DESIGN STUDY OF RAMP FLUMES FOR A-CANAL KLAMATH PROJECT - OREGON-CALIFORNIA

R. A. Dodge

OPTIONAL FORM NO. 10
JULY 1973 EDITION
GSA FPMR (41 CFR) 101-11.6

UNITED STATES GOVERNMENT

Memorandum

Denver, Colorado
DATE: June 10, 1982

TO : S. R. Leslie, D-235A

FROM : E. J. Carlson, D-1532

SUBJECT: Design Data - Water Measurement Device, A-Canal - Klamath Project, Oregon-California

Attached is a summary of the design study for A-Canal ramp flumes, prepared by R. A. Dodge, for your reply to the MP Regional Engineer's letter dated April 12, 1982, Sacramento, concerning the above subject.

Because of the age and condition of the canal, flow does not follow "normal flow" assumptions. Design of a ramp flume is very sensitive to what the actual submergence depth is, therefore, considerable time was spent in making least square fits of depth versus discharge and backwater computations to force fit results to match 1981 field data at sites 2, 3, and 4. Results of the design study are summarized in a table for quick reference. Crest heights for the ramp flumes resulted from trial and error determinations that produced submergence depths that are 85 percent of the measuring head at a discharge of 1,050 ft^3/s. Doing this assures that submergence will not significantly effect measuring accuracy for discharges equal to 1,050 ft^3/s or less. It is suggested that all the attached material be submitted to the Region. Later the same material should be sent to the project for comparison with any other field data that they may have.

The computer program is now being tested by designing some small ramp flumes for laterals. When the program is tested to our satisfaction it will be made public.

If you have any further questions concerning these results you can contact me or Mr. Dodge at extension 3997.

E. J. Carlson

Attachment

DESIGN STUDY OF RAMP FLUMES FOR A-CANAL KLAMATH PROJECT - OREGON-CALIFORNIA

by

R. A. DODGE

Two possible locations were investigated for installation of a ramp flume. One was with measuring station of the flume at 28+00 and the other was at station 16+50.

Water surface and bed elevations were taken from the table of 1981 field data and drawing 12-201-5302 furnished by the project. However, it was noted that the station for the headworks gates (10+82 on the water surface profiles) was 100 feet too high in relation to the plan drawing 12-201-1767 and the sections shown on drawing 12-201-1765. Thus the invert profile was modified between station 11+82 and the gates assumed to be at station 9+82.

Depths were calculated and log-log least square fits of discharge versus depth were computed for field measurement sites 2, 3, and 4. The correlation coefficients for the best fit equations were 0.9993, 0.9992, and 0.9972, respectively. These equations of fit were used to predict depths of 10.73, 10.86, and 10.75 feet for sites 2, 3, and 4 and a design discharge of 1050 ft^3/s.

Backwater profiles were computed in an effort to match these depths. During the backwater computations, it was found that one single value of rugosity could not be used to match the depths over the reach from sites 2 to 4. However, it was found that the water surface profiles could be forced fit to the depths between sites 2 to 3 and sites 3 to 4 separately by using different rugosities. By trial and error, the resulting apparent rugosity for the upper reach was found to be 0.038 feet and the corresponding apparent Mannings "n" value was 0.019; for the lower reach the values were 0.235 feet and 0.025, respectively. The term "apparent" is used here because the canal flow is not strictly normal and these values average out variable roughness and there is a lack of exact knowledge of the as-built canal dimensions combined with subsequent settlement and weathering.

The backwater profiles were used to determine the downstream submergence depths for the ramp flume at the two possible locations and for the design discharge of 1050 ft^3/s. Apparent slopes were then found that would produce, by normal flow computation, submergence depths very nearly the same as determined by the backwater profile computations.

The above slopes and rugosities were used in the ramp flume computer program for computing submergence and checking for the 85 percent submergence limit. The submergence limit is the ratio of depths downstream to measuring head relative to the crest elevation that produces an error of discharge of 1 percent from free flow calibration. For this submergence limit it was found that a crest height of 5.33 feet is required for a ramp flume at station 28+00 and 5.80 feet at station 16+50. Normal flows computed by the ramp flume program were within ± 0.03 feet of the depth determined by backwater computations.

T. Wahl 11/20/97

$$Q = C_d A \sqrt{2gH}$$

$$1050 = 0.9\, A \sqrt{2g(0.19)}$$

$$A = 333\ ft^2$$

Backwater computations were also computed to station 10+10 for the discharges given in the 1981 project field data. Resulting depths at station 10+10 were used as submergence heads in the orifice equation with the fully opened area to compute and plot coefficients of discharge (C_d) versus percent of actual gate opening. The gate openings of the 1981 data only covered the range of 24 percent and less. However, the corresponding (C_d) values plotted with considerable model gate data show approach (C_d) values of about 0.90 for full gate opening. Some data for constant-head orifice turnouts indicate that (C_d) approaches a fully opened (C_d) limit of 0.73 to 0.95 varying with approach geometry and averaged about 0.90. Using this value in the orifice equation, the head loss was 0.19 foot for 1050 ft^3/s for the fully opened case. If a (C_d) of 0.8 or 1.0 were used, head loss would be plus and minus 0.02 foot of the value for (C_d) at 0.90. This head loss value combined with the backwater computations was used to predict minimum required reservoir water surface elevation at the 1981 field measurement site 1 of 4137.42, 4138.28, and 4138.10 feet to deliver 1050 ft^3/s for the canal without a ramp flume, for the ramp flume in place at station 16+50, and for the ramp flume in place of station 28+00.

The above results are for ramp flumes with vertical drops at the downstream end of their crests. Our model studies indicate that a downstream 6:1 ramp diverging the flow from the downstream end of the crest raises the submergence limit from 85 percent to 93 percent for a maximum deviation of discharge of 1 percent from free flow calibration. Profiles and crest elevations were not calculated for downstream divergence ramps. It is expected that the crests could be lowered by about 0.48 foot and the upstream water surface profile would be parallel and lowered by the same amount. Accurate flow measurements cannot be expected for submergence limits exceeding 85 percent for flumes with a vertical drop and 93 percent for flumes with a 6:1 diverging downstream ramp.

Water surface profiles and ramp flume calibrations for both possible locations are enclosed. The calibrations should not be used for measuring heads less than 0.65 foot nor for heads greater than about 6.1 feet. If one of these possible ramp flumes is built, it should be recalibrated using as-built measurements of the approach canal, ramp flume, and just downstream of the end of the crest.

On the basis of this study, it is estimated that the maximum discharge which can be delivered at a reservoir elevation of 4136.7 is about 970, 840, and 770 ft^3/s for no ramp flume, for the ramp flume at station 16+50, and the ramp flume at station 28+00, respectively.

A summary of this preliminary design study is given in the attached table for quick reference. The computer output and a plot of the resulting profiles are also attached. These results should be compared with computations using additional field data that the project may have, and adjusted in terms of the true location of the gates and the nature of the transition from the gate structure to the canal with the bottom width of 13.5 feet.

A-CANAL - KLAMATH PROJECT
SUMMARY OF COMPUTATIONS FOR DESIGN OF BROADCRESTED RAMP
MEASURING FLUME FOR A MAXIMUM DESIGN Q OF 1050 FT^3/S

Ramp location (Sta.)	Crest height (ft)	Depth downstream of ramp flume (ft)	Measuring station depth (ft)	Water surface drop across ramp flume (ft)	Water surface El. at site 1 (ft)	Depth at station 10+10 (ft)	Depth at site 2 (ft)	Depth at site 3 (ft)	Depth at site 4 (ft)	Gate loss (ft)	Estimated max. discharge delivered with reservoir El. 4136.7
No ramp	-	-	-	-	4137.42	11.23	10.73	10.86	10.75	0.19	970
16+50	5.80	10.79	11.84	1.05	4138.28	12.09	11.75	10.86	10.75	0.19	840
28+00	5.33	10.36	11.43	1.07	4138.10	11.91	11.51	10.68	10.75	0.19	770

Ramp Flume at Sta 28+00

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-,HFUSM,RAD28
  WHAT IS ALF VALUE ? 1
1
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STATION 2800 BACKWATER--A CANAL

Q = 1050.0 CFS INITIAL DEPTH = 11.41 FT RUGOSITY = .235000 FT N = .0252

STATION	INVERT ELEV	SLOPE	DEPTH	VELOCITY	PIEZ	ENERGY GRADE LINE	Q AIR/Q WATER	PROFILE	DEPTH NORMAL	DEPTH CRITICAL	THICKNESS BOUNDARY LAYER
FT	FT		FT	FT/SEC	FT	FT			FT	FT	FT
2800.	25.300	.0003	11.407	4.793	11.407	37.064	0.000	M2	14.143	5.504	11.407
2773.	25.320	.0007	11.406	4.784	11.406	37.082	0.000	M1	11.002	5.495	11.406
2675.	25.260	-.0006	11.536	4.744	11.536	37.145	0.000	A2	-1000.000	5.522	11.395
2573.	25.300	.0004	11.563	4.729	11.563	37.211	0.000	M2	13.267	5.522	10.849
2470.	25.400	.0010	11.528	4.738	11.528	37.276	0.000	M1	10.204	5.513	10.280
2380.	25.460	.0007	11.527	4.729	11.527	37.334	0.000	M1	11.362	5.504	9.783
2282.	25.490	.0003	11.562	4.710	11.562	37.396	0.000	M2	14.184	5.504	9.238
2180.	25.580	.0009	11.534	4.725	11.534	37.461	0.000	M1	10.474	5.504	8.648
2070.	25.640	.0005	11.545	4.719	11.545	37.531	0.000	M2	12.037	5.504	8.008
1987.	25.660	.0002	11.580	4.701	11.580	37.583	0.000	M2	15.168	5.504	7.522
1880.	25.700	.0004	11.609	4.685	11.609	37.650	0.000	M2	13.407	5.504	6.878
1788.	25.690	-.0001	11.678	4.674	11.678	37.707	0.000	A2	-1000.000	5.527	6.312

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READY.
OLD,RAD28

READY.
LIST

 82/05/27. 13.59.21.
PROGRAM   RAD28

1050,11.407,0.235,0,1,0.0003093,982
  STATION 2800 BACKWATER--A CANAL
12
0,1,2800,25.30,13.50,.5,0
0,1,2773,25.32,13.54,.5,0
0,1,2675,25.26,13.42,.5,0
0,1,2573,25.30,13.42,.5,0
0,1,2470,25.40,13.46,.5,0
0,1,2380,25.46,13.50,.5,0
0,1,2288,25.49,13.50,.5,0
0,1,2180,25.58,13.50,.5,0
0,1,2070,25.64,13.50,.5,0
0,1,1987,25.66,13.50,.5,0
0,1,1880,25.70,13.50,.5,0
0,1,1788,25.69,13.40,.5,0
READY.
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28+00

RAMP FLUME AT STA 28+00

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-,HFUSM,SITLE23
  WHAT IS ALF VALUE ? 1
1
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A CANAL, KLAMATH -- SITES 2 TO 3

Q = 1050.0 CFS INITIAL DEPTH = 11.68 FT RUGOSITY = .038030 FT N = .0191

STATION	INVERT ELEV	SLOPE	DEPTH	VELOCITY	PIEZ	ENERGY GRADE LINE	Q AIR/Q WATER	PROFILE	DEPTH NORMAL	DEPTH CRITICAL	THICKNESS BOUNDARY LAYER
FT	FT		FT	FT/SEC	FT	FT			FT	FT	FT
1788.	25.690	-.0001	11.678	4.673	11.678	37.707	0.000	A2	-1000.000	5.527	6.312
1700.	25.760	.0008	11.638	4.685	11.638	37.738	0.000	M1	9.158	5.517	5.751
1590.	25.800	.0004	11.637	4.683	11.637	37.778	0.000	M1	11.545	5.515	5.035
1503.	25.860	.0007	11.606	4.697	11.606	37.809	0.000	M1	9.550	5.513	4.448
1382.	25.920	.0005	11.589	4.701	11.589	37.852	0.000	M1	10.525	5.508	3.599
1280.	26.050	.0013	11.491	4.733	11.491	37.889	0.000	M1	7.902	5.490	2.840
1263.	26.000	-.0029	11.508	4.998	11.508	37.896	0.000	A2	-1000.000	5.741	2.680
1180.	25.860	-.0017	11.698	4.892	11.698	37.930	0.000	A2	-1000.000	5.741	2.034
1100.	25.920	.0007	11.706	4.635	11.706	37.960	0.000	M1	9.297	5.504	1.359
1070.	25.960	.0013	11.854	3.135	11.854	37.967	0.000	M1	5.671	4.096	1.162
1040.	25.980	.0007	11.903	2.366	11.903	37.970	0.000	M1	5.641	3.313	.881
1010.	26.000	.0007	11.914	1.918	11.914	37.971	0.000	M1	4.805	2.832	.513

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READY.
OLD,SITLE23

READY.
LIST

 82/05/27. 14.03.23.
PROGRAM   SITLE23

1050,11.678,.03803,0,1,-0.0000833,982
  A CANAL, KLAMATH -- SITES 2 TO 3
12
0,1,1788,25.69,13.4,.5,0
0,1,1700,25.76,13.44,.5,0
0,1,1590,25.8,13.45,.5,0
0,1,1503,25.86,13.46,.5,0
0,1,1382,25.92,13.48,.5,0
0,1,1280,26.05,13.56,.5,0
0,1,1263,26.12.5,.5,0
0,1,1180,25.86,18.5,.5,0
0,1,1100,25.92,13.5,.5,0
0,1,1070,25.96,22.33,.5,0
0,1,1040,25.98,31.33,.5,0
0,1,1010,26.00,40.000,.5,0
READY.
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28+00

RAMP FLUME AT STA 16+50

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-,HFWSM,RADL16

  WHAT IS ALF VALUE ? 1
1
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STATION 1650 RAMP BACKWATER--A CANAL

Q = 1050.0 CFS INITIAL DEPTH = 11.84 FT RUGOSITY = .038030 FT N = .0191

STATION	INVERT ELEV	SLOPE	DEPTH	VELOCITY	PIEZ	ENERGY GRADE LINE	Q AIR/Q WATER	PROFILE	DEPTH NORMAL	DEPTH CRITICAL	THICKNESS BOUNDARY LAYER
FT	FT		FT	FT/SEC	FT	FT			FT	FT	FT
1650.	25.780	.0004	11.843	4.565	11.843	37.947	0.000	M1	11.522	5.503	5.457
1590.	25.800	.0003	11.843	4.577	11.843	37.967	0.000	M1	11.843	5.515	5.058
1503.	25.860	.0007	11.809	4.592	11.809	37.996	0.000	M1	9.550	5.512	4.468
1382.	25.920	.0005	11.789	4.597	11.789	38.037	0.000	M1	10.524	5.508	3.615
1280.	26.050	.0013	11.689	4.629	11.689	38.072	0.000	M1	7.902	5.490	2.853
1263.	26.000	-.0029	11.747	4.614	11.747	38.078	0.000	A2	-1000.000	5.504	2.724
1180.	25.860	-.0017	11.892	4.787	11.892	38.108	0.000	A2	-1000.000	5.741	2.043
1100.	25.920	.0007	11.896	4.539	11.896	38.136	0.000	M1	9.297	5.503	1.365
1070.	25.960	.0013	12.035	3.078	12.035	38.142	0.000	M1	5.671	4.096	1.167
1040.	25.980	.0007	12.081	2.326	12.081	38.145	0.000	M1	5.641	3.312	.884
1010.	26.000	.0007	12.091	1.886	12.091	38.147	0.000	M1	4.805	2.832	.515

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READY.
OLD,RADL16

READY.
LIST

 82/05/27. 14.05.50.
PROGRAM   RADL16

1050,11.843,0.03803,0,1,0.0003636,982
   STATION 1650 RAMP BACKWATER--A CANAL
11
0,1,1650,25.78,13.5,.5,0
0,1,1590,25.80,13.45,.5,0
0,1,1503,25.86,13.46,.5,0
0,1,1382,25.92,13.48,.5,0
0,1,1280,26.05,13.56,.5,0
0,1,1263,26.00,13.5,.5,0
0,1,1180,25.86,12.5,.5,0
0,1,1100,25.92,13.5,.5,0
0,1,1070,25.96,22.33,.5,0
0,1,1040,25.98,31.33,.5,0
0,1,1010,26.00,40.00,.5,0
READY.
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1650

No Ramp Flume

12+63 Target depth = 10.73

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LIST

 82/05/26. 09.16.34.
PROGRAM   SITLE23

1050,10.86,.03803,0,1,-0.0000833,1082
  A CANAL, KLAMATH -- SITES 2 TO 3
12
0,1,1788,25.69,13.4,.5,0
0,1,1700,25.76,13.44,.5,0
0,1,1590,25.8,13.45,.5,0
0,1,1503,25.86,13.46,.5,0
0,1,1382,25.92,13.48,.5,0
0,1,1280,26.05,13.56,.5,0
0,1.1263,26,12.5,.5,0
0,1,1180,25.86,12.5,.5,0
0,1,1100,25.92,13.5,.5,0
0,1,1070,25.96,22.33,.5,0
0,1,1040,25.98,31.33,.5,0
0,1,1010,26.00,40.000,.5,0
READY.
-,HFWSM,SITLE23

  WHAT IS ALF VALUE ? 1
1
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A CANAL, KLAMATH -- SITES 2 TO 3

Q = 1050.0 CFS INITIAL DEPTH = 10.86 FT RUGOSITY = .038030 FT N = .0190

STATION	INVERT ELEV	SLOPE	DEPTH	VELOCITY	PIEZ	ENERGY GRADE LINE	Q AIR/Q WATER	PROFILE	DEPTH NORMAL	DEPTH CRITICAL	THICKNESS BOUNDARY LAYER
FT	FT		FT	FT/SEC	FT	FT			FT	FT	FT
1788.	25.690	-.0001	10.860	5.135	10.860	36.959	0.000	A2	-1000.000	5.526	5.571
1700.	25.760	.0008	10.829	5.143	10.829	36.999	0.000	M1	9.158	5.517	5.007
1590.	25.800	.0004	10.840	5.133	10.840	37.049	0.000	M2	11.545	5.515	4.282
1503.	25.860	.0007	10.818	5.144	10.818	37.089	0.000	M1	9.549	5.513	3.683
1382.	25.920	.0005	10.814	5.141	10.814	37.144	0.000	M1	10.525	5.508	2.809
1280.	26.050	.0013	10.725	5.174	10.725	37.191	0.000	M1	7.902	5.490	2.012
1263.	26.000	-.0029	10.734	5.475	10.734	37.199	0.000	A2	-1000.000	5.741	1.851
1180.	25.860	-.0017	10.939	5.341	10.939	37.242	0.000	A2	-1000.000	5.741	1.139
1100.	25.920	.0007	10.965	5.045	10.965	37.280	0.000	M1	9.297	5.503	.297
1070.	25.960	.0013	11.152	3.374	11.152	37.289	0.000	M1	5.671	4.095	.233
1040.	25.980	.0007	11.212	2.535	11.212	37.292	0.000	M1	5.641	3.313	.671
1010.	26.000	.0007	11.229	2.050	11.229	37.294	0.000	M1	4.805	2.838	1.078

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READY.
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Plane 4 16-450

No Ramp Flume
17+83 Target depth = 10.86

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-,HFUSM,SITE34
  WHAT IS ALF VALUE ? 1
1
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A CANAL, KLAMATH -- SITES 3 TO 4

Q = 1050.0 CFS INITIAL DEPTH = 10.75 FT RUGOSITY = .235000 FT N = .0252

STATION	INVERT ELEV	SLOPE	DEPTH	VELOCITY	PIEZ	ENERGY GRADE LINE	Q AIR/Q WATER	PROFILE	DEPTH NORMAL	DEPTH CRITICAL	THICKNESS BOUNDARY LAYER
FT	FT		FT	FT/SEC	FT	FT			FT	FT	FT
3280.	24.480	-.0013	10.750	5.327	10.750	35.671	0.000	A2	-1000.000	5.629	10.750
3175.	24.340	-.0013	10.995	5.236	10.995	35.761	0.000	A2	-1000.000	5.682	10.995
3075.	25.220	.0088	10.156	5.535	10.155	35.851	0.000	S1	5.247	5.481	10.156
2955.	25.230	.0001	10.273	5.458	10.273	35.966	0.000	M2	20.221	5.484	10.273
2870.	25.290	.0007	10.293	5.453	10.293	36.045	0.000	M2	11.148	5.491	10.293
2773.	25.320	.0003	10.360	5.414	10.360	36.135	0.000	M2	14.122	5.495	10.360
2675.	25.260	-.0006	10.520	5.343	10.520	36.223	0.000	A2	-1000.000	5.522	10.520
2573.	25.300	.0004	10.575	5.307	10.575	36.313	0.000	M2	13.266	5.522	10.575
2470.	25.400	.0010	10.565	5.302	10.565	36.402	0.000	M1	10.203	5.513	10.051
2380.	25.460	.0007	10.587	5.277	10.587	36.479	0.000	M2	11.361	5.504	9.570
2282.	25.490	.0003	10.646	5.240	10.646	36.562	0.000	M2	14.184	5.504	9.043
2180.	25.580	.0009	10.641	5.243	10.641	36.648	0.000	M1	10.475	5.504	8.470
2070.	25.640	.0005	10.677	5.220	10.677	36.740	0.000	M2	12.037	5.504	7.848
1987.	25.660	.0002	10.730	5.187	10.730	36.808	0.000	M2	15.168	5.504	7.375
1880.	25.700	.0004	10.782	5.155	10.782	36.895	0.000	M2	13.406	5.504	6.748
1788.	25.690	-.0001	10.870	5.129	10.870	36.968	0.000	A2	-1000.000	5.527	6.196

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READY.
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RAMP FLUME AT STATION 16+50

1

CYBER 730EE DATE 82/05/27. TIME 14.19.30.

CANAL SLOPE= .000455

FLUME DIMENSIONAL DATA% SILL HEIGHT=5.800 K= .00500000 KC= .03803000

B1=13.500 Z1= .500 XL= 2.000 B3=19.300 Z3= .500

D1=12.000 Z4= .500 CL=13.000 D3=12.000 Z8= .500

D2=12.000 Z5= .500 TL=17.400 D4=12.000 Z9= .500

Y1 FT.	Q CFS	CRITICAL DEPTH-FT	FROUDE NO.AT Y	IDEAL-Q	DISC.C	V1	ALF 3	V3	YN
	Y1/CL UNDER .05 +++ FRICTIONAL PROBLEMS +++ INVALID REGION								
	RANGE WHERE XL+TL EXCEEDS 5(Y1) SHOULD BE MINIMIZED +++ SEE INSTRUCTIONS								
.200	3.955	.11	.003	5.349	.7394	.04	1.057	1.84	.356
	Y1/CL UNDER .05 +++ FRICTIONAL PROBLEMS +++ INVALID REGION								
	RANGE WHERE XL+TL EXCEEDS 5(Y1) SHOULD BE MINIMIZED +++ SEE INSTRUCTIONS								
.300	7.935	.18	.006	9.848	.8058	.08	1.057	2.31	.539
	Y1/CL UNDER .05 +++ FRICTIONAL PROBLEMS +++ INVALID REGION								
	RANGE WHERE XL+TL EXCEEDS 5(Y1) SHOULD BE MINIMIZED +++ SEE INSTRUCTIONS								
.400	12.795	.24	.010	15.200	.8420	.12	1.057	2.71	.718
	Y1/CL UNDER .05 +++ FRICTIONAL PROBLEMS +++ INVALID REGION								
	RANGE WHERE XL+TL EXCEEDS 5(Y1) SHOULD BE MINIMIZED +++ SEE INSTRUCTIONS								
.500	18.410	.31	.013	21.290	.8648	.18	1.058	3.06	.895
	Y1/CL UNDER .05 +++ FRICTIONAL PROBLEMS +++ INVALID REGION								
	RANGE WHERE XL+TL EXCEEDS 5(Y1) SHOULD BE MINIMIZED +++ SEE INSTRUCTIONS								
.600	24.786	.38	.018	28.050	.8836	.23	1.049	3.38	1.072
	RANGE WHERE XL+TL EXCEEDS 5(Y1) SHOULD BE MINIMIZED +++ SEE INSTRUCTIONS								
.700	31.820	.44	.022	35.440	.8978	.29	1.041	3.68	1.249
	RANGE WHERE XL+TL EXCEEDS 5(Y1) SHOULD BE MINIMIZED +++ SEE INSTRUCTIONS								
.800	39.456	.51	.027	43.410	.9088	.36	1.036	3.95	1.426
	RANGE WHERE XL+TL EXCEEDS 5(Y1) SHOULD BE MINIMIZED +++ SEE INSTRUCTIONS								
.900	47.666	.58	.032	51.950	.9176	.42	1.032	4.21	1.602
1.000	56.421	.65	.036	61.010	.9248	.49	1.029	4.46	1.778
1.100	65.699	.71	.041	70.590	.9307	.56	1.026	4.69	1.954
1.200	75.482	.78	.046	80.670	.9357	.63	1.024	4.91	2.130
1.300	85.758	.85	.052	91.230	.9400	.71	1.022	5.12	2.306
1.400	96.511	.92	.057	102.300	.9437	.78	1.020	5.32	2.482
1.500	107.733	.99	.062	113.800	.9470	.86	1.019	5.51	2.659
1.600	119.411	1.06	.067	125.700	.9498	.94	1.017	5.70	2.835
1.700	131.543	1.13	.072	138.100	.9524	1.02	1.016	5.88	3.012
1.800	144.117	1.19	.077	151.000	.9546	1.10	1.015	6.06	3.188
1.900	157.137	1.26	.083	164.200	.9568	1.18	1.015	6.23	3.365
2.000	170.583	1.33	.088	177.900	.9586	1.26	1.014	6.40	3.542
2.100	184.458	1.40	.093	192.100	.9603	1.34	1.013	6.56	3.720
2.200	198.755	1.48	.098	206.600	.9619	1.42	1.013	6.72	3.897
2.300	213.473	1.55	.103	221.600	.9633	1.50	1.012	6.88	4.075
2.400	228.607	1.62	.108	237.000	.9646	1.58	1.011	7.03	4.253
2.500	244.154	1.69	.113	252.800	.9659	1.67	1.011	7.18	4.431
2.600	260.105	1.76	.118	269.000	.9670	1.75	1.010	7.33	4.609
2.700	276.472	1.83	.123	285.600	.9680	1.83	1.010	7.47	4.787
2.800	293.244	1.90	.128	302.600	.9690	1.92	1.010	7.61	4.966
2.900	310.421	1.98	.133	320.100	.9699	2.00	1.009	7.75	5.145
3.000	327.999	2.05	.138	337.900	.9708	2.08	1.009	7.88	5.324
3.100	345.978	2.12	.143	356.100	.9716	2.17	1.009	8.02	5.503

Sta 16+50

3.200	364.357	2.19	.148	374.700	.9724	2.25	1.008	8.15	5.682
3.300	383.133	2.27	.153	393.700	.9731	2.33	1.008	8.28	5.861
3.400	402.306	2.34	.157	413.100	.9738	2.42	1.008	8.40	6.040
3.500	421.874	2.41	.162	432.900	.9745	2.50	1.008	8.53	6.220
3.600	441.837	2.49	.167	453.100	.9751	2.58	1.007	8.65	6.400
3.700	462.194	2.56	.171	473.700	.9757	2.67	1.007	8.77	6.579
3.800	482.944	2.63	.176	494.700	.9763	2.75	1.007	8.89	6.759
3.900	504.087	2.71	.180	516.000	.9769	2.83	1.007	9.01	6.939
4.000	525.621	2.78	.185	537.800	.9774	2.91	1.006	9.13	7.119
4.100	547.556	2.86	.189	559.900	.9779	3.00	1.006	9.24	7.299

1

CYBER 730EE DATE 82/05/27. TIME 14.20.28.

CANAL SLOPE= .000455

FLUME DIMENSIONAL DATA% SILL HEIGHT=5.800 K= .00500000 KC= .03803000

B1=13.500 Z1= .500 XL= 2.000 B3=19.300 Z3= .500

D1=12.000 Z4= .500 CL=13.000 D3=12.000 Z8= .500

D2=12.000 Z5= .500 TL=17.400 D4=12.000 Z9= .500

Y1 FT.	Q CFS	CRITICAL DEPTH-FT	FROUDE NO.AT Y	IDEAL-Q	DISC.C	V1	ALF 3	V3	YN
4.200	569.900	2.93	.194	582.500	.9784	3.08	1.006	9.36	7.479
4.300	592.578	3.01	.198	605.400	.9788	3.16	1.006	9.47	7.659
4.400	615.674	3.08	.202	628.700	.9793	3.25	1.006	9.58	7.839
4.500	639.159	3.16	.207	652.400	.9797	3.33	1.006	9.69	8.019
4.600	663.034	3.23	.211	676.500	.9801	3.41	1.005	9.80	8.199
4.700	687.298	3.31	.215	700.980	.9805	3.49	1.005	9.91	8.380
4.800	711.951	3.39	.219	725.800	.9809	3.57	1.005	10.00	8.560
4.900	736.993	3.46	.223	751.000	.9813	3.65	1.005	10.10	8.740
5.000	762.424	3.54	.227	776.700	.9817	3.74	1.005	10.20	8.920
5.100	788.244	3.62	.231	802.700	.9820	3.82	1.005	10.30	9.100
5.200	814.403	3.69	.235	829.000	.9824	3.90	1.005	10.40	9.280
5.300	841.000	3.77	.239	855.900	.9826	3.98	1.005	10.50	9.461
5.400	867.986	3.85	.243	883.000	.9830	4.06	1.004	10.60	9.641
5.500	895.360	3.93	.247	910.600	.9833	4.14	1.004	10.70	9.821
5.600	923.159	4.00	.251	938.500	.9836	4.22	1.004	10.80	10.001
5.700	951.312	4.08	.255	966.800	.9839	4.30	1.004	10.90	10.182
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
5.800	979.854	4.16	.258	995.600	.9842	4.38	1.004	11.00	10.362
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
5.900	1008.786	4.24	.262	1025.000	.9845	4.46	1.004	11.10	10.542
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.000	1038.107	4.32	.266	1054.000	.9848	4.53	1.004	11.20	10.722
	SUBMERGENCE LIMIT MUCH EXCEEDED +++ MEASUREMENT REGION HIGHLY QUESTIONABLE								
6.100	1067.818	4.39	.269	1084.000	.9851	4.61	1.004	11.30	10.902

CAUTION SHOULD ALWAYS BE USED REGARDING LOW VELOCITIES IN APPROACH SECTION.

RK=
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CYBER 730EE DATE 82/05/27. TIME 09.00.37.

CANAL SLOPE= .000455
FLUME DIMENSIONAL DATA= SILL HEIGHT=5.800 K= .00500000 KC= .03803000
B1=13.500 Z1= .500 XL= 2.000 B3=19.300 Z3= .500
D1=12.000 Z4= .500 CL=13.000 D3=12.000 Z8= .500
D2=12.000 Z5= .500 TL=17.400 D4=12.000 Z9= .500

Y1 FT.	Q CFS	CRITICAL DEPTH-FT	FROUDE NO.AT Y	IDEAL-Q	DISC.C	V1	ALF 3	U3	YN
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.020	1044.000	4.33	.267	1060.000	.9849	4.55	1.004	11.20	10.758
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.022	1044.610	4.33	.267	1061.000	.9849	4.55	1.004	11.20	10.762
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.024	1045.202	4.33	.267	1061.000	.9849	4.55	1.004	11.20	10.765
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.026	1045.794	4.34	.267	1062.000	.9849	4.56	1.004	11.20	10.769
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.028	1046.387	4.34	.267	1062.000	.9849	4.56	1.004	11.20	10.772
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.030	1046.979	4.34	.267	1063.000	.9849	4.56	1.004	11.20	10.776
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.032	1047.572	4.34	.267	1064.000	.9849	4.56	1.004	11.20	10.780
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.034	1048.165	4.34	.267	1064.000	.9849	4.56	1.004	11.20	10.783
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.036	1048.758	4.34	.267	1065.000	.9849	4.56	1.004	11.20	10.787
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.038	1049.351	4.35	.267	1065.000	.9849	4.56	1.004	11.20	10.790
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.040	1049.945	4.35	.267	1066.000	.9849	4.57	1.004	11.20	10.794
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.042	1050.538	4.35	.267	1067.000	.9849	4.57	1.004	11.20	10.798
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.044	1051.132	4.35	.267	1067.000	.9849	4.57	1.004	11.30	10.801
	SUBMERGENCE LIMIT MUCH EXCEEDED +++ MEASUREMENT REGION HIGHLY QUESTIONABLE								
6.046	1051.726	4.35	.268	1068.000	.9849	4.57	1.004	11.30	10.805
	SUBMERGENCE LIMIT MUCH EXCEEDED +++ MEASUREMENT REGION HIGHLY QUESTIONABLE								
6.048	1052.319	4.35	.268	1068.000	.9849	4.57	1.004	11.30	10.808
	SUBMERGENCE LIMIT MUCH EXCEEDED +++ MEASUREMENT REGION HIGHLY QUESTIONABLE								
6.050	1052.914	4.36	.268	1069.000	.9849	4.57	1.004	11.30	10.812
	SUBMERGENCE LIMIT MUCH EXCEEDED +++ MEASUREMENT REGION HIGHLY QUESTIONABLE								
6.052	1053.508	4.36	.268	1070.000	.9850	4.58	1.004	11.30	10.816
	SUBMERGENCE LIMIT MUCH EXCEEDED +++ MEASUREMENT REGION HIGHLY QUESTIONABLE								
6.054	1054.102	4.36	.268	1070.000	.9850	4.58	1.004	11.30	10.819
	SUBMERGENCE LIMIT MUCH EXCEEDED +++ MEASUREMENT REGION HIGHLY QUESTIONABLE								
6.056	1054.697	4.36	.268	1071.000	.9850	4.58	1.004	11.30	10.823
	SUBMERGENCE LIMIT MUCH EXCEEDED +++ MEASUREMENT REGION HIGHLY QUESTIONABLE								
6.058	1055.292	4.36	.268	1071.000	.9850	4.58	1.004	11.30	10.826
	SUBMERGENCE LIMIT MUCH EXCEEDED +++ MEASUREMENT REGION HIGHLY QUESTIONABLE								
6.060	1055.887	4.36	.268	1072.000	.9850	4.58	1.004	11.30	10.830

CAUTION SHOULD ALWAYS BE USED REGARDING LOW VELOCITIES IN APPROACH SECTION.

Sta 16+50

RAMP FLUME AT STATION 28+00

1

CYBER 730EE DATE 82/05/27. TIME 14.13.14.

CANAL SLOPE= .000918

FLUME DIMENSIONAL DATA% SILL HEIGHT=5.333 K= .00500000 KC= .23500000

B1=13.500	Z1= .500	XL= 2.000	B3=18.833	Z3= .500
D1=12.000	Z4= .500	CL=13.000	D3=12.000	Z8= .500
D2=12.000	Z5= .500	TL=16.000	D4=12.000	Z9= .500

Y1 FT.	Q CFS	CRITICAL DEPTH-FT	FROUDE NO.AT Y	IDEAL-Q	DISC.C	V1	ALF 3	V3	YN
	Y1/CL UNDER .05 +++ FRICTIONAL PROBLEMS +++ INVALID REGION								
	RANGE WHERE XL+TL EXCEEDS 5(Y1) SHOULD BE MINIMIZED +++ SEE INSTRUCTIONS								
.200	3.867	.11	.003	5.220	.7408	.04	1.057	1.84	.381
	Y1/CL UNDER .05 +++ FRICTIONAL PROBLEMS +++ INVALID REGION								
	RANGE WHERE XL+TL EXCEEDS 5(Y1) SHOULD BE MINIMIZED +++ SEE INSTRUCTIONS								
.300	7.755	.18	.007	9.612	.8068	.08	1.057	2.32	.561
	Y1/CL UNDER .05 +++ FRICTIONAL PROBLEMS +++ INVALID REGION								
	RANGE WHERE XL+TL EXCEEDS 5(Y1) SHOULD BE MINIMIZED +++ SEE INSTRUCTIONS								
.400	12.503	.24	.011	14.830	.8429	.13	1.057	2.71	.736
	Y1/CL UNDER .05 +++ FRICTIONAL PROBLEMS +++ INVALID REGION								
	RANGE WHERE XL+TL EXCEEDS 5(Y1) SHOULD BE MINIMIZED +++ SEE INSTRUCTIONS								
.500	17.988	.31	.015	20.780	.8655	.19	1.058	3.06	.907
	Y1/CL UNDER .05 +++ FRICTIONAL PROBLEMS +++ INVALID REGION								
	RANGE WHERE XL+TL EXCEEDS 5(Y1) SHOULD BE MINIMIZED +++ SEE INSTRUCTIONS								
.600	24.217	.38	.020	27.390	.8841	.25	1.049	3.38	1.079
	RANGE WHERE XL+TL EXCEEDS 5(Y1) SHOULD BE MINIMIZED +++ SEE INSTRUCTIONS								
.700	31.092	.44	.024	34.610	.8984	.31	1.042	3.68	1.249
	RANGE WHERE XL+TL EXCEEDS 5(Y1) SHOULD BE MINIMIZED +++ SEE INSTRUCTIONS								
.800	38.557	.51	.029	42.400	.9093	.38	1.036	3.96	1.418
	RANGE WHERE XL+TL EXCEEDS 5(Y1) SHOULD BE MINIMIZED +++ SEE INSTRUCTIONS								
.900	46.584	.58	.035	50.750	.9180	.45	1.032	4.21	1.587
	RANGE WHERE XL+TL EXCEEDS 5(Y1) SHOULD BE MINIMIZED +++ SEE INSTRUCTIONS								
1.000	55.147	.65	.040	59.610	.9251	.52	1.029	4.46	1.755
1.100	64.224	.71	.045	68.990	.9310	.60	1.026	4.69	1.923
1.200	73.799	.78	.051	78.850	.9360	.67	1.024	4.91	2.090
1.300	83.858	.85	.056	89.190	.9402	.75	1.022	5.12	2.257
1.400	94.388	.92	.062	100.000	.9439	.83	1.020	5.32	2.424
1.500	105.380	.99	.067	111.300	.9472	.91	1.019	5.52	2.592
1.600	116.823	1.06	.073	123.000	.9500	.99	1.018	5.70	2.759
1.700	128.714	1.13	.079	135.100	.9525	1.08	1.016	5.89	2.926
1.800	141.042	1.20	.084	147.700	.9548	1.16	1.016	6.06	3.093
1.900	153.811	1.27	.090	160.700	.9569	1.24	1.015	6.24	3.260
2.000	167.002	1.34	.095	174.200	.9587	1.33	1.014	6.40	3.428
2.100	180.617	1.41	.101	188.100	.9604	1.41	1.013	6.57	3.595
2.200	194.651	1.48	.106	202.300	.9620	1.50	1.013	6.73	3.763
2.300	209.101	1.55	.112	217.000	.9634	1.58	1.012	6.88	3.930
2.400	223.963	1.62	.117	232.200	.9647	1.67	1.011	7.03	4.098
2.500	239.236	1.69	.122	247.700	.9659	1.75	1.011	7.18	4.266
2.600	254.910	1.76	.128	263.600	.9671	1.84	1.011	7.33	4.434
2.700	270.996	1.84	.133	279.900	.9681	1.93	1.010	7.47	4.602
2.800	287.484	1.91	.138	296.700	.9691	2.01	1.010	7.61	4.771
2.900	304.374	1.98	.143	313.800	.9700	2.10	1.009	7.75	4.939
3.000	321.663	2.05	.148	331.300	.9709	2.18	1.009	7.89	5.108
3.100	339.351	2.13	.153	349.200	.9717	2.27	1.009	8.02	5.277

S/A 28+00

3.200	357.435	2.20	.158	367.500	.9725	2.36	1.008	8.15	5.446
3.300	375.914	2.27	.163	386.300	.9732	2.44	1.008	8.28	5.615
3.400	394.788	2.35	.168	405.400	.9739	2.53	1.008	8.41	5.784
3.500	414.055	2.42	.173	424.900	.9746	2.62	1.008	8.54	5.953
3.600	433.715	2.49	.178	444.700	.9752	2.70	1.007	8.66	6.122
3.700	453.766	2.57	.183	465.000	.9758	2.79	1.007	8.78	6.292
3.800	474.208	2.64	.188	485.700	.9764	2.87	1.007	8.90	6.461
3.900	495.041	2.72	.192	506.700	.9770	2.96	1.007	9.02	6.630
4.000	516.264	2.79	.197	528.200	.9774	3.04	1.006	9.14	6.800
4.100	537.884	2.87	.202	550.000	.9780	3.13	1.006	9.25	6.970

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CYBER 730EE DATE 82/05/27. TIME 14.14.13.

CANAL SLOPE= .000918

FLUME DIMENSIONAL DATA% SILL HEIGHT=5.333 K= .00500000 KC= .23500000

B1=13.500 Z1= .500 XL= 2.000 B3=18.833 Z3= .500
D1=12.000 Z4= .500 CL=13.000 D3=12.000 Z8= .500
D2=12.000 Z5= .500 TL=16.000 D4=12.000 Z9= .500

Y1 FT.	Q CFS	CRITICAL DEPTH-FT	FROUDE NO.AT Y	IDEAL-Q	DISC.C	V1	ALF 3	V3	YN
4.200	559.900	2.94	.206	572.200	.9784	3.22	1.006	9.37	7.140
4.300	582.274	3.02	.211	594.800	.9789	3.30	1.006	9.48	7.309
4.400	605.051	3.10	.215	617.800	.9794	3.38	1.006	9.59	7.479
4.500	628.217	3.17	.220	641.200	.9798	3.47	1.006	9.70	7.649
4.600	651.770	3.25	.224	664.900	.9802	3.55	1.005	9.81	7.819
4.700	675.710	3.32	.228	689.100	.9806	3.64	1.005	9.92	7.989
4.800	700.038	3.40	.233	713.600	.9810	3.72	1.005	10.00	8.159
4.900	724.754	3.48	.237	738.500	.9815	3.80	1.005	10.10	8.329
5.000	749.857	3.56	.241	763.800	.9818	3.89	1.005	10.20	8.499
5.100	775.347	3.63	.245	789.500	.9821	3.97	1.005	10.30	8.669
5.200	801.175	3.71	.249	815.500	.9824	4.05	1.005	10.40	8.838
5.300	827.439	3.79	.253	842.000	.9828	4.14	1.005	10.50	9.008
5.400	854.126	3.87	.257	868.800	.9831	4.22	1.004	10.60	9.179
5.500	881.166	3.94	.261	896.000	.9834	4.30	1.004	10.70	9.349
5.600	908.593	4.02	.265	923.600	.9838	4.38	1.004	10.80	9.519
5.700	936.408	4.10	.269	951.600	.9841	4.46	1.004	10.90	9.689
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
5.800	964.610	4.18	.273	979.900	.9844	4.54	1.004	11.00	9.859
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
5.900	993.201	4.26	.277	1009.000	.9847	4.63	1.004	11.10	10.029
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.000	1022.180	4.34	.281	1038.000	.9849	4.71	1.004	11.20	10.199
	SUBMERGENCE LIMIT MUCH EXCEEDED +++ MEASUREMENT REGION HIGHLY QUESTIONABLE								
6.100	1051.547	4.42	.284	1067.000	.9852	4.79	1.004	11.30	10.368

CAUTION SHOULD ALWAYS BE USED REGARDING LOW VELOCITIES IN APPROACH SECTION.

RK=
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STA 29+00

1 RK=
2

CYBER 730EE DATE 82/06/09. TIME 10.29.41.

CANAL SLOPE= .000918

FLUME DIMENSIONAL DATA% SILL HEIGHT=5.333 K= .00500000 KC= .23500000

B1=13.500 Z1= .500 XL= 2.000 B3=18.833 Z3= .500
D1=12.000 Z4= .500 CL=13.000 D3=12.000 Z8= .500
D2=12.000 Z5= .500 TL=16.000 D4=12.000 Z9= .500

Y1 FT.	Q CFS	CRITICAL DEPTH-FT	FROUDE NO.AT Y	IDEAL-Q	DISC.C	V1	ALF 3	V3	YN
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.080	1046.000	4.40	.284	1061.000	.9852	4.77	1.004	11.30	10.337
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.081	1045.937	4.40	.284	1062.000	.9852	4.77	1.004	11.30	10.336
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.082	1046.232	4.40	.284	1062.000	.9852	4.77	1.004	11.30	10.338
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.083	1046.527	4.40	.284	1062.000	.9852	4.77	1.004	11.30	10.340
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.084	1046.822	4.40	.284	1063.000	.9852	4.77	1.004	11.30	10.341
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.085	1047.117	4.40	.284	1063.000	.9852	4.77	1.004	11.30	10.343
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.086	1047.412	4.41	.284	1063.000	.9852	4.78	1.004	11.30	10.345
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.087	1047.707	4.41	.284	1063.000	.9852	4.78	1.004	11.30	10.346
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.088	1048.002	4.41	.284	1064.000	.9852	4.78	1.004	11.30	10.348
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.089	1048.298	4.41	.284	1064.000	.9852	4.78	1.004	11.30	10.350
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.090	1048.593	4.41	.284	1064.000	.9852	4.78	1.004	11.30	10.351
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.091	1048.888	4.41	.284	1065.000	.9852	4.78	1.004	11.30	10.353
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.092	1049.183	4.41	.284	1065.000	.9852	4.78	1.004	11.30	10.355
	SUBMERGENCE LIMIT MUCH EXCEEDED +++ MEASUREMENT REGION HIGHLY QUESTIONABLE								
6.093	1049.479	4.41	.284	1065.000	.9852	4.78	1.004	11.30	10.357
	SUBMERGENCE LIMIT MUCH EXCEEDED +++ MEASUREMENT REGION HIGHLY QUESTIONABLE								
6.094	1049.774	4.41	.284	1066.000	.9852	4.78	1.004	11.30	10.358
	SUBMERGENCE LIMIT MUCH EXCEEDED +++ MEASUREMENT REGION HIGHLY QUESTIONABLE								
6.095	1050.069	4.41	.284	1066.000	.9852	4.78	1.004	11.30	10.360
	SUBMERGENCE LIMIT MUCH EXCEEDED +++ MEASUREMENT REGION HIGHLY QUESTIONABLE								
6.096	1050.365	4.41	.284	1066.000	.9852	4.78	1.004	11.30	10.362
	SUBMERGENCE LIMIT MUCH EXCEEDED +++ MEASUREMENT REGION HIGHLY QUESTIONABLE								
6.097	1050.660	4.41	.284	1066.000	.9852	4.78	1.004	11.30	10.363
	SUBMERGENCE LIMIT MUCH EXCEEDED +++ MEASUREMENT REGION HIGHLY QUESTIONABLE								
6.098	1050.956	4.41	.284	1067.000	.9852	4.78	1.004	11.30	10.365
	SUBMERGENCE LIMIT MUCH EXCEEDED +++ MEASUREMENT REGION HIGHLY QUESTIONABLE								
6.099	1051.251	4.41	.284	1067.000	.9852	4.78	1.004	11.30	10.367

CAUTION SHOULD ALWAYS BE USED REGARDING LOW VELOCITIES IN APPROACH SECTION.

This is with 0.8 cfs
and $Y_N < Y_{BW}$
∴ design ok

$Y_{BW} = 10.32$

5

28 +00

10
1

CYBER 730EE DATE 82/05/27. TIME 08.48.00.

CANAL SLOPE= .000918

FLUME DIMENSIONAL DATA: SILL HEIGHT=5.333 K= .00500000 KC= .23500000

B1=13.500	Z1= .500	XL= 2.000	B3=18.833	Z3= .500			
D1=12.000	Z4= .500	CL=13.000	D3=12.000	Z8= .500			
D2=12.000	Z5= .500	TL=16.000	D4=12.000	Z9= .500			

Y1 FT.	Q CFS	CRITICAL DEPTH-FT	FROUDE NO.AT Y	IDEAL-Q	DISC.C	V1	ALF 3	V3	YN
5.599	908.300	4.02	.265	923.300	.9838	4.38	1.004	10.80	9.517
5.619	913.848	4.04	.266	928.900	.9838	4.40	1.004	10.90	9.551
5.639	919.395	4.05	.267	934.400	.9839	4.41	1.004	10.90	9.585
5.659	924.957	4.07	.268	940.000	.9840	4.43	1.004	10.90	9.619
5.679	930.534	4.08	.268	945.700	.9840	4.45	1.004	10.90	9.653
5.699	936.128	4.10	.269	951.300	.9841	4.46	1.004	10.90	9.687
5.719	941.736	4.12	.270	956.900	.9841	4.48	1.004	11.00	9.721
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
5.739	947.361	4.13	.271	962.600	.9842	4.49	1.004	11.00	9.755
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
5.759	953.000	4.15	.271	968.300	.9842	4.51	1.004	11.00	9.789
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
5.779	958.656	4.16	.272	973.900	.9843	4.53	1.004	11.00	9.823
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
5.799	964.326	4.18	.273	979.600	.9844	4.54	1.004	11.00	9.857
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
5.819	970.013	4.19	.274	985.400	.9844	4.56	1.004	11.10	9.891
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
5.839	975.715	4.21	.274	991.100	.9845	4.58	1.004	11.10	9.925
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
5.859	981.432	4.23	.275	996.800	.9845	4.59	1.004	11.10	9.959
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
5.879	987.165	4.24	.276	1003.000	.9846	4.61	1.004	11.10	9.993
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
5.899	992.913	4.26	.277	1008.000	.9846	4.62	1.004	11.10	10.027
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
5.919	998.677	4.27	.278	1014.000	.9847	4.64	1.004	11.10	10.061
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
5.939	1004.457	4.29	.278	1020.000	.9848	4.66	1.004	11.20	10.095
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
5.959	1010.252	4.30	.279	1026.000	.9848	4.67	1.004	11.20	10.129
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
5.979	1016.062	4.32	.280	1032.000	.9849	4.69	1.004	11.20	10.163
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
5.999	1021.888	4.34	.281	1038.000	.9849	4.71	1.004	11.20	10.197
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.019	1027.730	4.35	.281	1043.000	.9850	4.72	1.004	11.20	10.231
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.039	1033.587	4.37	.282	1049.000	.9850	4.74	1.004	11.30	10.265
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.059	1039.459	4.38	.283	1055.000	.9851	4.75	1.004	11.30	10.299
	SUBMERGENCE LIMIT EXCEEDED +++ MEASUREMENT REGION QUESTIONABLE								
6.079	1045.348	4.40	.284	1061.000	.9852	4.77	1.004	11.30	10.333

SUBMERGENCE LIMIT MUCH EXCEEDED +++ MEASUREMENT REGION HIGHLY QUESTIONABLE

Sta 25+00

Field Measurements

United States Department of the Interior

Bureau of Reclamation
KLAMATH PROJECT

Memorandum Date 4/5/84

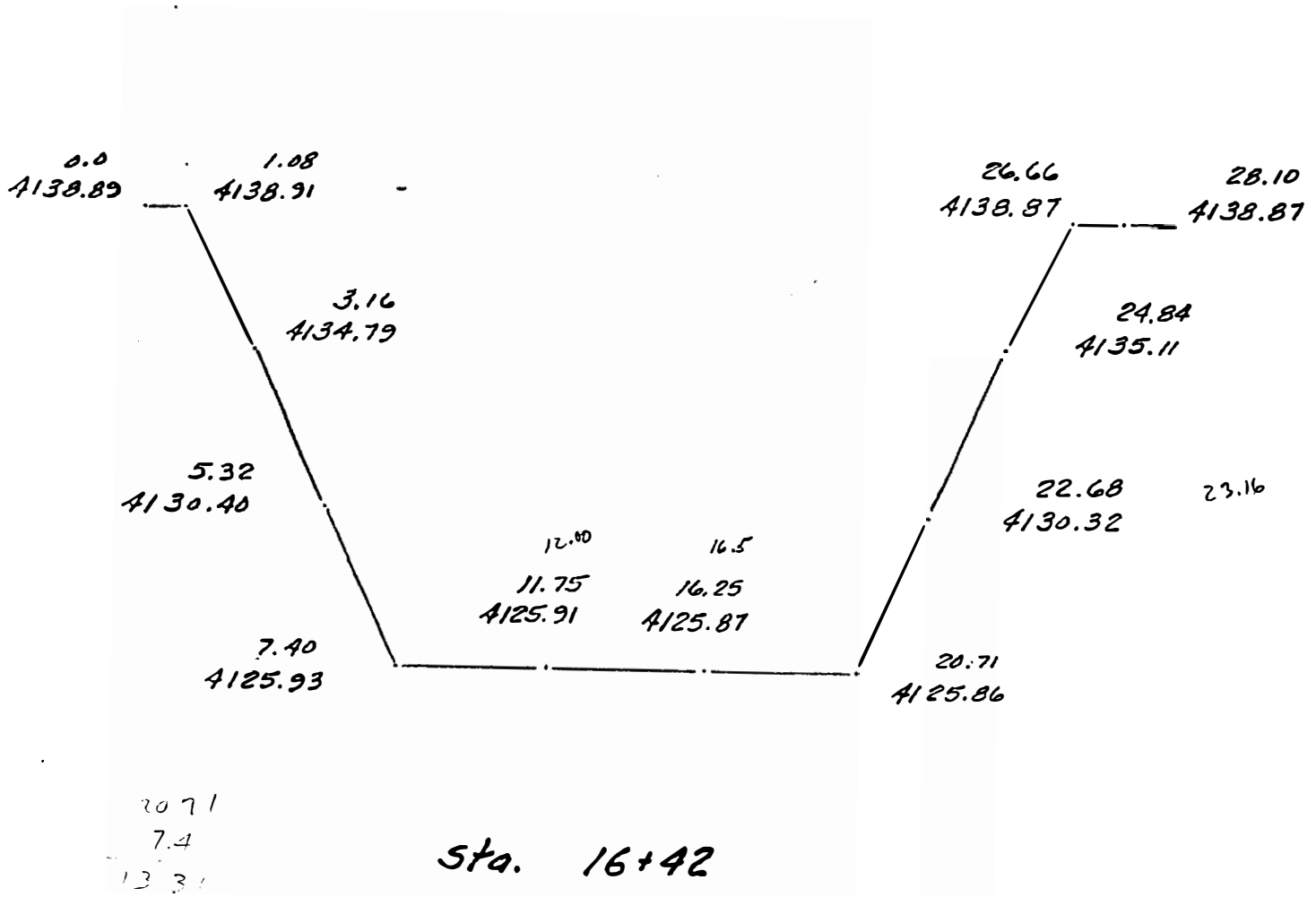
To: Paul Fujitani, Terry Martin 0-1532

From: Tom Mansfield

All coordinates accurate to ±0.01'

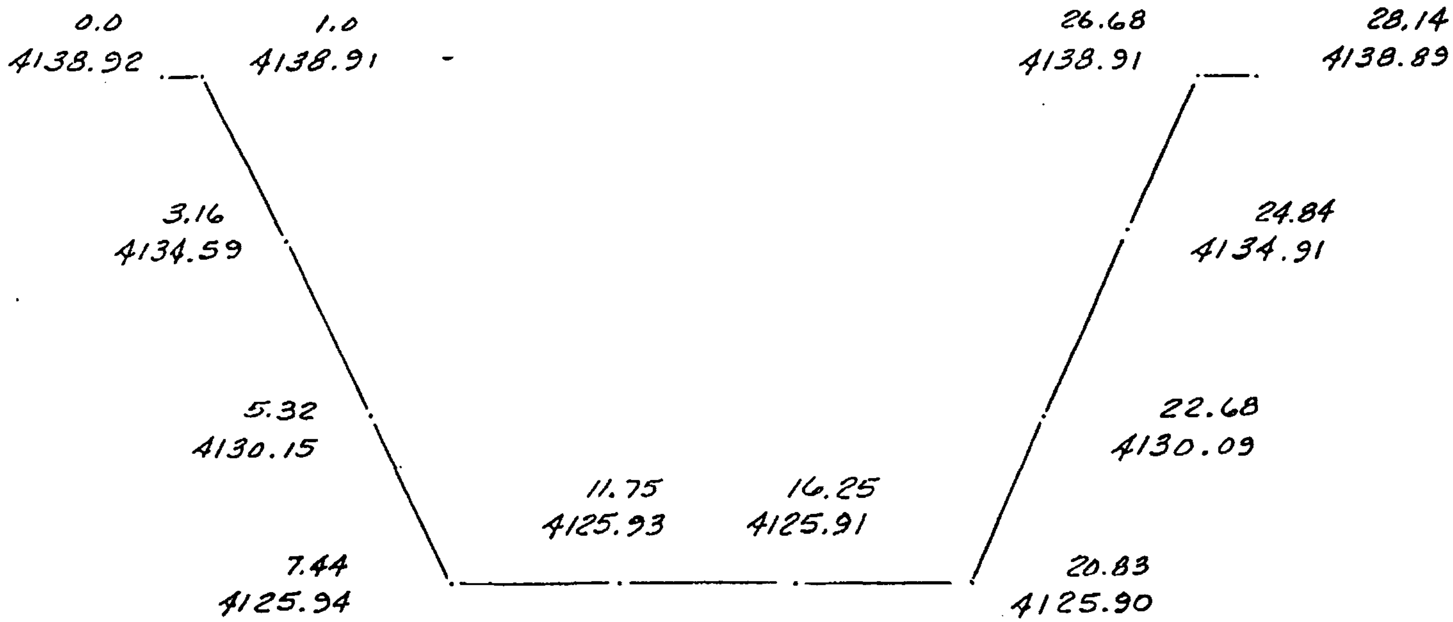
Note: horizontal coordinates for floor/right wall are .25'/.50' left of theoritical (or design) b/3/5/3 points. Call me if this confuses you.

All corners shot as constructed w/o regard to design dimensions.



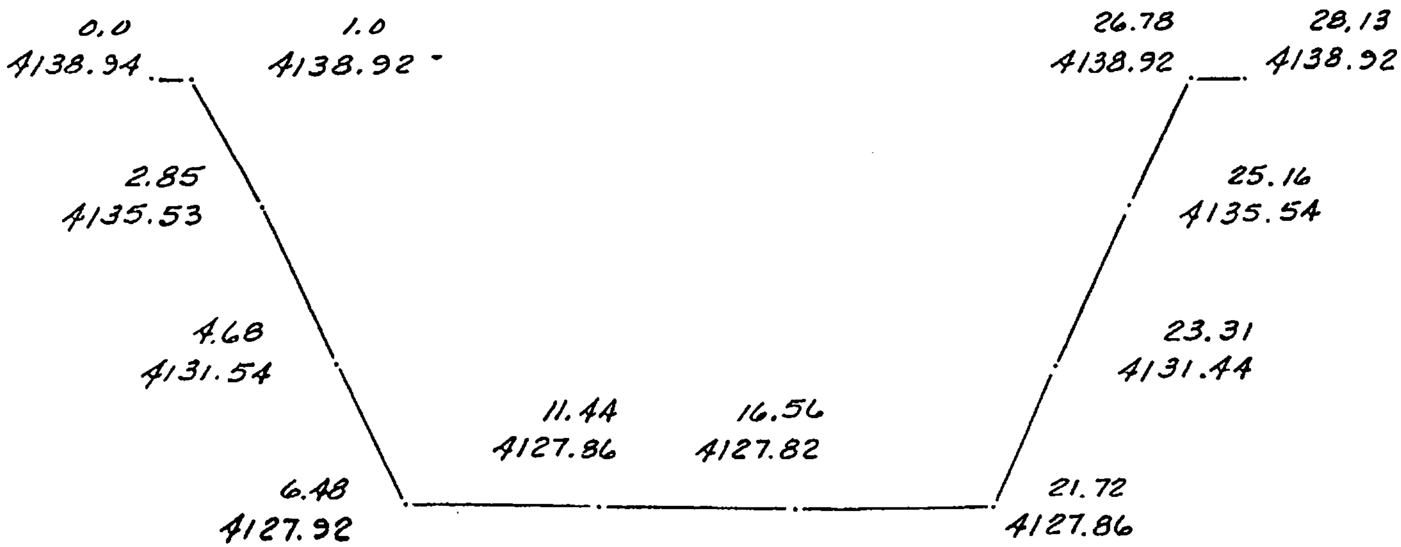
BY WMW	DATE 4-5-84	PROJECT Klamath	SHEET 1 OF 11
CHKD BY [illegible]	DATE	FEATURE D-Canal	
DETAILS Water Measurement Structure, Cross-Sections 3/27/84			

BY	umw
DATE	4-5-84
CHKD BY	
DATE	
PROJECT	Klamath
FEATURE	A- Canal
SHEET	2 OF 11
DETAILS	Water Measurement Structure, Cross-Sections

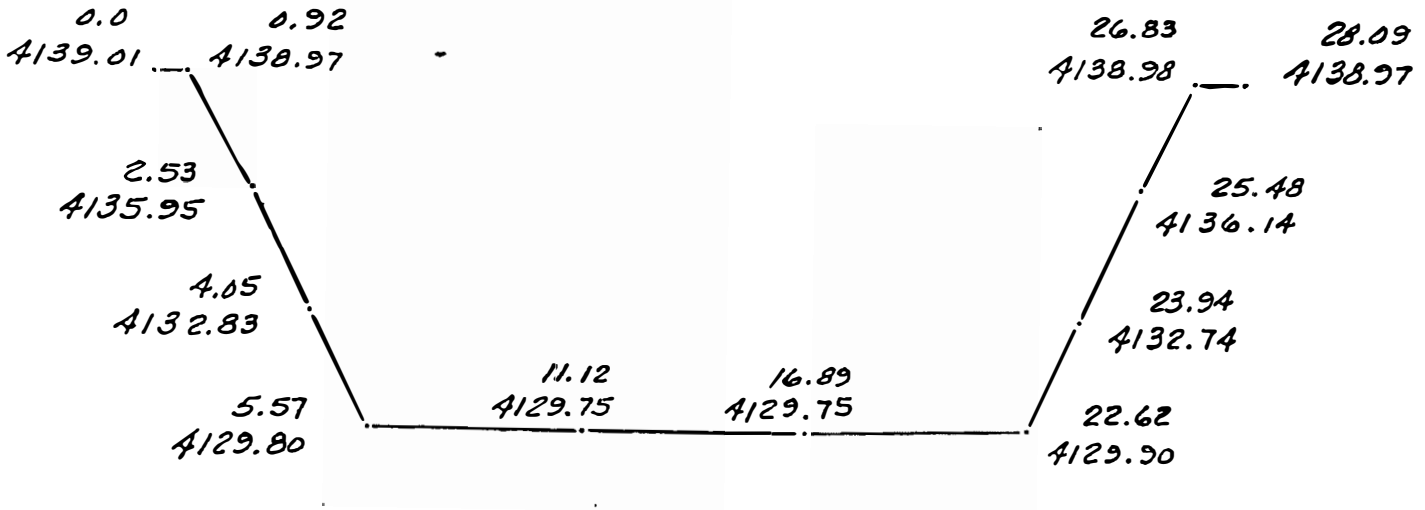


Sta. 16+52

BY: WMW | DATE: 4-5-84 | PROJECT: Klamath | SHEET 3 OF 11
CHKD BY: | DATE: | FEATURE: A-Canal
DETAILS: Water Measurement Structure, Cross-Section



Sta 16+57.75

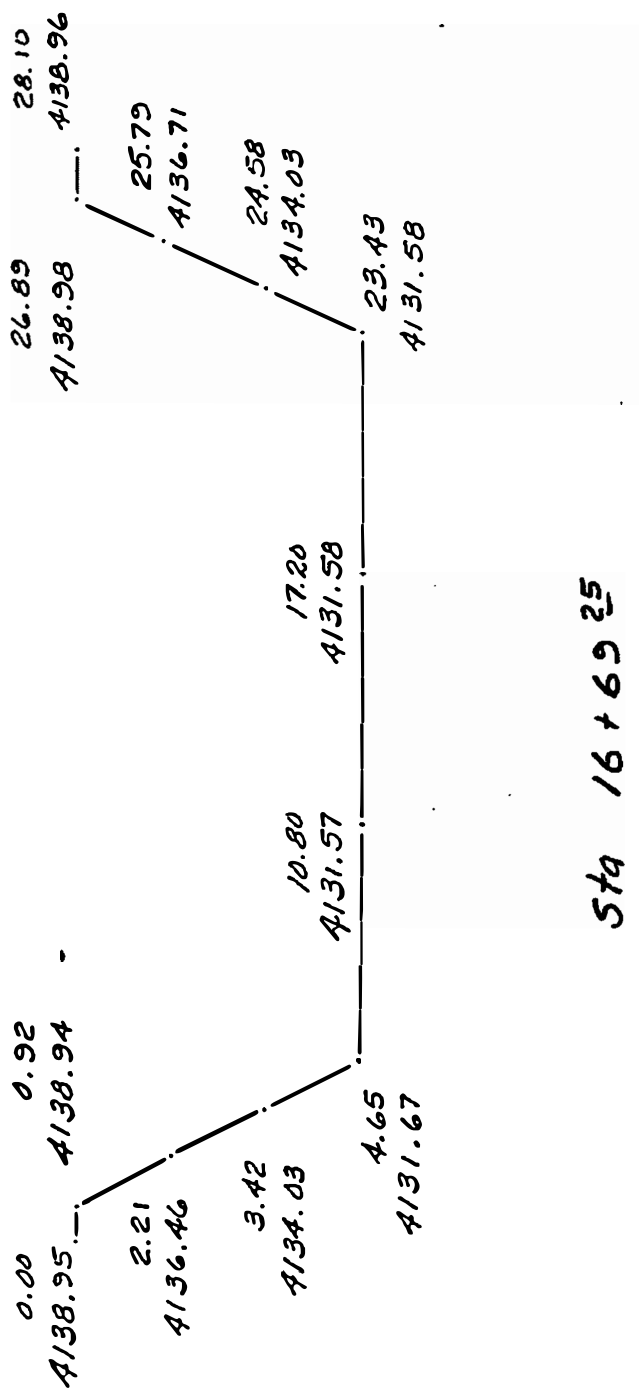


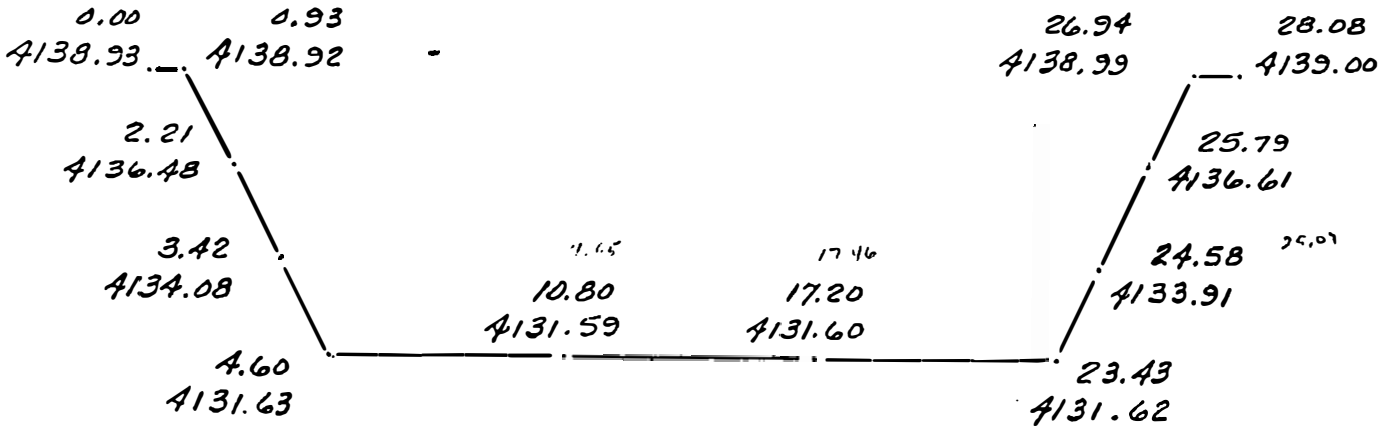
Sta 16+63 50

BY Wmw	DATE 4-5-84	PROJECT Klamath	
CHKD BY	DATE	FEATURE A-Canal	SHEET 4 OF 11
DETAILS Water Measurement Structure, Cross-Section			

BY	DATE	PROJECT	SHEET
wmw	4-5-84	Klamath	SHEET 5 OF 11
CHKD BY	DATE	FEATURE	
		A- Canal	

DETAILS Water Measurement Structure, Cross-Sections





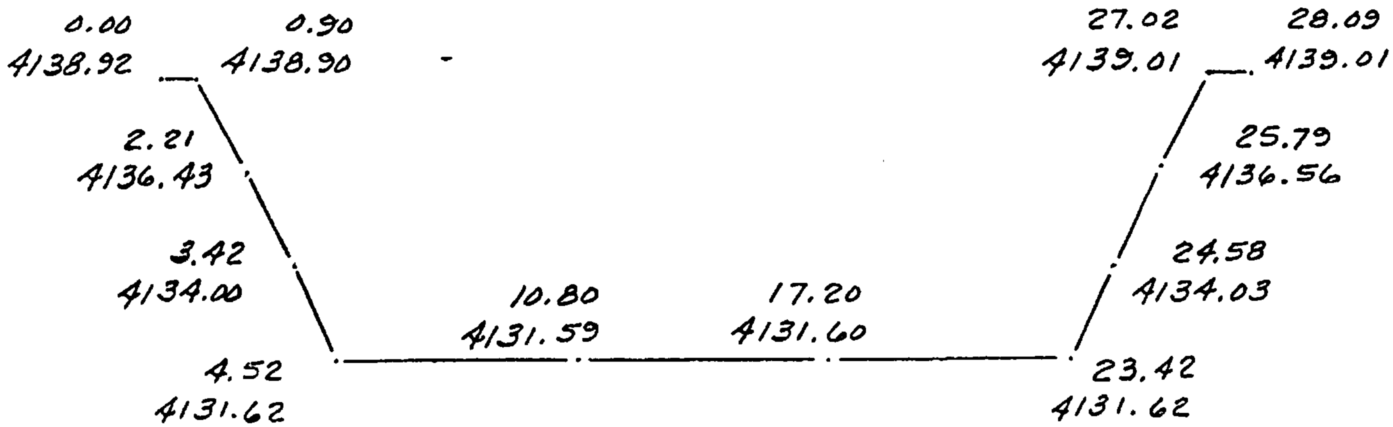
Sta 16+73 58

BY WMW	DATE 4-5-84	PROJECT Klamath	SHEET 6 OF 11
CHKD BY	DATE	FEATURE A-Canal	
DETAILS Water Measurement Structure, Cross-Section			

BY wmw | DATE 4-5-84 | PROJECT Klamath | SHEET 7 OF 11

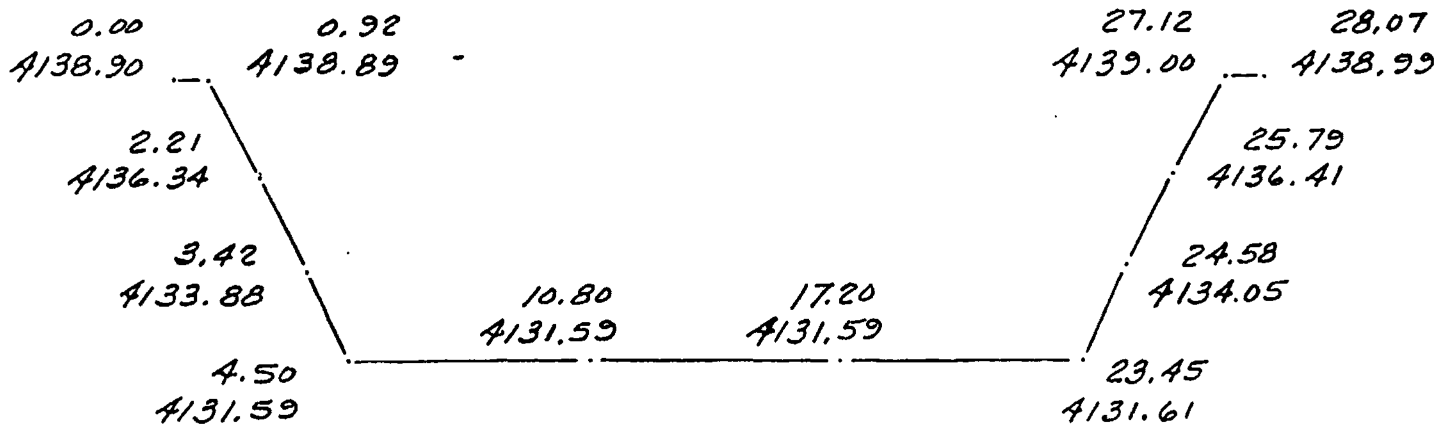
CHKD BY | DATE | FEATURE A- Canal

DETAILS Water Measurement Structure, Cross-Section

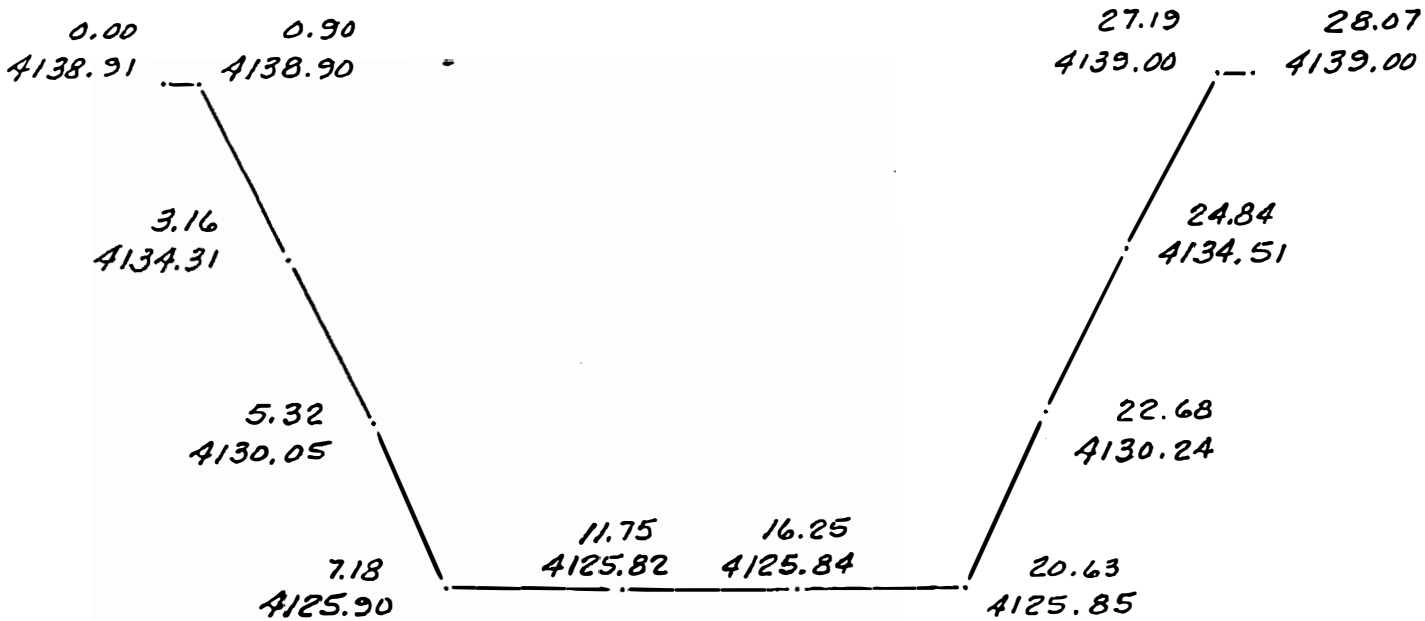


Sta 16+77 91

BY: wmw	DATE: 4-5-84	PROJECT: Klamath	SHEET 8 OF 11
CHKD BY:	DATE:	FEATURE: A-Canal	
DETAILS: Water Measurement Structure, Cross-Section			



Sta 16+82 25



Sta 16+82.25

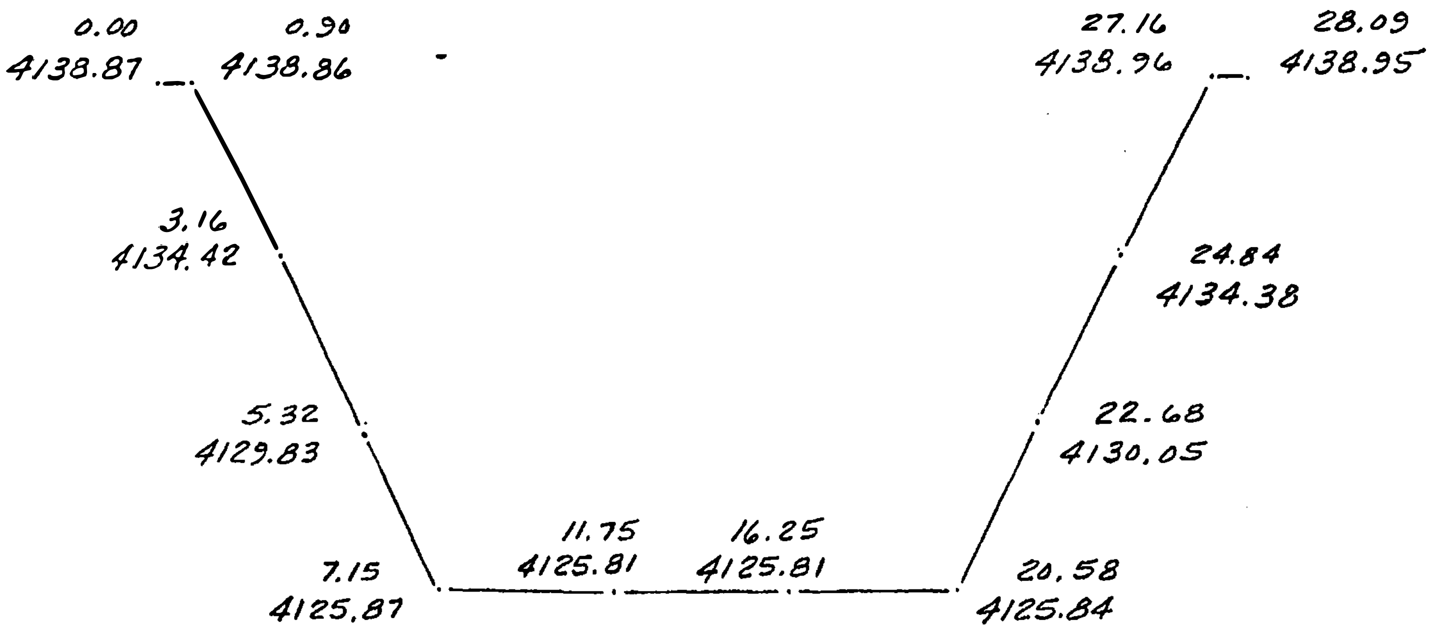
BY WMW | DATE 4-5-84 | PROJECT Klamath | SHEET 9 OF 11

CHKD BY | DATE | FEATURE A- Canal

DETAILS Water Measurement Structure, Cross-Section

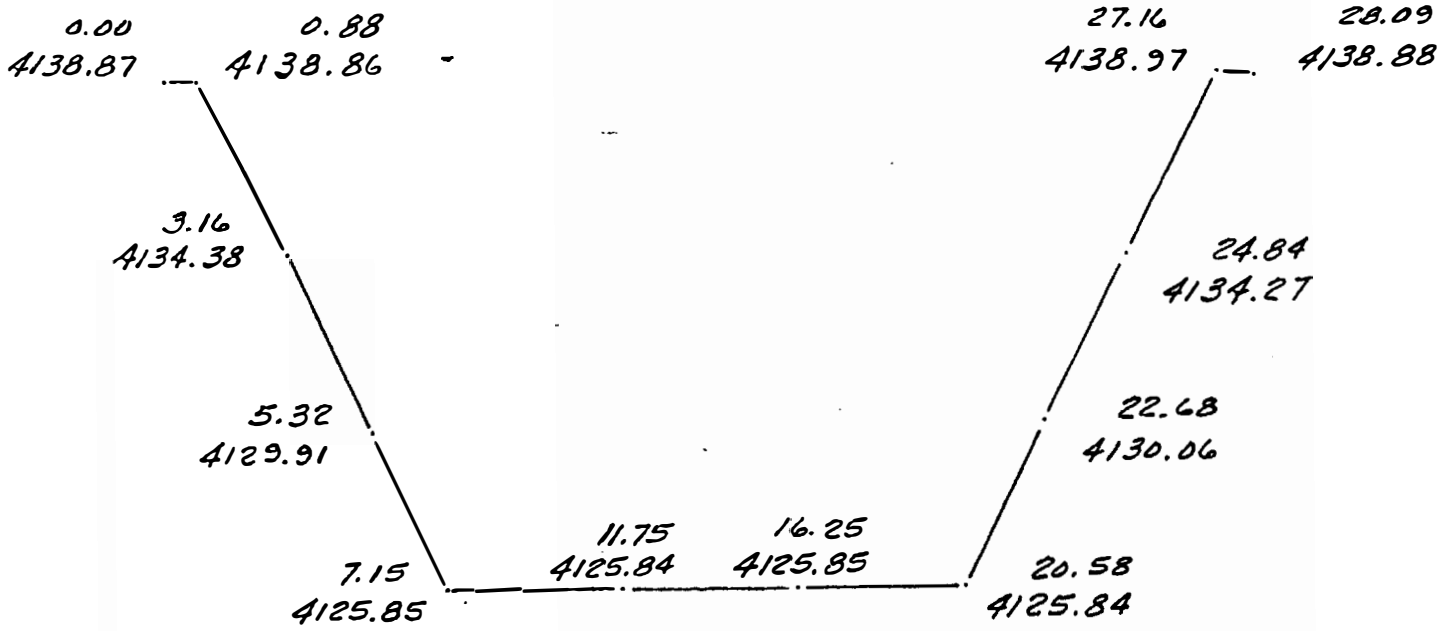
BY	DATE	PROJECT	SHEET
wmw	4-5-84	Klamath	10 OF 11
CHKD BY	DATE	FEATURE A-Canal	

DETAILS Water Measurement Structure, Cross-Section



Sta 16+92 25

Upstream of Joint



Sta 16+92 25

Downstream of Joint

BY WMW	DATE 4-5-84	PROJECT Klamath	SHEET 11 OF 11
CHKD BY	DATE	FEATURE A- Canal	
DETAILS Water Measurement Structure, Cross-Section			

CYBER 730EE DATE 84/04/16. TIME 08.51.55.

CANAL SLOPE= .000455

FLUME DIMENSIONAL DATA% SILL HEIGHT=5.715 K= .00500000 KC= .03803000

B1=13.350 Z1= .464 XL= 2.000 B3=18.906 Z3= .469
D1= 4.330 Z4= .487 CL=13.000 D3= 2.380 Z8= .485
D2= 8.920 Z5= .482 TL=17.250 D4= 4.890 Z9= .508

Y1 FT.	Q CFS	CRITICAL DEPTH-FT	FROUDE NO.AT Y	IDEAL-Q	DISC.C	V1	ALF 3	V3	YN
	Y1/CL UNDER .05 +++ FRICTIONAL PROBLEMS +++ INVALID REGION								
	RANGE WHERE XL EXCEEDS 2(Y1) SHOULD BE MINIMIZED +++ SEE INSTRUCTIONS								
.200	3.874	.11	.003	5.239	.7395	.04	1.057	1.84	.355
	Y1/CL UNDER .05 +++ FRICTIONAL PROBLEMS +++ INVALID REGION								
	RANGE WHERE XL EXCEEDS 2(Y1) SHOULD BE MINIMIZED +++ SEE INSTRUCTIONS								
.300	7.772	.18	.006	9.645	.8058	.08	1.057	2.31	.536
	Y1/CL UNDER .05 +++ FRICTIONAL PROBLEMS +++ INVALID REGION								
	RANGE WHERE XL EXCEEDS 2(Y1) SHOULD BE MINIMIZED +++ SEE INSTRUCTIONS								
.400	12.531	.24	.010	14.880	.8420	.13	1.057	2.71	.714
	Y1/CL UNDER .05 +++ FRICTIONAL PROBLEMS +++ INVALID REGION								
	RANGE WHERE XL EXCEEDS 2(Y1) SHOULD BE MINIMIZED +++ SEE INSTRUCTIONS								
.500	18.028	.31	.014	20.850	.8648	.18	1.058	3.06	.891
	Y1/CL UNDER .05 +++ FRICTIONAL PROBLEMS +++ INVALID REGION								
	RANGE WHERE XL EXCEEDS 2(Y1) SHOULD BE MINIMIZED +++ SEE INSTRUCTIONS								
.600	24.270	.38	.018	27.470	.8835	.24	1.049	3.38	1.068
	RANGE WHERE XL EXCEEDS 2(Y1) SHOULD BE MINIMIZED +++ SEE INSTRUCTIONS								
.700	31.156	.44	.023	34.700	.8978	.30	1.042	3.68	1.245
	RANGE WHERE XL EXCEEDS 2(Y1) SHOULD BE MINIMIZED +++ SEE INSTRUCTIONS								
.800	38.631	.51	.027	42.510	.9087	.36	1.036	3.95	1.421
	RANGE WHERE XL EXCEEDS 2(Y1) SHOULD BE MINIMIZED +++ SEE INSTRUCTIONS								
.900	46.666	.58	.032	50.860	.9175	.43	1.032	4.21	1.597
	RANGE WHERE XL EXCEEDS 2(Y1) SHOULD BE MINIMIZED +++ SEE INSTRUCTIONS								
1.000	55.236	.65	.037	59.740	.9247	.50	1.029	4.46	1.773
1.100	64.316	.71	.042	69.110	.9306	.57	1.026	4.69	1.949
1.200	73.890	.78	.047	78.980	.9356	.64	1.024	4.91	2.125
1.300	83.946	.85	.053	89.320	.9399	.72	1.022	5.12	2.302
1.400	94.469	.92	.058	100.100	.9436	.80	1.020	5.32	2.478
1.500	105.449	.99	.063	111.400	.9468	.87	1.019	5.52	2.655
1.600	116.876	1.06	.068	123.100	.9497	.95	1.018	5.70	2.832
1.700	128.746	1.13	.074	135.200	.9522	1.03	1.017	5.89	3.009
1.800	141.048	1.19	.079	147.800	.9545	1.11	1.016	6.06	3.187
1.900	153.786	1.26	.084	160.800	.9566	1.19	1.015	6.24	3.365
2.000	166.940	1.33	.089	174.200	.9585	1.28	1.014	6.40	3.543
2.100	180.513	1.40	.095	188.000	.9602	1.36	1.013	6.57	3.722
2.200	194.499	1.48	.100	202.200	.9617	1.44	1.013	6.73	3.900
2.300	208.895	1.55	.105	216.900	.9632	1.52	1.012	6.88	4.079
2.400	223.697	1.62	.110	231.900	.9645	1.61	1.012	7.04	4.259
2.500	238.902	1.69	.115	247.400	.9657	1.69	1.011	7.18	4.438
2.600	254.502	1.76	.120	263.200	.9668	1.77	1.011	7.33	4.618
2.700	270.507	1.83	.125	279.500	.9679	1.86	1.010	7.47	4.798
2.800	286.909	1.90	.131	296.100	.9689	1.94	1.010	7.62	4.979
2.900	303.704	1.98	.136	313.200	.9697	2.03	1.009	7.75	5.159
3.000	320.891	2.05	.140	330.600	.9706	2.11	1.009	7.89	5.340
3.100	338.469	2.12	.145	348.400	.9715	2.20	1.009	8.02	5.521

3.200	356.437	2.19	.150	366.600	.9722	2.28	1.008	8.15	5.701
3.300	374.792	2.27	.155	385.200	.9730	2.36	1.008	8.28	5.882
3.400	393.533	2.34	.160	404.200	.9737	2.45	1.008	8.41	6.063
3.500	412.661	2.41	.165	423.500	.9743	2.53	1.008	8.54	6.245
3.600	432.175	2.49	.169	443.300	.9750	2.62	1.007	8.66	6.426
3.700	452.074	2.56	.174	463.400	.9756	2.70	1.007	8.78	6.607
3.800	472.357	2.63	.178	483.900	.9761	2.78	1.007	8.90	6.789
3.900	493.025	2.71	.183	504.800	.9767	2.87	1.007	9.02	6.970
4.000	514.076	2.78	.188	526.100	.9772	2.95	1.007	9.14	7.152
4.100	535.509	2.86	.192	547.700	.9777	3.04	1.006	9.25	7.334

17

3.4825 0.965 2
0.5000

FORM 1411-3

PRINTED IN U.S.A.

CYBER 730EE DATE 84/04/16. TIME 08.51.57.

CANAL SLOPE= .000455

FLUME DIMENSIONAL DATA% SILL HEIGHT=5.715 K= .00500000 KC= .03803000

B1=13.350	Z1=	.464	XL= 2.000	B3=18.906	Z3=	.469	
D1= 4.330	Z4=	.487	CL=13.000	D3= 2.380	Z8=	.485	
D2= 8.920	Z5=	.482	TL=17.250	D4= 4.880	Z9=	.508	

Y1 FT.	Q CFS	CRITICAL DEPTH-FT	FROUDE NO.AT Y	IDEAL-Q	DISC.C	V1	ALF 3	V3	YN
4.200	557.300	2.93	.196	569.800	.9782	3.12	1.006	9.37	7.515
4.300	579.532	3.01	.201	592.200	.9787	3.20	1.006	9.48	7.697
4.400	602.113	3.08	.205	615.000	.9791	3.29	1.006	9.59	7.879
4.500	625.074	3.16	.210	638.100	.9796	3.37	1.006	9.70	8.061
4.600	648.416	3.24	.214	661.700	.9800	3.45	1.006	9.81	8.243
4.700	672.140	3.31	.218	685.600	.9804	3.53	1.005	9.92	8.425
4.800	696.244	3.39	.222	709.900	.9808	3.62	1.005	10.00	8.607
4.900	720.729	3.46	.226	734.600	.9811	3.70	1.005	10.10	8.789
5.000	745.595	3.54	.230	759.600	.9815	3.78	1.005	10.20	8.970
5.100	770.841	3.62	.235	785.000	.9819	3.86	1.005	10.30	9.152
5.200	796.468	3.70	.239	810.900	.9822	3.94	1.005	10.40	9.334
5.300	822.426	3.77	.243	837.100	.9825	4.03	1.005	10.50	9.516
5.400	848.815	3.85	.246	863.700	.9828	4.11	1.005	10.60	9.698
5.500	875.584	3.93	.250	890.600	.9831	4.19	1.004	10.70	9.880
	SUBMERGENCE LIMIT EXCEEDED +.80 MEASUREMENT REGION QUESTIONABLE								
5.600	902.770	4.01	.254	917.900	.9835	4.27	1.004	10.80	10.062
	SUBMERGENCE LIMIT EXCEEDED +.82 MEASUREMENT REGION QUESTIONABLE								
5.700	930.302	4.08	.258	945.600	.9838	4.35	1.004	10.90	10.244
	SUBMERGENCE LIMIT EXCEEDED +.84 MEASUREMENT REGION QUESTIONABLE								
5.800	958.215	4.16	.262	973.700	.9841	4.43	1.004	11.00	10.425
	SUBMERGENCE LIMIT MUCH EXCEEDED +.85 MEASUREMENT REGION HIGHLY QUESTIONABLE								
5.900	986.510	4.24	.266	1002.000	.9844	4.51	1.004	11.10	10.607
	SUBMERGENCE LIMIT MUCH EXCEEDED +.87 MEASUREMENT REGION HIGHLY QUESTIONABLE								
6.000	1015.186	4.32	.269	1031.000	.9847	4.59	1.004	11.20	10.789

CAUTION SHOULD ALWAYS BE USED REGARDING LOW VELOCITIES IN APPROACH SECTION.

TA CHANGE CODE; (1 TO 10),END=0,COMPUTE=10
)START,INCREMENT,AND LIMIT=
TA CHANGE CODE; (1 TO 10),END=0,COMPUTE=10

CYBER 730FE DATE 84/04/16. TIME 08.52.55.

CANAL SLOPE= .000455

FLUME DIMENSIONAL DATA% SILL HEIGHT=5.715 K= .00500000 KC= .03803000

B1=13.350 Z1= .464 XL= 2.000 B3=18.906 Z3= .469
D1= 4.330 Z4= .487 CL=13.000 D3= 2.380 Z8= .485
D2= 8.920 Z5= .482 TL=17.250 D4= 4.880 Z9= .508

Y1 FT.	Q CFS	CRITICAL DEPTH-FT	FROUDE NO.AT Y	IDEAL-Q	DISC.C	V1	ALF 3	V3	YN
	SUBMERGENCE LIMIT MUCH EXCEEDED +.87			MEASUREMENT REGION HIGHLY QUESTIONABLE					
6.020	1021.000	4.34	.270	1037.000	.9847	4.60	1.004	11.20	10.826
	SUBMERGENCE LIMIT MUCH EXCEEDED +.87			MEASUREMENT REGION HIGHLY QUESTIONABLE					
6.022	1021.546	4.34	.270	1037.000	.9847	4.61	1.004	11.20	10.829
	SUBMERGENCE LIMIT MUCH EXCEEDED +.87			MEASUREMENT REGION HIGHLY QUESTIONABLE					
6.024	1022.125	4.34	.270	1038.000	.9847	4.61	1.004	11.20	10.833
	SUBMERGENCE LIMIT MUCH EXCEEDED +.87			MEASUREMENT REGION HIGHLY QUESTIONABLE					
6.026	1022.704	4.34	.270	1039.000	.9847	4.61	1.004	11.20	10.836
	SUBMERGENCE LIMIT MUCH EXCEEDED +.87			MEASUREMENT REGION HIGHLY QUESTIONABLE					
6.028	1023.284	4.34	.270	1039.000	.9847	4.61	1.004	11.20	10.840
	SUBMERGENCE LIMIT MUCH EXCEEDED +.87			MEASUREMENT REGION HIGHLY QUESTIONABLE					
6.030	1023.863	4.34	.271	1040.000	.9847	4.61	1.004	11.20	10.844
	SUBMERGENCE LIMIT MUCH EXCEEDED +.87			MEASUREMENT REGION HIGHLY QUESTIONABLE					
6.032	1024.443	4.34	.271	1040.000	.9847	4.61	1.004	11.30	10.847
	SUBMERGENCE LIMIT MUCH EXCEEDED +.87			MEASUREMENT REGION HIGHLY QUESTIONABLE					
6.034	1025.023	4.35	.271	1041.000	.9847	4.62	1.004	11.30	10.851
	SUBMERGENCE LIMIT MUCH EXCEEDED +.87			MEASUREMENT REGION HIGHLY QUESTIONABLE					
6.036	1025.603	4.35	.271	1041.000	.9847	4.62	1.004	11.30	10.855
	SUBMERGENCE LIMIT MUCH EXCEEDED +.87			MEASUREMENT REGION HIGHLY QUESTIONABLE					
6.038	1026.183	4.35	.271	1042.000	.9848	4.62	1.004	11.30	10.858
	SUBMERGENCE LIMIT MUCH EXCEEDED +.87			MEASUREMENT REGION HIGHLY QUESTIONABLE					
6.040	1026.763	4.35	.271	1043.000	.9848	4.62	1.004	11.30	10.862
	SUBMERGENCE LIMIT MUCH EXCEEDED +.87			MEASUREMENT REGION HIGHLY QUESTIONABLE					
6.042	1027.344	4.35	.271	1043.000	.9848	4.62	1.004	11.30	10.866
	SUBMERGENCE LIMIT MUCH EXCEEDED +.87			MEASUREMENT REGION HIGHLY QUESTIONABLE					
6.044	1027.924	4.35	.271	1044.000	.9848	4.62	1.004	11.30	10.869
	SUBMERGENCE LIMIT MUCH EXCEEDED +.87			MEASUREMENT REGION HIGHLY QUESTIONABLE					
6.046	1028.505	4.36	.271	1044.000	.9848	4.62	1.004	11.30	10.873
	SUBMERGENCE LIMIT MUCH EXCEEDED +.87			MEASUREMENT REGION HIGHLY QUESTIONABLE					
6.048	1029.086	4.36	.271	1045.000	.9848	4.63	1.004	11.30	10.876
	SUBMERGENCE LIMIT MUCH EXCEEDED +.87			MEASUREMENT REGION HIGHLY QUESTIONABLE					
6.050	1029.667	4.36	.271	1046.000	.9848	4.63	1.004	11.30	10.880
	SUBMERGENCE LIMIT MUCH EXCEEDED +.87			MEASUREMENT REGION HIGHLY QUESTIONABLE					
6.052	1030.248	4.36	.271	1046.000	.9848	4.63	1.004	11.30	10.884
	SUBMERGENCE LIMIT MUCH EXCEEDED +.87			MEASUREMENT REGION HIGHLY QUESTIONABLE					
6.054	1030.830	4.36	.271	1047.000	.9848	4.63	1.004	11.30	10.887
	SUBMERGENCE LIMIT MUCH EXCEEDED +.87			MEASUREMENT REGION HIGHLY QUESTIONABLE					
6.056	1031.411	4.36	.271	1047.000	.9848	4.63	1.004	11.30	10.891
	SUBMERGENCE LIMIT MUCH EXCEEDED +.87			MEASUREMENT REGION HIGHLY QUESTIONABLE					
6.058	1031.993	4.37	.272	1048.000	.9848	4.63	1.004	11.30	10.895
	SUBMERGENCE LIMIT MUCH EXCEEDED +.87			MEASUREMENT REGION HIGHLY QUESTIONABLE					
6.060	1032.575	4.37	.272	1049.000	.9848	4.64	1.004	11.30	10.898

CAUTION SHOULD ALWAYS BE USED REGARDING LOW VELOCITIES IN APPROACH SECTION.

9+00

30+00

Elevation (ft)

4138

4137

4136

Ramp flume, Sta 28+00

WS

Q = 1050 ft³/s

Ramp flume, Sta 16+50

4138

4137

4136

WS

Q = 1050 ft³/s

9+00

30+00

Q = 1050 ft³/s from backwater computations

4137

4136

WS

4135

WS

Q = 905 ft³/s
from 1981 data, drawing
12-201-5302

4130

Elevation (ft)

invert

4120

9+00

30+00

Station (ft)

A-CANAL RAMP FLUMES
KLAMATH PROJECT