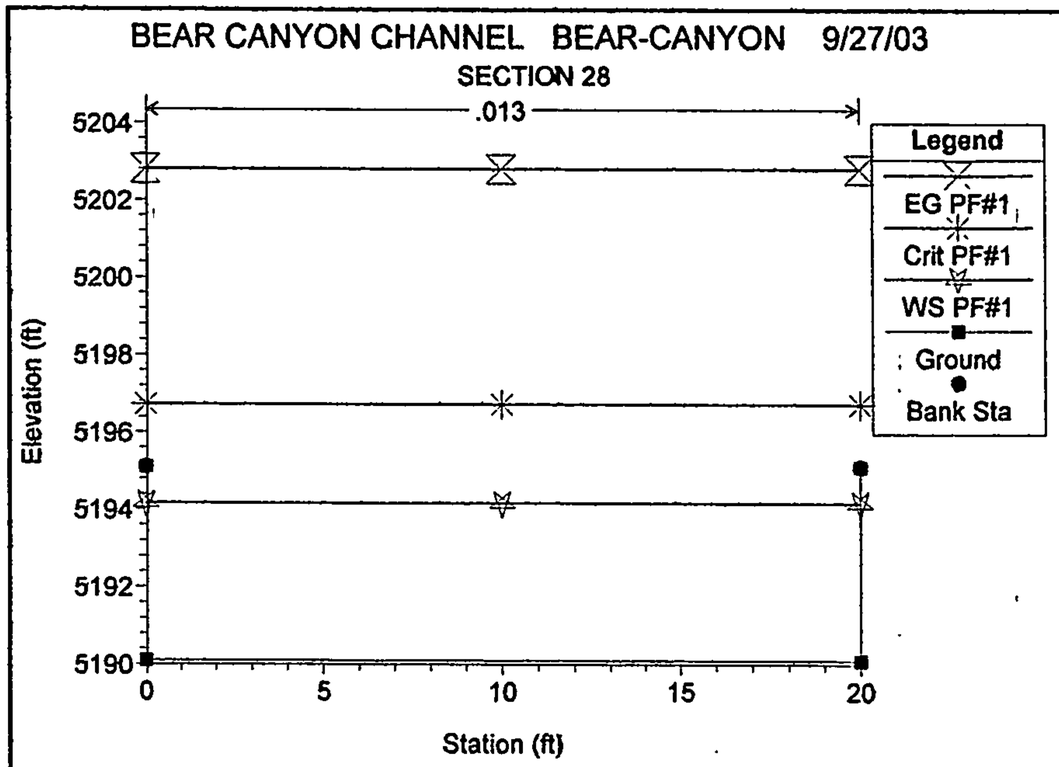
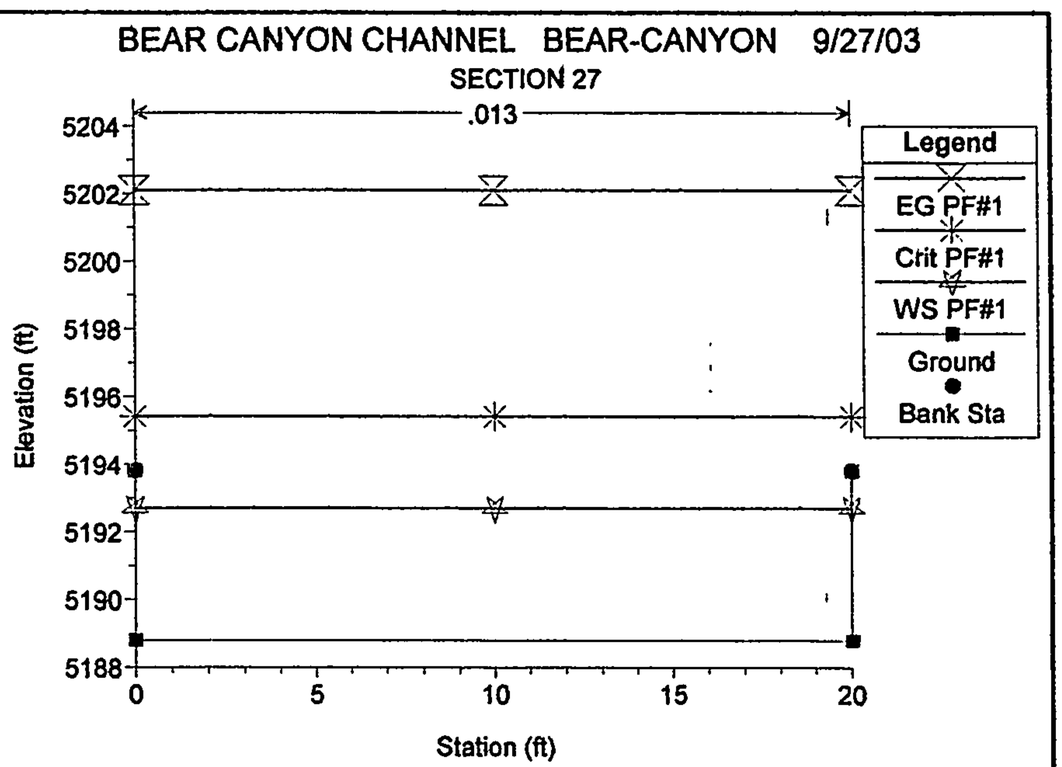
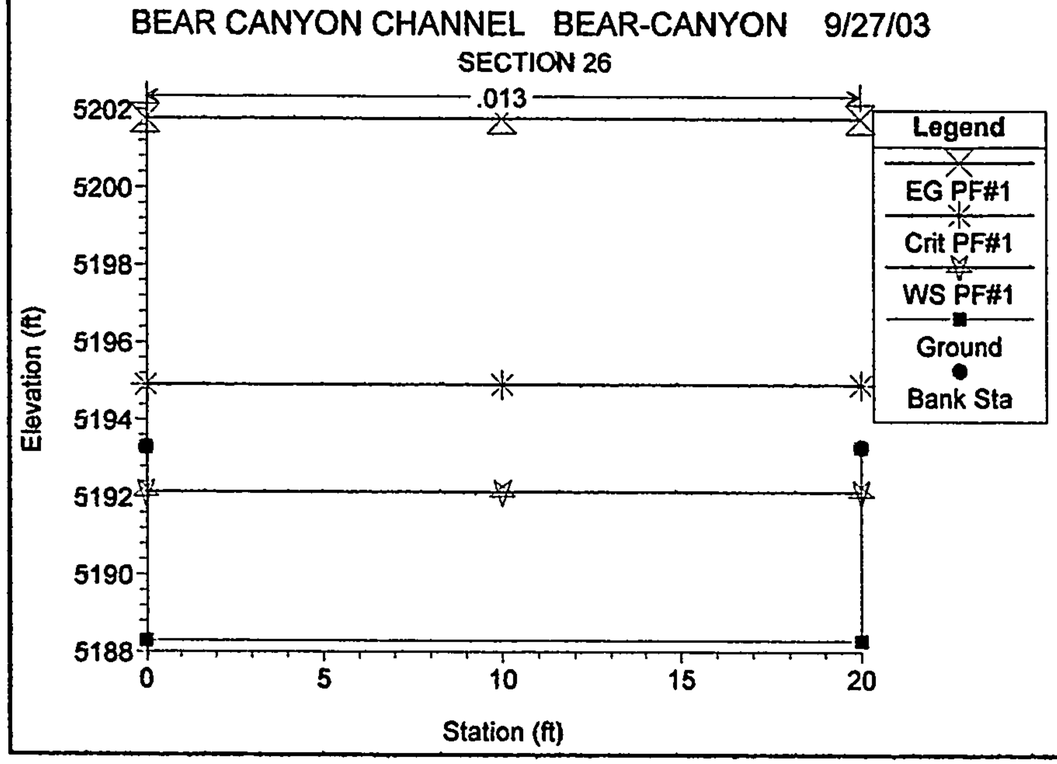
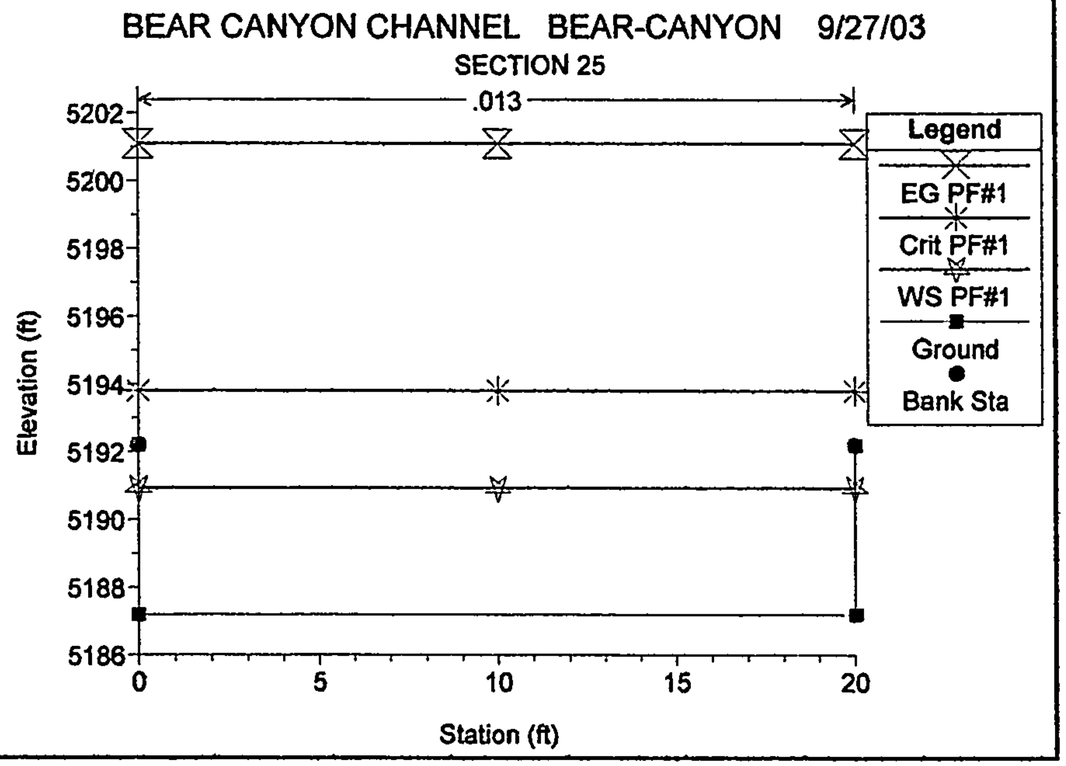

BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 28
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5204
5202
5200
5198
5196
5194
5192
5190
0
5
10
15
20


BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 27
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5204
5202
5200
5198
5196
5194
5192
5190
5188
0
5
10
15
20


BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 26
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5202
5200
5198
5196
5194
5192
5190
5188
0
5
10
15
20


BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 25
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5202
5200
5198
5196
5194
5192
5190
5188
5186
0
5
10
15
20

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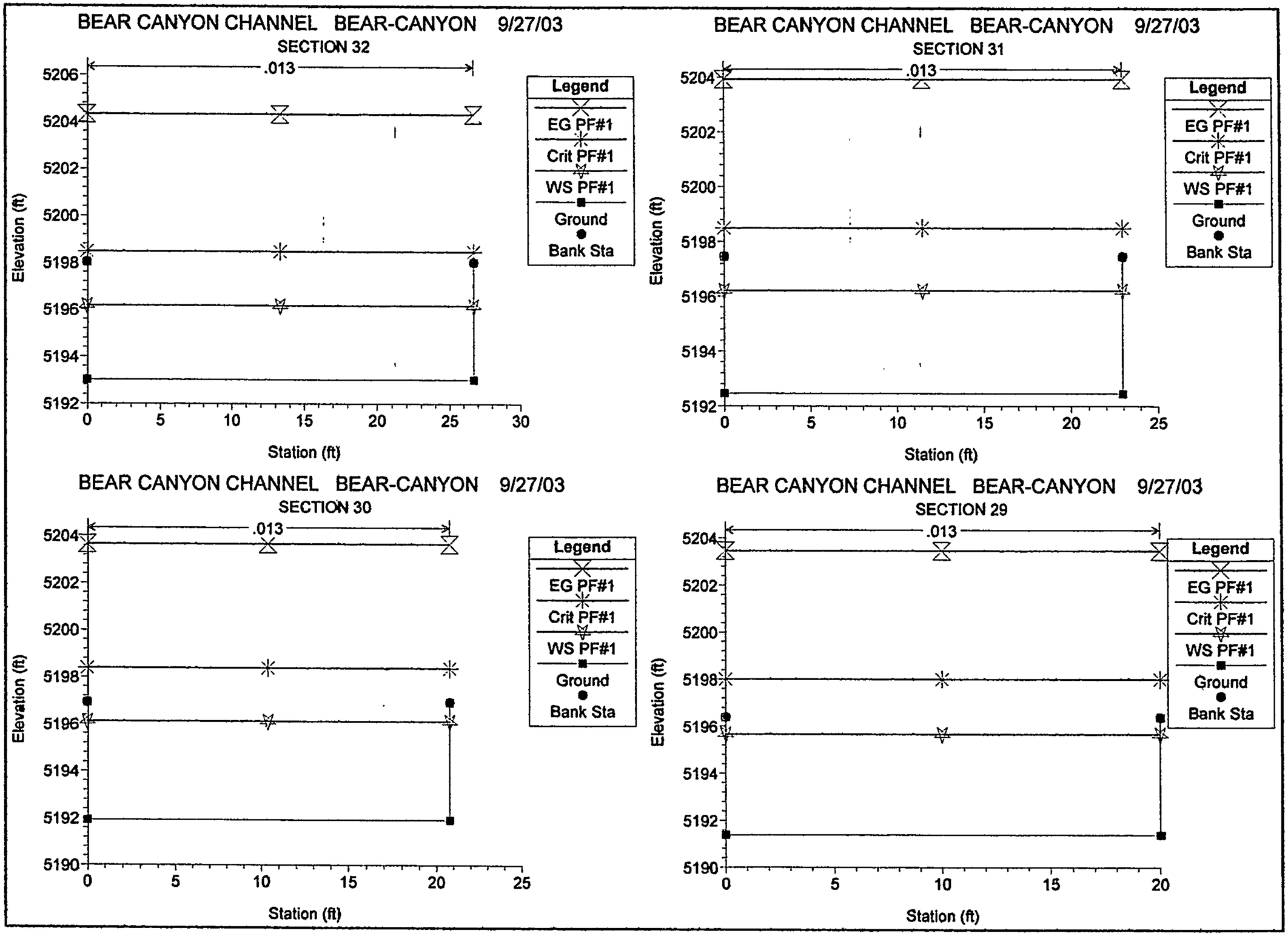
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 32
.013
Elevation (ft)
Station (ft)
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 31
.013
Elevation (ft)
Station (ft)
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 30
.013
Elevation (ft)
Station (ft)
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 29
.013
Elevation (ft)
Station (ft)
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta

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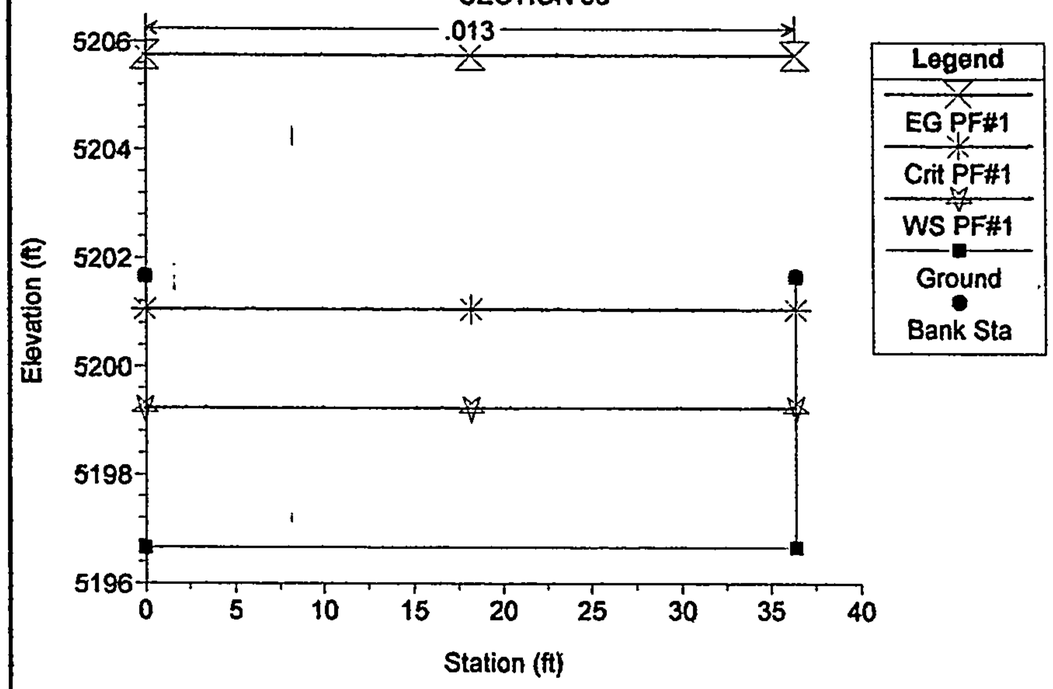
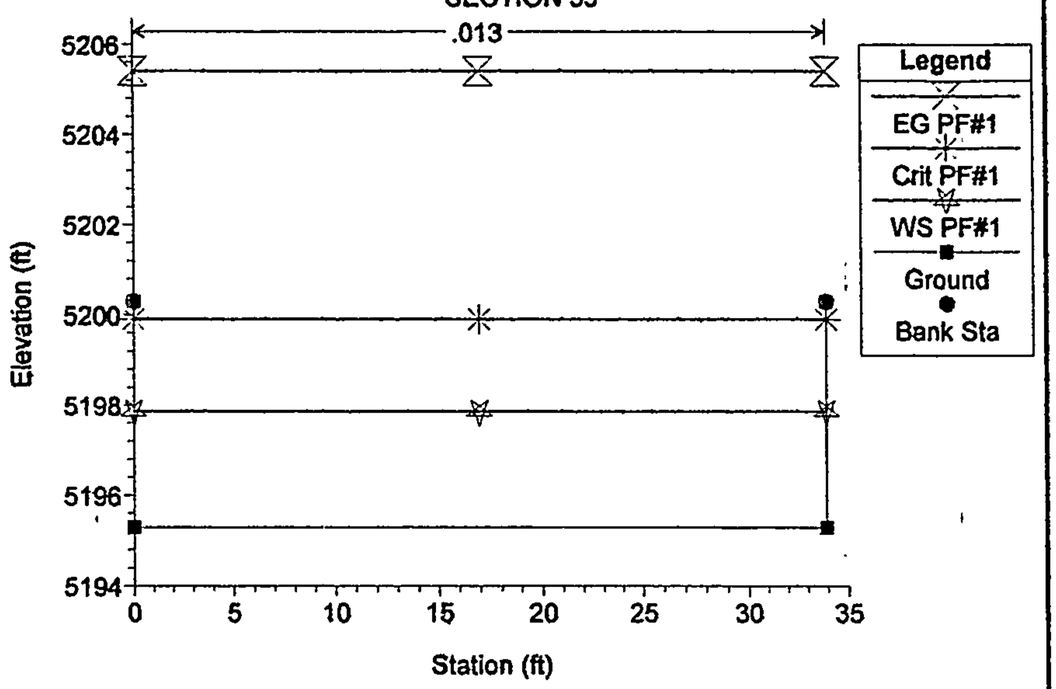
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03

SECTION 36



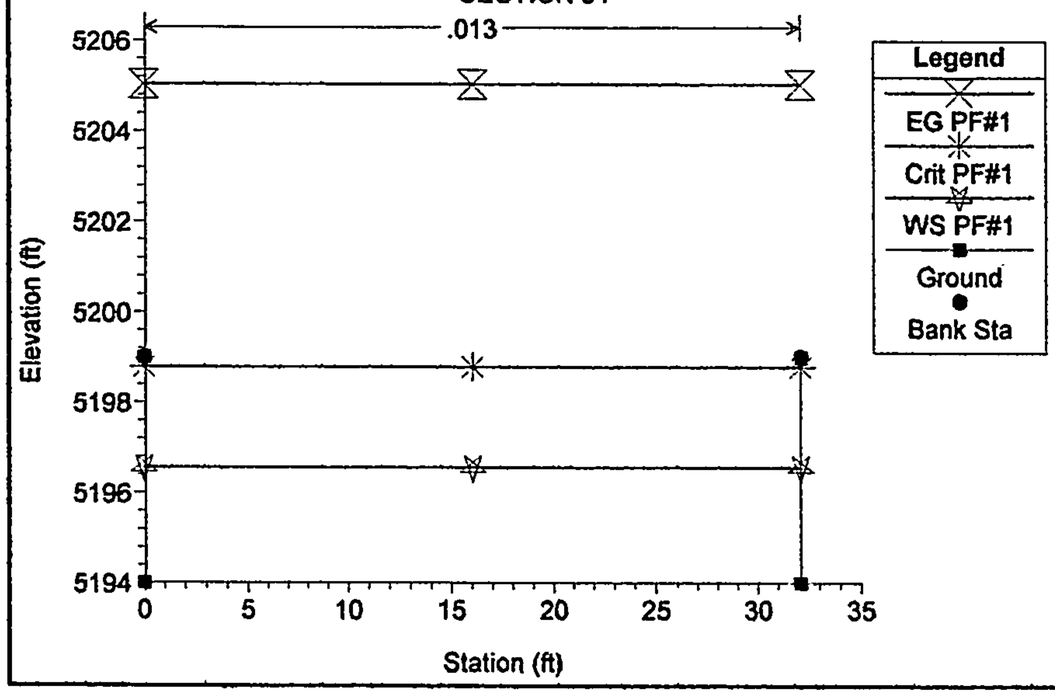
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03

SECTION 35



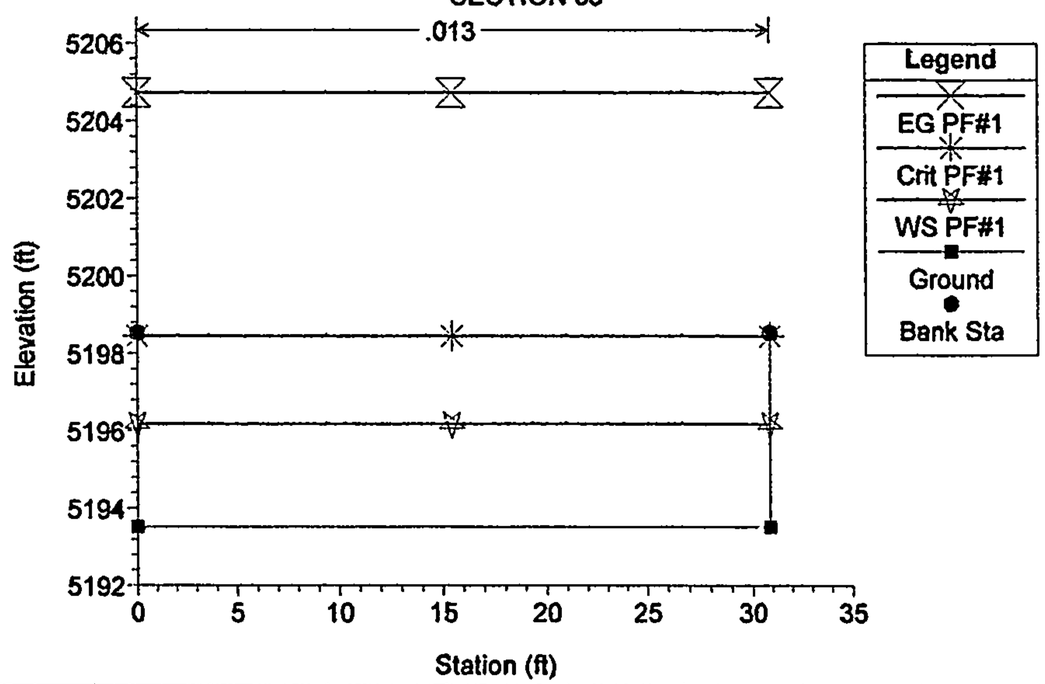
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03

SECTION 34



BEAR CANYON CHANNEL BEAR-CANYON 9/27/03

SECTION 33



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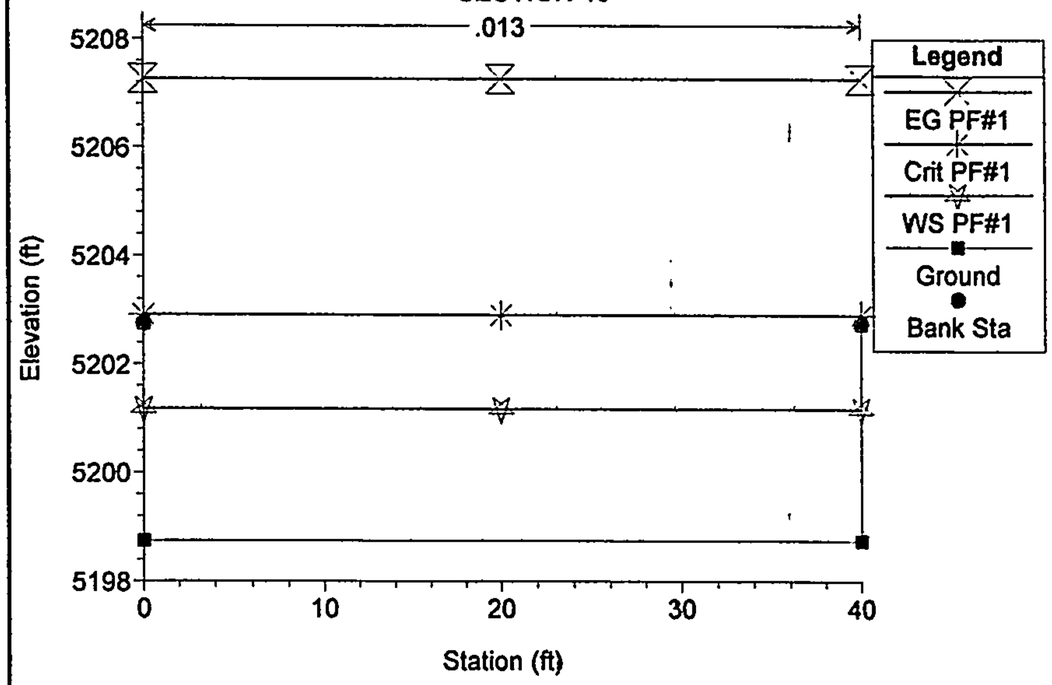
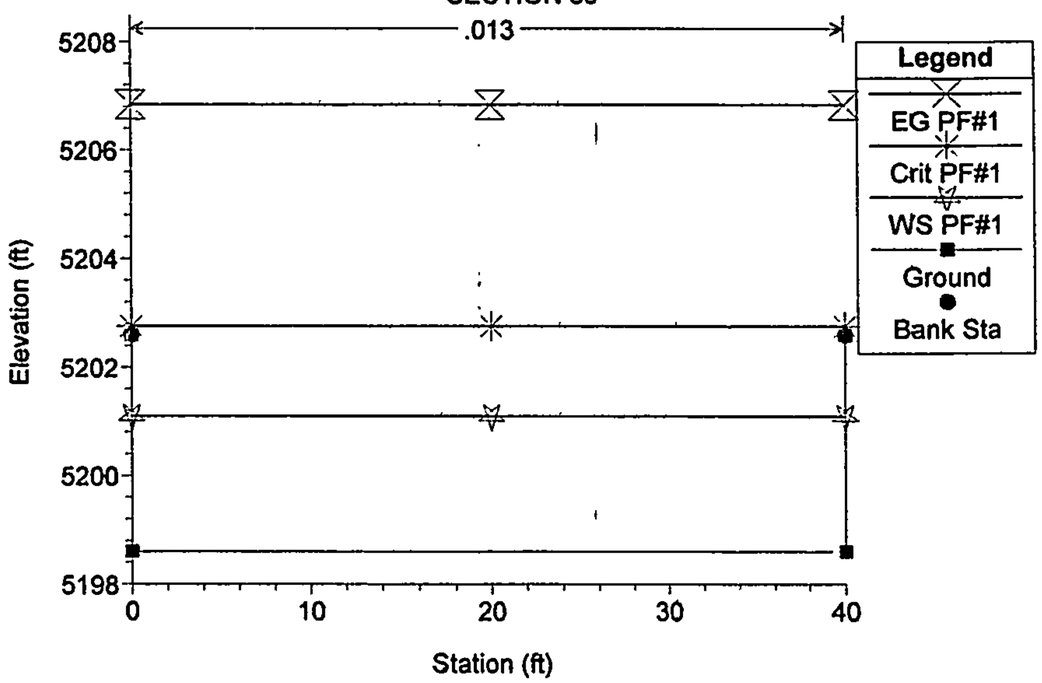
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03

SECTION 40



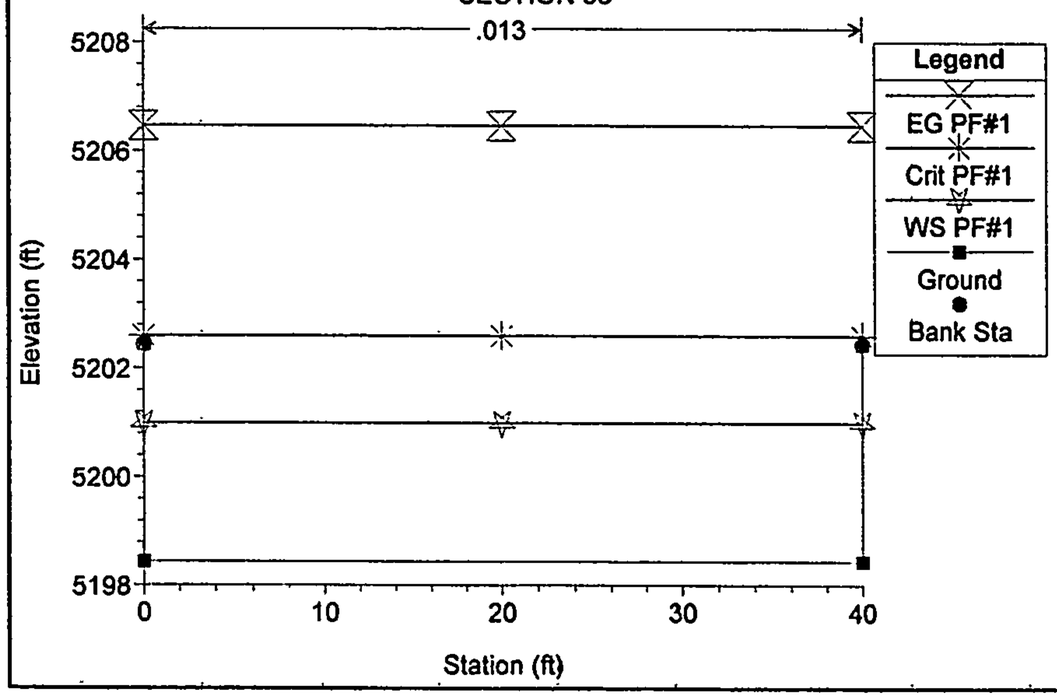
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03

SECTION 39



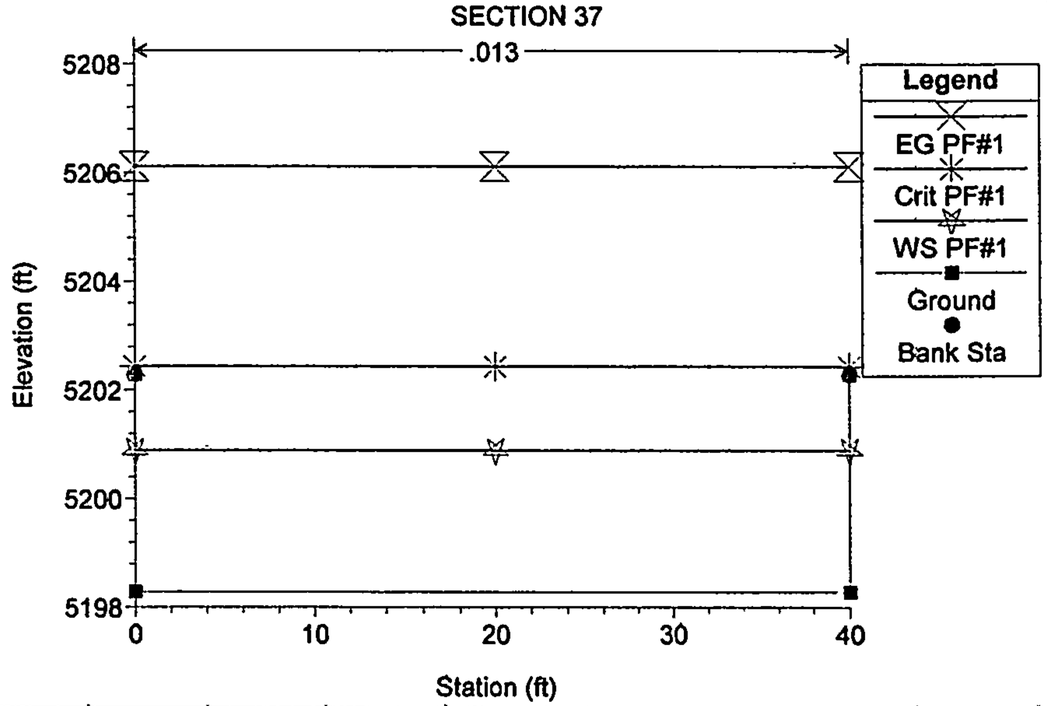
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03

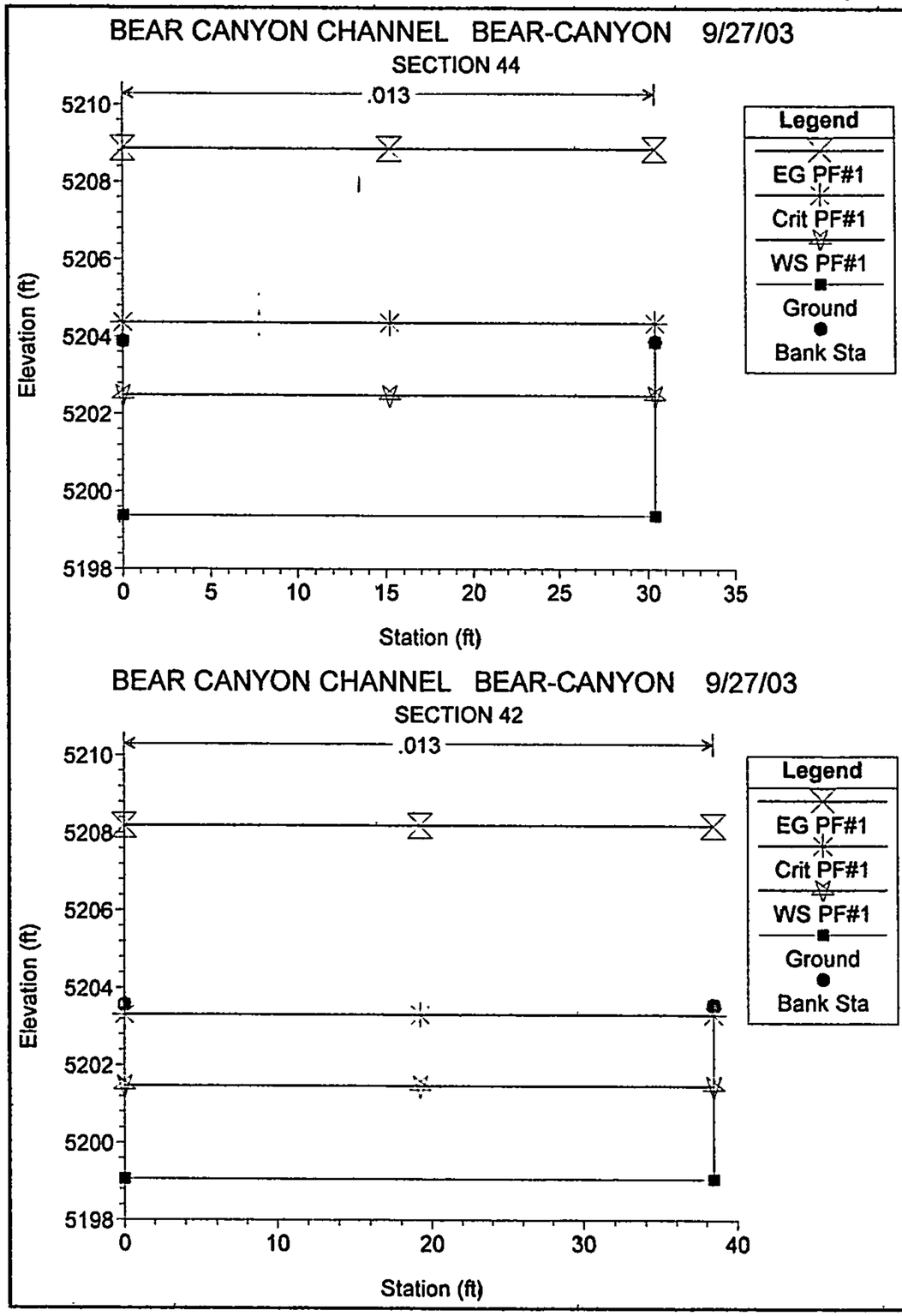
SECTION 38

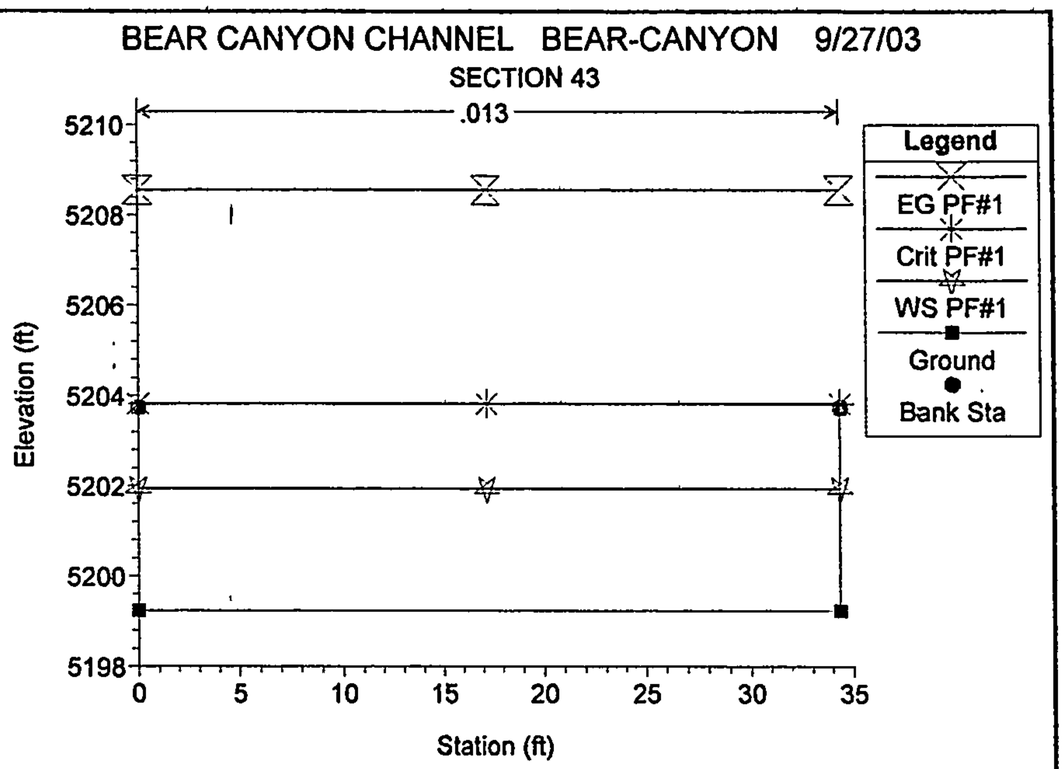


BEAR CANYON CHANNEL BEAR-CANYON 9/27/03

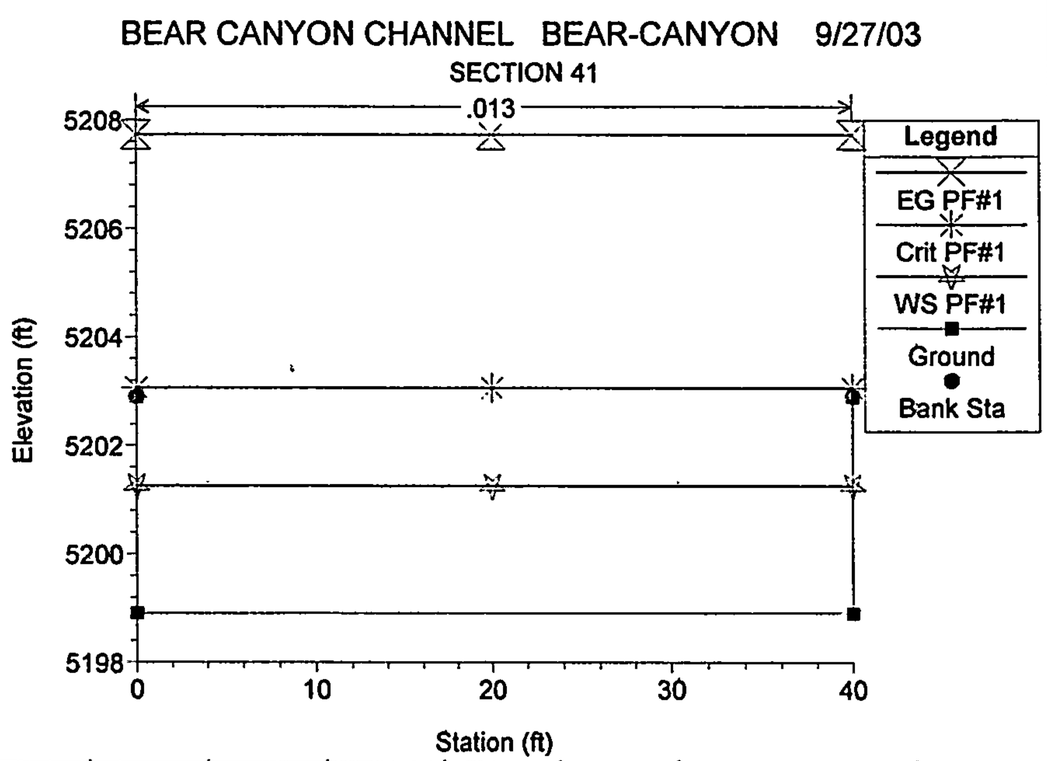
SECTION 37




BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 44
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5210
5208
5206
5204
5202
5200
5198
0
5
10
15
20
25
30
35


BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 43
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5210
5208
5206
5204
5202
5200
5198
0
5
10
15
20
25
30
35

BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 42
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5210
5208
5206
5204
5202
5200
5198
0
10
20
30
40


BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 41
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5208
5206
5204
5202
5200
5198
0
10
20
30
40

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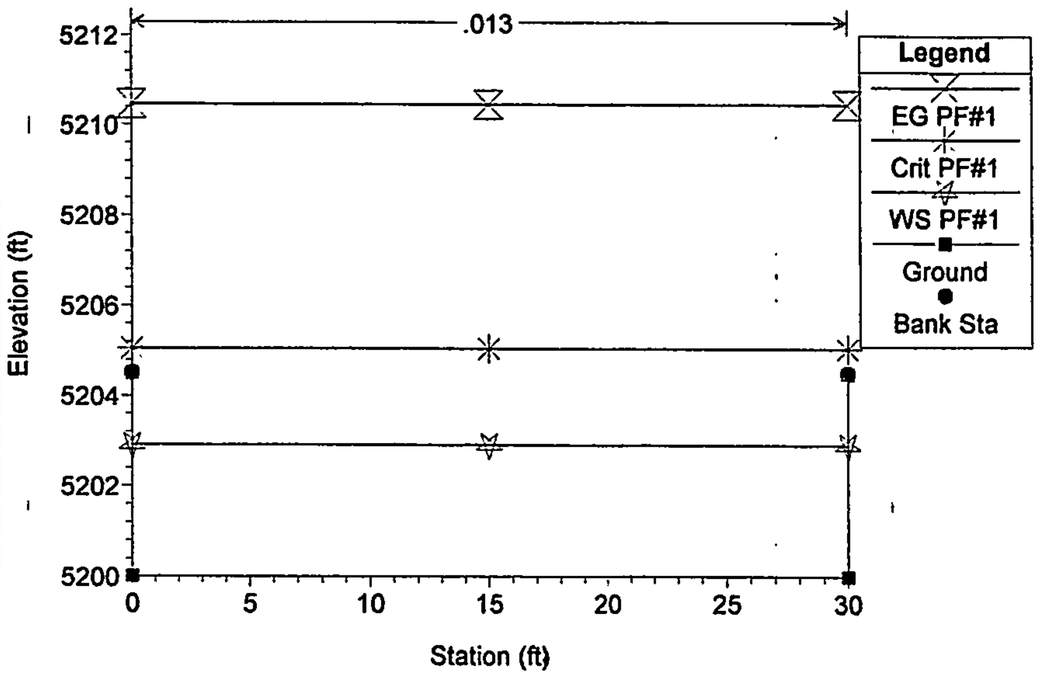
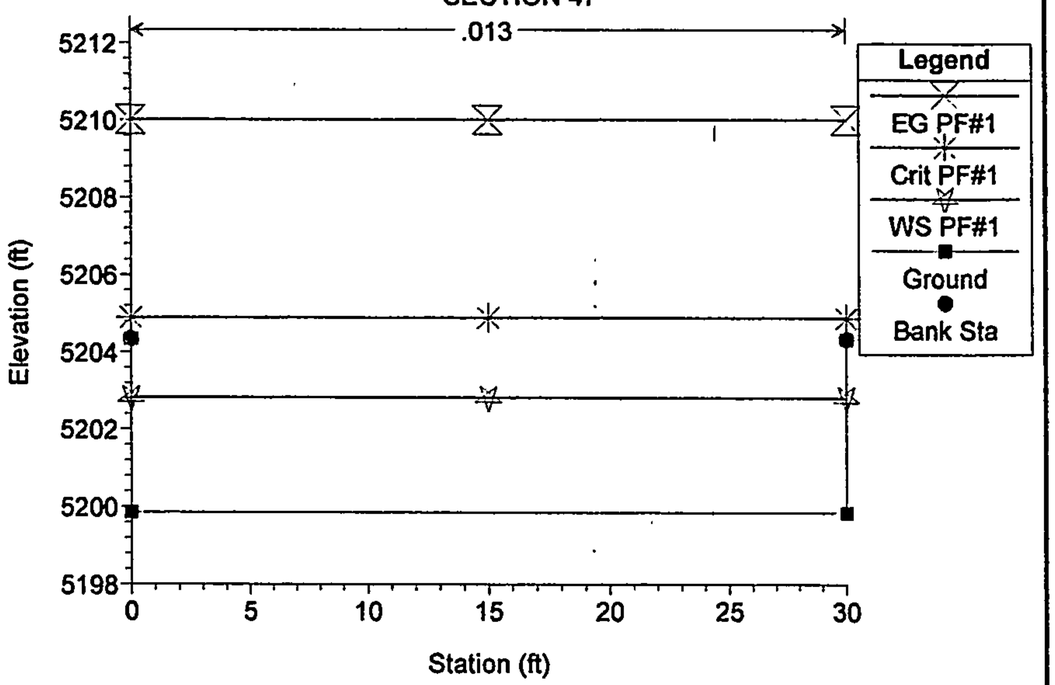
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03

SECTION 48



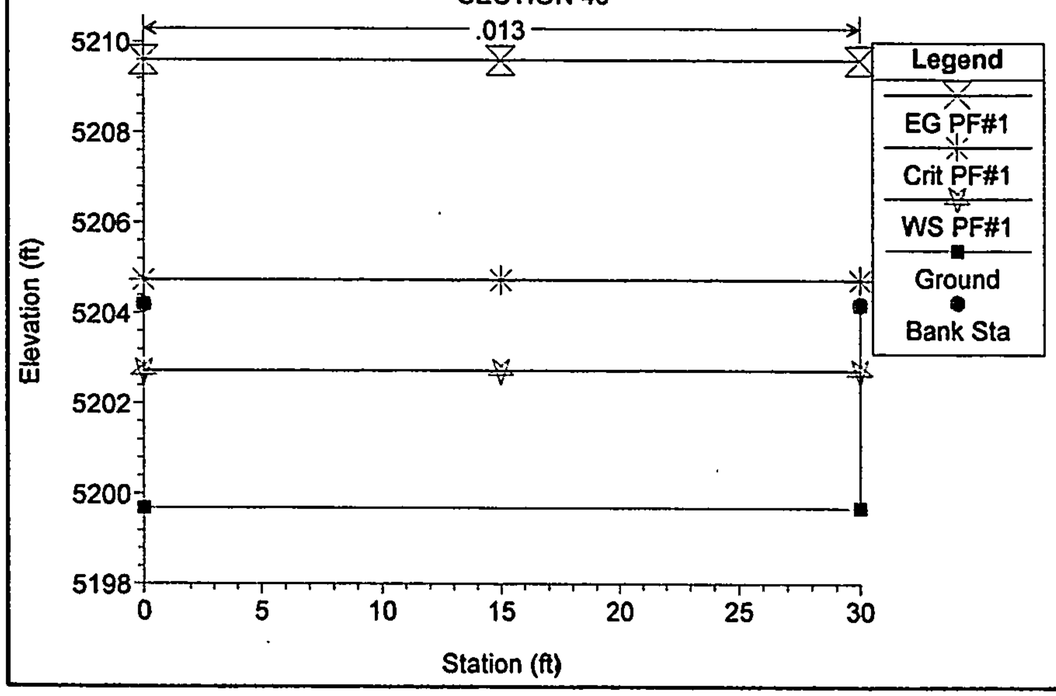
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03

SECTION 47



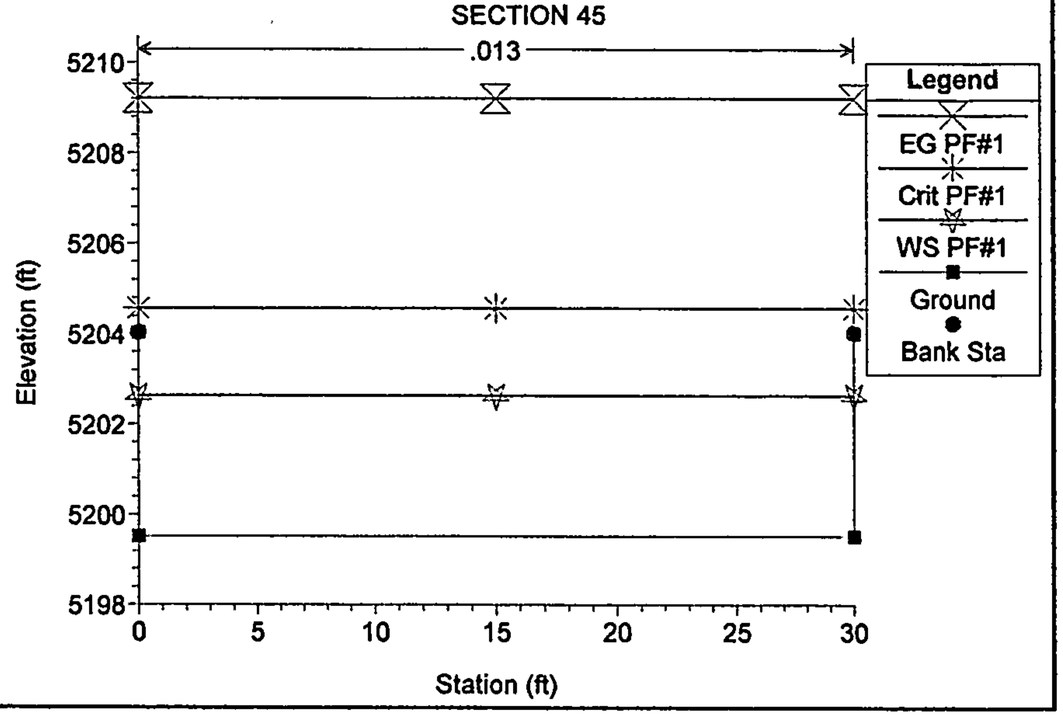
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03

SECTION 46



BEAR CANYON CHANNEL BEAR-CANYON 9/27/03

SECTION 45



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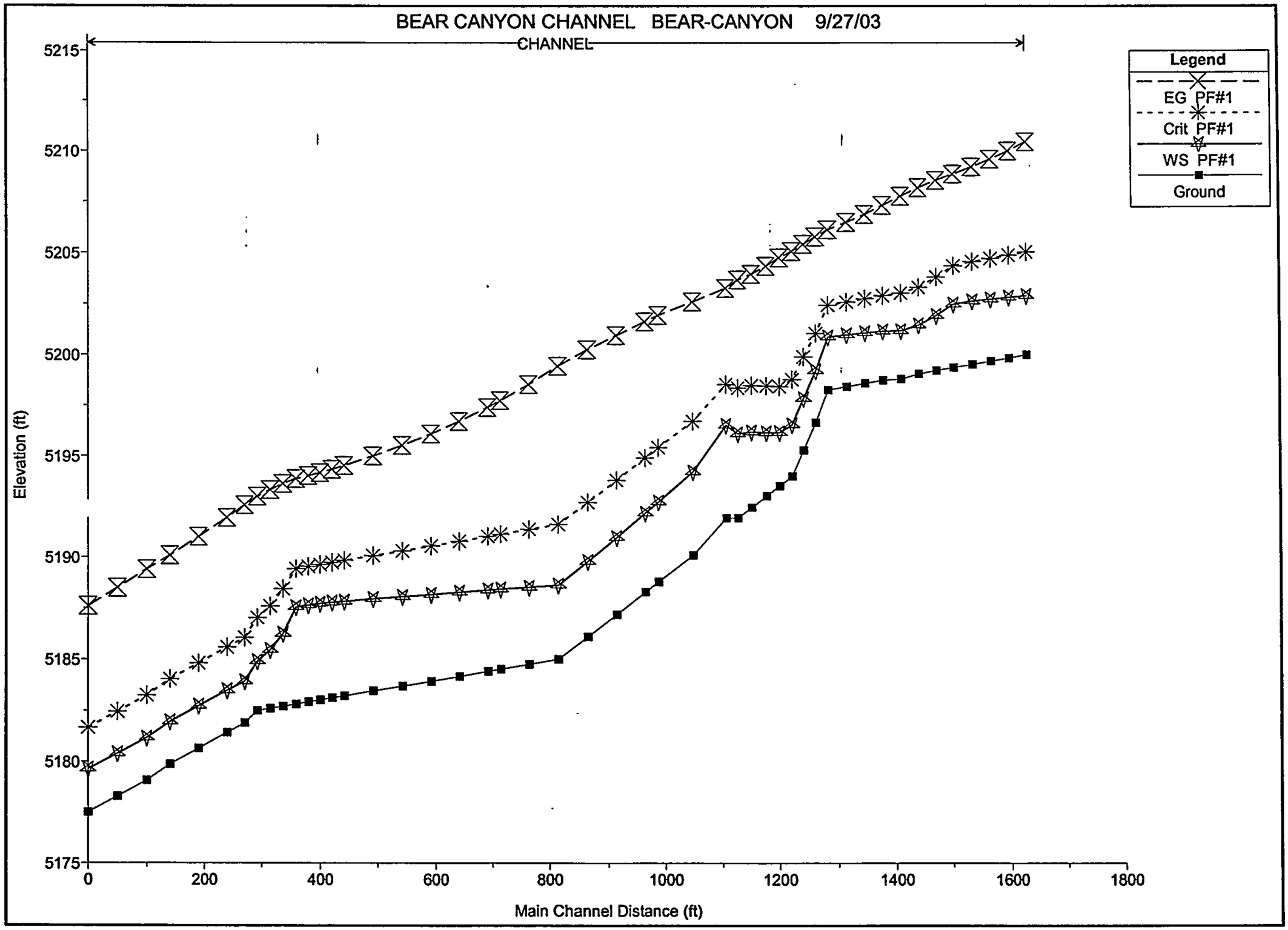
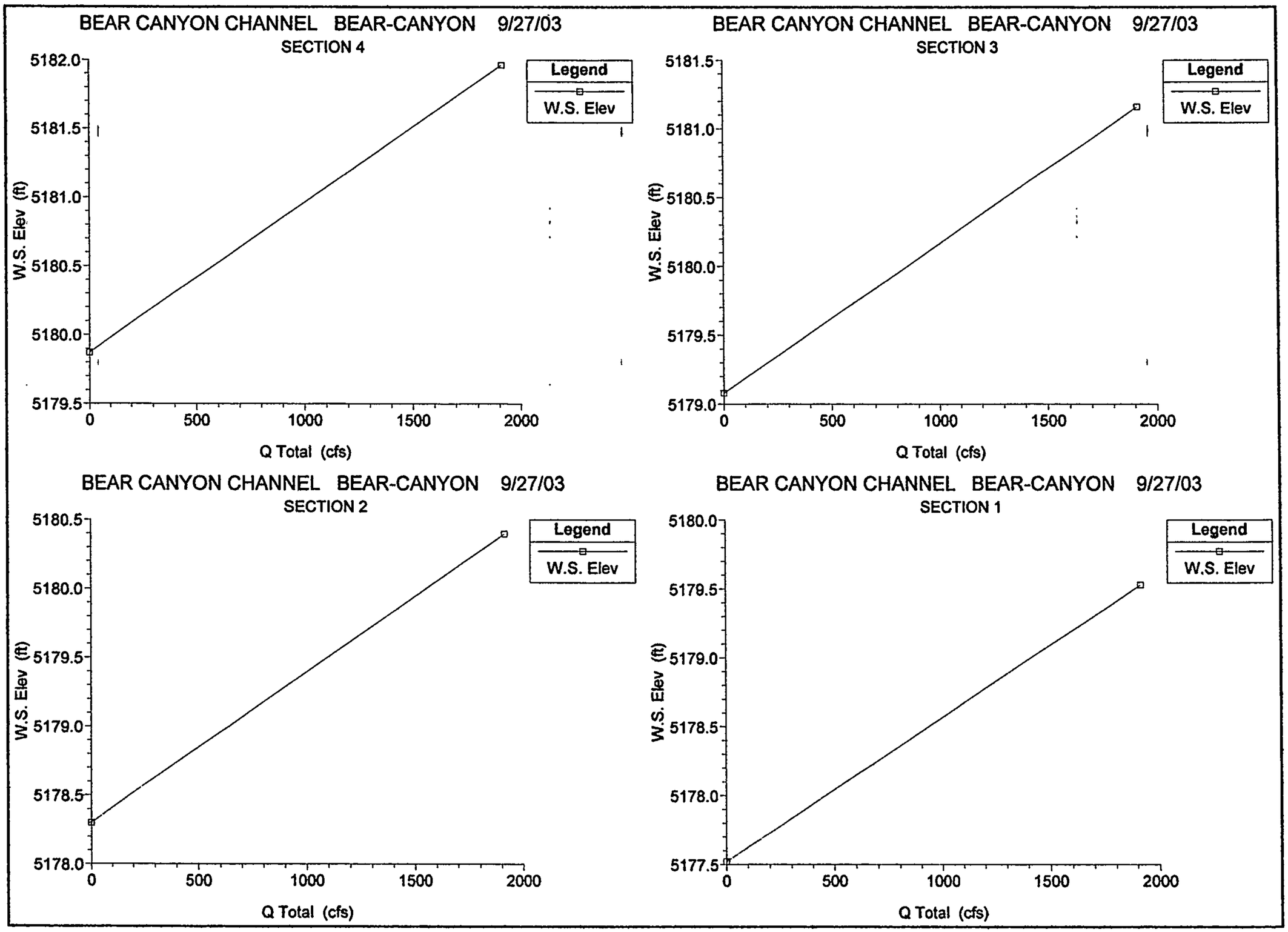
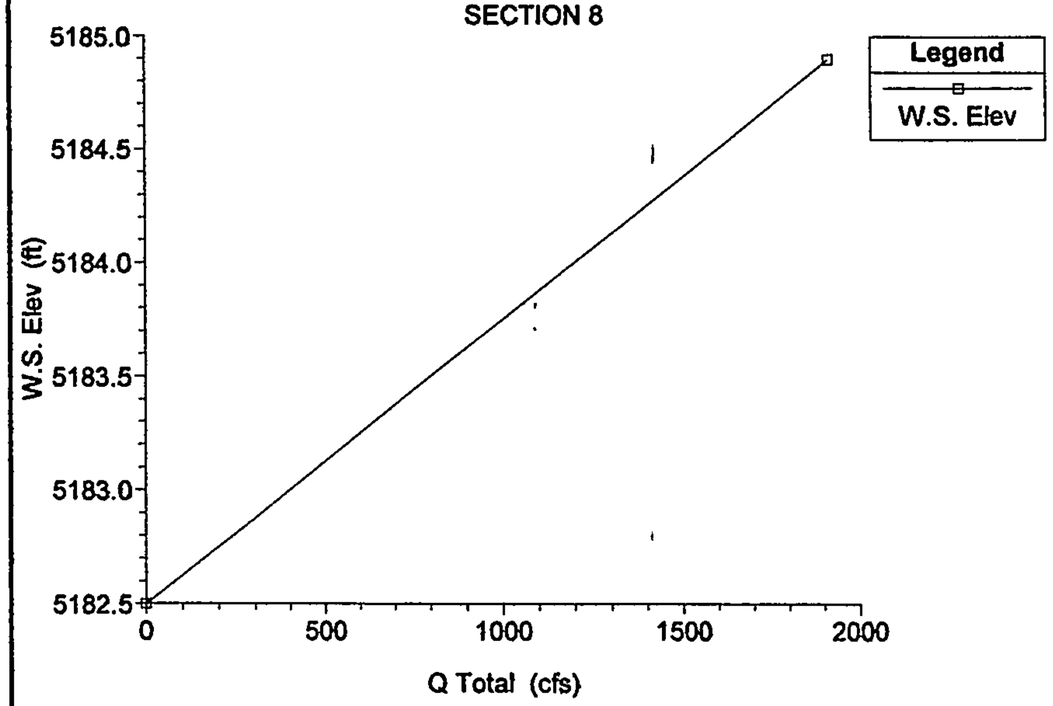

BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
CHANNEL
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Elevation (ft)
5215
5210
5205
5200
5195
5190
5185
5180
5175
0
200
400
600
800
1000
1200
1400
1600
1800
Main Channel Distance (ft)


BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 4
Legend
W.S. Elev
W.S. Elev (ft)
5182.0
5181.5
5181.0
5180.5
5180.0
5179.5
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 3
Legend
W.S. Elev
W.S. Elev (ft)
5181.5
5181.0
5180.5
5180.0
5179.5
5179.0
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 2
Legend
W.S. Elev
W.S. Elev (ft)
5180.5
5180.0
5179.5
5179.0
5178.5
5178.0
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 1
Legend
W.S. Elev
W.S. Elev (ft)
5180.0
5179.5
5179.0
5178.5
5178.0
5177.5
0
500
1000
1500
2000
Q Total (cfs)

****

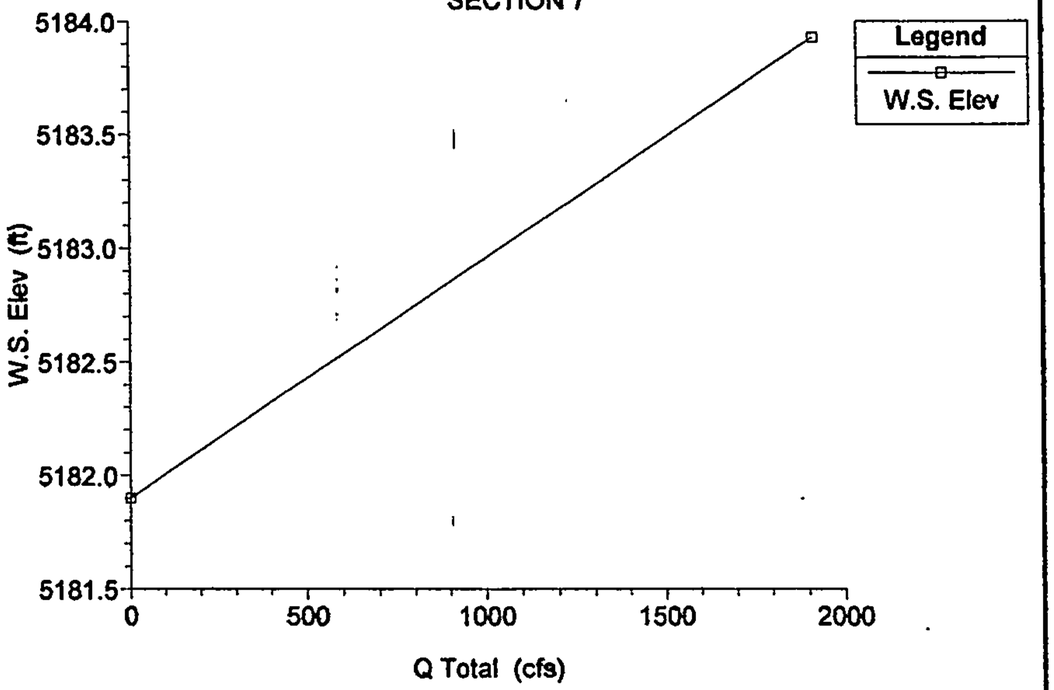
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03

SECTION 8



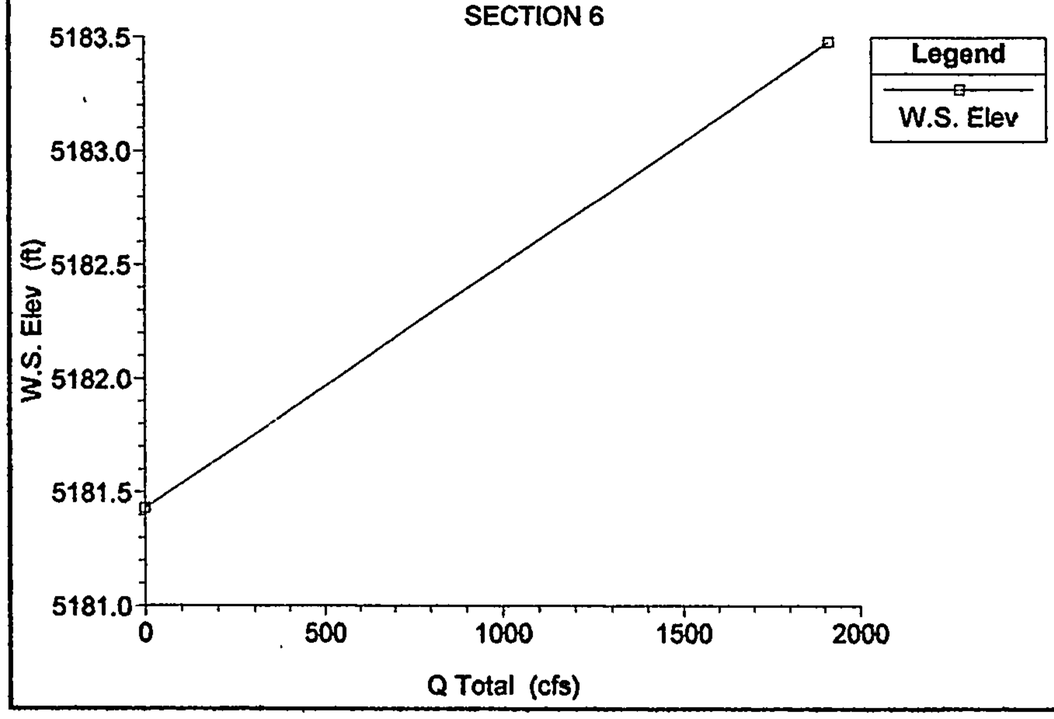
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03

SECTION 7



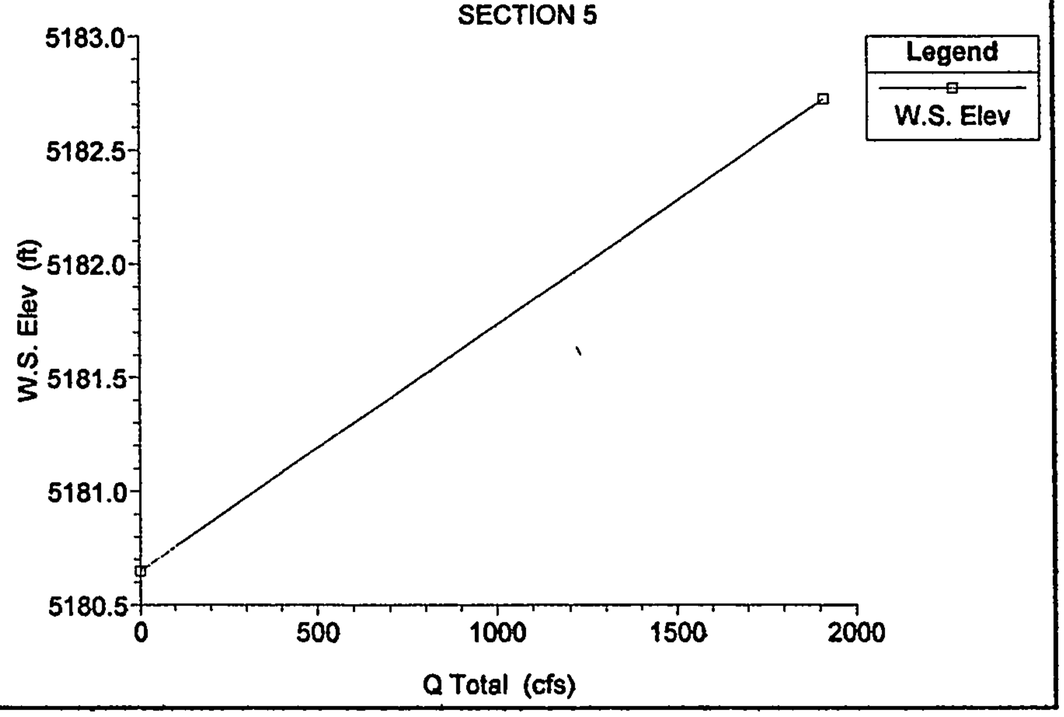
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03

SECTION 6



BEAR CANYON CHANNEL BEAR-CANYON 9/27/03

SECTION 5



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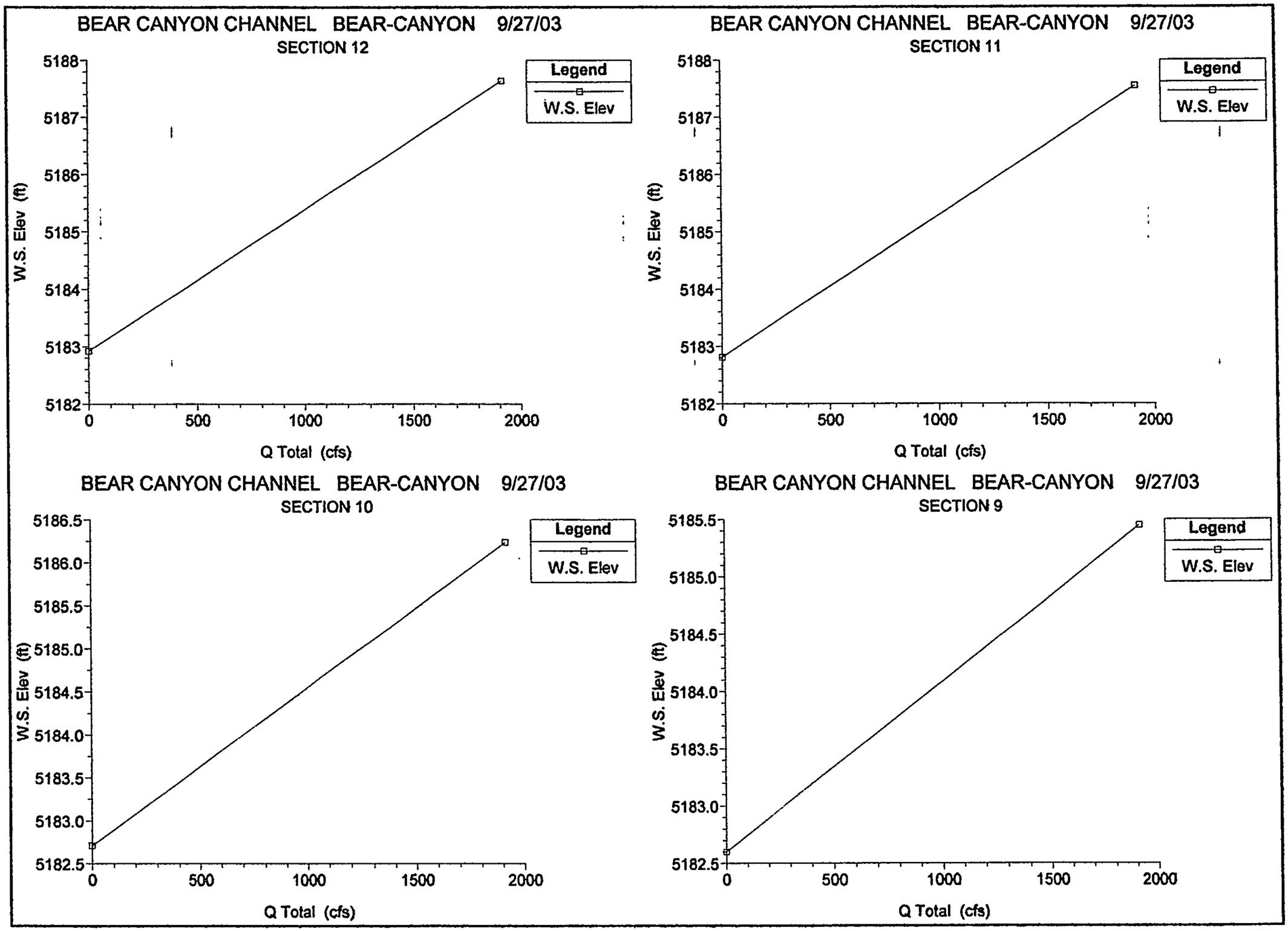
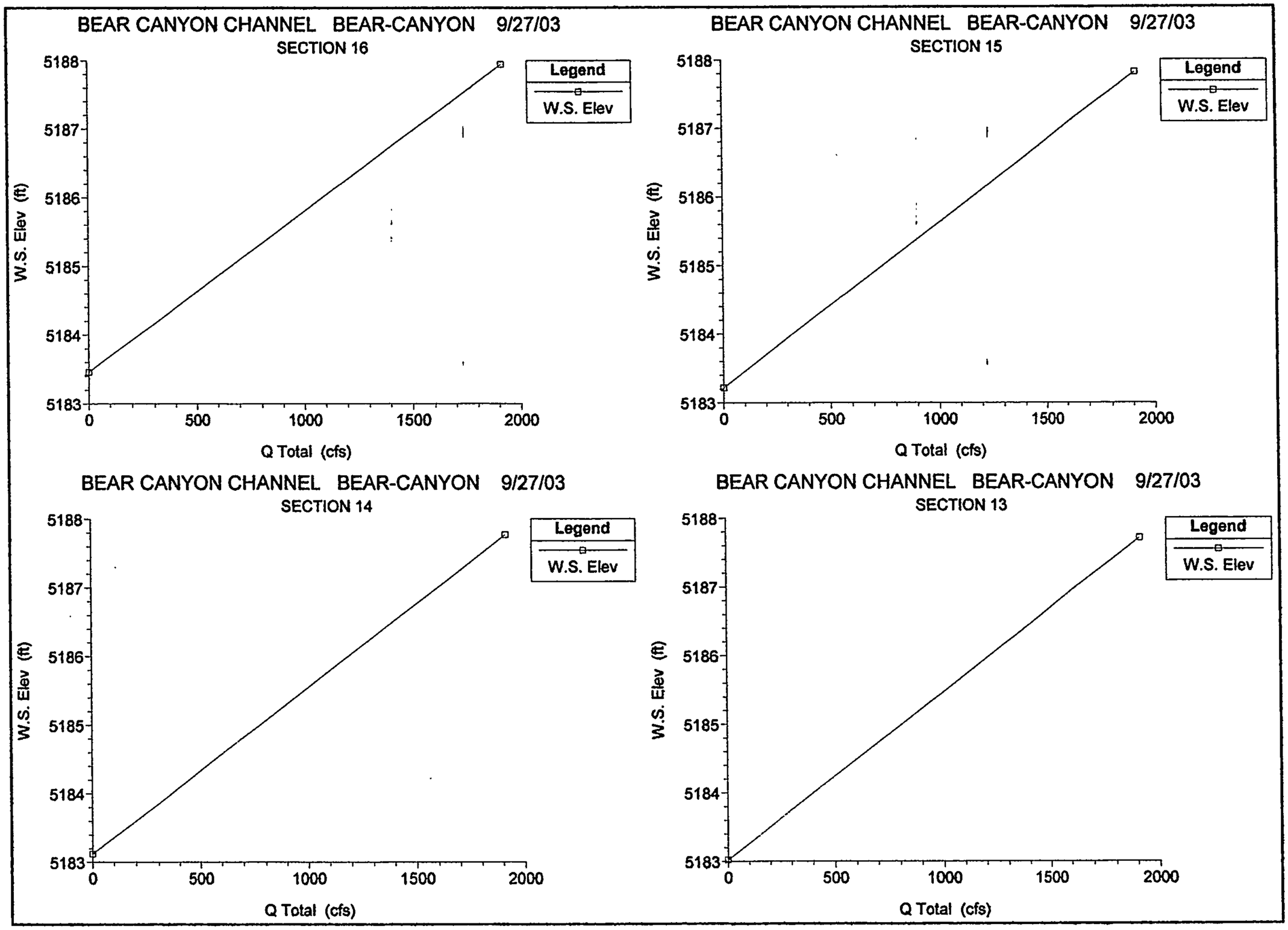
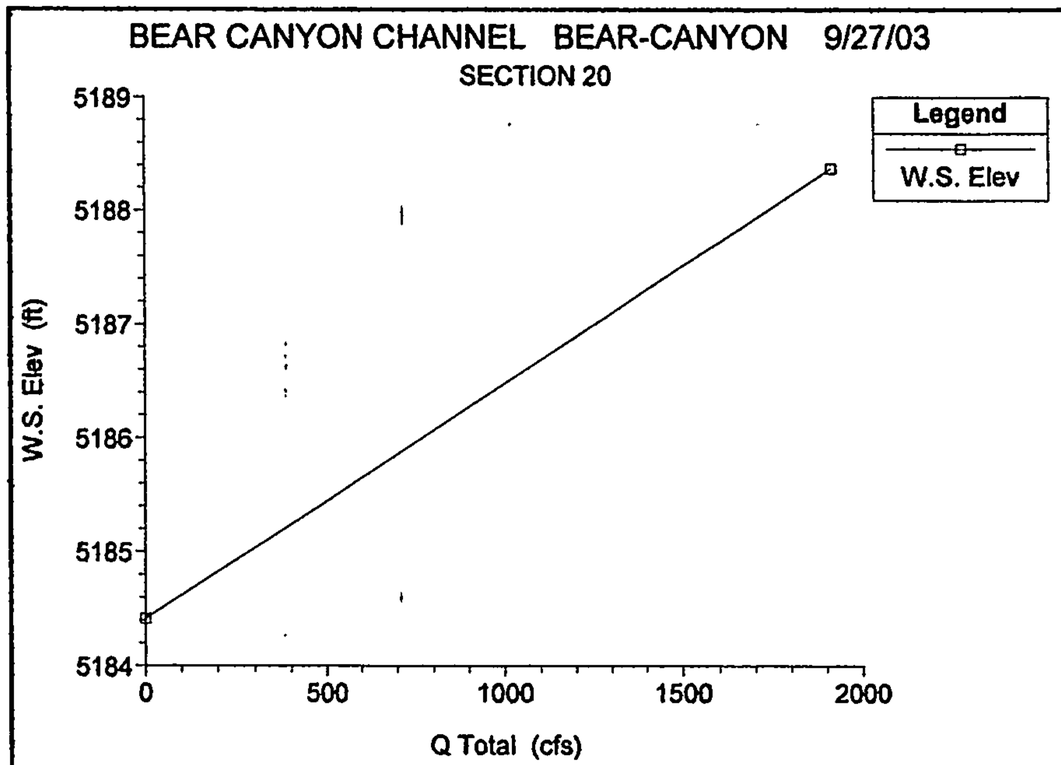
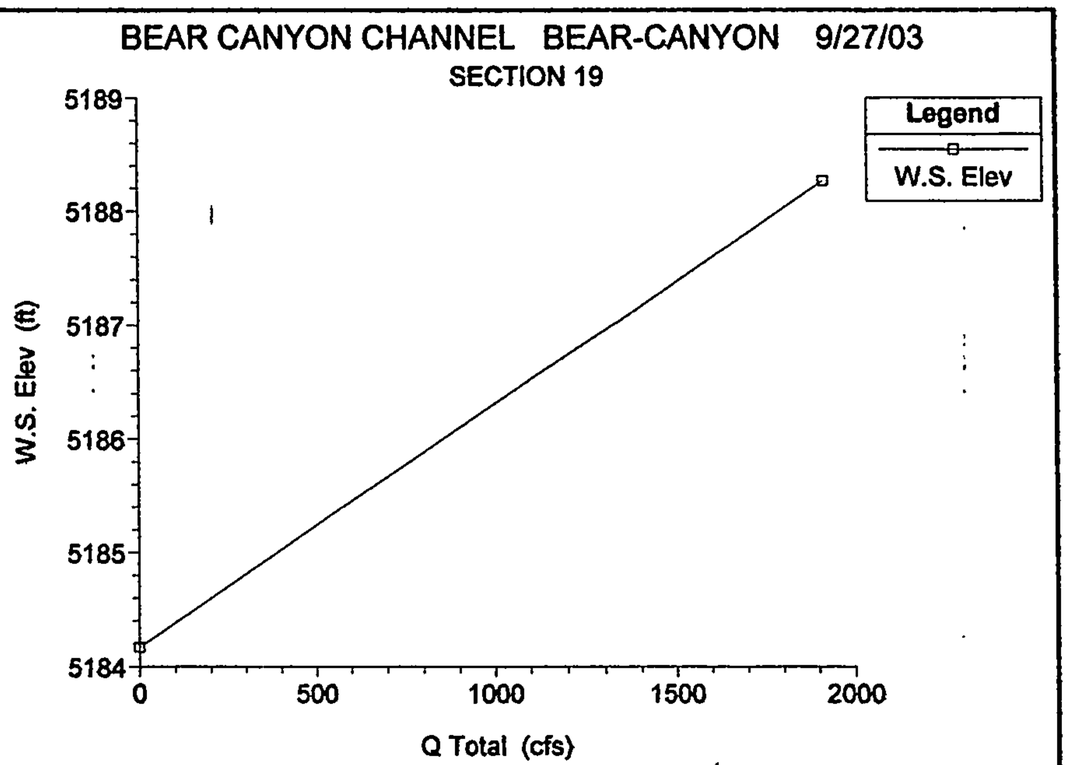

BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 12
Legend
W.S. Elev
W.S. Elev (ft)
5188
5187
5186
5185
5184
5183
5182
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 11
Legend
W.S. Elev
W.S. Elev (ft)
5188
5187
5186
5185
5184
5183
5182
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 10
Legend
W.S. Elev
W.S. Elev (ft)
5186.5
5186.0
5185.5
5185.0
5184.5
5184.0
5183.5
5183.0
5182.5
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 9
Legend
W.S. Elev
W.S. Elev (ft)
5185.5
5185.0
5184.5
5184.0
5183.5
5183.0
5182.5
0
500
1000
1500
2000
Q Total (cfs)

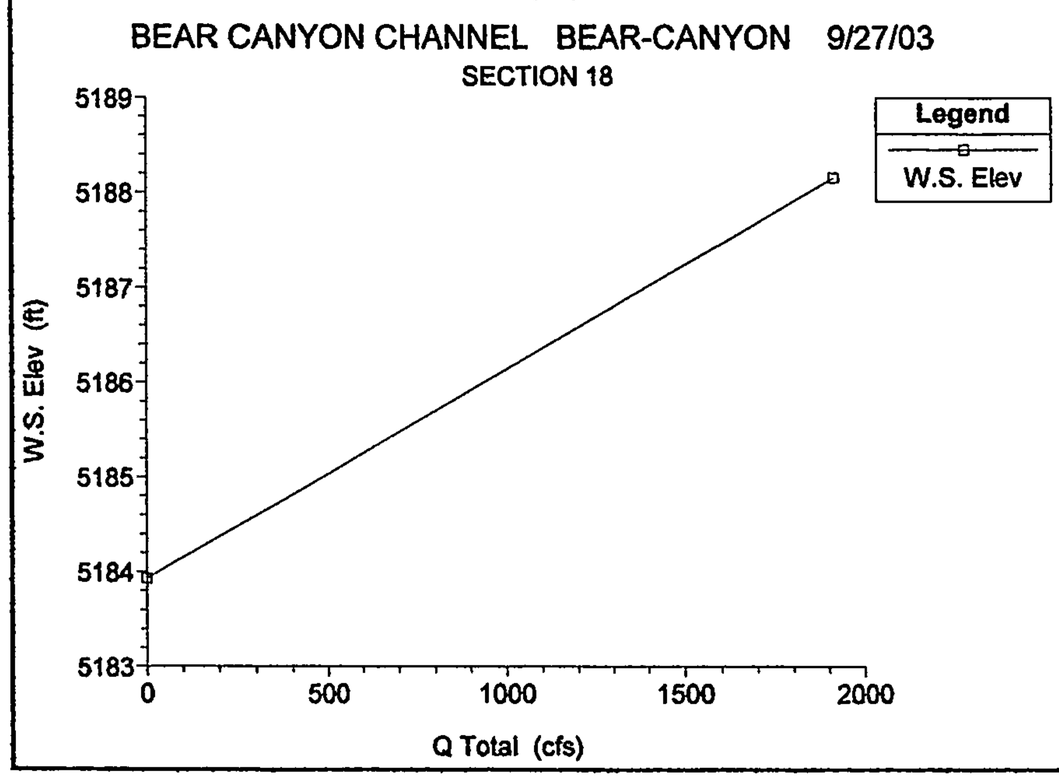
****

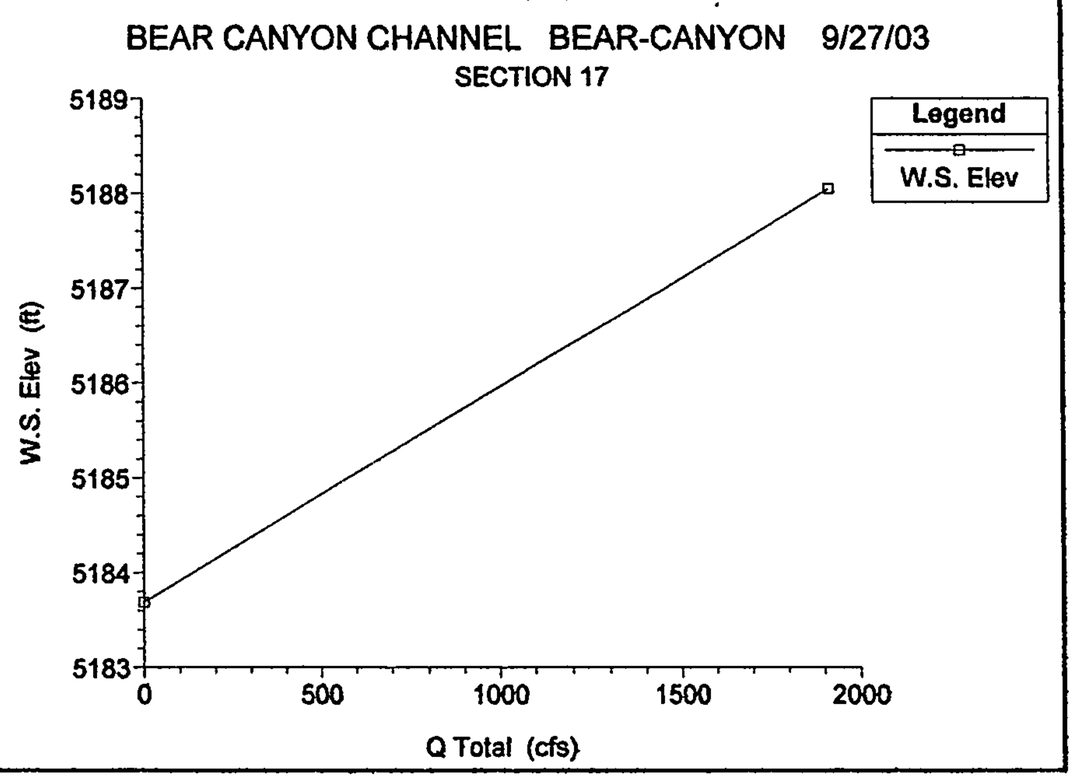

BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 16
Legend
W.S. Elev
W.S. Elev (ft)
5188
5187
5186
5185
5184
5183
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 15
Legend
W.S. Elev
W.S. Elev (ft)
5188
5187
5186
5185
5184
5183
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 14
Legend
W.S. Elev
W.S. Elev (ft)
5188
5187
5186
5185
5184
5183
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 13
Legend
W.S. Elev
W.S. Elev (ft)
5188
5187
5186
5185
5184
5183
0
500
1000
1500
2000
Q Total (cfs)

****


BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 20
Legend
W.S. Elev
W.S. Elev (ft)
5189
5188
5187
5186
5185
5184
0
500
1000
1500
2000
Q Total (cfs)


BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 19
Legend
W.S. Elev
W.S. Elev (ft)
5189
5188
5187
5186
5185
5184
0
500
1000
1500
2000
Q Total (cfs)


BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 18
Legend
W.S. Elev
W.S. Elev (ft)
5189
5188
5187
5186
5185
5184
5183
0
500
1000
1500
2000
Q Total (cfs)


BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 17
Legend
W.S. Elev
W.S. Elev (ft)
5189
5188
5187
5186
5185
5184
5183
0
500
1000
1500
2000
Q Total (cfs)

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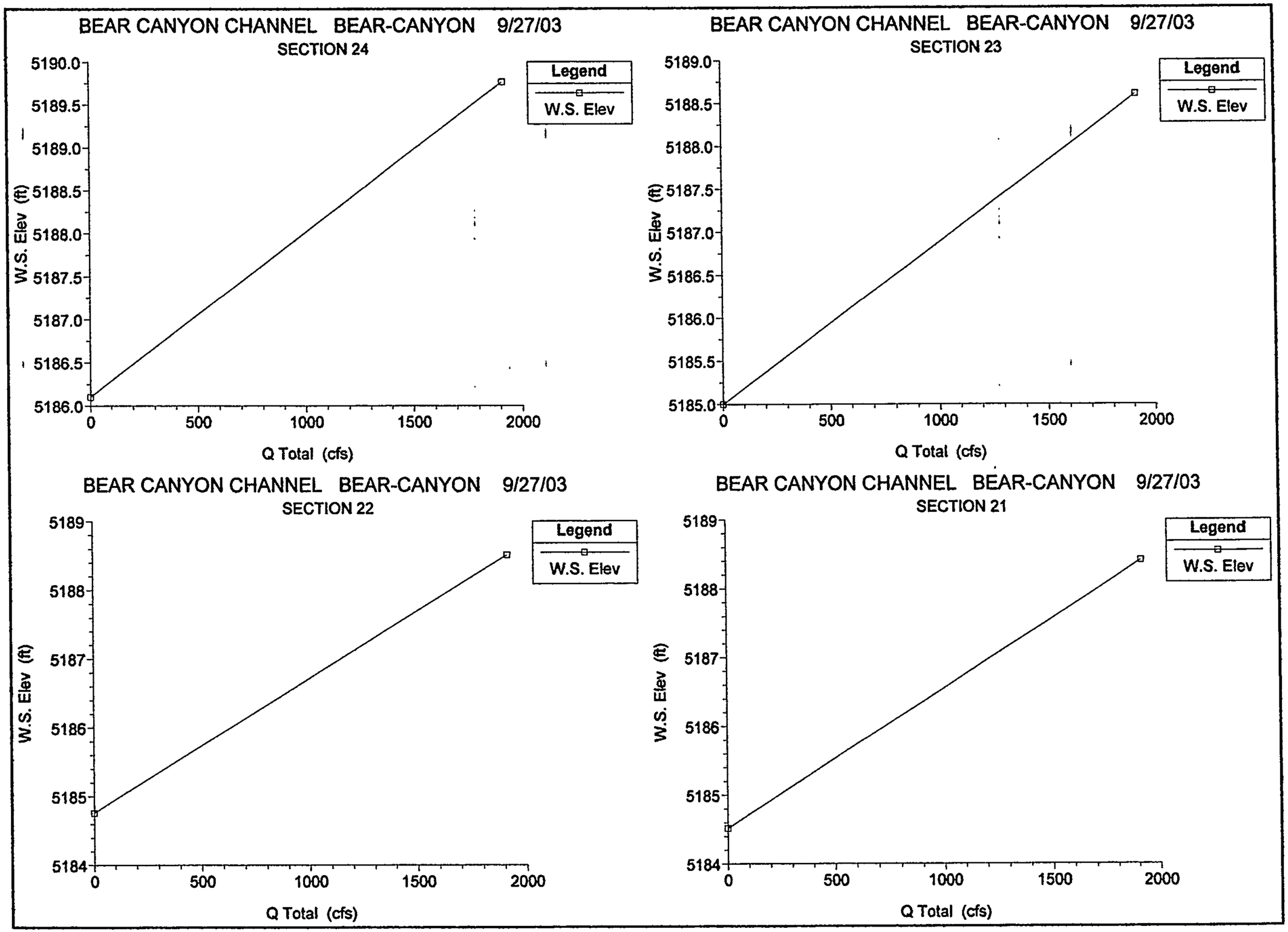
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 24
Legend
W.S. Elev
W.S. Elev (ft)
5190.0
5189.5
5189.0
5188.5
5188.0
5187.5
5187.0
5186.5
5186.0
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 23
Legend
W.S. Elev
W.S. Elev (ft)
5189.0
5188.5
5188.0
5187.5
5187.0
5186.5
5186.0
5185.5
5185.0
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 22
Legend
W.S. Elev
W.S. Elev (ft)
5189
5188
5187
5186
5185
5184
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 21
Legend
W.S. Elev
W.S. Elev (ft)
5189
5188
5187
5186
5185
5184
0
500
1000
1500
2000
Q Total (cfs)

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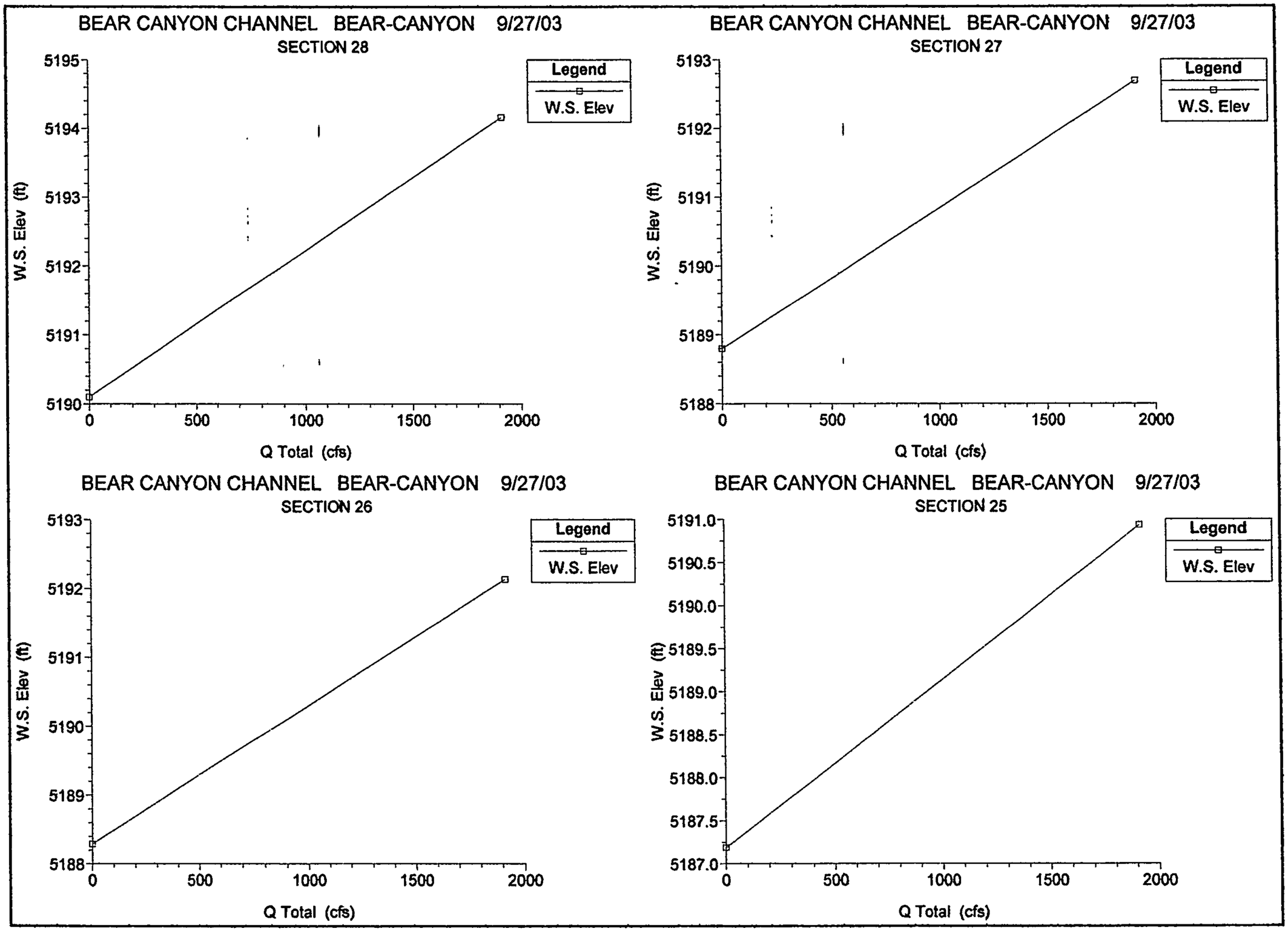
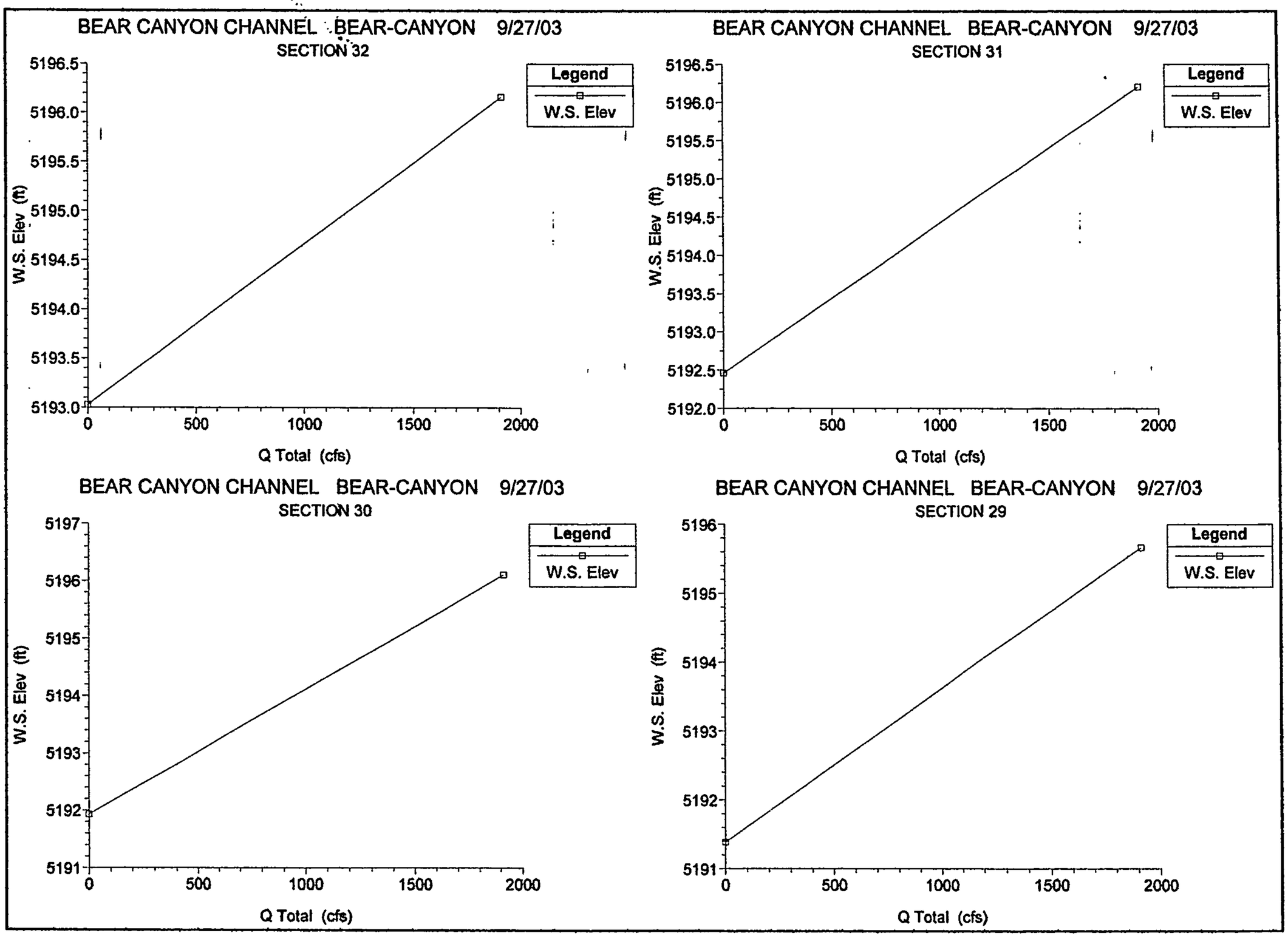

BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 28
Legend
W.S. Elev
W.S. Elev (ft)
5195
5194
5193
5192
5191
5190
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 27
Legend
W.S. Elev
W.S. Elev (ft)
5193
5192
5191
5190
5189
5188
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 26
Legend
W.S. Elev
W.S. Elev (ft)
5193
5192
5191
5190
5189
5188
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 25
Legend
W.S. Elev
W.S. Elev (ft)
5191.0
5190.5
5190.0
5189.5
5189.0
5188.5
5188.0
5187.5
5187.0
0
500
1000
1500
2000
Q Total (cfs)


BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 32
Legend
W.S. Elev
W.S. Elev (ft)
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 31
Legend
W.S. Elev
W.S. Elev (ft)
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 30
Legend
W.S. Elev
W.S. Elev (ft)
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 29
Legend
W.S. Elev
W.S. Elev (ft)
Q Total (cfs)

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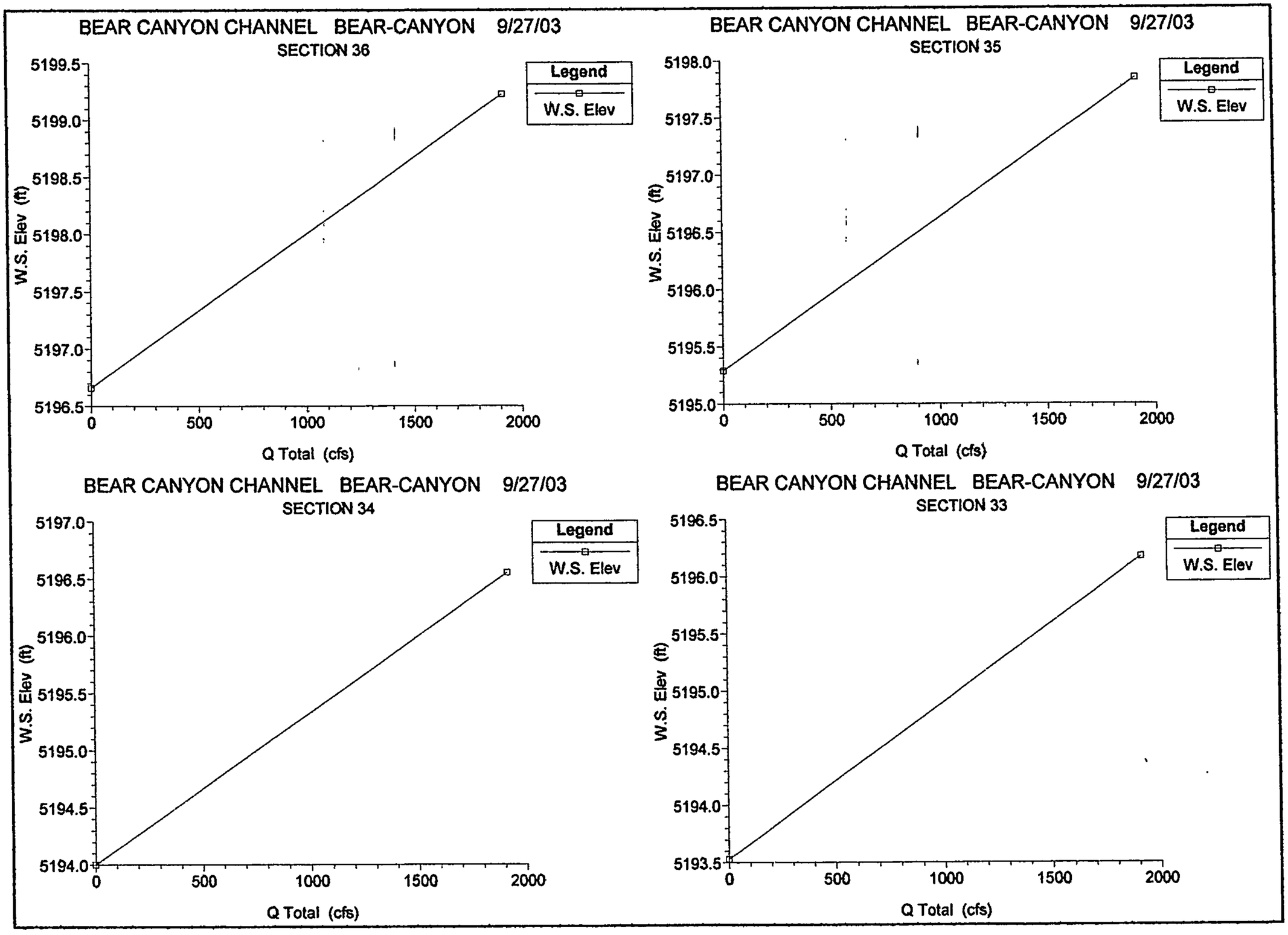
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 36
Legend
W.S. Elev
W.S. Elev (ft)
5199.5
5199.0
5198.5
5198.0
5197.5
5197.0
5196.5
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 35
Legend
W.S. Elev
W.S. Elev (ft)
5198.0
5197.5
5197.0
5196.5
5196.0
5195.5
5195.0
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 34
Legend
W.S. Elev
W.S. Elev (ft)
5197.0
5196.5
5196.0
5195.5
5195.0
5194.5
5194.0
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 33
Legend
W.S. Elev
W.S. Elev (ft)
5196.5
5196.0
5195.5
5195.0
5194.5
5194.0
5193.5
0
500
1000
1500
2000
Q Total (cfs)

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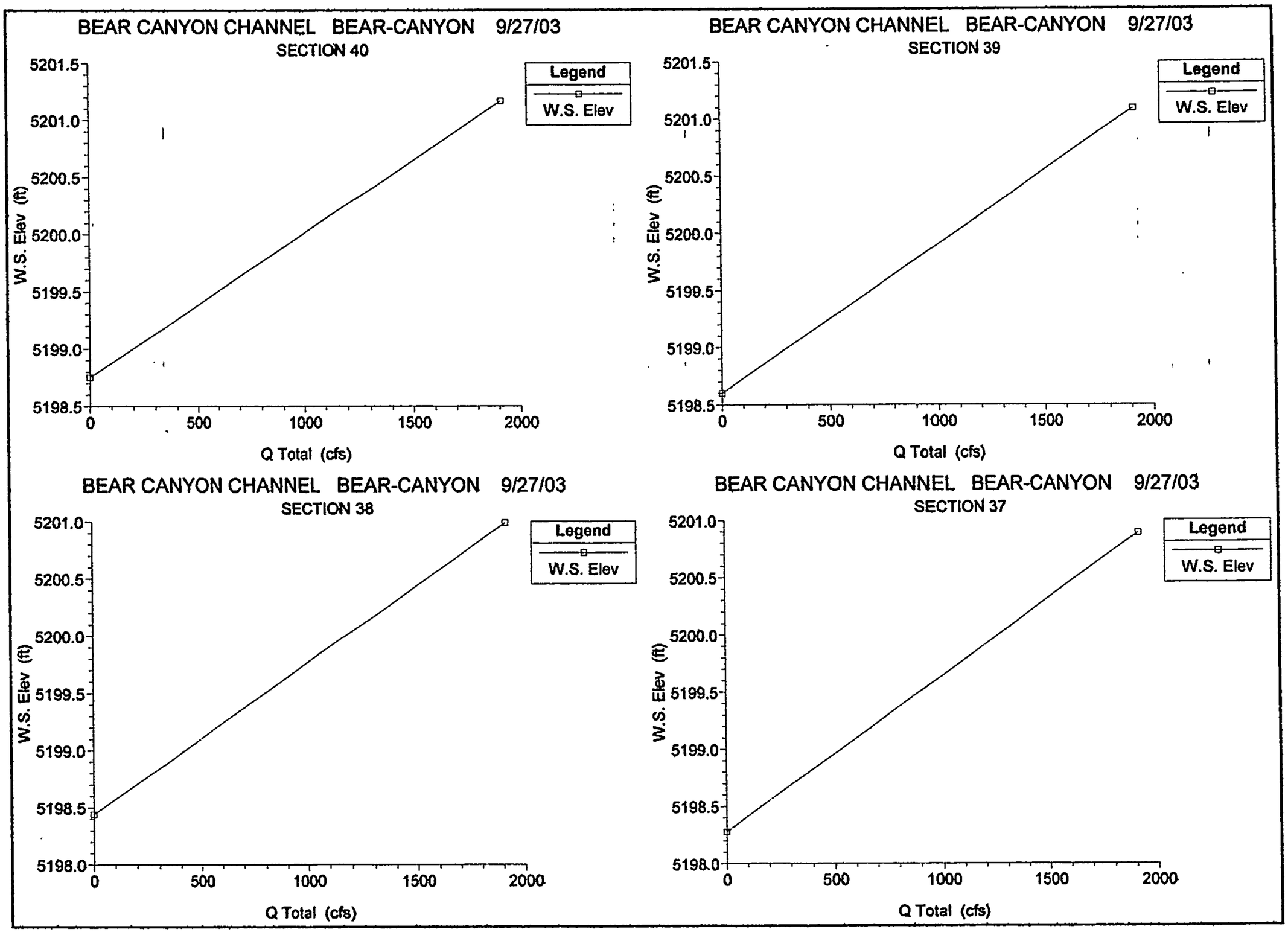
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 40
Legend
W.S. Elev
W.S. Elev (ft)
5201.5
5201.0
5200.5
5200.0
5199.5
5199.0
5198.5
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 39
Legend
W.S. Elev
W.S. Elev (ft)
5201.5
5201.0
5200.5
5200.0
5199.5
5199.0
5198.5
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 38
Legend
W.S. Elev
W.S. Elev (ft)
5201.0
5200.5
5200.0
5199.5
5199.0
5198.5
5198.0
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 37
Legend
W.S. Elev
W.S. Elev (ft)
5201.0
5200.5
5200.0
5199.5
5199.0
5198.5
5198.0
0
500
1000
1500
2000
Q Total (cfs)

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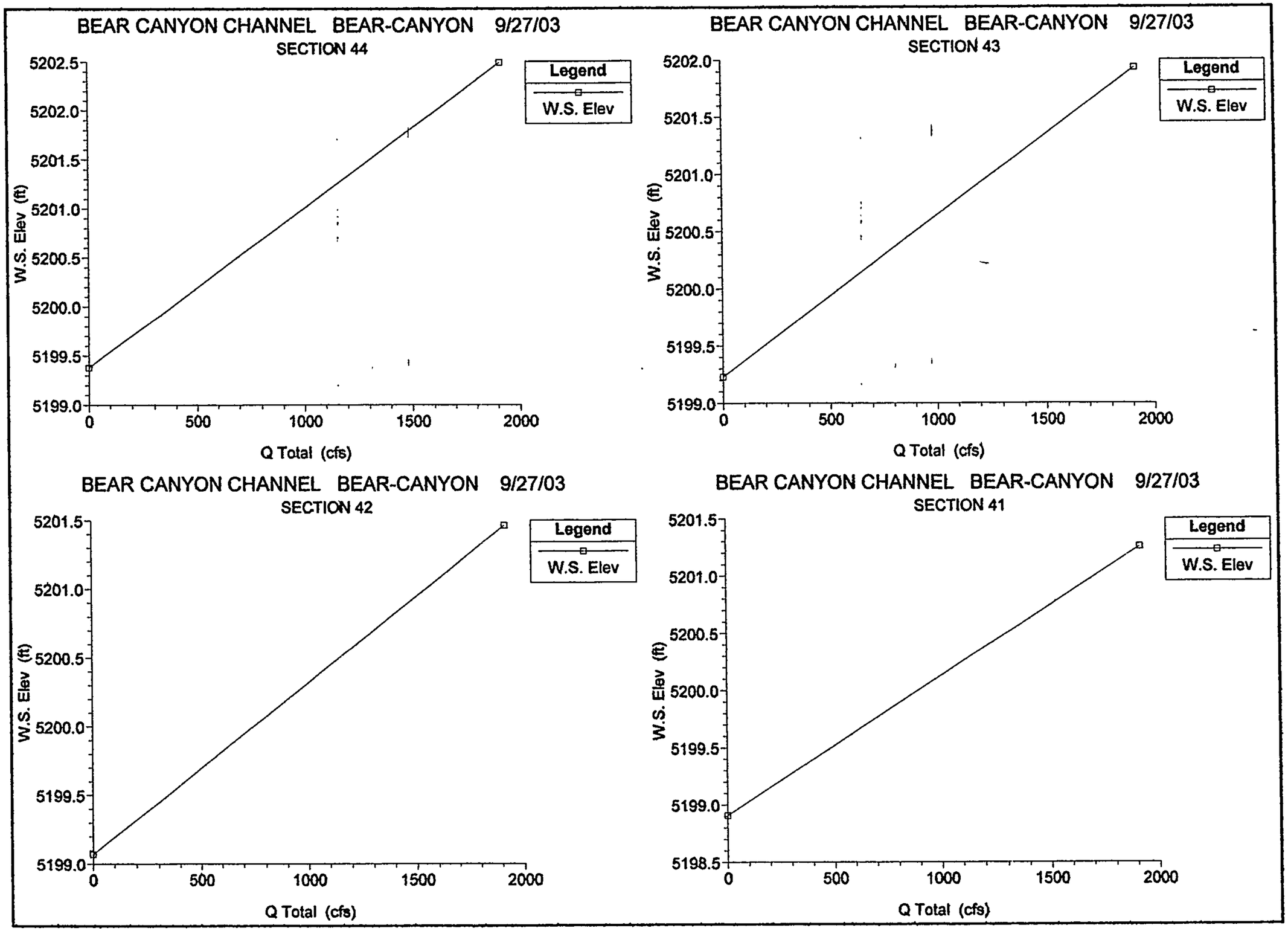
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 44
Legend
W.S. Elev
W.S. Elev (ft)
5202.5
5202.0
5201.5
5201.0
5200.5
5200.0
5199.5
5199.0
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 43
Legend
W.S. Elev
W.S. Elev (ft)
5202.0
5201.5
5201.0
5200.5
5200.0
5199.5
5199.0
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 42
Legend
W.S. Elev
W.S. Elev (ft)
5201.5
5201.0
5200.5
5200.0
5199.5
5199.0
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 41
Legend
W.S. Elev
W.S. Elev (ft)
5201.5
5201.0
5200.5
5200.0
5199.5
5199.0
5198.5
0
500
1000
1500
2000
Q Total (cfs)

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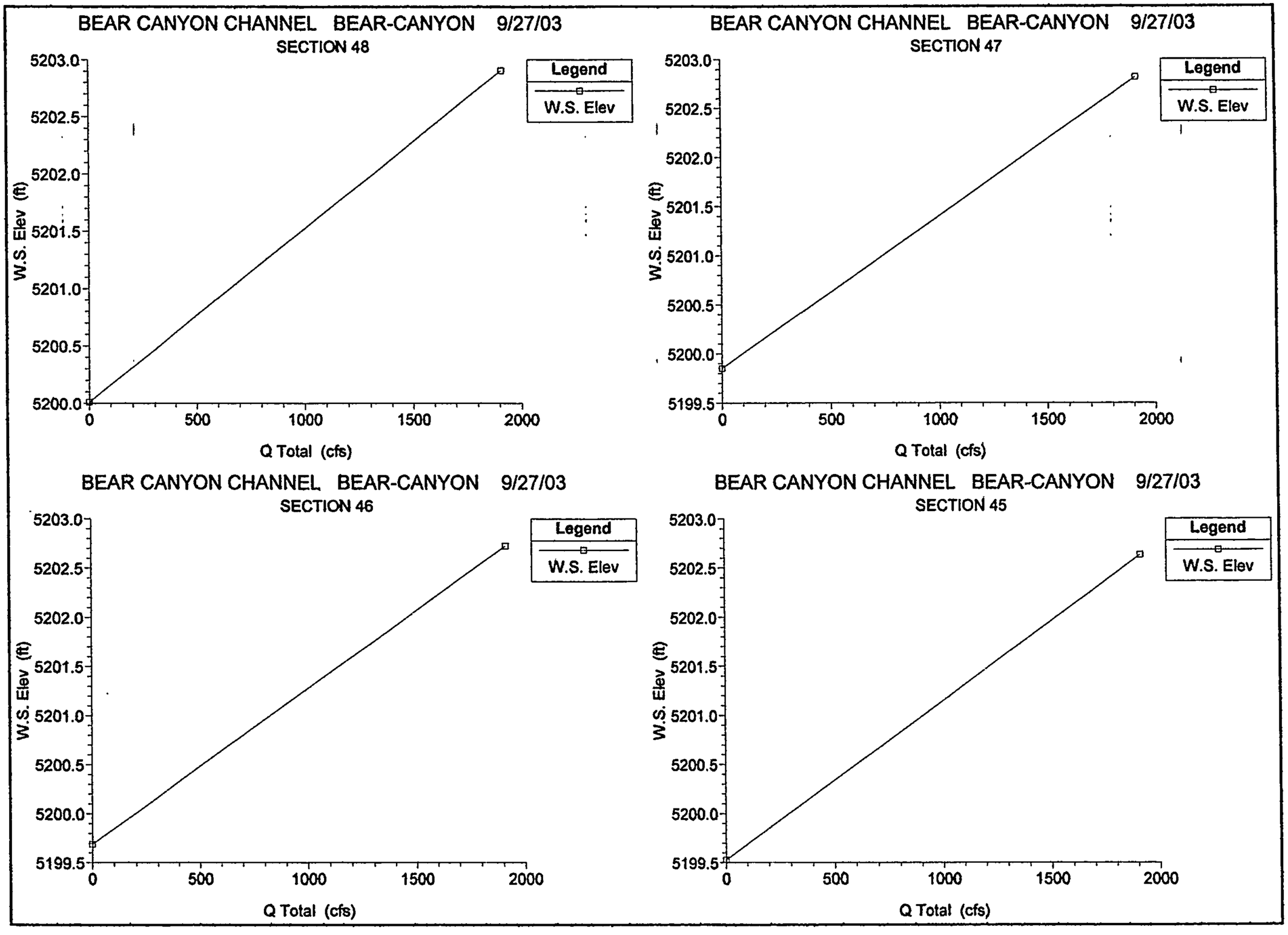
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 48
Legend
W.S. Elev
W.S. Elev (ft)
5203.0
5202.5
5202.0
5201.5
5201.0
5200.5
5200.0
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 47
Legend
W.S. Elev
W.S. Elev (ft)
5203.0
5202.5
5202.0
5201.5
5201.0
5200.5
5200.0
5199.5
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 46
Legend
W.S. Elev
W.S. Elev (ft)
5203.0
5202.5
5202.0
5201.5
5201.0
5200.5
5200.0
5199.5
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 9/27/03
SECTION 45
Legend
W.S. Elev
W.S. Elev (ft)
5203.0
5202.5
5202.0
5201.5
5201.0
5200.5
5200.0
5199.5
0
500
1000
1500
2000
Q Total (cfs)

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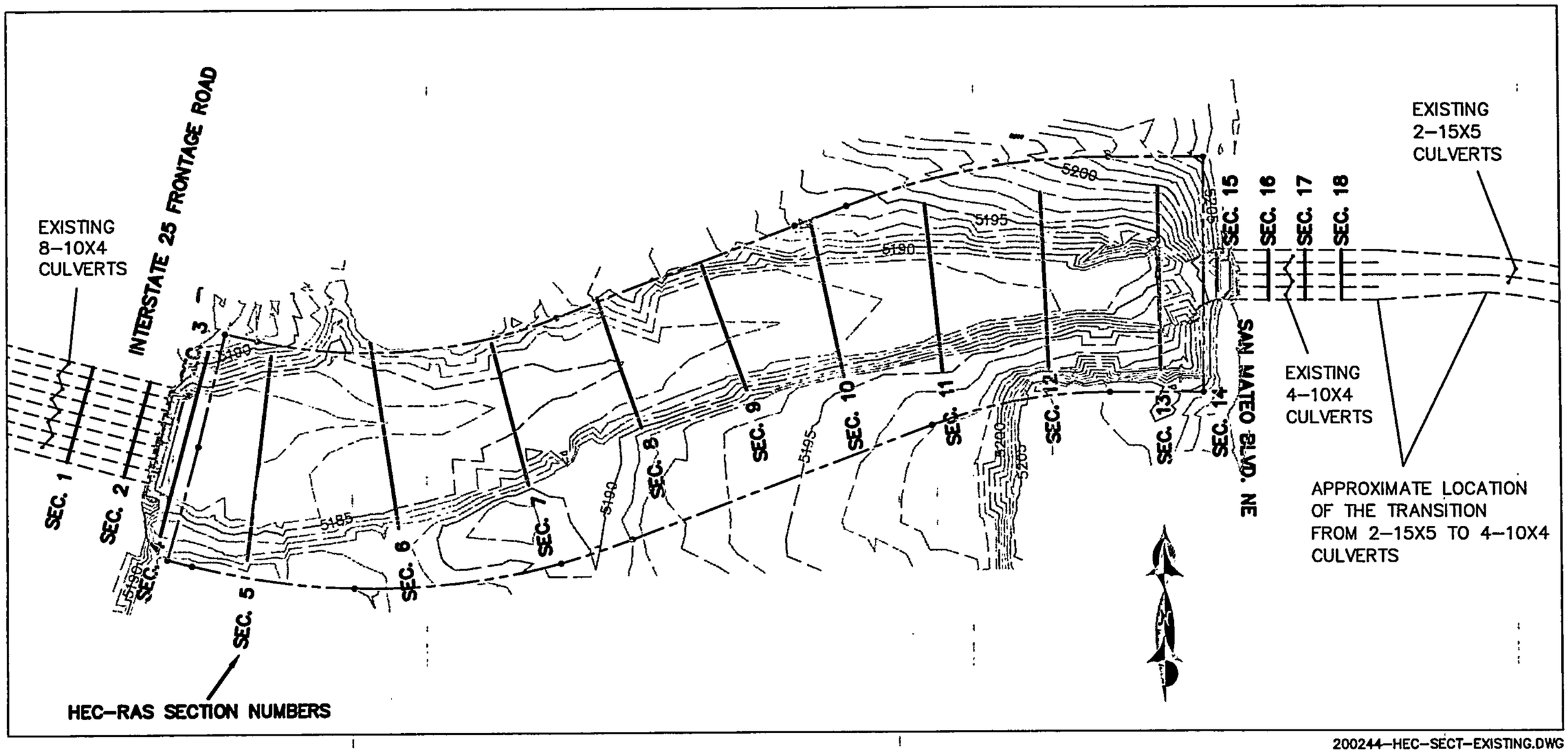

200244–HEC–SECT–EXISTING.DWG

HEC-RAS SECTION LAYOUT

NTS

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HEC-RAS OUTPUT FILE

HEC-RAS Plan: BEAR River: BEAR CANYON Reach: CHANNEL

River Sta.	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (sq ft)	Froude # Chl (ft)
18	1915.00	5198.75	5201.12	5202.90	5207.44	0.01	20.17	94.96	40.00	2.31
17	1915.00	5198.60	5201.05	5202.75	5206.99	0.01	19.56	97.89	40.00	2.20
16	1915.00	5198.44	5200.95	5202.59	5206.59	0.01	19.05	100.53	40.00	2.12
15	1915.00	5198.28	5200.85	5202.43	5206.22	0.01	18.60	102.97	40.00	2.04
14	1915.00	5198.10	5200.53	5202.13	5206.09	0.01	18.92	101.20	41.60	2.14
13	1915.00	5190.95	5192.72	5194.73	5204.56	0.04	27.61	69.36	52.29	4.22
12	1915.00	5187.95	5189.74	5191.82	5200.69	0.03	26.96	73.32	54.53	3.91
11	1915.00	5187.30	5188.89	5190.51	5196.87	0.03	22.87	85.70	74.73	3.62
10	1915.00	5186.55	5188.21	5189.58	5193.98	0.02	19.28	99.46	82.06	3.06
9	1915.00	5185.75	5187.72	5188.86	5192.01	0.01	16.67	116.01	90.63	2.54
8	1915.00	5185.00	5187.20	5188.23	5190.75	0.01	15.41	129.93	88.39	2.08
7	1915.00	5184.15	5186.36	5187.28	5189.61	0.01	14.49	132.59	105.46	2.25
6	1915.00	5183.00	5185.51	5186.33	5188.48	0.01	16.90	149.96	127.93	2.10
5	1915.00	5182.60	5183.93	5184.82	5187.26	0.01	14.84	132.99	128.77	2.46
4	1915.00	5182.20	5184.38	5184.95	5186.37	0.00	11.47	172.31	106.76	1.51
3	1915.00	5181.90	5186.05	5186.05	5188.12	0.00	11.52	166.17	40.00	1.00
2	1915.00	5181.43	5184.81	5185.58	5187.93	0.00	14.18	135.02	40.00	1.36
1	1915.00	5180.65	5183.64	5184.80	5187.61	0.01	15.99	119.79	40.00	1.63

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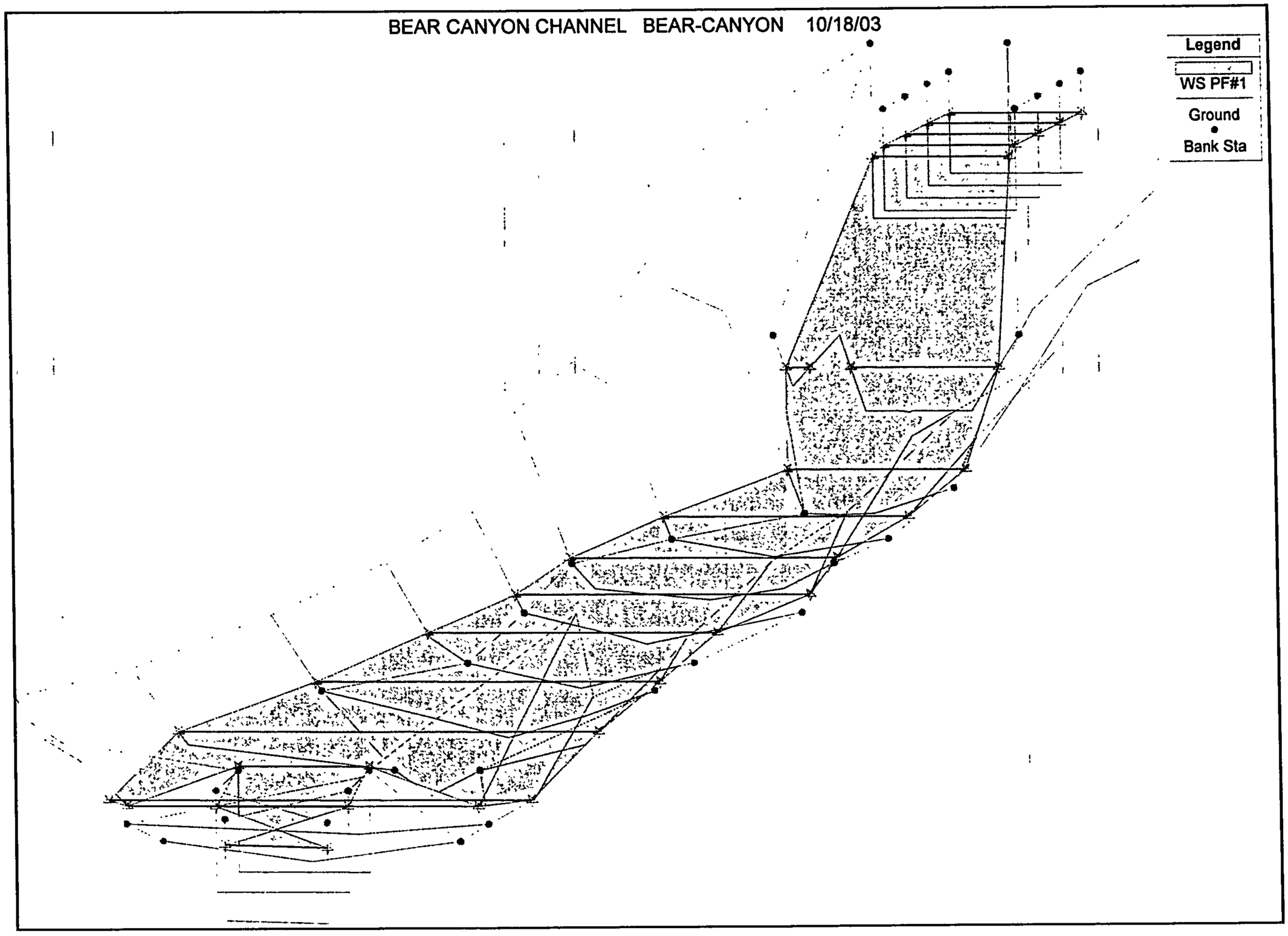
BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
Legend
WS PF#1
Ground
Bank Sta

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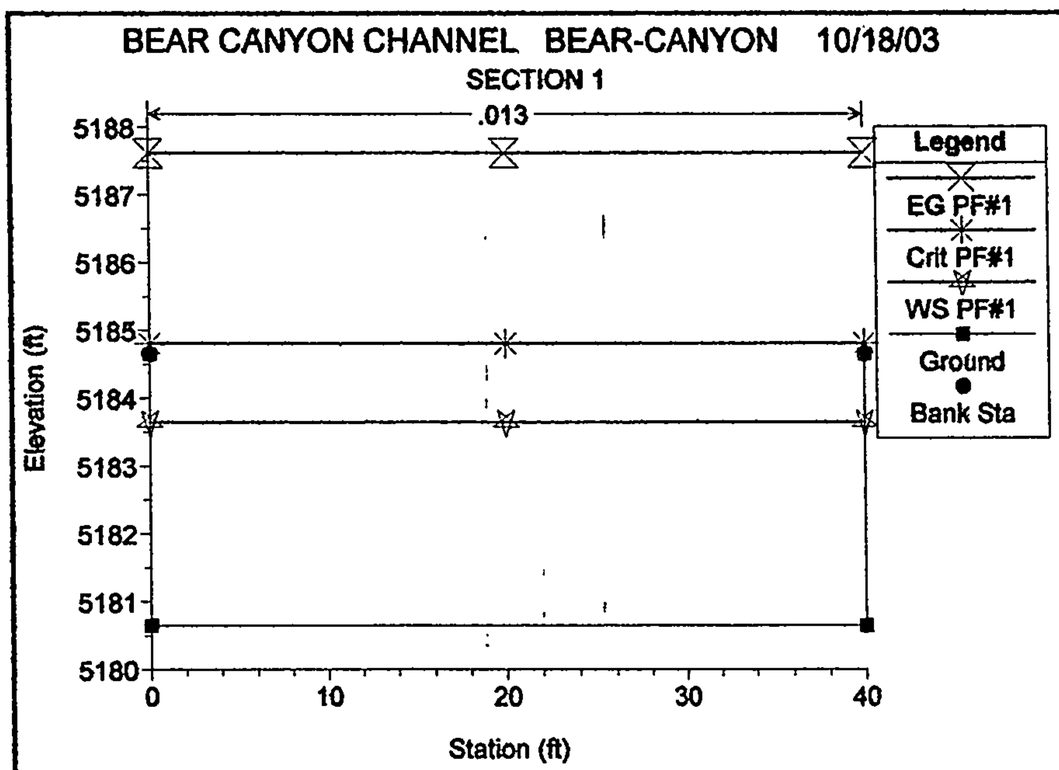
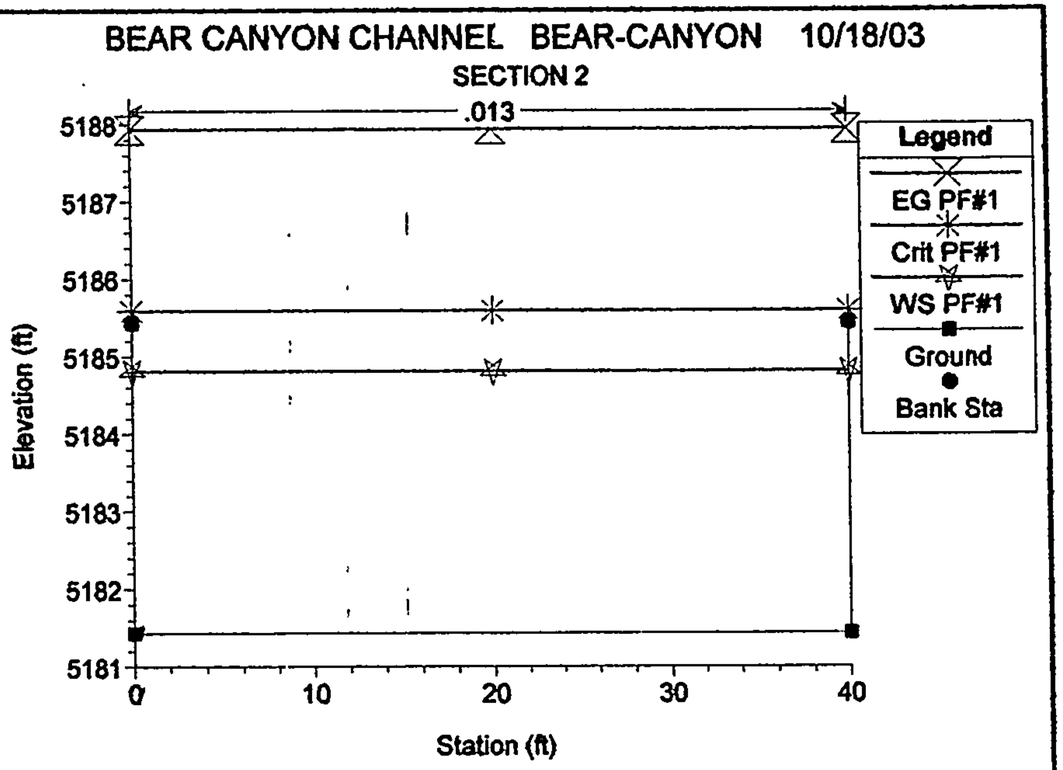
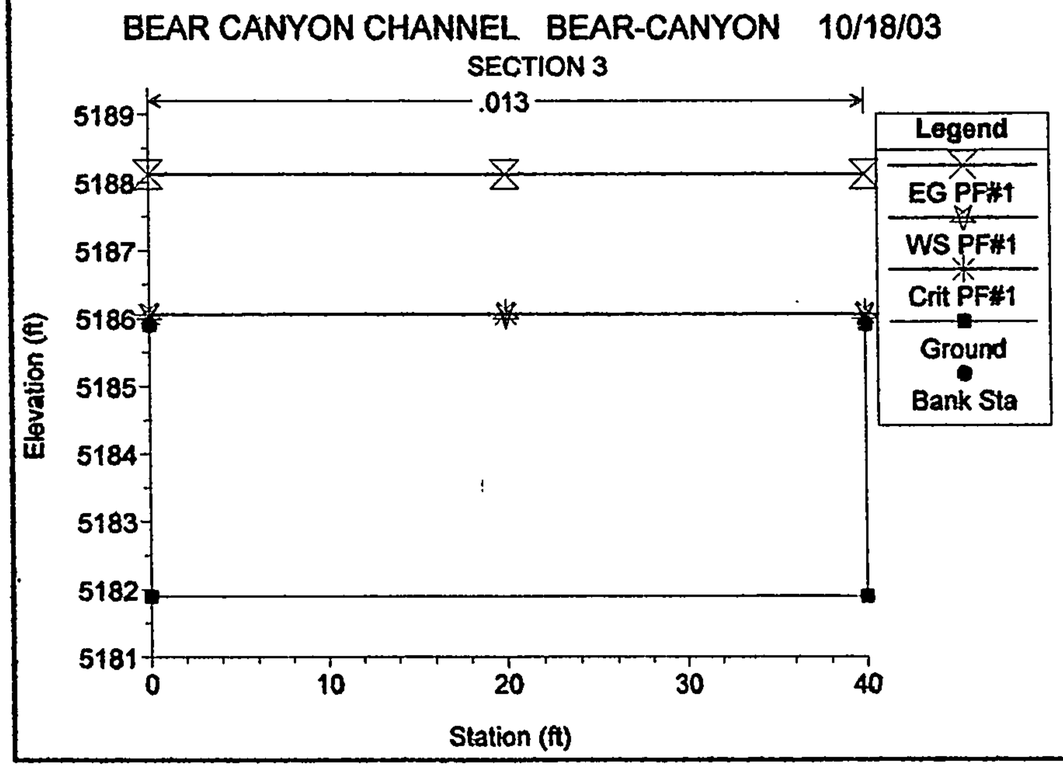
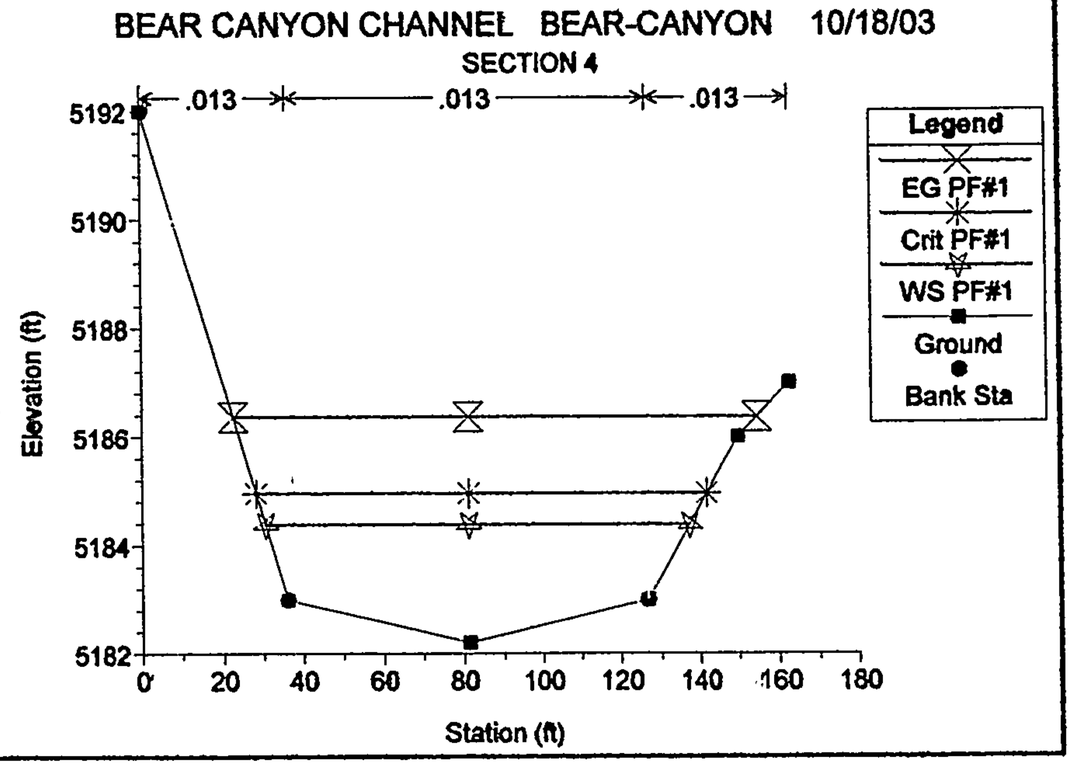

BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
SECTION 1
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5188
5187
5186
5185
5184
5183
5182
5181
5180
0
10
20
30
40


BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
SECTION 2
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5188
5187
5186
5185
5184
5183
5182
5181
0
10
20
30
40


BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
SECTION 3
.013
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5189
5188
5187
5186
5185
5184
5183
5182
5181
0
10
20
30
40


BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
SECTION 4
.013
.013
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5192
5190
5188
5186
5184
5182
0
20
40
60
80
100
120
140
160
180

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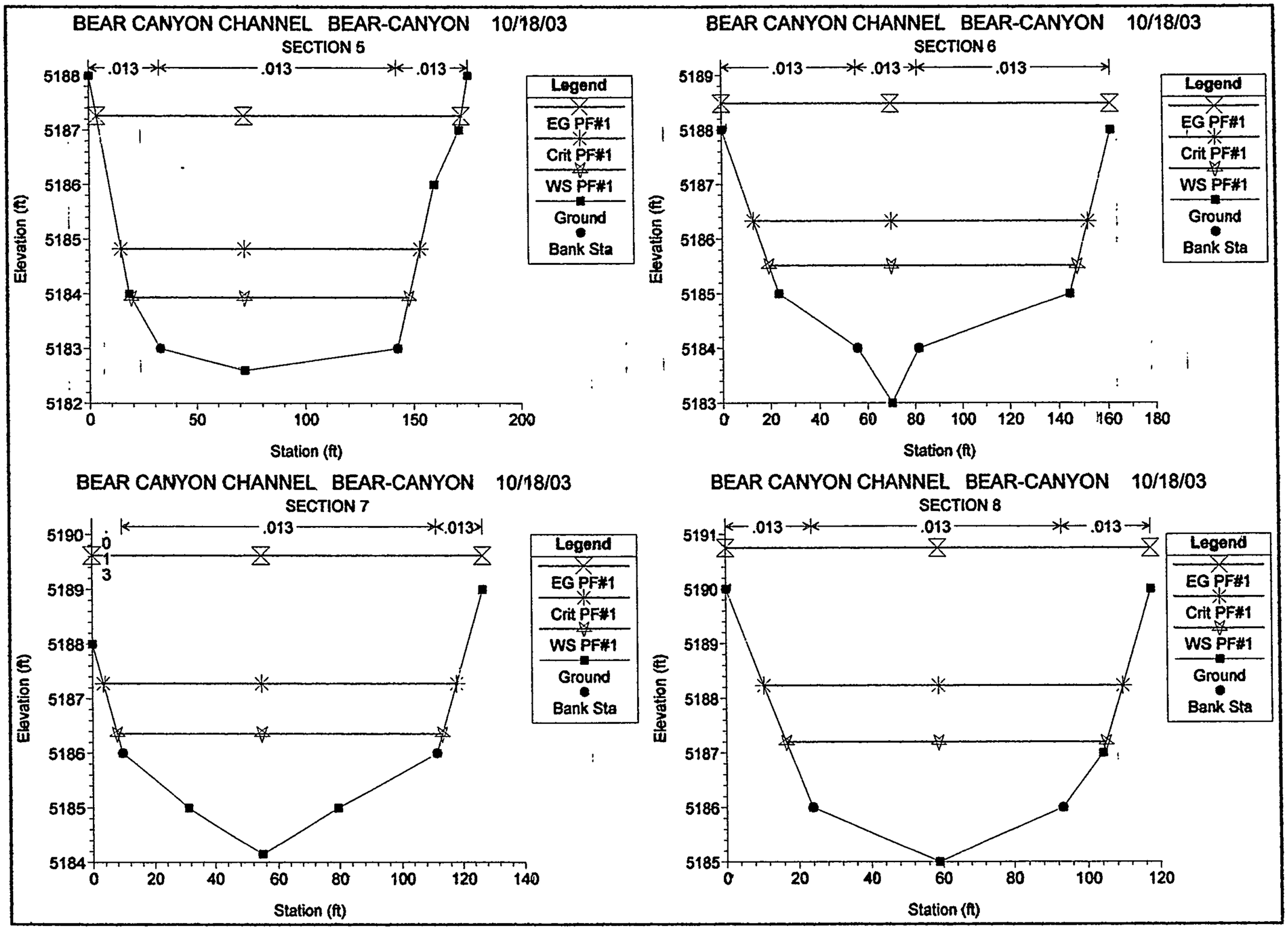
BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
SECTION 5
.013
.013
.013
Elevation (ft)
Station (ft)
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
SECTION 6
BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
SECTION 7
BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
SECTION 8

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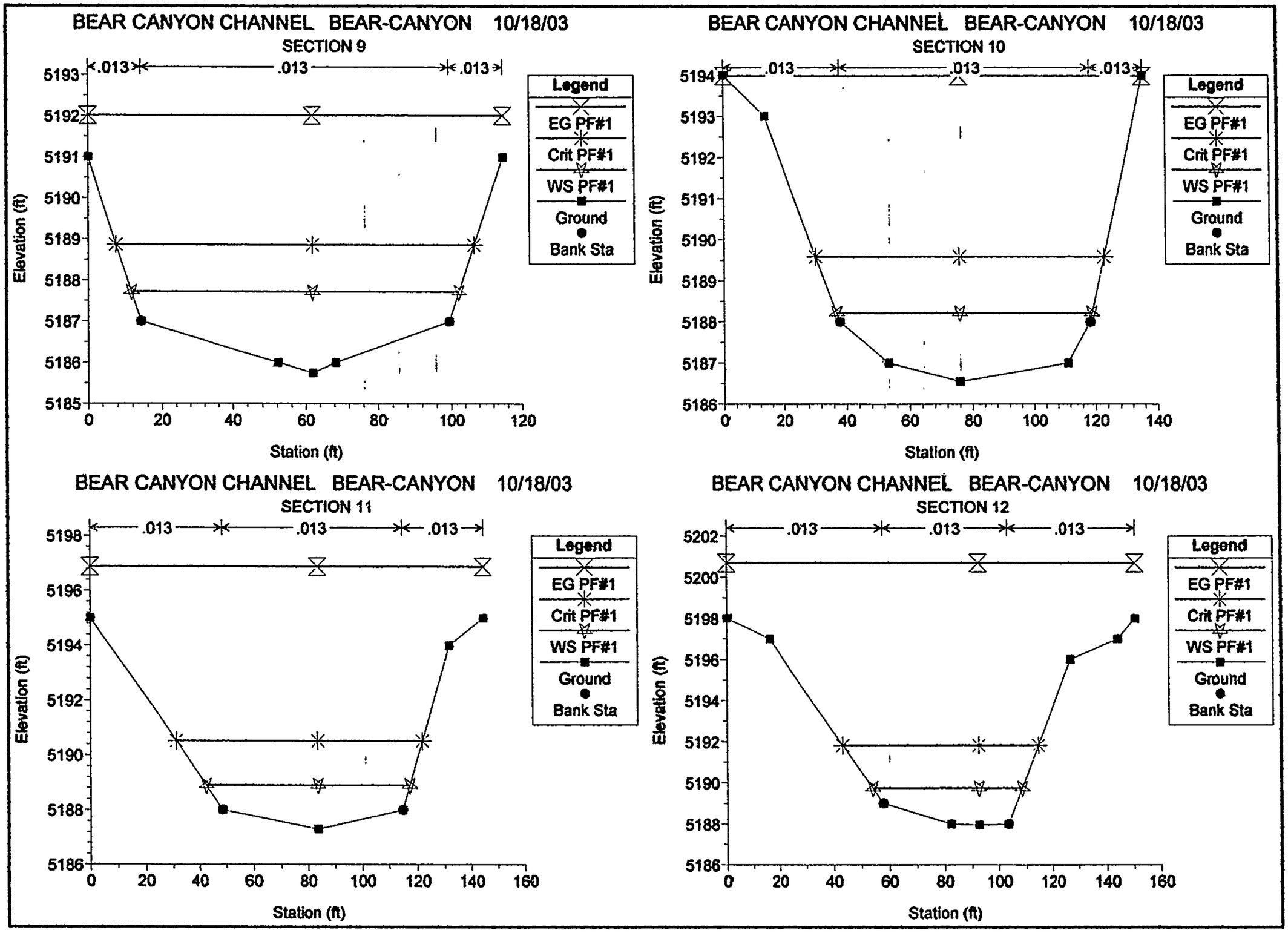
BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
SECTION 9
.013
.013
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
SECTION 10
.013
.013
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
SECTION 11
.013
.013
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
SECTION 12
.013
.013
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)

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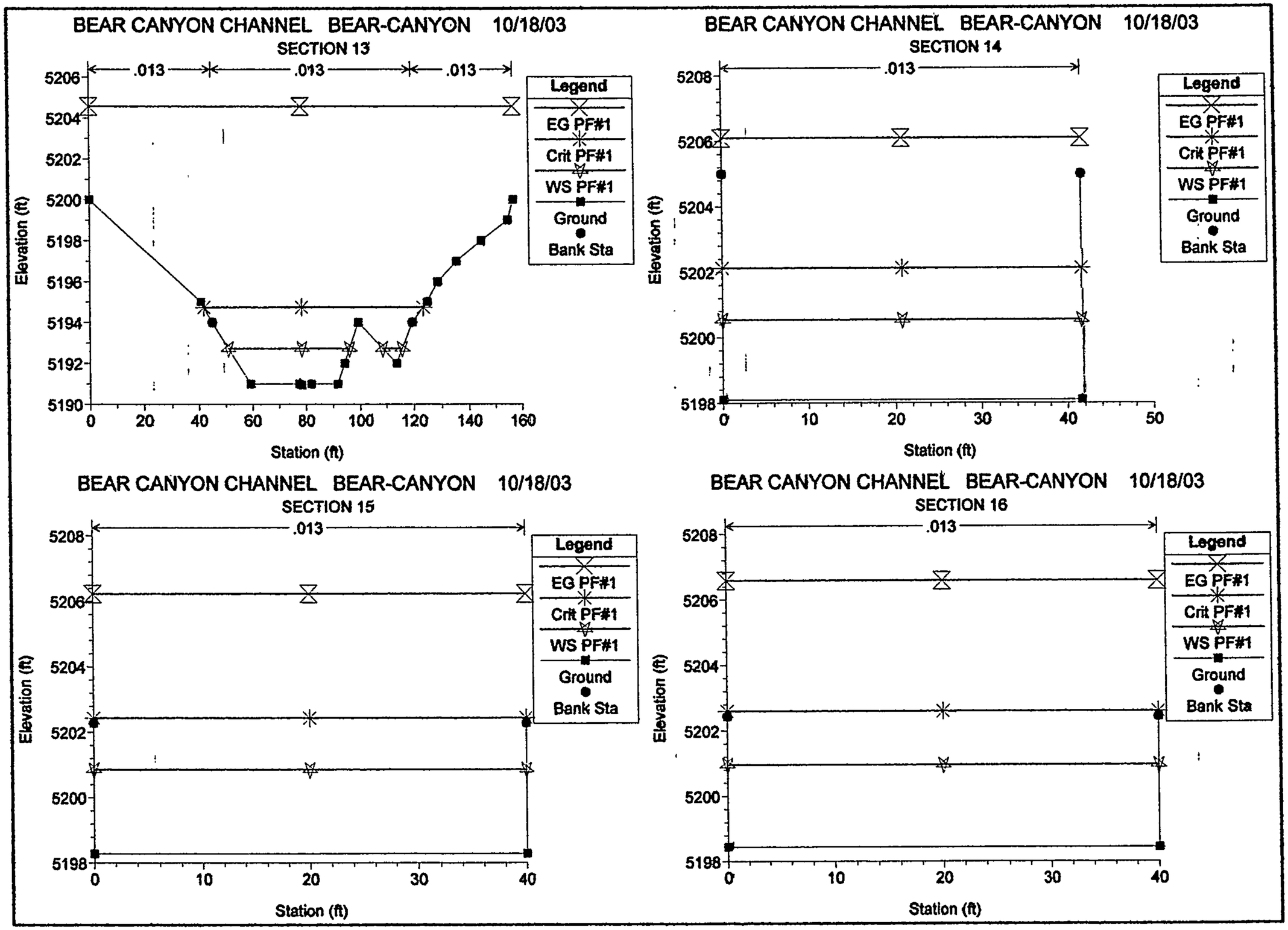
BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
SECTION 13
.013
.013
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
SECTION 14
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
SECTION 15
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
SECTION 16
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)

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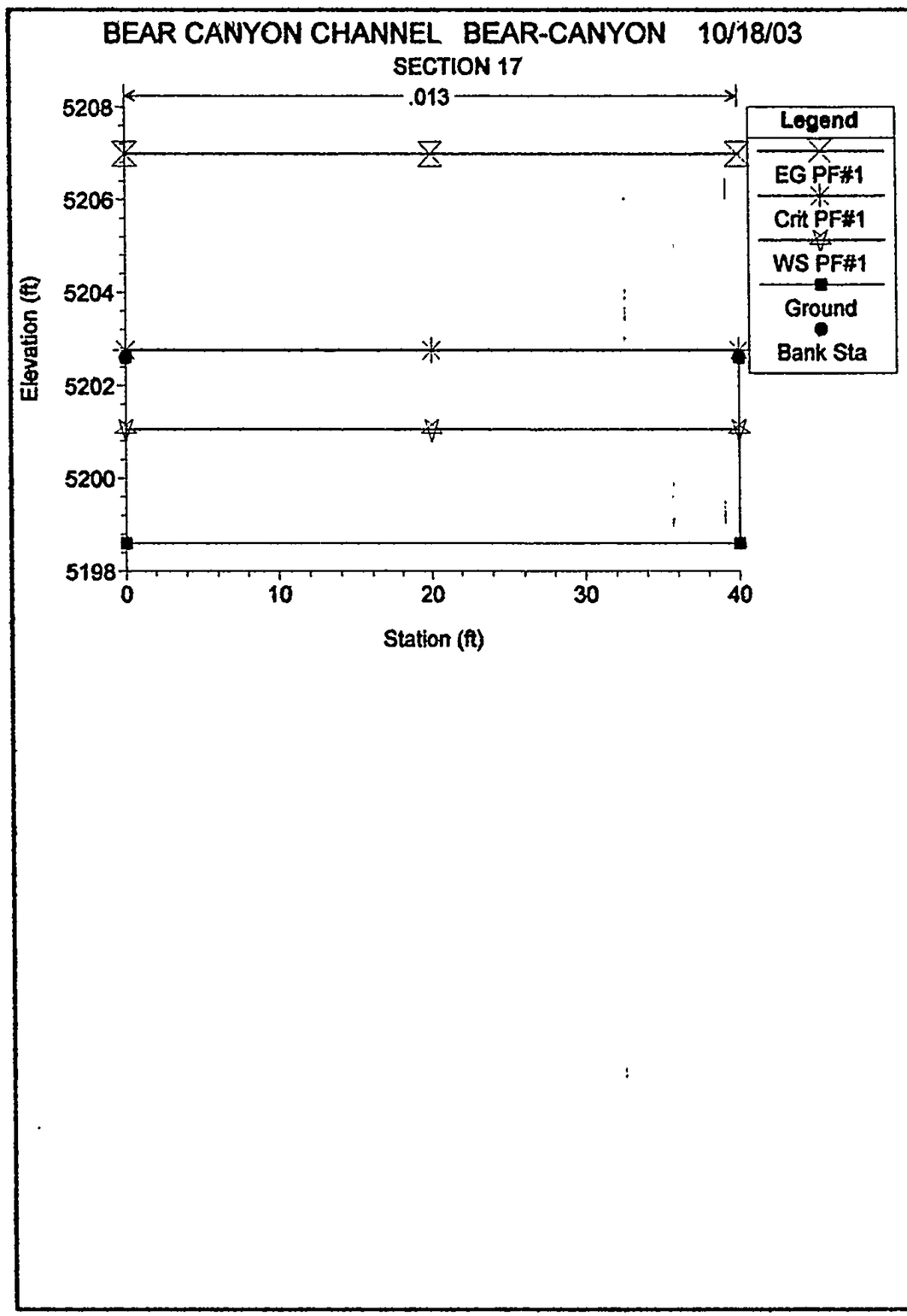
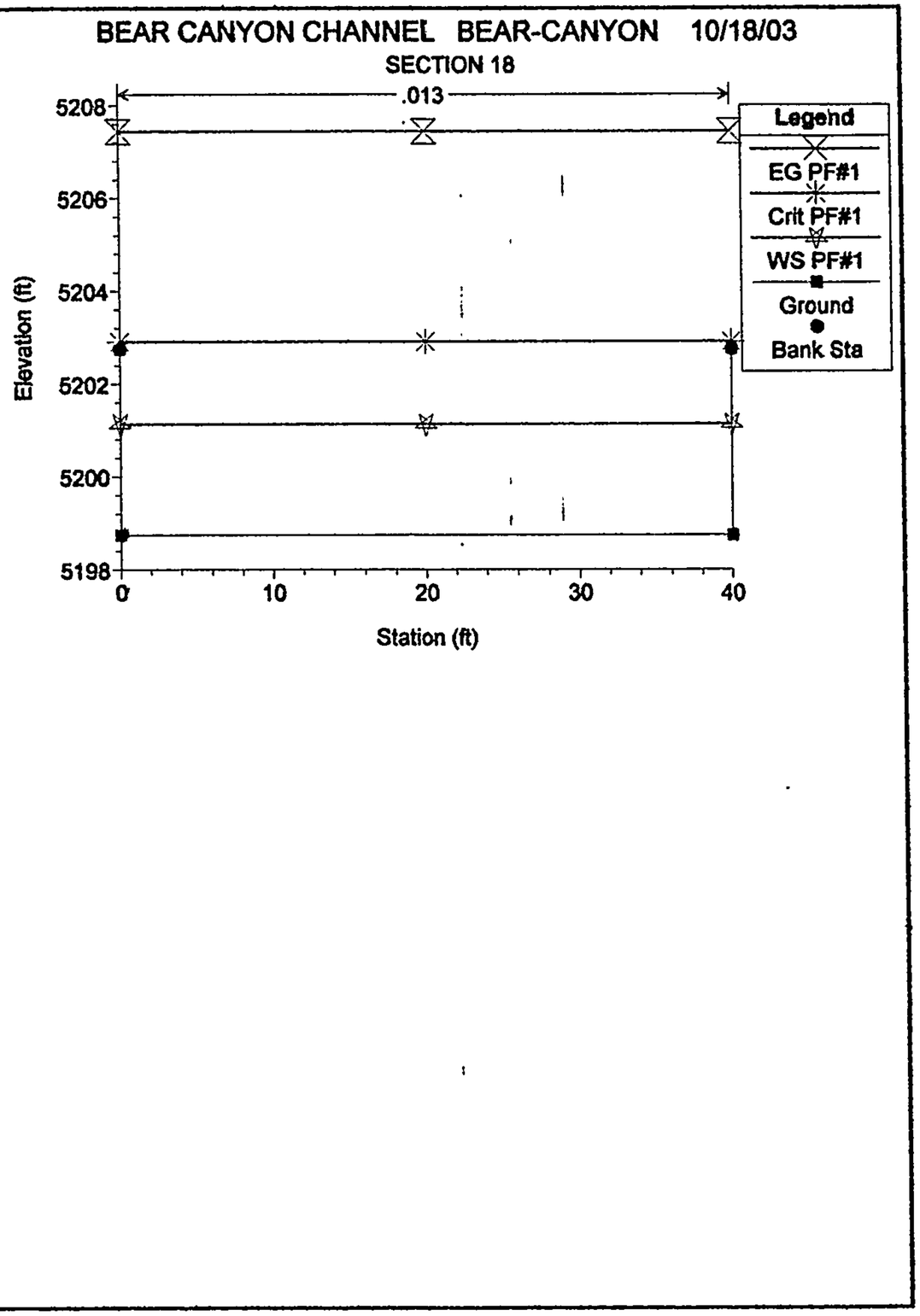

BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
SECTION 17
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5208
5206
5204
5202
5200
5198
0
10
20
30
40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SECTION 18
.013
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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5206
5204
5202
5200
5198
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10
20
30
40

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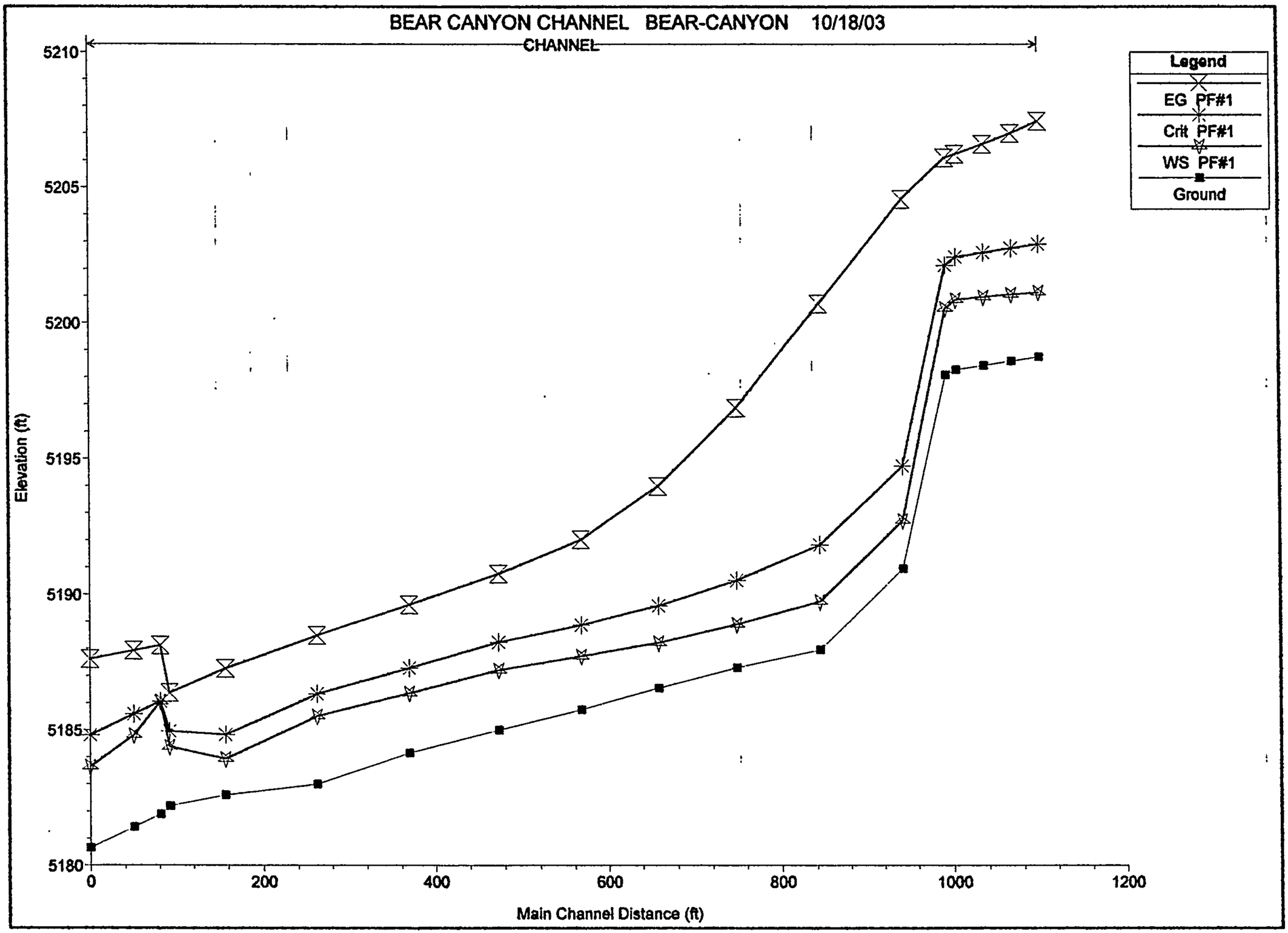
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CHANNEL
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Elevation (ft)
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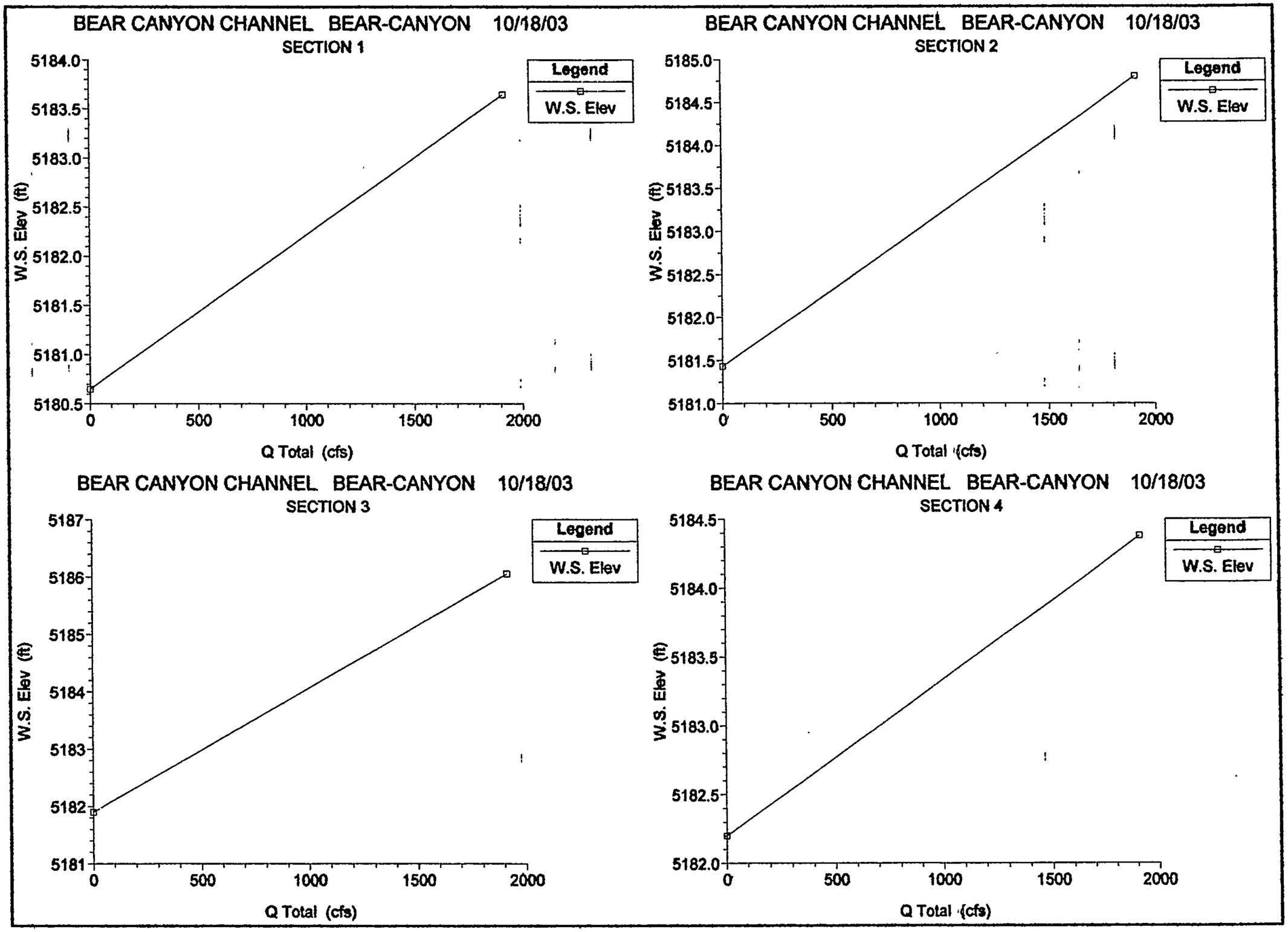
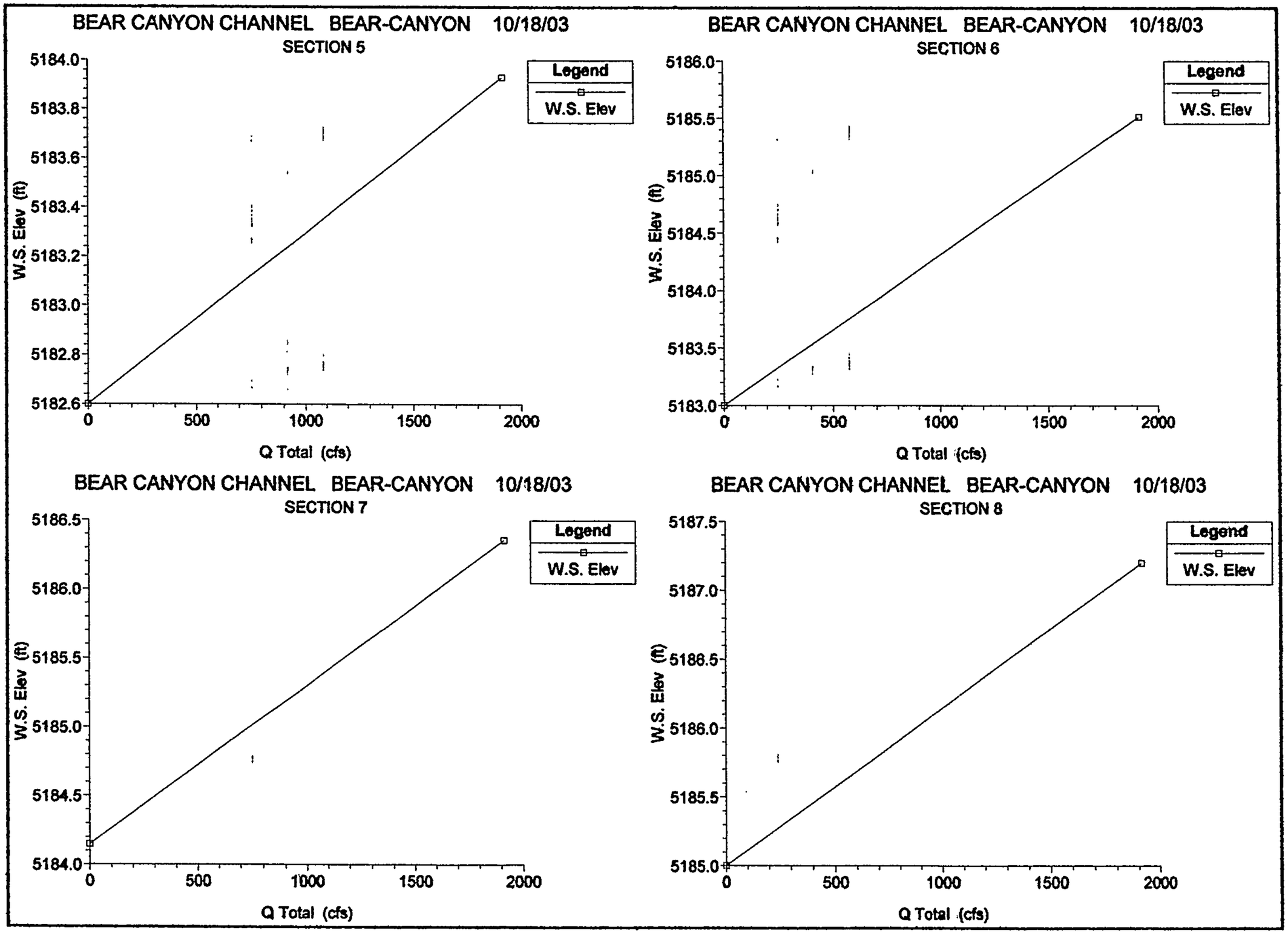
5205
5200
5195
5190
5185
5180
0
200
400
600
800
1000
1200
Main Channel Distance (ft)

****


BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
SECTION 1
Legend
W.S. Elev
W.S. Elev (ft)
5184.0
5183.5
5183.0
5182.5
5182.0
5181.5
5181.0
5180.5
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
SECTION 2
Legend
W.S. Elev
W.S. Elev (ft)
5185.0
5184.5
5184.0
5183.5
5183.0
5182.5
5182.0
5181.5
5181.0
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
SECTION 3
Legend
W.S. Elev
W.S. Elev (ft)
5187
5186
5185
5184
5183
5182
5181
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
SECTION 4
Legend
W.S. Elev
W.S. Elev (ft)
5184.5
5184.0
5183.5
5183.0
5182.5
5182.0
0
500
1000
1500
2000
Q Total (cfs)

****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SECTION 5
Legend
W.S. Elev
W.S. Elev (ft)
5184.0
5183.8
5183.6
5183.4
5183.2
5183.0
5182.8
5182.6
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
SECTION 6
Legend
W.S. Elev
W.S. Elev (ft)
5186.0
5185.5
5185.0
5184.5
5184.0
5183.5
5183.0
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
SECTION 7
Legend
W.S. Elev
W.S. Elev (ft)
5186.5
5186.0
5185.5
5185.0
5184.5
5184.0
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
SECTION 8
Legend
W.S. Elev
W.S. Elev (ft)
5187.5
5187.0
5186.5
5186.0
5185.5
5185.0
0
500
1000
1500
2000
Q Total (cfs)

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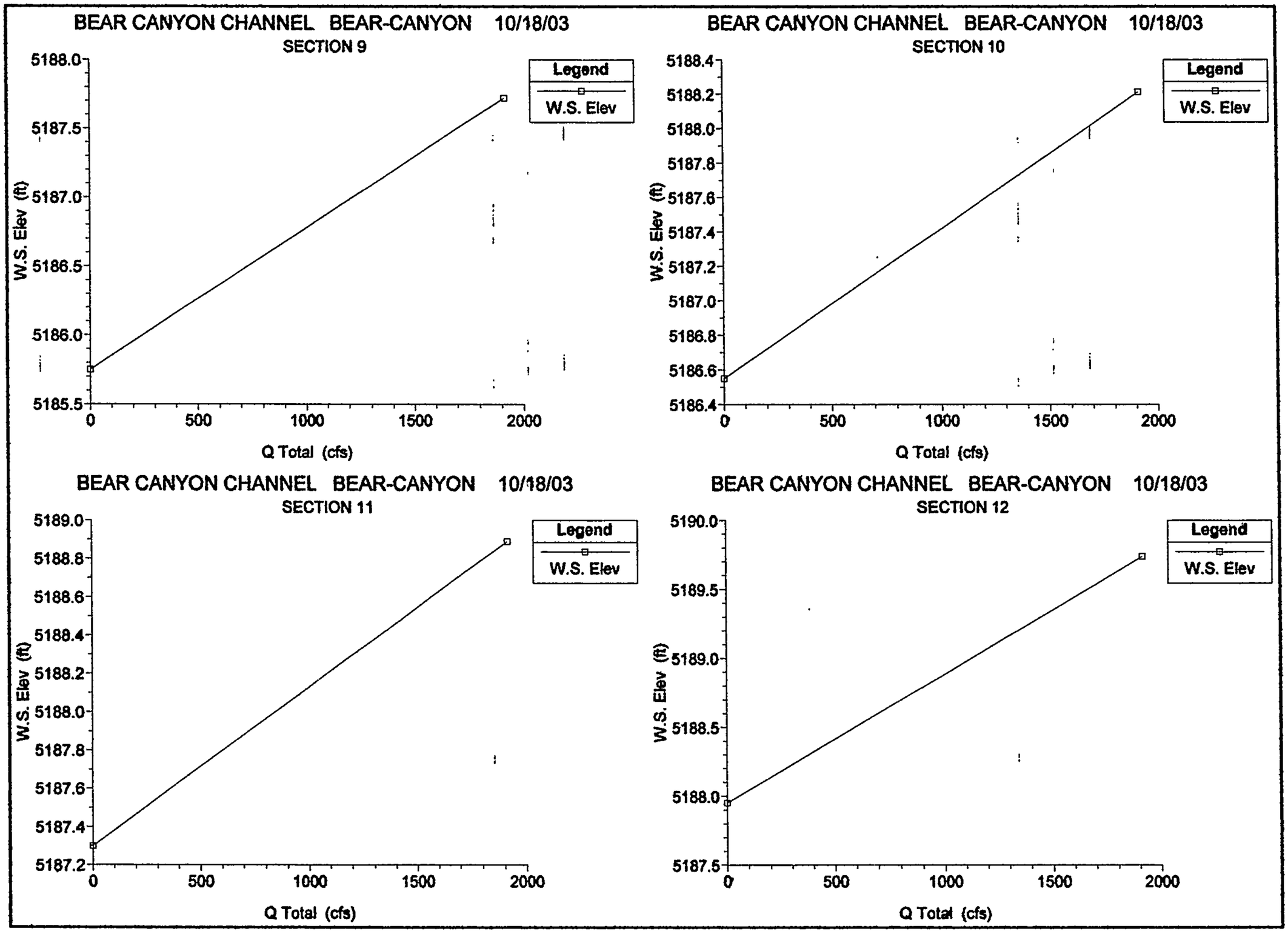
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SECTION 9
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W.S. Elev
W.S. Elev (ft)
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5187.5
5187.0
5186.5
5186.0
5185.5
0
500
1000
1500
2000
BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
SECTION 10
Legend
W.S. Elev
W.S. Elev (ft)
Q Total (cfs)
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5188.2
5188.0
5187.8
5187.6
5187.4
5187.2
5187.0
5186.8
5186.6
5186.4
0
500
1000
1500
2000
BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
SECTION 11
Legend
W.S. Elev
W.S. Elev (ft)
Q Total (cfs)
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5188.6
5188.4
5188.2
5188.0
5187.8
5187.6
5187.4
5187.2
0
500
1000
1500
2000
BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
SECTION 12
Legend
W.S. Elev
W.S. Elev (ft)
Q Total (cfs)
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5188.5
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5187.5
0
500
1000
1500
2000

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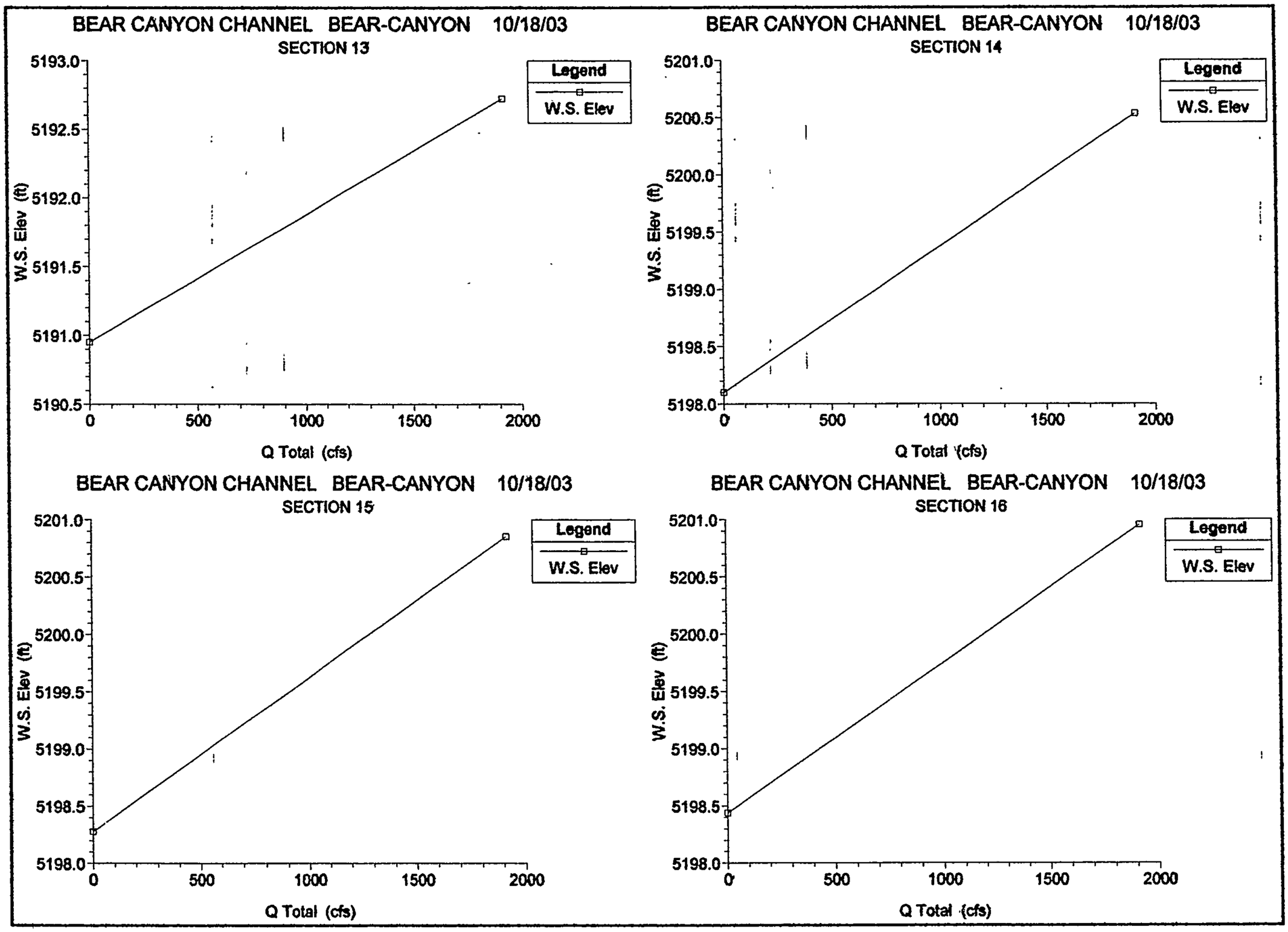
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W.S. Elev (ft)
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5192.0
5191.5
5191.0
5190.5
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
SECTION 14
Legend
W.S. Elev
W.S. Elev (ft)
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5200.5
5200.0
5199.5
5199.0
5198.5
5198.0
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
SECTION 15
Legend
W.S. Elev
W.S. Elev (ft)
5201.0
5200.5
5200.0
5199.5
5199.0
5198.5
5198.0
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
SECTION 16
Legend
W.S. Elev
W.S. Elev (ft)
5201.0
5200.5
5200.0
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500
1000
1500
2000
Q Total (cfs)

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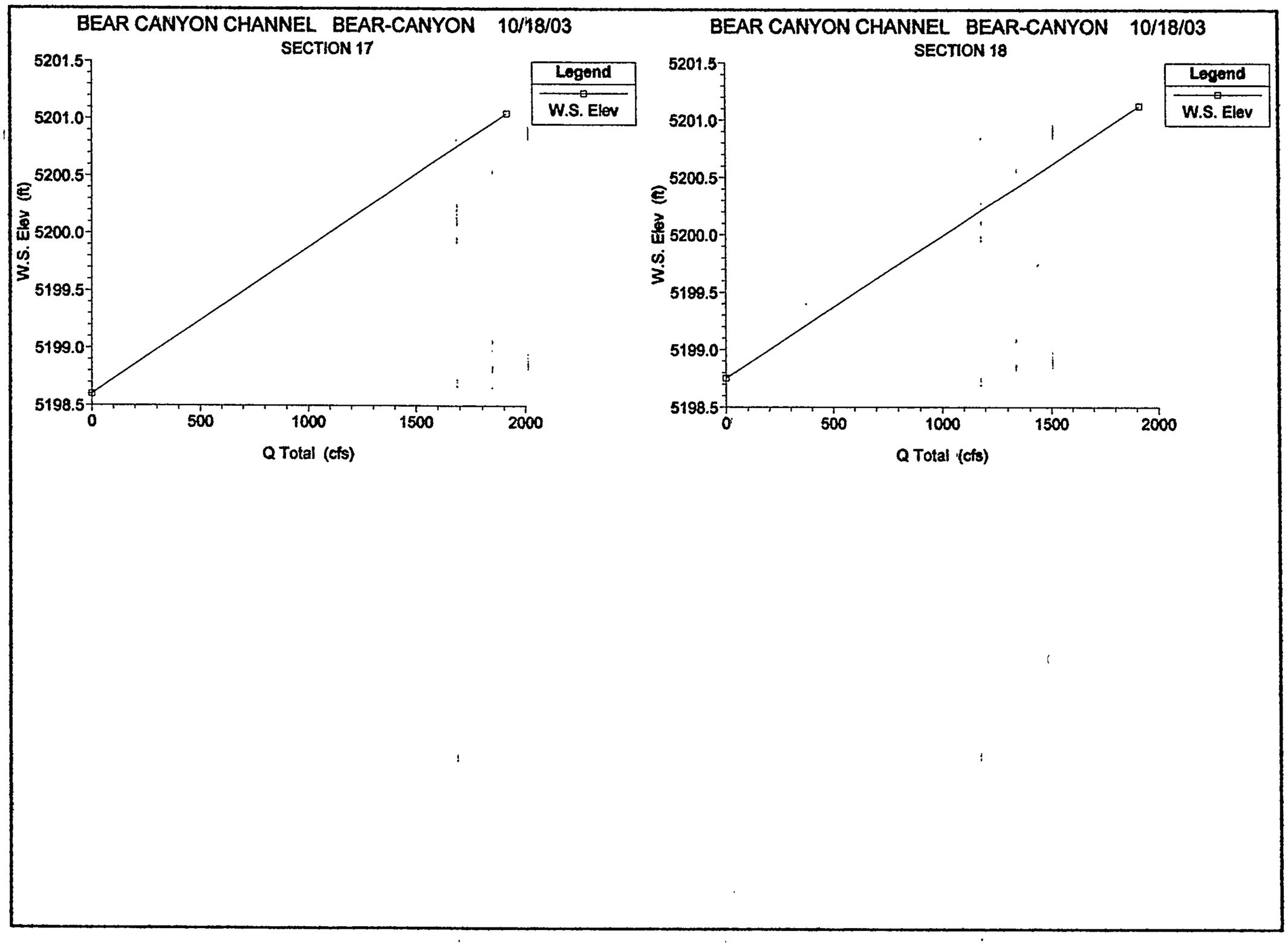
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SECTION 17
Legend
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W.S. Elev (ft)
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5201.0
5200.5
5200.0
5199.5
5199.0
5198.5
0
500
1000
1500
2000
Q Total (cfs)
BEAR CANYON CHANNEL BEAR-CANYON 10/18/03
SECTION 18
Legend
W.S. Elev
W.S. Elev (ft)
5201.5
5201.0
5200.5
5200.0
5199.5
5199.0
5198.5
0
500
1000
1500
2000
Q Total (cfs)

TABLE OF CONTENTS

FORM 1

Revision Requester And Community Official Form
(Pages 1 of 2 and 2 of 2)

Additional Information for Form 1

FORM 2

Reverine Hydrology & Hydraulics Form
(Pages 1 of 2 and 2 of 2)

Additional Information for Form 2

Section of the Modeling Map from the "Far Northeast Heights Master Drainage Plan"

Flow Spread Sheet from the "Far Northeast Heights Master Drainage Plan"

Flow Spread Sheet from the "Far Northeast Heights Master Drainage Plan"

FORM 3

Reverine Structure Form
(Pages 1 of 2 and 2 of 2)

FORM 4

Riverine Hydraulic Analysis Form
(Pages 1 of 2 and 2 of 2)

Additional Information for Form 4

Cover Sheet of The Firm Map

Exhibit - Portion Of The Actual Firm Map With The Location of the Site (1"=500')

Exhibit - Portion Of The Actual Firm Map After Floodplain is Revised (1"=500')

Exhibit - Firm Map Downloaded From The City Web Site With Floodplain Area To Be Removed (1"=400')

Exhibit - Firm Map Downloaded From The City Web Site With Floodplain Area To Be Removed (1"=200')

Exhibit - Flood Plain Map After Construction of The Box Culvert (1"=±400')

Payment Information Form

Fee Schedule Sheet

APPENDIX A

Drainage Report

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FEDERAL EMERGENCY MANAGEMENT AGENCY **REVISION REQUESTER AND COMMUNITY OFFICIAL**	O.M.B No. 3067-0148 Expires April 30, 2001

Public reporting burden for this form is estimated to average 2.13 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.

1. REQUESTED RESPONSE FROM FEMA

This request is for a:

☒ CLOMR A letter from FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision, or proposed hydrology changes (See 44 CFR Ch. 1, Parts 60,65 & 72).

☐ LOMR A letter from FEMA officially revising the current NFIP map to show the changes to floodplains, floodway or flood elevations. LOMRs typically decrease flood hazards. (See 44 CFR Ch. 1 Parts 60 & 65.)

☐ Other Describe: _____

2. OVERVIEW

1. The basis for this revision request is (are): (check all that apply)

☒ Physical Change ☐ Improved Methodology/Data ☐ Floodway Revision

☐ Other Describe: _____
Note: A photograph is not required, but is very helpful during review.

2. Flooding Source: EXISITNG ARROYO, LARGE UPSTREAM BASIN

3. Project Name/Identifier: BEAR CANYON BOX CULVERT EXTENSION

4. FEMA zone designations affected: ZONE AO (DEPTH 2)
(example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, VE, B, C, D, X)

5. The NFIP map panel(s) affected for all impacted communities is (are):

Community No.	Community Name	State	Map No.	Panel No.	Effective Date
Ex: 480301 480287	Katy, City Harris County	TX TX	480301 48201C	0005D 0220G	02/08/83 09/28/90
350002	CITY OF ALBUQUERQUE, BERNALILLO COUNTY	NM	35001C	0139D	09/20/1996

6. The area of revision encompasses the following types of flooding and structures. Check all that apply.

Types of Flooding	Structures
☐ Riverine	☐ Channelization
☐ Coastal	☐ Levee/Floodwall
☐ Alluvial fan	☐ Bridge/Culvert
☒ Shallow Flooding (e.g. Zones AO and AH)	☐ Dam
☐ Lakes	☐ Fill
☐ Other (describe)	☒ Other (describe)

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

4. ENCROACHMENT INFORMATION

1. Does the State have jurisdiction over the floodway or its adoption by communities participating in the NFIP?
☐ Yes ☒ No

If Yes, attach a copy of a letter notifying the appropriate State agency of the floodway revision and documentation of the approval of the revised floodway by the appropriate State agency.

2. Does the development in the floodway cause the 1% annual chance (base) elevation to increase at any location by more than 0.000 feet? ☐ Yes ☐ No ☒ N/A

3. Does the cumulative effect of all development that has occurred since the effective SFHA was originally identified cause the base flood elevation to increase at any location by more than one foot (or other increase limit if community or state has adopted more stringent criteria - even if a floodway has not been delineated by FEMA)? ☐ Yes ☒ No

If the answer to either items is Yes, please attach documentation that all requirements of Section 65.12 of the NFIP regulations have been met, regarding evaluation of alternatives, notice to individual legal property owners, concurrence of CEO, and certification that no insurable structures are impacted.

5. MAINTENANCE RESPONSIBILITY

The community is willing to assume responsibility for ☒ performing ☐ overseeing compliance with the maintenance and operation plans of the BEAR CANYON BOX CULVERT EXTENSION (Name)
flood control structure. If not performed promptly by an owner other than the community, the community will provide the necessary services without cost to the Federal government.

Operation and maintenance plans are attached. ☐ **Yes** ☐ **No** ☒ **N/A**

6. REVIEW FEE

The review fee for the appropriate request category has been included. ☒ Yes Fee amount: $4,000.00

OR

This request is based on a federally sponsored flood-control project where 50 percent or more of the project's cost is federally sponsored, or the request is based on detailed hydrologic and hydraulic studies conducted by Federal, State, or local agencies to replace approximate studies conducted by FEMA and shown on the effective FIRM; thus the project is fee exempt.
☐ Yes

Please see Instructions for Fee Amounts

7. SIGNATURE

Note: **I understand that my signature indicates that all information submitted in support of this request is correct**

Signature of Revision Requester

SHAHAB BIAZAR, P.E.
Printed Name and Title of Revision Requester

ADVANCED ENGINEERING AND CONSULTING, LLC
Company Name

Telephone No.: (505) 899-5570 Date: 02-06-2003

Note: **Signature indicates that the community understands, from the revision requester, the impacts of the revision on flooding conditions in the community.**

Signature of Community Official

BRADLY BINGAHAM, P.E.
Printed Name and Title of Community Official

Community Name

Telephone No.: (505) 924-8992 Date:

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

This certification is in accordance with 44 CFR Ch. 1, Sect 65.2

Signature

SHAHAB BIAZAR, P.E.
Printed Name and Title of Revision Requester

Registr No. 13709 Expires (Date) 12-31-2003 State NM

Type of License/Expertise: REGISTERED PROFESSIONAL ENGINEER

Check which forms have been included with this request

Form Name and (Number)	Required if .....
☐ Hydrologic (3)	new or revised discharges
☒ Hydraulic (4)	new or revised water-surface elevations
☐ Mapping (5)	floodplain/floodway changes
☐ Channelization (6)	channel is modified
☐ Bridge/Culvert (7)	addition/revision of bridge/culvert
☐ Levee/Floodwall (8)	addition/revision of levee/floodwall
☐ Coastal (9)	new or revised coastal elevations
☐ Coastal Structures (10)	addition/revision of coastal structure
☐ Dam (11)	addition/revision of dam
☐ Alluvial Fan (12)	structures proposed on alluvial fan

ADDITIONAL INFORMATION FOR FORM-1

(REVISION REQUESTER AND COMMUNITY OFFICIAL)

1. REQUESTED RESPONSE FORM FEMA

A CLOMR is requested for the 2 (10x5) Box Culvert extension connecting to exiting box culverts located to the east and to the west. Therefore, the extension of the Box Culvert will remove the exiting floodplain from the site.

2. OVERVIEW

1. The runoff will be confined to Box Culverts

6. For the structure construction of 2 (10x5) Box Culvert is being proposed.

FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE HYDROLOGY & HYDRAULICS FORM

O.M.B No. 3067-0148
Expires September 30, 2005

PAPERWORK REDUCTION ACT

Public reporting burden for this form is estimated to average 3 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless a valid OMB control number appears in the upper right corner of this form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, SW, Washington DC 20472, Paperwork Reduction Project (3067-0148). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

Flooding Source: EXISTING ARROYO, LARGE UPSTREAM BASIN
Note: Fill out one form for each flooding source studied

A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply)

☐ Not revised (skip to section 2) ☐ No existing analysis ☐ Improved data
☐ Alternative methodology ☒ Proposed Conditions (CLOMR) ☐ Changed physical condition of watershed

2. Comparison of Representative 1%-Annual-Chance Discharges

Location	Drainage Area (Sq. Mi.)	FIS (cfs)	Revised (cfs)
@ SAN MATEO (174-A)	N/A	1801	THE SAME

3. Methodology for New Hydrologic Analysis (check all that apply) N/A

☐ Statistical Analysis of Gage Records ☐ Precipitation/Runoff Model [TR-20, HEC-1, HEC-HMS etc.]
☐ Regional Regression Equations ☐ Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters) and documentation to support the new analysis. The document, "Numerical Models Accepted by FEMA for NFIP Usage" lists the models accepted by FEMA. This document can be found at: http://www.fema.gov/mit/tsd/en_modl.htm.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review.

5. Impacts of Sediment Transport on Hydrology

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered.

B. HYDRAULICS

1. Reach to be Revised

	Description	Cross Section	Water-Surface Elevations (ft.) Effective	Proposed/Revised
Downstream Limit	WEST OF SAN MATEO	30	3.00	3.93
Upstream Limit	EAST OF I-25 FRONTAGE RD.	1	3.00	4.47

2. Hydraulic Method Used

Hydraulic Analysis HEC-RAS [HEC-2 , HEC-RAS, Other (Attach description)]

B. HYDRAULICS (CONTINUED)

3. Pre-Submittal Review of Hydraulic Models

FEMA has developed two review programs, CHECK-2 and CHECK-RAS, to aid in the review of HEC-2 and HEC-RAS hydraulic models, respectively. These review programs verify that the hydraulic estimates and assumptions in the model data are in accordance with NFIP requirements, and that the data are comparable with the assumptions and limitations of HEC-2/HEC-RAS. CHECK-2 and CHECK-RAS identify areas of potential error or concern. These tools do not replace engineering judgment. CHECK-2 and CHECK-RAS can be downloaded from http://www.fema.gov/mit/tsd/frm_soft.htm. We recommend that you review your HEC-2 and HEC-RAS models with CHECK-2 and CHECK-RAS. If you disagree with a message, please attach an explanation of why the message is not valid in this case. Review of your submittal and resolution of valid modeling discrepancies will result in reduced review time.

HEC-2/HEC-RAS models reviewed with CHECK-2/CHECK-RAS? ☒ Yes ☐ No

4. Models Submitted N/A

Duplicate Effective Model*	Natural File Name:	Floodway File Name:
Corrected Effective Model*	Natural File Name:	Floodway File Name:
Existing or Pre-Project Conditions Model	Natural File Name:	Floodway File Name:
Revised or Post-Project Conditions Model	Natural File Name:	Floodway File Name:
Other - (attach description)	Natural File Name:	Floodway File Name:

*Not required for revisions to approximate 1%-annual-chance floodplains (Zone A) – for details, refer to the corresponding section of the instructions.

The document "Numerical Models Accepted by FEMA for NFIP Usage" lists the models accepted by FEMA. This document can be found at: http://www.fema.gov/mit/tsd/en_modl.htm.

C. MAPPING REQUIREMENTS

A **certified topographic map** must be submitted showing the following information (where applicable): the boundaries of the effective, existing, and proposed conditions 1%-annual-chance floodplain (for approximate Zone A revisions) or the boundaries of the 1%- and 0.2%-annual-chance floodplains and regulatory floodway (for detailed Zone AE, AO, and AH revisions); location and alignment of all cross sections with stationing control indicated; stream, road, and other alignments (e.g., dams, levees, etc.); current community easements and boundaries; boundaries of the requester's property; certification of a registered professional engineer registered in the subject State; location and description of reference marks; and the referenced vertical datum (NGVD, NAVD, etc.).

Note that the boundaries of the existing or proposed conditions floodplains and regulatory floodway to be shown on the revised FIRM and/or FBFM must tie-in with the effective floodplain and regulatory floodway boundaries. Please attach **a copy of the effective FIRM and/or FBFM,** annotated to show the boundaries of the revised 1%- and 0.2%-annual-chance floodplains and regulatory floodway that tie-in with the boundaries of the effective 1%- and 0.2%-annual-chance floodplain and regulatory floodway at the upstream and downstream limits of the area of revision.

D. COMMON REGULATORY REQUIREMENTS

1. For CLOMR requests, do Base Flood Elevations (BFEs) increase? ☐ Yes ☒ No

For CLOMR requests, if either of the following is true, please submit evidence of compliance with Section 65.12 of the NFIP regulations:
- The proposed project encroaches upon a regulatory floodway and would result in increases above 0.00 foot.
- The proposed project encroaches upon a SFHA with BFEs established and would result in increases above 1.00 foot.

2. Does the request involve the placement or proposed placement of fill? ☐ Yes ☒ No

If Yes, the community must be able to certify that the area to be removed from the special flood hazard area, to include any structures or proposed structures, meets all of the standards of the local floodplain ordinances, and is reasonably safe from flooding in accordance with the NFIP regulations set forth at 44 CFR 60.3(a)(3), 65.5(a)(4), and 65.6(a)(14). Please see the MT-2 instructions for more information.

3. For LOMR requests, is the regulatory floodway being revised? ☐ Yes ☒ No

If Yes, attach evidence of regulatory floodway revision notification. As per Paragraph 65.7(b)(1) of the NFIP Regulations, notification is required for requests involving revisions to the regulatory floodway. (Not required for revisions to approximate 1%-annual-chance floodplains [studied Zone A designation] unless a regulatory floodway is being added. Elements and examples of regulatory floodway revision notification can be found in the MT-2 Form 2 Instructions.)

4. For LOMR requests, does this request require property owner notification and acceptance of BFE increases? ☐ Yes ☒ No

If Yes, please attach proof of property owner notification and acceptance (if available). Elements of and examples of property owner notification can be found in the MT-2 Form 2 Instructions.

ADDITIONAL INFORMATION FOR FORM-2

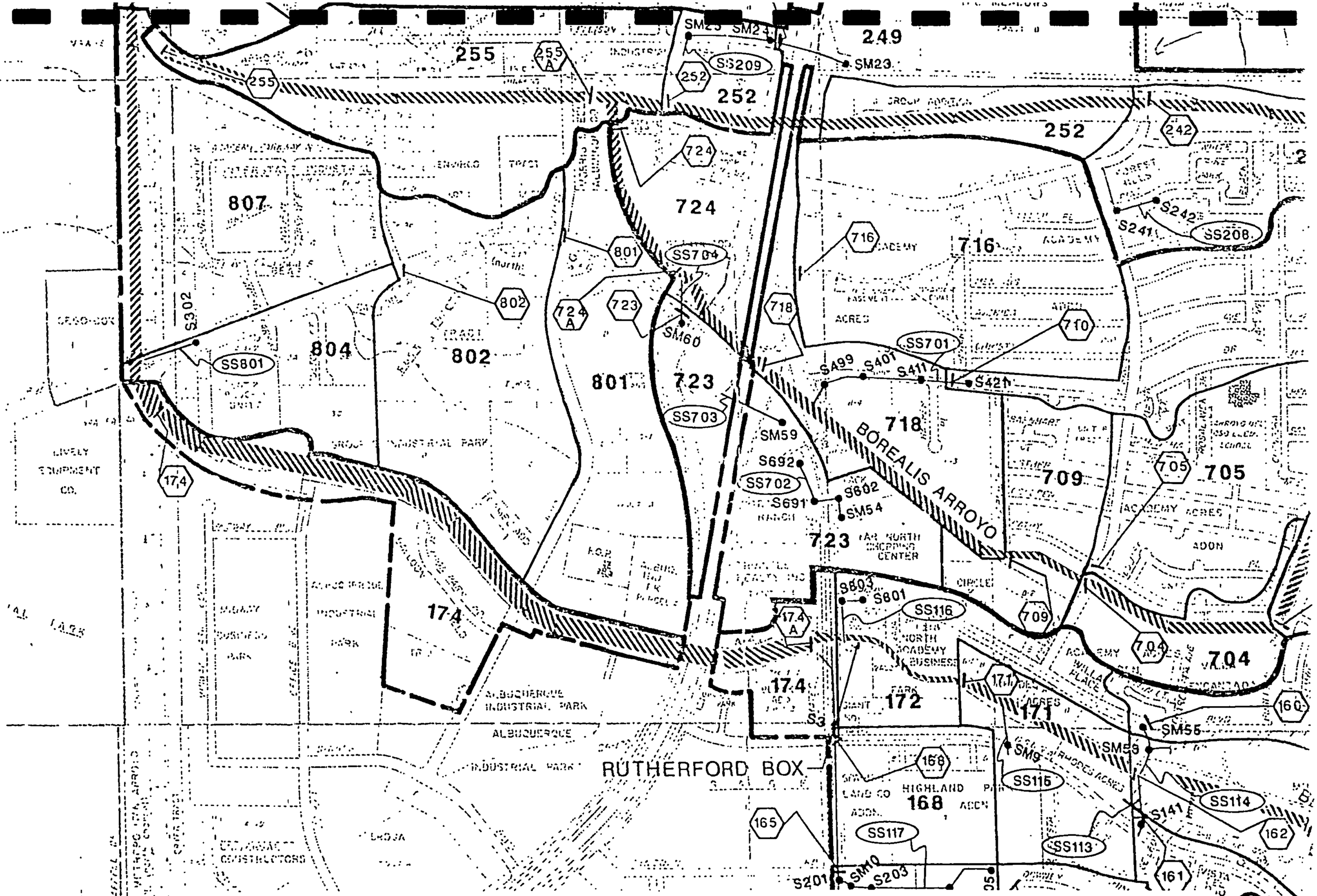
(REVERINE HYDROLOGY & HYDRAULICS FORM)

A. HYDROLOGY

2. Flow quantity was obtained from the "Far Northeast Heights Master Drainage Plan" and same number is being used for HEC-RAS analysis. See the following sheets for the location of the drainage analysis point number 174-A and flow numbers.

B. HYDRAULICS

1. See HEC-RAS section of the attached drainage report for the location of the Sections 30 and 1.



SECTION OF THE "MODELING MAP"

(FROM THE FAR NORTHEAST HEIGHTS MASTER DRAINAGE PLAN)

SCALE 1"=1000'(±)

INVENTORY OF CHANNEL AND CROSSING STRUCTURES

NOTE: FUTURE CONDITIONS ARE SHOWN IN BRACKETS [ ]

CHANNEL	ANALYSIS POINT ID NUMBER	LOCATION	DESCRIPTION	ZONE ATLAS MAP NO.	10 YEAR FLOOD Q10 (cfs)	10 YEAR FLOOD DEPTH (ft)	10 YEAR FLOOD VELOCITY (fps)	100 YEAR FLOOD Q100 (cfs)	100 YEAR FLOOD DEPTH (ft)	100 YEAR FLOOD VELOCITY (fps)
BEAR CANYON ARROYO	100	JOHN B. ROBERT DAM	PEAK INFLOW USED	F21	* 2888	NA	NA	* 7840	NA	NA
	116-A	CHANNEL @JUAN TABO	CONCRETE LINED	F21	1393	2.79	32.0	1920	3.29	35.2
	116	@MORRIS	CONCRETE LINED	F21	1398	2.79	32.1	1927	3.29	35.2
	123-A	CHANNEL	CONCRETE LINED	F21	1412	3.01	29.3	1941	3.55	31.9
	123	CHANNEL	CONCRETE LINED	F21	1419	3.02	29.3	1950	3.56	32.0
	126	@EUBANK	CONCRETE LINED	F20/F21	1420 [1421]	3.02	29.3	1957 [1958]	3.56	32.0
	134-A	CONFLUENCE W/BEAR ARROYO	UNLINED WIDE EARTH	F20	1440	2.67	13.4	1973 [1974]	3.06	15.8
	134	@MOON	UNLINED WIDE EARTH	F20	1525 [1576]	2.76 [2.82]	13.6 [13.7]	2211 [2275]	3.47 [3.53]	15.3 [15.4]
	143-A	CHANNEL	UNLINED WIDE EARTH [CONCRETE LINED]	F20	1540 [1663]	2.80 [3.37]	13.5 [29.4]	2354 [2488]	3.63 [4.15]	15.5 [32.8]
	143	@WYOMING	UNLIMITED WIDE EARTH [CONCRETE LINED]	F19/F20	1699 [1869]	3.19 [3.79]	13.0 [31.7]	2678 [2905]	4.18 [4.73]	15.0 [35.0]
	145-A	CONFLUENCE W/BEAR TRIB	GABION WIDE EARTH	F19	2496 [2807]	3.28 [3.52]	18.7 [19.5]	4502 [4935]	4.66 [4.92]	23.3 [24.1]
	145	CHANNEL	RIPRAP WIDE EARTH	F19	2449 [2755]	4.12 [4.42]	13.5 [14.0]	4506 [4958]	5.92 [6.27]	16.0 [17.1]
	149	ARROYO DEL OSO DAM	PEAK INFLOW USED	F19	** 2323	NA	NA	* 4038	NA	NA
		ARROYO DEL OSO DAM			* 17251	NA	NA	** 4416	NA	NA
	162-A	DAM OUTLET	CONCRETE LINED	F19	1084	2.62	27.2	1778	3.39	31.2
	162	CHANNEL	CONCRETE LINED	F18	1096	2.64	27.3	1793	3.41	31.2
	171	@RUTHERFORD BOX INLET	CONCRETE LINED	E18	1097	3.11	21.7	1794	4.01	24.8
	174-A	@SAN MATEO	RUTHERFORD BOX	E17	1103	2.29	16.4	1801	3.11	19.7
	174	@N. DIVERSION CHANNEL	UNLINED WIDE EARTH	E17	1103	2.46	11.2	1804	3.33	13.1
ARROYO DEL PINO	200	TRAMWAY DAM	PEAK INFLOW USED	E22	* 1016	NA	NA	* 5199	NA	NA
	201	PINO DIVERSION CHANNEL	UNLINED NARROW EARTH	D22	174	1.96	6.4	398	3.05	8.1
	207-A	DAM OUTLET	WIDE CHANNEL W/GRASS	E22	61	0.64	6.9	203	1.23	10.0
	207	@EUBANK	WIDE CHANNEL W/GRASS	E21	255	1.33	11.5	655	2.13	14.8
	209	@TANOAN	WIDE CHANNEL W/GRASS	E21	497	1.20	12.4	1287	3.14	15.9
	219	@LAYTON	WIDE CHANNEL W/GRASS	E20	551	2.10	12.8	1423	3.29	16.4
	224	CHANNEL - ABQ ACADEMY	UNLINED WIDE EARTH	E20	565	1.47	9.6	1463	2.69	13.5
	226	CHANNEL - ABQ ACADEMY	UNLINED WIDE EARTH	E19	593	1.43	10.3	1533	2.61	14.6
	237	@WYOMING	UNLINED WIDE EARTH	E19	668	1.71	9.8	1735	3.13	13.5
	239	@LOUISIANA	CONCRETE LINED	E18/E19	691	2.12	22.9	1783	3.50	29.9
	242	@SAN PEDRO	CONCRETE LINED	E18	707	2.11	23.5	1820	3.48	30.7
	252	CHANNEL	CONCRETE LINED	E17	777 [793]	2.19 [2.21]	24.6 [24.9]	1915 [1936]	3.52 [3.54]	31.8 [31.9]
	255-A	@JEFFERSON	CONCRETE LINED	E17	1714 [2021]	3.33 [3.62]	30.9 [32.3]	3885 [4443]	5.03 [5.37]	38.5 [39.9]
	255	@N. DIVERSION CHANNEL	UNLINED NARROW EARTH [CONCRETE LINED]	D17	1745 [2160]	5.42 [3.98]	15.4 [30.2]	4044 [4776]	8.07 [5.89]	19.2 [37.2]
NORTH ARROYO DEL PINO	305	@HOLBROOK	UNLINED WIDE EARTH	D20/D21	87 [206]	0.42 [0.72]	5.2 [7.2]	242 [448]	0.79 [1.16]	7.6 [9.7]
	310	CHANNEL	CONCRETE LINED	D20	104 [223]	0.67 [1.04]	13.7 [17.7]	275 [485]	1.17 [1.62]	18.9 [22.5]

(FROM THE FAR NORTHEAST HEIGHTS MASTER DRAINAGE PLAN)

***

APPENDIX F (CONTINUED)

NOTE: FUTURE CONDITIONS ARE SHOWN IN BRACKETS [ ]

	ANALYSIS POINT ID NO.	ZONE ATLAS MAP NO.	10 YEAR FLOOD Q10 (cfs)	10 YEAR FLOOD OVERLAND FLOW (cfs)	10 YEAR FLOOD OVERLAND DEPTH (ft)	10 YEAR FLOOD OVERLAND VELOCITY (fps)	100 YEAR FLOOD Q100 (cfs)	100 YEAR FLOOD OVERLAND FLOW (cfs)	100 YEAR FLOOD OVERLAND DEPTH (ft)	100 YEAR FLOOD OVERLAND VELOCITY (fps)	REMARKS AND CHANNEL OR DAM LOCATION (IF APPLICABLE)
	157	E19	71	71	0.50	8.8	145	145	0.67	7.7	
	158	E19/F19	235	235	0.79	8.6	491	491	1.04	11.0	
			[235]	[0]	[0.00]	[0.0]	[491]	[141]	[0.65]	[7.2]	
	159	E18/F18	264	264	0.87	8.2	577	577	1.16	11.0	
			[264]	[0]	[0.00]	[0.0]	[577]	[227]	[0.81]	[8.0]	
	160	E18/F18	240	240	0.83	8.1	570	570	1.15	11.0	
			[240]	[0]	[0.00]	[0.0]	[570]	[0]	[0.00]	[0.0]	
	161	F18	82	32	0.50	3.7	174	124	0.80	6.0	
*	162-A	F19	1084				1778				BEAR CANYON ARROYO
*	162	F18	1096				1793				BEAR CANYON ARROYO
*	171	E18	1097				1794				BEAR CANYON ARROYO
	164	F18	46	0	0.00	0.0	99	34	**	**	PONDING/UNDERSIZED INLET
	165	F17/F18	123	44	0.59	2.5	229	150	0.95	5.0	
			[123]	[0]	[0.00]	[0.0]	[229]	[86]	[0.78]	[2.7]	
	168	F17/F18	182	39	0.57	2.4	317	174	0.99	3.5	
			[182]	[0]	[0.00]	[0.0]	[317]	[85]	[0.78]	[2.7]	
*	174-A	E17	1103				1801				BEAR CANYON ARROYO
*	174	E16	1103				1804				BEAR CANYON ARROYO
^	200	E22	1016	NA	NA	NA	5199	NA	NA	NA	TRAMWAY DAM
*	201	D22	174				398				PINO DIVERSION CHANNEL
	202	E22	18	0	0.00	0.0	46	0	0.00	0.0	-
	204	E21	78	0	0.00	0.0	169	45	0.45	6.0	-
*	207-A	E22	61				203				ARROYO DEL PINO
*	207	E21	255				655				ARROYO DEL PINO
*	209	E21	497				1287				ARROYO DEL PINO
	212	E20/E21	149	0	0.00	0.0	312	111	0.70	9.0	
	217	E20	186	0	0.00	0.0	380	93	0.58	6.9	
*	219	E20	551				1423				ARROYO DEL PINO
	223	E20	32	0	0.00	0.0	66	8	0.30	3.5	
*	224	E20	565				1463				ARROYO DEL PINO
*	226	E19	593				1533				ARROYO DEL PINO
	230	E19	76	18	0.30	3.7	144	86	0.30	3.5	
	235	E19	85	85	0.78	3.2	209	209	0.80	9.0	
	236	E19	66	66	0.69	3.0	180	180	0.70	9.0	
*	237	E19	668				1735				ARROYO DEL PINO
	240	E18/E19	94	94	0.66	5.7	199	199	0.87	7.0	
*	239	E18/E19	691				1783				ARROYO DEL PINO
*	242	E18	707				1820				ARROYO DEL PINO
	249	D17	139	52	0.45	5.4	261	174	0.87	7.5	
*	252	E17	777				1915				ARROYO DEL PINO
			[793]				[1936]				
*	255-A	E17	1714				3885				ARROYO DEL PINO
			[2021]				[4443]				
*	255	D16	1745				4044				ARROYO DEL PINO
			[2160]				[4776]				
	307	D20/D21	22	22	0.30	6.5	66	66	1.07	10.0	
			[78]	[33]	[0.49]	[2.7]	[163]	[118]	[0.83]	[4.0]	[HOLBROOK ST. IMPROVED TO COLLECTOR STREET]

(FROM THE FAR NORTHEAST HEIGHTS MASTER DRAINAGE PLAN)

***

FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE STRUCTURES FORM

O.M.B. No. 3067-0148
Expires September 30, 2005

PAPERWORK REDUCTION ACT

Public reporting burden for this form is estimated to average 7 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless a valid OMB control number appears in the upper right corner of this form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, SW, Washington DC 20472, Paperwork Reduction Project (3067-0148). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

Flooding Source: EXISTING ARROYO. LARGE UPSTREAM BASIN
Note: Fill out one form for each flooding source studied

A. GENERAL

Complete the appropriate section(s) for each Structure listed below:

Channelization ..... complete Section B
Bridge/Culvert..... complete Section C
Dam..... complete Section D
Levee/Floodwall..... complete Section E
Sediment Transport ..... complete Section F (if required)

Description Of Structure

1. **Name of Structure: Bear Arroyo Canyon Box Culvert (2-10Wx5H Box Culvert)**

   Type (check one): ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

   Location of Structure: Between San Mateo Boulevard and I-25 Frontage Road

   Downstream Limit/Cross Section: Section 7 (HEC-RAS section number)

   Upstream Limit/Cross Section: Section 36 (HEC-RAS section number)

2. **Name of Structure:**

   Type (check one): ☐ Channelization ☐ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

   Location of Structure:

   Downstream Limit/Cross Section:

   Upstream Limit/Cross Section:

3. **Name of Structure:**

   Type (check one) ☐ Channelization ☐ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

   Location of Structure:

   Downstream Limit/Cross Section:

   Upstream Limit/Cross Section:

NOTE: For more structures, attach additional pages as needed.

B. CHANNELIZATION

Flooding Source:

Name of Structure:

1. Accessory Structures

The channelization includes (check one):

- ☐ Levees [Attach Section E (Levee/Floodwall)]
- ☐ Superelevated sections
- ☐ Debris basin/detention basin
- ☐ Other (Describe):
- ☐ Drop structures
- ☐ Transitions in cross sectional geometry
- ☐ Energy dissipator

2. Drawing Checklist

Attach the plans of the channelization certified by a registered professional engineer, as described in the instructions.

3. Hydraulic Considerations

The channel was designed to carry (cfs) and/or the -year flood.

The design elevation in the channel is based on (check one):

☐ Subcritical flow ☐ Critical flow ☐ Supercritical flow ☐ Energy grade line

If there is the potential for a hydraulic jump at the following locations, check all that apply and attach an explanation of how the hydraulic jump is controlled without affecting the stability of the channel.

☐ Inlet to channel ☐ Outlet of channel ☐ At Drop Structures ☐ At Transitions
☐ Other locations (specify):

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☐ No If Yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered.

C. BRIDGE/CULVERT

Flooding Source: EXISTING ARROYO. LARGE UPSTREAM BASIN

Name of Structure: Bear Arroyo Canyon Box Culvert (2-10Wx5H Box Culvert)

1. This revision reflects (check one):

- ☒ New bridge/culvert not modeled in the FIS
- ☐ Modified bridge/culvert previously modeled in the FIS
- ☐ New analysis of bridge/culvert previously modeled in the FIS

2. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8): HEC-RAS
If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structures. Attach justification.

3. Attach plans of the structures certified by a registered professional engineer. The plan detail and information should include the following (check the information that has been provided):

- ☒ Dimensions (height, width, span, radius, length)
- ☒ Shape (culverts only)
- ☒ Material
- ☐ Beveling or Rounding
- ☐ Wing Wall Angle
- ☐ Skew Angle
- ☐ Distances Between Cross Sections
- ☐ Erosion Protection
- ☐ Low Chord Elevations – Upstream and Downstream
- ☐ Top of Road Elevations – Upstream and Downstream
- ☐ Structure Invert Elevations – Upstream and Downstream
- ☐ Stream Invert Elevations – Upstream and Downstream
- ☐ Cross-Section Locations

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered.

FEDERAL EMERGENCY MANAGEMENT AGENCY **RIVERINE HYDRAULIC ANALYSIS**	O.M.B No. 3067-0148 Expires April 30, 2001

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 2.25 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.

Note: Fill out one form for each flooding source studied

Community Name: CITY OF ALBUQUERQUE, BERNALILLO COUNTY

Flooding Source: EXISTING ARROYO, LARGE UPSTREAM BASIN

Project Name/Identifier: BEAR CANYON BOX CULVERT EXTENSION

1. REACH TO BE REVISED

Describe the limits of the revision OR submit a copy of the FIRM with the revision area clearly highlighted.
Copy of FIRM(s) attached depicting area of the revision (highlighted, or circled)? ☒ Yes

Downstream Limit: SEE ATTACHED EXHIBIT

Upstream Limit: SEE ATTACHED EXHIBIT

2. MODELS SUBMITTED

Requirements: for areas which have detailed flooding:	**for areas which do not have detailed flooding**:
Full input and output listings along with files on diskette for each of the models listed below (items 1-4) and a summary of the source of input parameters used in the models must be provided. The summary must include a description of any changes made from model to model (e.g., Duplicate Effective model to Corrected Effective model). At a minimum, the Duplicate Effective (item 1) and the Revised or Post-Project Conditions (item 4) models must be submitted. See instructions for directions on when other models may be required.	Only the 100-year (Base) flood profile is required. A hydraulic model is not required for areas which do not have detailed flooding; however, BFEs may not be added to the revised FIRM. If a hydraulic model is developed for the area, items 3 and 4 described below must be submitted.

If hydraulic models are not developed, hydraulic analyses (including all calculations) for existing or pre-project conditions and revised or post-project conditions must be submitted.

1. Duplicate Effective Model ☐ **Natural** **File Name** _____ ☐ **Floodway** **File Name** _____
Copies of the hydraulic analysis used in the effective FIS, referred to as the effective models (10-, 50-, 100-, and 500-year multi-profile runs and the floodway run) must be obtained and then reproduced on the requester's equipment to produce the Duplicate Effective model. This is required to assure that the effective models input data has been transferred correctly to the requester's equipment and to assure that the revised data will be integrated into the effective data to provide a continuous FIS model upstream and downstream of the revised reach.

2. Corrected Effective Model ☐ **Natural** **File Name** _____ ☐ **Floodway** **File Name** _____
The Corrected Effective model is the model that corrects any errors that occur in the Duplicate Effective model, adds any additional cross sections to the Duplicate Effective model, or incorporates more detailed topographic information than that used in the currently effective model. The Corrected Effective model must not reflect any man-made physical changes since the date of the effective model. An error could be a technical error in the modeling procedures, or any construction in the floodplain that occurred prior to the date of the effective model but was not incorporated into the effective model.

3. Existing or Pre-Project Conditions Model ☐ **Natural** **File Name** _____ ☐ **Floodway** **File Name** _____
The Duplicate Effective model or Corrective Effective model is modified to produce the Existing or Pre-Project Conditions model to reflect any modifications that have occurred within the floodplain since the date of the Effective model but prior to the construction of the project for which the revision is being requested. If no modification has occurred since the date of the effective model, then this model would be identical to the Corrected Effective model or Duplicate Effective model.

4. Revised or Post-Project Conditions Model ☐ **Natural** **File Name** _____ ☐ **Floodway** **File Name** _____
The Existing or Pre-Project Conditions model (or Duplicate Effective model or Corrected Effective model, as appropriate) is revised to reflect revised or post-project conditions. This model must incorporate any physical changes to the floodplain since the effective model was produced as well as the effects of the project. When the request is for the proposed project this model must reflect proposed conditions.

5. Other – Please attach a sheet describing all other models submitted along with the file names. ☐ **Natural** ☒ **Floodway**

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

3. STARTING WATER-SURFACE ELEVATIONS N/A

Explain how they were determined. Explanation Attached? ☐ Yes ☐ No

NOTE: If the effective study is an approximate study, the slope/area method is recommended.
For detailed analysis studies, using a known water-surface elevation is recommended.

4. RESULTS (from the model used to revise the 100-year water surface elevations)

If the results indicate any of the following, attach an explanation - to this form, or to the hydraulic model printout- as to the reasonableness of the situation.

☐ Supercritical depth ☐ Critical Depth ☐ Drawdowns ☐ Negative Floodway Surcharges

☐ Floodway Surcharges Greater Than Maximum Allowed by Community/State

☐ Water surface elevations higher than the end points of cross sections.

☐ Floodway discharge is different than the Natural 100-year (base) flood discharge.

☒ Project causes 100-year floodplain or floodway elevations to increase (state if increases are located off the requester's property)

Explanation attached with Form ☐ **Explanation provided on attached printout** ☒

If Hydraulic model used is HEC-2, has it been checked with FEMA'S CHECK-2 computer program? ☐ **Yes** ☒ **No**
(see instructions for information on how to obtain CHECK-2)

5. REVISED FIRM/FBFM AND FLOOD PROFILES

1. Profile Transition N/A

a. 100-Year Water-Surface Elevations - indicate the difference in water surface elevations where the project 100-year elevations tie into the existing 100-year water surface elevations at each end of the project.

Downstream End _____ within _____ (feet) *Cross-Section #*
Upstream End _____ within _____ (feet) *Cross-Section #*

b. Floodway Elevations - indicate the difference in water surface elevations where the project floodway elevations tie into the existing floodway water surface elevations at each end of the project.

Downstream End _____ within _____ (feet) *Cross-Section #*
Upstream End _____ within _____ (feet) *Cross-Section #*

c. Floodway widths - indicate the difference in floodway widths where the project floodway widths tie into the existing floodway width at each end of the project.

Downstream End _____ within _____ (feet) *Cross-Section #*
Upstream End _____ within _____ (feet) *Cross-Section #*

2. Profile Checklist (check box if information has been provided on profile) N/A

The following information (unless in parentheses) must be included at the same scale as the existing profiles for this project:

☐ Stream Name ☐ Community Name ☐ Corporate Limits labeled ☐ Study limits labeled

☐ Confluences labeled ☐ Channel Stationing ☐ Streambed profiled ☐ Cross Sections labeled

☐ Horizontal/Vertical Scales indicated ☐ 100-year elevs profiled*

☐ Road Crossings ☐ Labeled ☐ Low Chord Elevations ☐ Top of Road Elevations

*All recurrence intervals in the effective study must also be profiled.

Floodway Data Table

Attach a Floodway Data Table for each cross section listed in the published Floodway Data table in the FIS report.

Floodway Data Table Attached ☐ **Yes** ☒ **Not Required**

ADDITIONAL INFORMATION FOR FORM-4

(REVERINE HYDRAULIC ANALYSIS)

1. REACH TO BE REVISED

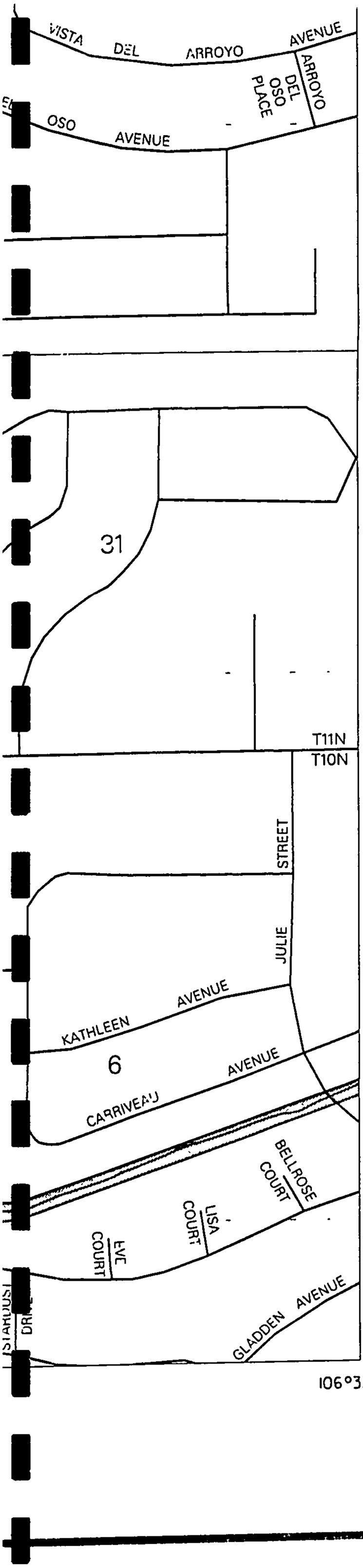
   Exhibit showing the modification to the existing floodplain are attached.

2. MODELS SUBMITTED

   HEC-RAS hydraulic analysis was preformed for the Box Culverts flow calculations. See Appendix A (Drainage Report) of this submittal for the HEC sections and calculation results.

4. RESULTS

   The project will cause the floodplain to increase, but the runoff will be confined inside the 2 (10x5) closed culverts.



Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE DATE shown on this map to determine when actuarial rates apply to structures in zones where elevations or depths have been established.

To determine if flood insurance is available, contact an insurance agent or call the National Flood Insurance Program at (800) 638-6620.

APPROXIMATE SCALE IN FEET

500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

BERNALILLO COUNTY, NEW MEXICO AND INCORPORATED AREAS

PANEL 139 OF 825

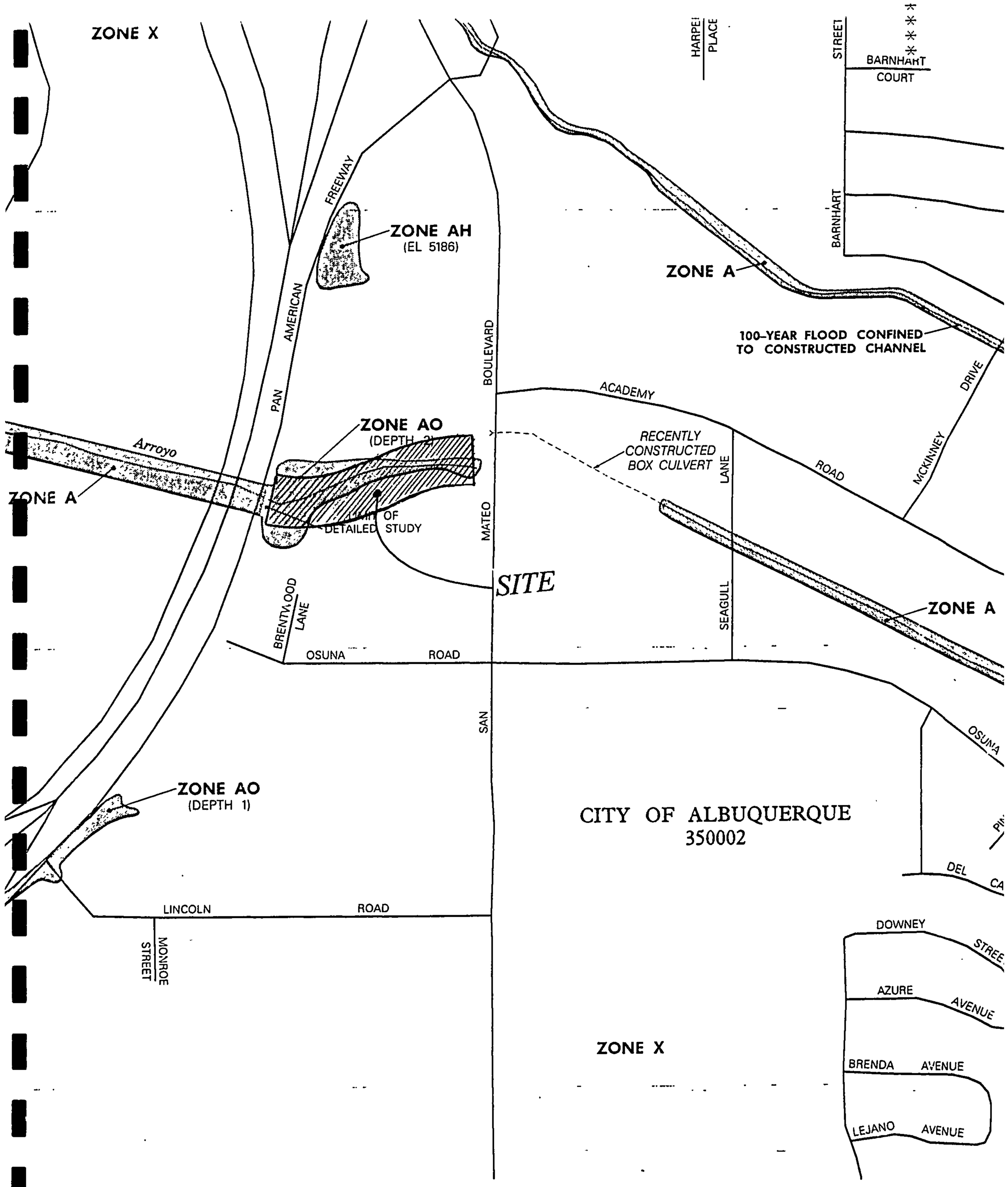
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS: COMMUNITY	NUMBER	PANEL	SUFFIX
ALBUQUERQUE, CITY OF	350002	0139	D
BERNALILLO COUNTY UNINCORPORATED AREAS	350001	0139	D

MAP NUMBER
35001C0139 D

EFFECTIVE DATE:
SEPTEMBER 20, 1996

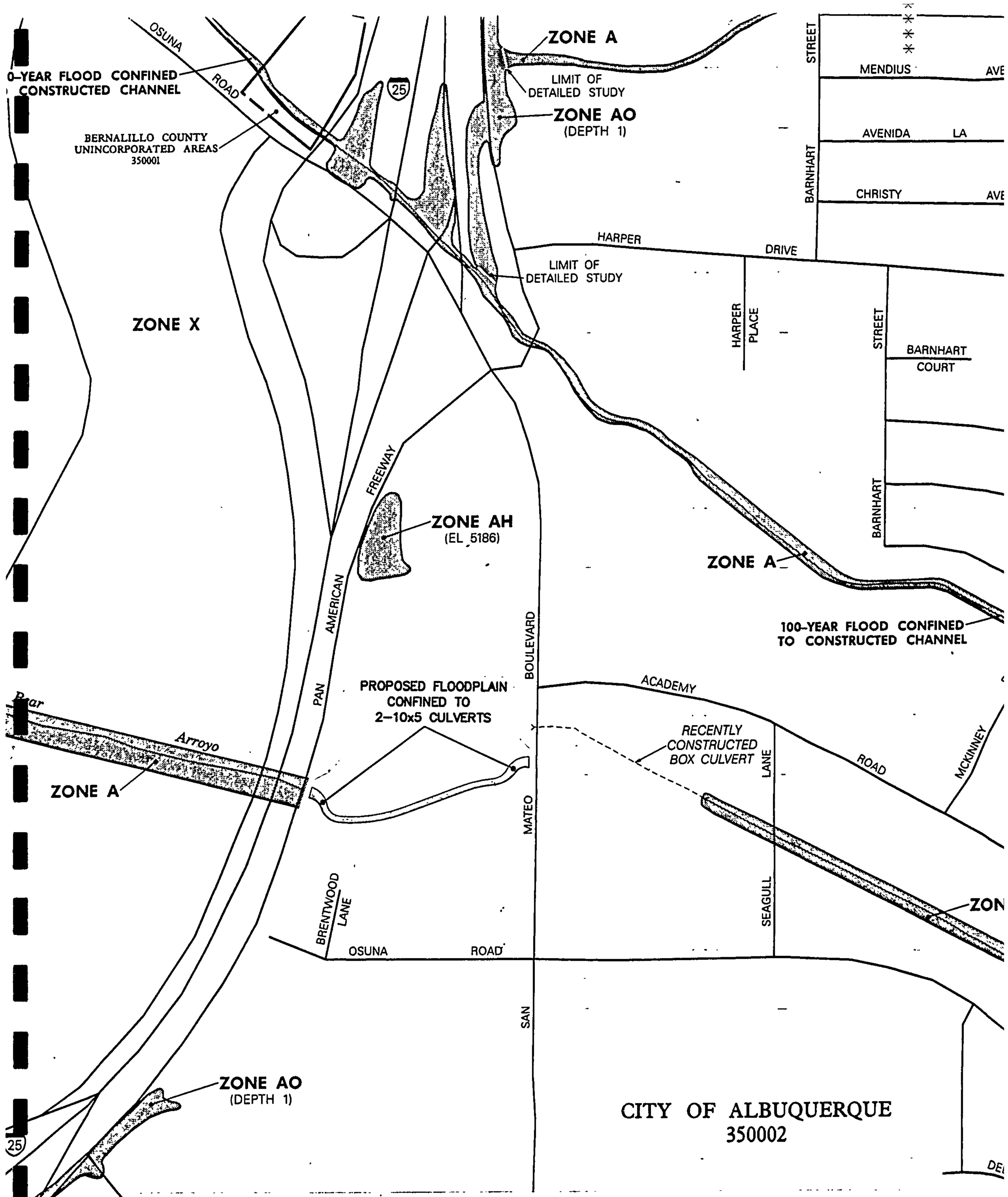
Federal Emergency Management Agency



CITY OF ALBUQUERQUE
350002

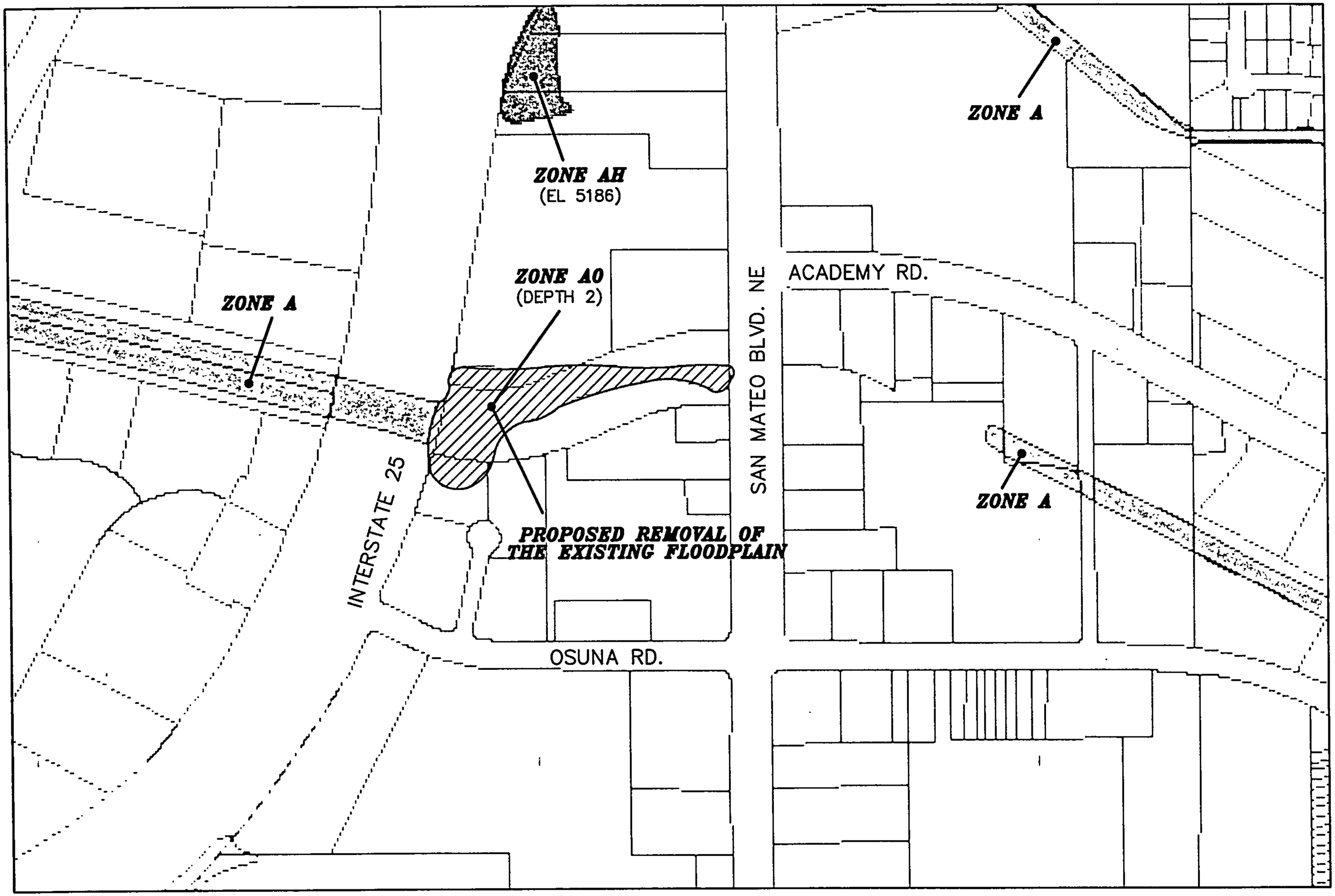
PORTION OF THE FRIM MAP NUMBER 35001C0139 D

(WITH LOCATION OF THE PROJECT SHOWN ON THE MAP)



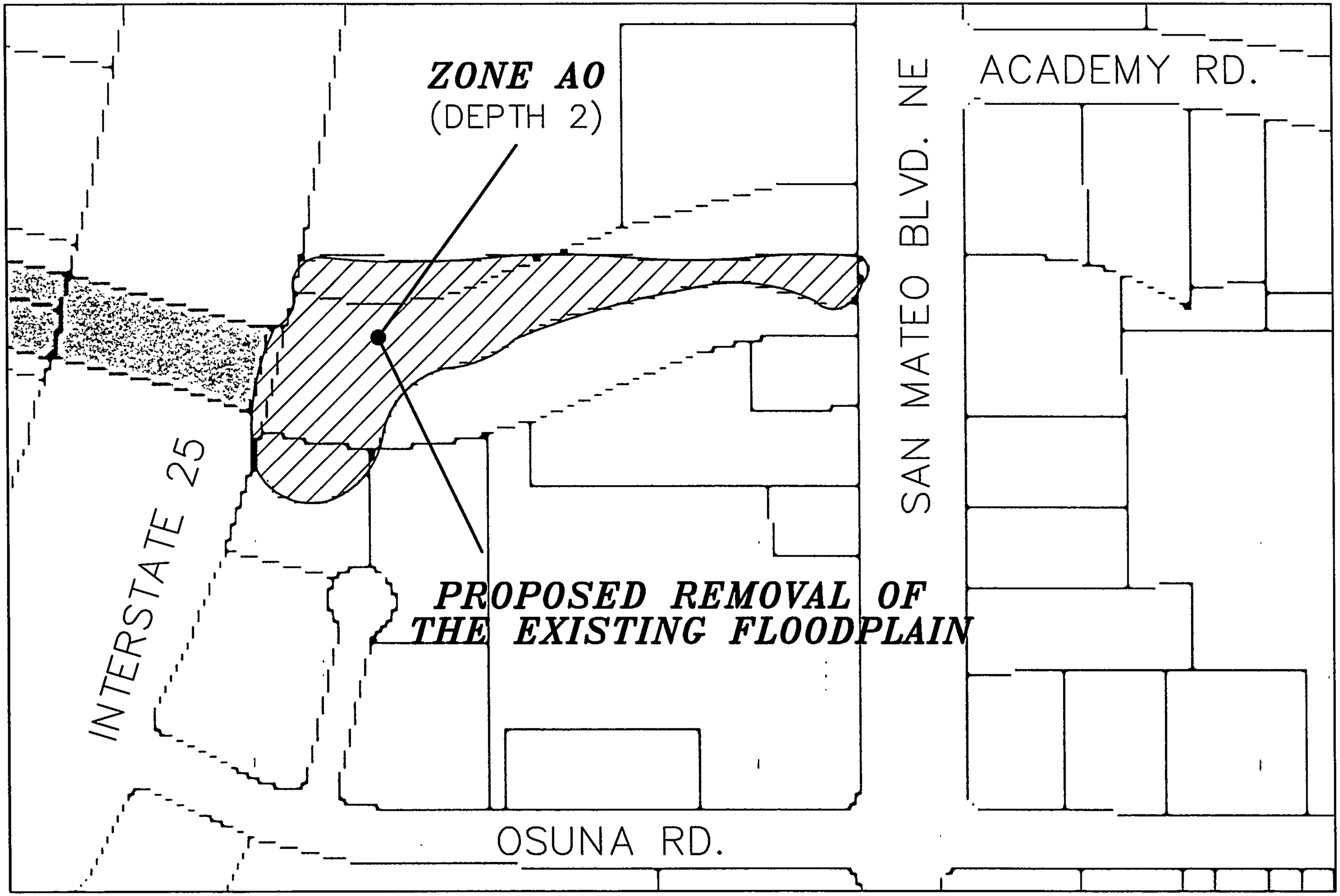
PORTION OF THE FIRM MAP NUMBER 35001C0139D

PROPOSED FLOODPLAIN (CONFINED IN THE PROPOSED BOX CULVERT)



FLOODPLAIN REMOVAL EXHIBIT

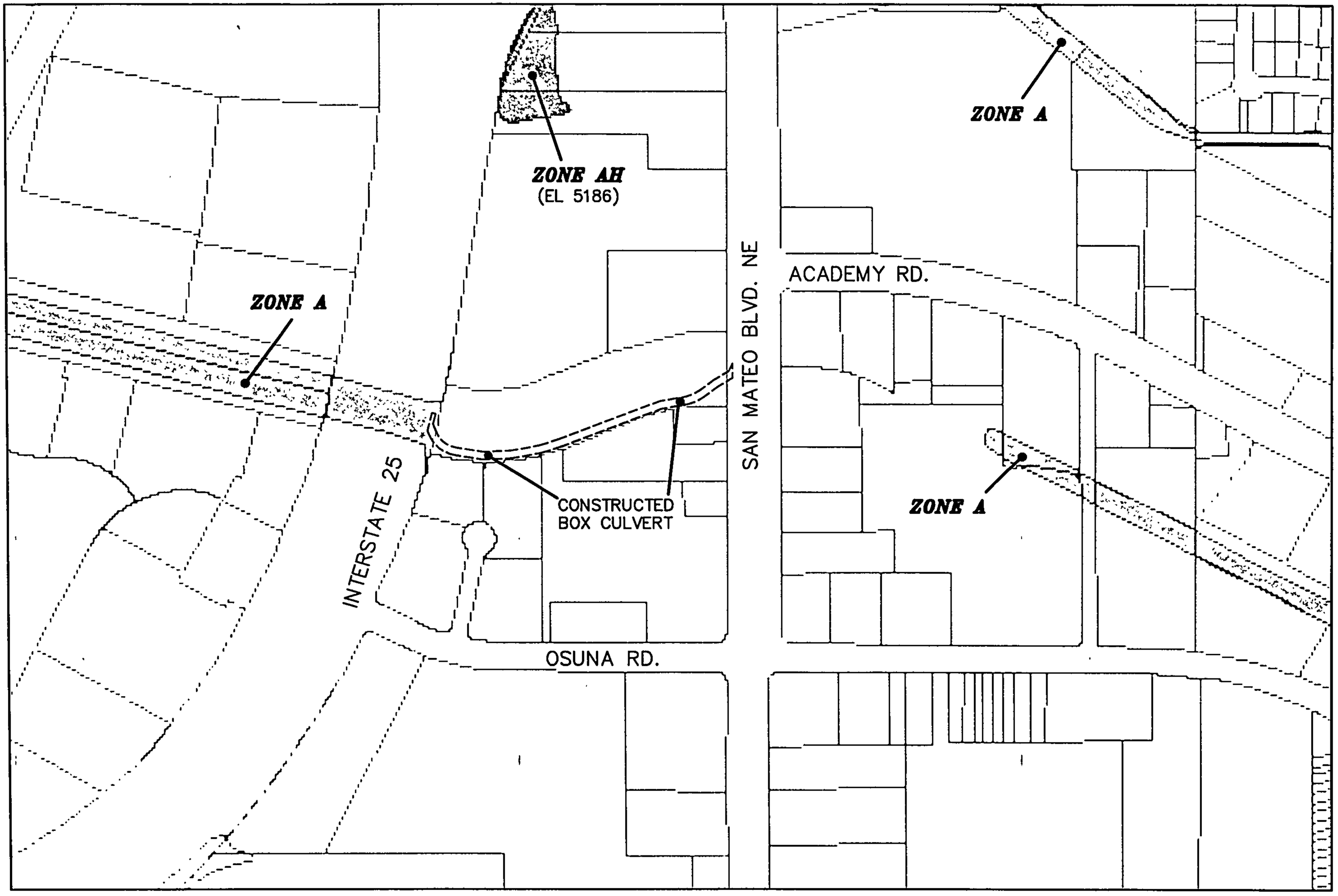
1"=±400 ****



FLOODPLAIN REMOVAL EXHIBIT

1"=±200

****



FLOODPLAIN MAP AFTER CONSTRUCTION OF THE BOX CULVERT 1"=±400 ****

CITY OF ALBUQUERQUE

January 19, 2006

Mr. Scott McGee, PE
ISAACSON & ARFMAN, PA
128 Monroe St. NE
Albuquerque, NM 87108

Re: FURR'S RESTAURANT
6111 San Mateo Blvd. NE
Approval of Permanent Certificate of Occupancy (C.O.)
Engineer's Stamp dated 06/30/2005 (E-17/D32A)
Certification dated 01/19/2006

Dear Scott,

Based upon the information provided in your submittal received 01/19/2006, the above referenced certification is approved for release of Permanent Certificate of Occupancy by Hydrology.

If you have any questions, you can contact me at 924-3982.

Sincerely,

Arlene V. Portillo
Plan Checker, Planning Dept. - Hydrology
Development and Building Services

C: CO Clerk
File

P.O. Box 1293

Albuquerque

New Mexico 87103

www.cabq.gov

CITY OF ALBUQUERQUE

July 12, 2005

Scott M. McGee, P.E.
Isaacson & Arfman, P.A.
128 Monroe St. NE
Albuquerque, NM 87108

Re: Furr's Restaurant, 6111 San Mateo NE, Grading & Drainage Plan
Engineer's Stamp dated 6-30-05 (E17-D32A)

Dear Mr. McGee,

Based upon the information provided in your submittal dated 6-30-05, the above referenced plan is approved for Building Permit. Please attach a copy of this approved plan to the construction sets prior to sign-off by Hydrology. Additionally, prior to release of the Certificate of Occupancy an Engineer's Certification of the grading plan per the DPM checklist will be required.

This project requires a National Pollutant Discharge Elimination System (NPDES) permit. Refer to the attachment that is provided with this letter for details. If you have any questions please feel free to call the Municipal Development Department Hydrology section at 768-3654 (Charles Caruso).

If you have any questions, you can contact me at 924-3990.

Sincerely,

Phillip J. Lovato, E.I., C.F.M.
Engineering Associate, Hydrology,
Development and Building Services,
Planning Department

cc: Charles Caruso, DMD
file

P.O. Box 1293

Albuquerque

New Mexico 87103

www.cabq.gov

CITY OF ALBUQUERQUE

Planning Department
Transportation Development Services Section

January 20, 2006

Scott M. McGee, P.E.
128 Monroe St NE
Albuquerque, NM 87108

Re: Certification Submittal for Final Building Certificate of Occupancy for
Furr's Restaurant, [E-17 / D32A]
6111 San Mateo NE
Engineer's Stamp Dated 01/19/06

Dear Mr. McGee:

The TCL / Letter of Certification submitted on January 19, 2006 is sufficient for acceptance by this office for final Certificate of Occupancy (C.O.). Notification has been made to the Building and Safety Section.

Sincerely,

Nilo E. Salgado-Fernandez, P.E.
Senior Traffic Engineer
Development and Building Services
Planning Department

c: Engineer
Hydrology file
CO Clerk

P.O. Box 1293

Albuquerque

New Mexico 87103

www.cabq.gov

CITY OF ALBUQUERQUE

July 21, 2005

Scott McGee, P.E.
Isaacson & Arfman, P.A.
128 Monroe St. NE
Albuquerque, NM 87108

Re: Furrs Fresh Buffet, 6111 San Mateo Blvd NE, Traffic Circulation Layout
Engineer's Stamp dated 7-14-05 (E17-D32A)

Dear Mr. McGee,

The TCL submittal received 7-20-05 is approved for Building Permit. The plan is stamped and signed as approved. A copy of this plan will be needed for each of the building permit plans. Please keep the original to be used for certification of the site for final C.O. for Transportation.

If a temporary CO is needed, a copy of the original TCL that was stamped as approved by the City will be needed. This plan must include a statement that identifies the outstanding items that need to be constructed or the items that have not been built in "substantial compliance," as well as the signed and dated stamp of a NM registered architect or engineer. Submit this TCL with a completed Drainage and Transportation Information Sheet to Hydrology at the Development Services Center of Plaza Del Sol Building.

When the site is completed and a final C.O. is requested, use the original City stamped approved TCL for certification. A NM registered architect or engineer must stamp, sign, and date the certification TCL along with indicating that the development was built in "substantial compliance" with the TCL. Submit this certification TCL with a completed Drainage and Transportation Information Sheet to Hydrology at the Development Services Center of Plaza Del Sol Building.

Once verification of certification is completed and approved, notification will be made to Building Safety to issue Final C.O. To confirm that a final C.O. has been issued, call Building Safety at 924-3306.

Sincerely,

Kristal D. Metro, P.E.
Senior Engineer, Planning Dept.
Development and Building Services

cc: file

P.O. Box 1293
Albuquerque
New Mexico 87103
www.cabq.gov

ISAACSON & ARFMAN, P.A.

Consulting Engineering Associates

Thomas O. Isaacson, PE & LS • Fred C. Arfman, PE
Scott M. McGee, PE

JANUARY 19, 2006

TRAFFIC CERTIFICATION

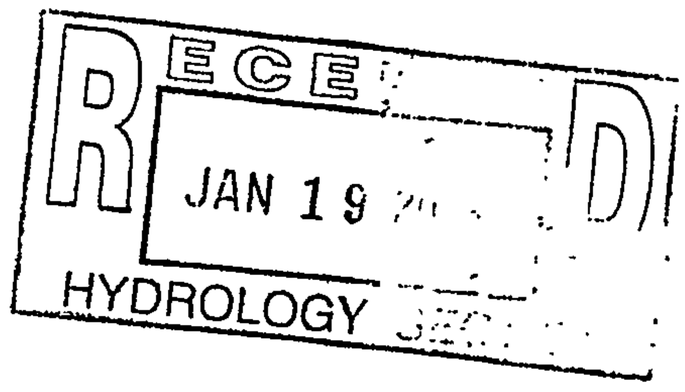
I, SCOTT M. MCGEE, NMPE #10519, OF THE FIRM ISAACSON & ARFMAN, P.A., HEREBY CERTIFY THAT THIS PROJECT IS IN SUBSTANTIAL COMPLIANCE WITH AND IN ACCORDANCE WITH THE DESIGN INTENT OF THE TCL APPROVED PLAN DATED 07/14/05. I FURTHER CERTIFY THAT I HAVE PERSONALLY VISITED THE PROJECT SITE ON 01/17/06 AND HAVE DETERMINED BY VISUAL INSPECTION THAT THE SURVEY DATA PROVIDED IS REPRESENTATIVE OF ACTUAL SITE CONDITIONS AND IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF. THIS CERTIFICATION IS SUBMITTED IN SUPPORT OF A REQUEST FOR CERTIFICATE OF OCCUPANCY.

THE RECORD INFORMATION PRESENTED HEREON IS NOT NECESSARILY COMPLETE AND INTENDED ONLY TO VERIFY SUBSTANTIAL COMPLIANCE OF THE TRAFFIC ASPECTS OF THIS PROJECT. THOSE RELYING ON THE RECORD DOCUMENT ARE ADVISED TO OBTAIN INDEPENDENT VERIFICATION OF ITS ACCURACY BEFORE USING IT FOR ANY OTHER PURPOSE.

Scott M McGee

Signature of Engineer

ENGINEER' STAMP



128 Monroe St. NE • Albuquerque, NM 87108 • (505) 268-8828 • FAX (505) 268-2632

CITY OF ALBUQUERQUE

Planning Department
Transportation Development Services Section

December 29, 2005

Shahab Biazar, P.E., Registered Architect
4416 Anaheim Ave. NE
Albuquerque, NM 87113

Re: Certification Submittal for Final Building Certificate of Occupancy for
Texas Road House. Lot 1, [E-17 / D32A]
5900 Pan American Fwy
Engineer's Stamp Dated 12/13/05

Dear Mr. Biazar:

The TCL / Letter of Certification submitted on December 27, 2005 is sufficient for acceptance by this office for final Certificate of Occupancy (C.O.). Notification has been made to the Building and Safety Section.

Sincerely,

Nilo E. Salgado-Fernandez, P.E.
Senior Traffic Engineer
Development and Building Services
Planning Department

c: Engineer
Hydrology file
CO Clerk

P.O. Box 1293

Albuquerque

New Mexico 87103

www.cabq.gov

CITY OF ALBUQUERQUE

July 19, 2005

Shahab Biazar, P.E.
Advanced Engineering and Consulting, LLC
4416 Anaheim Ave. NE
Albuquerque, NM 87113

Re: Texas Road Hourse, Lot 1 San Mateo del Norte, Traffic Circulation Layout
Engineer's Stamp dated 5-17-05 (E17-D32A)

Dear Mr. Biazar,

The TCL submittal received 6-23-05 is approved for Building Permit. The plan is stamped and signed as approved. A copy of this plan will be needed for each of the building permit plans. Please keep the original to be used for certification of the site for final C.O. for Transportation.

If a temporary CO is needed, a copy of the original TCL that was stamped as approved by the City will be needed. This plan must include a statement that identifies the outstanding items that need to be constructed or the items that have not been built in "substantial compliance," as well as the signed and dated stamp of a NM registered architect or engineer. Submit this TCL with a completed Drainage and Transportation Information Sheet to Hydrology at the Development Services Center of Plaza Del Sol Building.

When the site is completed and a final C.O. is requested, use the original City stamped approved TCL for certification. A NM registered architect or engineer must stamp, sign, and date the certification TCL along with indicating that the development was built in "substantial compliance" with the TCL. Submit this certification TCL with a completed Drainage and Transportation Information Sheet to Hydrology at the Development Services Center of Plaza Del Sol Building.

Once verification of certification is completed and approved, notification will be made to Building Safety to issue Final C.O. To confirm that a final C.O. has been issued, call Building Safety at 924-3306.

Sincerely,

Kristal D. Metro, P.E.
Senior Engineer, Planning Dept.
Development and Building Services

cc: file

P.O. Box 1293
Albuquerque
New Mexico 87103
www.cabq.gov

ADVANCED ENGINEERING and CONSULTING, LLC

Consulting
Design
Development
Management
Inspection
Surveying

December 27, 2005

Mr. Nilo Salgado, P.E.
City Transportation Department
600 Second Street NW
Albuquerque, New Mexico 87102

Re: SITE PLAN CERTIFICATION FOR FINAL CERTIFICATION OF OCCUPANCY FOR TEXAS ROAD HOUSE, LOT 1, SAN MATEO DEL NORTE (E17-D32A)

Dear Mr. Salgado:

We are requesting Final Certification of Occupancy with this submittal. Enclosed please find copy of the as-built Site Plan for the above mentioned site. The site plan was approved with engineering stamp date of 05/17/2005. The project was inspected by Advanced Engineering and Consulting, LLC on December 22, 2005. I certify that the project was built in substantial compliance to the approved site plan.

Should you have any questions, please do not hesitate to contact our office.

Sincerely,

Shahab Biazar, P.E.

RECEIVED
DEC 27 2005
HYDROLOGY SECTION

4416 Anaheim Ave., N.E., Albuquerque, NM 87113 PH (505) 899-5570 FAX (505) 897-4996 EMAIL AECLLC@aol.com