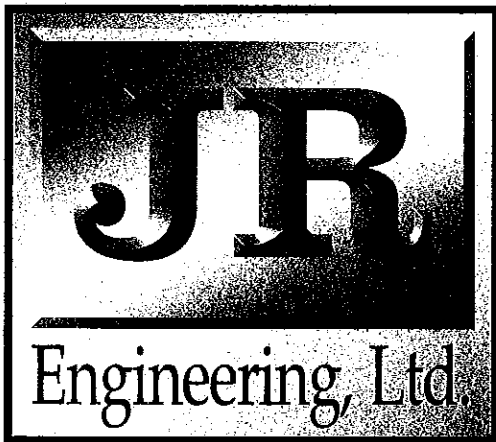


**PRELIMINARY/FINAL DRAINAGE REPORT  
FOR  
EAST FORK SAND CREEK  
CHANNEL IMPROVEMENTS**



*3087*

# **JR** Engineering, Ltd.

4935 North 30th Street  
Colorado Springs, Colorado 80919  
(719) 593-2593 • FAX (719) 528-6613  
www.jreng.com

## **PRELIMINARY/FINAL DRAINAGE REPORT FOR EAST FORK SAND CREEK CHANNEL IMPROVEMENTS**

January 1998  
*Revised July 1998*  
*Revised September 1998*  
*Revised January 1999*  
*Revised February 1999*  
*Revised March 1999*

Prepared For:

**SAND CREEK DEVELOPMENT, L. L. C.**  
616 West Monument Street  
Colorado Springs, CO 80905  
(719) 227-1022

Prepared By:

**JR ENGINEERING**  
4935 North 30th Street  
Colorado Springs, CO 80919  
(719) 593-2593

Job No. 8631.07

# JR Engineering, Ltd.

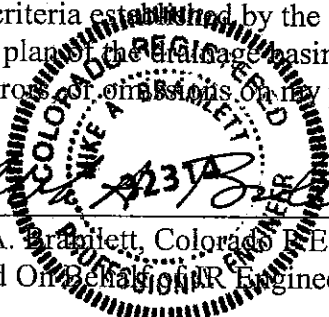
4935 North 30th Street  
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## PRELIMINARY/FINAL DRAINAGE REPORT FOR EAST FORK SAND CREEK CHANNEL IMPROVEMENTS

### DRAINAGE REPORT STATEMENT

#### ENGINEER'S STATEMENT:

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the City for drainage reports and said report is in conformity with the master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.



Mike A. Brantlett

Mike A. Brantlett, Colorado P.E. #32314  
For and On Behalf of JR Engineering, Ltd.

4.15.99

Date

#### DEVELOPER'S STATEMENT:

I, the developer, have read and will comply with all of the requirements specified in this drainage report and plan.

Business Name: Sand Creek Development, L. L. C.

By: David Knell

Title: Director of Construction

Address: 3300 Fitzgerald Road

Rancho Cordova, CA 95742

#### CITY OF COLORADO SPRINGS ONLY:

Filed in accordance with Section 15-3-906 of the Code of the City of Colorado Springs, 1980, as amended.

[Signature]  
City Engineer

6/5/99  
Date

Conditions:

**PRELIMINARY/FINAL DRAINAGE REPORT  
FOR  
EAST FORK SAND CREEK  
CHANNEL IMPROVEMENTS**

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**PRELIMINARY/FINAL DRAINAGE REPORT  
FOR  
EAST FORK SAND CREEK  
CHANNEL IMPROVEMENTS**

**PURPOSE**

This document is the Preliminary and Final Drainage Report for the East Fork Sand Creek Channel Improvements. The purpose of this report is to establish the extent of the existing channel improvements, recommend proposed locations for drop structure improvements, and analyze their effect on the water surface elevations using a HEC-RAS model and up-to-date topographic information for approximately 4,900 L.F. of the East Fork Sand Creek, and approximately 200 L.F. of the Central Tributary.

**GENERAL DESCRIPTION**

The East Fork Sand Creek Channel Improvements are located in Sections 23 and 24, Township 14 South, Range 66 West of the Sixth Principal Meridian in the City of Colorado Springs, County of El Paso. The site is bounded to the east by Powers Boulevard, to the south by the existing pedestrian bridge south of the confluence of the "East Fork" of Sand Creek and Sand Creek, and to the north by Airport Road.

**BASIN DESCRIPTION**

The Sand Creek Basin covers a total of 54 square miles in unincorporated El Paso County and Colorado Springs, Colorado. Of this total, approximately 28 square miles is encompassed by the Sand Creek Basin and 26 square miles for the East Fork Sand Creek Basin. The basin slopes in generally a south to southwesterly direction, entering the Fountain Creek approximately two miles upstream of the Academy Boulevard bridge over Fountain Creek.

## **SOILS AND GEOLOGY**

Soils within the Sand Creek Basin vary between soil Types A through D, as identified by the U.S. Department of Agriculture, Soil Conservation Service. The predominant soil groupings are in the Truckton and Bresser Soil Associations. The soils consist of deep, well-drained soils that formed in alluvium and residuum derived from sedimentary rock. The soils have high to moderate infiltration rates, and are extremely susceptible to wind and water erosion where poor vegetation cover exists. In undeveloped areas the predominance of Type A and B soils give this basin a lower runoff per unit area as compared to basins with soils dominated by Types C and D. Presented in the appendix is the Hydrologic Soil distribution map for the Sand Creek Basin.

## **EXISTING DRAINAGE CONDITIONS**

Previous drainage reports done for the Villages at Sand Creek development indicated that existing bank stabilization check and drop structures were installed per the 1980 Weiss Consulting Engineering, Inc. construction drawings for the East Fork of Sand Creek and the 1972 Richard Cox construction drawings for the Sand Creek Drainageway. A field investigation revealed no visible check or drop structures, three failed rip-rap gabion drop structures on the "East Fork" of Sand Creek, and a very minimal amount of visible bank stabilization in the form of sparsely placed rip-rap along the banks of the channel in isolated areas. Much of the existing bank stabilization is assumed to be under the existing vegetation.

The recently approved Sand Creek Drainage Basin Planning Study (D.B.P.S.) reflected the need for improvements along both Sand Creek and the East Fork of Sand Creek. These improvements include check and drop structures and bank stabilization adjacent to the previously mentioned creeks. The fact that these improvements may have been installed once and have failed indicates the possible need for additional improvements upstream of the site and/or the need for a long-term maintenance program for these improvements.

Using the 100-year and 10-year future condition flows from the Sand Creek D.B.P.S. and current topographic information, we created an HEC-RAS model for the East Fork of Sand Creek. This model extends from just west of the Powers Boulevard Bridge to the existing pedestrian bridge and concrete drop structure south of the confluence of the two creeks.

### **PROPOSED DRAINAGE CONDITIONS**

Check structures, drop structures, and a rip-rap mattress with lowering at the creek confluence bank stabilization, and creek widening are the proposed improvements recommended in the D.B.P.S. Five-drop structures are proposed on the East Fork of Sand Creek.. The effects of these structures can be seen in the chart located in the appendix which compares the proposed and existing water surface elevations and velocities based upon the HEC-RAS computer model. No improvements are proposed at the existing pedestrian bridge or along Sand Creek at this time due to City budgetary constraints. Widening of the East Fork of Sand Creek is recommended in the D.B.P.S., but is not proposed at this time due to City budgetary constraints.

It is noted that the existing drop at the pedestrian bridge appears to be at the correct elevation based upon the Sand Creek D.B.P.S. The failed condition of the drop at the lower end has lead to the recommendation that the drop should be rebuilt by the City at the same location.

As can be seen on the chart in the appendix, in most cases, the proposed improvements lower the proposed 10 and 100-year water surface elevations from 0.20' to 2.70'. The proposed improvements raise the 100-year water surface elevation at various locations as shown in Chart I in the Appendix due to the fact that the flowline of the creek bed is to be raised. The Chart 1 compares the improvement impacts to the channel velocity. In certain instances, the velocity is increased in the proposed condition. However, the proposed velocities are not out of line with other existing velocities in the channel. In addition, the velocities are lowered at several locations along the channel (see chart). Significant lowering of velocity of the channel will not occur until the channel is widened as recommended in the D.B.P.S. At Station 4+00 and 5+00, the 100-year high water

level is above the elevation of the southerly bank. The existing HECRAS model in the Appendix, shows a 100-year existing elevation higher than the F.E.M.A. elevation at Sta. 4+00, 5+00, and 15+00. This may be due to different assumptions for the 100-year flows.

It is important to note that these improvements will need to be properly maintained in order to be successful. In addition, the analysis for the proposed structures is based upon the future condition flows from the Sand Creek D.B.P.S., basins which may underestimate the flows in the current existing state due to the future regional detention basins which are not yet constructed.

### **HYDROLOGIC/HYDRAULIC CRITERIA**

This report has been prepared in accordance with the 1991 City/County Drainage Criteria Manual. The U.S. Army Corps of Engineers (HECRAS) computer program was used to create a model of the creek. The model was created using topographic information obtained in the field and the 100-year and 10-year future condition flows from the Sand Creek D.B.P.S.

The East Fork of Sand Creek is vegetated and irregular so a Mannings  $n = 0.04$  was used. Tractive force calculations were completed on the rip-rap to ensure that the rip-rap was of sufficient size. Cross-sections on the existing channel were taken at regular intervals and wherever the channel section changed significantly.

### **EROSION CONTROL PLAN**

The City of Colorado Springs Drainage Criteria Manual specifies that an Erosion Control Plan and associated cost estimate be submitted in conjunction with the Final Drainage Report. We have included the Erosion Control Plan as part of the overall improvement plan.



## FLOODPLAIN STATEMENT

A portion of this site is located within the floodplain as determined by the Flood Insurance Rate Map (F.I.R.M.) Community Panel Number 08041C0753F, dated March 17, 1997. The developers/engineer of Millers Crossing to the north of Airport Road has determined that the initial calculations performed to analyze this area used incorrect vertical data that resulted in larger floodplain to the north and south of the Airport Road Bridge than what is actually realized. This issue is not addressed in this report, but noted here for informational purposes only.

## CONSTRUCTION COST OPINION Sand Creek Channel Improvements

<u>Item</u>	<u>Description</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Cost</u>
<i>East Fork Sand Creek</i>				
1.	Drop Structure	5 EACH	\$40,000/EA	\$ 200,000.00
2.	Bank Stabilization and Grading Allowance	1 LUMP SUM	\$100,000/EA	<u>\$ 100,000.00</u>
			SUBTOTAL	\$ 300,000.00
			10% Engineering	\$ 30,000.00
			5% Contingencies	<u>\$ 15,000.00</u>
			<b>TOTAL</b>	<b><u>\$ 345,000.00</u></b>

JR Engineering cannot and does not guarantee that the construction cost will not vary from these opinions of probable construction costs. These opinions represent our best judgement as design professionals familiar with the construction industry and this development.

## EROSION CONTROL COST OPINION

<u>Item</u>	<u>Description</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Cost</u>
1.	Strawbale Check Dam (3 Bales)	36 EACH	\$4/EA	\$ 144.00
2.	Mirafi Silt Fence	500 L.F.	\$3/L.F.	\$ 1,500.00
3.	Reseeding	1 ACRE	\$500/AC	\$ 500.00
4.	25% Maintenance & Replacement			<u>\$ 536.00</u>
			<b>TOTAL</b>	<b><u>\$ 2,680.00</u></b>

JR Engineering cannot and does not guarantee that the construction cost will not vary from these opinions of probable construction costs. These opinions represent our best judgement as design professionals familiar with the construction industry and this development. Assurances for \$168,000.00 of the \$345,000.00 construction cost were posted with the Villages of Sand Creek Filing No. 2. The City also holds \$350,000 in financial assurances (see Filing No. 2 or 3 Final Drainage Report) based on letter from Greg Timm.

**DRAINAGE AND BRIDGE FEES**

As no new area is to be platted, the following apply:

Required Drainage Basin Fees	=	\$0.00
Required Bridge Fees	=	\$0.00

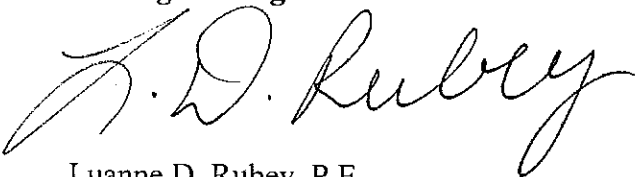
As assurances for \$168,000.00 of the \$345,000.00 were posted with the Villages of Sand Creek Filing No. 2, we recommend the developer post construction assurances of \$177,000.00 for the drainage improvements at such time that the City requires these assurances.

**SUMMARY**

Construction of these improvements will not adversely affect the surrounding developments.

PREPARED BY:

**JR Engineering**



Luanne D. Rubey, P.E.  
Senior Project Engineer

hw/863107/drainage.doc

## REFERENCES

1. City of Colorado Springs/County of El Paso Drainage Criteria Manual, dated October 1991.
2. "Sand Creek Drainage Basin Planning Study," Simons, Li & Associates, Inc., July 1985.
3. "Sand Creek Drainage Basin Study," United Planning and Engineering Company, October 1977.
4. "Sand Creek Drainage Basin Planning Study Preliminary Design Report," Kiowa Engineering Corporation, revised April 1995.
5. "East Fork Sand Creek Drainage Basin Planning Study," Kiowa Engineering Corporation, January 1989.
6. "Drainage Report and Plan Texas Instruments Subdivision," Leigh Whitehead and Associates, December 1981.
7. "Master Development Drainage Report for The Villages at Sand Creek Filing No. 1," JR Engineering, Ltd., April 1994.
8. "Preliminary/Final Drainage Report for the Villages at Sand Creek Filing No. 1," JR Engineering, Ltd., September 1994.
9. "Preliminary/Final Drainage Report for the Villages at Sand Creek Filing No. 2," JR Engineering, Ltd., November 1995.
10. "Sand Creek D.B.P.S. Preliminary Design Report," Kiowa Engineering Corporation, March 1996.

**CHART I**

**CHART I**  
**SAND CREEK CHANNEL IMPROVEMENTS**  
**Job No. 8631.07**

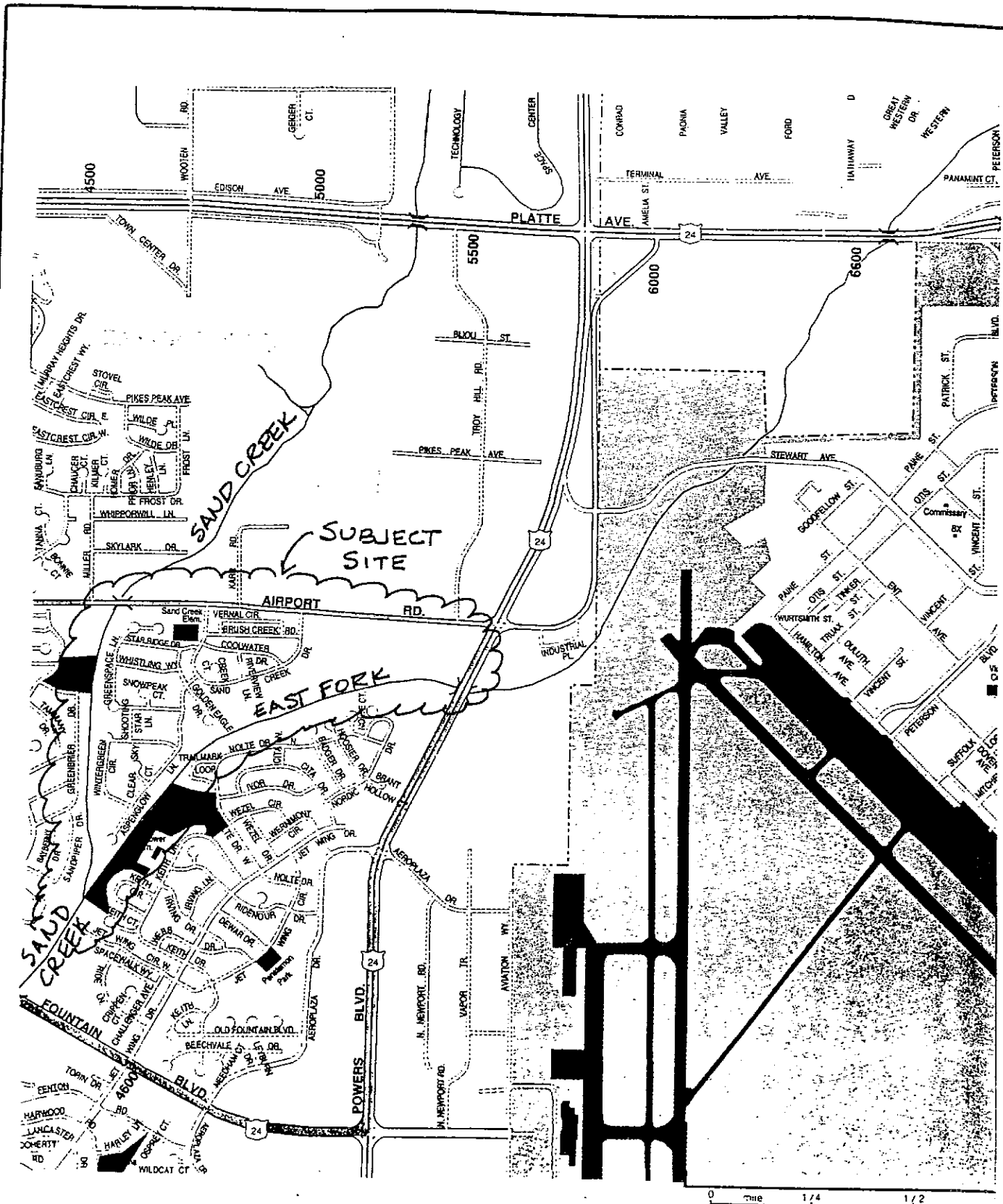
**Change in Elevation from Existing to Proposed**

Reach	Station	Existing 100-year WS	Proposed 100-year WS	Change in 100-year WS	Change in 100-year Velocity
East Fork 2	47+35	6088.46	6092.86	4.40	-4 fps
	46+65	6086.51	6092.85	6.34	-7 fps
	27+50	6061.46	6060.38	-1.08	+1.15
	22+50	6054.44	6053.32	-1.12	+2.1
	20+00	6051.75	6050.18	-1.57	-.53
	17+50	6048.36	6048.56	0.20	-2.69
	15+00	6046.23	6045.38	-0.85	+1.19
	14+00	6044.87	6044.67	-0.20	-1.81
	12+00	6042.87	6041.70	-1.17	+5.0
	10+50	6039.05	6038.82	-0.23	+9.6
	7+00	6036.09	6035.29	-0.80	-2.19
	*5+00	6033.28	6034.51	1.23	-3.89
	*4+00	6033.21	6032.61	-0.60	+0.18
	2+35	6029.70	6029.44	-0.26	+0.17
Central Trib	4+80	6096.59	6196.59	0.00	0.00
	1+30	6093.43	6095.42	1.99	-7.5
	8+30	6101.31	6098.61	-2.70	-0.01

\*sta 5+00 and 4+00 appear to overtop the bank in the 100-year event

## **APPENDIX**

**VICINITY MAP**



# VICINITY MAP

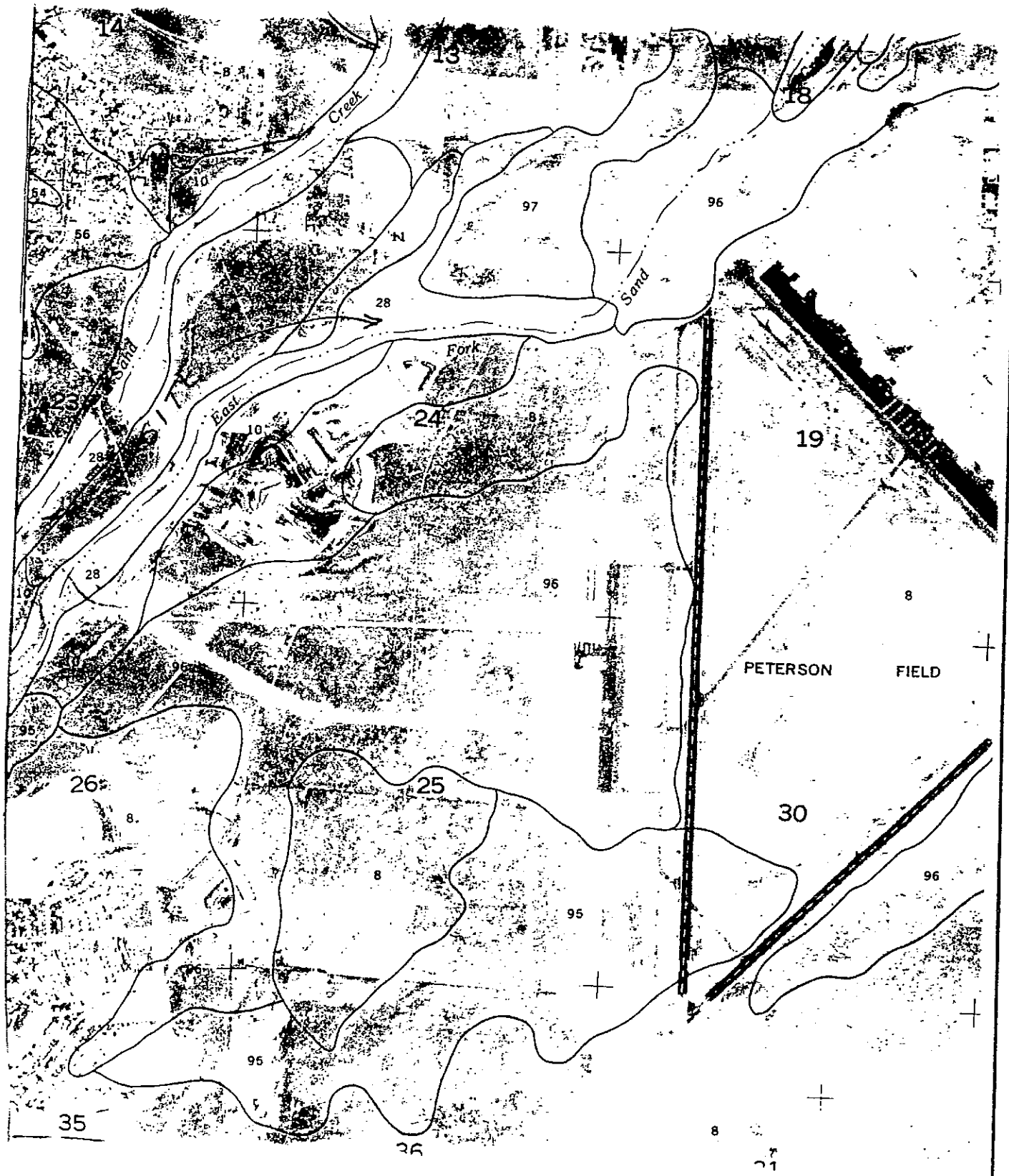
**JR** Engineering, Ltd.  
 4935 North 30th Street  
 Colorado Springs, Colorado 80919  
 (719) 593-2593 • FAX (719) 528-8813



**S. C. S. SOIL MAP**

## SOIL TYPE SUMMARY

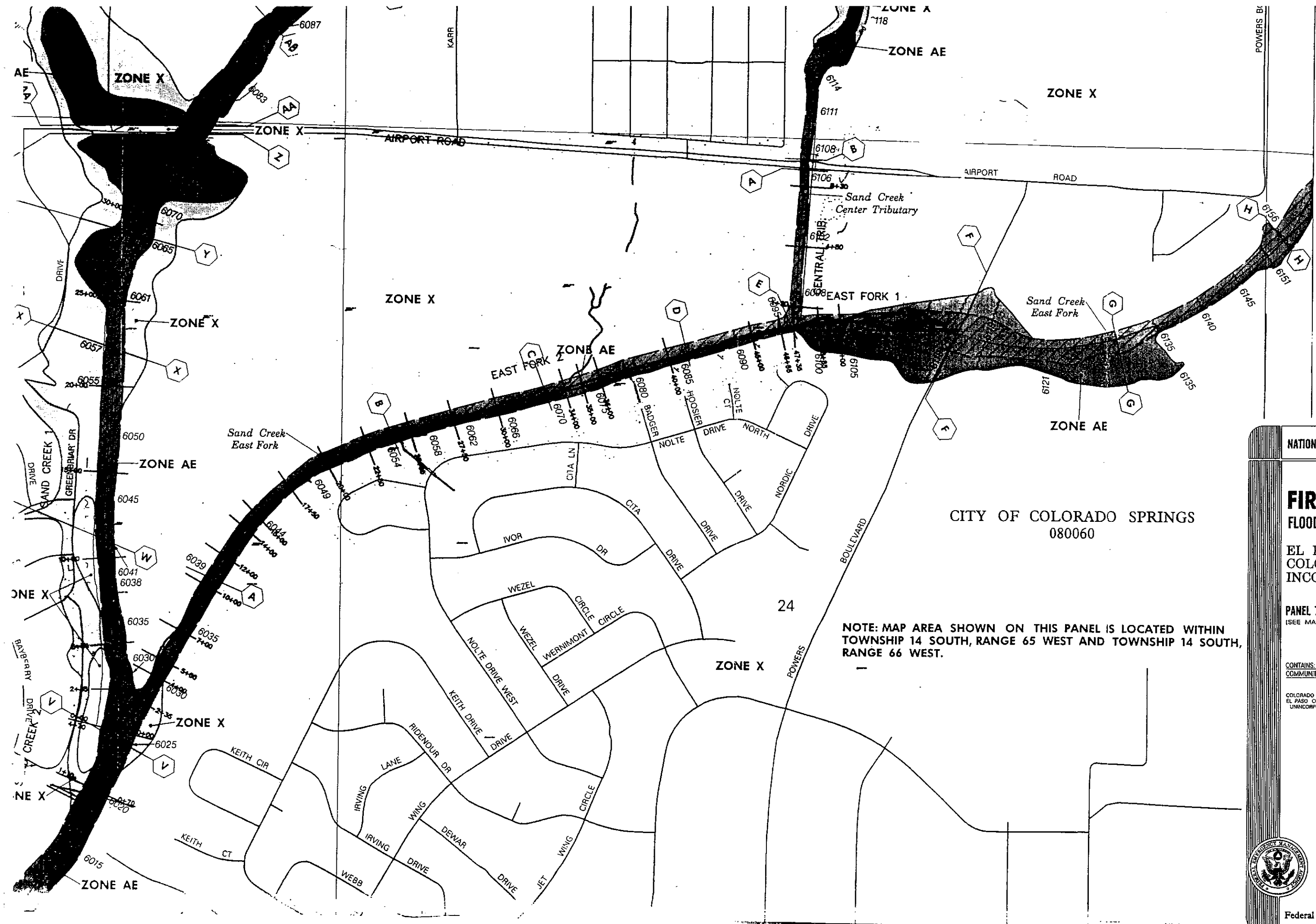
<u>Classification</u>	<u>Type/Characteristics</u>
78	SAMPSON "B" - Deep, well drained



SCS SOIL SURVEY

**JR** Engineering, Ltd.  
 4935 North 30th Street  
 Colorado Springs, Colorado 80919  
 (719) 583-2583 • FAX (719) 528-6613

**F. E. M. A. FLOODPLAIN MAP**



CITY OF COLORADO SPRINGS  
080060

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN  
TOWNSHIP 14 SOUTH, RANGE 65 WEST AND TOWNSHIP 14 SOUTH,  
RANGE 66 WEST.

NATIONAL FLOOD INSURANCE PROGRAM

**FIRM**  
FLOOD INSURANCE RATE MAP

EL PASO COUNTY,  
COLORADO AND  
INCORPORATED AREAS

PANEL 753 OF 1300  
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

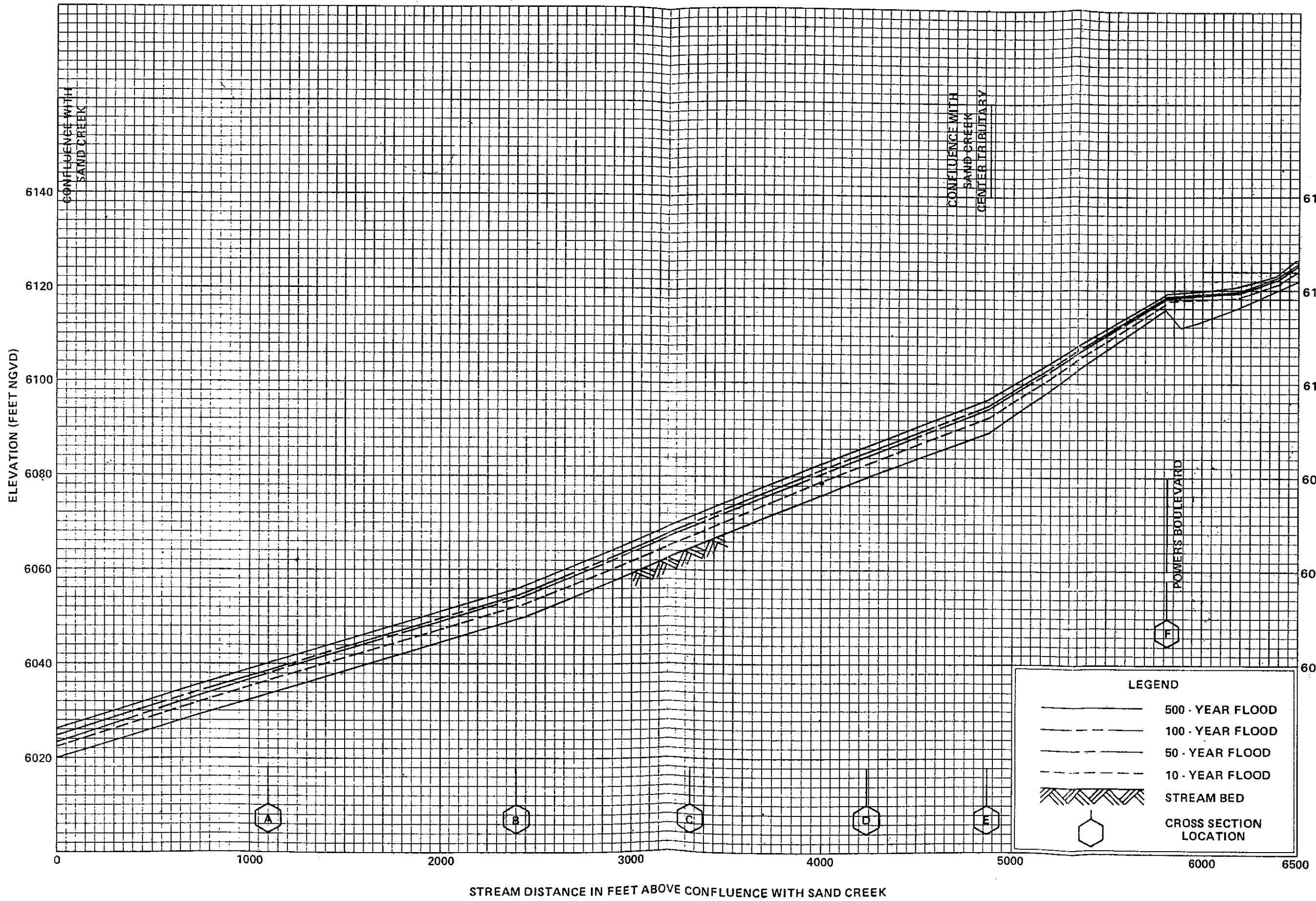
COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0753	-
EL PASO COUNTY,			
UNINCORPORATED AREAS	080059	0753	-

MAP NUMBER  
08041C0753 F

EFFECTIVE DATE:  
MARCH 17, 1997



Federal Emergency Management Agency



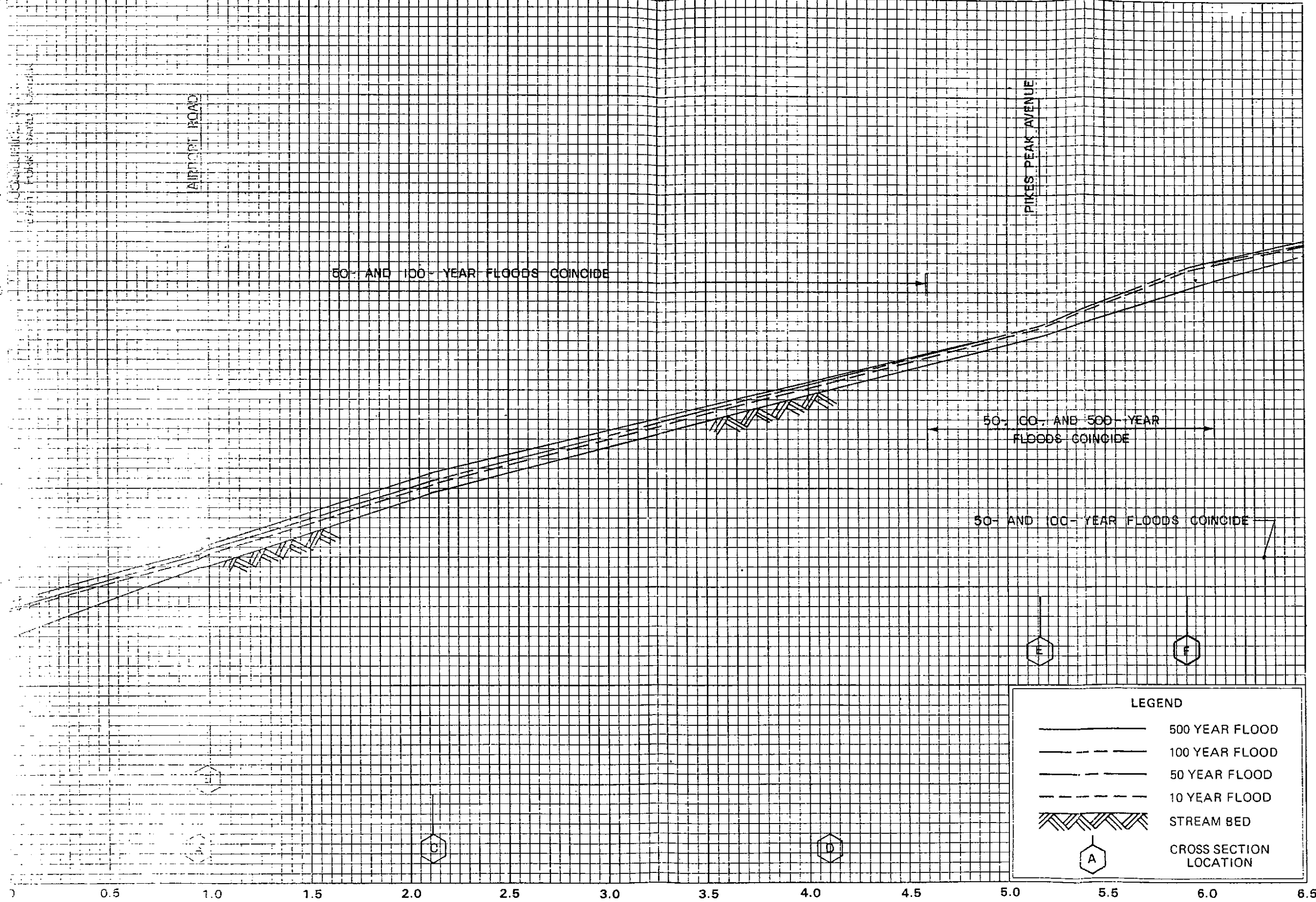
**FLOOD PROFILES**

SAND CREEK EAST FORK

FEDERAL EMERGENCY MANAGEMENT AGENCY

**EL PASO COUNTY, CO  
AND INCORPORATED AREAS**

8220

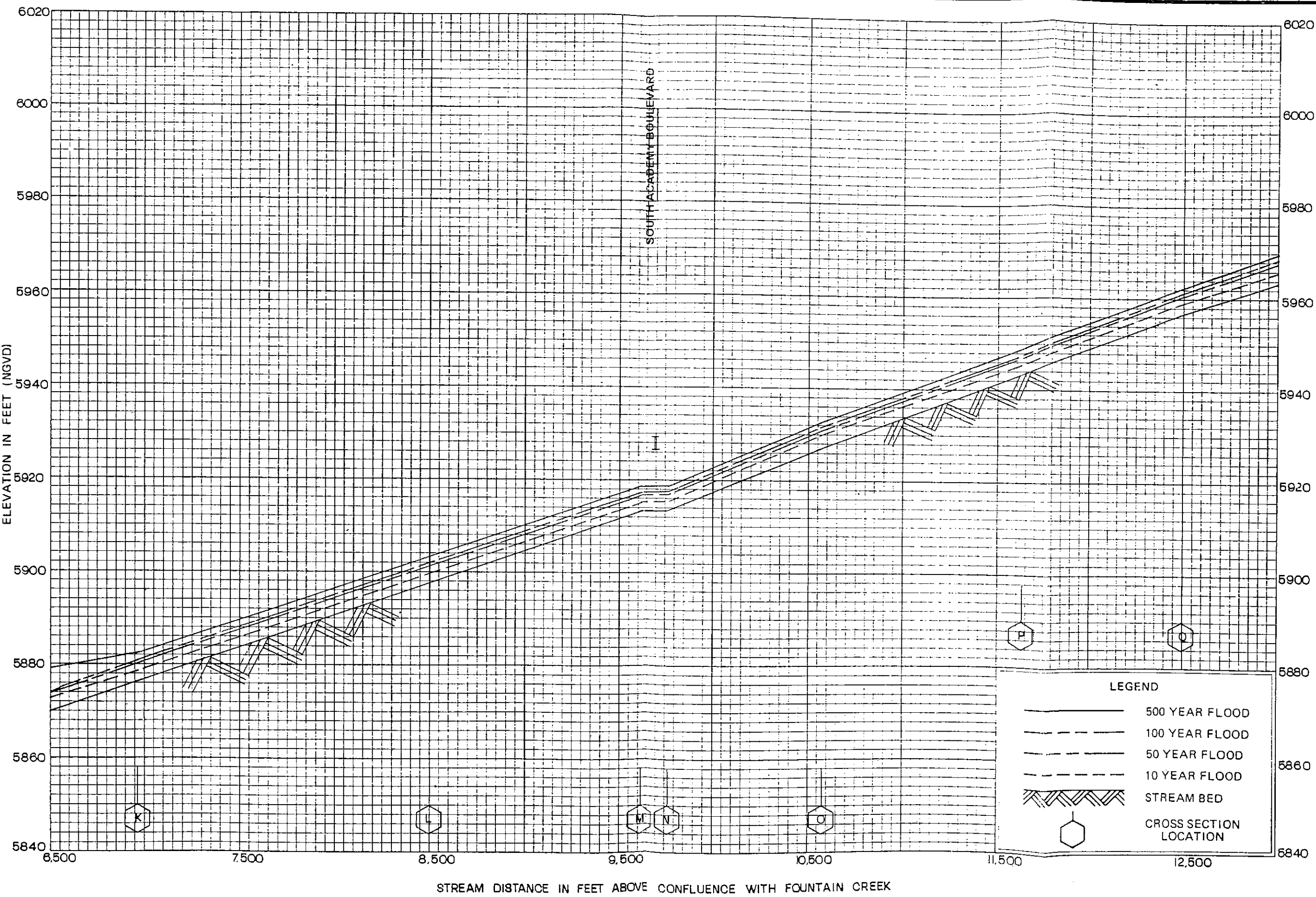


**LEGEND**

	500 YEAR FLOOD
	100 YEAR FLOOD
	50 YEAR FLOOD
	10 YEAR FLOOD
	STREAM BED
	CROSS SECTION LOCATION

**FLOOD PROFILES**  
**SAND CREEK CENTER TRIBUTARY**

FEDERAL EMERGENCY MANAGEMENT AGENCY  
 EL PASO COUNTY, CO  
 AND INCORPORATED AREAS

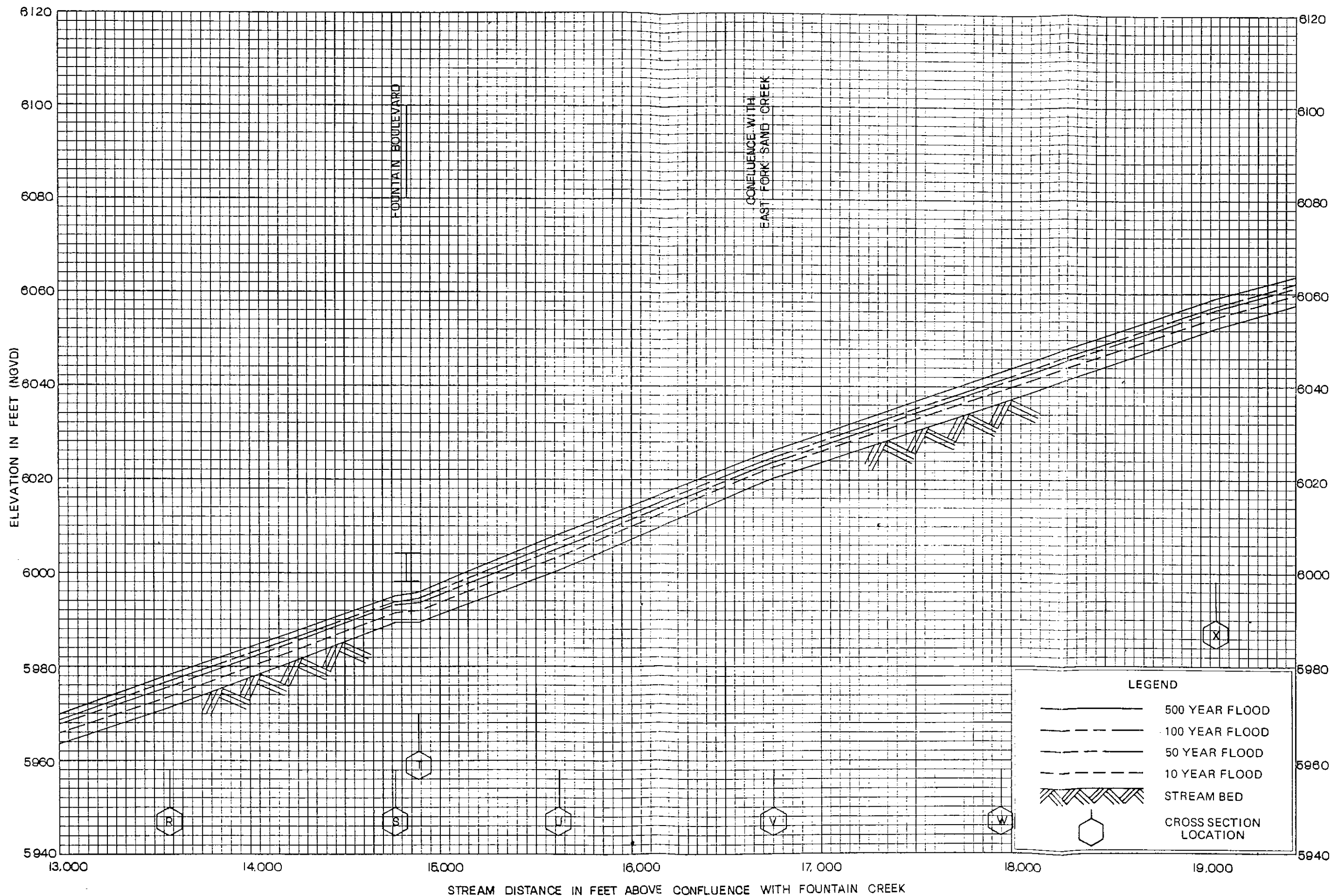


**FLOOD PROFILES  
SAND CREEK**

FEDERAL EMERGENCY MANAGEMENT AGENCY  
EL PASO COUNTY, CO  
AND INCORPORATED AREAS

LEGEND	
	500 YEAR FLOOD
	100 YEAR FLOOD
	50 YEAR FLOOD
	10 YEAR FLOOD
	STREAM BED
	CROSS SECTION LOCATION





**LEGEND**

- 500 YEAR FLOOD
- - - 100 YEAR FLOOD
- · - · 50 YEAR FLOOD
- · - · 10 YEAR FLOOD
- ▨ STREAM BED
- ⬡ CROSS SECTION LOCATION

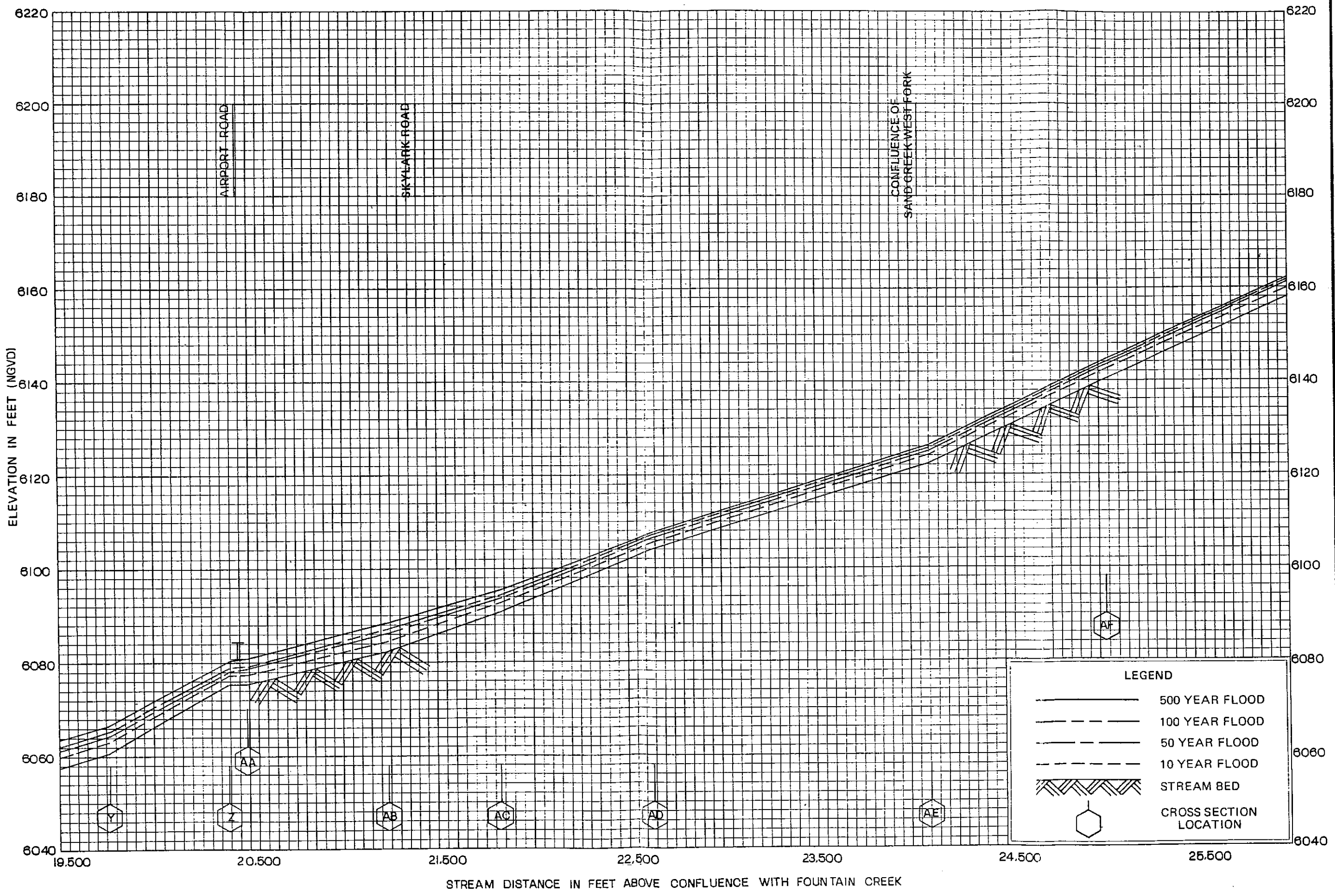
**FLOOD PROFILES  
SAND CREEK**

FEDERAL EMERGENCY MANAGEMENT AGENCY  
EL PASO COUNTY, CO  
AND INCORPORATED AREAS

# FLOOD PROFILES SAND CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY  
EL PASO COUNTY, CO  
AND INCORPORATED AREAS

196P



LEGEND	
	500 YEAR FLOOD
	100 YEAR FLOOD
	50 YEAR FLOOD
	10 YEAR FLOOD
	STREAM BED
	CROSS SECTION LOCATION

Table 2. Floodway Data

<u>FLOODING SOURCE</u>		<u>FLOODWAY</u>			<u>BASE FLOOD ELEVATION</u>			
<u>Cross Section</u>	<u>Distance</u> <sup>1</sup>	<u>Width (Feet)</u>	<u>Section Area (Square Feet)</u>	<u>Mean Velocity (Feet per Second)</u>	<u>Regulatory (Feet)</u>	<u>Without Floodway (Feet)</u>	<u>With Floodway (Feet)</u>	<u>Increase (Feet)</u>
Sand Creek								
East Fork								
Subtributary								
A	650	133	250	7.9	6,423.6	6,423.6	6,423.6	0.0
B	2,090	52	185	10.7	6,446.9	6,446.9	6,446.9	0.0
C	2,202	52	224	8.8	6,448.0	6,448.0	6,448.0	0.0
D	3,452	214	294	6.7	6,465.6	6,465.6	6,465.6	0.0
E	4,852	86	224	8.8	6,483.1	6,483.1	6,484.0	0.9
F	5,702	140	244	7.6	6,501.6	6,501.6	6,502.1	0.5
G	6,747	78	211	9.2	6,510.2	6,510.2	6,510.4	0.2
H	7,397	44	257	7.5	6,516.3	6,516.3	6,517.3	1.0
I	8,347	64	192	9.9	6,535.2	6,535.2	6,535.2	0.0
J	9,257	100	403	4.3	6,545.1	6,545.1	6,546.1	1.0
K	10,737	80	195	8.9	6,557.6	6,557.6	6,558.0	0.4
L	11,540	231	202	5.5	6,577.2	6,577.2	6,577.2	0.0
M	13,300	214	201	5.5	6,601.9	6,601.9	6,601.9	0.0
N	16,170	219	209	5.3	6,639.1	6,639.1	6,639.1	0.0
O	18,910	60	96	7.2	6,674.2	6,674.2	6,674.2	0.0
P	20,650	90	110	6.3	6,697.8	6,697.8	6,697.8	0.0
Q	22,900	100	112	6.1	6,729.2	6,729.2	6,729.3	0.1

<sup>1</sup>Feet Above Confluence With Sand Creek East Fork

Table 2. Floodway Data

FLOODING SOURCE		FLOODWAY			BASE FLOOD ELEVATION			
Cross Section	Distance <sup>1</sup>	Width (Feet)	Section Area (Square Feet)	Mean Velocity (Feet per Second)	Regulatory (Feet)	Without	With	Increase (Feet)
						Floodway (Feet)	Floodway (Feet)	
Sand Creek								
East Fork								
N	13,130	425	711	7.5	6,226.1	6,226.1	6,226.5	0.4
O	14,170	263	613	8.7	6,238.5	6,238.5	6,239.2	0.7
P	15,170	290	633	8.4	6,253.7	6,253.7	6,253.7	0.0
Q	15,270	290	1,005	5.3	6,254.0	6,254.0	6,255.0	1.0
R	16,200	228	582	9.2	6,268.8	6,268.8	6,268.8	0.0
S	16,900	300	678	7.9	6,277.3	6,277.3	6,277.5	0.2
T	17,570	321	690	7.7	6,291.4	6,291.4	6,292.0	0.6
U	17,640	326	667	8.0	6,291.4	6,291.4	6,292.1	0.7
V	18,490	388	1,598	3.3	6,293.4	6,293.4	6,294.0	0.6
W	19,570	367	683	7.8	6,307.2	6,307.2	6,307.6	0.4
X	21,100	413	706	7.5	6,326.4	6,326.4	6,327.1	0.7
Y	22,700	255	620	8.6	6,348.7	6,348.7	6,348.8	0.1
Z	23,680	397	706	7.6	6,359.9	6,359.9	6,359.9	0.0
AA	25,410	431	705	7.4	6,383.7	6,383.7	6,383.7	0.0
AB	27,080	353	667	7.8	6,401.0	6,401.0	6,401.5	0.5

<sup>1</sup> Feet Above Confluence With Sand Creek

Table 2. Floodway Data

FLOODING SOURCE		FLOODWAY			BASE FLOOD ELEVATION			
Cross Section	Distance <sup>1</sup>	Width (Feet)	Section Area (Square Feet)	Mean	Regulatory (Feet)	Without	With	Increase (Feet)
				Velocity (Feet per Second)		Floodway (Feet)	Floodway (Feet)	
Sand Creek Center Tributary								
G	6,740	60	102	7.4	6,171.9	6,171.9	6,172.5	0.6
H	7,960	67	107	7.1	6,186.3	6,186.3	6,186.3	0.0
I	9,080	8	41	12.8	6,209.9	6,209.9	6,210.9	1.0
J	9,180	125	163	3.2	6,213.1	6,213.1	6,214.1	1.0
K	9,900	20	64	10.2	6,215.5	6,215.5	6,216.5	1.0
L	9,940	20	64	10.2	6,215.5	6,215.5	6,216.5	1.0
M	10,980	120	166	6.6	6,229.3	6,229.3	6,229.4	0.1
N	12,020	60	98	7.3	6,244.6	6,244.6	6,245.4	0.8
O	12,840	29	85	9.6	6,253.8	6,253.8	6,253.8	0.0
P	13,730	27	83	9.9	6,273.6	6,273.6	6,273.6	0.0
Q	14,592	26	68	9.3	6,299.7	6,299.7	6,299.7	0.0
R	14,670	40	61	6.9	6,304.2	6,304.2	6,305.2	1.0
S	15,050	20	63	10.1	6,307.6	6,307.6	6,308.1	0.5
T	15,460	25	68	9.5	6,310.8	6,310.8	6,311.4	0.6
U	15,750	20	41	7.8	6,319.6	6,319.6	6,319.6	0.0
V	16,670	20	39	8.1	6,346.0	6,346.0	6,346.0	0.0

<sup>1</sup>Feet Above Confluence With Sand Creek East Fork

**HEC-RAS MODEL**

INPUT - Existing & Proposed conditions:

Starting Conditions & Flow conditions for  
 HECRAS model of Sand Creek

EAST FORK 1

Profile	Upstream	Downstream	Flow	
1	Known WS=6102	Junct 1	4760	(30+0)
2	Critical	Junct 1	1990	(30+0)

Central TRIB

1	Known WS=6105	Junct 1	1980	(8+30)
2	Critical	Junct 1	1180	(8+30)

East Fork 2

1	Junct 1	Junct 2	4760	(47+35)
2	Junct 1	Junct 2	1970	(47+35)

Sand Creek 1

1	Known WS=6070	Junct 2	7150	(34+0)
2	Critical	Junct 2	3910	(34+0)

Sand Creek 2

1	Junct 2	Critical	11830	(4+70)
2	Junct 2	Critical	5850	(4+70)

Additional Flow data input:

Sand Creek 1

1			7900	(20+0)
2			4300	(20+0)

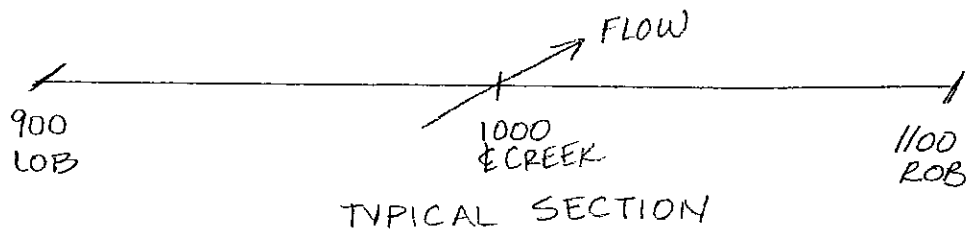
Sand Creek 2

1			11830	(0+0)
2			5850	(0+0)

**SUMMARY  
EXISTING CONDITIONS**



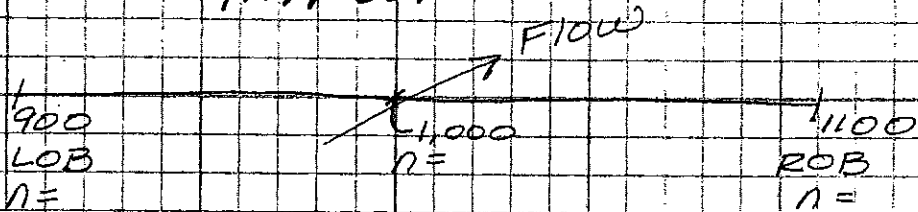
**SANDCREEK HEC-RAS EXISTING CONDITIONS  
INPUT DATA (EXGEO)**



**SUPERCritical FLOW ASSUMED**

**EXGEO**

Sand Creek HEC-RAS  
EXISTING CONDITIONS  
INPUT DATA



Looking downstream

Supercritical flow assumed

## ~~10-100YR~~ (scrk.f 02)

Profile 1 = 100yr peak discharge for selected plan  
 Profile 2 = 10yr section IV - SandCreek DPBS

Q = cfs

REACH	River STA.	Profile No.		Reach Name in SandCreek DPBS
		1	2	
1 East Fork 1	50	4760	1990	EF-2
2 Cen TRIB	8.3	1980	1180	CT-1
3 East Fork 2	47.35	4760	1970	EF-1
4 SandCreek 1	34	7150	3910	SC-2
	19	7900	4300	
5 SandCreek 2	4	11,830	5850	SC-1

### Boundary Conditions

100 yr - Profile 1

Reach      UPSTREAM      DOWNSTREAM

East Fork 1      Known WS = 6102 ✓      Junct 1

Cen Trib      Known WS = 6105 ✓      Junct 1

East Fork 2      Junct 1      Junct 2

SandCreek 1      Known WS = 6070 ✓      Junct 2

SandCreek 2      Junct 2      Critical

10 yr Profile 2

Reach      UPSTREAM      DOWNSTREAM

East Fork 1      Critical      Junct 1

Cen Trib      Critical      Junct 1

East Fork 2      Junct 1      Junct 2

SandCreek 1      Critical      Junct 2

SandCreek 2      Junct 2      Critical

Flows Considered:

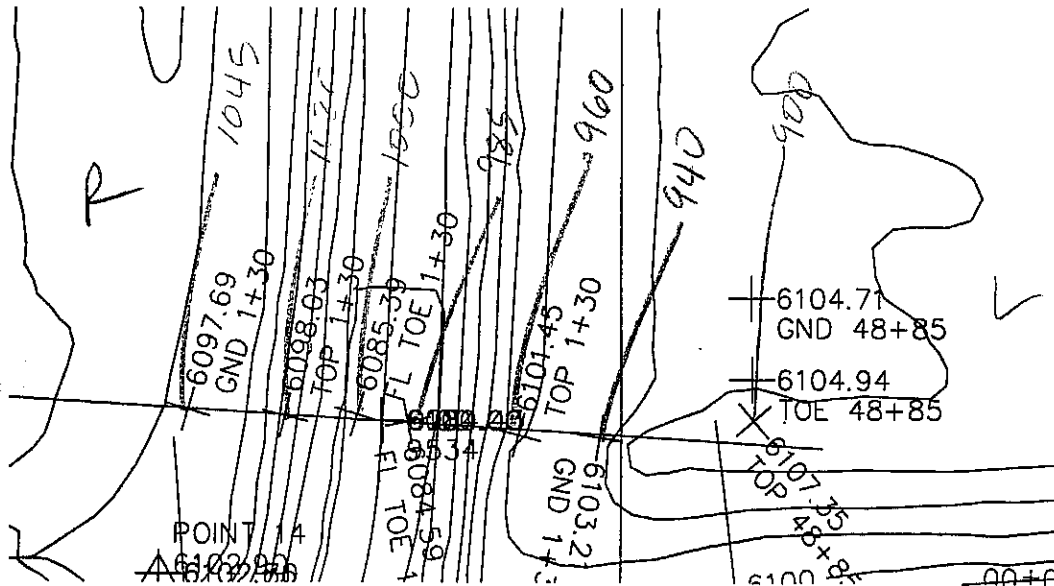
Based upon SAND CREEK - DPBS  
3-96 revision

from Section IV - Peak Discharge Data  
for selected plan  
& preliminary design profile information

DS. Each Lengths  
LOB Channel ROB  
 150 150 150

Main Channel Bank  
Left Bank Right Bank  
 940 1020

<u>STA.</u>	<u>ELEV.</u>
900	6104.94
940	6103.21
960	6101.45
985	6084.59
1000	6085.39
1020	6098.03
1045	6097.69

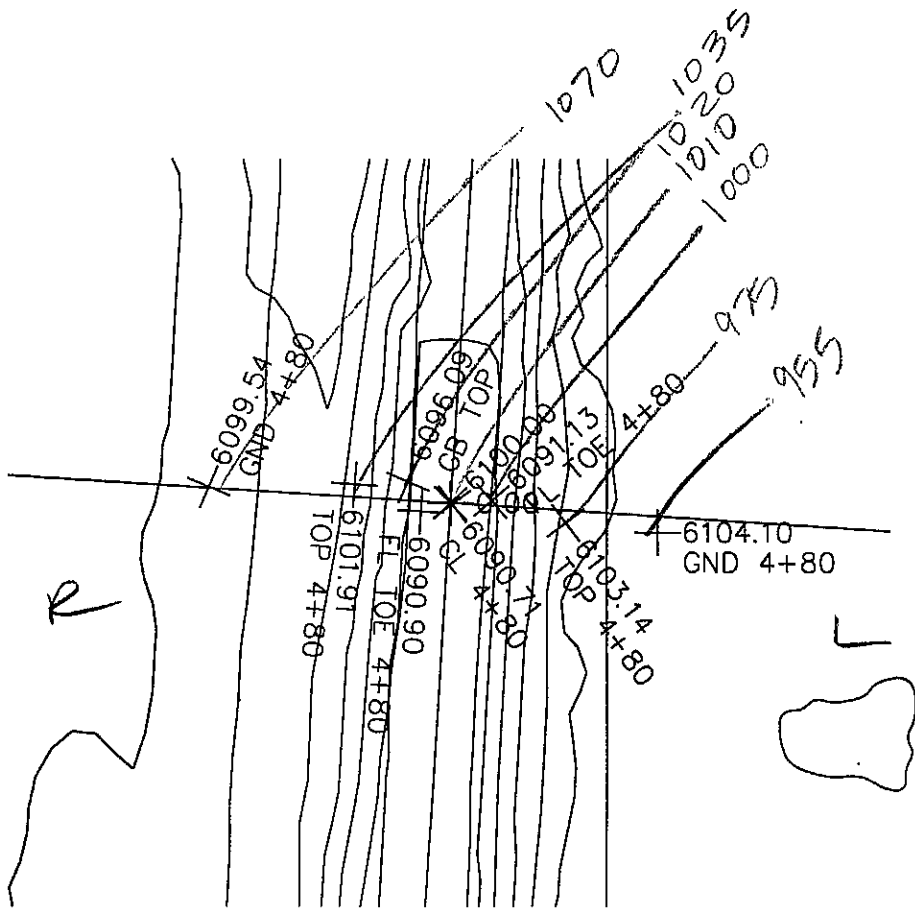


6101.45  
 Cent. Top  
 11-50'

DS Reach Lengths  
LOB channel ROB  
 350 30 350

Main Channel Bank  
Left Bank Right Bank  
 975 1035

<u>STA.</u>	<u>Elev.</u>
955	6104.10
975	6103.14
1000	6091.13
1010	6090.71
1020	6090.90
1035	6101.91
1070	6099.54

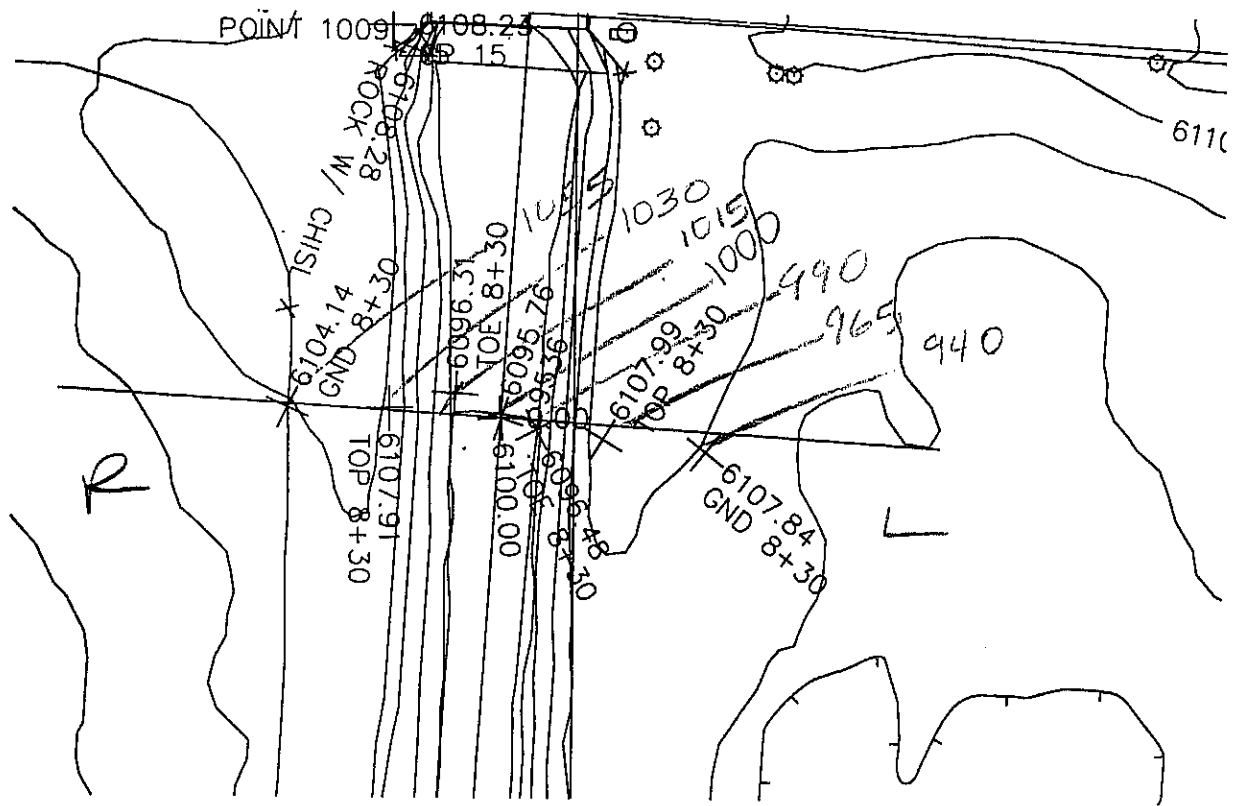


STA 4+80  
 Cent. TND  
 12/10/97  
 11-50'

LVE Channel ROF:  
 350    350    350

Main Channel Bank  
 Left Bank    Right Bank  
 965            1030

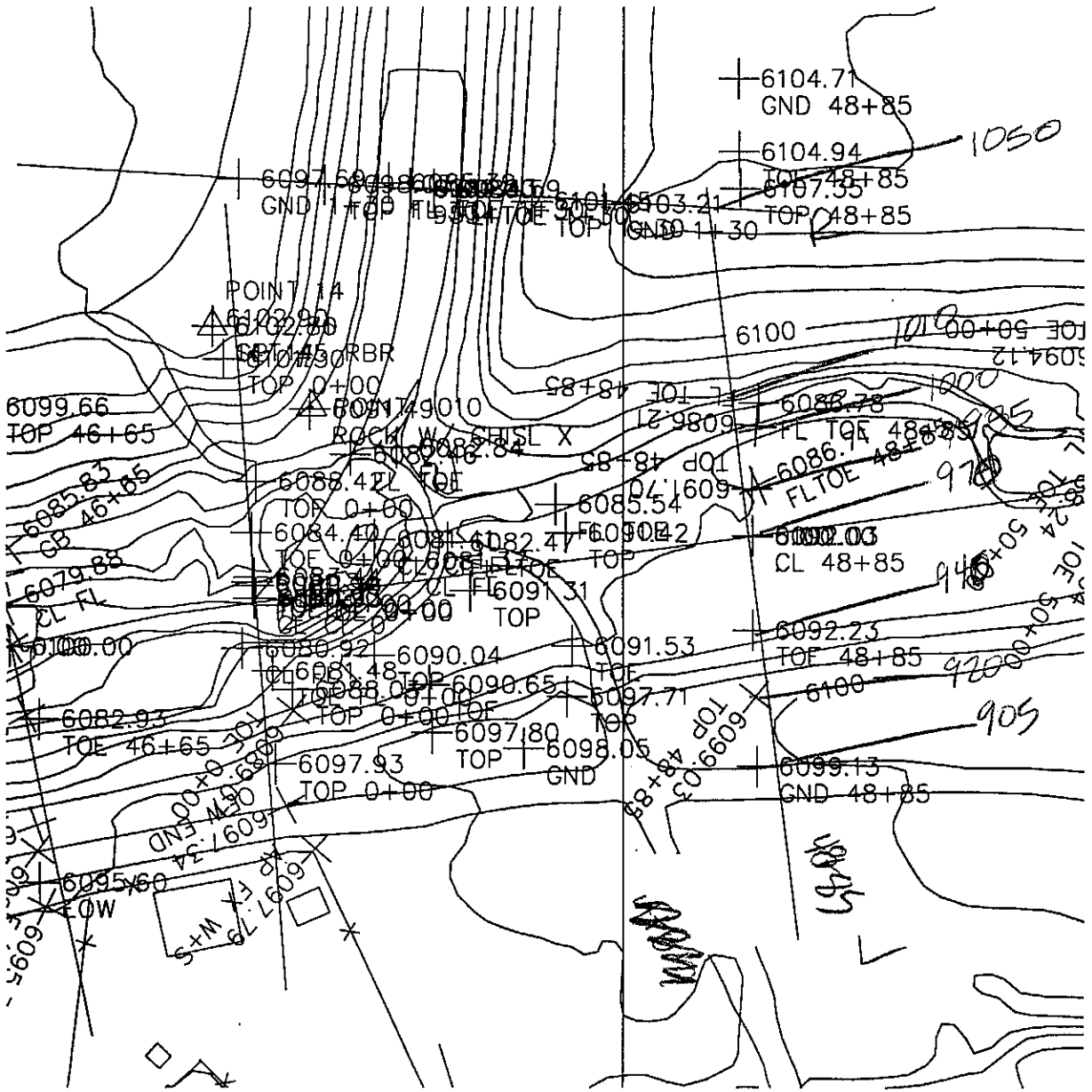
STA.	Elev
940	6107.84
965	6107.99
990	6096.48
1000	6095.76
1015	6096.31
1030	6107.91
1055	6104.14



STA 8+30  
 CANT. TYP  
 12/8/97  
 11=601

L's Reach Lengths  
LOB      Channel      ROB  
 150            150            150

Main Channel Bank  
Left Bank      Right Bank  
 940                    1030



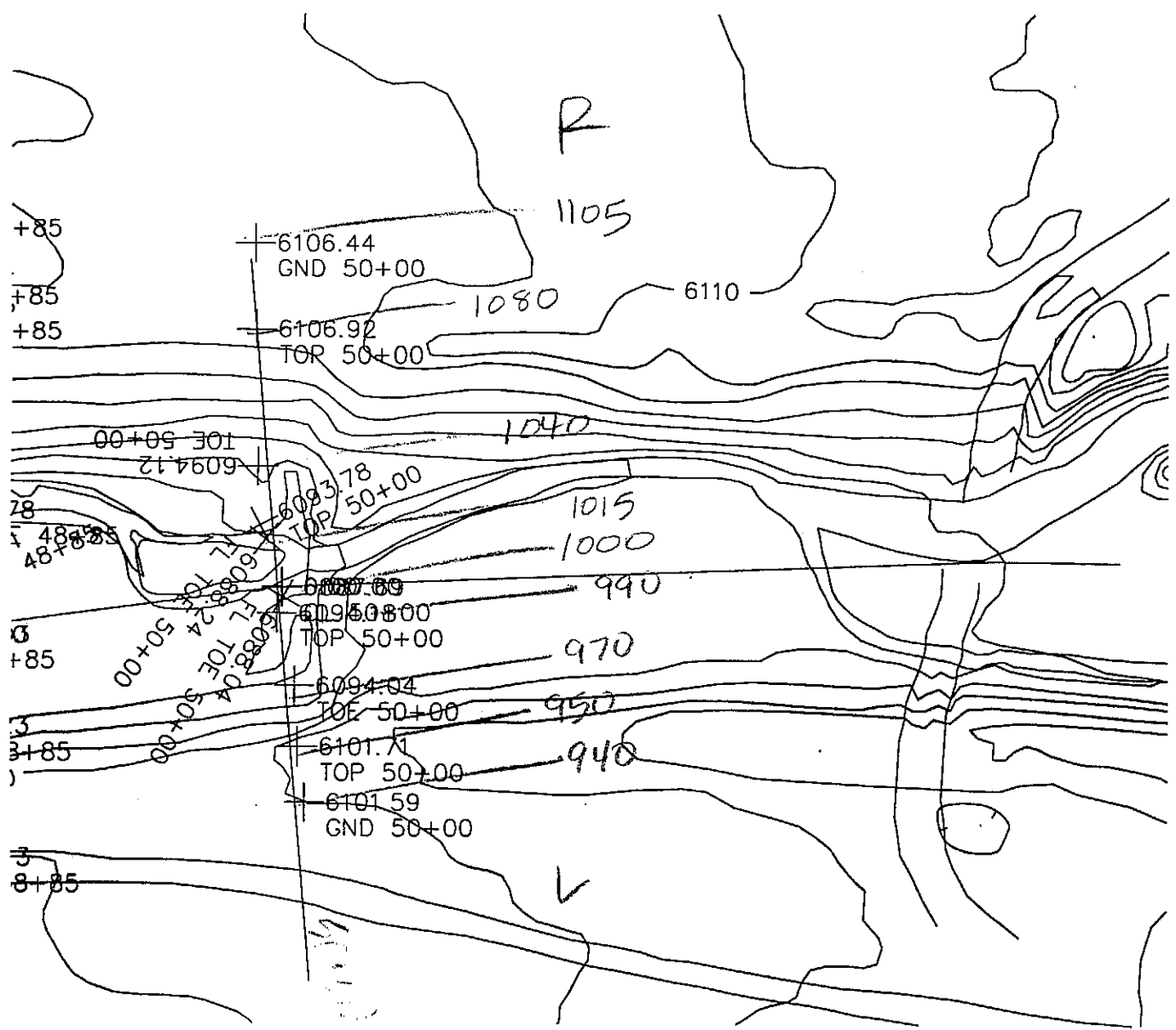
<u>STA</u>	<u>ELEV</u>
905	6099.13
920	6099.03
940	6092.23
970	6092.03
985	6086.74
1000	6086.21
1010	6086.78
1050	6107.35

1" = 50'  
 STA 48+85  
 SUST FOR 1  
 12/18/97



LOB      Channel      ROB  
 110      115      120

main Channel Bank  
Left Bank      Right Bank  
 970      1040

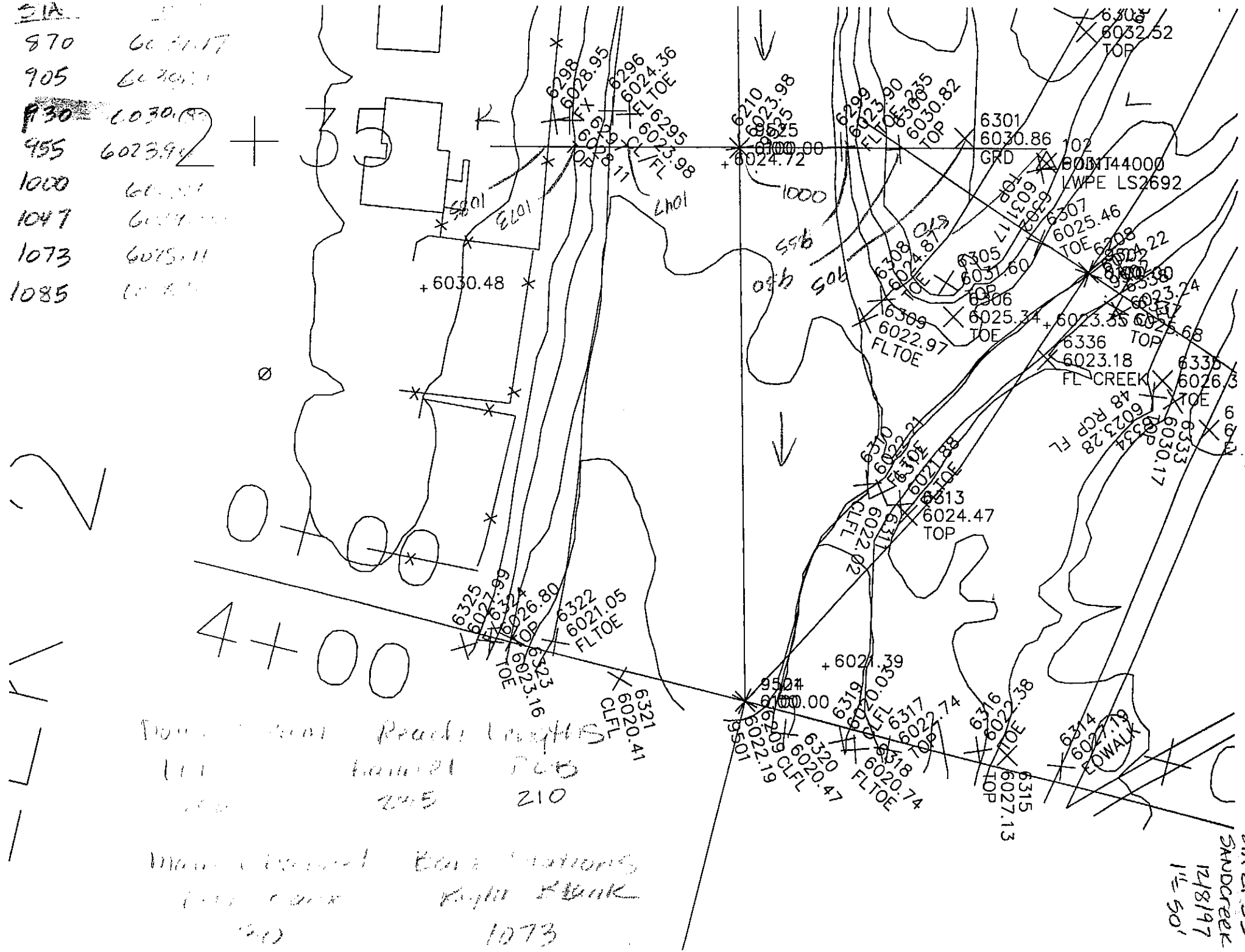


STA	Elev
940	6101.59
950	6101.71
970	6094.04
990	6094.18
1000	6087.69
1015	6093.78
1040	6094.12
1080	6106.92
1105	6106.44

STA 50+00  
 East Fork  
 12/8/97  
 1"=50'

SIA

- 870 6031.17
- 905 6030.11
- ~~930~~ 6030.17
- 955 6023.94
- 1000 6024.72
- 1047 6025.11
- 1073 6025.11
- 1085 6025.11



Downstream Reach Lengths  
 111 140 170  
 245 210

Main channel Bank Stations  
 Right Bank  
 1073

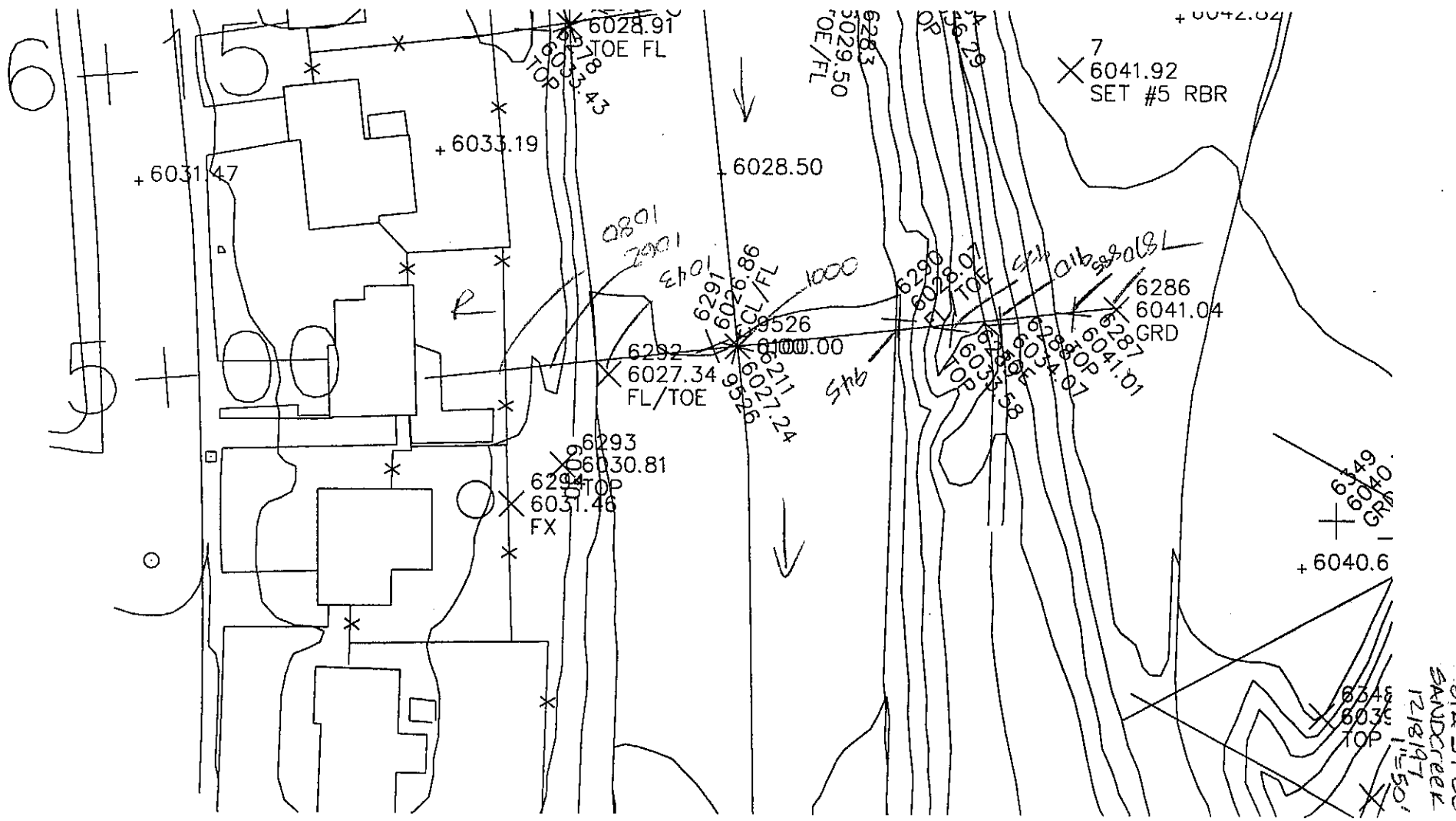
SNA 2435  
 SANDCREEK  
 12/8/97  
 1 1/2 50'

Left Bank Channel Right Bank  
 280 205 260

Main Channel Bank Stations  
 Left Bank Right Bank

1062

STA	ele
870	6041.04
885	6041.01
910	6034.07
925	6033.58
945	6028.07
1000	6027.24
1043	6027.34
1062	6030.81
1080	6031.46



DIST NO

LOB

Channel ROB

120

H~~115~~ 110

Main channel Bank Stationing

Left Bank

Right Bank

929

1059

915

6036.82

925

6036.29

930

6029.50

1000

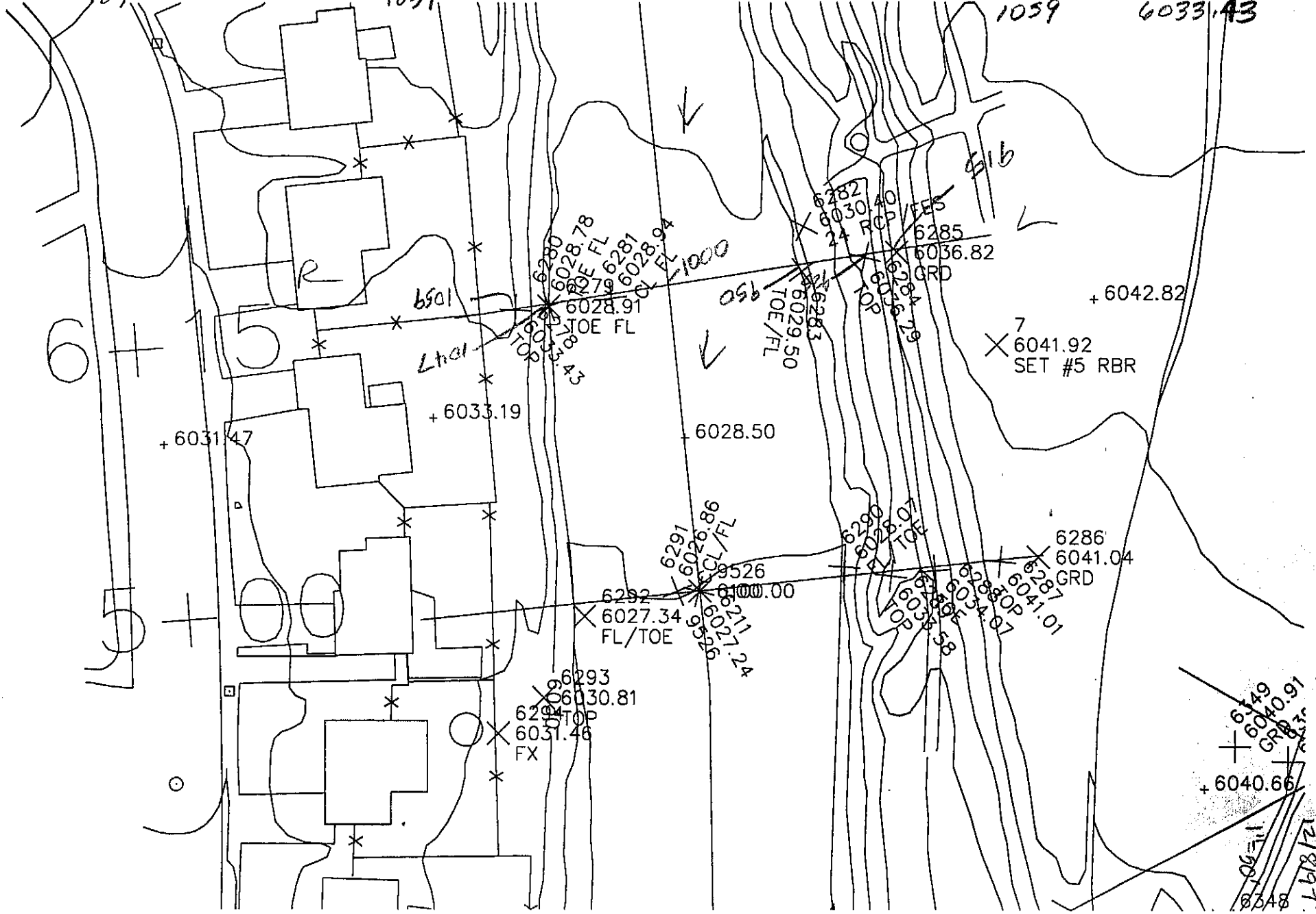
6028.94

1047

~~6028.78~~

1059

6033.43



6280  
6028.78  
6279  
6281  
6028.94  
6028.91  
6028.91  
TOE FL  
6280  
6028.91  
6279  
6281  
6028.94

6282  
6030.40  
6285  
6036.82  
GRD  
6283  
6029.50  
TOE/FL  
6283  
6029.50  
TOE/FL  
6285  
6036.82  
GRD  
6285  
6036.82  
GRD

7  
6041.92  
SET #5 RBR

+6031.47

+6033.19

6028.50

+6042.82

6291  
6026.86  
6292  
6027.34  
FL/TOE  
6292  
6027.34  
FL/TOE  
6292  
6027.34  
FL/TOE  
6292  
6027.34  
FL/TOE  
6292  
6027.34  
FL/TOE

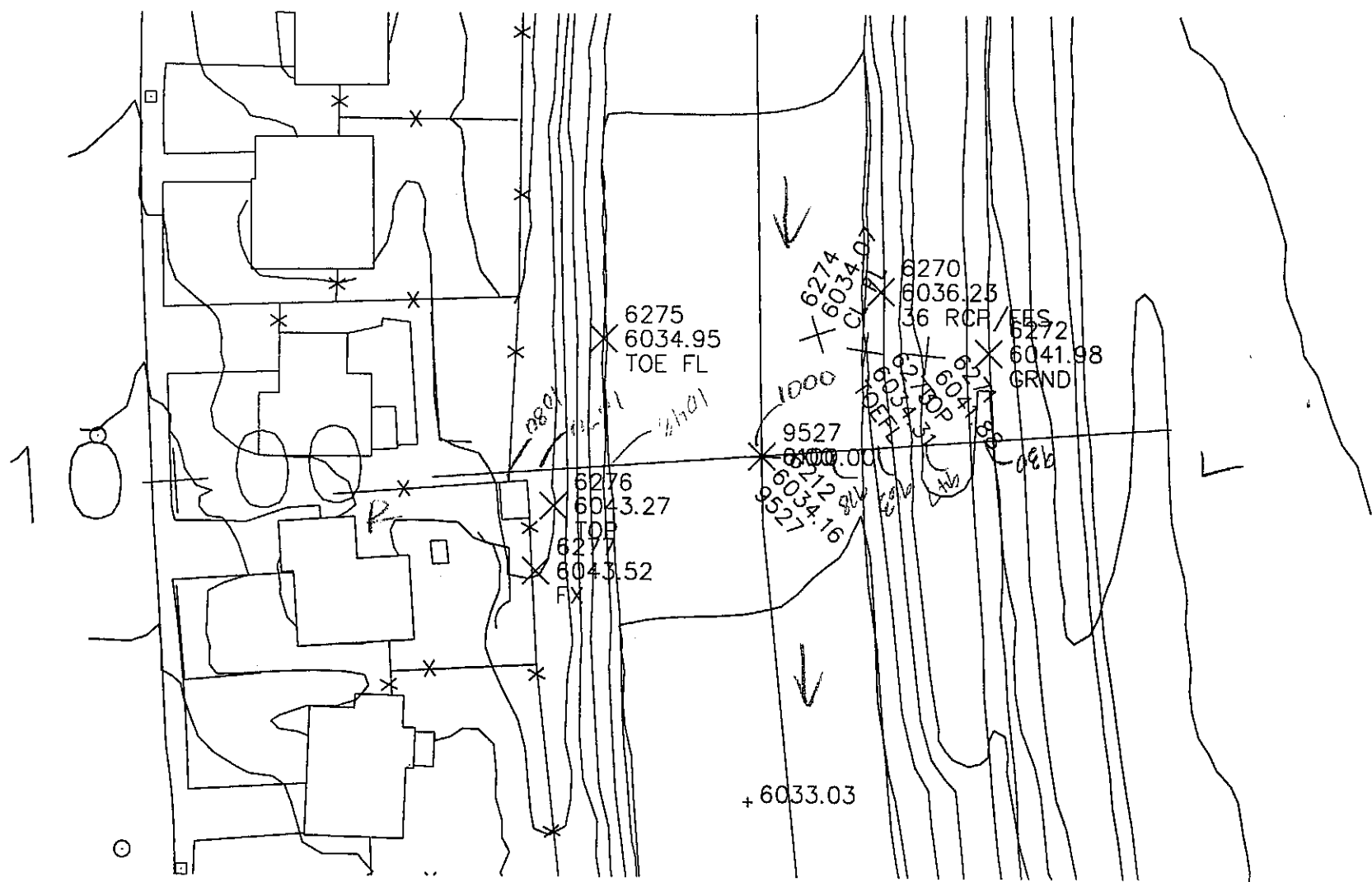
6286  
6041.04  
GRD  
6287  
6041.01  
6288  
6034.87  
6289  
6034.87  
6290  
6034.87  
6291  
6034.87  
6292  
6034.87  
6293  
6034.87  
6294  
6034.87  
6295  
6034.87  
6296  
6034.87  
6297  
6034.87  
6298  
6034.87  
6299  
6034.87

6293  
6030.81  
6294  
6031.46  
FX

6149  
6040.91  
GRD  
+6040.66

STA 0+15  
SADDLE  
12/18/97  
8248

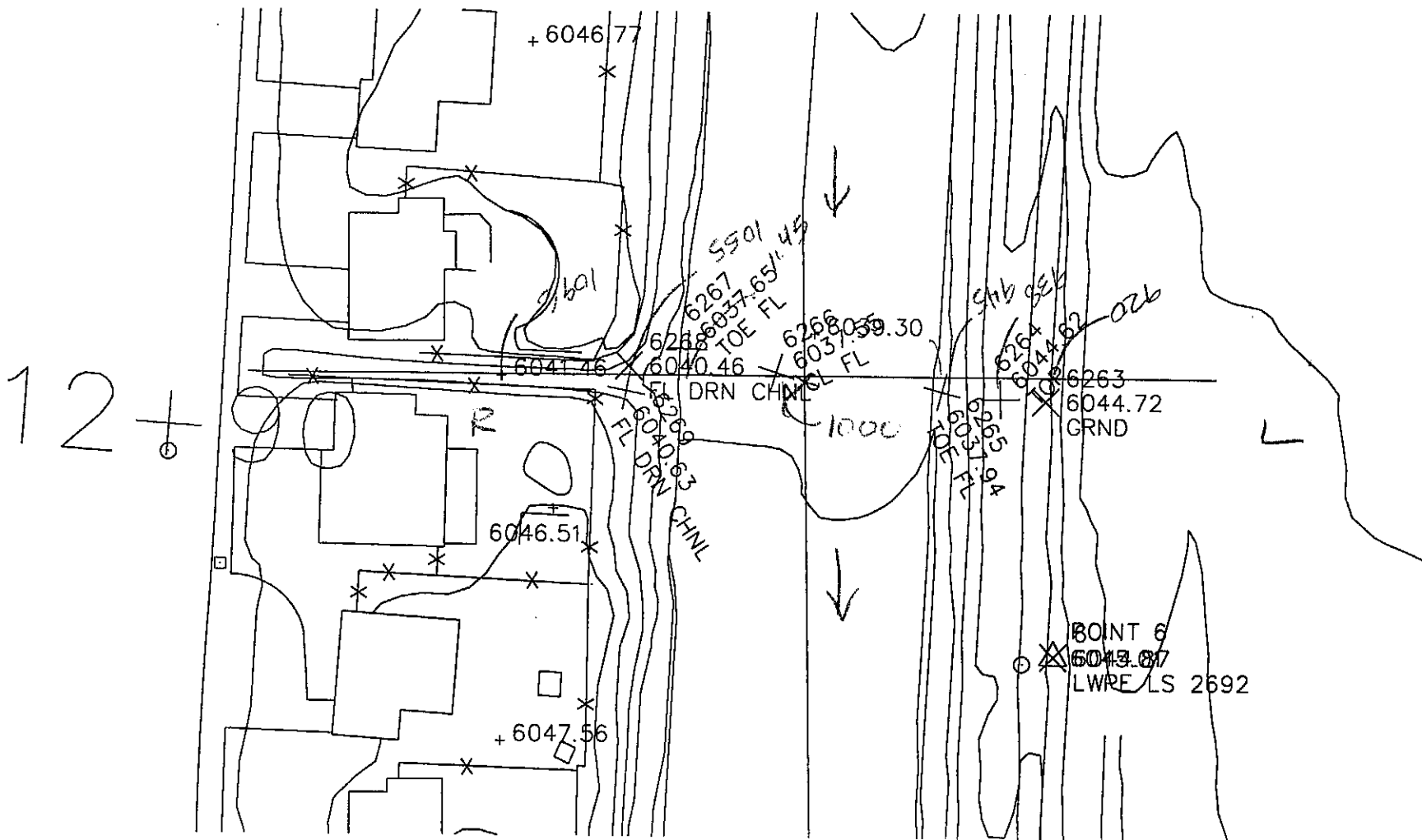
LOE	Channel	Ret.		
370'	<del>301</del> 385	<del>380</del> 395'	930	6041.98
			947	6041.88
			963	6034.31
			115	
Main ...		Bank ...	1000	6034.16
Ld ...		Right bank	1048	6034.95
947		1070	1070	6043.27
		1080	1080	6043.52



STA. 10+00  
 SAND CREEK  
 12/8/97  
 1" = 50'

DOWN  
 LOP  
 280'  
 (Main  
 Left  
 935  
 Right  
 1055

-1A	12
920	6044.72
935	6044.02
945	6037.94
1000	6037.55
1045	6037.65
1055	6040.46
1096	6041.46

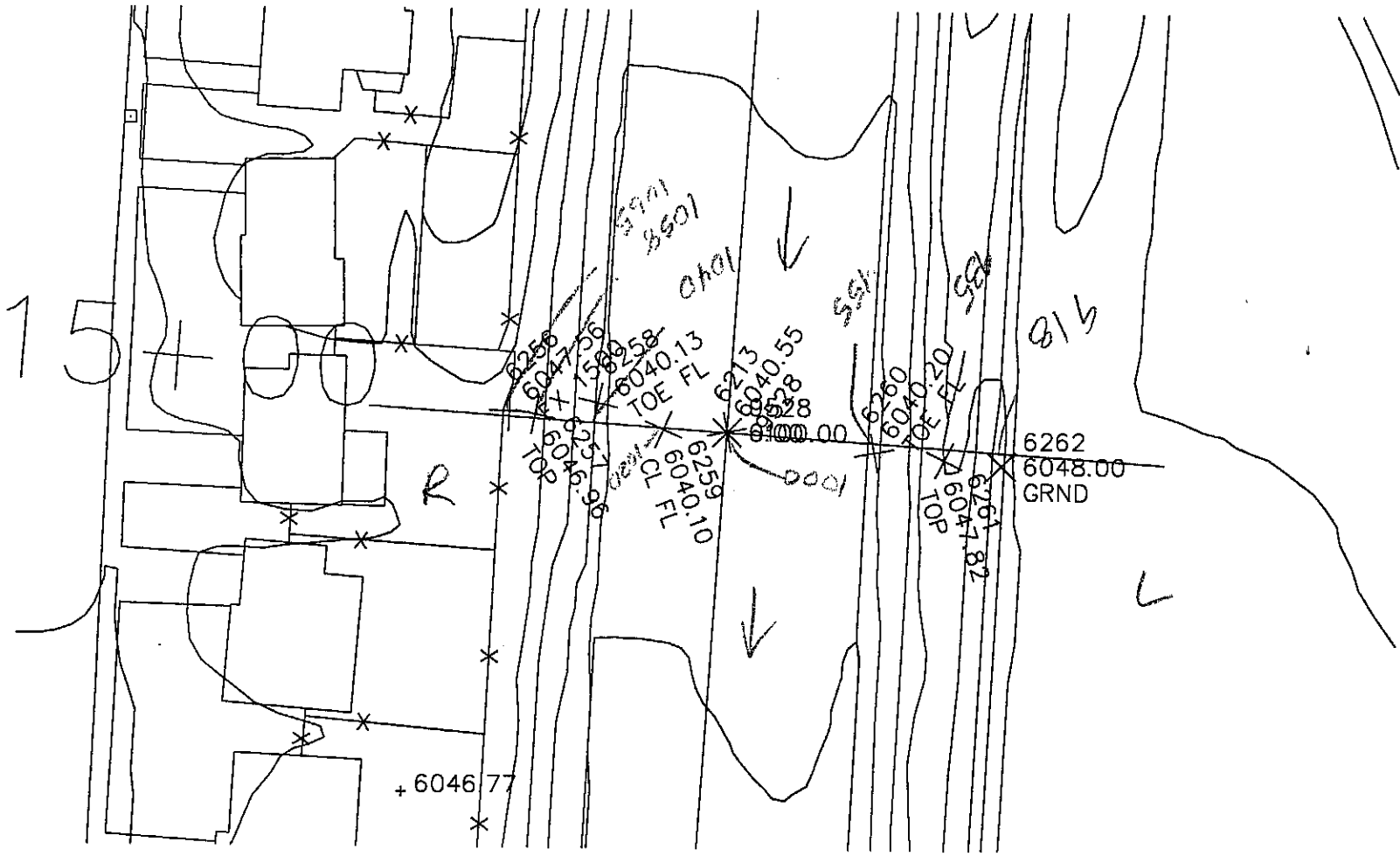


STA. 12+90  
 SANDCREEK 1  
 12/8/97  
 1"=50'

100' channel 2.15  
 200' 2.10 2.15

Left Bank Right Bank  
 935 1050

918	6048.00
935	6047.82
955	6040.20
1000	6040.55
1020	6040.10
1040	6040.13
1055	6046.96
1065	6047.56

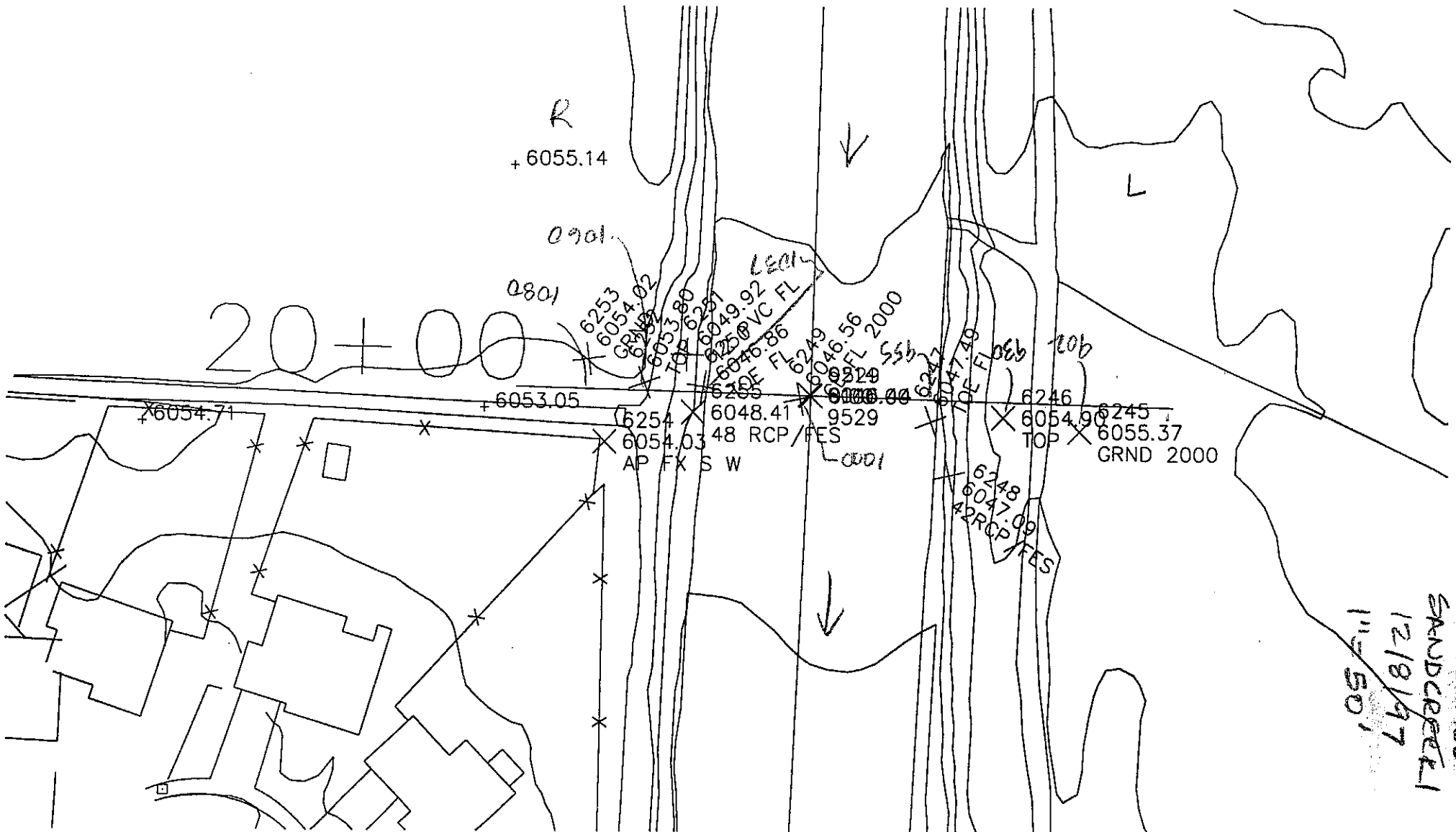


STA 15+00  
 SADD CREEK  
 12/8/97  
 1" = 50'

20.00000  
 LOR 500  
 RCB 490  
 500  
 500  
 490

Station	Elevation
902	6055.31
930	6051.90
955	6047.19
1000	6046.56
1037	6046.86
1060	6053.50
1080	6054.02

Main  
 Left Bank 930  
 Right Bank 1060





LOB

Channel

ROB

490'

500'

500'

Main Channel

Left Bank

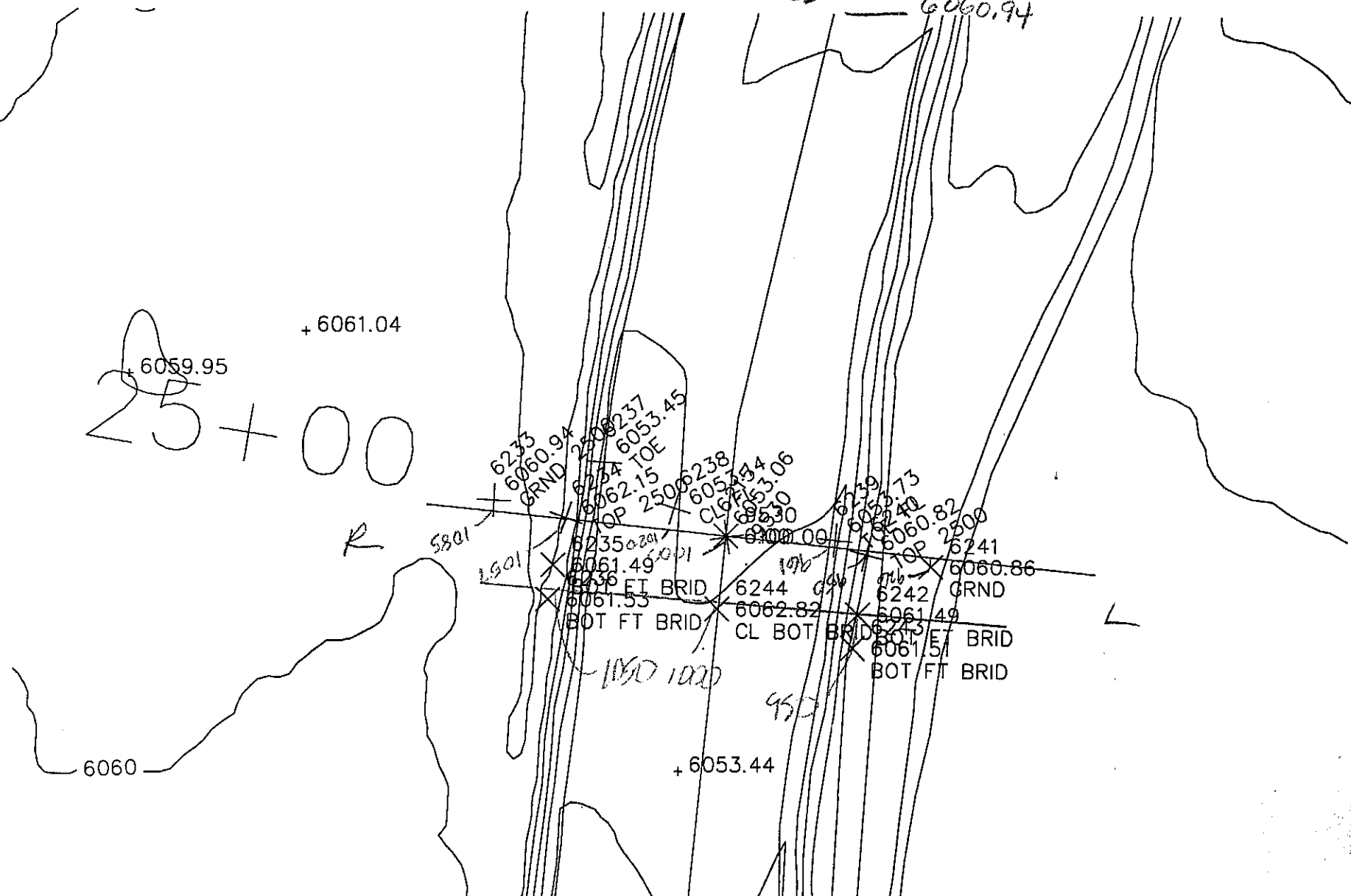
Right Bank

990

1057

Station	Elevation
926	6060.86
950	6060.82
961	6053.73
1000	6053.06
1020	6053.14
1057	6062.15
1085	6060.94

+6061.04  
 +6059.95  
 25+00



6060

+6053.44

6233  
 6060.94 GRND  
 6234  
 6062.15  
 6053.45 TOE  
 6235  
 6061.49  
 6061.53  
 6244  
 6062.82  
 6242  
 6061.49  
 6061.51  
 6060.86  
 6241  
 6060.82  
 6240  
 6060.00  
 6053.06  
 6053.73  
 6060.82  
 6241  
 6060.86  
 6242  
 6061.49  
 6061.51  
 6060.86

Down ...  
 L015  
 480'

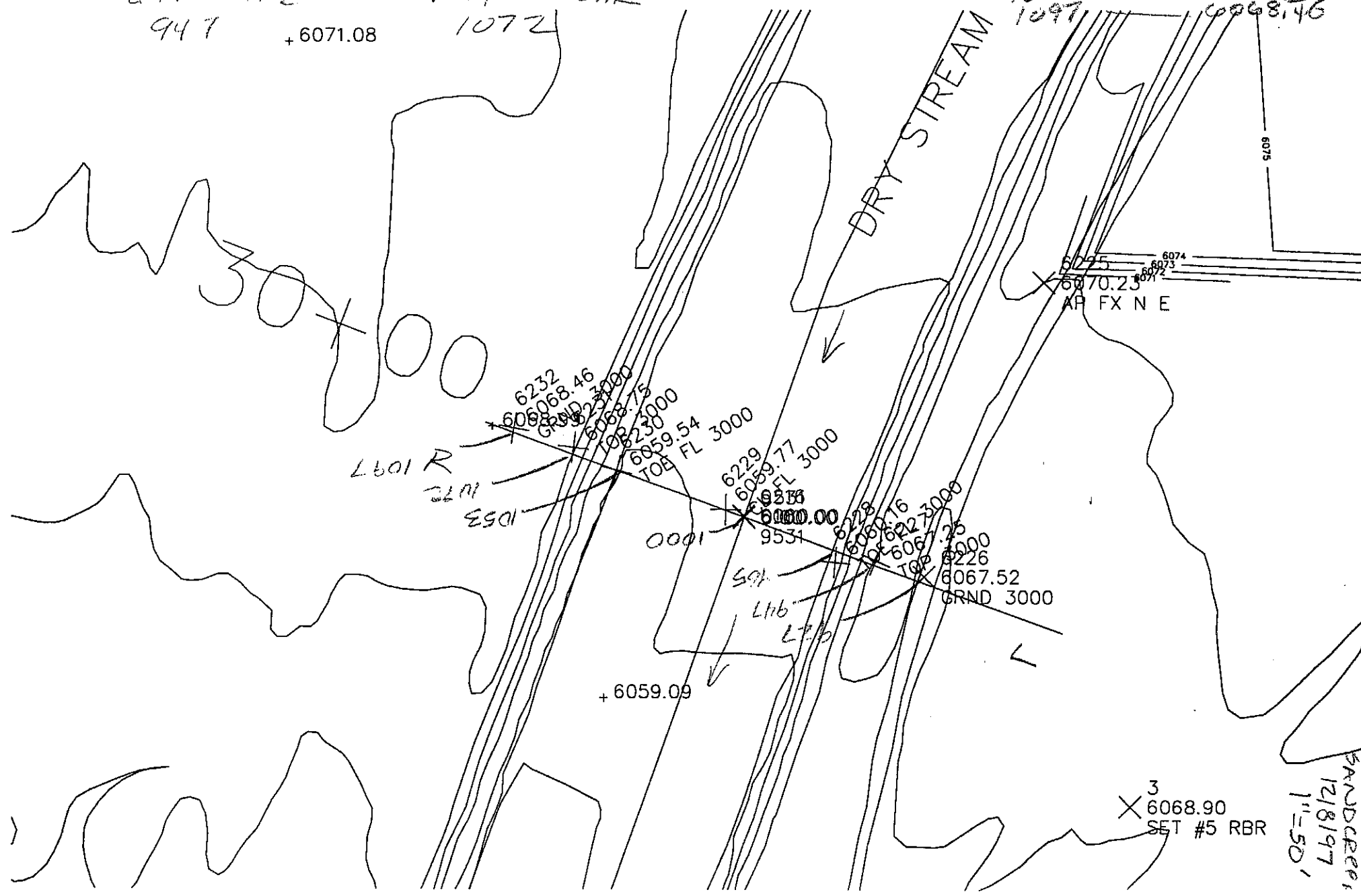
Reach ...  
 channel  
 500'

K015  
 510'

927	6067.52
947	6067.25
965	6060.16
1000	6059.77
1053	6059.54
1072	6068.75
1097	6068.46

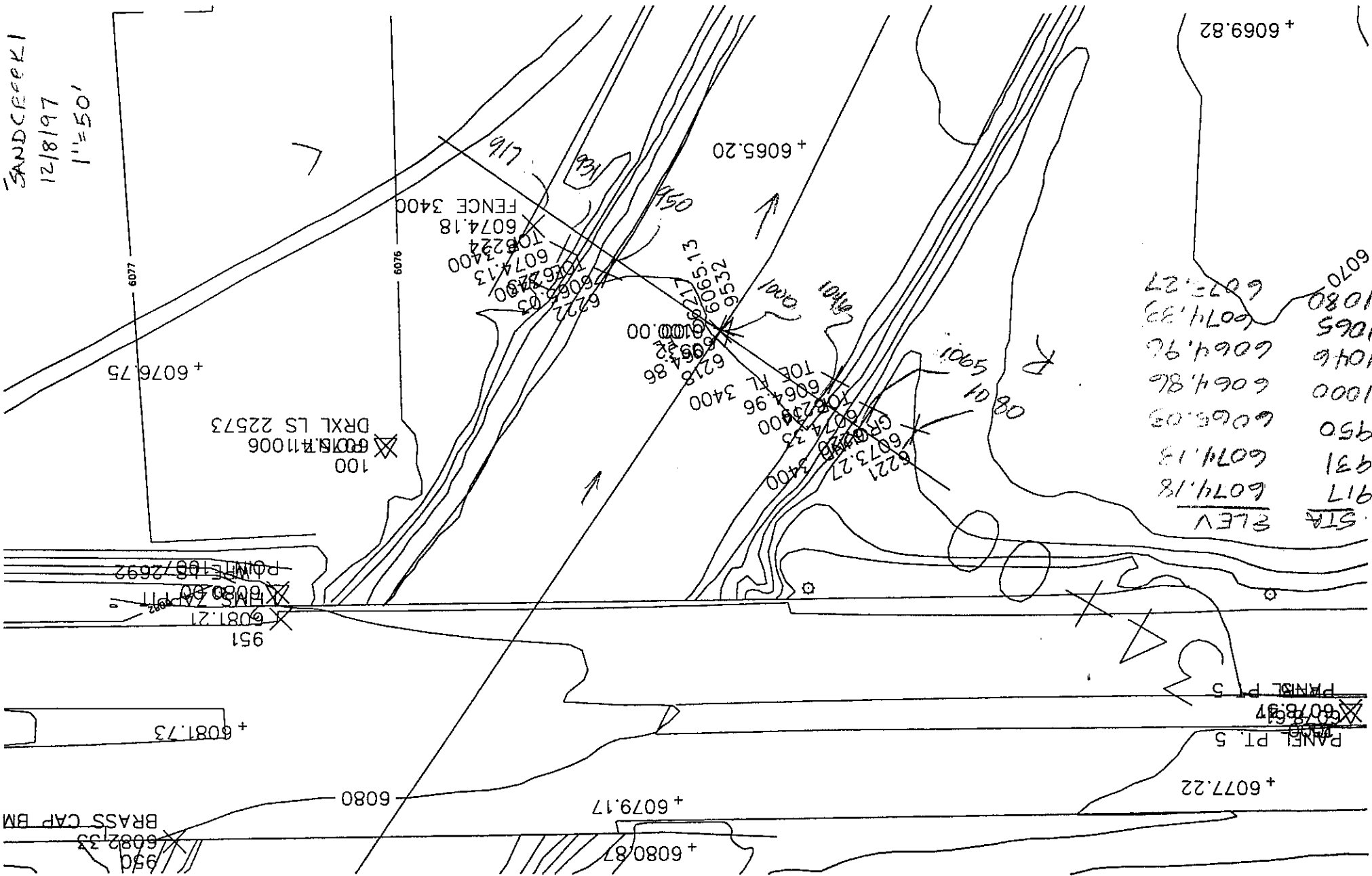
Main ...  
 Left ...  
 947 +6071.08

Right Bank  
 1072



STA. 30+00  
 SANDCREEP  
 12/8/97  
 1"=50'

STA 34+00  
SANDCREEK I  
12/8/97  
1"=50'



+ 6069.82

+ 6065.20

+ 6076.75

100  
DRXL LS 22573  
6076.11006

STA  
917  
931  
950  
1000  
1046  
1065  
1080  
ELEV  
6074.18  
6074.13  
6064.96  
6064.96  
6074.27  
6074.27

POINT 106/2692

BRASS CAP BM  
6080.87

6081.21

951

+ 6081.73

6080

+ 6079.17

+ 6080.87

+ 6077.22

PANEL PT. 5

BRASS CAP BM  
6078.97

PANEL PT. 5

Downstream  
LOB  
380'  
Main Channel Bank STATIONS  
Left Bank  
931  
Right Bank  
1065  
400'  
410'

Ditch  
102  
 200

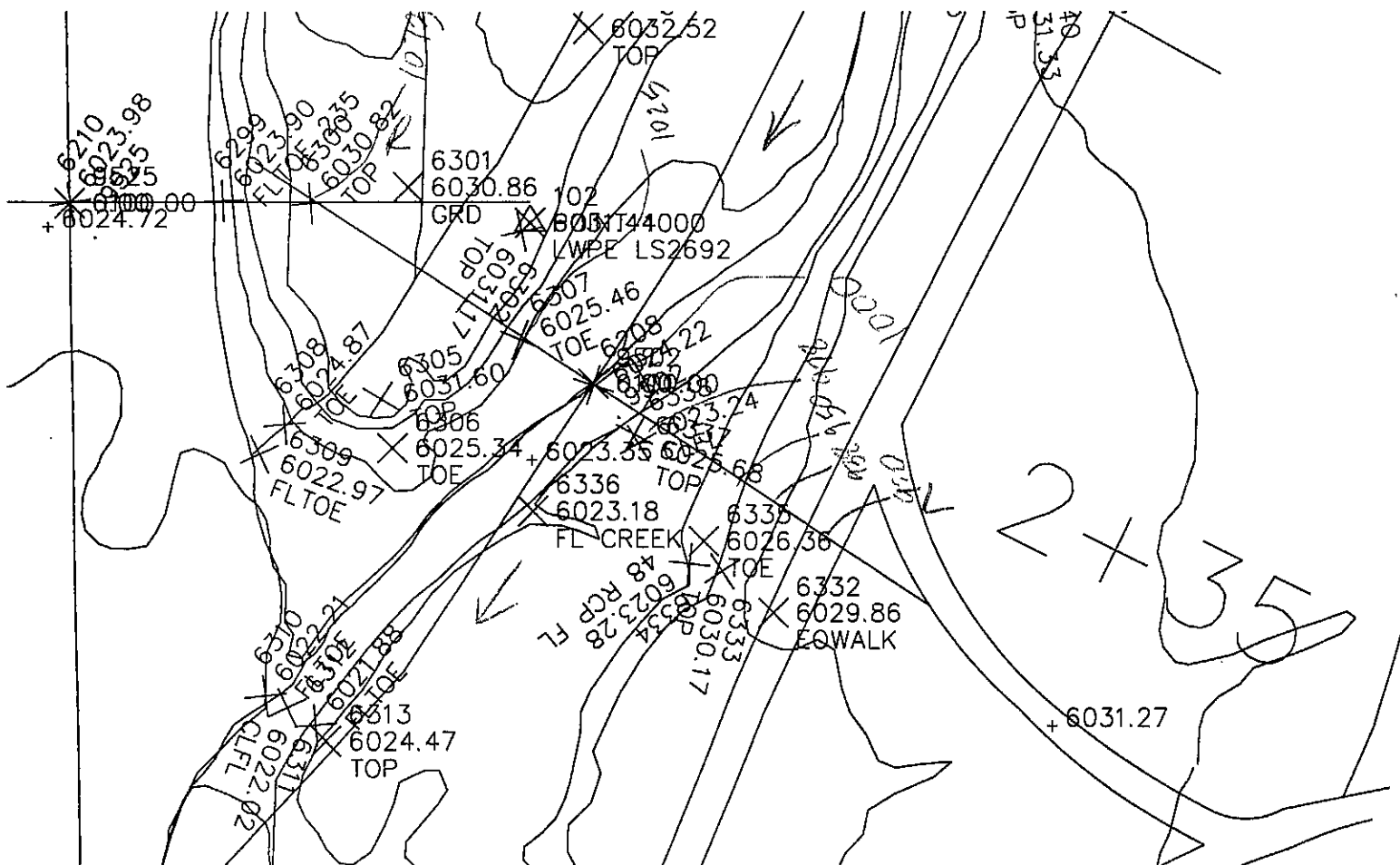
Channel  
 235

104  
 240

Drain Channel  
 Left Side  
 978

Bank  
Right Side  
 1045

<u>-1A</u>	<u>LV</u>
920	6079.86
938	6030.17
950	6076.36
978	6075.68
1000	6074.22
1075	6075.46
1045	6031.17
1075	6030.82

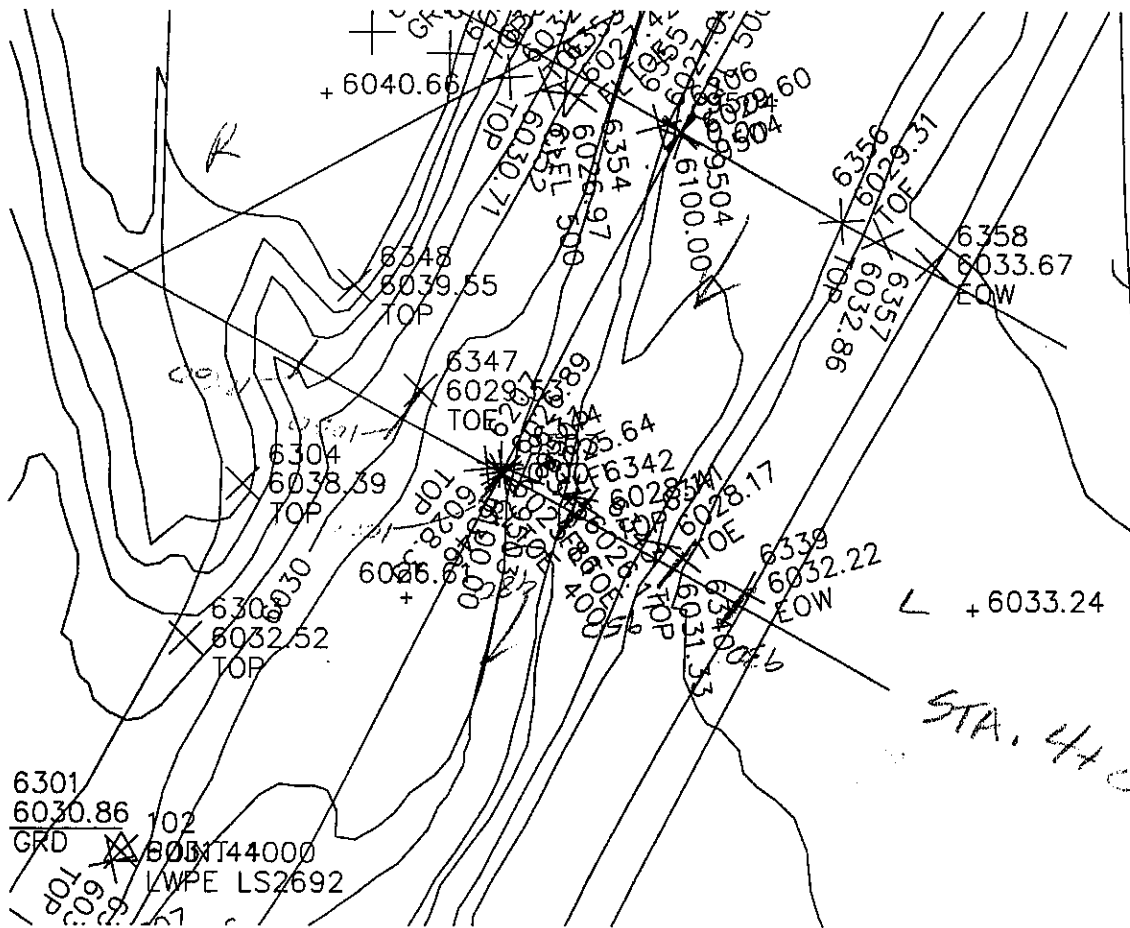


STA 2+35  
 EAST FOR L2  
 12/8/97  
 1" = 50'

Dist. between centerlines  
 LWS Channel RWS  
 170 165 160

Sta	Elev
930	6027.22
950	6031.33
980	6026.10
1000	6024.39
1030	6029.53
1060	6039.00

Main Channel Bank  
 Left Face Right Face  
 160 160

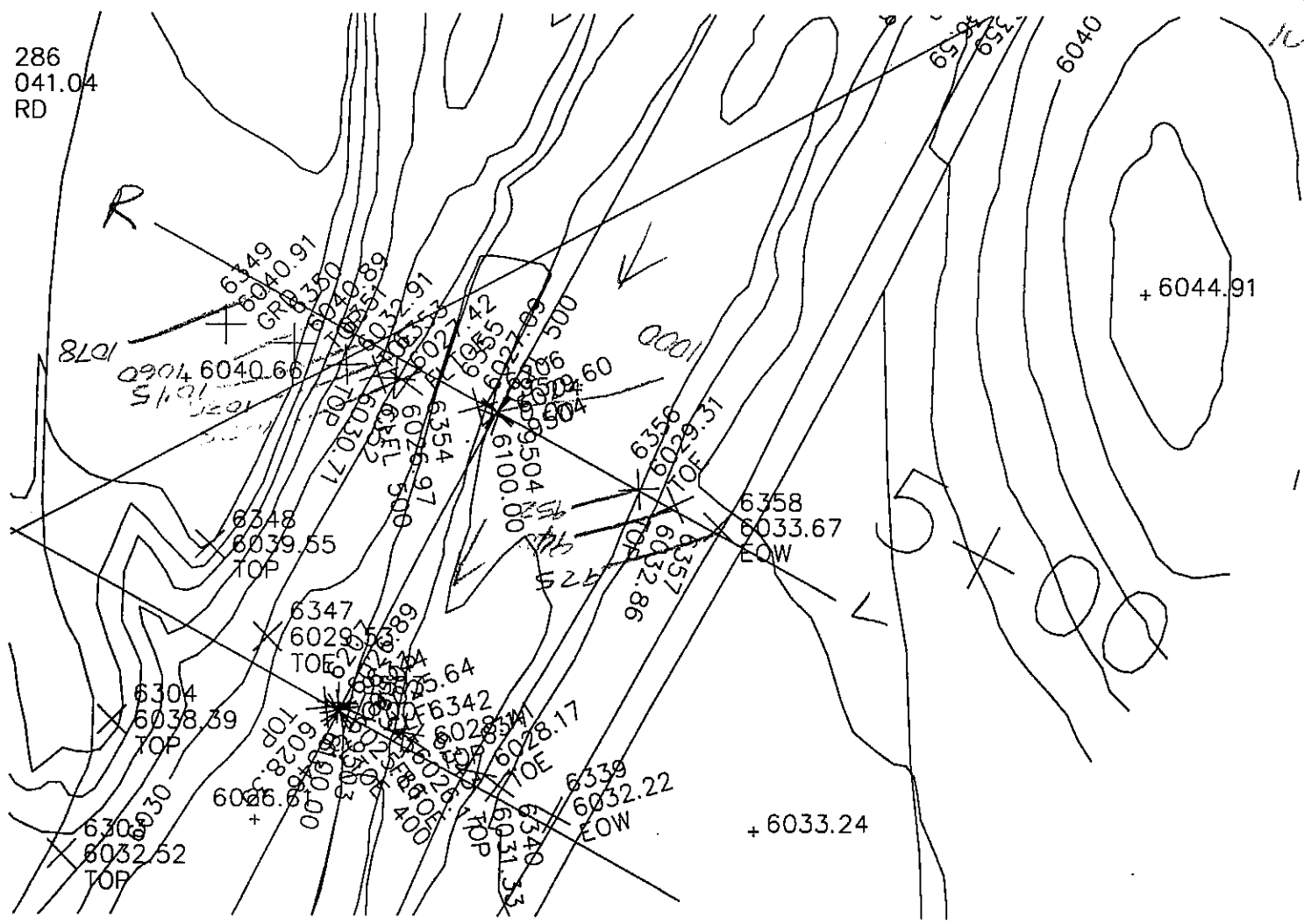


STATION  
 EAST FORK 2  
 12/8/97  
 1"=50'

Drawn by [unclear]  
LOP      channel      RUP  
 100      100      100

Main channel      Bank  
Left Bank      Right Bank  
 940      1045

St.	Elev
925	6033.67
940	6032.86
952	6024.31
1000	6027.09
1025	6027.42
1035	6030.71
1045	6032.91
1060	6040.89
1078	6040.91



FRANK STOW  
 EAST FORK 2  
 12/8/97  
 1" = 50'

DOWN

LOE

200

RCE

200

Main

975

1120

1120

1120

STA	ELEV
945	6036.59
960	6035.28
975	6031.76
985	6032.47
1000	6029.69
1020	6031.96
1043	6031.41
1068	6033.93
1075	6034.92
1120	6045.27
1140	6045.57

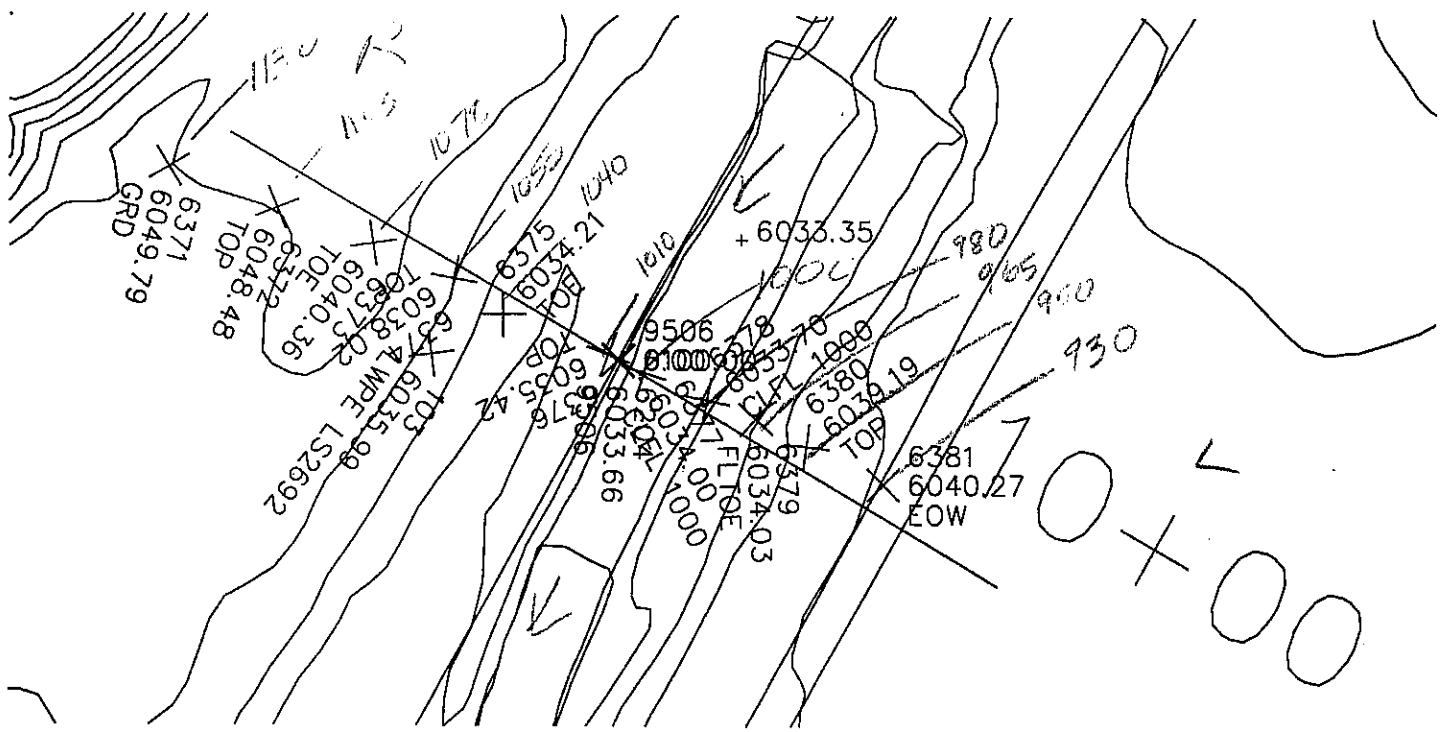


5:14:00  
 EAST FOR 2  
 12/8/97  
 11:50'

Down ...  
LOB      LOB      ROB  
 300      300      300

Man ...  
Let ...      Let ...  
 990      1055

<u>STA</u>	<u>ELEV</u>
930	6040.27
950	6039.11
965	6039.00
980	6039.00
1000	6039.00
1010	6033.66
1041	6033.66
1055	6033.66
1078	6033.66
1105	6033.66
1130	6033.66



STA 10400  
 EAST FORK 2  
 1" = 50'



DIS 1000 1010 1020

LOB  
200

1000

ROB  
210

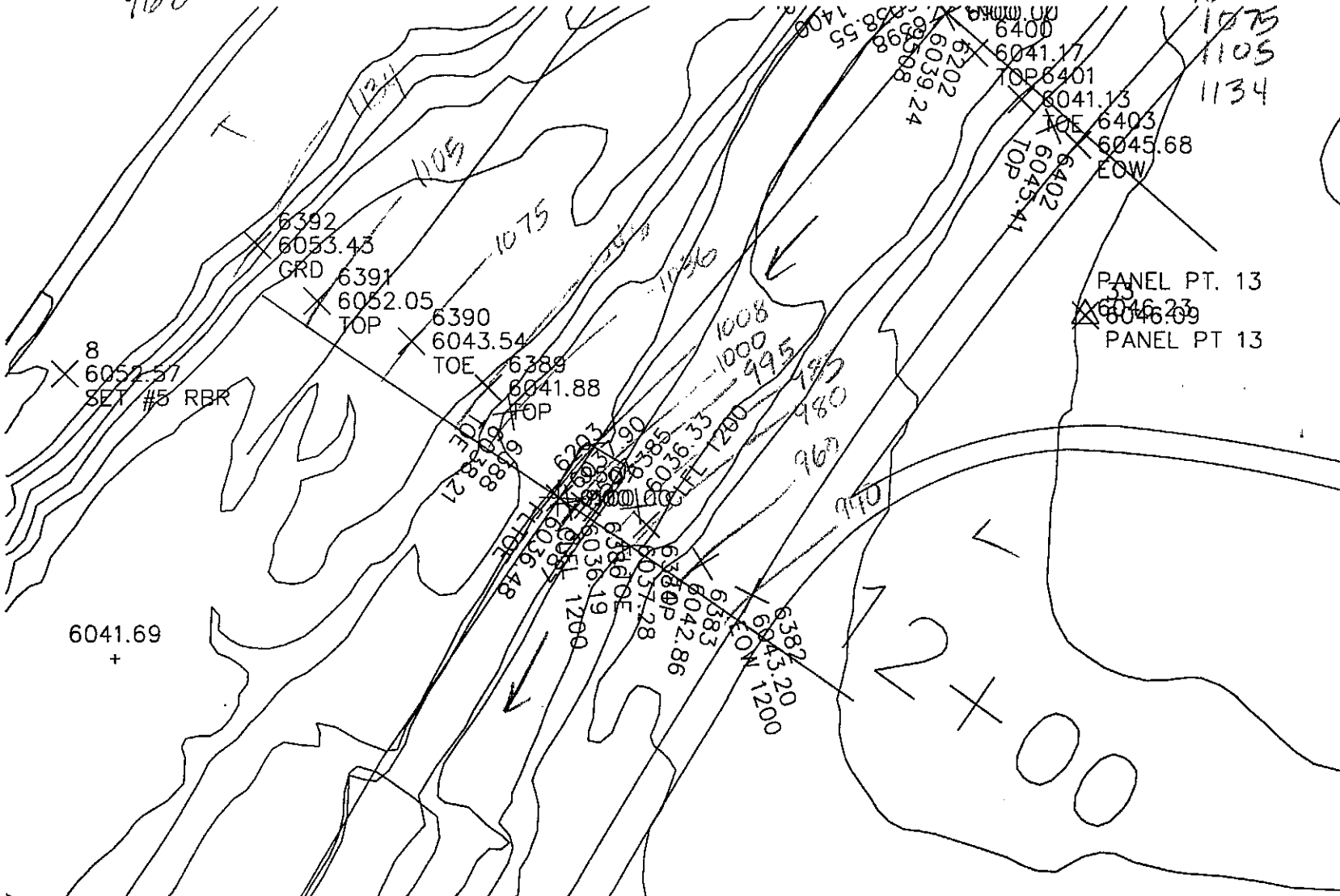
31A

11V

940  
960  
980  
985  
995  
1000  
1008  
1036  
1040  
1075  
1105  
1134

6046.20  
6047.86  
6057.28  
6056.33  
6036.19  
6037.90  
6036.48  
6038.26  
6041.88  
6043.54  
6052.05  
6053.43

Main Bank  
Left Bank  
960  
1036

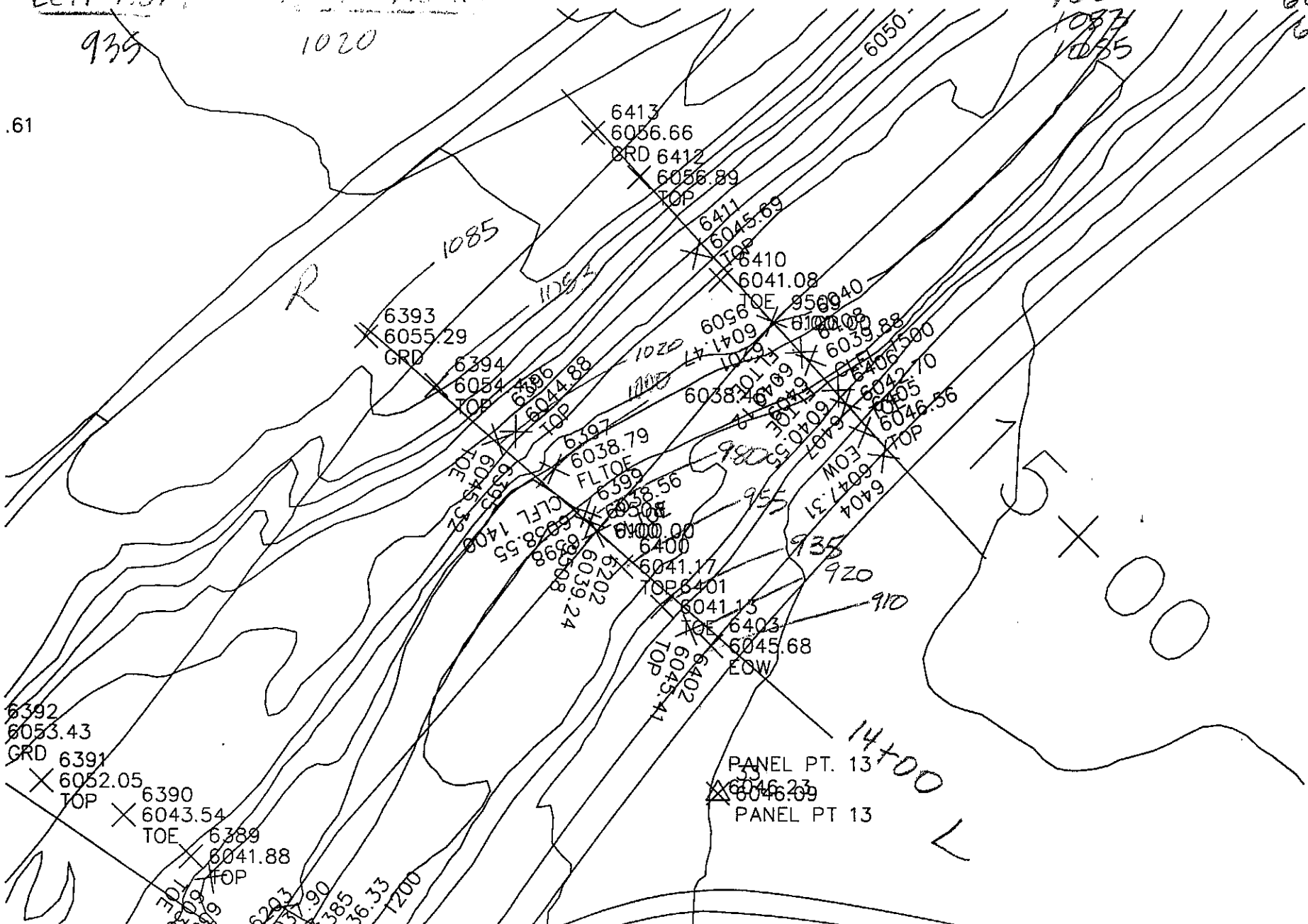


SAT FORK 2  
1"=50'  
STA 12+00

LOB 11.11.11 RUC  
190 10

	Lt
910	6045.68
920	6045.41
935	6041.13
955	6041.17
980	6038.55
1000	6038.79
1020	6044.88
1037	6054.43
1055	6055.29

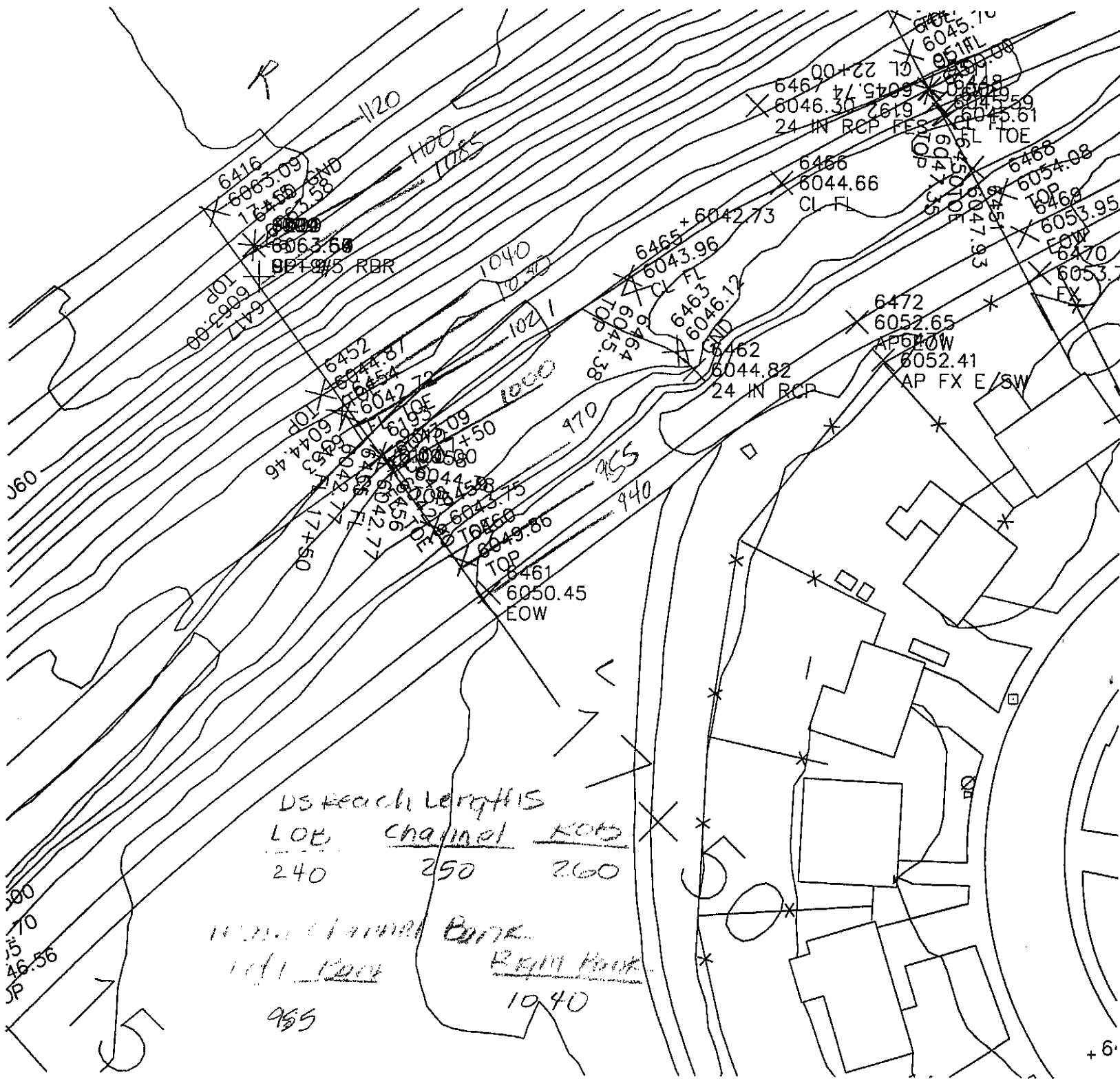
Main Creek  
Left Bank  
939 1020



.61

STA 14+00  
EAST FORK 2  
12/8/97  
1"=50'



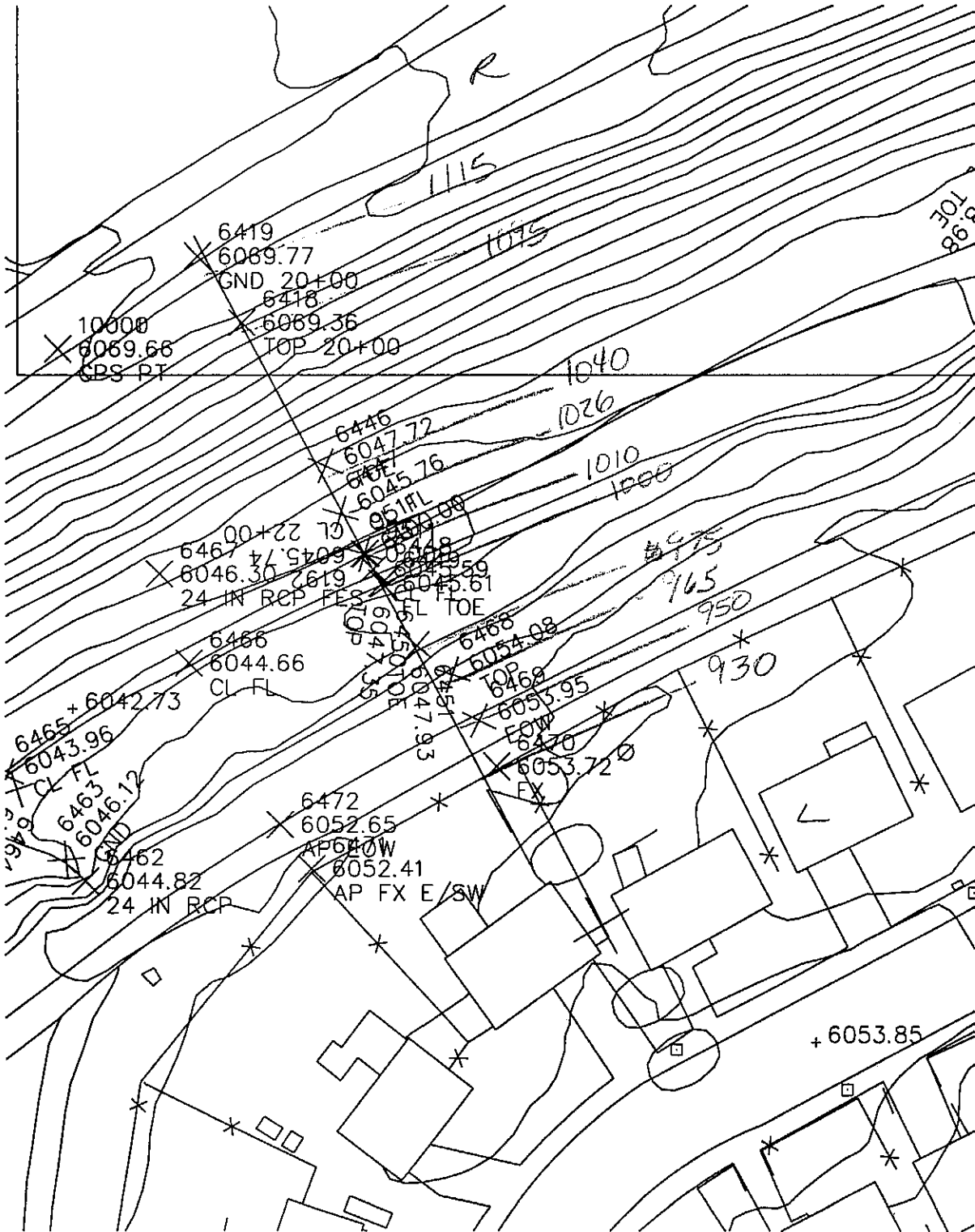


STA	ELEV
940	6050.45
955	6049.86
970	6043.75
1000	6042.77
1021	6042.77
1030	6044.46
1040	6044.87
1085	6063.00
1100	6063.60
1120	6063.09

DS Reach Lengths  
 LOB    Channel    ROB  
 240    250    260

1000' Channel Bank  
 1040  
 955

STA 11+50  
 EAST FORM 2  
 12/8/97  
 1" = 50'



DIS REACH LEGINS

Sta Elev

LOB Channel ROB

240 250 260

Main Channel Bank

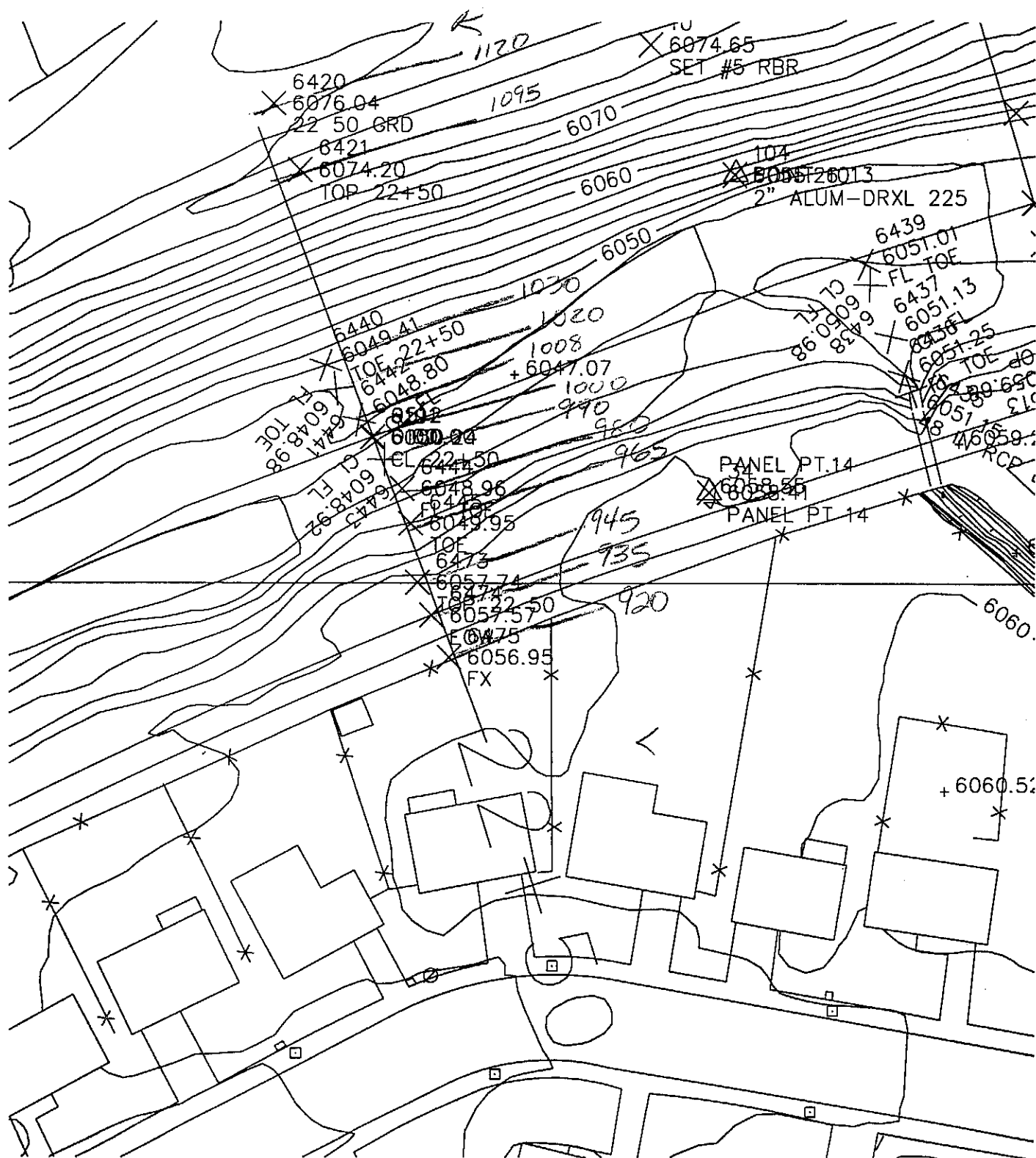
Left Bank Right Bank

965 1095

930	6053.72
950	6053.95
965	6054.08
975	6047.93
1000	6045.61
1010	6045.74
1026	6045.76
1040	6047.72
1095	6069.36
1115	6069.77

+ 6053.85

STA 20+00  
EAST FORK Z  
12/8/97  
1"=50'



US Reacht. eqn's  
LOB channel ROB  
 240 250 260

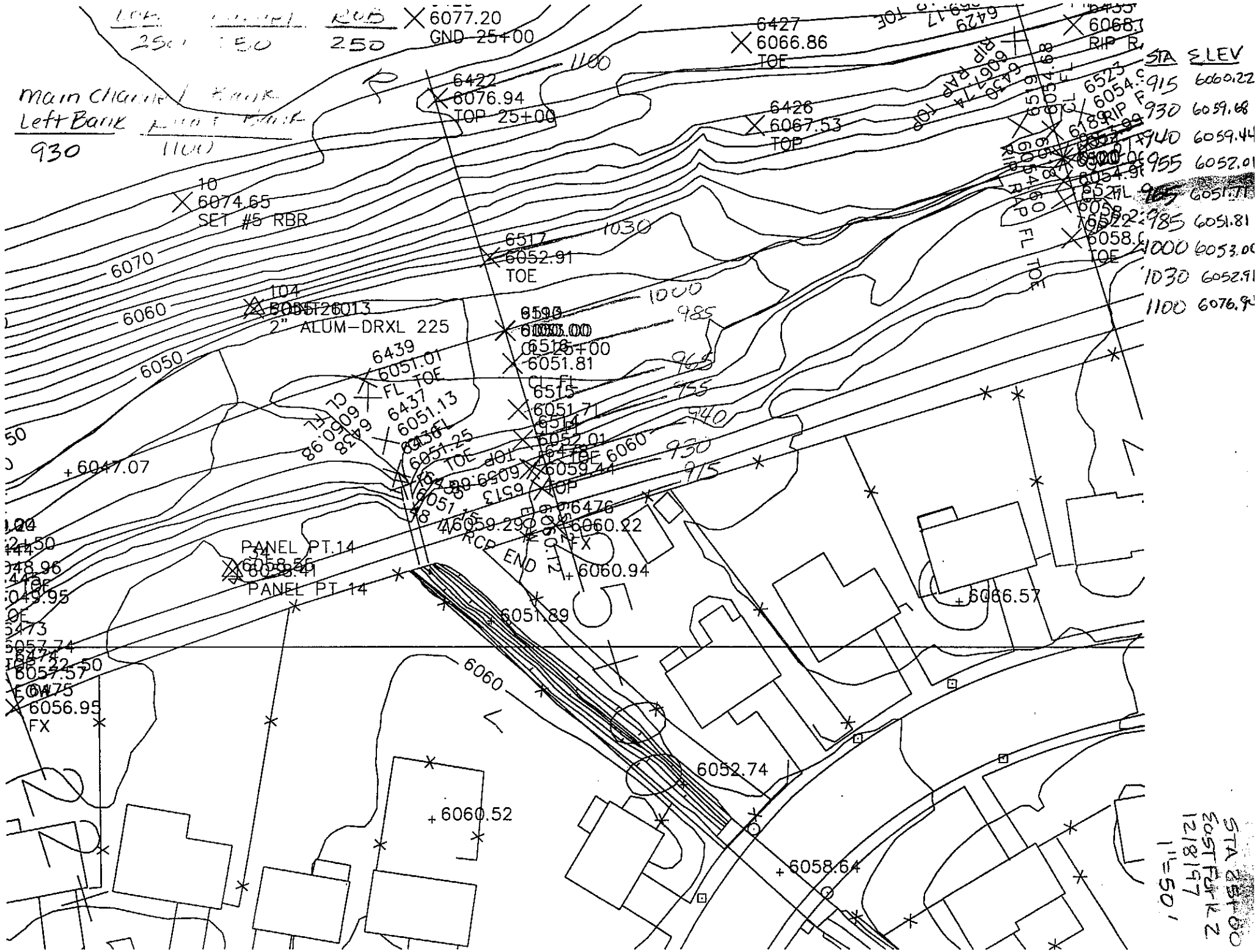
Main channel Bank  
Left Bank      Right Bank  
 945                      1095

STA	ELEV
920	6050.95
935	6057.57
945	6057.74
965	6049.95
980	6048.76
990	6048.92
1000	6050.24
1008	6048.80
1020	6048.98
1030	6049.41
1095	6074.20
1120	6076.04

STA 22+50  
 EAST FORK  
 12/8/97

LOC. 250+00 RUB 6077.20  
 250 250 GND 25+00

Main Channel Bank  
 Left Bank  
 930 1100



STA	ELEV
6523	915
6054	930
6189	940
6054	955
6058	985
6058	1000
1030	6052.91
1100	6076.94

STA 25+00  
 EAST FOR KZ  
 12/8/97  
 1"=50'



LOB Channel ROB  
 250 250 250

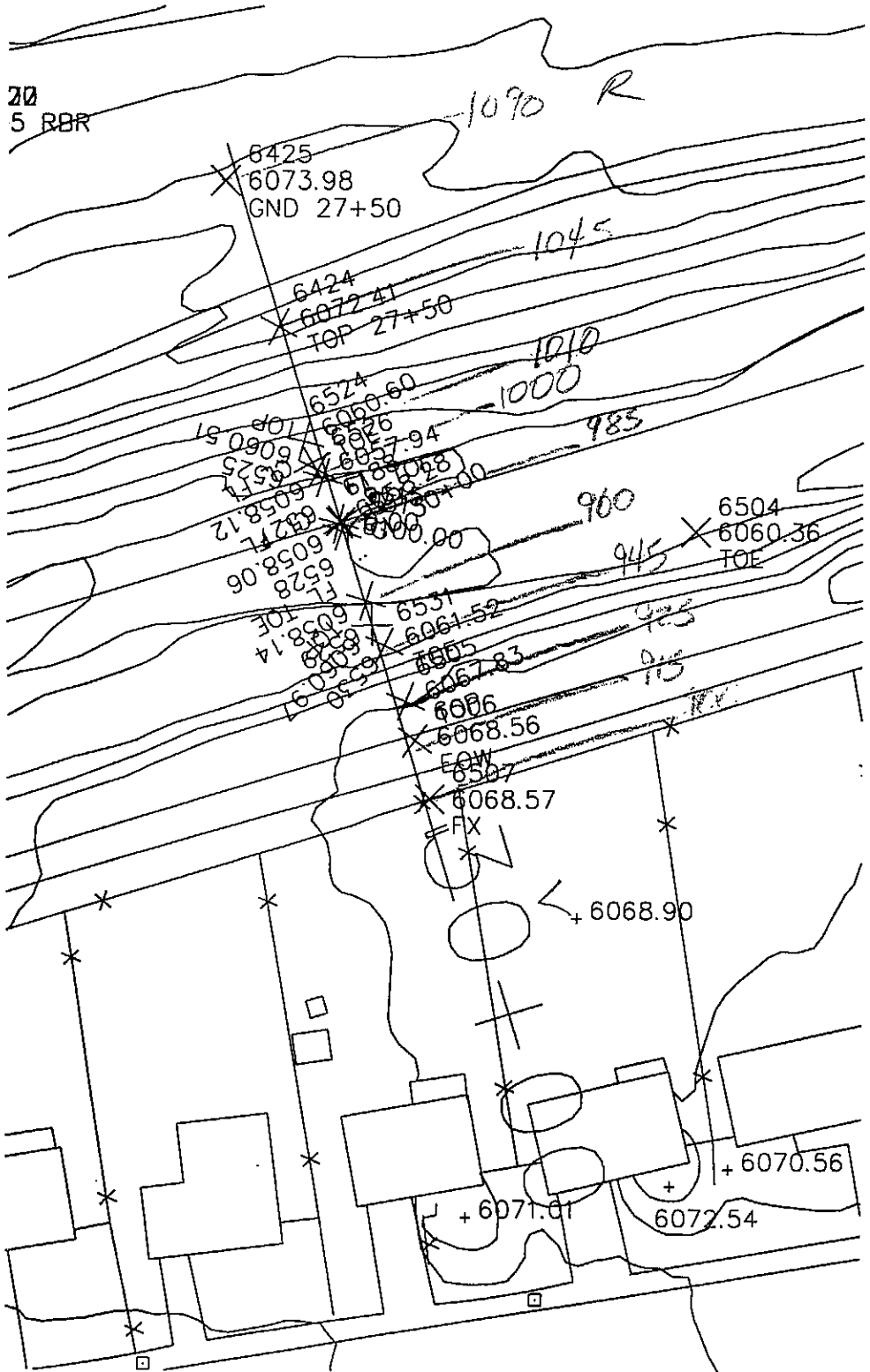
Main Channel Bank  
 Left Bank Right Bank  
 935 1100

STA	ELEV
911	6064.42
935	6064.45
947	6064.33
965	6058.05
980	6058.22
990	6054.96
1000	6053.99
1012	6054.6
1020	6054.68
1053	6067.74
1075	6069.86
1100	6075.56

EAST FORCE 2  
 STA 27+50  
 1" = 50'



20  
5 RBR



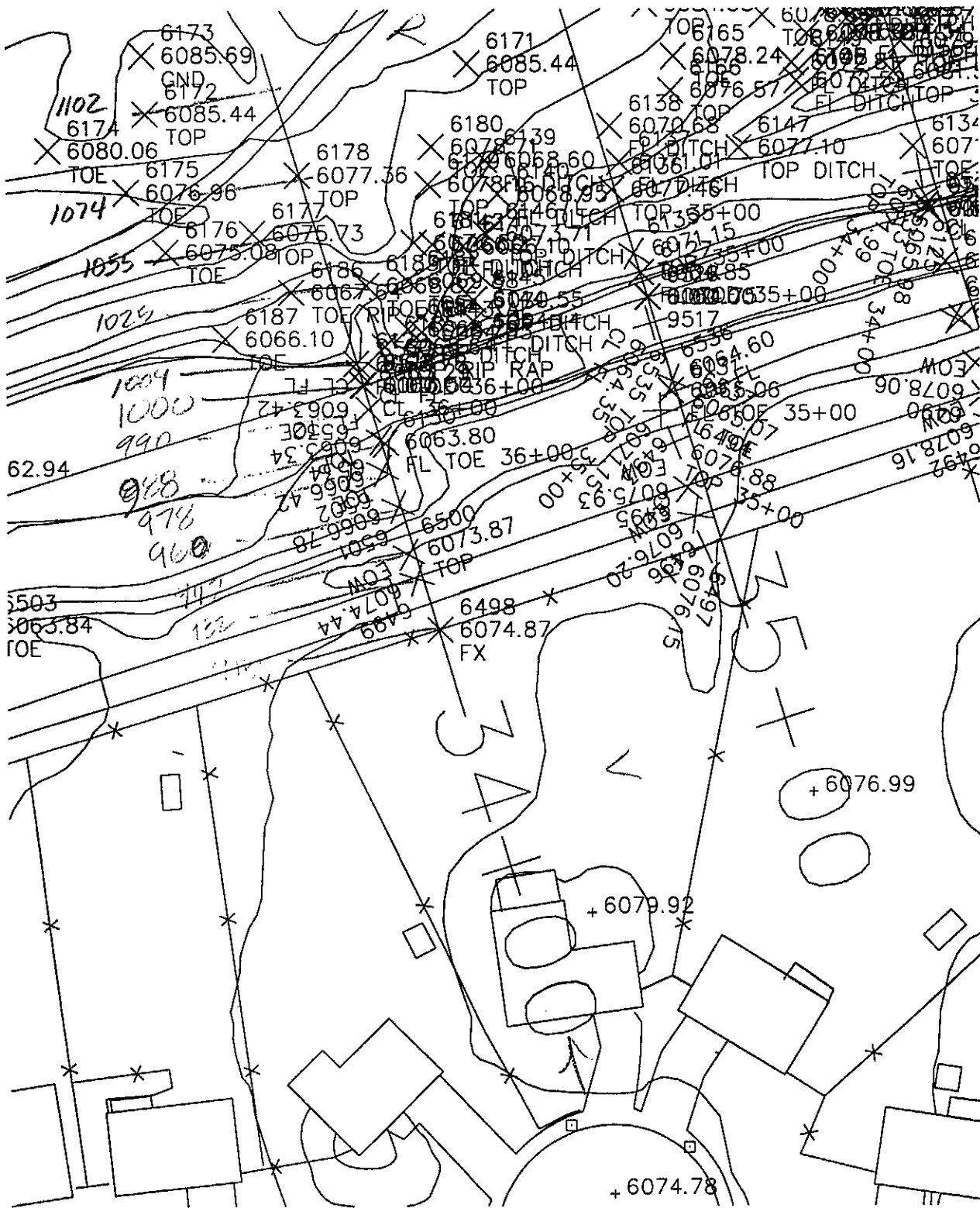
DS Reach Lengths

<u>LOB</u>	<u>Channel</u>	<u>ROI</u>
250'	250'	250'

<u>Main Channel</u>	<u>Bank</u>
<u>Left Bank</u>	<u>Right Bank</u>
925	1045

<u>STA</u>	<u>ELEV</u>
900	6068.57
915	6068.56
925	6067.83
945	6061.52
960	6058.14
985	6058.06
1000	6058.12
1010	6060.60
1045	6072.41
1040	6073.98

1" = 50'  
12/18/197  
EAST FORK 2  
STA 30+00



DS Reach Lengths

LOB	Channel	ROB
400	400	400

Main Channel Bank  
 Left Bank      Right Bank  
 942                  1025

STA	Elev
915	6074.87
932	6074.44
942	6073.87
960	6066.78
978	6066.42
988	6063.34
990	6063.42
1000	6063.29
1009	
1025	6067.64
1055	6075.73
1074	6077.36
1102	6085.44

STA 34+00  
 EAST FOR RZ  
 12/8/97  
 111=501

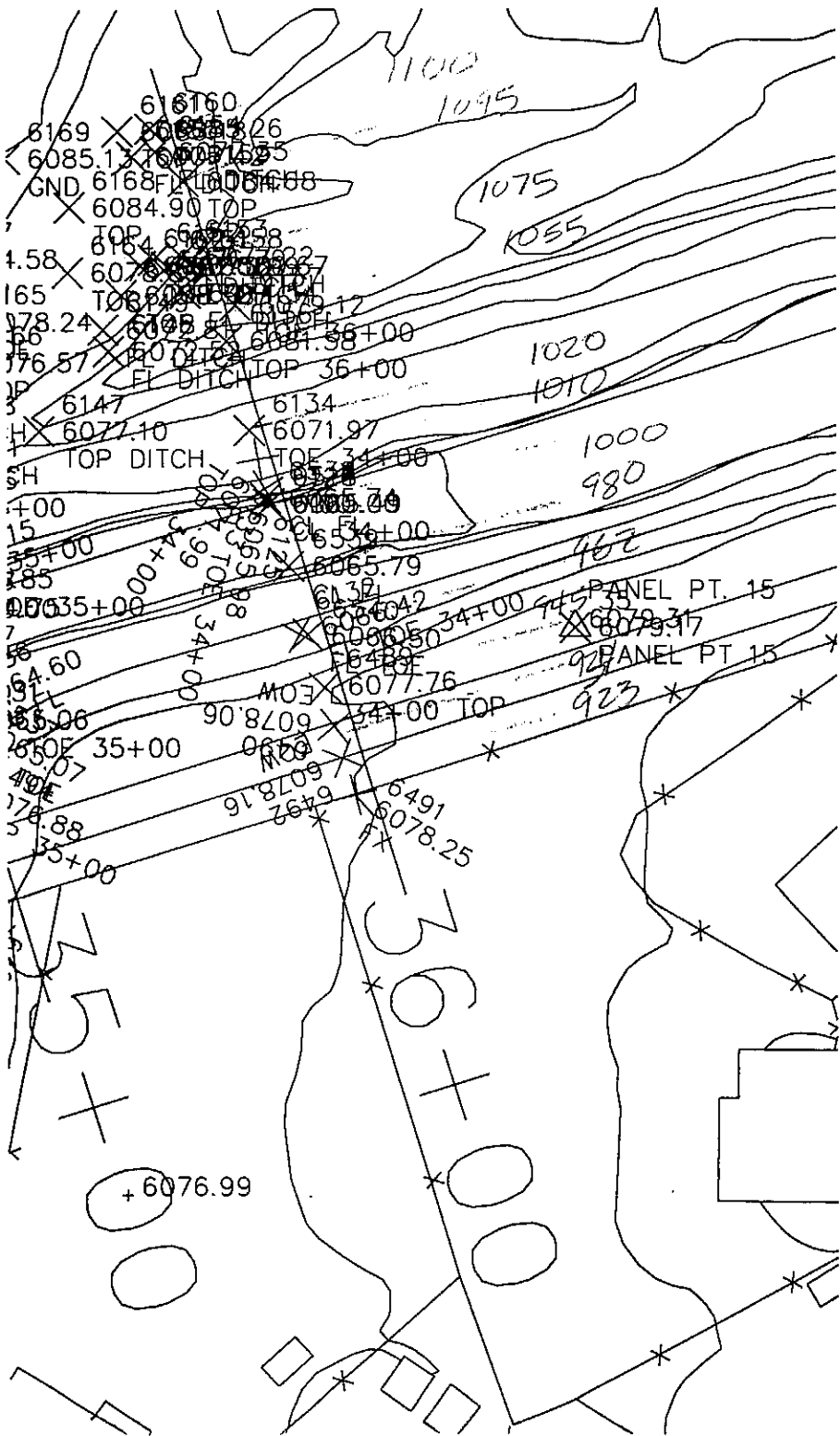


DS Reach Length  
 LOB Channel 100  
 100 100 100

Main Channel Bank  
 Left Bank Right Bank  
 945 1045

STA	Elev
925	6076.15
945	6076.20
960	6076.88
970	6065.08
980	6064.60
1000	6064.60
1015	6064.85
1025	6071.15
1045	6077.46
1055	6071.01
1070	6070.68
1120	6085.23

STA 35+00  
 EAST FORK 2  
 12/8/97  
 1"=50'



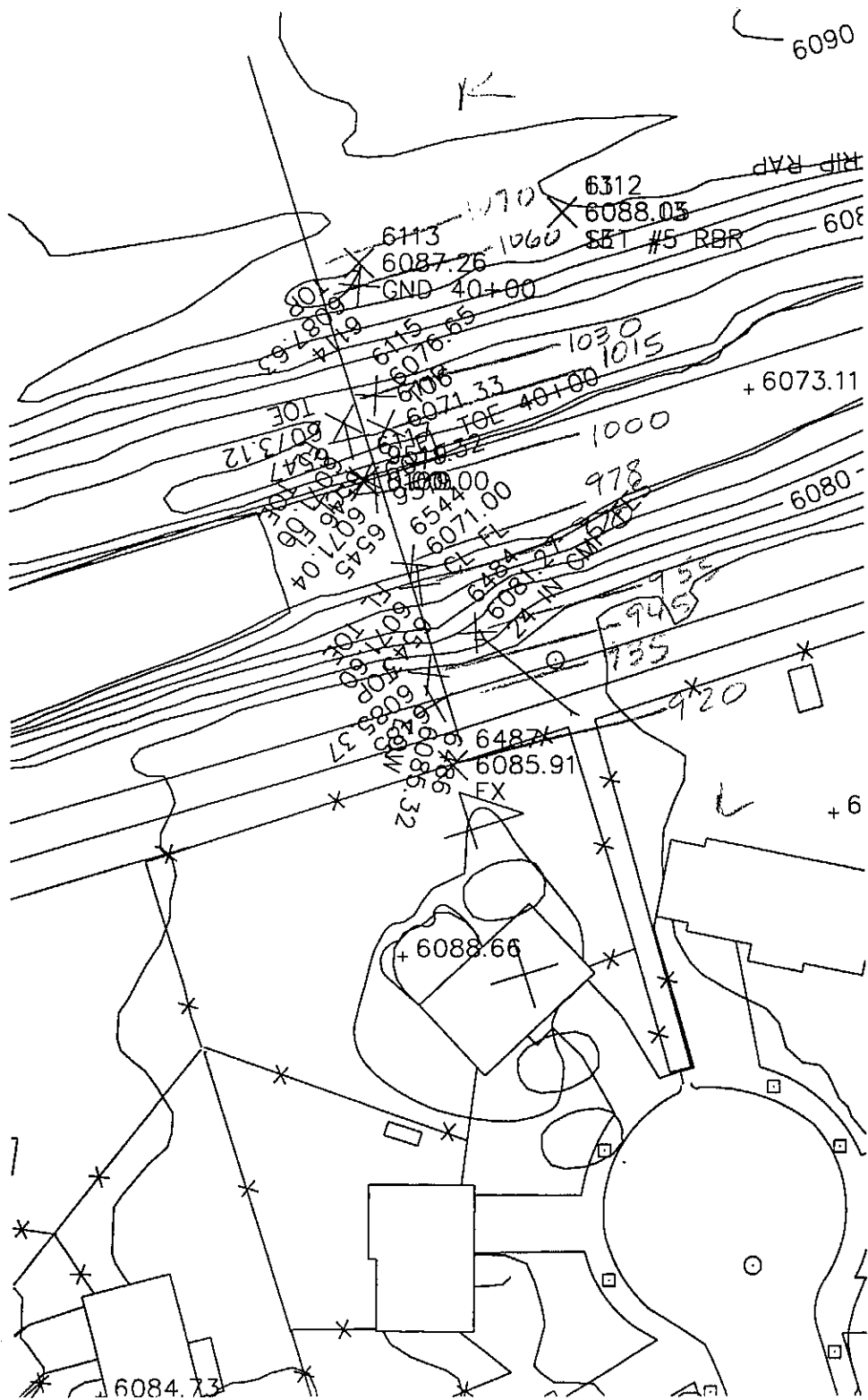
DS reach lengths

Dist	Channel	Bank
107	100	100

Main Channel	Bank
Left Bank	Right Bank
934	1055

STA	Elev
923	6078.25
931	6078.06
945	6077.76
967	6066.50
980	6065.79
1000	6065.98
1010	6071.99
1020	6071.97
1035	6079.12
1075	6080.67
1095	6084.68
1100	6085.26

STA 36+00  
East Fork  
12/8/97  
1"=50'

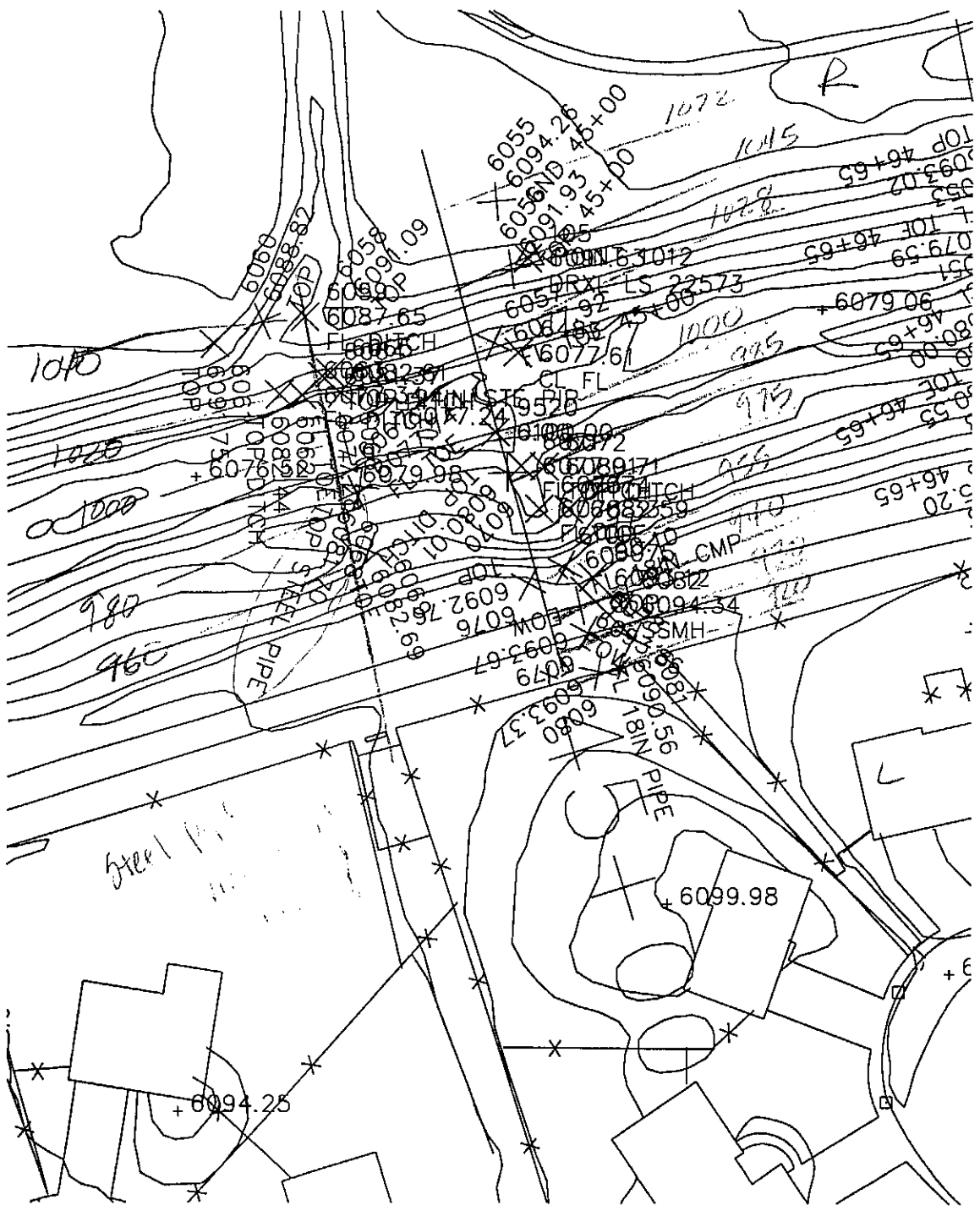


15' Reach Lengths  
 1015 Channel ROT  
 400      400      400

Main Channel Elev  
 1015 Main      1015 Main  
 9115      1030

STA	ELEV
920	6085.91
935	6085.32
945	6085.37
955	6081.27
970	6071.60
978	6071.00
1000	6071.04
1015	6071.33
1030	6076.65
1060	6087.63
1070	6087.26

STA. 40+00  
 EAST FORK  
 12/8/97  
 1"=50'

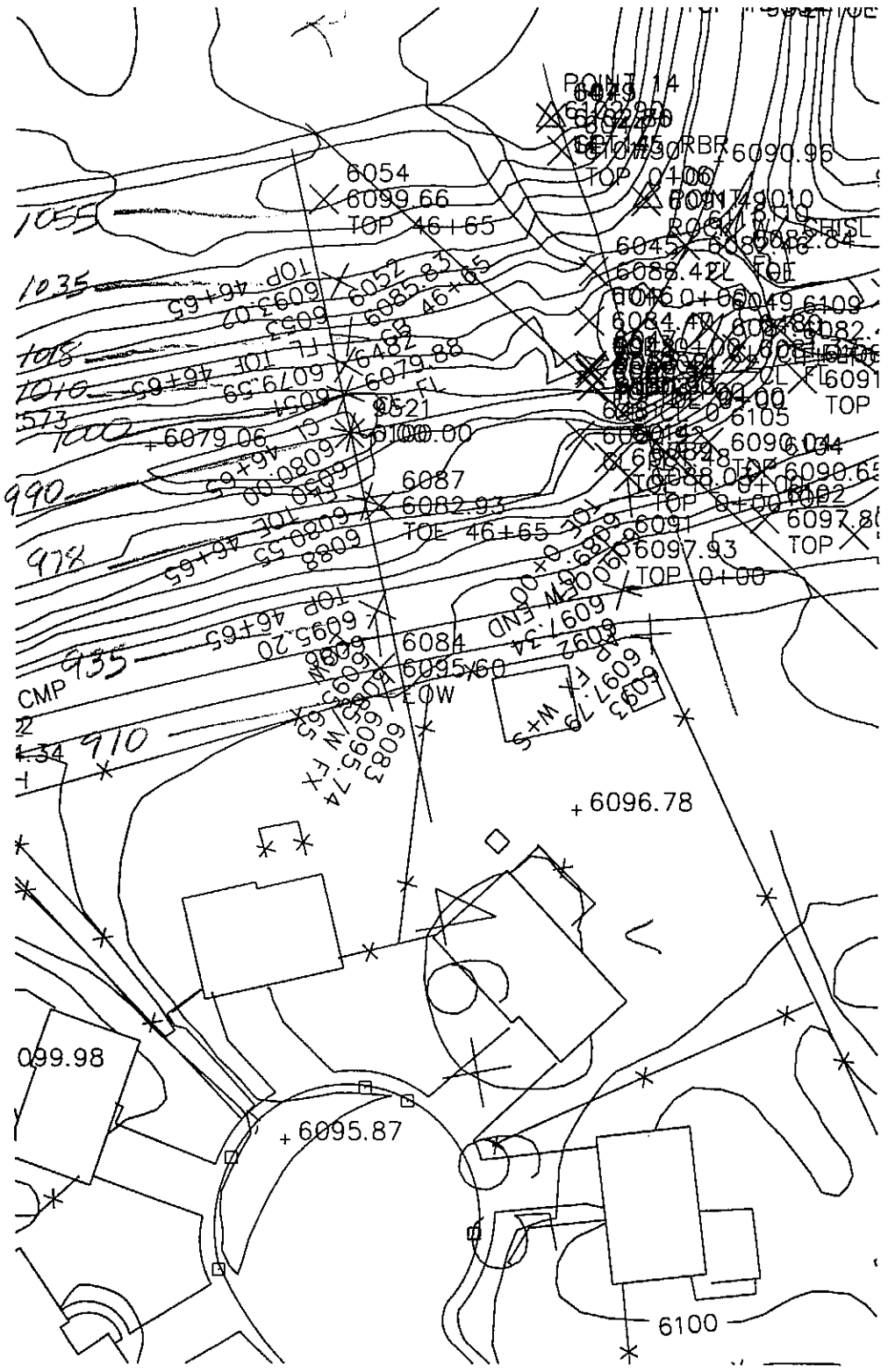


DB Road 1072  
 LOB Channel 1072  
 500 500 500

Main Channel 1072  
 Left Bank Right Bank  
 955 1045

STA	ELEV
970	6093.07
930	6093.07
940	6093.86
955	6092.70
975	6078.33
985	6080.01
1000	6077.60
1078	6077.01
1045	6071.93
1072	6071.26

STA 45+00  
 East Fork  
 12/18/97  
 1"=50'



DS Reach Length  
 LOS channel L.P  
 160      105      170

Main channel Bank  
 Left Bank      Right Bank  
 935      1018

<u>STA</u>	<u>ELEV</u>
910	6095.74
935	6095.20
978	6080.55
990	6080.00
1000	6079.88
1010	6079.59
1018	6085.83
1035	6093.02
1055	6079.66

STA 46+65  
 EAST FORK  
 12/8/97  
 1"=50'

DS Read 11/11/14

LOB    CL    RDE

65                      70                      80

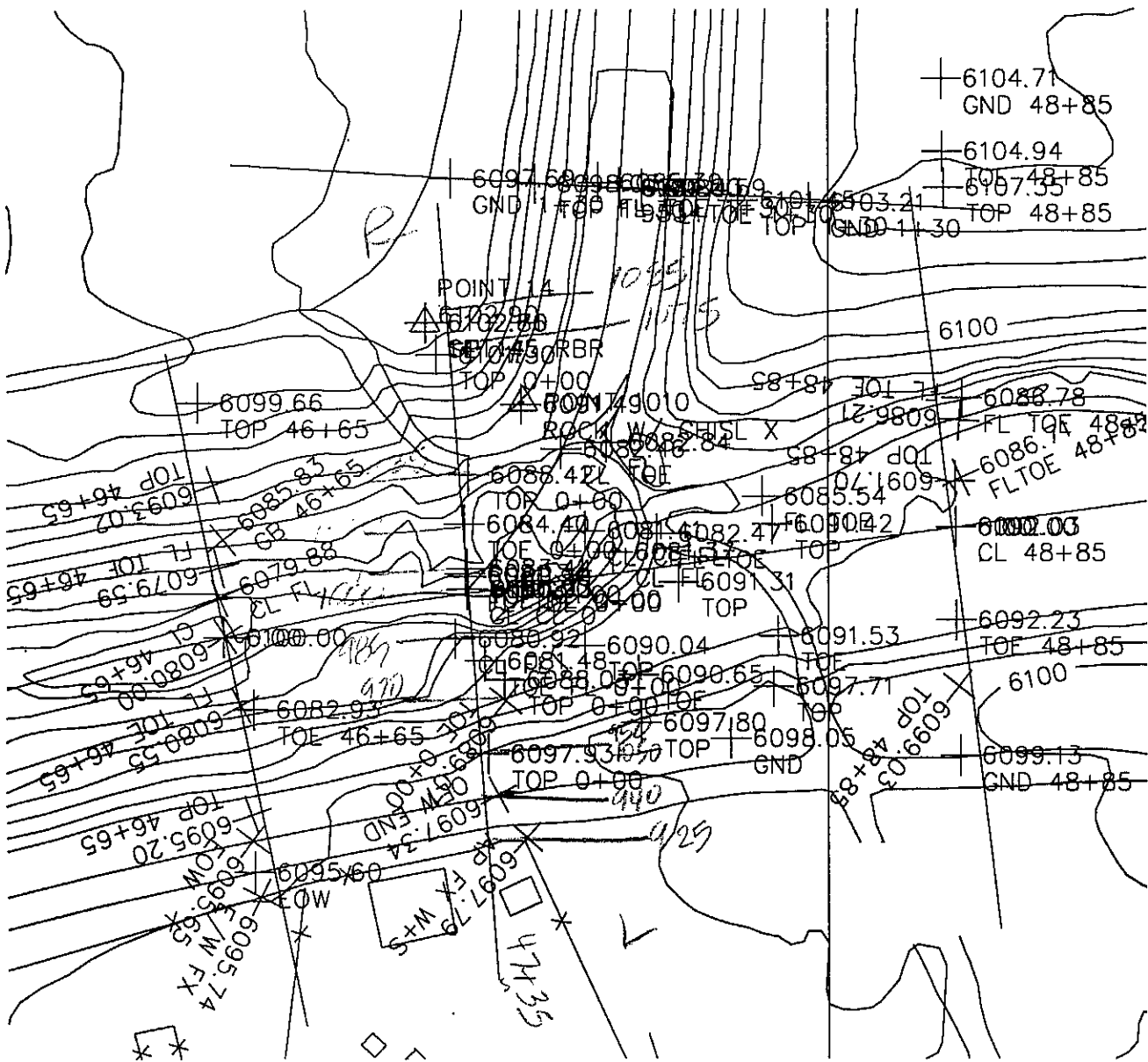
Main Channel Bank

Left Bank                      Right Bank

950                                  1035

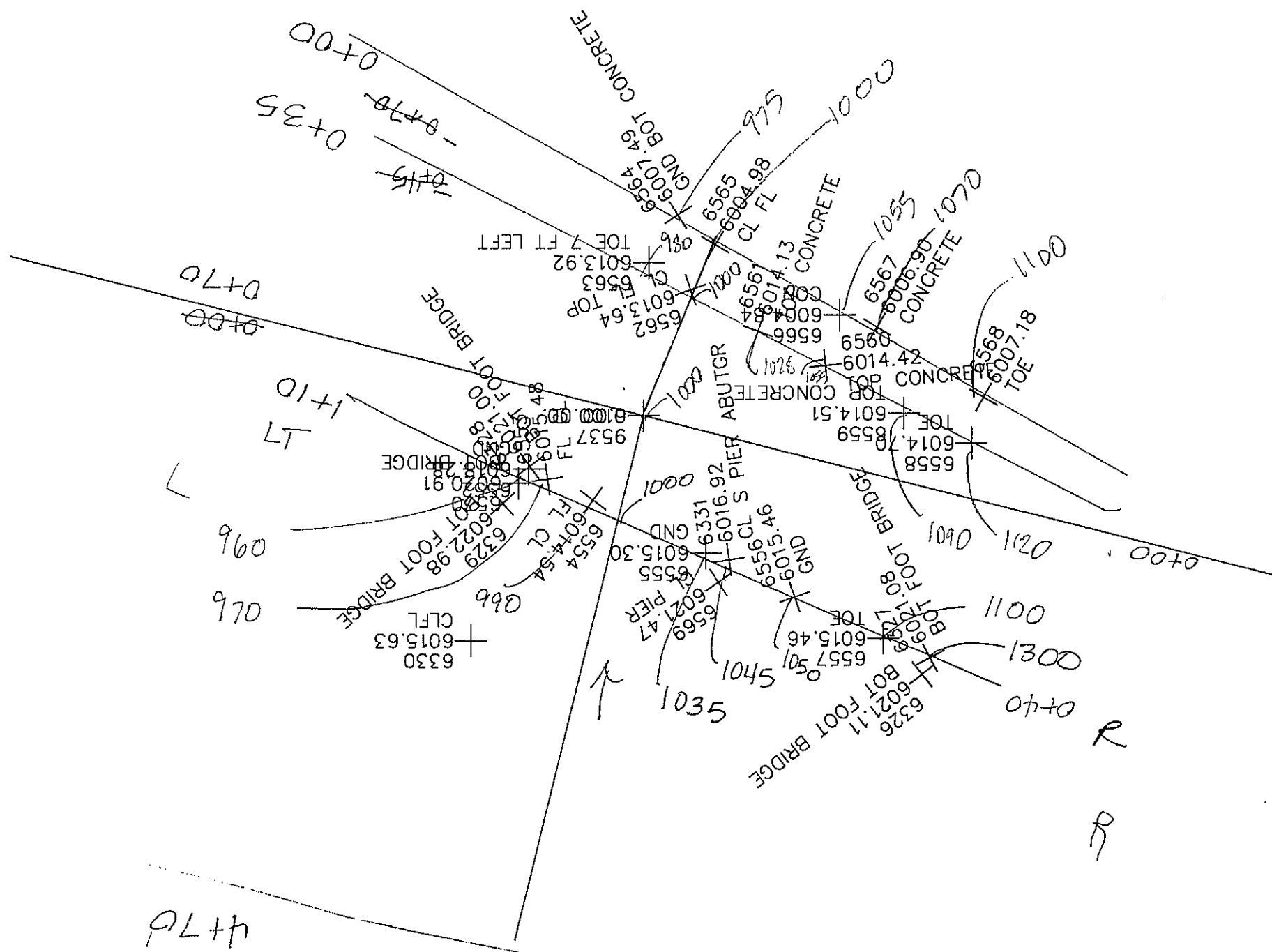
Sta	Elev
925	6097.79
940	6097.34
950	6097.93
985	6089.07
985	6080.92
1000	6080.93
1007	6083.44
1020	6084.40
1035	6088.42
1075	6101.30
1085	6102.10

Sta 47+35  
East For 2  
12/8/14  
= 501





24.95  
BRIDGE

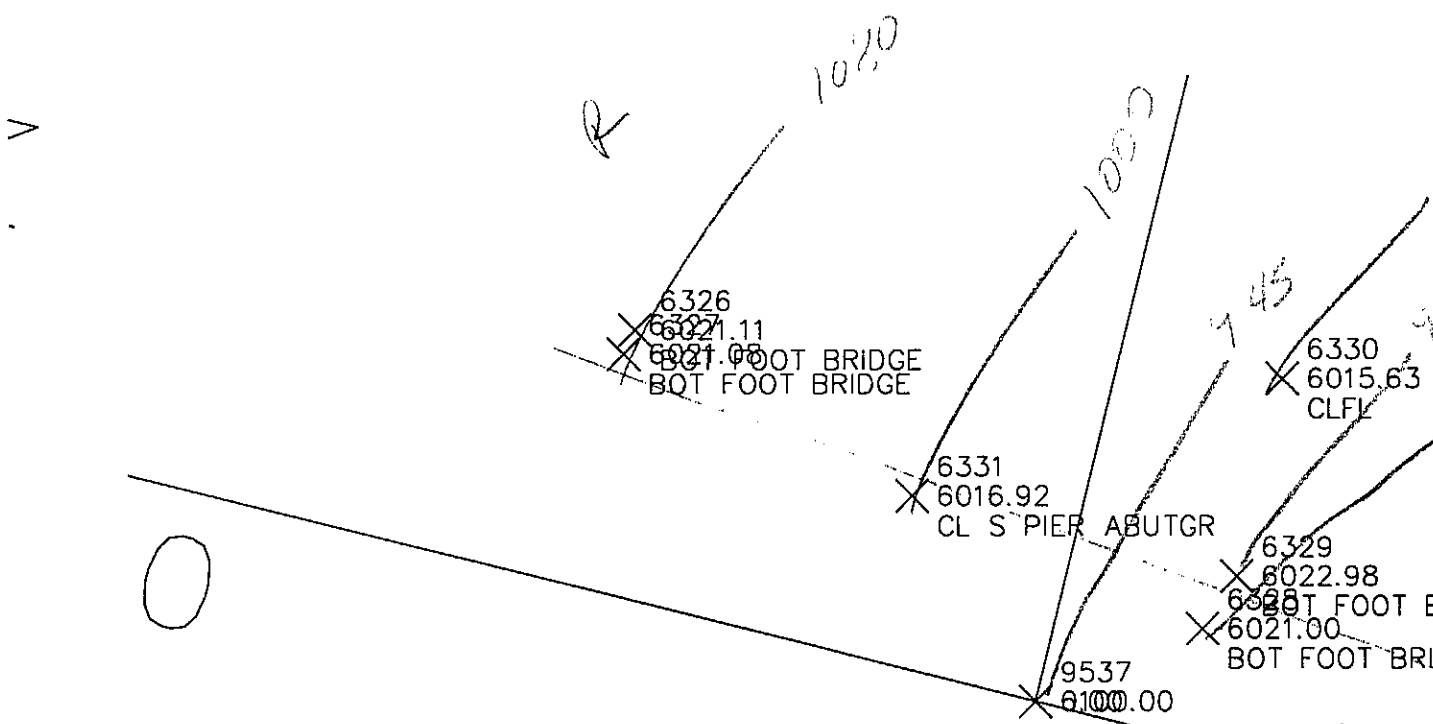


Sand Creek 2  
12/28/97  
1"=50'

DE Reach Lengths  
 LUB Channel RFB  
 0 0 0

Main Channel Bank  
 Left Bank Right Bank  
 905 1080

STA.	ELV.
905	6021.00
920	6022.98
<del>915</del>	<del>6016.92</del>
1000	6016.92
1080	6021.08

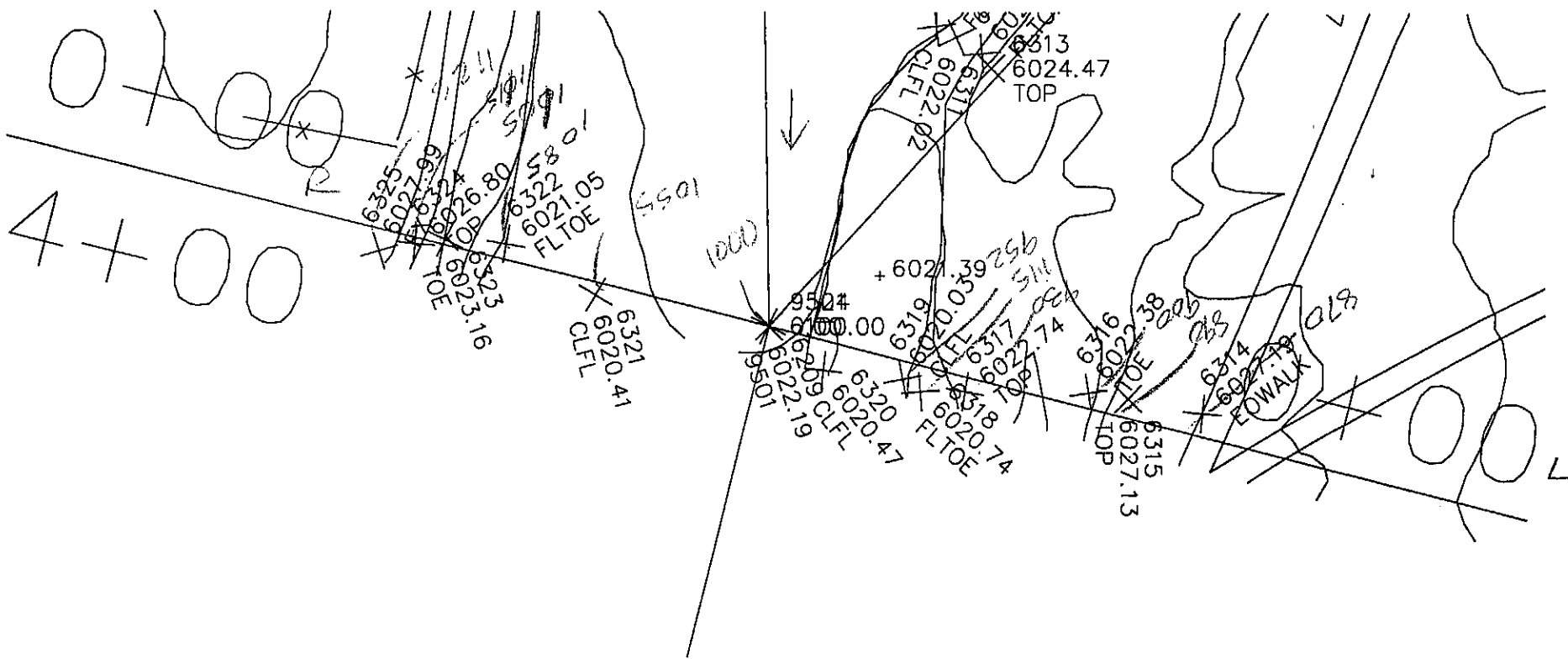


12/8/97  
 hand check  
 0+00

SOUTH CHANNEL  
LOT                      Channel                      MOB  
 400                              400                              400

Inside channel                      Bank Station  
 L. Bank                              R. Bank  
 100                                      1005

STA	ELEV
870	6021.19
890	6021.13
900	6021.28
930	6022.74
945	6020.74
952	6020.03
1000	6022.19
1055	6021.41
1085	6021.05
1105	6023.16
1115	6026.80
1120	6027.99



STA 4+00 4+70  
 5/10/00  
 12/8/97  
 1" = 50'

EXGEO  
10 and 100y  
EXISTING  
PLAN 06

HEC-RAS Plan: PLAN2

River	Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Ch W.S. (ft)	E.G. Elev (ft)	F.G. Slope (ft/ft)	Vol Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
SANDCRK2	SANDCRK2	4.7	11830.00	6020.03	6024.50	6026.17	6029.94	0.014366	18.76	634.91	213.14	1.89
SANDCRK2	SANDCRK2	4.7	5850.00	6020.03	6023.34	6024.36	6026.81	0.017183	14.96	391.81	207.53	1.91
SANDCRK2	SANDCRK2	1.50	11830.00	6014.54	6018.93	6020.83	6025.00	0.015996	21.40	630.67	243.06	2.02
SANDCRK2	SANDCRK2	1.50	5850.00	6014.54	6017.85	6019.07	6021.64	0.015091	16.56	391.76	202.56	1.86
SANDCRK2	SANDCRK2	0.70	Bridge									
SANDCRK2	SANDCRK2	.60	11830.00	6015.46	6020.11	6020.94	6022.98	0.007680	13.60	869.77	286.94	1.38
SANDCRK2	SANDCRK2	.80	5850.00	6015.46	6018.91	6019.29	6020.65	0.006793	10.61	551.52	241.03	1.24
SANDCRK2	SANDCRK2	.35	11830.00	6004.84	6016.95	6018.54	6022.47	0.008858	19.21	633.80	140.00	1.55
SANDCRK2	SANDCRK2	.35	5850.00	6004.84	6014.74	6016.27	6019.96	0.018560	18.56	324.54	140.00	2.05
SANDCRK2	SANDCRK2	0	11830.00	6004.84	6009.19	6012.38	6021.29	0.028909	27.92	423.75	125.00	2.87
SANDCRK2	SANDCRK2	0	5850.00	6004.84	6007.58	6009.90	6018.32	0.058613	26.30	222.40	125.00	3.48
EASTFORK2	EASTFORK2	47.35	4760.00	6080.92	6088.55	6089.45	6092.34	0.023396	15.81	305.00	64.46	1.26
EASTFORK2	EASTFORK2	47.35	1970.00	6080.92	6085.92	6086.51	6088.45	0.027622	12.78	154.19	49.85	1.28
EASTFORK2	EASTFORK2	46.85	4760.00	6079.59	6086.54	6087.59	6090.84	0.023518	16.25	293.36	59.28	1.27
EASTFORK2	EASTFORK2	46.85	1970.00	6079.59	6083.88	6084.48	6086.50	0.027627	13.04	151.05	47.17	1.28
EASTFORK2	EASTFORK2	45	4760.00	6077.80	6083.74	6084.17	6088.89	0.019042	14.25	334.08	67.77	1.13
EASTFORK2	EASTFORK2	45	1970.00	6077.80	6081.60	6081.80	6083.19	0.017106	10.10	195.11	62.28	1.01
EASTFORK2	EASTFORK2	44.5	Bridge									
EASTFORK2	EASTFORK2	40	4760.00	6071.00	6077.54	6077.54	6080.12	0.013590	12.89	370.21	71.64	0.98
EASTFORK2	EASTFORK2	40	1970.00	6071.00	6074.83	6074.83	6076.46	0.016607	10.24	192.35	59.90	1.01
EASTFORK2	EASTFORK2	36	4760.00	6065.79	6073.27	6073.27	6076.00	0.014472	13.26	358.98	66.42	1.01
EASTFORK2	EASTFORK2	36	1970.00	6065.79	6070.15	6070.15	6071.97	0.016280	10.82	182.01	50.47	1.00
EASTFORK2	EASTFORK2	35	4760.00	6064.60	6070.85	6071.50	6074.29	0.018755	14.89	320.33	67.71	1.13
EASTFORK2	EASTFORK2	35	1970.00	6064.60	6068.36	6068.48	6070.24	0.018485	10.99	179.33	53.35	1.06
EASTFORK2	EASTFORK2	34	4760.00	6063.29	6070.42	6070.42	6072.81	0.013302	12.48	389.75	84.54	0.98
EASTFORK2	EASTFORK2	34	1970.00	6063.29	6068.01	6068.01	6069.46	0.015983	9.67	209.93	69.47	0.99
EASTFORK2	EASTFORK2	30	4760.00	6058.06	6063.84	6064.19	6066.57	0.018263	13.27	358.81	81.96	1.12
EASTFORK2	EASTFORK2	30	1970.00	6058.06	6061.78	6061.78	6063.24	0.016597	9.71	202.92	69.32	1.00
EASTFORK2	EASTFORK2	27.50	4760.00	6053.99	6061.46	6061.46	6063.85	0.014749	12.39	384.26	81.92	1.01
EASTFORK2	EASTFORK2	27.50	1970.00	6053.99	6059.04	6059.04	6060.52	0.017130	9.79	201.30	68.83	1.01
EASTFORK2	EASTFORK2	25	4760.00	6051.71	6058.62	6057.12	6059.34	0.022191	13.26	359.07	95.09	1.20
EASTFORK2	EASTFORK2	25	1970.00	6051.71	6054.84	6055.07	6056.38	0.024257	9.97	197.59	88.31	1.16
EASTFORK2	EASTFORK2	22.50	4760.00	6048.80	6054.44	6054.44	6056.67	0.014853	12.00	396.64	89.70	1.01
EASTFORK2	EASTFORK2	22.50	1970.00	6048.80	6052.22	6052.22	6053.58	0.017434	9.37	210.16	78.17	1.01
EASTFORK2	EASTFORK2	20	4760.00	6045.61	6051.75	6051.75	6054.14	0.014557	12.39	384.13	81.47	1.01
EASTFORK2	EASTFORK2	20	1970.00	6045.61	6049.41	6049.41	6050.85	0.016954	9.64	204.39	71.68	1.01
EASTFORK2	EASTFORK2	17.50	4760.00	6042.77	6048.36	6048.49	6050.71	0.014745	12.41	391.10	89.97	1.02
EASTFORK2	EASTFORK2	17.50	1970.00	6042.77	6046.23	6046.23	6047.60	0.016998	9.42	210.52	79.45	1.00
EASTFORK2	EASTFORK2	15	4760.00	6040.12	6046.23	6046.23	6048.40	0.013542	12.05	408.21	93.32	0.98
EASTFORK2	EASTFORK2	15	1970.00	6040.12	6043.96	6043.96	6045.31	0.016045	9.43	213.53	78.70	0.98
EASTFORK2	EASTFORK2	14	4760.00	6038.55	6044.87	6044.89	6047.04	0.014082	11.96	409.26	98.10	0.99
EASTFORK2	EASTFORK2	14	1970.00	6038.55	6042.77	6042.77	6044.06	0.016040	9.14	218.17	83.84	0.97
EASTFORK2	EASTFORK2	12	4760.00	6036.19	6042.87	6042.87	6045.03	0.012379	11.99	418.73	104.05	0.94
EASTFORK2	EASTFORK2	12	1970.00	6036.19	6040.34	6040.34	6041.77	0.015902	9.65	207.25	72.80	0.96
EASTFORK2	EASTFORK2	11.5	4760.00	6035.56	6040.97	6041.78	6044.11	0.023130	14.31	339.16	89.05	1.25
EASTFORK2	EASTFORK2	11.5	1970.00	6035.56	6039.22	6039.47	6040.85	0.021731	10.24	193.56	77.72	1.12
EASTFORK2	EASTFORK2	11	4760.00	6034.92	6040.15	6040.88	6042.90	0.020464	13.36	361.39	95.84	1.17
EASTFORK2	EASTFORK2	11	1970.00	6034.92	6038.52	6038.56	6039.83	0.017349	9.19	214.88	84.31	1.01
EASTFORK2	EASTFORK2	10.5	4760.00	6034.29	6039.05	6039.65	6041.82	0.022508	13.37	357.89	100.00	1.22
EASTFORK2	EASTFORK2	10.5	1970.00	6034.29	6037.38	6037.58	6038.85	0.022370	9.75	202.03	86.30	1.12
EASTFORK2	EASTFORK2	10	4760.00	6033.66	6036.12	6038.61	6040.66	0.021361	12.78	372.42	102.91	1.18
EASTFORK2	EASTFORK2	10	1970.00	6033.66	6036.56	6036.57	6037.80	0.018094	8.93	220.58	91.59	1.01
EASTFORK2	EASTFORK2	7	4760.00	6029.69	6036.09	6036.09	6037.79	0.014688	10.67	463.05	138.26	0.98
EASTFORK2	EASTFORK2	7	1970.00	6029.69	6034.27	6034.27	6035.37	0.018963	8.49	236.78	105.72	0.98
EASTFORK2	EASTFORK2	5	4760.00	6027.42	6033.28	6033.28	6035.23	0.014305	11.21	426.23	113.47	0.98
EASTFORK2	EASTFORK2	5	1970.00	6027.42	6031.25	6031.25	6032.47	0.017742	8.87	222.12	92.02	1.01

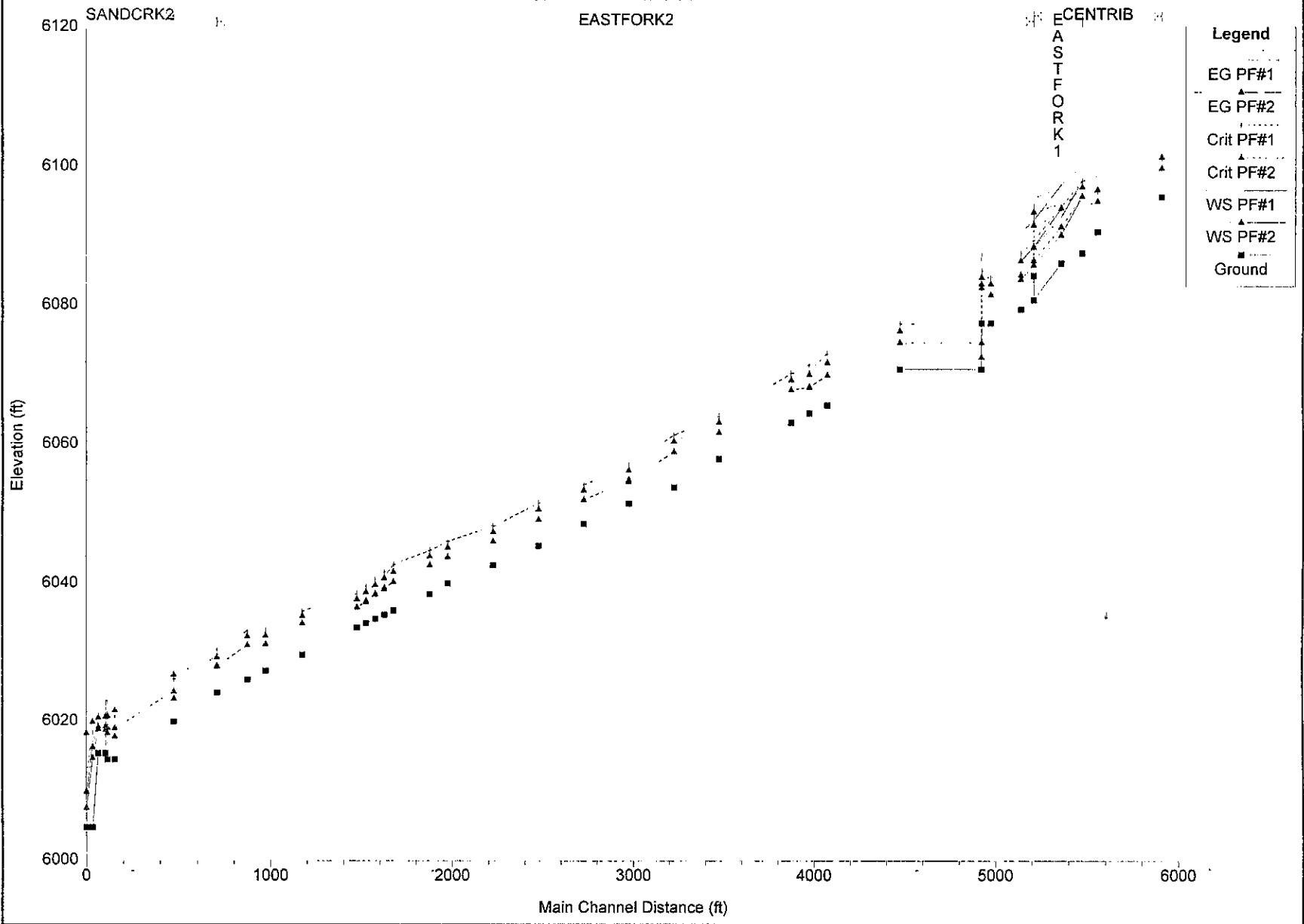
EX GEO  
CONT.

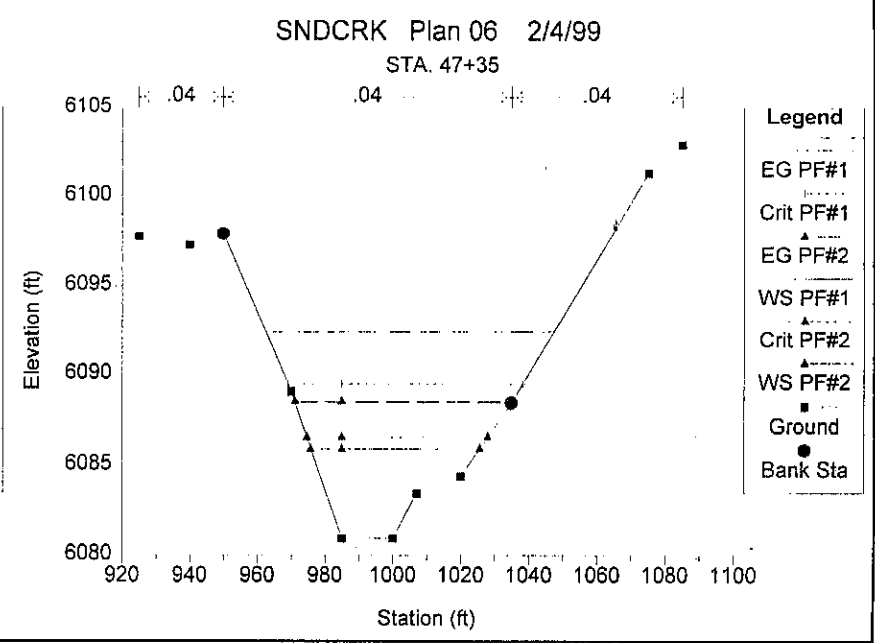
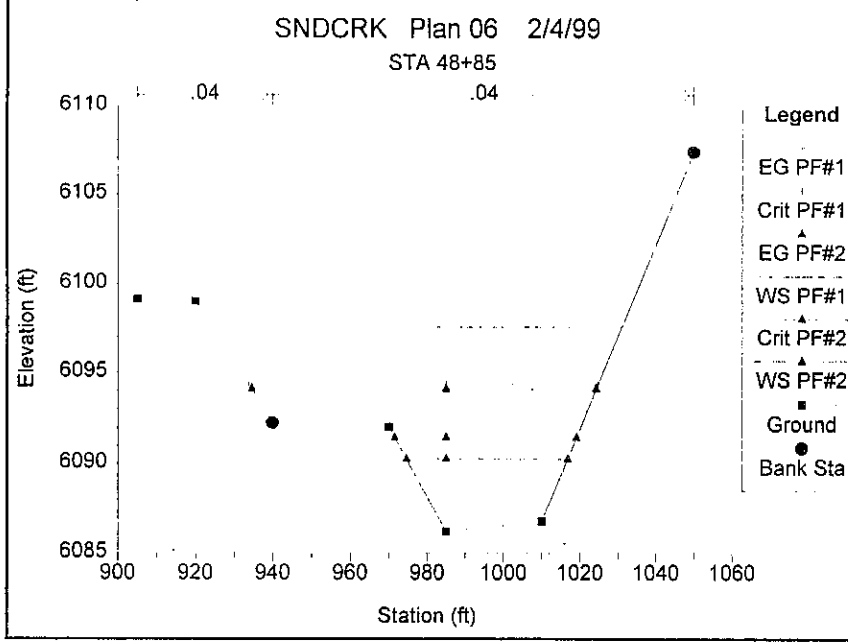
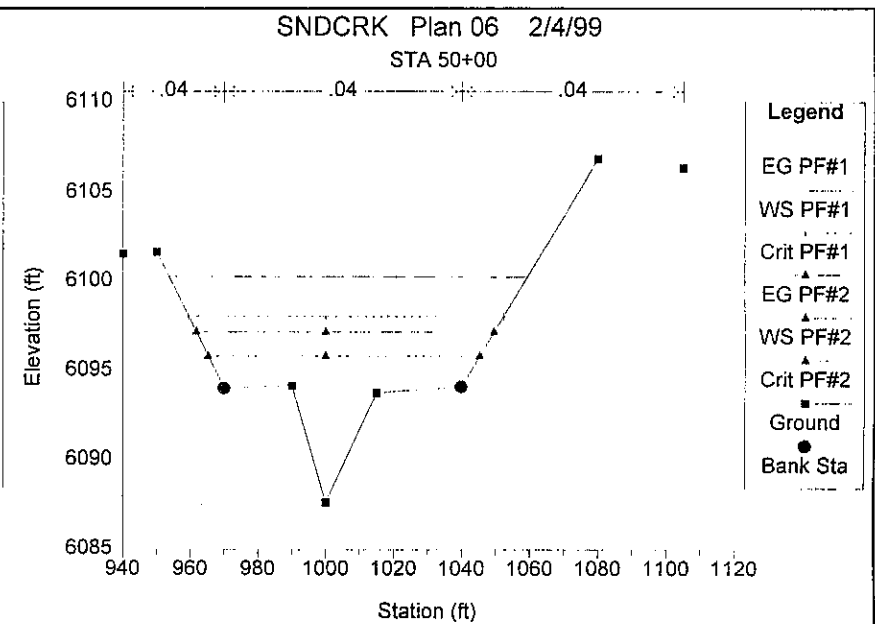
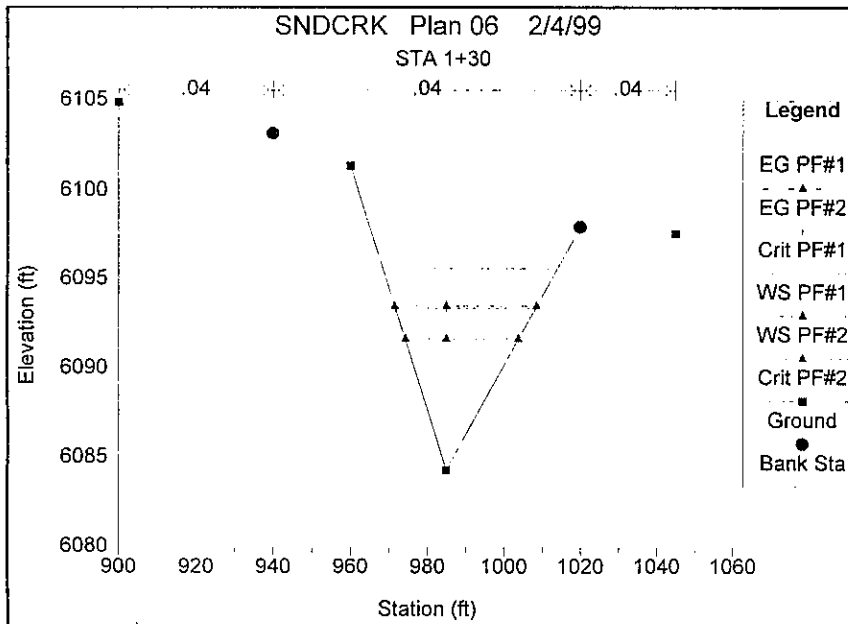
HEC-RAS Plan: PLAN2 (Continued)

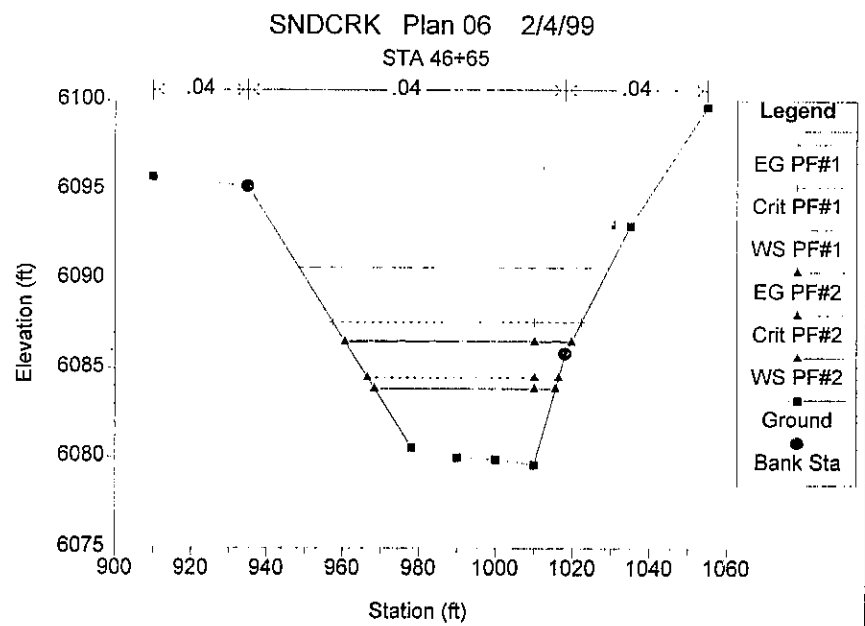
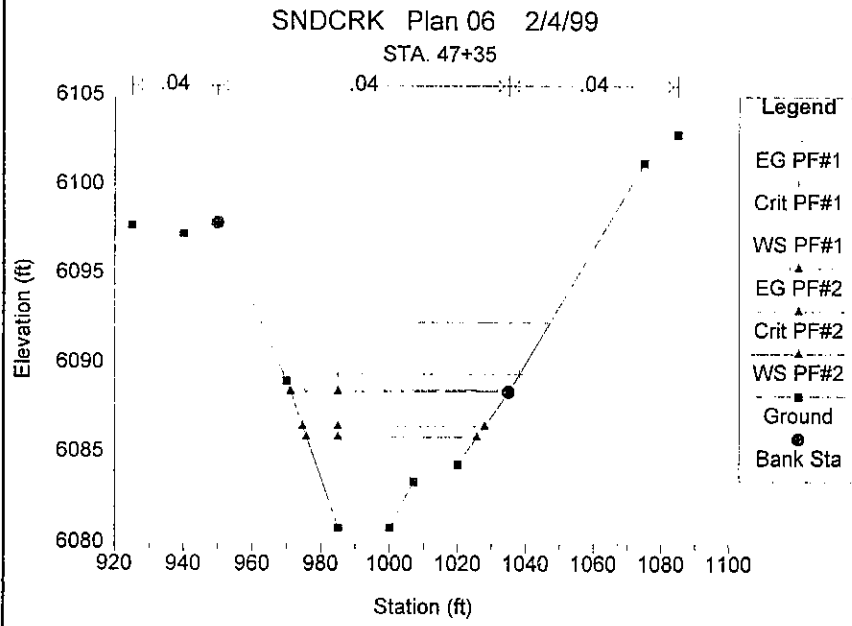
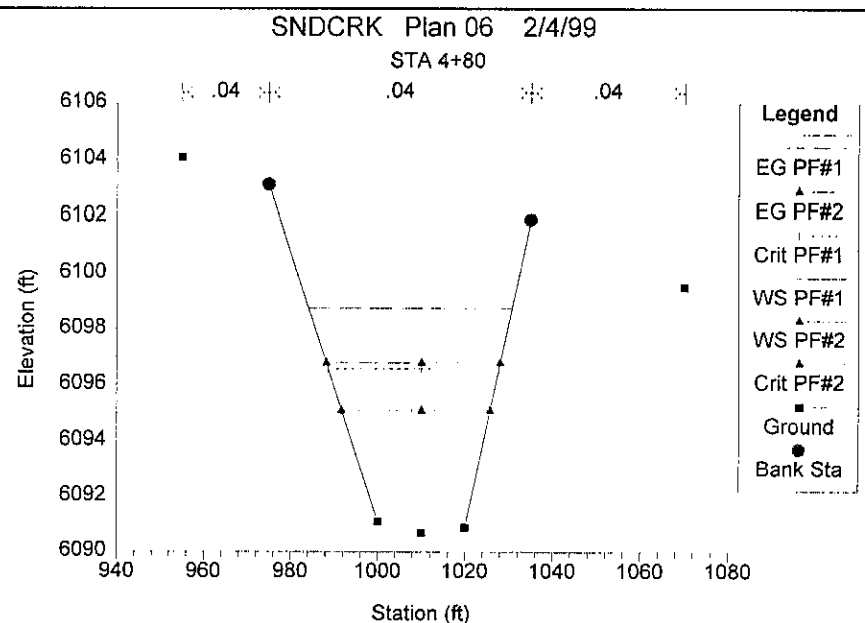
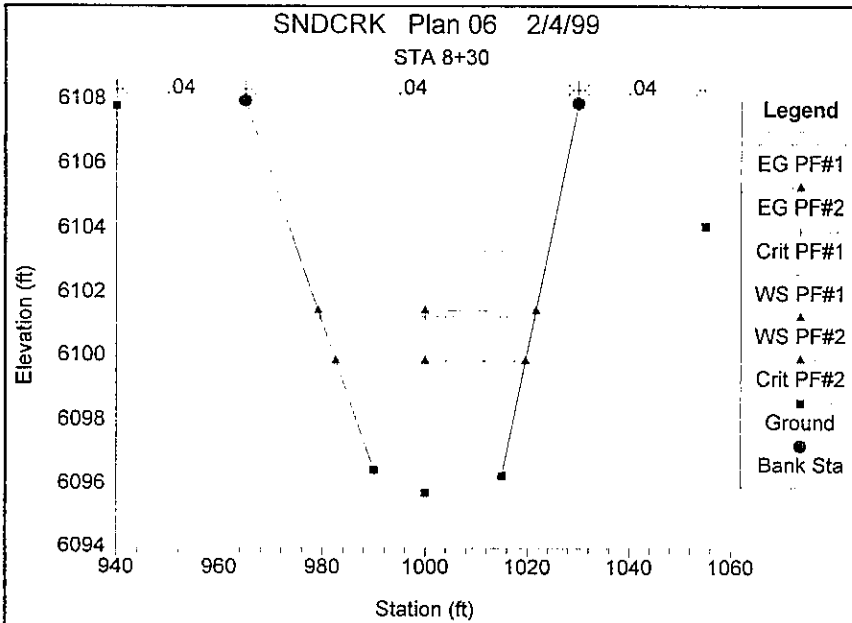
River	Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
EASTFORK2	EASTFORK2	4	4760.00	6026.10	6033.21	6033.21	6035.10	0.014847	11.04	431.25	111.64	0.99
EASTFORK2	EASTFORK2	4	1970.00	6026.10	6031.06	6031.06	6032.38	0.017871	9.24	213.28	83.27	1.02
EASTFORK2	EASTFORK2	2.35	4760.00	6024.22	6029.70	6030.47	6032.21	0.019442	13.31	378.55	100.40	1.15
EASTFORK2	EASTFORK2	2.35	1970.00	6024.22	6027.94	6028.12	6029.34	0.018823	10.00	212.16	88.70	1.08
CENTRIB	CENTRIB	8.3	1980.00	6095.76	6101.29	6101.29	6103.35	0.015963	11.52	171.87	41.90	1.00
CENTRIB	CENTRIB	8.3	1180.00	6095.76	6099.90	6099.90	6101.48	0.017215	10.11	116.72	37.06	1.00
CENTRIB	CENTRIB	4.8	1980.00	6090.71	6096.59	6096.59	6098.76	0.018094	11.81	167.61	39.12	1.01
CENTRIB	CENTRIB	4.8	1180.00	6090.71	6095.10	6095.10	6096.79	0.017209	10.41	113.34	34.00	1.00
CENTRIB	CENTRIB	1.3	1980.00	6084.39	6093.43	6093.43	6095.87	0.016332	12.01	164.82	36.45	1.00
CENTRIB	CENTRIB	1.3	1180.00	6084.39	6091.71	6091.71	6093.56	0.017970	10.94	107.88	29.49	1.01
EASTFORK1	EASTFORK1	50	4760.00	6087.89	6098.08	6098.08	6100.31	0.012775	12.25	410.34	92.93	0.95
EASTFORK1	EASTFORK1	50	1990.00	6087.89	6095.84	6095.84	6097.20	0.015900	9.40	216.70	80.10	0.96
EASTFORK1	EASTFORK1	48.85	4760.00	6086.21	6092.87	6094.34	6097.55	0.045538	17.37	274.47	83.72	1.67
EASTFORK1	EASTFORK1	48.85	1990.00	6086.21	6090.25	6091.43	6094.09	0.043619	15.74	126.41	42.14	1.60
EASTFORK1	EASTFORK1	47.35	4760.00	6080.92	6088.46	6089.45	6092.39	0.024851	15.91	299.17	64.01	1.30
EASTFORK1	EASTFORK1	47.35	1990.00	6080.92	6085.91	6086.55	6088.51	0.028390	12.94	153.80	49.81	1.30

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EASTFORK2



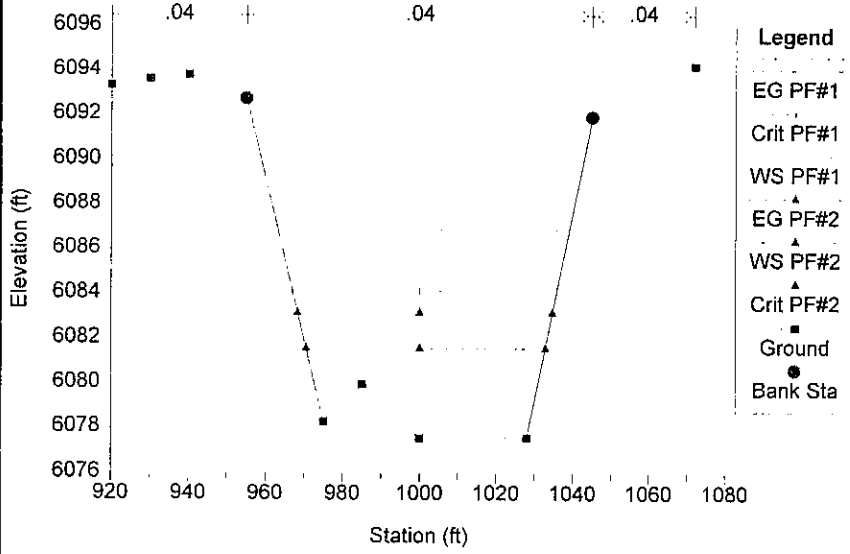






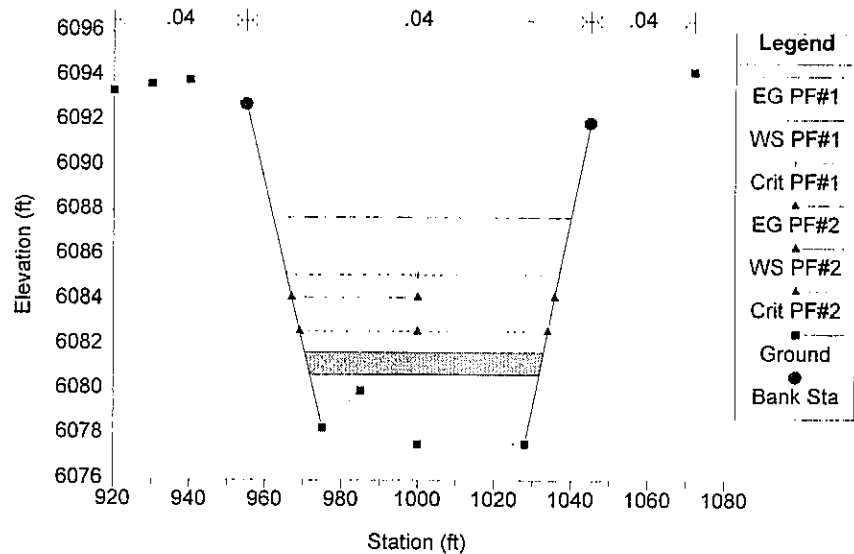
SNDCRK Plan 06 2/4/99

STA 45+00



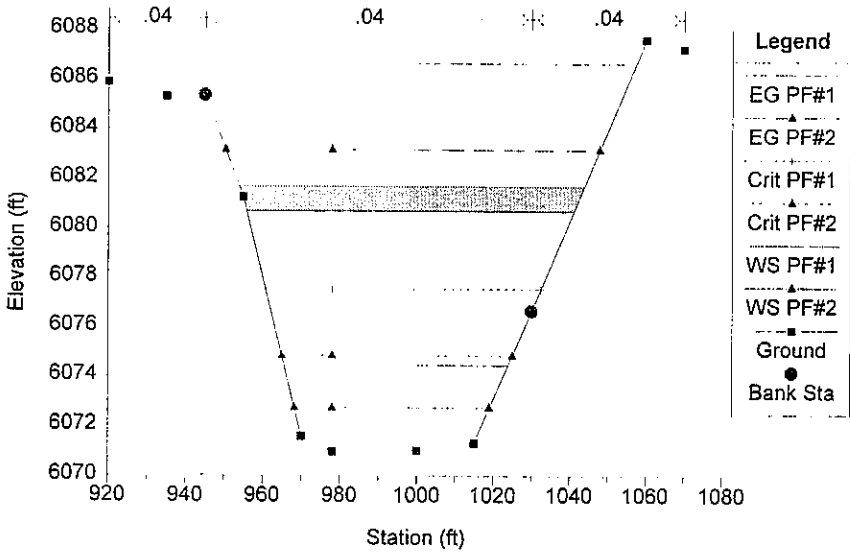
SNDCRK Plan 06 2/4/99

STEEL PIPE



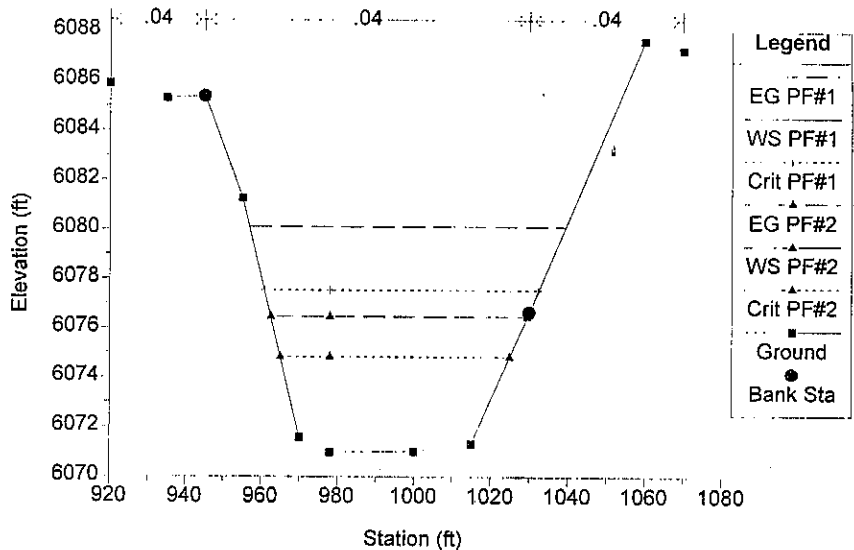
SNDCRK Plan 06 2/4/99

STEEL PIPE

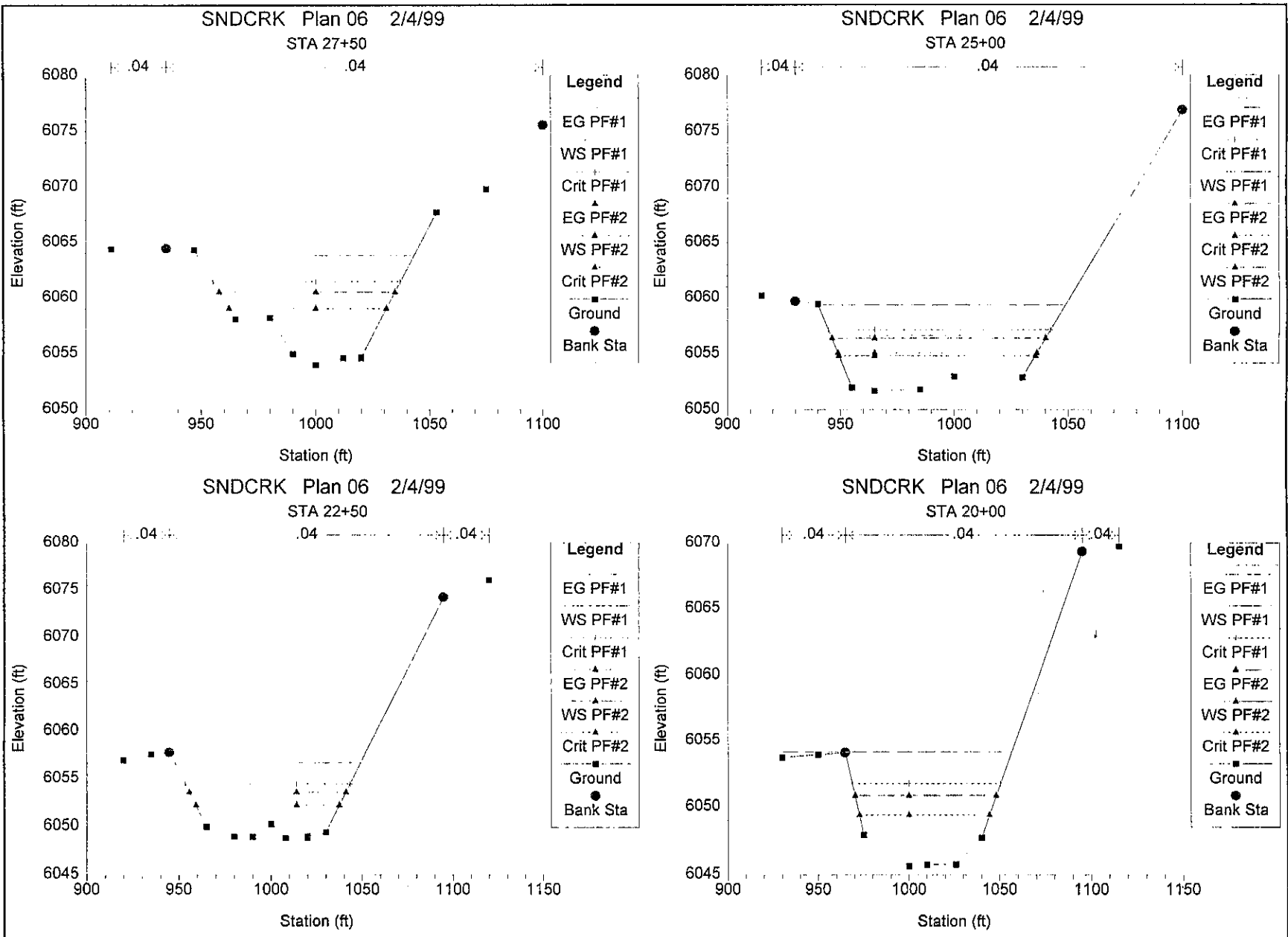


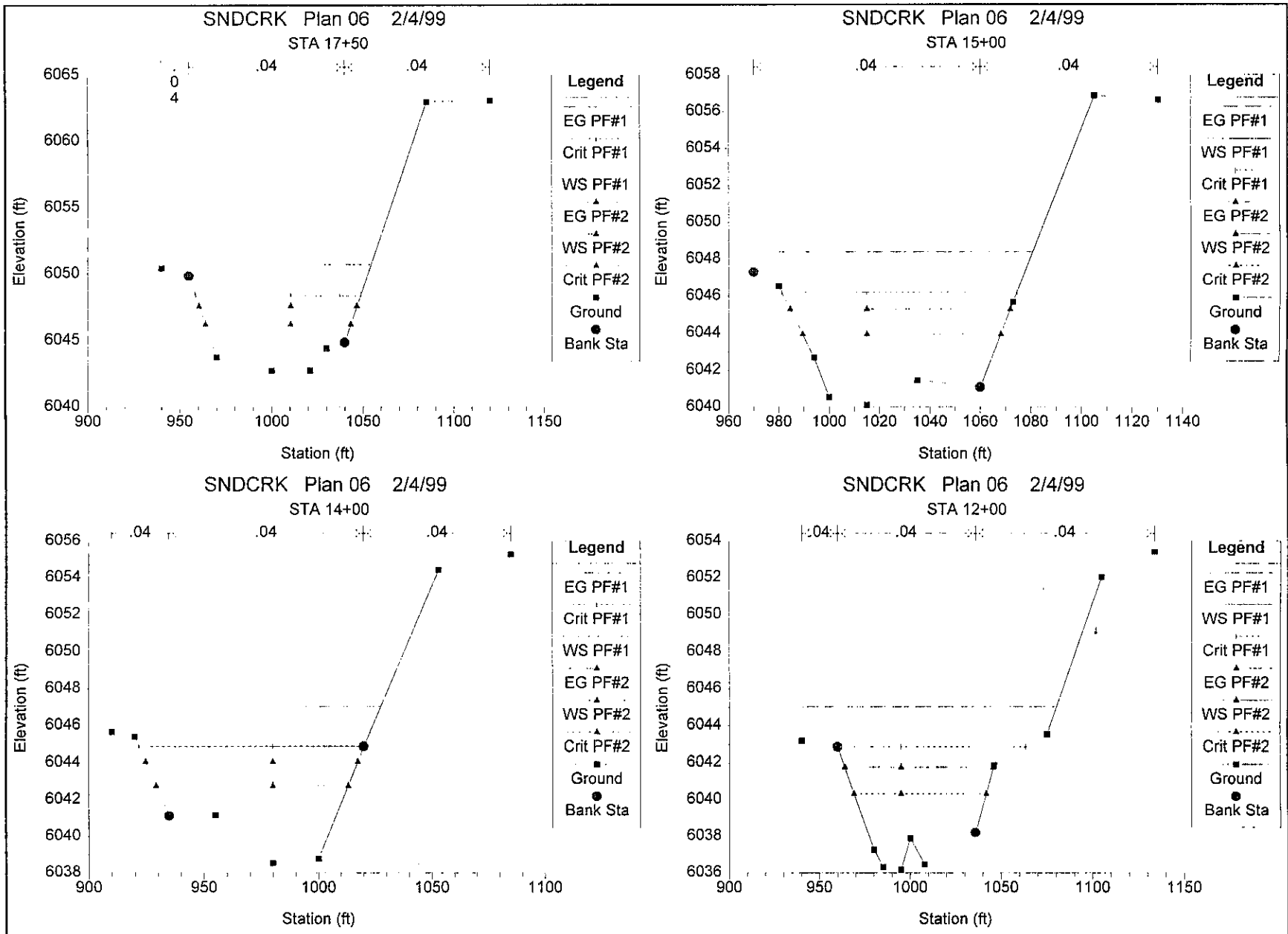
SNDCRK Plan 06 2/4/99

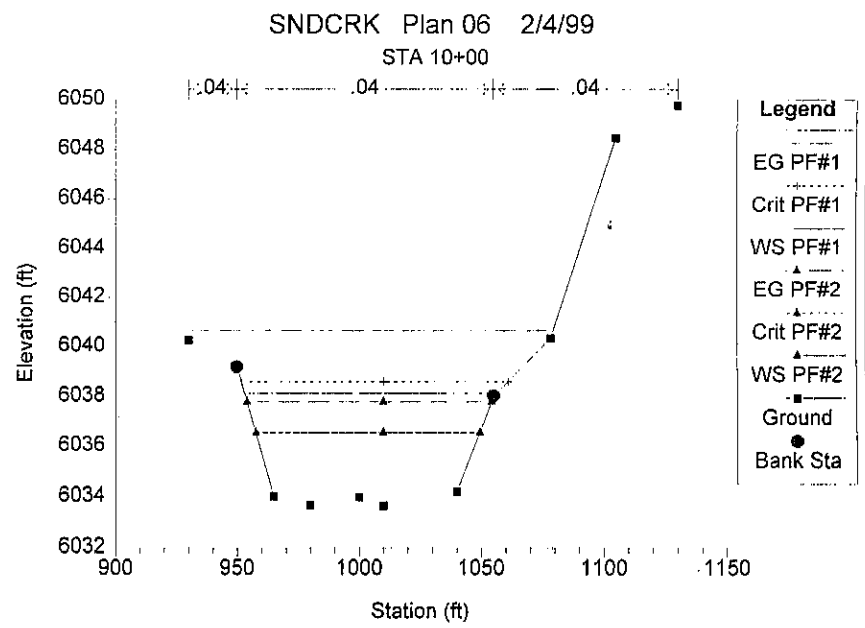
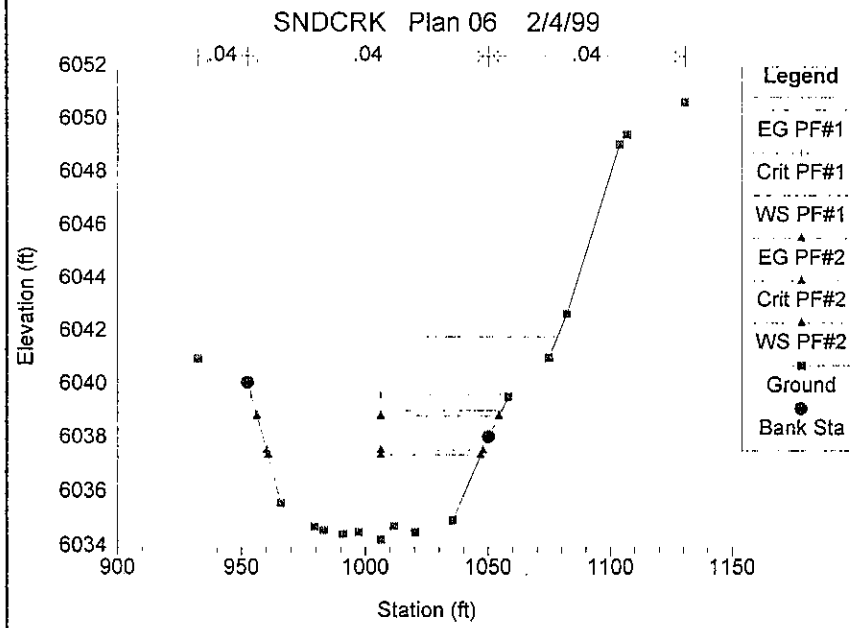
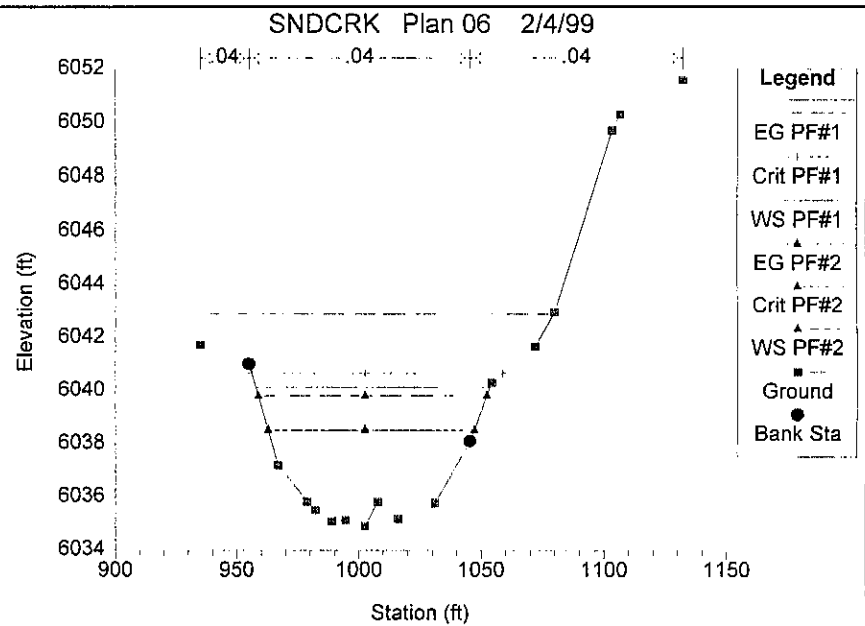
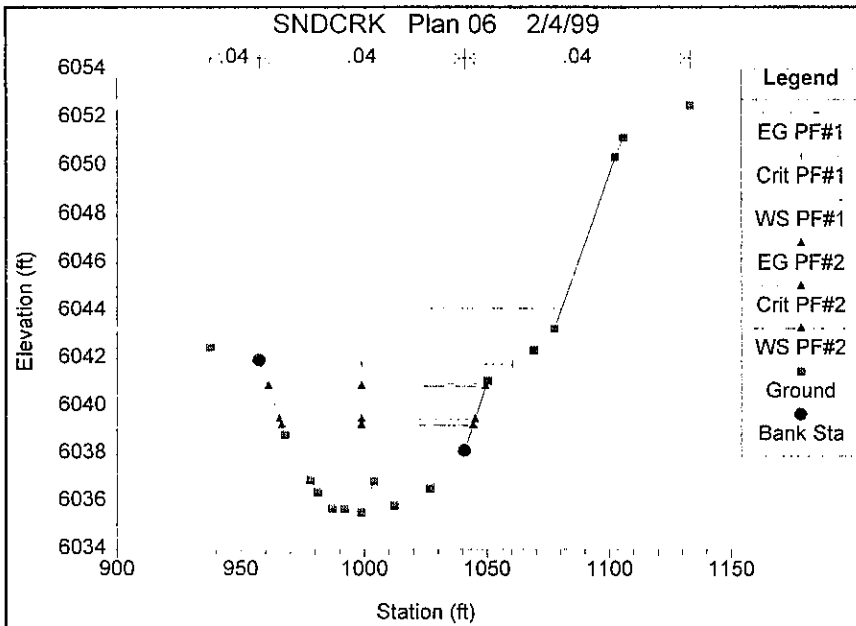
STA 40+00

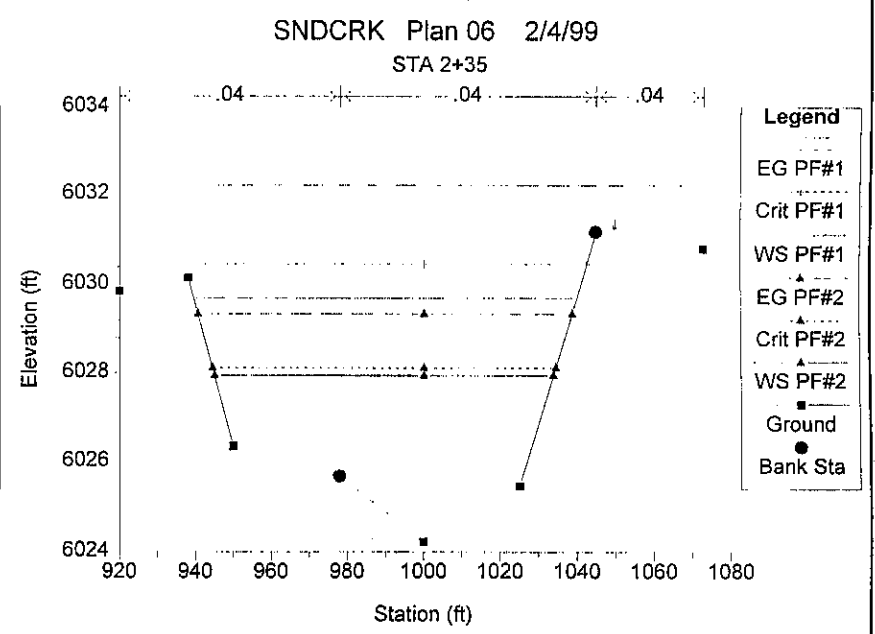
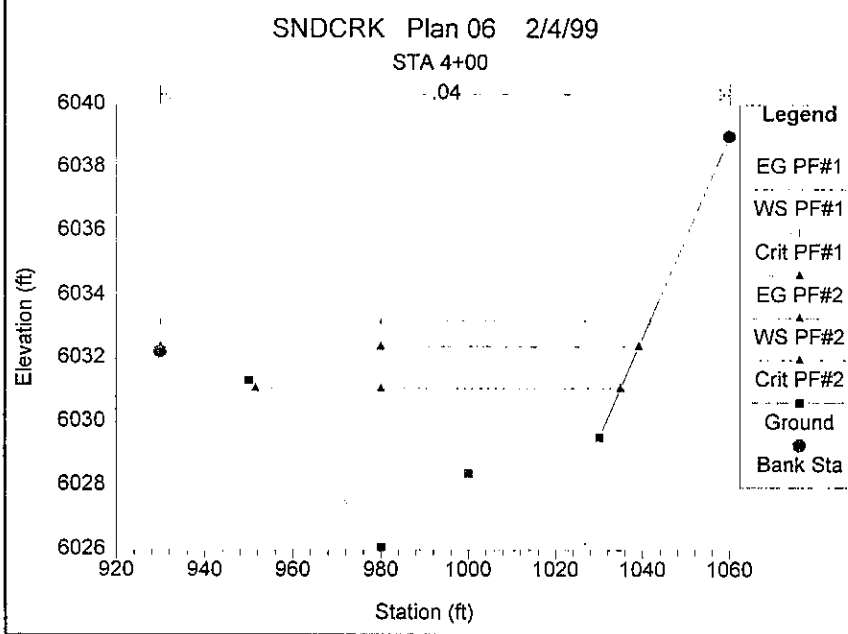
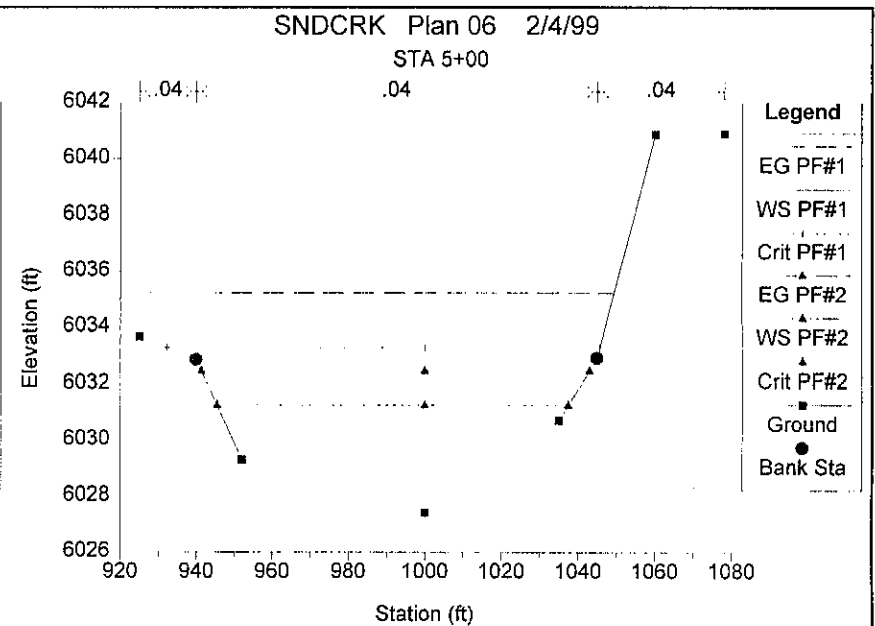
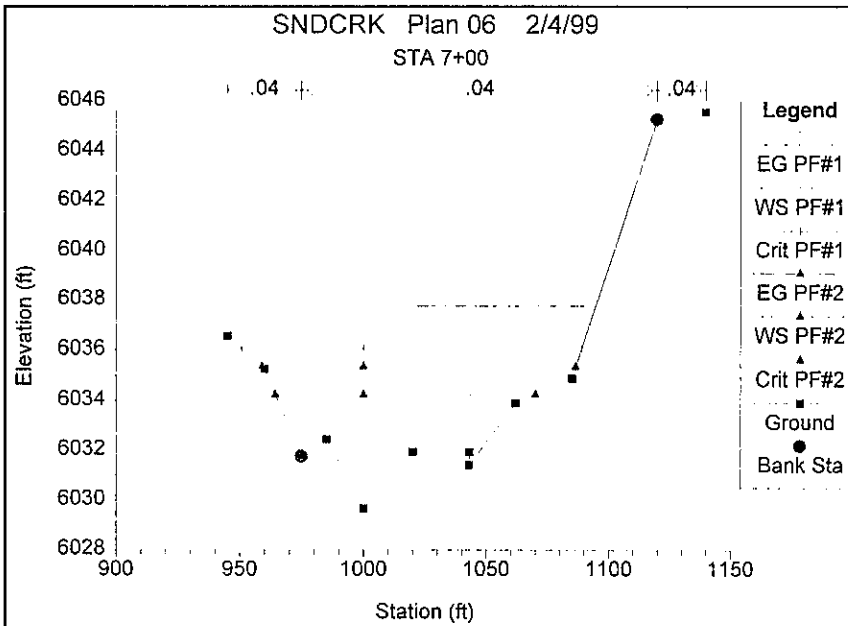








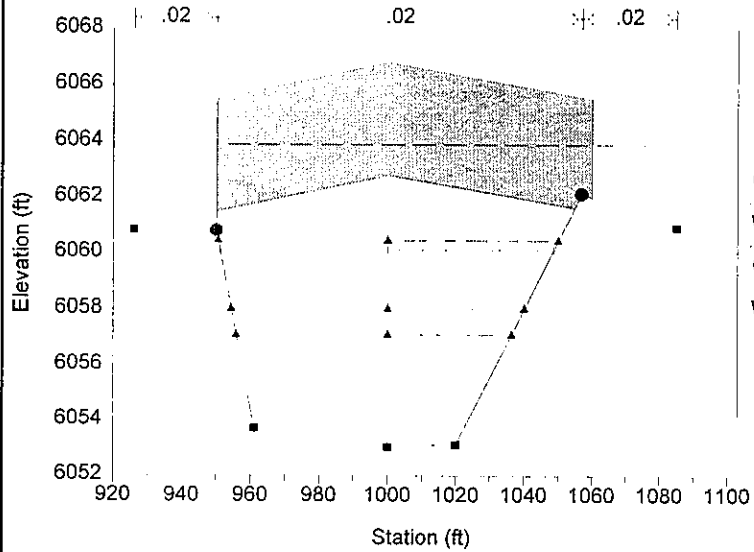






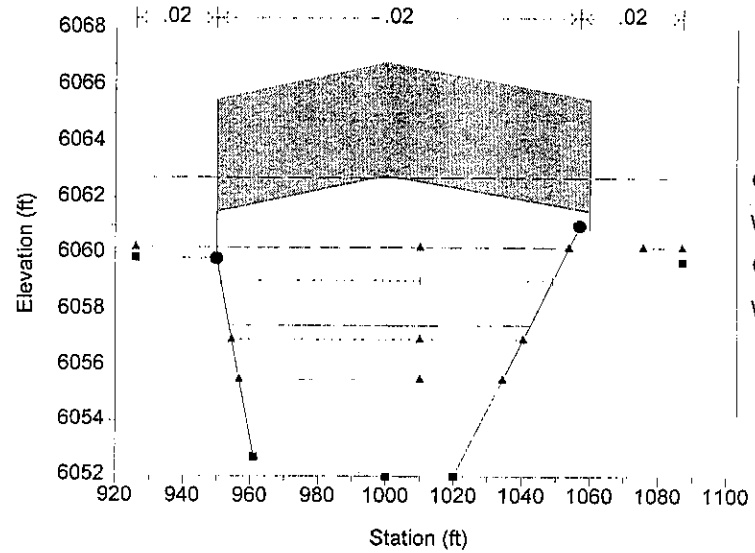
SNDCRK Plan 06 2/4/99

BRIDGE



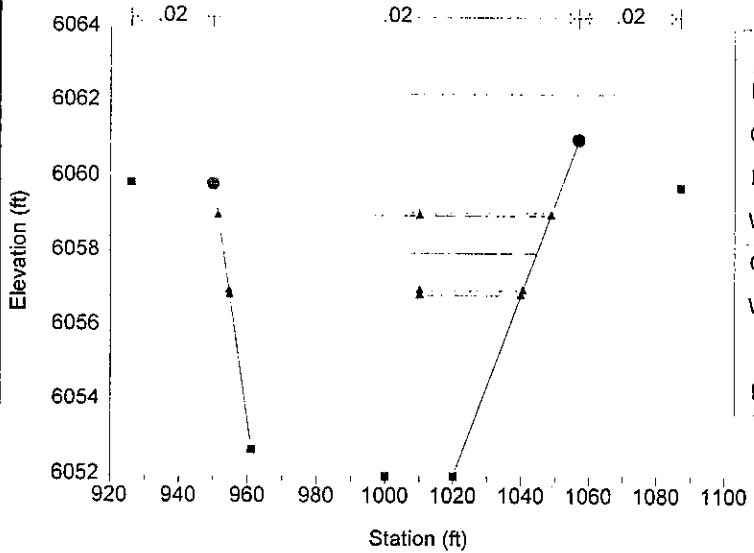
SNDCRK Plan 06 2/4/99

BRIDGE



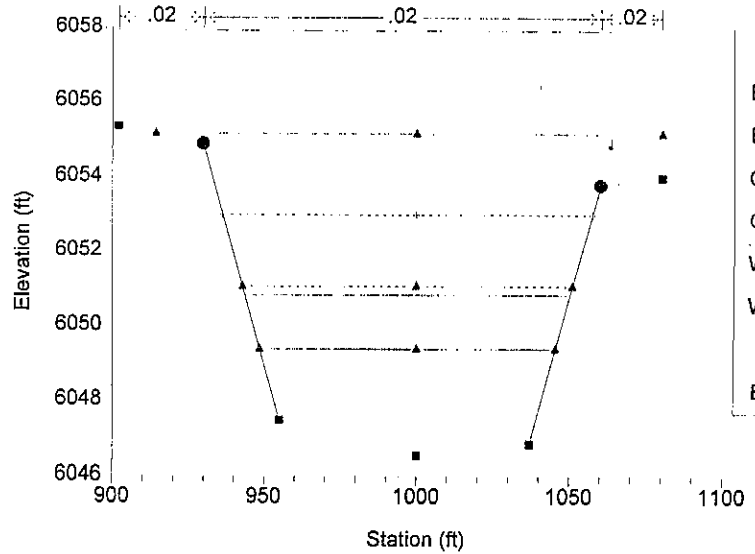
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STA. 24+00

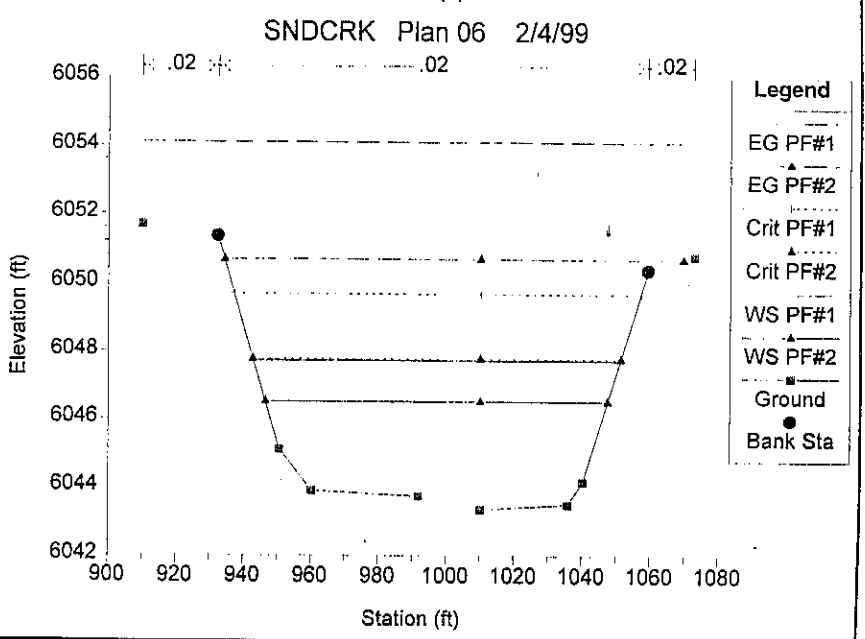
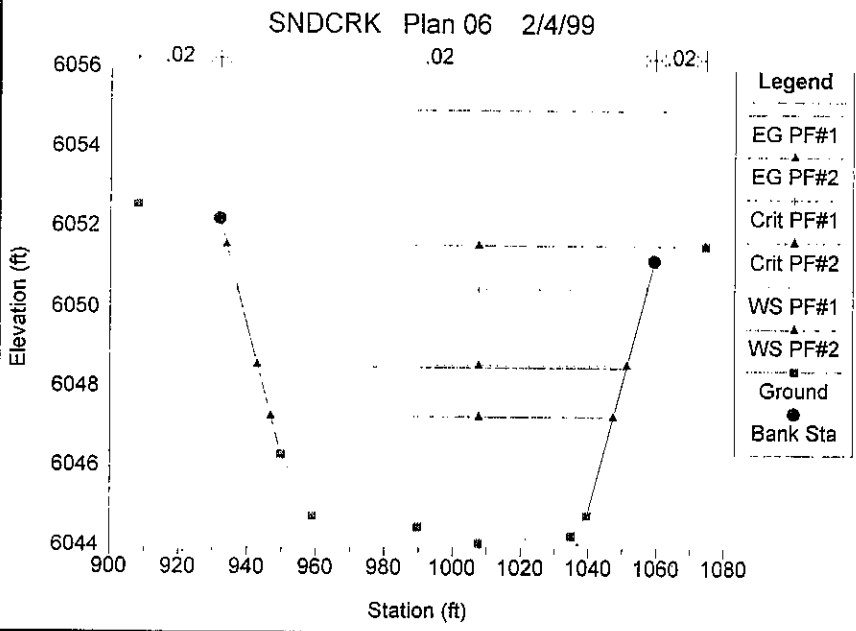
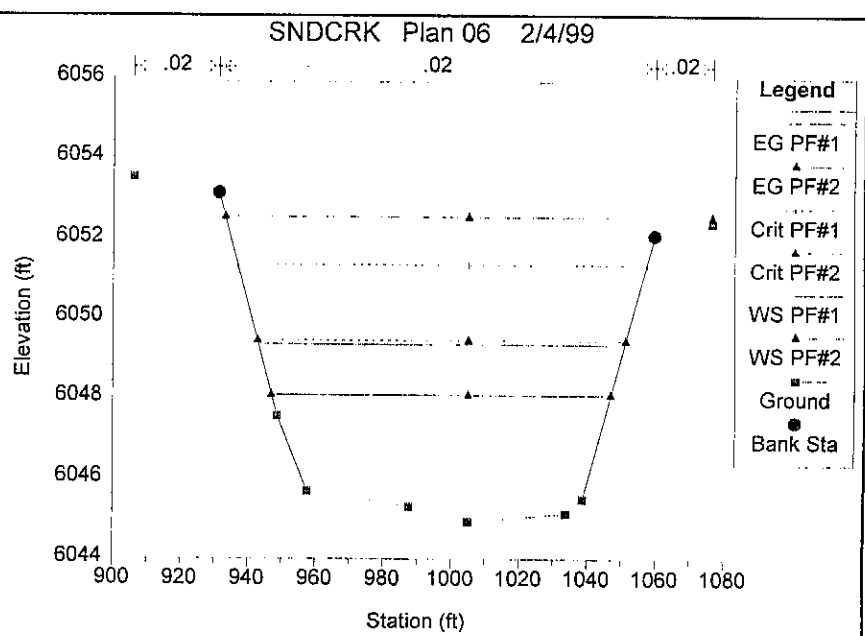
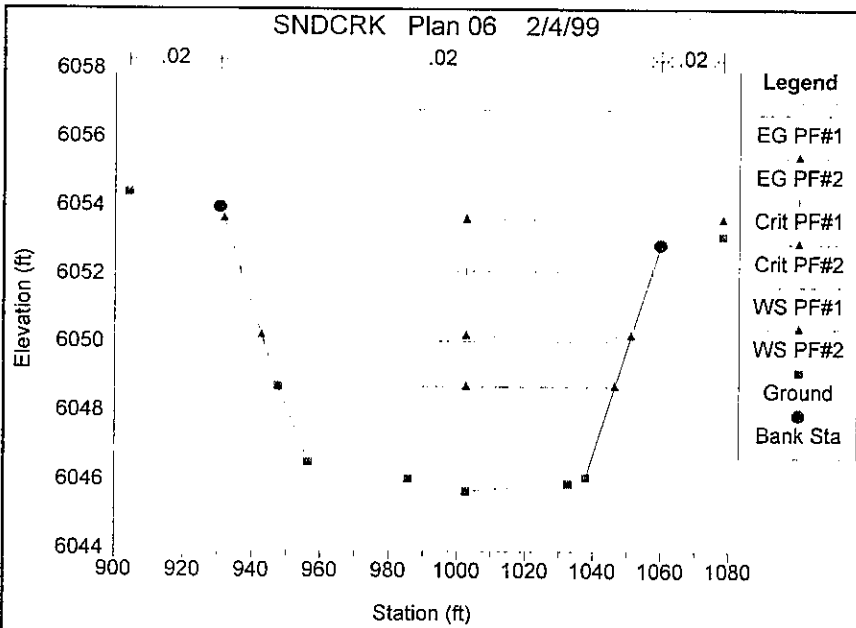


SNDCRK Plan 06 2/4/99

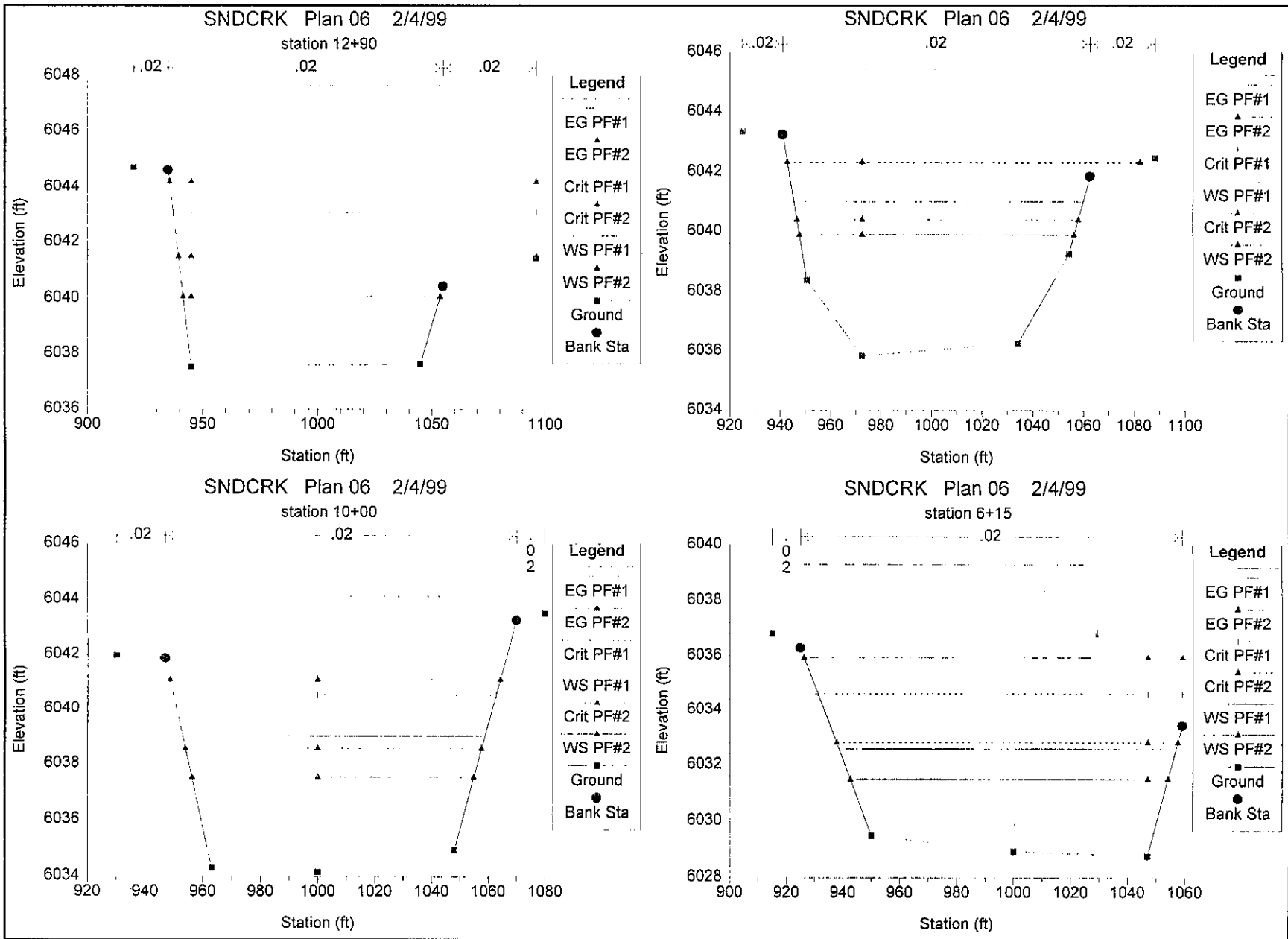
station 20+00



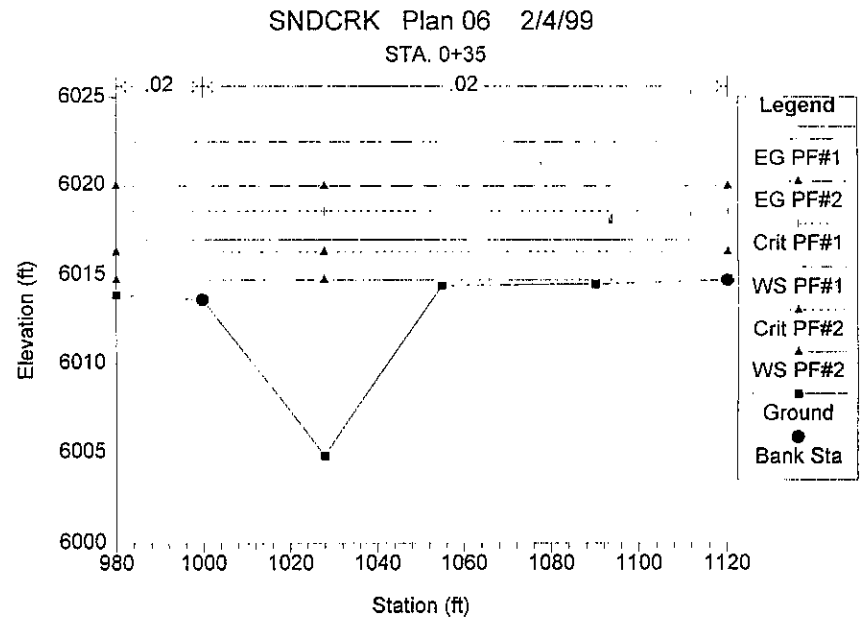
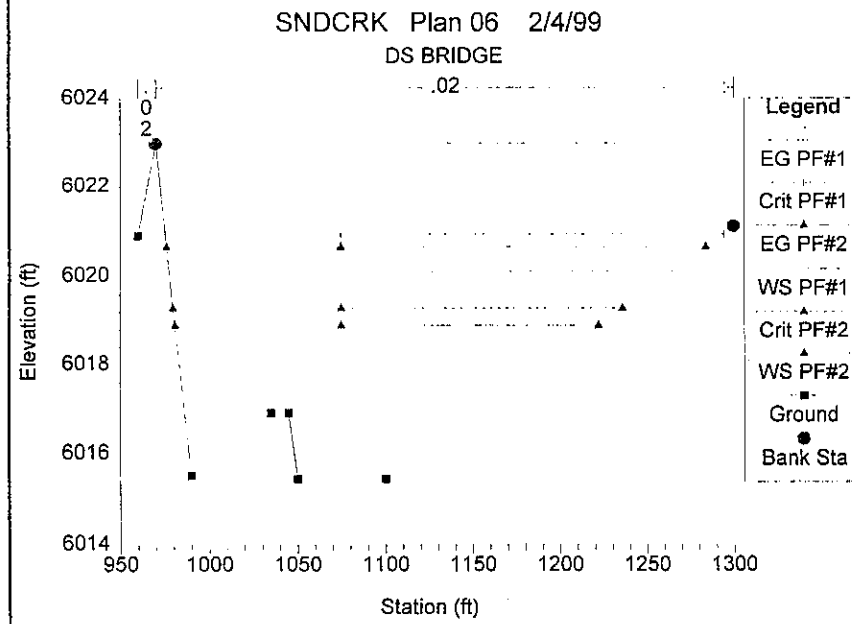
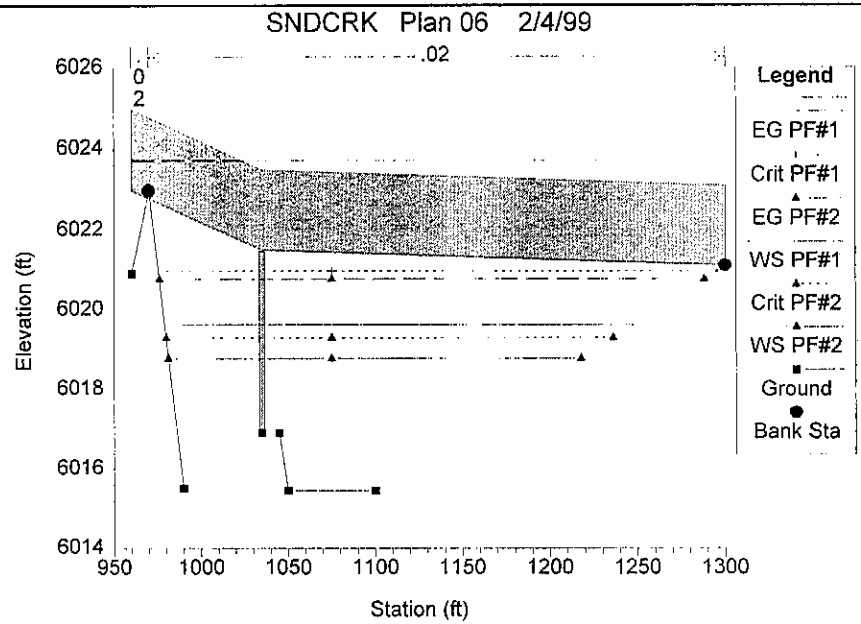
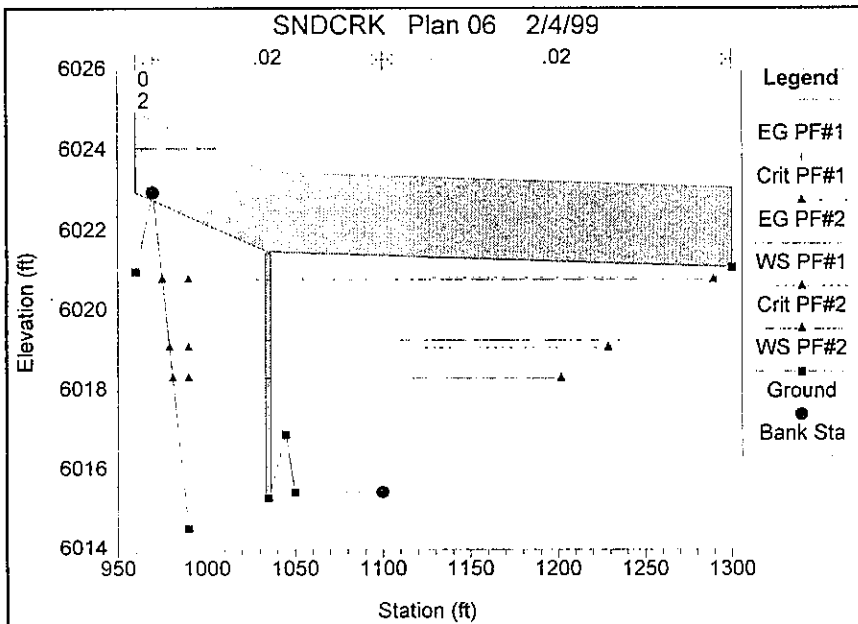








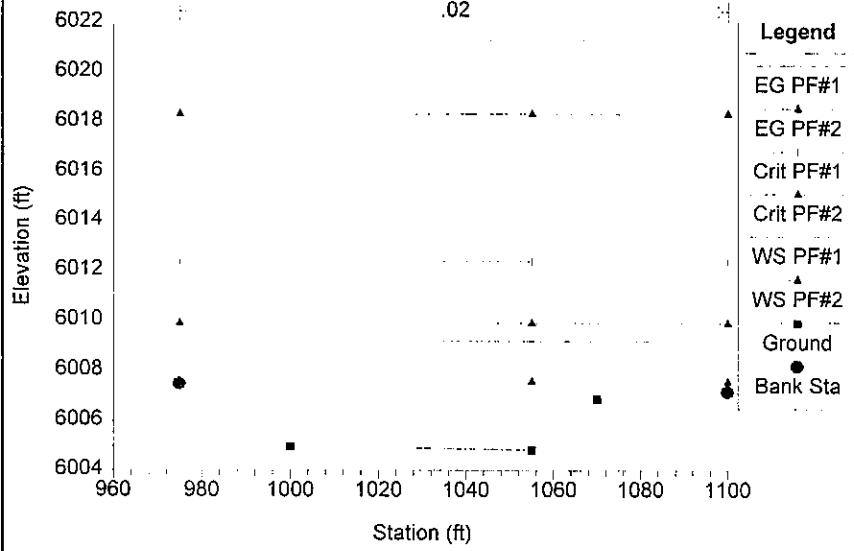




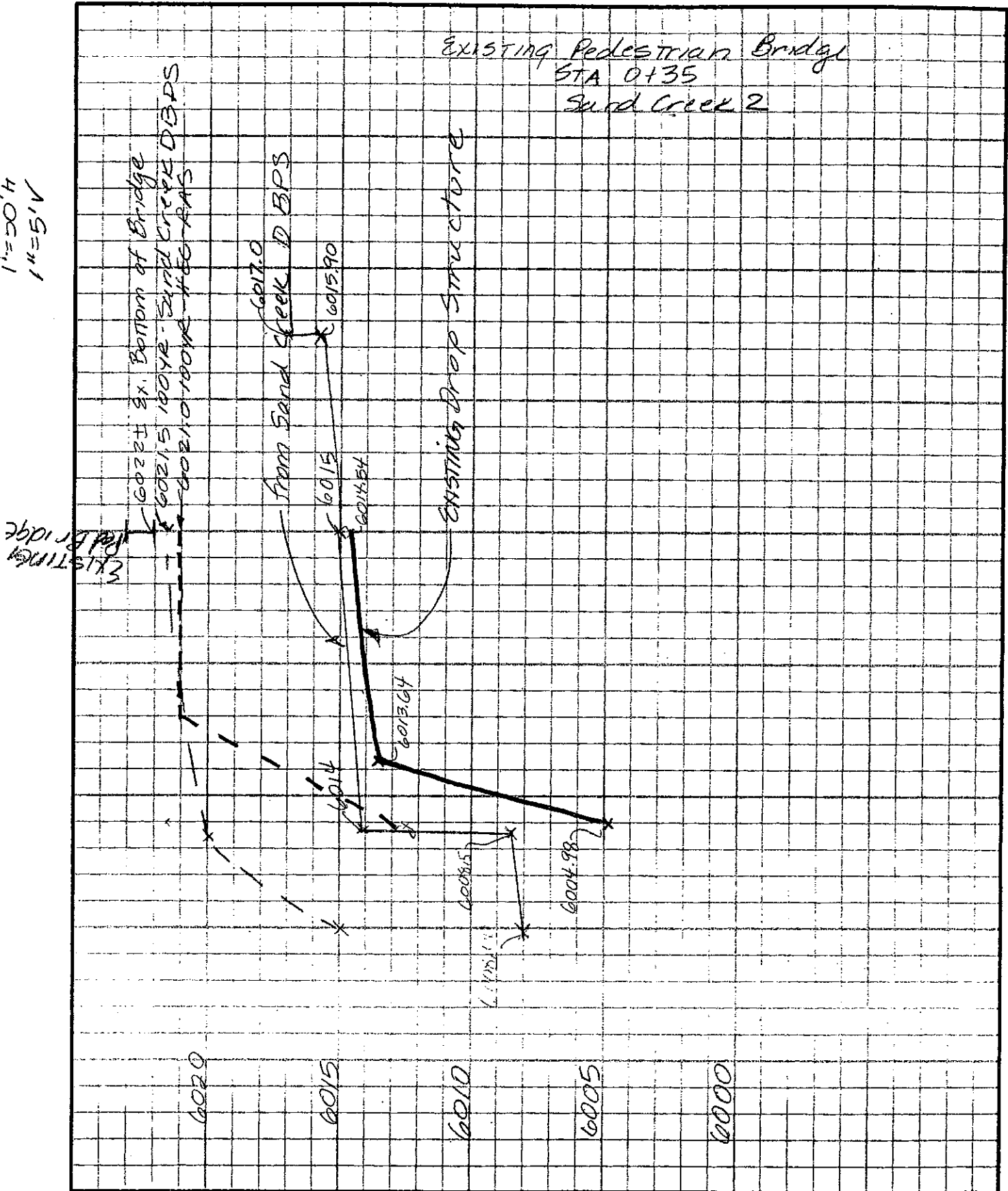
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STA 0+00

.02



1" = 50'  
1/4" = 5'



**SUMMARY  
PROPOSED CONDITIONS**



HEC-RAS TYPICAL SECTION

S

N

900      1000      1100

EX. EAST  
FORK  
CREEK

← 50' →

Drainage  
Utility  
Trail  
Tract

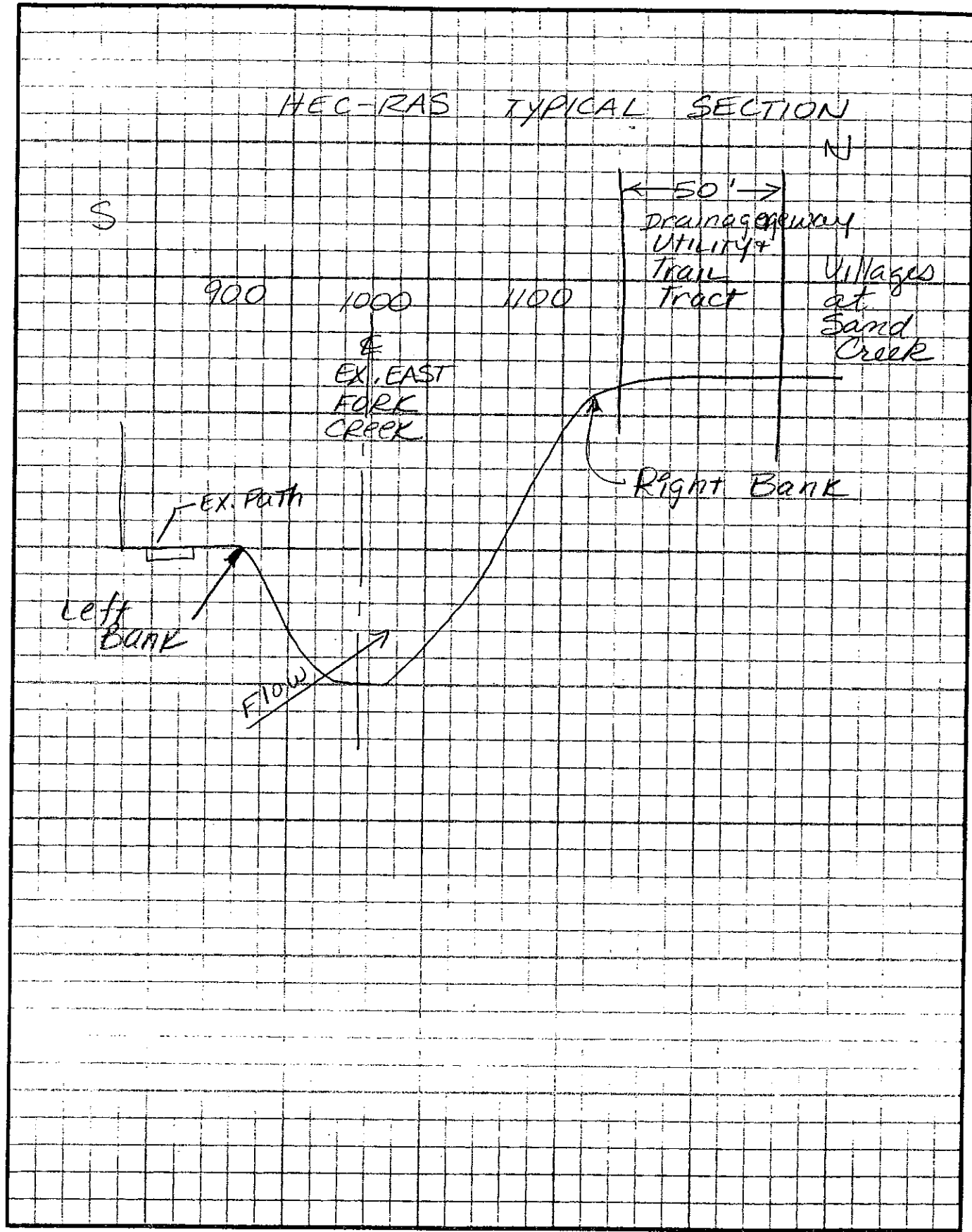
Utilities  
at  
Sand  
Creek

EX. PATH

Left  
Bank

Flow

Right Bank



## PROPOSED CONDITIONS

EAST FORK 1

STA 50+83 ✓		LOB	Channel	ROB
		82 ✓	83 ✓	85 ✓
STA	ELEV.	LB	RB	
949	6105			
954	6105	954	1073	
970	6099			
1009	6099			
1019	6087 ✓			
1026	6087			
1047	6103			
1073	6110			

STA 50+00 ✓		LOB	Channel	ROB
		113	113	118
STA	ELEV.	LB	RB	
940	6101.59			
950	6101.71	950	1030	
970	6094.04			
990	6094.18			
1000	6093.59			
1015	6093.24			
1040	6094.12			
1080	6106.92			
1105	6106.44			

STA 48+85 ✓		LOB	Channel	ROB
		150	150	145
STA	ELEV.	LB	RB	
905	6099.13			
920	6099.03	920	1378	
940	6092.23			
970	6092.03			
985	6092.2 ✓			
1040	6107.23			

EAST FORK 2

		LOB	Channel	ROB
	<u>47+35</u> ✓			
<u>925</u>	<u>6097.79</u>	<u>68</u>	<u>70</u>	<u>83</u>
<u>940</u>	<u>6097.34</u>			
<u>950</u>	<u>6097.93</u>			
<u>970</u>	<u>6089.07</u>	<u>LB</u>	<u>RB</u>	
<u>985</u>	<u>6036.00</u>	<u>950</u>	<u>1075</u>	
<u>1000</u>	<u>6035.26</u> ✓			
<u>1027</u>	<u>6085.76</u>			
<u>1035</u>	<u>6085.42</u>			
<u>1075</u>	<u>6101.3</u>			
<u>1085</u>	<u>6102.9</u>			

46+65

		LOB	Channel	ROB
<u>143</u>				
<u>265</u>		<u>265</u>	<u>265</u>	<u>270</u>
<u>748</u>		<u>LB</u>	<u>RB</u>	
		<u>748</u>	<u>1045</u>	

<u>935</u>	<u>6081.1</u>
<u>1000</u>	
<u>1019</u>	<u>6080.23</u>
<u>1045</u>	<u>6093.02</u>
<u>1071</u>	<u>6100</u>

5' DROP STRUCTURE

		LOB	Channel	ROB
	<u>44+00</u> ✓			
<u>045</u>	<u>6095</u>	<u>15</u>	<u>15</u>	<u>15</u>
<u>775</u>				
<u>985</u>		<u>LB</u>	<u>RB</u>	
<u>1015</u>		<u>115</u>	<u>115</u>	
<u>1028</u>				
<u>1035</u>				

PROJECT Sand Creek

BY LDR

CHK BY

DATE 2-3-99

SUBJECT HEC RAS

SHEET NO. 3 OF     

3' DROP STRUCTURE				
STA	ELEV	LOB	CHANNEL	ROB
431.85 ✓				
945	6032	305	305	305
		<u>LB</u>	<u>RB</u>	
		945	1044	
985	6032			
990	6030			
1000	6078.6 ✓			
1009	6078.6			
1010	6078.6			
1025	6080			
1031	6082			
1044	6080			
4' DROP STRUCTURE				
STA	ELEV	LOB	CHANNEL	ROB
401.80 ✓				
946	6086	12	12	12
954	6080	<u>LB</u>	<u>RB</u>	
972	6072	945	1059	
982	6075.2			
991	6075.2			
1000	6075.2 ✓			
1009	6075.2			
1020	6075.2			
1031	6082			

4' DROP STRUCTURE

STA 40+68 ✓

<u>STA</u>	<u>ELEV</u>	<u>LOB</u>	<u>Channel</u>	<u>ROB</u>
<u>945</u>	<u>6087</u>	<u>488</u>	<u>488</u>	<u>488</u>
<u>958</u>	<u>6086</u>			
<u>970</u>	<u>6080</u>	<u>LB</u>	<u>RB</u>	
<u>979</u>	<u>6076</u>	<u>945</u>	<u>1037</u>	
<u>980</u>	<u>6071.2</u>			
<u>990</u>	<u>6071.2</u>			
<u>991</u>	<u>6071.2</u>			
<u>1000</u>	<u>6071.2 ✓</u>			
<u>1008</u>	<u>6071.2</u>			

<u>1025</u>	<u>6071.2</u>
<u>1031</u>	<u>6071.2</u>
<u>1037</u>	<u>6080</u>

STA 35+80

<u>STA</u>	<u>ELEV</u>	<u>LOB</u>	<u>Channel</u>	<u>ROB</u>
<u>923</u>	<u>6078.75</u>	<u>82</u>	<u>80</u>	<u>80</u>
<u>924</u>	<u>6075.00</u>			
<u>945</u>	<u>6071.75</u>	<u>LB</u>	<u>RB</u>	
<u>962</u>	<u>6068.5</u>	<u>934</u>	<u>1075</u>	
<u>984</u>	<u>6064.27</u>			
<u>1000</u>	<u>6064.27 ✓</u>			
<u>1010</u>	<u>6066.27</u>			
<u>1016</u>	<u>6068</u>			
<u>1075</u>	<u>6067</u>			
<u>1095</u>	<u>6068</u>			
<u>1100</u>	<u>6066</u>			

STA 35+00				
STA	ELEV	LOB	Channel	ROB
925	6070.15	100	100	100
945	6070.81			
960	6070.88			
970	6065.43	LF	RF	
980	6049.43	945	1045	
1000	6065.43 ✓			
1015	6065.43			
1025	6071.15			
1045	6077.40			
1055	6071.01			
1070	6070.68			
1120	6085.23			
STA 34+00				
STA	ELEV	LOB	Channel	ROB
915	6071.21	100	100	100
932	6071.24			
942	6073.01	LF	RF	
960	6072.58	942	1035	
980	6074.92			
990	6071.41			
1000	6071.41 ✓			
1015	6074.45			
1025	6070.83			
1045	6077.26			
1102	6053.44			
STA 32+40				
S'DROP STRUCTURE				
STA	ELEV	LOB	Channel	ROB
940	6070.5	15	15	15
950	6070			
960	6072.8	LF	RF	
970	6073.8	950	1040	
980	6073.8			
1000	6073.8 ✓			
1015	6073.8			
1025	6073.8			
1045	6073.8			

STATION		ELEV	LOB	Channel	KOB
<b>STATION 25</b>					
STA	ELEV	LOB	Channel	KOB	
930	6070	155	160	160	
905	6064	LB	RB		
980	6057.8	930	1040		
1000	6057.8 ✓				
1015	6057.8				
1040	6070				
1055	6072				
<b>STATION 70</b>					
STA	ELEV	LOB	Channel	KOB	
900	6068.57	320	320	320	
915	6068.56	LB	RB		
975	6067.83	975	1045		
945	6064.52				
930	6056.24				
985	6056.24				
1000	6056.24 ✓				
1010	6060.16				
1045	6072.41				
1090	6073.98				
<b>STATION 50</b>					
STA	ELEV	LOB	Channel	KOB	
911	6064.42	140	140	140	
935	6064.45				
947	6064.33	LB	RB		
985	6058.05	935	1100		
980	6058.22				
930	6052.97				
910	6052.97 ✓				
902	6051.87				
1052	6051.02				
1075	6049.82				
1000	6052.97				

STA 20+10 ✓		LOB	Channel	ROB
STA	ELEV			
930	6062	240	240	240
950	6060			
960	6051.55 ✓	<u>RLB</u>		<u>RB</u>
1025	6051.55	930		1040
1040	6060			
1055	6064			

STA 23+70 ✓		LOB	Channel	ROB
STA	ELEV			
930	6058	10	10	10
955	6056			
990	6049.1 ✓	<u>LB</u>	<u>RB</u>	
1030	6049.1	955	1050	
1050	6060			
1078	6070			

4' DROP STRUCTURE

STA 23+60		LOB	Channel	ROB
STA	ELEV			
930	6058	12	12	12
955	6056			
975	6049 ✓	<u>LB</u>	<u>RB</u>	
1025	6049	955	1050	
1050	6060			
1078	6070			

4' DROP STRUCTURE

STA 23+48		LOB	Channel	ROB
STA	ELEV			
930	6058	98	98	98
955	6056			
988	6045 ✓	<u>LB</u>	<u>RB</u>	
1013	6045	955	1050	
1050	6060			
1078	6070			



STA 22+50		LOB	Channel ROB	
STA	ELEV	250	250	250
920	6056.95			
935	6057.57	LB		RB
945	6057.74	945		1095
965	6049.95			
980	6048.96			
990	6048.72			
1000	6050.24			
1008	6044.17 ✓			
1020	6044.17			
1025	6048.98			
1030	6049.41			
1095	6074.70			
1120	6076.04			
STA 20+00		LOB	Channel	ROB
STA	ELEV	240	250	260
930	6053.72			
950	6053.95			
965	6054.08	LB		RB
975	6047.93	965		1095
990	6048.08 ✓			
1000	6047.08			
1007	6047.98			
1040	6047.72			
1095	6069.36			
1115	6069.77			
STA 17+50		LOB	Channel	ROB
STA	ELEV	240	250	260
940	6050.45			
955	6049.86			
970	6043.75			
1000	6039.95 ✓	LB		RB
1010	6039.95	955		1040
1020	6044.46			
1045	6041.87			
1095	6063.59			
1120	6063.59			

STA 15+00				
STA	ELEV	LOB	Channel	ROB
970	6047.31	90	100	110
980	6046.56			
994	6042.70			
1000	6037.82 ←	LB 970	RB 1060	
1015	6037.82 ←			
1035	6041.47			
1040	6041.08			
1073	6045.69			
1105	6056.89			
1130	6056.66			
STA 14+00				
STA	ELEV	LOB	Channel	ROB
910	6045.68	190	200	210
920	6045.41			
935	6041.13			
955	6041.17	LB 935	RB 1020	
975	6036.97 ←			
1000	6036.97 ←			
1008	6040.40			
1053	6054.42			
1085	6055.29			
STA 12+00				
STA	ELEV	LOB	Channel	ROB
940	6043.20	150	150	150
960	6042.86			
980	6035.27			
985	6035.27	LB 960	RB 1036	
995	6035.27			
1000	6035.27 ✓			
1008	6035.27			
1036	6038.21			
1040	6041.88			
1075	6043.54			
1105	6052.05			
1135	6053.43			

### 4' DROP STRUCTURE

STA 10+50

STA	ELEV	LOB	Channel	ROB
930	6041.02			
950	6040.13	12	12	12
965	6034			
980	6034	LB	RB	
1000	6034 ✓	950	1078	
1010	6034			
1035	6034			
1055	6039			
1078	6041.17			
1105	6049.39			
1130	6050.79			

### 4' DROP STRUCTURE

STA 10+38

STA	ELEV	LOB	Channel	ROB
930	6041.02	38	38	38
950	6040.13			
965	6035	LB	RB	
980	6030	950	1105	
1000	6030 ✓			
1010	6030			
1025	6030			
1055	6039			
1078	6041.17			
1105	6049.39			
1130	6050.79			

STA 10+00

STA	ELEV	LOB	Channel	ROB
930	6040.27			
950	6039.19	300	300	300
965	6034.03			
980	6029.82	LB	RB	
1000	6029.82 ✓	950	1055	
1010	6029.82			
1020	6029.82			
1055	6038.52			
1078	6040.36			
1105	6048.48			
1130	6049.79			

STA 7+00				
STA	ELEV.	LOB	Channel	RDB
945	6036.59	200	200	200
<del>960</del>	<del>6035.88</del>			
<del>975</del>	<del>6031.76</del>	<u>LB</u>	<u>RB</u>	
1000	6028.43	975	1120	
1013	6028.43			
1043	6031.44			
1062	6033.93			
1085	6034.92			
1120	6045.27			
1140	6045.57			
STA 5+00				
STA	ELEV.	LOB	Channel	RDB
925	6033.67	100	100	100
940	6032.86			
953	6029.31	<u>LB</u>	<u>RB</u>	
1005	6027.09	940	1045	
1033	6027.42			
1045	6031			
1062	6040.39			
1078	6040.91			
STA 4+00				
STA	ELEV.	LOB	Channel	RDB
930	6027.22	170	165	160
932	6026.10			
<del>995</del>	<del>6025.86</del>			
1000	6025.87	<u>LB</u>	<u>RB</u>	
1030	6029.43	930	1060	
1060	6029			
STA 2+35				
STA	ELEV.	LOB	Channel	RDB
920	6029.86			
938	6030.17			
950	6026.36			
978	6025.87	<u>LB</u>	<u>RB</u>	
1000	6026.82	978	1045	
1025	6025.46			
1045	6031.17			
1073	6030.82			

PRGEO4  
 Plan 12  
 Proposed Geo  
 2-4-99

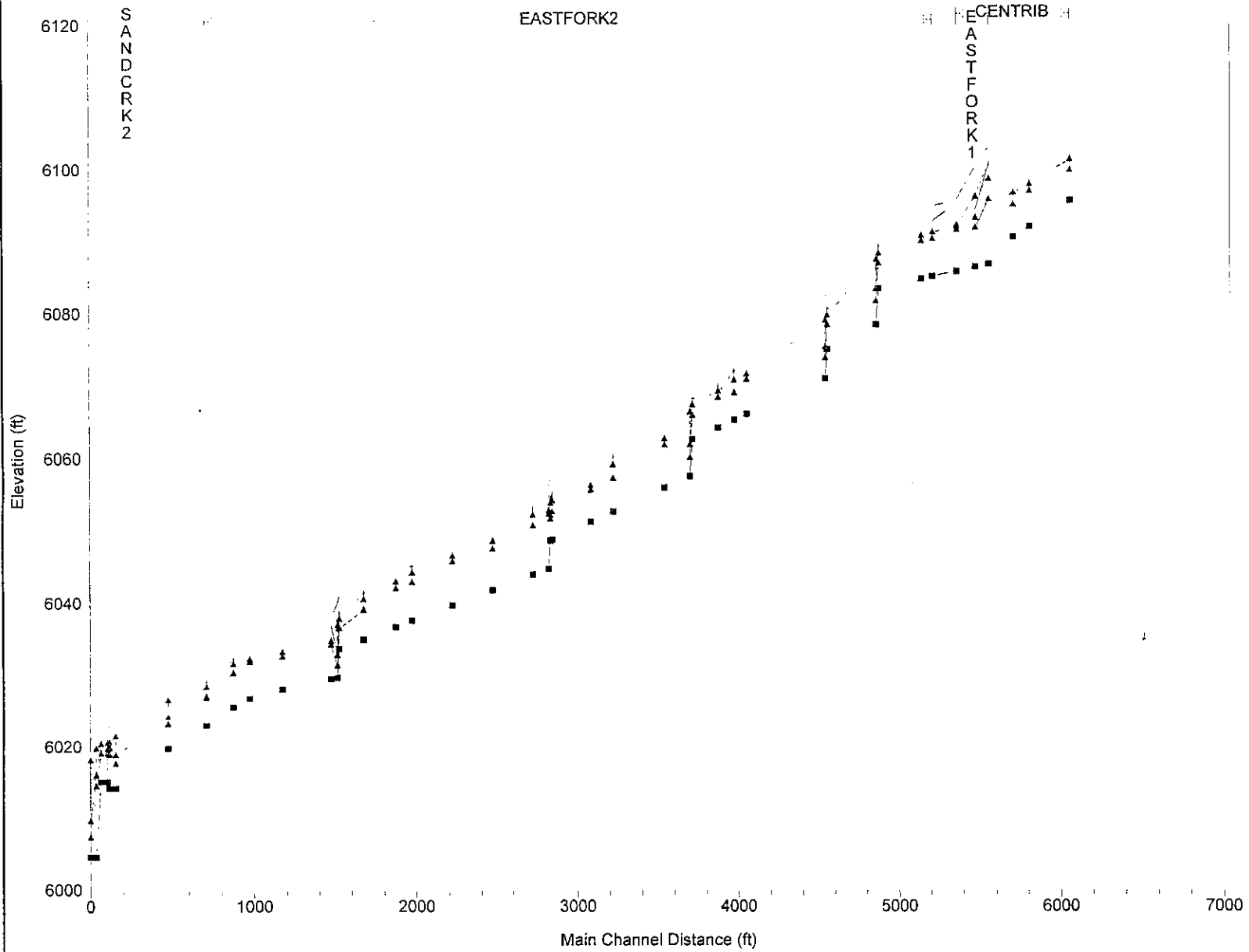
HEC-RAS Plan: PLAN2

River	Reach	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 (ft)	Froude # Chl
SANDCRK2	SANDCRK2	4.7	11830.00	6020.03	6024.53	6026.17	6029.86	0.013921	18.58	641.05	213.27	1.86
SANDCRK2	SANDCRK2	4.7	5850.00	6020.03	6023.35	6024.36	6026.80	0.017052	14.92	392.73	207.55	1.90
SANDCRK2	SANDCRK2	1.50	11830.00	6014.54	6018.92	6020.83	6025.03	0.016115	21.46	629.01	242.80	2.03
SANDCRK2	SANDCRK2	1.50	5850.00	6014.54	6017.85	6019.07	6021.65	0.015146	16.58	391.26	202.47	1.86
SANDCRK2	SANDCRK2	0.70	Bridge									
SANDCRK2	SANDCRK2	.60	11830.00	6015.46	6020.10	6020.94	6023.00	0.007781	13.67	865.71	286.40	1.39
SANDCRK2	SANDCRK2	.60	5850.00	6015.46	6019.28	6019.29	6020.56	0.004384	9.09	643.46	255.14	1.01
SANDCRK2	SANDCRK2	.35	11830.00	6004.84	6016.94	6018.54	6022.48	0.008907	19.25	632.71	140.00	1.56
SANDCRK2	SANDCRK2	.35	5850.00	6004.84	6014.75	6018.27	6019.93	0.018339	18.49	325.78	140.00	2.04
SANDCRK2	SANDCRK2	0	11830.00	6004.84	6009.19	6012.38	6021.32	0.029017	27.95	423.27	125.00	2.68
SANDCRK2	SANDCRK2	0	5850.00	6004.84	6007.58	6009.90	6018.31	0.058507	26.29	222.52	125.00	3.47
EASTFORK2	EASTFORK2	47.35	4760.00	6085.26	6092.86		6094.96	0.010022	11.62	409.74	65.56	0.82
EASTFORK2	EASTFORK2	47.35	1970.00	6085.26	6090.37		6091.31	0.007185	7.76	253.78	59.95	0.66
EASTFORK2	EASTFORK2	46.85	4760.00	6084.91	6092.85		6094.18	0.008217	9.27	513.64	88.61	0.68
EASTFORK2	EASTFORK2	46.85	1970.00	6084.91	6090.10		6090.81	0.005406	6.76	291.39	73.15	0.60
EASTFORK2	EASTFORK2	44	4760.00	6083.60	6089.36	6089.36	6091.66	0.014796	12.16	391.33	86.06	1.01
EASTFORK2	EASTFORK2	44	1970.00	6083.60	6087.02	6087.02	6088.43	0.016434	9.53	206.78	71.62	0.99
EASTFORK2	EASTFORK2	43.85	4760.00	6078.60	6084.27	6086.35	6090.84	0.051308	20.57	231.44	56.77	1.83
EASTFORK2	EASTFORK2	43.85	1970.00	6078.60	6081.78	6083.48	6087.51	0.090745	19.21	102.55	44.79	2.24
EASTFORK2	EASTFORK2	40.80	4760.00	6075.20	6080.76	6080.76	6082.94	0.014523	11.86	401.34	91.39	1.00
EASTFORK2	EASTFORK2	40.80	1970.00	6075.20	6078.50	6078.50	6079.87	0.017049	9.40	209.59	76.75	1.00
EASTFORK2	EASTFORK2	40.88	4760.00	6071.20	6077.35	6078.84	6082.41	0.031842	18.05	263.73	59.09	1.43
EASTFORK2	EASTFORK2	40.88	1970.00	6071.20	6073.98	6075.53	6079.12	0.073848	18.19	108.28	41.80	1.99
EASTFORK2	EASTFORK2	35.80	4760.00	6066.27	6074.27		6075.99	0.005103	8.48	561.11	94.93	0.61
EASTFORK2	EASTFORK2	35.80	1970.00	6066.27	6071.01		6071.75	0.006065	6.93	284.37	74.82	0.63
EASTFORK2	EASTFORK2	35	4760.00	6065.43	6072.25	6072.25	6074.65	0.012355	12.59	394.97	86.73	0.93
EASTFORK2	EASTFORK2	35	1970.00	6065.43	6069.18	6069.18	6070.90	0.016722	10.54	186.92	54.82	1.01
EASTFORK2	EASTFORK2	34	4760.00	6064.41	6069.15	6070.12	6072.75	0.028339	15.24	313.66	83.99	1.37
EASTFORK2	EASTFORK2	34	1970.00	6064.41	6068.53		6068.41	0.008430	7.51	262.72	80.82	0.73
EASTFORK2	EASTFORK2	32.40	4760.00	6062.80	6068.41	6068.41	6070.78	0.014622	12.35	385.43	82.28	1.01
EASTFORK2	EASTFORK2	32.40	1970.00	6062.80	6066.04	6066.04	6067.49	0.016999	9.68	203.52	70.74	1.01
EASTFORK2	EASTFORK2	32.25	4760.00	6057.80	6062.60	6064.95	6068.89	0.058257	21.65	219.77	56.47	1.93
EASTFORK2	EASTFORK2	32.25	1970.00	6057.80	6060.23	6062.00	6065.49	0.109374	20.09	98.05	45.84	2.42
EASTFORK2	EASTFORK2	30.70	4760.00	6056.24	6064.71		6066.25	0.007739	9.96	477.83	87.31	0.75
EASTFORK2	EASTFORK2	30.70	1970.00	6056.24	6061.94		6062.83	0.007589	7.61	258.98	70.28	0.70
EASTFORK2	EASTFORK2	27.50	4760.00	6052.97	6060.38	6060.38	6062.83	0.014816	12.54	379.54	78.92	1.01
EASTFORK2	EASTFORK2	27.50	1970.00	6052.97	6057.47	6057.47	6059.31	0.018192	10.91	180.64	49.54	1.01
EASTFORK2	EASTFORK2	26.10	4760.00	6051.55	6058.81		6059.85	0.005435	8.94	532.55	85.88	0.63
EASTFORK2	EASTFORK2	26.10	1970.00	6051.55	6056.84		6056.48	0.005047	6.44	306.12	77.69	0.57
EASTFORK2	EASTFORK2	23.70	4760.00	6049.10	6055.38	6055.38	6057.72	0.014839	12.30	387.15	83.36	1.01
EASTFORK2	EASTFORK2	23.70	1970.00	6049.10	6052.86	6052.86	6054.38	0.016688	9.89	199.15	65.96	1.00
EASTFORK2	EASTFORK2	23.60	4760.00	6049.00	6054.19	6054.89	6057.45	0.022618	14.49	328.40	76.61	1.23
EASTFORK2	EASTFORK2	23.60	1970.00	6049.00	6051.88	6052.41	6054.08	0.030095	11.91	165.46	64.79	1.31
EASTFORK2	EASTFORK2	23.48	4760.00	6045.00	6055.38		6056.53	0.004426	8.59	553.95	81.74	0.58
EASTFORK2	EASTFORK2	23.48	1970.00	6045.00	6052.57		6053.08	0.002739	5.69	348.16	66.41	0.44
EASTFORK2	EASTFORK2	22.50	4760.00	6044.20	6053.38	6053.32	6055.88	0.015211	12.21	389.77	84.12	1.00
EASTFORK2	EASTFORK2	22.50	1970.00	6044.20	6050.96	6050.98	6052.43	0.018156	9.65	204.21	71.76	1.01
EASTFORK2	EASTFORK2	20	4760.00	6042.08	6050.18		6052.36	0.011389	11.86	401.41	74.91	0.90
EASTFORK2	EASTFORK2	20	1970.00	6042.08	6047.71		6048.86	0.010147	8.59	229.35	64.41	0.80
EASTFORK2	EASTFORK2	17.50	4760.00	6039.95	6048.56		6050.01	0.006510	9.72	499.10	90.99	0.71
EASTFORK2	EASTFORK2	17.50	1970.00	6039.95	6045.97		6046.75	0.006485	7.07	279.83	78.19	0.65
EASTFORK2	EASTFORK2	15	4760.00	6037.82	6045.38	6045.38	6047.64	0.013459	12.24	400.14	87.82	0.97
EASTFORK2	EASTFORK2	15	1970.00	6037.82	6043.11		6044.41	0.013867	9.19	217.59	73.20	0.91
EASTFORK2	EASTFORK2	14	4760.00	6036.97	6044.67		6046.24	0.008440	10.15	480.18	99.96	0.78
EASTFORK2	EASTFORK2	14	1970.00	6036.97	6042.23		6043.16	0.009452	7.73	256.50	83.64	0.76
EASTFORK2	EASTFORK2	12	4760.00	6035.27	6041.70	6041.70	6044.08	0.013123	12.49	389.92	82.45	0.97
EASTFORK2	EASTFORK2	12	1970.00	6035.27	6039.25	6039.25	6040.71	0.015695	9.70	204.17	69.33	0.98

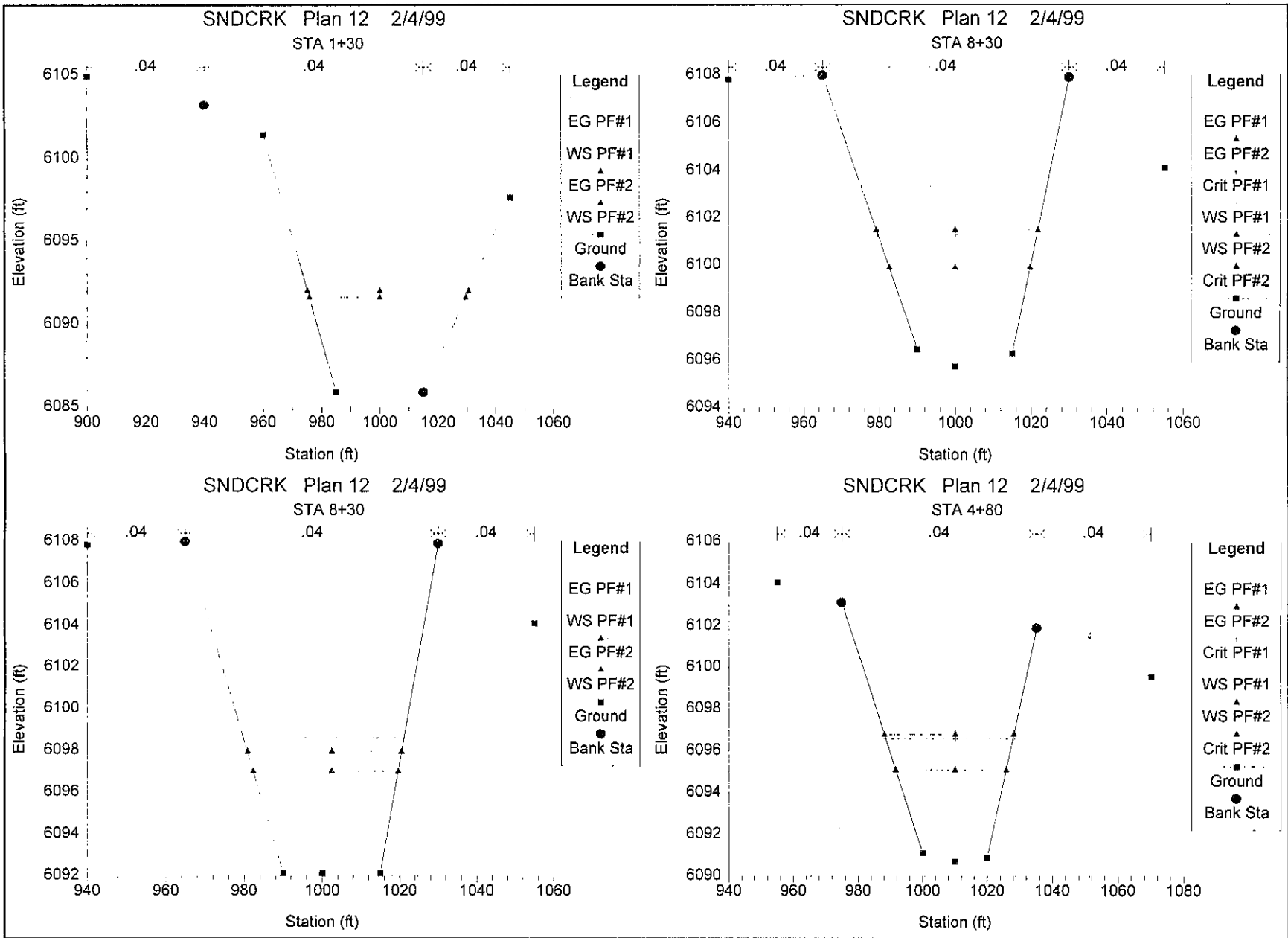
HEC-RAS Plan: PLAN2 (Continued)

River	Reach	River Sta.	Q Total (cfs)	Min. Ch. El. (ft)	W.S. Elev. (ft)	Cr. W.S. (ft)	E.G. Elev. (ft)	E.G. Slope (ft/ft)	Vel. Chnl. (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl.
EASTFORK2	EASTFORK2	10.50	4760.00	6034.00	6038.01	6038.82	6041.20	0.028893	14.33	332.09	95.82	1.36
EASTFORK2	EASTFORK2	10.50	1970.00	6034.00	6036.67	6036.78	6038.04	0.019983	9.38	210.13	87.23	1.06
EASTFORK2	EASTFORK2	10.38	4760.00	6030.00	6033.32	6035.38	6040.27	0.077599	21.16	224.98	75.50	2.16
EASTFORK2	EASTFORK2	10.38	1970.00	6030.00	6031.64	6033.08	6037.12	0.144698	18.79	104.85	67.67	2.66
EASTFORK2	EASTFORK2	10	4760.00	6029.82	6037.11		6038.16	0.004766	8.24	577.53	97.29	0.60
EASTFORK2	EASTFORK2	10	1970.00	6029.82	6034.48		6035.02	0.003969	5.81	339.17	84.89	0.51
EASTFORK2	EASTFORK2	7	4760.00	6028.43	6035.29		6036.40	0.007341	8.48	561.59	126.33	0.71
EASTFORK2	EASTFORK2	7	1970.00	6028.43	6032.81		6033.49	0.006594	6.61	298.24	89.98	0.84
EASTFORK2	EASTFORK2	5	4760.00	6027.09	6034.51		6035.33	0.003538	7.32	667.94	125.32	0.52
EASTFORK2	EASTFORK2	5	1970.00	6027.09	6032.15		6032.54	0.003066	5.01	394.21	104.34	0.45
EASTFORK2	EASTFORK2	4	4760.00	6025.86	6032.61	6032.61	6034.57	0.015400	11.22	424.10	109.76	1.01
EASTFORK2	EASTFORK2	4	1970.00	6025.86	6030.80	6030.60	6031.84	0.017770	8.92	220.77	90.20	1.01
EASTFORK2	EASTFORK2	2.35	4760.00	6023.24	6028.94	6029.44	6031.60	0.020792	13.48	384.95	95.33	1.18
EASTFORK2	EASTFORK2	2.35	1970.00	6023.24	6027.11	6027.32	6028.81	0.021198	10.13	201.83	83.17	1.11
CENTRIB	CENTRIB	8.3	1980.00	6095.76	6101.30	6101.30	6103.35	0.015915	11.51	172.06	41.92	1.00
CENTRIB	CENTRIB	8.3	1180.00	6095.76	6099.91	6099.91	6101.48	0.017084	10.08	117.03	37.09	1.00
CENTRIB	CENTRIB	5.8	1980.00	6092.15	6098.61		6099.94	0.007943	9.24	214.35	41.35	0.71
CENTRIB	CENTRIB	5.8	1180.00	6092.15	6097.02		6097.96	0.007597	7.77	151.83	37.33	0.68
CENTRIB	CENTRIB	4.8	1980.00	6090.71	6096.59	6096.59	6098.76	0.016089	11.81	167.63	39.12	1.01
CENTRIB	CENTRIB	4.8	1180.00	6090.71	6095.10	6095.10	6096.79	0.017216	10.41	113.33	34.00	1.01
CENTRIB	CENTRIB	1.3	1980.00	6085.91	6095.42		6095.70	0.001012	4.51	472.86	69.50	0.28
CENTRIB	CENTRIB	1.3	1180.00	6085.91	6091.83		6092.03	0.002404	5.22	239.83	53.79	0.41
EASTFORK1	EASTFORK1	50.83	4760.00	6087.00	6100.86	6100.86	6103.31	0.016750	12.56	379.06	79.16	1.01
EASTFORK1	EASTFORK1	50.83	1990.00	6087.00	6095.88	6095.88	6098.73	0.018369	13.56	146.77	26.06	1.01
EASTFORK1	EASTFORK1	50.00	4760.00	6086.59	6094.47	6096.38	6100.52	0.060314	19.74	241.18	72.24	1.90
EASTFORK1	EASTFORK1	50.00	1990.00	6086.59	6091.92	6093.31	6096.26	0.047918	16.71	119.08	38.11	1.67
EASTFORK1	EASTFORK1	48.85	4760.00	6086.02	6095.23		6095.89	0.003259	6.51	731.03	133.32	0.49
EASTFORK1	EASTFORK1	48.85	1990.00	6086.02	6091.62		6092.29	0.005732	6.60	301.62	82.58	0.61

SNDCRK Plan 12 2/4/99  
EASTFORK2



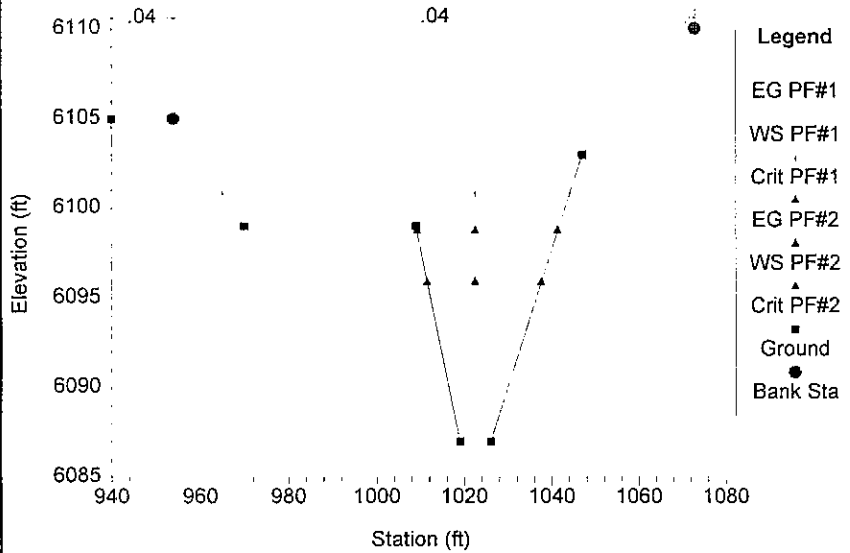
- Legend**
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  - EG PF#2
  - Crit PF#1
  - Crit PF#2
  - WS PF#1
  - WS PF#2
  - Ground





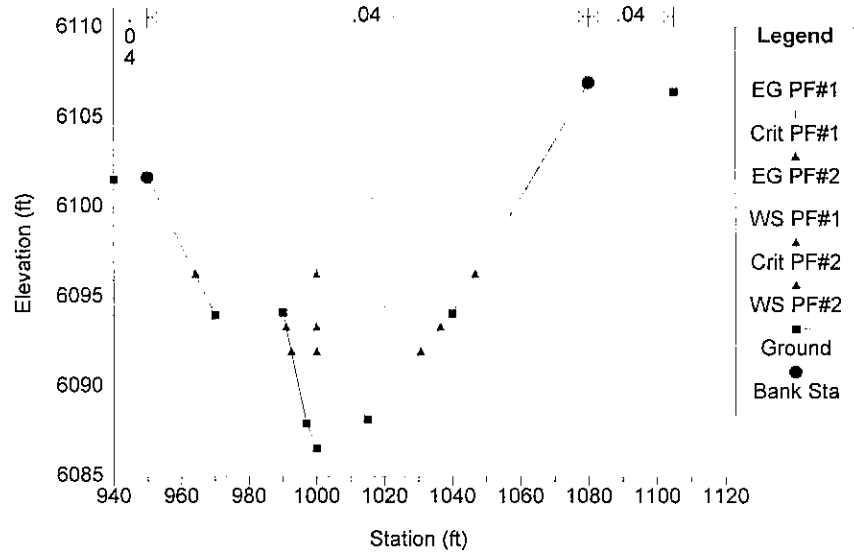
SNDCRK Plan 12 2/4/99

STA. 5+83



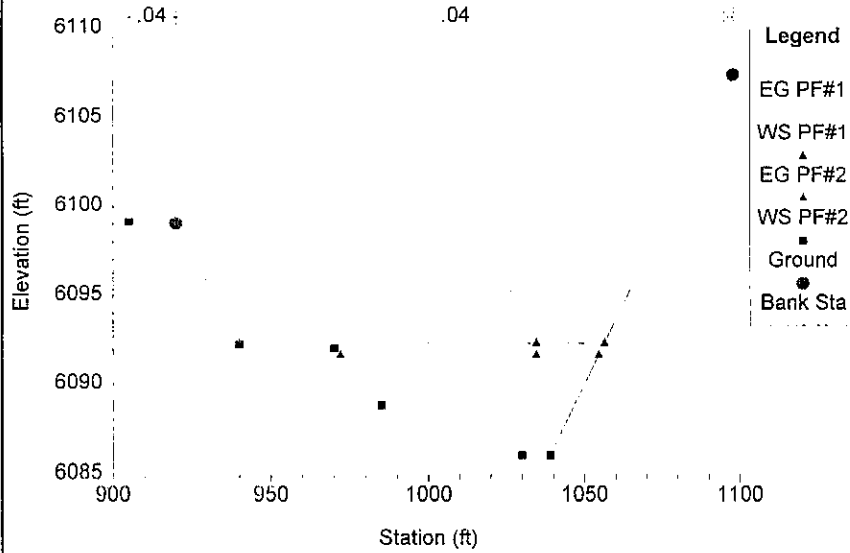
SNDCRK Plan 12 2/4/99

STA 50+00



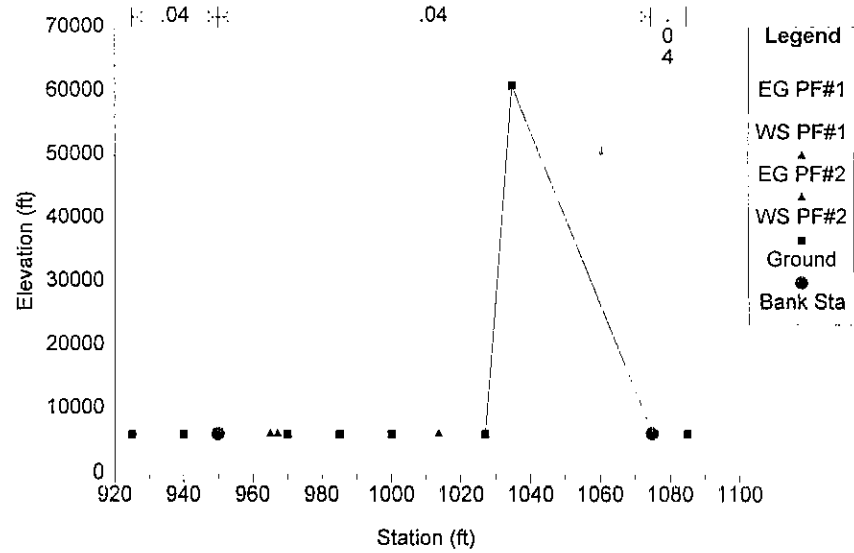
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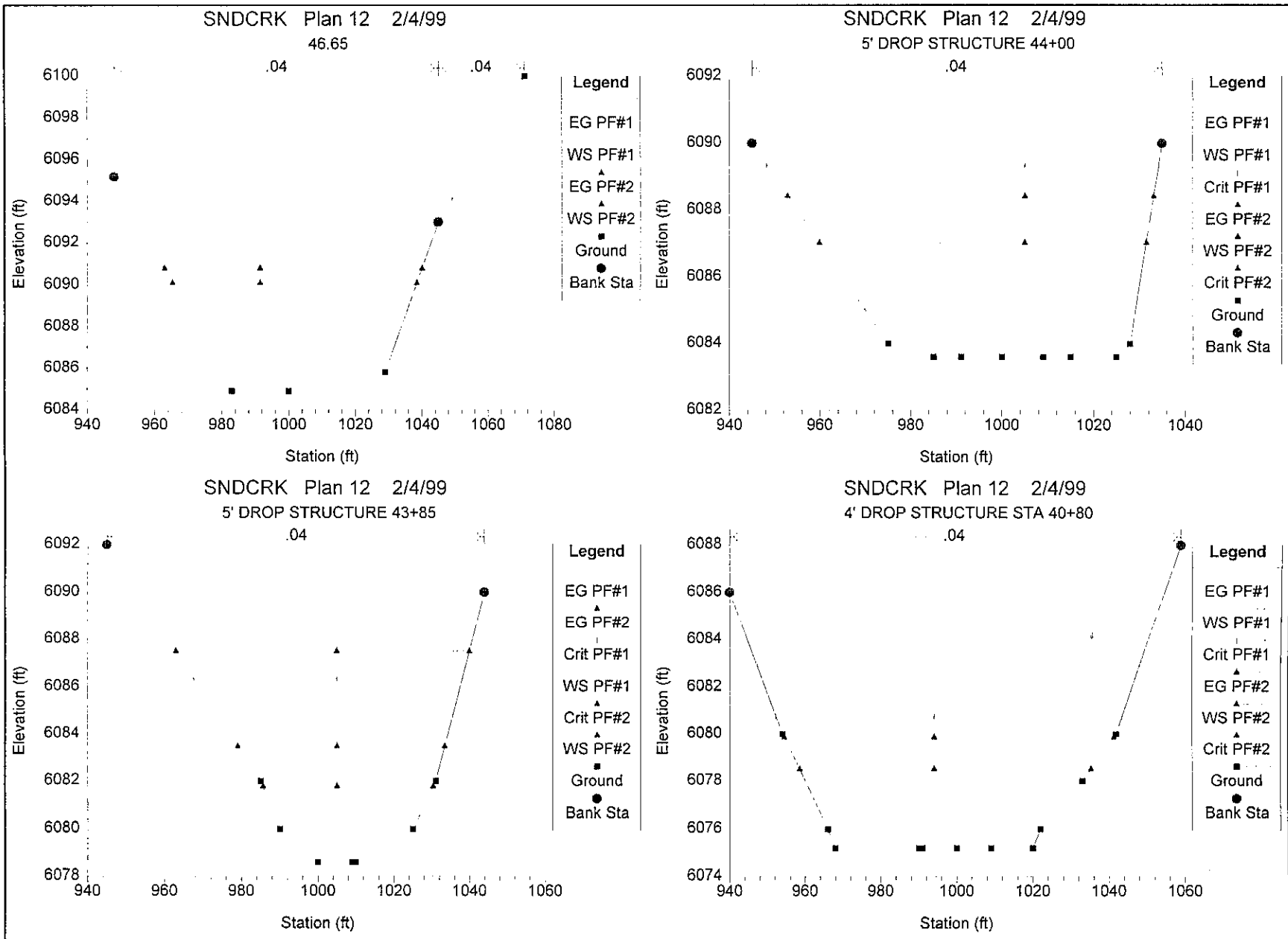
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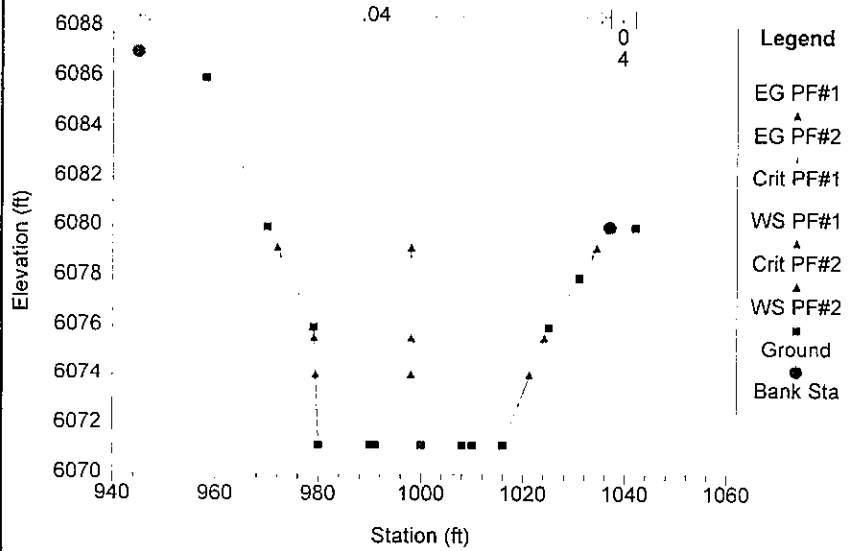
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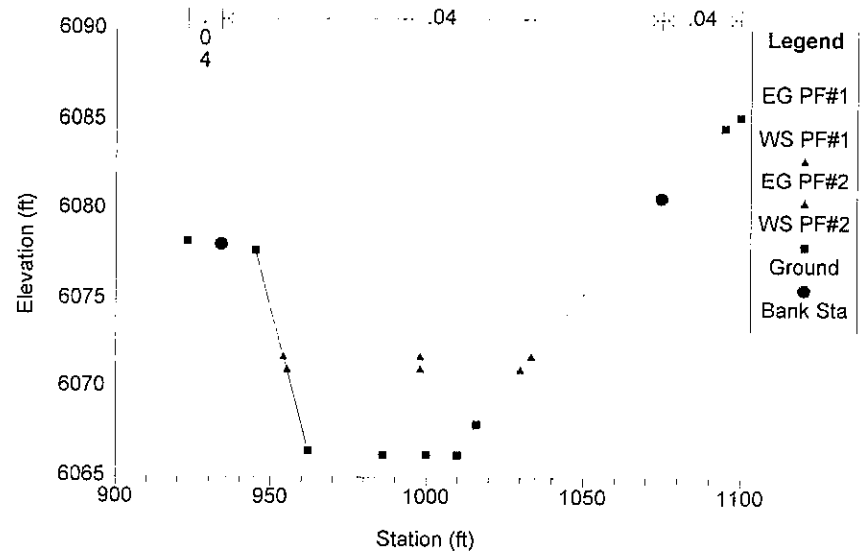




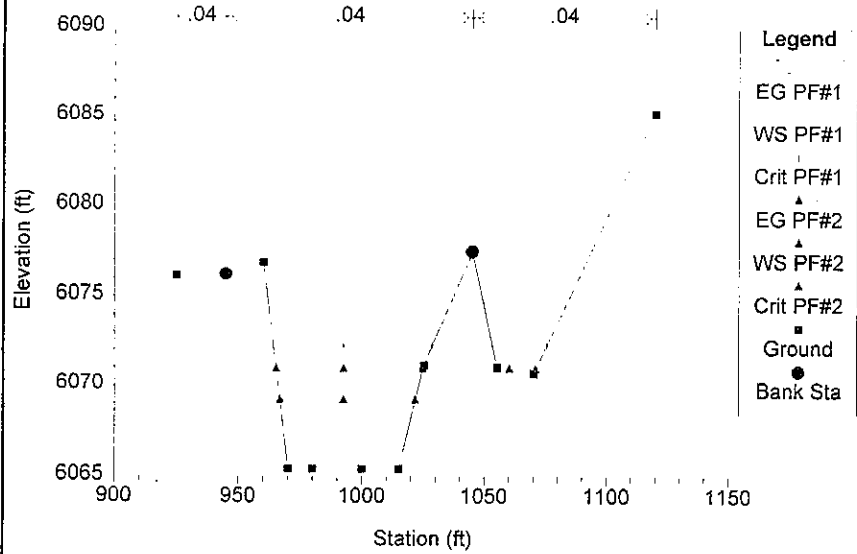
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4' DROP STRUCTURE STA 40+68



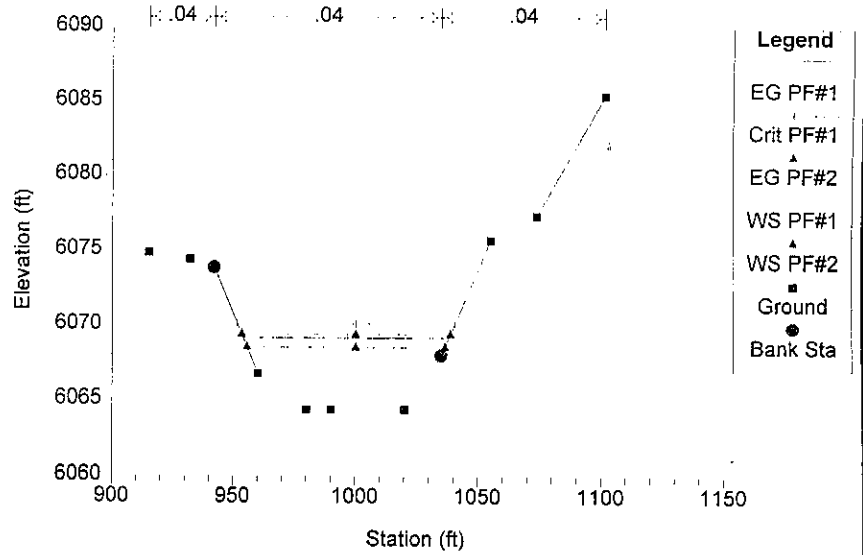
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STA 35+80



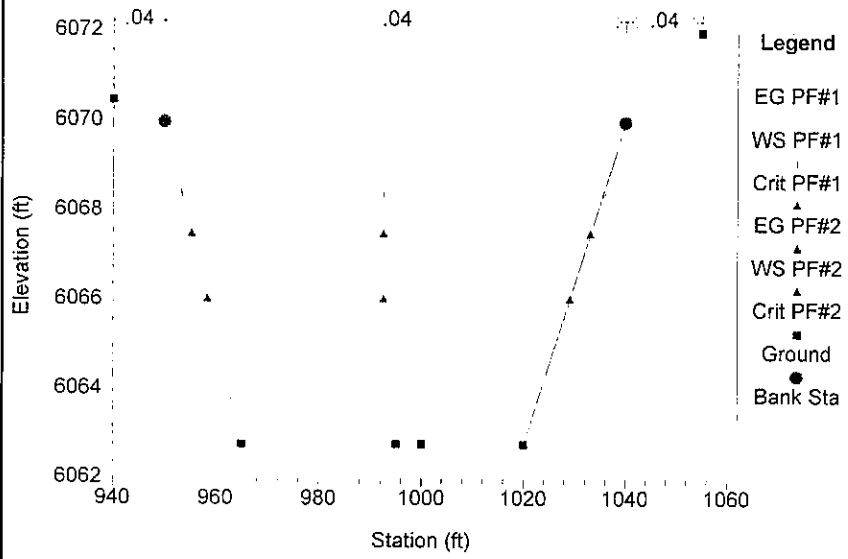
SNDCRK Plan 12 2/4/99  
STA 35+00



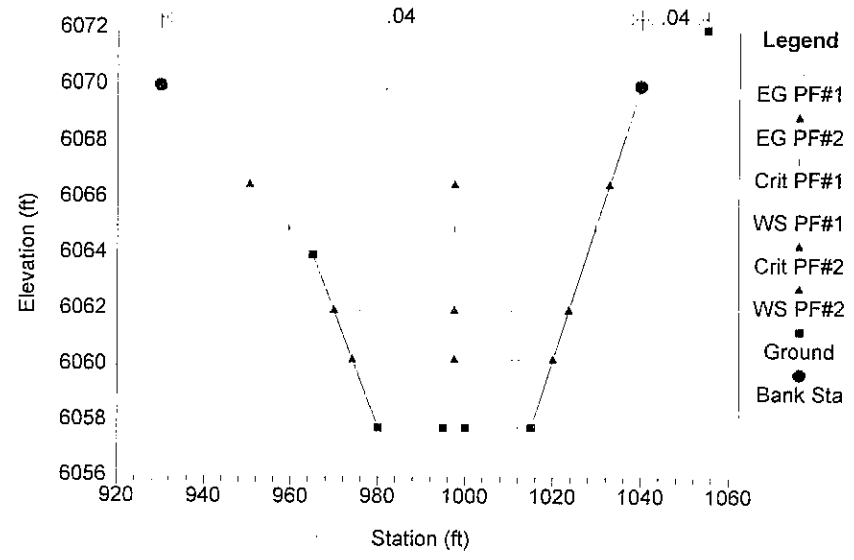
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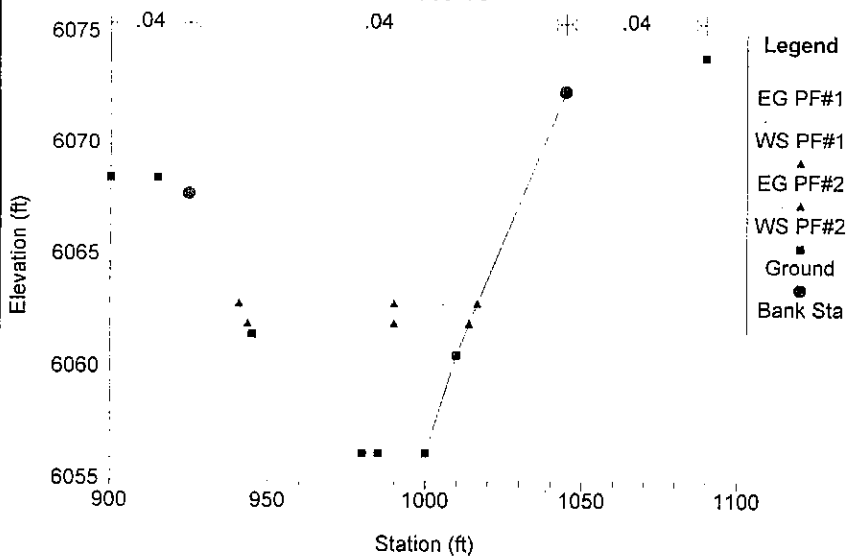
SNDCRK Plan 12 2/4/99  
5' DROP STRUCTURE STA. 32+40



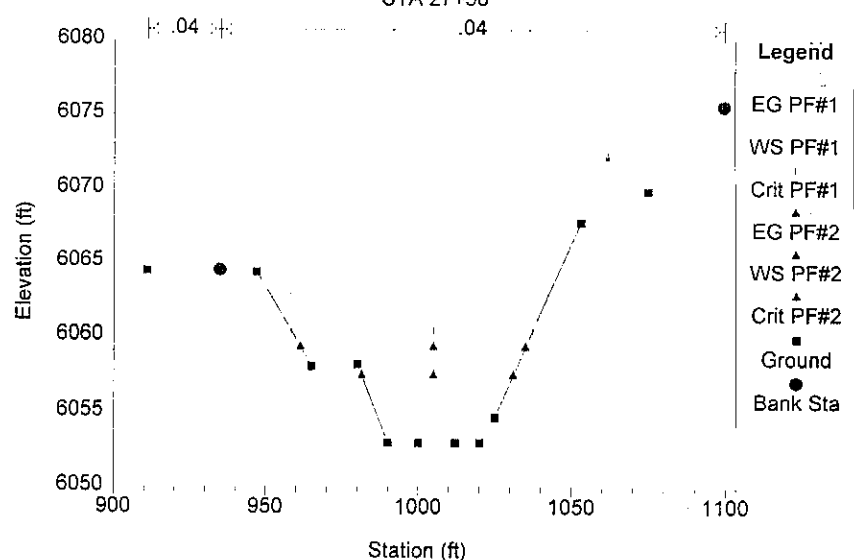
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5' DROP STRUCTURE STA. 32+25

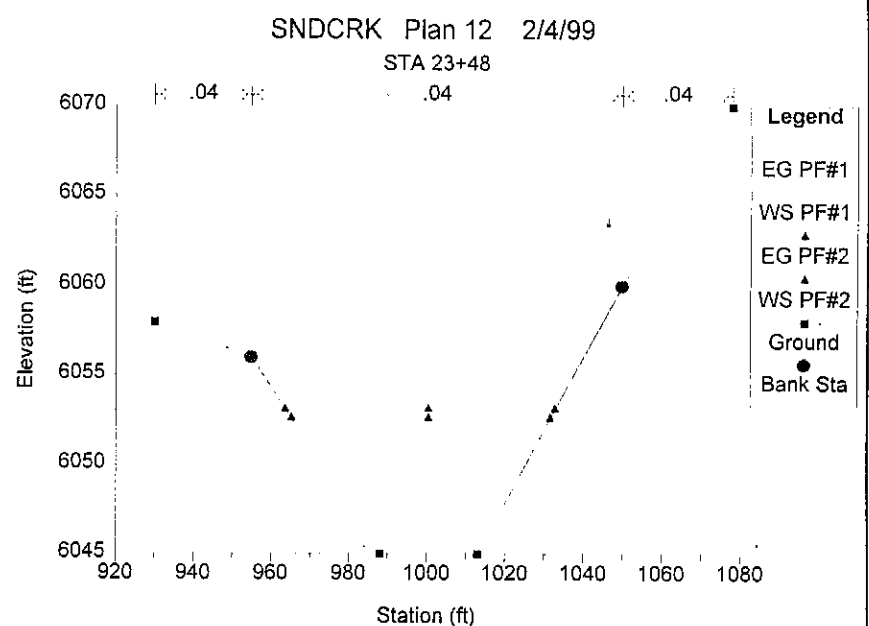
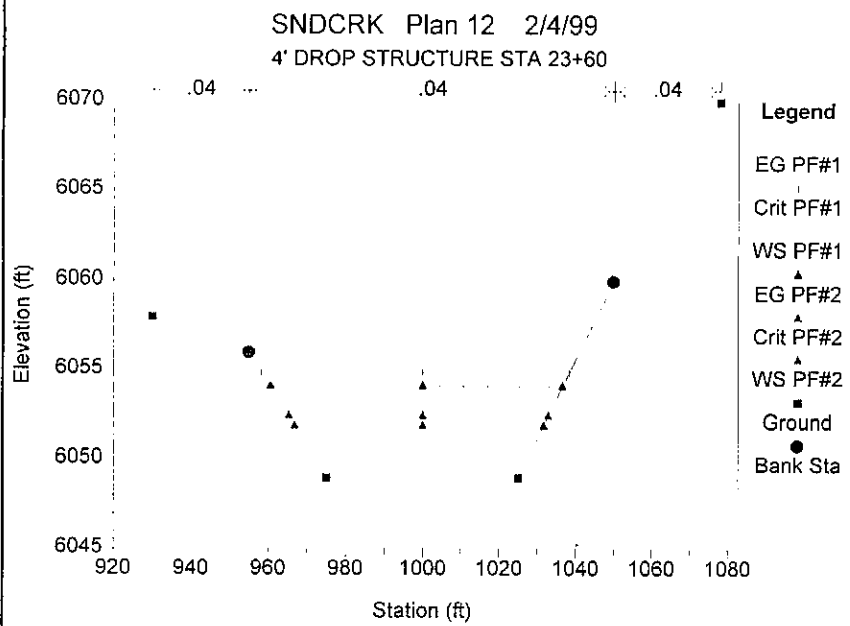
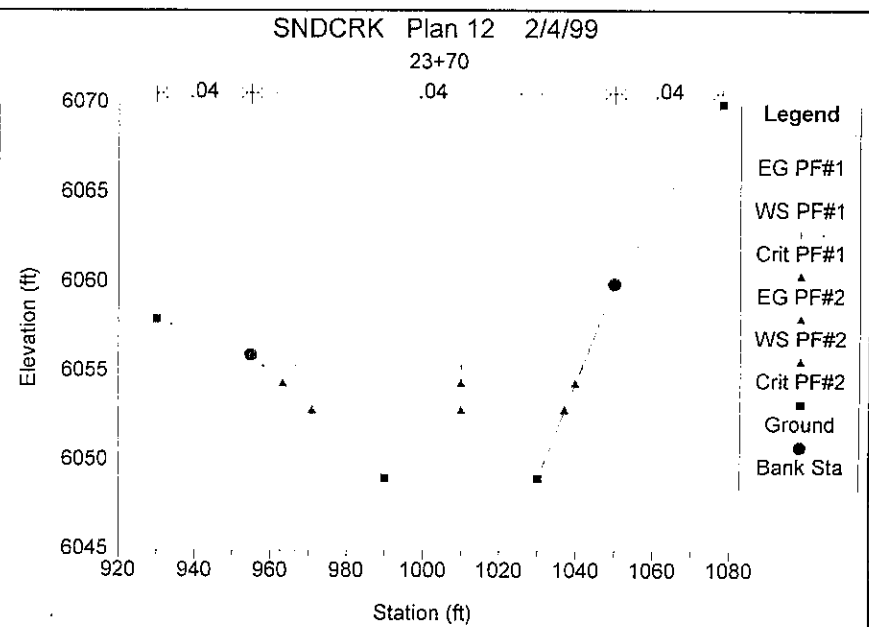
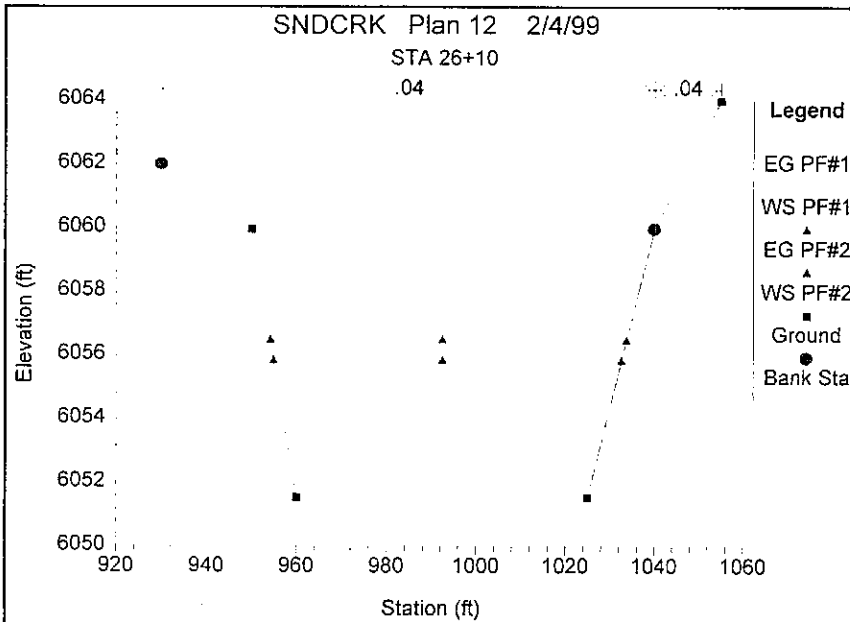


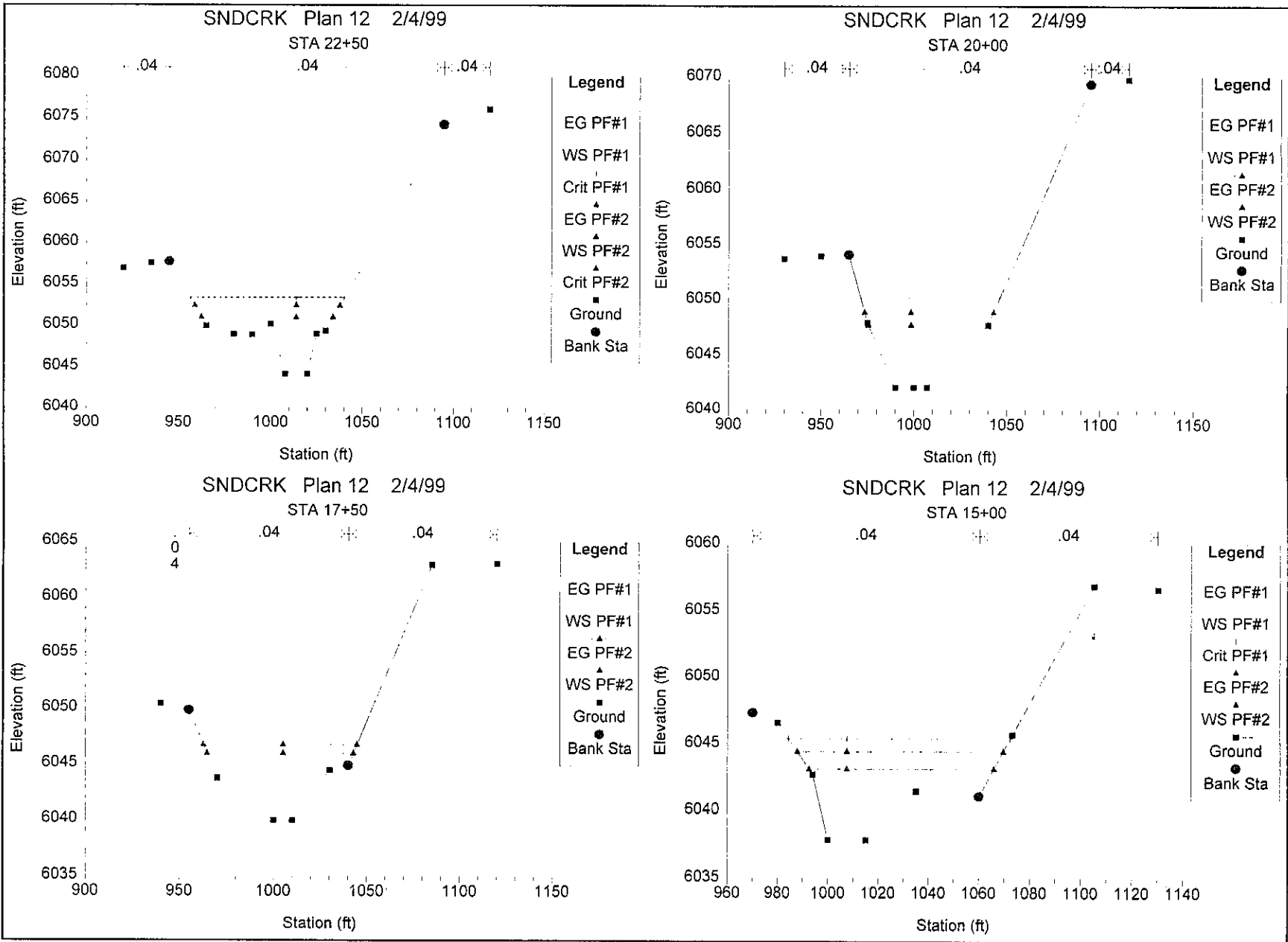
SNDCRK Plan 12 2/4/99  
STA 30+70

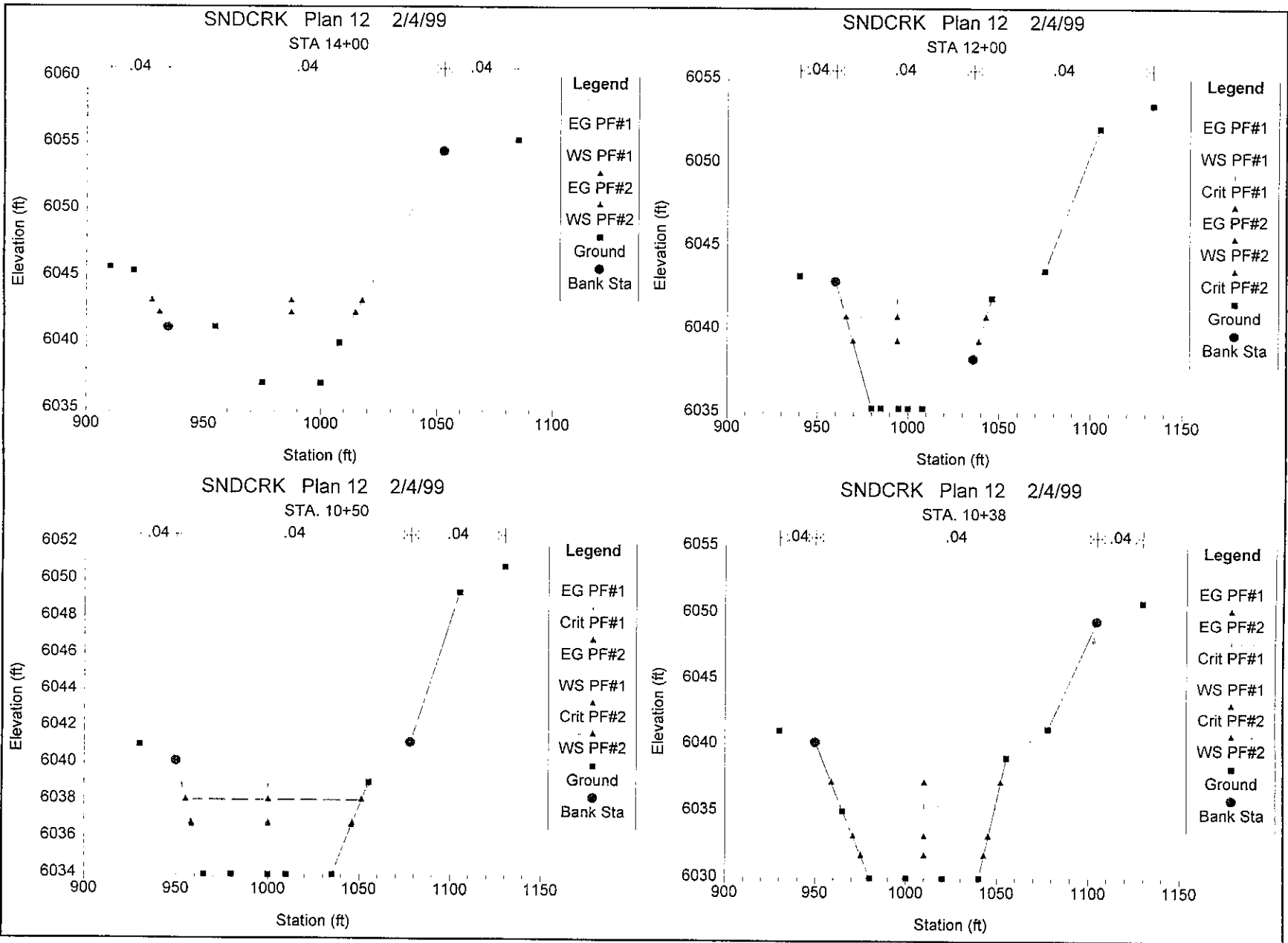


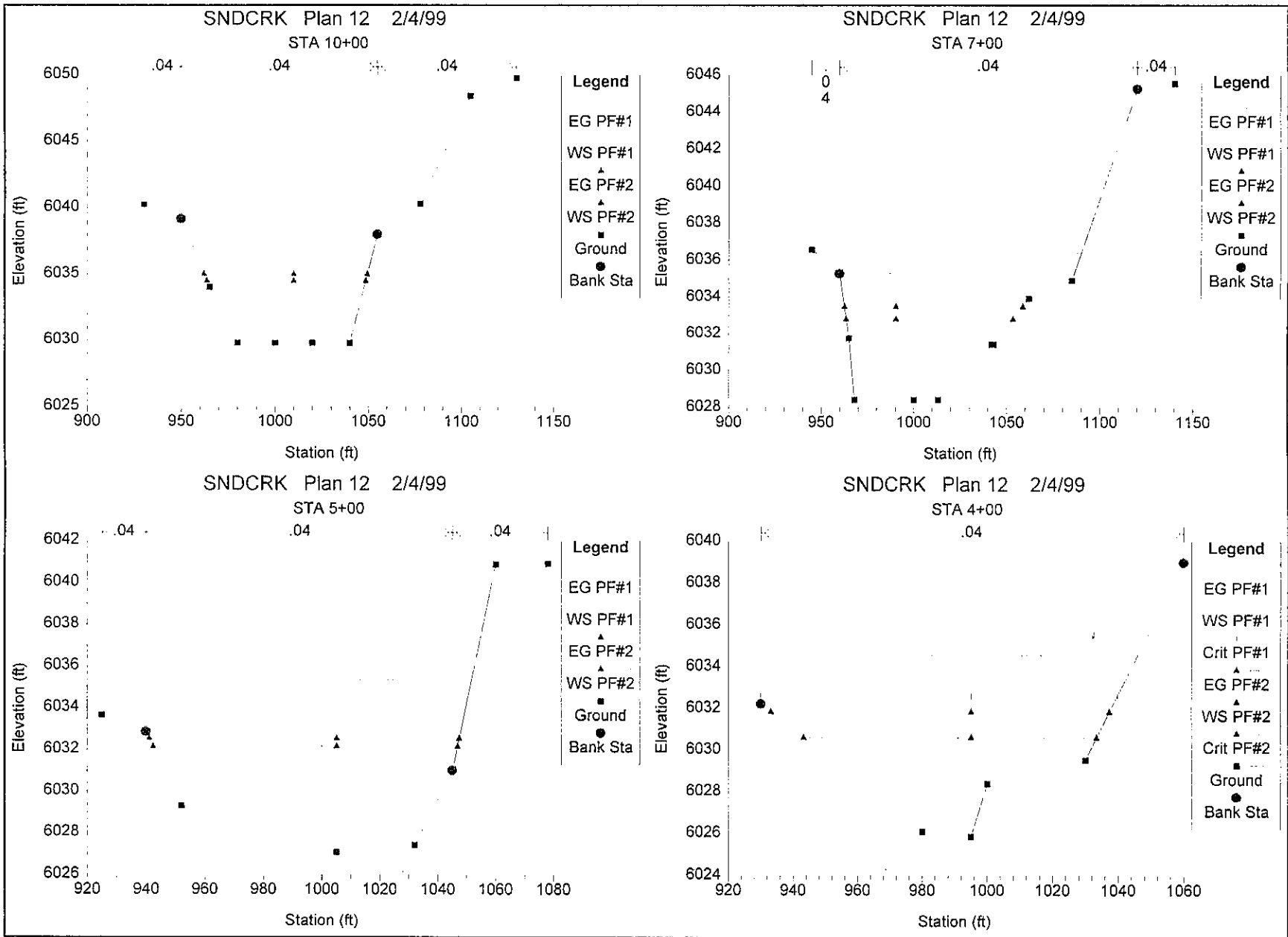
SNDCRK Plan 12 2/4/99  
STA 27+50



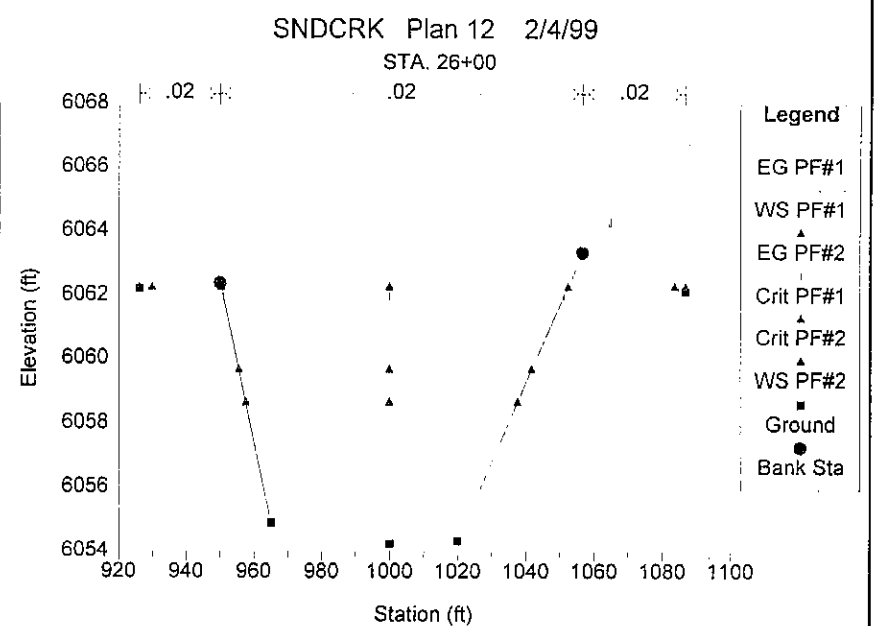
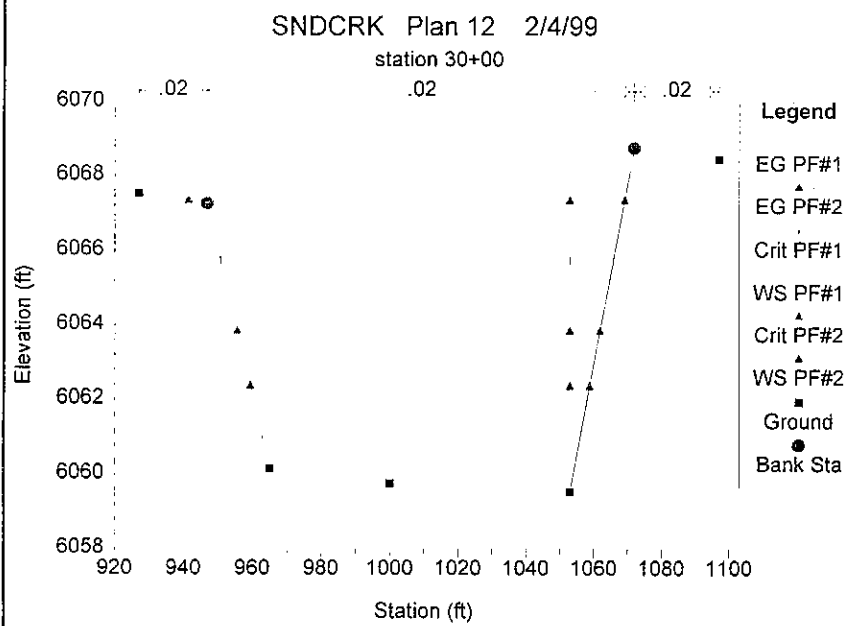
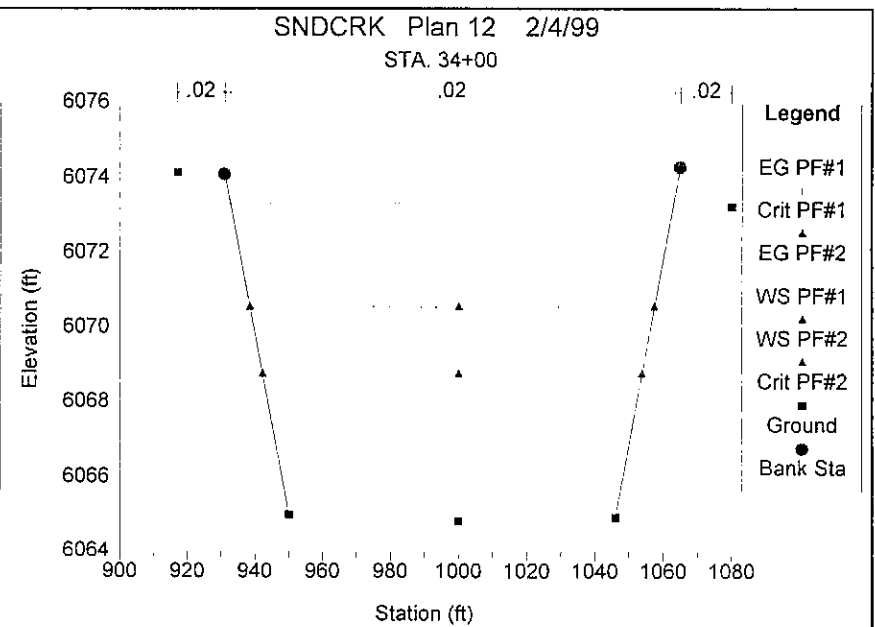
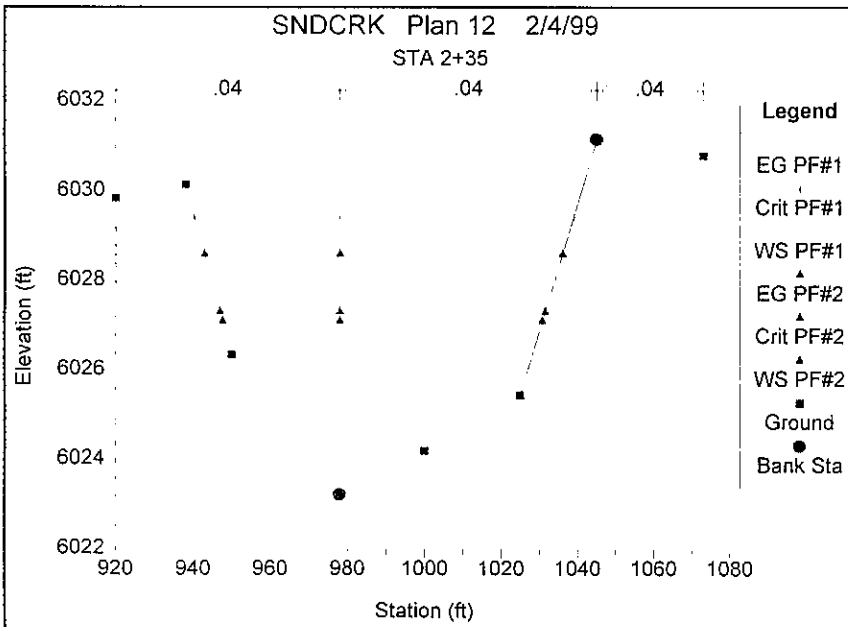




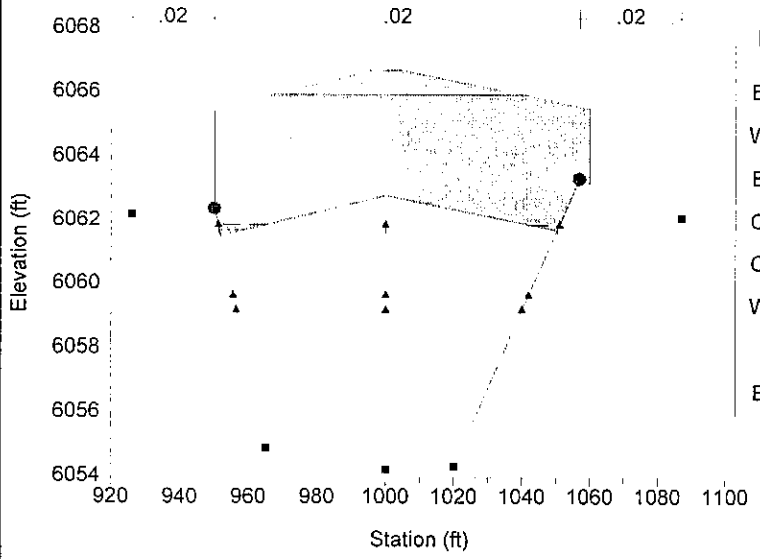






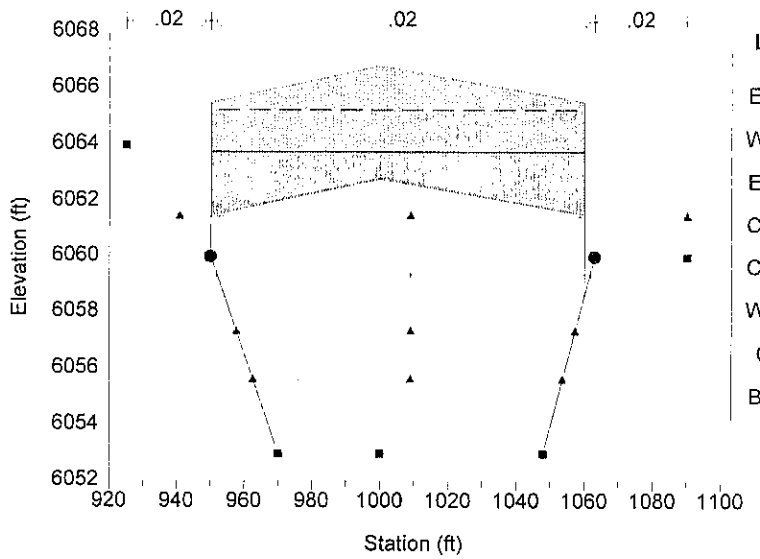


SNDCRK Plan 12 2/4/99  
BRIDGE



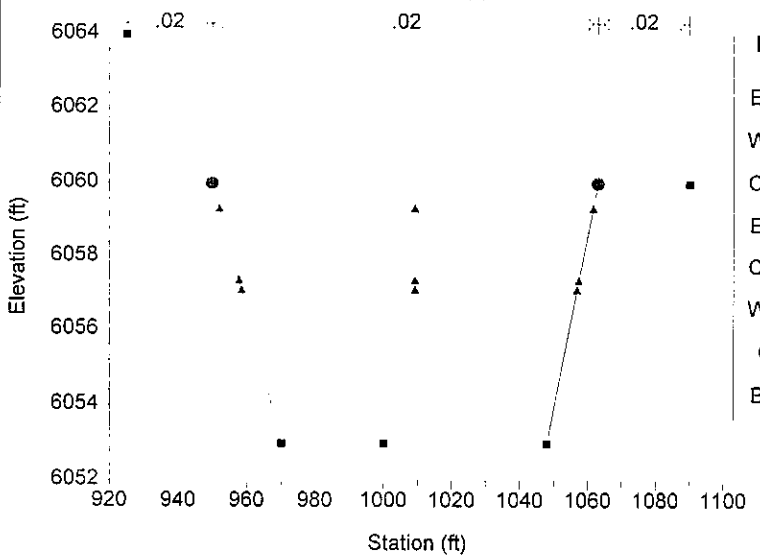
- Legend**
- EG PF#1
  - WS PF#1
  - EG PF#2
  - Crit PF#1
  - Crit PF#2
  - WS PF#2
  - Ground
  - Bank Sta

SNDCRK Plan 12 2/4/99  
BRIDGE



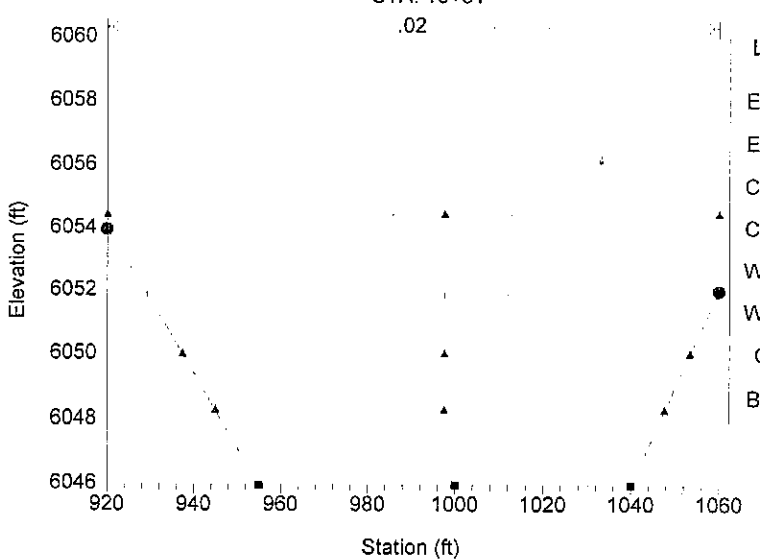
- Legend**
- EG PF#1
  - WS PF#1
  - EG PF#2
  - Crit PF#1
  - Crit PF#2
  - WS PF#2
  - Ground
  - Bank Sta

SNDCRK Plan 12 2/4/99  
STA 24+01

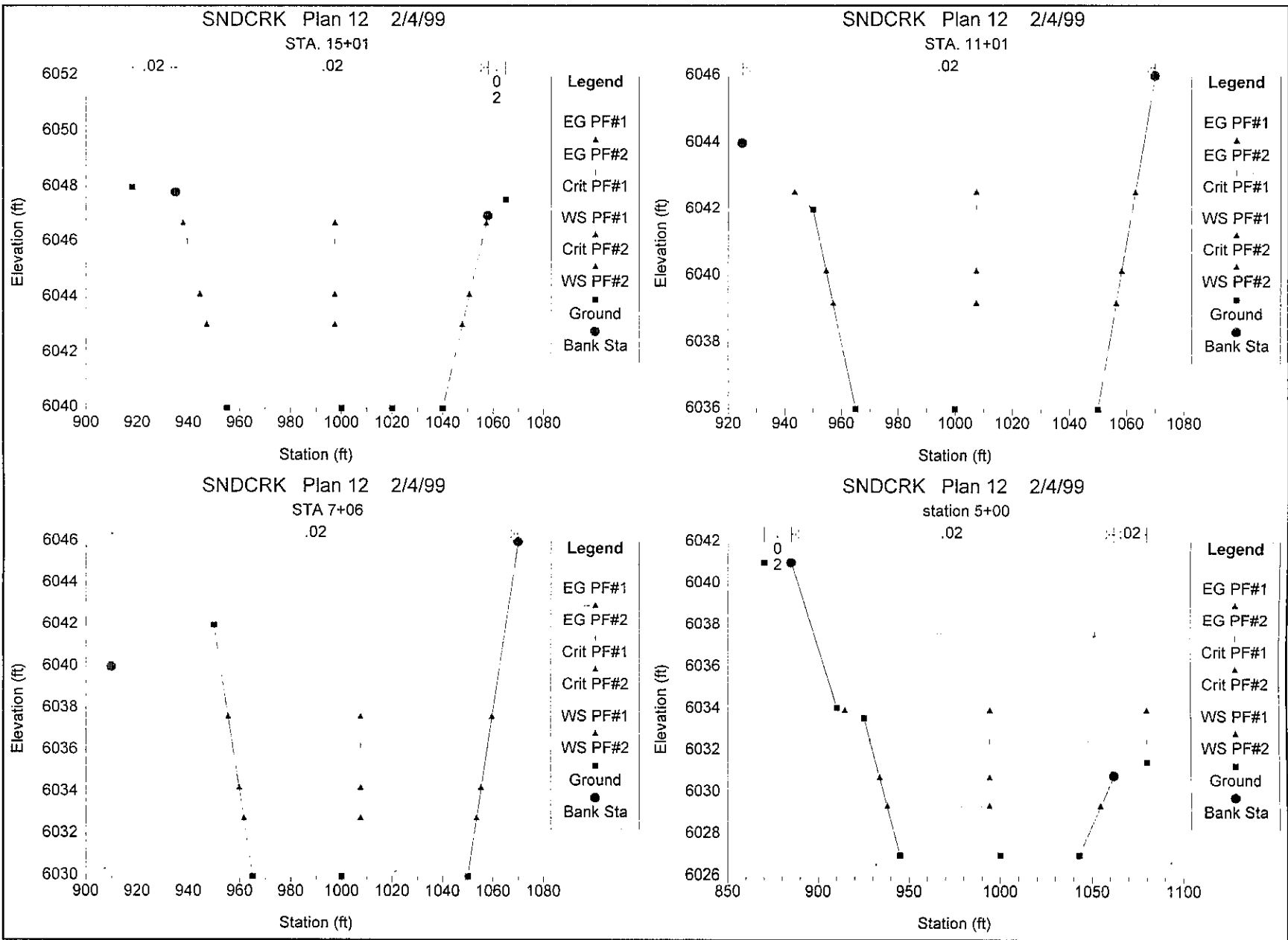


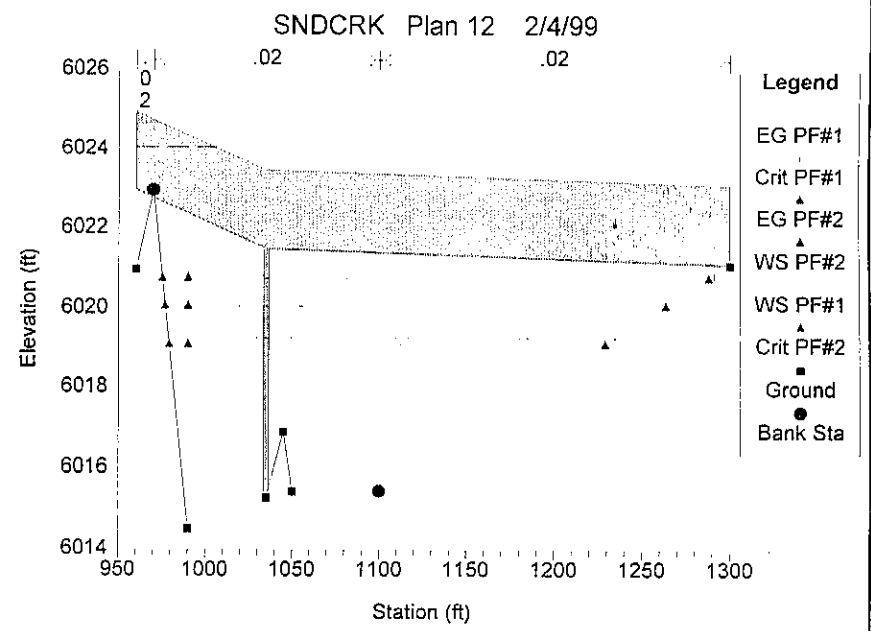
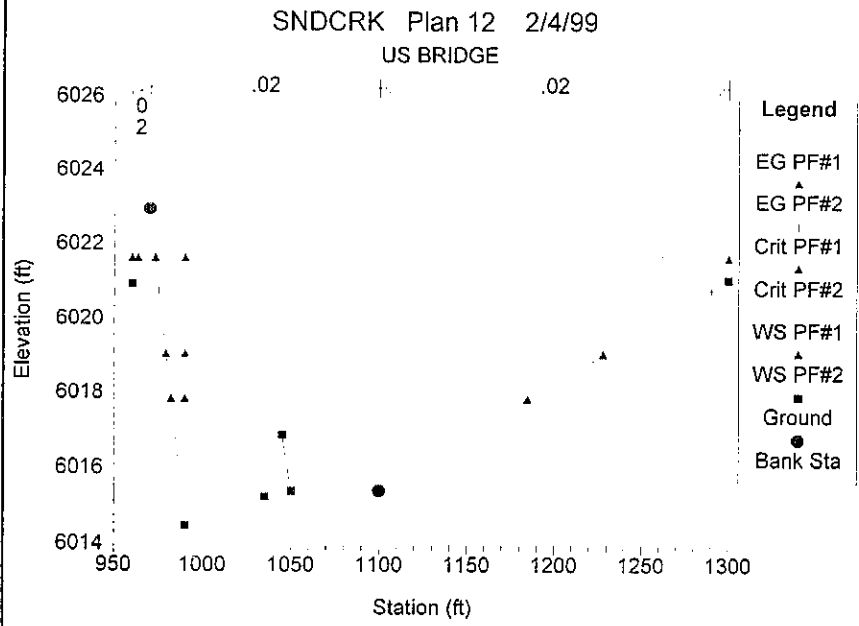
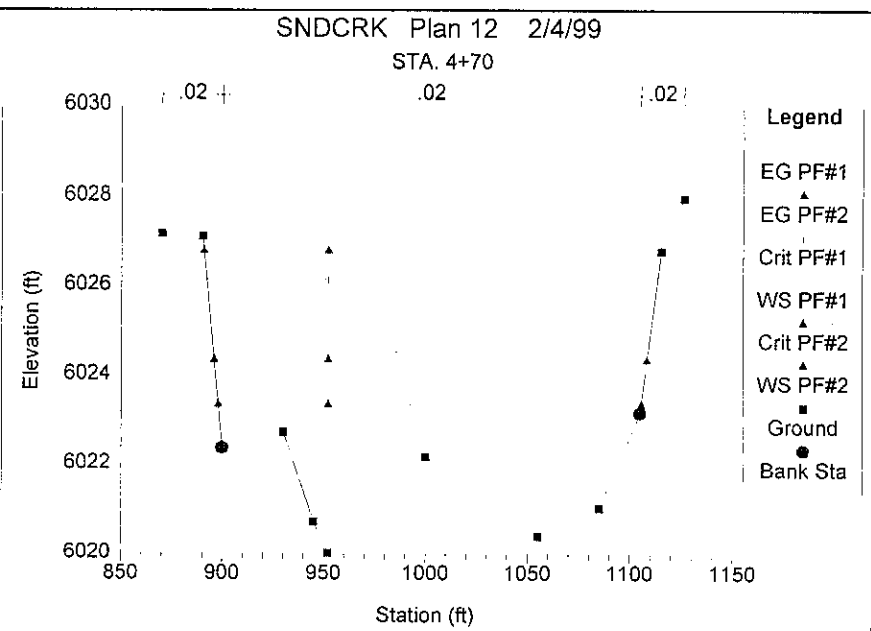
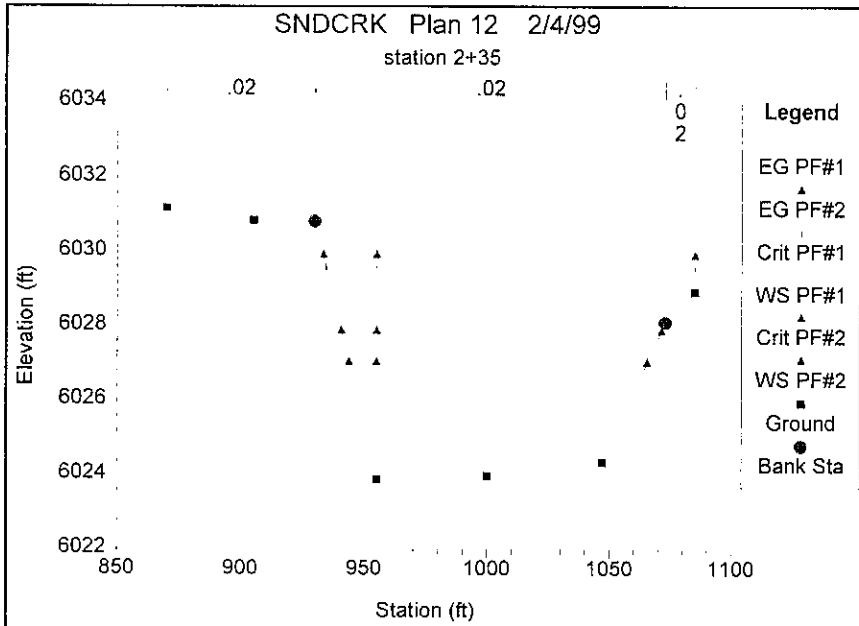
- Legend**
- EG PF#1
  - WS PF#1
  - Crit PF#1
  - EG PF#2
  - Crit PF#2
  - WS PF#2
  - Ground
  - Bank Sta

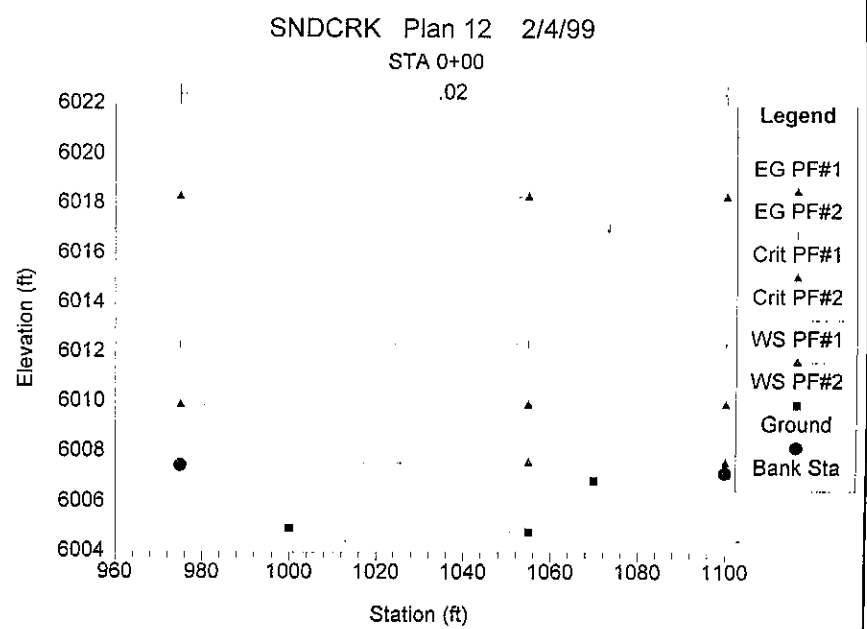
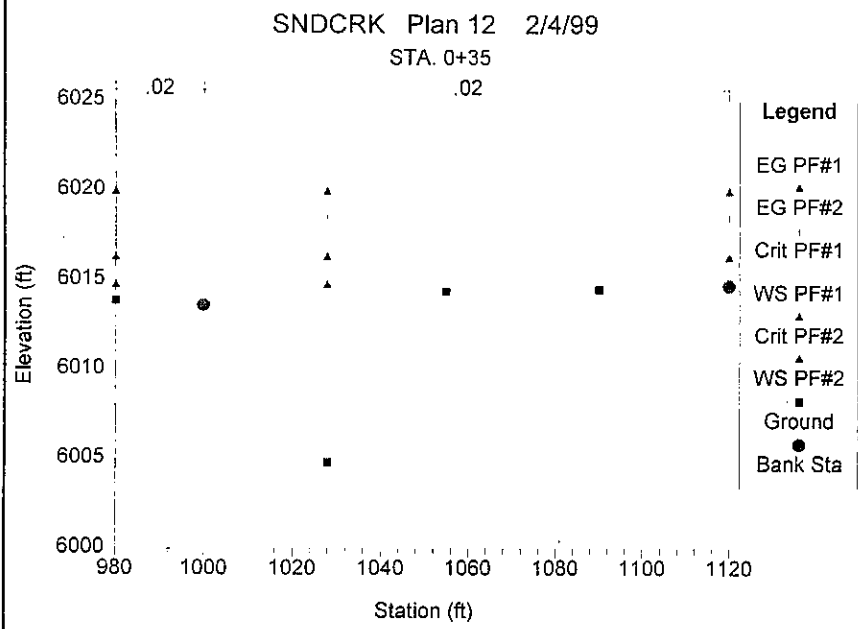
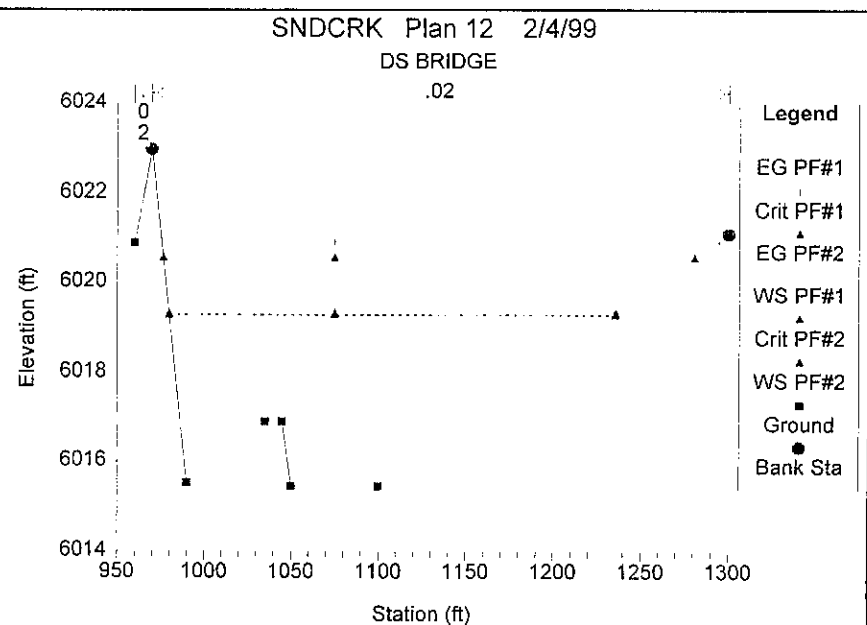
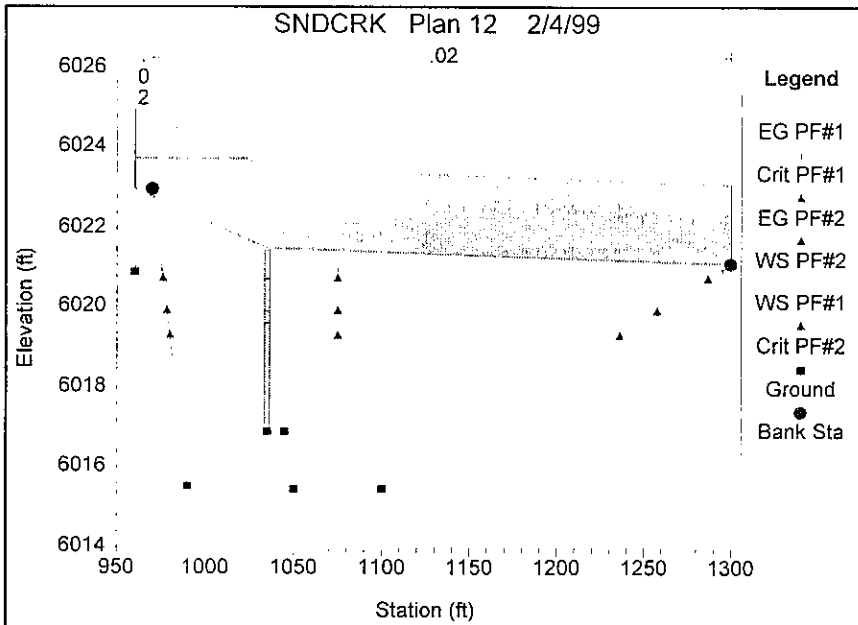
SNDCRK Plan 12 2/4/99  
STA. 19+31



- Legend**
- EG PF#1
  - EG PF#2
  - Crit PF#1
  - Crit PF#2
  - WS PF#1
  - WS PF#2
  - Ground
  - Bank Sta







**SITE PHOTOS**



**Sand Creek - 11/3/97**  
**North of Sta. 165+00**  
**Looking South from East Bank at Existing Pedestrian Bridge**



**Sand Creek - 11/3/97**  
**South of Sta. 165+00**  
**Looking North from East Bank at Existing Pedestrian Bridge**



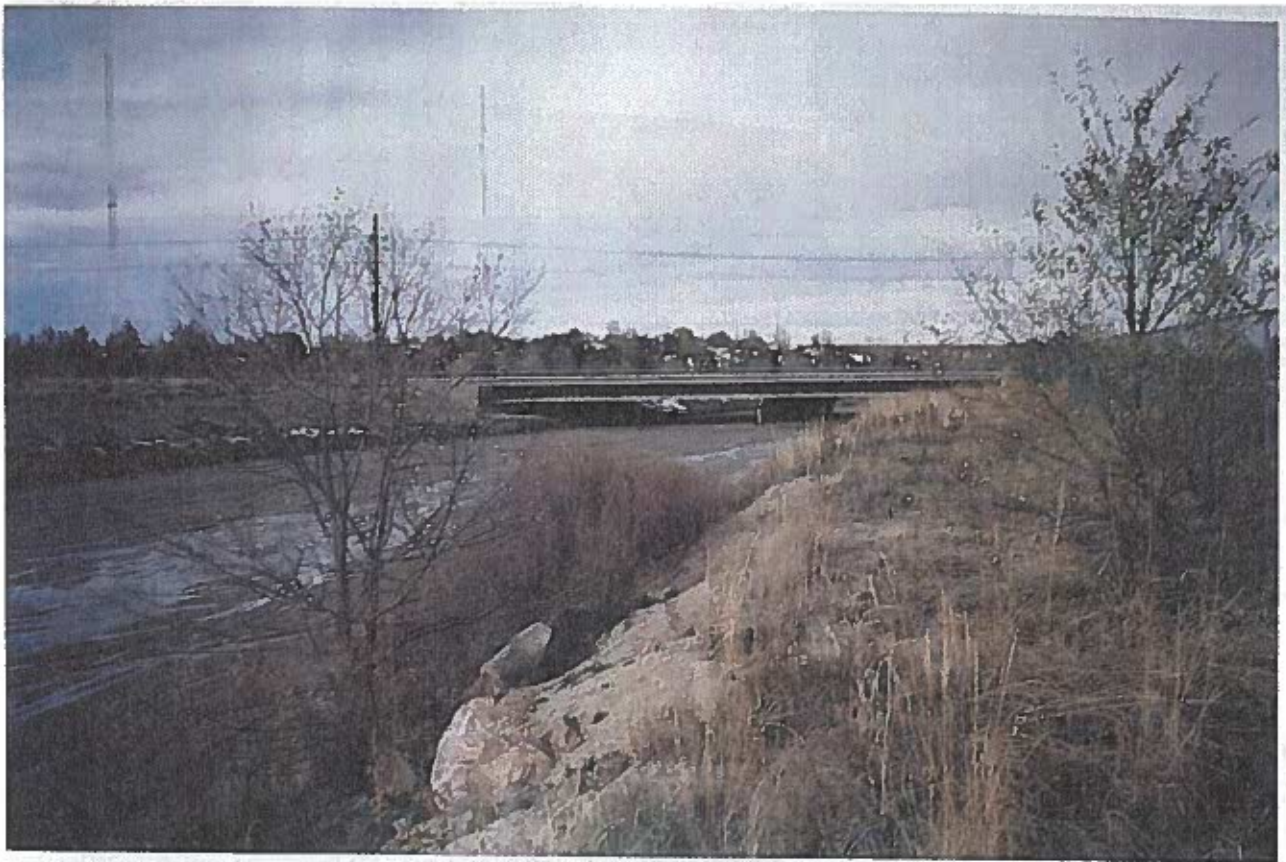


**Sand Creek - 11/3/97**  
**Sta. 118+50+/-**  
**Looking West from East Bank at Existing Structure**

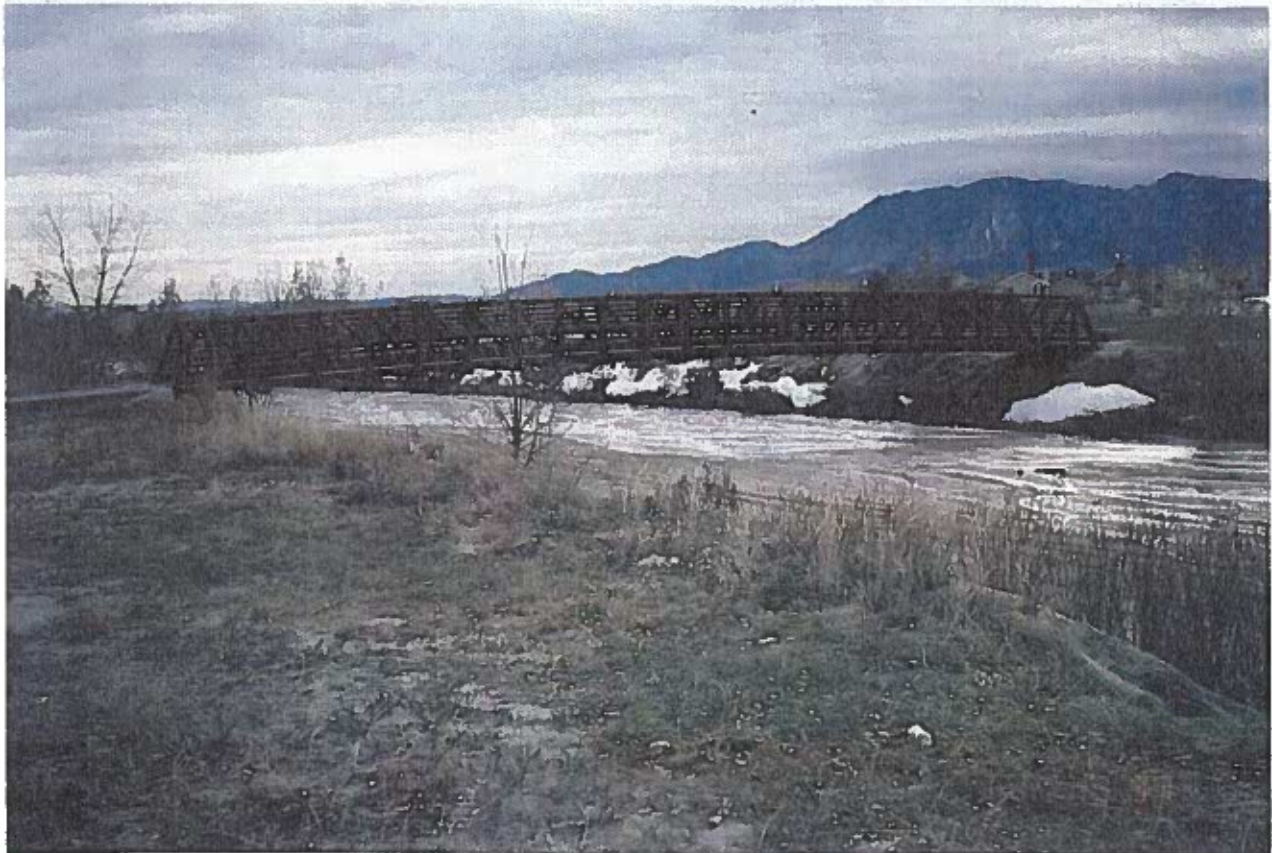


**Sand Creek - 11/3/97**  
**+/-Sta. 183+00 Eroded Grouted Rip-Rap**  
**Looking West from East Bank**



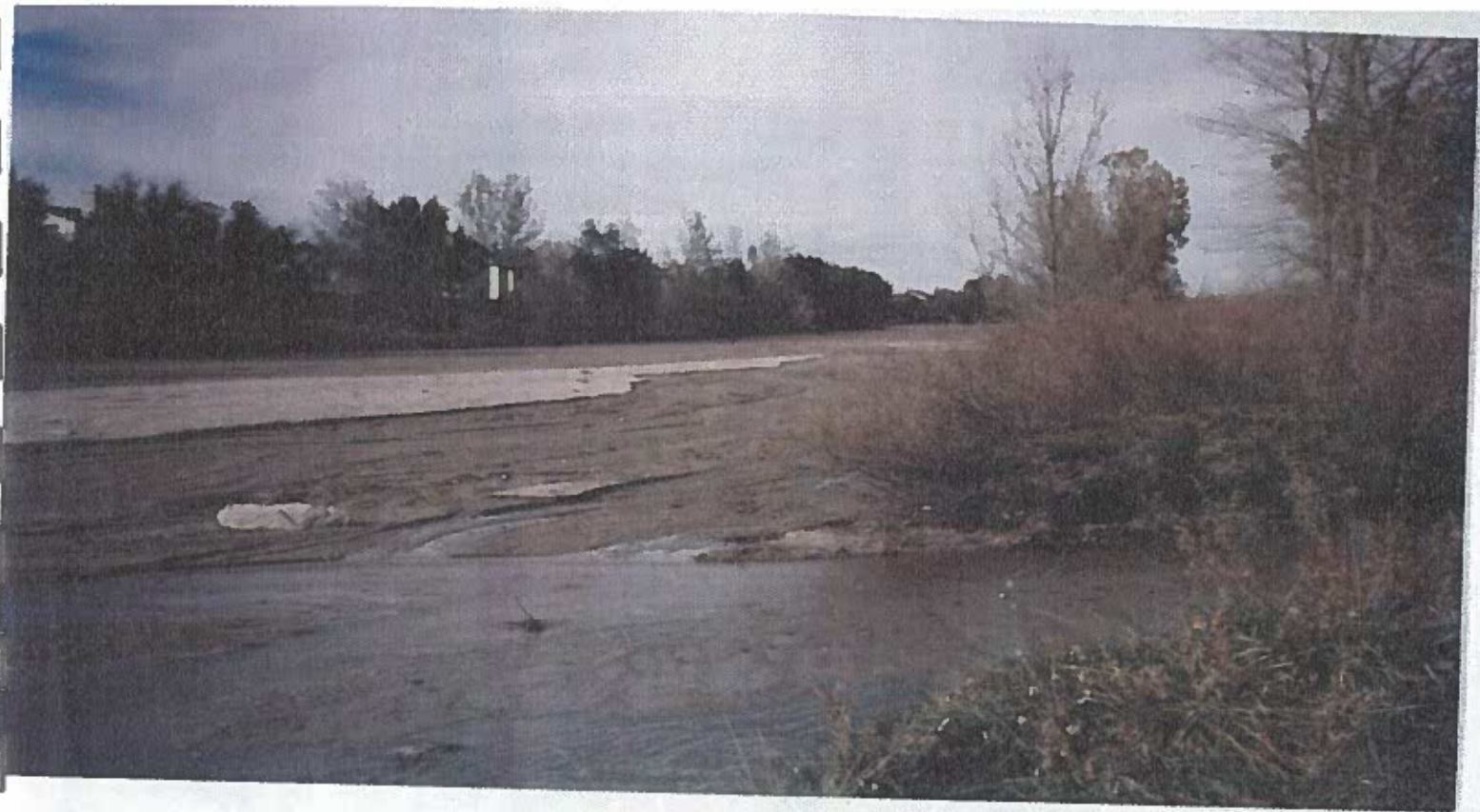


**Sand Creek - 11/3/97**  
**Looking North from East Bank at Airport Road Bridge**



**Sand Creek - 11/3/97**  
**Newly Constructed Pedestrian Bridge +/-Sta. 195+00**  
**Looking Southwest from East Bank**





**Sand Creek - 11/3/97**  
**Sta. 168+50 at Confluence with East Fork**  
**Looking Northwest from East Bank**



**East Fork, Sand Creek - 11/3/97**  
**Just North of Confluence with Sand Creek**  
**Looking North from East Bank**





**East Fork, Sand Creek - 11/3/97**  
**Looking Northwest at Existing Outflow Structure from Filing No. 2**



**East Fork, Sand Creek - 11/3/97**  
**Slope Failure Sta. 34+00**  
**Looking North from South Bank**





**East Fork, Sand Creek - 11/3/97  
Existing Conduit Sta. 43+00+/-  
Looking North from South Bank**



**East Fork, Sand Creek - 11/3/97  
Sta. 43+00+/-  
Existing Conduit**

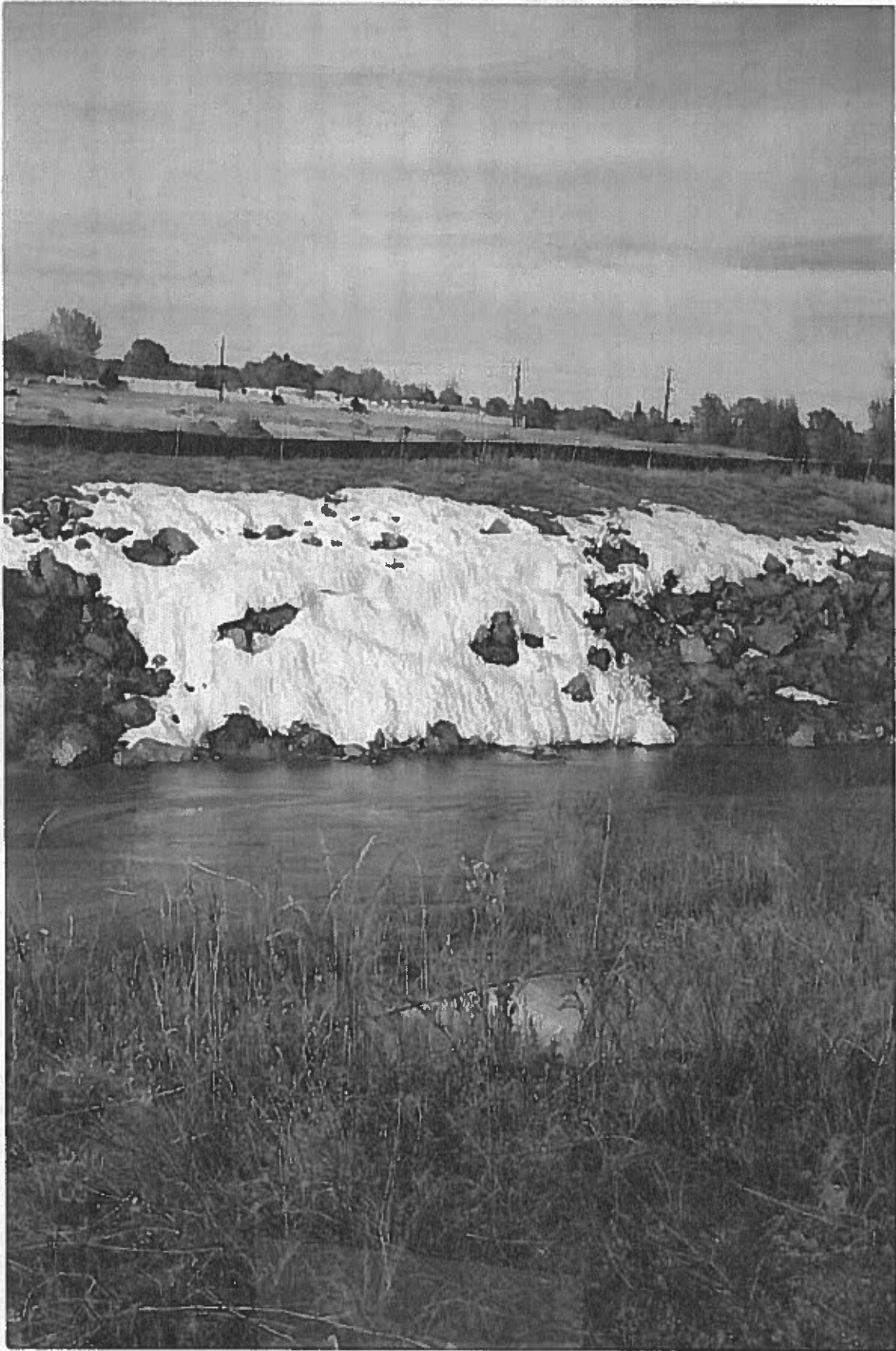




**East Fork, Sand Creek - 11/3/97**  
**Existing Center Tributary to Sand Creek**  
**Looking North from South Bank of East Fork**



**Powers Boulevard Bridge**  
**East Fork, Sand Creek - 11/3/97**  
**Looking to Bridge from Southwest (South Bank of East Fork)**



**East Fork, Sand Creek - 11/3/97  
Existing Rip-Rap and CMPFES Sta. 44+00+/-  
Looking North from South Bank**

**DRAINAGE MAP**