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DRAINAGE REPORT
SUN VALLEY PARKWAY PHASE II
(STATION 410 + 00 - 1023 +95)
CWW NO. 850840-9
MARICOPA COUNTY, ARIZONA

VOLUME I

04.0-00-2-03/87

DRAINAGE REPORT
SUN VALLEY PARKWAY PHASE II
(STATION 410 + 00 - 1023 +95)
CWW NO. 850840-9
MARICOPA COUNTY, ARIZONA

VOLUME I

Prepared for
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March, 1987
Revised April, 1987

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TABLE OF CONTENTS

I. INTRODUCTION.....1

II. DESCRIPTION OF AREA AND MAJOR DRAINAGE FEATURES.....1

III. PROPOSED DEVELOPMENT AND DRAINAGE SYSTEM.....2

IV. ANALYSIS PROCEDURES.....4

V. EXHIBITS
1. Location Map
2. Drainage Area Map (In Back Pocket)

VI. APPENDIX
A. Tables
I. Precipitation Values
II. Runoff and Culvert Summary
III. Pavement Drainage Worksheets
IV. Median Drainage Worksheets
V. Channel Design Summary
VI. Hydrology Data Summary
VII. Culvert Scour Calculations
VIII. Roughness Coefficient
B. Figures
2-5. Time of Concentration - Areas Less Than 10 Square Miles
2-8. Time of Concentration Overland Flow Graph
2-21. Runoff Coefficient vs. Curve Number Graph
3-1. Time of Concentration Kirpich Nomograph
3-2. Rainfall Intensity Curves
3-3. Values of Runoff Coefficient C
6-3. Standard Drawing 7-N-20104
C. Design Data Sheets
Hydrologic Design Data Sheets
Culvert Design Sheets
Channel Calculations
Roadside Ditch Calculations
Natural Channel Velocity Calculations
HEC-1 Runoff Summary Printouts
HEC-2 Backwater Analysis Wagner Wash
HEC-2 Backwater Analysis South Side Channel

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I. INTRODUCTION

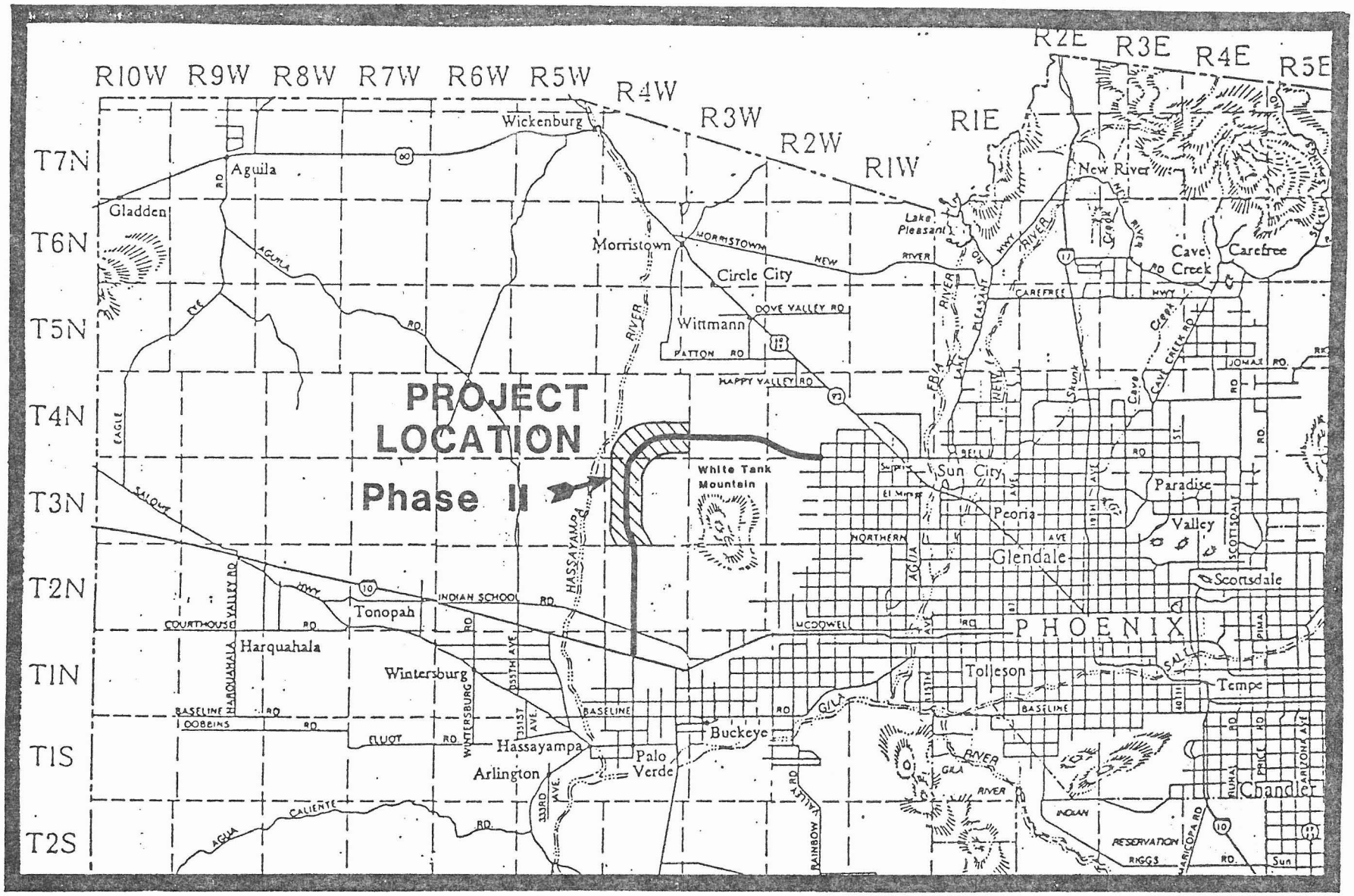
This drainage report is for Phase II of the Sun Valley Parkway. The extension of 291st Avenue (Palo Verde Road) for approximately 11.6 miles from Station 410+00 to Station 1023+95 as a portion of the development for the proposed master planned community of Sun Valley, Arizona. Collar, Williams & White Engineering Inc. was contracted by the Adams Group, Inc. to prepare the construction plans and drainage report for this road.

This report quantifies the amount of runoff that will cross the roadway in the 100-year storm and sizes the culverts and channels necessary to keep the road surface dry. This report is only for the roadway improvements and is not intended to be used as master drainage study for future development. It is the future development's responsibility to not adversely impact the highway.

II. DESCRIPTION OF AREA AND MAJOR DRAINAGE FEATURES

This project area is located in Townships 3 and 4 North and Range 4 West of Maricopa County and lies between the White Tank Mountains to the east and south, the Hassayampa River to the west and the Central Arizona Project Canal to the north. (See Exhibit 1 - Location Map). The surrounding area is undeveloped desert rangeland.

The parkway in Phase II crosses over Wagner Wash twice. Wagner Wash is the biggest and only named wash crossed by the entire 28 miles of parkway. The area contributing runoff that crosses the road alignment elsewhere consists of a portion of the and northern side of the White Tank Mountains, the lower alluvial fan slopes at the base of the White Tanks, and the remnant fan slope north of Wagner Wash. The land generally slopes to the east or northeast and drains directly into the Hassayampa River or Wagner Wash which also drains to the Hassayampa.



LOCATION MAP

Exhibit - 1

The alluvial fan slope area, across which the proposed road will be built, is characterized by a number of active washes, braided split-flow channels, and overland sheet flow. The washes intersecting most of the north-south section of the road are predominantly incised with well-defined, stable ridges in between. The remaining washes crossing the road for the most part have wide braided channels with evidence of overbank flow and sheet flow and are relatively unstable and unpredictable.

There are no major man-made improvements in the area crossed by this phase of the parkway. The CAP is the only major improvement which has some impact on the parkway. The CAP cuts off a seven square mile of watershed area north of the CAP which drains into Wagner Wash. According to Lowell Heaton, U.S. Bureau of Reclamation, the CAP overchutes are the only outlets for flow from this area. Inflow to Wagner from this area is reduced by the design of the CAP which reduces the 100 year 6 hour duration peak from 1669 cfs to 356 cfs per each overchute. The CAP reduces the peak by providing 292 acre feet of storage behind the canal.

III. PROPOSED DEVELOPMENT AND DRAINAGE SYSTEM

This project consists of a 6-lane parkway including a raised median. The Maricopa County Highway Department has stipulated that this road be designed with a 70 mile-per-hour design speed and that crossroad drainage structures are to be designed for a flow of a 100 year, 1 hour duration storm with pavement and median designed for a 100 year storm.

The proposed drainage system for the road consists of a series of collection channels along the upstream side of the road to collect overbank and sheet flows and direct these flows to the the main channels. Concrete box culverts or pipe culverts are placed in main channels to carry stormwater under the roadway. The culverts have been designed to carry the runoff from a 100-year storm with the headwater maximum at shoulder elevation. Pipe culverts are reinforced

concrete pipes or CSP pipes. In those areas where the cover depth is between one and two feet Class IV pipe was used for RC pipes. Catch basins have been located at sufficient spacing in the median to collect the water that falls in the median to prevent runoff from overtopping the curbs in a 100-year storm, although the minimum requirement is only for the 10 year storm.

The proposed drainage system for the east-west portion of Phase II includes a large collector channel running 2 3/4 miles along the south side of the road outleting directly into Wagner Wash. This southside channel will intercept all runoff from eleven major drainage areas and eliminate the need for at least eleven major box culverts and numerous smaller culverts plus reduce the size of the culvert needed at the upper Wagner Wash crossing. These eleven areas and numerous washes all naturally flow northwesterly, crossing the parkway alignment into Wagner Wash which then flows southwesterly crossing back under the parkway again. In addition to the economic savings associated with the parkway construction, the interception of the runoff will greatly enhance the developability of the downstream property between the parkway and Wagner Wash by completely eliminating the need to deal with the numerous channels and complex offsite flows.

The channel is being sized with at least one half a foot of freeboard. A series of catch basins within the parkway will intercept street runoff from the parkway along superelevated sections and convey it into side ditches.

Future development upstream of the roadway may increase runoff from present conditions, however, it will not affect the performance of the hydraulic structures on the project because design discharges were derived using projected future condition runoff curve numbers in addition to County retention requirements, which are designed to prevent an increase in runoff.

Ponding during the 100 year event will occur upstream of culverts, however, the proposed project will have minimal effect on drainage flows and flood levels except for the southside channel which will be beneficial. In the case of areas of unpredictable split flow

situations the road will improve the developability of downstream areas because the culverts will cutoff or convey flows in a well defined location which will permit easier and safer planning and development of the areas.

IV. ANALYSIS PROCEDURES

Watershed areas for the area draining across the project are delineated on Exhibit 2, the Drainage Area Map, which is a combination of U.S.G.S. quadrangle maps overlayed on Orthophoto quads obtained from the State Land Department. Watershed boundaries were also confirmed with 1985 aerial photography of the entire watershed area at a scale of 1"= 1000' and with contact prints of the strip aerial photography used for the topographic mapping of the road alignment at a scale of 1"=400'.

Peak discharges for the watershed areas were determined using the Rational formula for areas less than 100 acres in size and using the Corps of Engineers HEC-1 Computer Program with the SCS runoff curve number and dimensionless unit hydrograph options for areas in excess of 100 acres. The drainage areas on the slopes of the White Tank Mountains were assumed to have curve numbers of 93 based on "D" hydrologic soil group and five percent desert brush vegetative cover. The flatter desert areas were assumed to have a curve number of 83 in an undeveloped condition, based on "B" hydrologic soil group and 15% desert brush. A curve number of 86 was used in the calculations to account for a potential increase in runoff due to future development based on "B" soils with average R1-70 single family development. Likewise, a runoff coefficient of 0.50 was used in the rational method calculations instead of the undeveloped desert runoff coefficient of 0.35 to account for future development (value obtained by using City of Scottsdale's Figure 2-21.).

Times of concentration for each drainage area were determined using Figure 3-1, in the Appendix, for flow in the washes and Figure 2-8 for overland flow (velocity in parenthesis on calculation sheets). TLAG in

the HEC-1 calculations is 0.6 TC. A precipitation value of 2.55 inches for the 100-year, one-hour duration storm were determined using the nearest station (Buckeye) see Table 3-1 in the Appendix. Rainfall intensities for the rational method were obtained from Figure 3-2 in the Appendix.

Future upstream development as in all cases must take into account the contributing area assumptions used in the design the parkway drainage structures so that significant upstream diversions from one area to another are not made. Natural conditions are such that a minor unintential improvement in the wrong location could cause a significant major diversion of flows.

Runoff hydrographs were combined at the concentration points of the drainage areas as they intersect the proposed roadway to determine the peak 100-year runoff that would intersect the road. A summary of the 100-year peak flows and the culverts designed to carry the flows under the road are shown in Table II. Copies of the HEC-1 computer runs are included in the Appendix. Rational method design forms for small drainage areas are included in the Appendix.

The design of CAP overchutes and storage capacity requires that the storage area be filled before water will pass over the overchutes, thus, delaying the peak out flow until Wagner Wash has already peaked.

Without even considering the effect of the CAP, the area north of Wagner Wash is so flat compared to the areas draining off the White Tanks that because of the Timing of flows it does not contribute to the peak at the Wagner Wash crossings.

Time to peak for the area inflowing into the CAP storage area is 2.5 hours and even assuming no delay in out flow there is another 0.60 hours of routing time to get to the upper crossing. While the time to peak at the upper Wagner Wash crossing occurs at 1.9 hours.

Runoff from the small areas calculated separately using the Rational Method is a conservative approach in accounting for all runoff on the upstream side of the road. These areas drain directly into the upstream side of the road and are not tributary to a larger wash. These areas could have been lumped in with the contributing area above the next downstream concentration point in the HEC-1 model however the small percentage increase in drainage area would have less effect on the design discharge value than if figured separately, as was done.

Concrete box culverts and pipe culverts were designed using Hydraulic Engineering Circulars #5 and #10 from the U.S. Department of Commerce, Bureau of Public Roads. Culvert design forms are included in the Appendix.

Catch basins were placed in the median at the low points of sag vertical curves and were also spaced at sufficient intervals on continuous grades so that the water carrying capacity of the median was not exceeded. The minimum capacity of the median swale (@ S = 0.32%) is 2.0 cfs. Using the Rational formula a 100-year storm would produce 0.85 cubic feet per second of runoff per 1000 feet of median length (Q = CIA = 0.35 x 6.6"/hr x .37 acres = 0.85 cfs). The runoff coefficient of 0.35 was selected from ADOT's Figure 3-3 based on worst case values for lawn or playground conditions. Therefore the maximum catch basin spacing is 1200 feet (1.2 x 0.85 = 1.0 cfs) where the slope is at the minimum. Containment dikes were placed immediately downstream from median catch basins to provide ponding depths of 0.36 feet above the top of the grate.

Pavement drainage and catch basin calculations are summarized in Tables III A, III-B, and III-C. The amount of runoff intercepted by the catch basins were determined using the equations on the page following Table III. The sizes and spacings were selected so that the width of the water spread across the street will generally leave 2 lanes of roadway dry in a 100 year storm.

ADOT recommendations obtained from 1972 Training Manual were used as a guide in evaluating the need for scour protection at the outlet of culverts. Culvert outlet velocity was compared to natural channel velocity. If the outlet velocity was less than 1.5 times the natural or the drainage area size less than 64 acres no protection is required. In no case did outlet velocity exceeded natural by more than 2.5 therefore energy dissapators were not recommended. A quantitive scour analysis was also done using HEC-14 procedures, as recommended, with results shown in Table VII. Areas with an asterisk have less than 4.0 feet of scour depth or don't need outlet protection based on the ADOT recommendations referred to above.

Grouted rip-rap aprons which are being installed to the end of the wingwalls on all box culverts will protect the culvert where depths of scour are greater than 4.0 feet. The apron will move the location of potential maximum scour depth downstream away from the end wall foundation by providing an area to spread out and decrease flow concentration before outletting into the natural channel.

The recommended procedure contained in HEC-14 is to provide at least minimum protection and then inspect the outlet channel after major storms to determine if protection must be increased or extended, which we have more than complied with by having a minimum 4.0 feet cut off wall on all boxes and by providing an apron at the outlet.

Roadside ditches and improved channels were evaluated for scour protection by determining velocity at the design discharge for channels and bank full discharge for roadside ditches. Based average soil conditions and maximum permissable velocities (from SCS Stnd. Drwg. No. 7-N-20104 in Appendix) if channel velocity exceeded 5.0 fps or ditch flow exceeded 6.0 generally lining or installation of drop structures or a combination of both were recommended. (See calculation sheets in the Appendix). Slightly higher velocities were accepted on roadside ditches because of the conservative assumption that ditches would be bank full (to edge of road shoulder) when in most cases their is not a large enough contributing area to fill the ditches.

On the downslope side of the parkway, in most cases, no ditch calculations were performed because of the small quantity of runoff which will be carried in these ditches. Pavement drainage is generally the only runoff entering these ditches.

An additional factor applied to evaluating the need for protection on the uphill roadside ditches was also the amount of contributing area. In many cases if the ditches were full, velocities would be higher than maximum permissible, but many of these steeper sections of roadside ditches are also only collecting pavement drainage, and would never flow full, therefore, protection was not recommended.

VI. APPENDIX

A. TABLES

TABLE I

ESTIMATED RETURN PERIODS FOR SHORT-DURATION PRECIPITATION IN ARIZONA
(Inches)

Station: Buckeye

Latitude: 32° 22'

Longitude: 112° 35'

Elevation (feet): 870

RETURN PERIOD (YEARS)

DURATION	1	2	5	10	25	50	100
5 min.	0.19	0.27	0.39	0.46	0.57	0.66	0.74
10 min.	0.29	0.41	0.60	0.72	0.89	1.02	1.15
15 min.	0.37	0.52	0.76	0.91	1.13	1.29	1.45
30 min.	0.51	0.73	1.05	1.26	1.56	1.79	2.01
1 hr.	0.65	0.92	1.33	1.59	1.98	2.27	2.55
2 hr.	0.68	0.97	1.41	1.69	2.11	2.42	2.72
3 hr.	0.71	1.02	1.49	1.79	2.23	2.56	2.89
6 hr.	0.79	1.14	1.69	2.04	2.54	2.92	3.30
12 hr.	0.86	1.25	1.87	2.26	2.81	3.24	3.67
24 hr.	0.93	1.36	2.05	2.49	3.10	3.57	4.05

7A

TABLE II
Sun Valley Parkway Phase II
Runoff and Culvert Summary

Drainage Basin	Watershed Area (acres)	Peak Discharge Q100 (cfs)	Culvert Inlet Location	Culvert Size & Type	Comments
1	941	1469	413+19	Triple 10'x3' RCBC	
1	"	"	416+36	Six 10'x3' RCBC	
2	12	40	425+35*	2- 35"x24" CSP	
3	350	530	430+82+	2- 8'x 4' RCBC	
4	27	67	437+19*	2- 35"x24" CSP	
5	145	232	443+84+	8'x4' RCBC	
6	80	150	446+24	8'x4' RCBC	
7	363	559	454+01	2- 8'x 4' RCBC	
8	81	98	460+45	6'x4' RCBC	Split
8		70	463+30	2- 35"x24" CSP	Split
9,10	72	164	473+45	8'x3' RCBC	
11	94	126	477+00	6'x3' RCBC	
12	2876	6753	480+11+	Six 10'x4' RCBC	Split
12	"	"	481+11+	Six 10'x4' RCBC	Split
12	"	"	482+66+	Six 10'x4' RCBC	Split
		24	489+72	35"x24" CSP	Req'd by ground config
13	182	279	492+78	10'x3' RCBC	
14	55	140	496+82*	24" CSP	Split
14	"	"	500+12*	42"x29" CSP	Split
14	"	"	505+04*	2- 42"x29" CSP	Split
15	563	1132	512+67	4- 10'x 4' RCBC	
16	1306	2449	518+75	6- 12'x 5' RCBC	
17	41	89	525+44*	57"x38" CSP	
18	23	65	530+05+*	57"x38" CSP	
19	168	256	539+44	10'x3' RCBC	
20	56	112	544+13*	57"x38" CSP	
21	70	150	549+16	6'x4' RCBC	
		28	550+67*	35"x24" CSP	Req'd by ground config
		11	552+75*	28"x20" CSP	
		12	555+08*	28"x20" CSP	Req'd by ground config
22	28	72	557+40*	49"x33" CSP	
23	53	120	561+95*	6'x3' RCBC	
24	14	46	568+23*	42"x29" CSP	
25	787	1123	577+13	3- 10'x 5' RCBC	
26	768	1538	580+67	4- 10'x 4' RCBC	
27	11	39	586+29*	42"x29" CSP	
28	20	66	590+82*	2- 42"x29" CSP	
29	9	11	595+12	28"x20" CSP	Split
29	"	29	598+34	42"x29" CSP	Split
30	58	124	602+10	2- 49"x33" CSP	
31	40	103	605+95	3- 42"x29" CSP	
32	18	46	611+51	2- 35"x24" CSP	Split
32	"	17	614+57	28"x20" CSP	Split
33	798	1565	618+19+	4- 10'x 4' RCBC	

TABLE II (CONT.)
Sun Valley Parkway Phase II
Runoff and Culvert Summary

Drainage Basin	Watershed Area (acres)	Peak Discharge Q100 (cfs)	Culvert Inlet Location	Culvert Size & Type	Comments
34	16	12	620+99	28"x20"CSP	
34	"	30	624+66	2- 28"x20" CSP	
35	18	50	628+00	2- 35"x24" CSP	
36	1026	1820	631+28	4- 10'x 3' RCBC	
36	"	"	632+12	4- 10'x 3' RCBC	
37	14	50	637+84	2- 35"x24" CSP	
38	99	158	645+73	10'x 3' RCBC	
39	7	32	652+10*	42"x29" CSP	
40	26	68	656+83*	2- 42"x29" CSP	
41	23	61	658+94*	2- 42"x29" CSP	
42	143	217	665+04	10'x3' RCBC	
43	7	26	670+28*	35"x24" CSP	
44	436	780	676+30	Triple 10'x3' RCBC	
45	569	1086	683+64	4-10'x3' RCBC	
46	23	65	690+29*	57"x38" CSP	
47		30	698+00*	Dble 28"x20" CSP	149 CFS rted to 716+43
48-49	10479	9679	716+43	Triple 10'x4' RCBC	
48-49	"	"	717+89	Triple 10'x4' RCBC	Wagner Wash South
A-Y	"	"	720+44	Triple 12'x6' RCBC	Collects areas:
"	"	"	721+10	Triple 12'x6' RCBC	A-Y, B1-K1, 47-49.
B1-K1	"	"	721+78	Triple 12'x6' RCBC	(See HEC-1)
"	"	"	724+09	Triple 10'x4' RCBC	
"	"	"	724+74	Triple 10'x4' RCBC	
		50	774+97	Dble 35"x24" CSP	Req'd by ground config
		28	781+52	Dble 28"x20" CSP	Req'd by ground config
Y	342	236	784+61	10'x4' RCBC	
U	314	384	824+91+	Dble 10'x3' RCBC	
T	315	423	839+23	Dble 10'x3' RCBC	
G-K, O-S	2776	2515	849+39+	Six 12'x4' RCBC	Wagner Wash North
K	66	111	1015+84	57"x38" CSP	

* Drainage Area Less than 64 acres.
\+ Culvert Outlet Velocity Less than 1.5 times the Natural Channel Velocity.

TABLE III

Arizona Department of Transportation

PAVEMENT DRAINAGE CALCULATION REPORT

LOCATION DATA
Highway: Sun Valley Parkway
Location: Phase II-A
Project No.: 850840-9

DESIGN DATA
Frequency: 100 years
P6=3.31 in. P24= 4.28 in. P1= 2.43 in.
T(all)
n= 0.016
Curb Height= 6 in.

RUNOFF CALCULATIONS

From Station	To Station	L (ft.)	W (ft.)	D.A. (arc.)	C	Tc (min.)	I (in/hr)	Q (cfs)	Qc (cfs)	Qt (cfs)	So (ft/ft)	Sx (ft/ft)	Z/n	D (ft.)	T (ft.)
43696	43050	646	40.75	0.60	0.95	10	6.6	3.789	-	3.789	0.0056	0.028	2232	0.300	10.73
43050	42860	190	40.75	0.18	0.95	10	6.6	1.114	2.536	3.651	0.0056	0.028	2232	0.296	10.58
42860	42470	390	40.75	0.36	0.95	10	6.6	2.288	2.429	4.716	0.0075	0.028	2232	0.309	11.03
42470	42080	390	40.75	0.36	0.95	10	6.6	2.288	3.194	5.481	0.0079	0.028	2232	0.324	11.57
42080	41750	330	40.75	0.31	0.95	10	6.6	1.936	3.785	5.720	0.0075	0.028	2232	0.332	11.86
43696	44090	394	40.75	0.37	0.95	10	6.6	2.311	-	2.311	0.0031	0.028	2232	0.279	9.96
44090	44564	474	40.75	0.44	0.95	10	6.6	2.780	1.495	4.276	0.0031	0.028	2232	0.351	12.55
45440	44940	500	40.75	0.47	0.95	10	6.6	2.933	-	2.933	0.0056	0.028	2232	0.273	9.75
44940	44564	376	40.75	0.35	0.95	10	6.6	2.205	1.878	4.084	0.0056	0.028	2232	0.309	11.04
48496	48110	386	40.75	0.36	0.95	10	6.6	2.264	-	2.264	0.0025	0.0165	3788	0.236	14.32
50775	50240	535	40.75	0.50	0.95	10	6.6	3.138	-	3.138	0.0037	0.036	1736	0.333	9.24
50240	49660	580	40.75	0.54	0.95	10	6.6	3.402	1.956	5.358	0.0037	0.036	1736	0.406	11.29
49660	49008	652	40.75	0.61	0.95	10	6.6	3.824	3.664	7.488	0.0037	0.036	1736	0.461	12.80
48496	49008	512	40.75	0.48	0.95	10	6.6	3.003	-	3.003	0.0042	0.036	1736	0.319	8.87

INLET CALCULATIONS (Grate Inlet Catch Basin)

Station	Inlet Type	D (ft)	Qi (cfs)	Qc= Qt-Qi	V (fps)	Lm (ft)	Lp (ft)
430+50	C-15.3 S	0.300	1.253	2.536	2.35	1.81	3.33
428+60	C-15.3 S	0.296	1.222	2.429	2.33	1.78	3.33
424+70	C-15.3 S	0.309	1.523	3.194	2.77	2.14	3.33
420+80	C-15.3 S	0.324	1.696	3.785	2.93	2.29	3.33
417+50	C-15.3 D	0.332	3.643	2.077	2.91	2.29	6.66
440+90	C-15.3 S	0.279	0.816	1.495	1.66	1.25	3.33
445+64							
449+40	C-15.3 S	0.273	1.054	1.878	2.20	1.65	3.33
445+64	C-15.3 D	0.309	9.793	0.000	2.39	1.85	6.66
481+10	C-15.3 D	0.236	1.726	0.538	1.34	0.97	6.66
502+40	C-15.3 S	0.333	1.182	1.956	2.04	1.61	3.33
496+60	C-15.3 S	0.406	1.695	3.664	2.34	1.95	3.33
490+08	C-15.3 D	0.461	11.615	0.000	2.54	2.20	6.66

Notes: V : Approach velocity.
Lm : Minimum grate length required.
Lp : Length of grate provided.

TABLE III (cont.)

Arizona Department of Transportation

PAVEMENT DRAINAGE CALCULATION REPORT

LOCATION DATA
Highway Sun Valley Parkway
Location Phase II-B
Project No. 850840-9

DESIGN DATA
Frequency 100 years
P6=3.31 in. P24= 4.28 in. P1= 2.43 in.
T(all) n= 0.016
Curb Height= 6 in.

RUNOFF CALCULATIONS

From Station	To Station	L (ft.)	W (ft.)	D.A. (arc.)	C	Tc (min.)	I (in/hr)	Q (cfs)	Qc (cfs)	Qt (cfs)	So (ft/ft)	Sx (ft/ft)	Z/n	D (ft.)	T (ft.)
67903	68312	409	40.75	0.38	0.95	10	6.6	2.399	-	2.399	0.00295	0.033	1894	0.304	9.20
68312	68496	184	40.75	0.17	0.95	10	6.6	1.079	1.493	2.572	0.00295	0.033	1894	0.312	9.45
68496	68672	176	40.75	0.16	0.95	10	6.6	1.032	1.622	2.654	0.00295	0.033	1894	0.315	9.56
68672	68848	176	40.75	0.16	0.95	10	6.6	1.032	1.684	2.716	0.00295	0.033	1894	0.318	9.64
68848	69024	176	40.75	0.16	0.95	10	6.6	1.032	1.730	2.762	0.00300	0.033	1894	0.319	9.67
69024	69200	176	40.75	0.16	0.95	10	6.6	1.032	1.762	2.795	0.00300	0.033	1894	0.321	9.71
69200	69376	176	40.75	0.16	0.95	10	6.6	1.032	1.787	2.819	0.00610	0.033	1894	0.281	8.53
69376	69792	416	40.75	0.39	0.95	10	6.6	2.440	1.683	4.123	0.00610	0.033	1894	0.325	9.84
69792	70042	250	40.75	0.23	0.95	10	6.6	1.466	2.652	4.119	0.00610	0.033	1894	0.324	9.83
70042	70292	250	40.75	0.23	0.95	10	6.6	1.466	2.649	4.115	0.00610	0.033	1894	0.324	9.83
73341	72890	451	40.75	0.42	0.95	10	6.6	2.645	-	2.645	0.0061	0.05	1250	0.321	6.42
72890	72577	313	40.75	0.29	0.95	10	6.6	1.836	1.302	3.138	0.0061	0.05	1250	0.342	6.85
72149	72577	428	40.75	0.40	0.95	10	6.6	2.510	-	2.510	0.0030	0.05	1250	0.360	7.20
72149	71815	334	40.75	0.31	0.95	10	6.6	1.959	-	1.959	0.0030	0.047	1330	0.320	6.82
75620	74617	1003	40.75	0.94	0.95	10	6.6	5.883	-	5.883	0.0087	0.05	1250	0.406	8.11
74617	74161	456	40.75	0.43	0.95	10	6.6	2.675	3.410	6.085	0.0087	0.05	1250	0.411	8.21
74161	73800	361	40.75	0.34	0.95	10	6.6	2.117	3.554	5.672	0.0087	0.05	1250	0.400	8.00
73800	73471	329	40.75	0.31	0.95	10	6.6	1.930	3.260	5.190	0.0061	0.03	2083	0.341	11.38

INLET CALCULATIONS (Grate Inlet Catch Basin)

Station	Inlet Type	D (ft)	Qi (cfs)	Qc= Qt-Qi	V (fps)	Lm (ft)	Lp (ft)
683+12	C-15.3 S	0.304	0.906	1.493	1.72	1.32	3.33
684+96	C-15.3 S	0.312	0.950	1.622	1.75	1.36	3.33
686+72	C-15.3 S	0.315	0.971	1.684	1.76	1.37	3.33
688+48	C-15.3 S	0.318	0.986	1.730	1.77	1.38	3.33
690+24	C-15.3 S	0.319	1.000	1.762	1.79	1.40	3.33
692+00	C-15.3 S	0.321	1.008	1.787	1.80	1.40	3.33
693+76	C-15.3 S	0.281	1.136	1.683	2.35	1.78	3.33
697+92	C-15.3 S	0.325	1.471	2.652	2.58	2.02	3.33
700+42	C-15.3 S	0.324	1.470	2.649	2.58	2.02	3.33
702+92	C-15.3 D	0.324	3.315	0.801	2.58	2.02	6.66
728+90	C-15.3 S	0.321	1.344	1.302	2.56	2.00	3.33
725+77	C-15.3 S	0.342	10.418	0.000	2.68	2.13	6.66
718+15	C-15.3 S	0.320	0.949	1.010	1.79	1.40	3.33
746+17	C-15.3 S	0.406	2.473	3.410	3.58	2.98	3.33
741+61	C-15.3 S	0.411	2.531	3.554	3.61	3.02	3.33
738+00	C-15.3 S	0.400	2.411	3.260	3.54	2.94	3.33
734+71	C-15.3 S	0.341	3.623	1.567	2.67	2.12	3.33

Notes: V : Approach velocity.
Lm : Minimum grate length required.
Lp : Length of grate provided.

TABLE III (cont.)

Arizona Department of Transportation

PAVEMENT DRAINAGE CALCULATION REPORT

LOCATION DATA
Highway: Sun Valley Parkway
Location: Phase II-B (Continue), II-C
Project No.: 850840-9

DESIGN DATA
Frequency: 100 years
P6=3.31 in. P24= 4.28 in. P1= 2.43 in.
T(all) n= 0.016
Curb Height= 6 in.

RUNOFF CALCULATIONS

From Station	To Station	L (ft.)	W (ft.)	D.A. (arc.)	C	Tc (min.)	I (in/hr)	Q (cfs)	Qc (cfs)	Qt (cfs)	So (ft/ft)	Sx (ft/ft)	Z/n	D (ft.)	T (ft.)
82663	81658	1005	40.75	0.94	0.95	10	6.6	5.895	-	5.895	0.00613	0.0500	1250	0.433	8.67
81658	81339	319	40.75	0.30	0.95	10	6.6	1.871	3.552	5.423	0.00613	0.0500	1250	0.420	8.40
81339	81020	319	40.75	0.30	0.95	10	6.6	1.871	3.209	5.081	0.00613	0.0500	1250	0.410	8.20
81020	80900	120	40.75	0.11	0.95	10	6.6	0.704	2.964	3.668	0.00613	0.0398	1570	0.333	8.37
82663	83328	665	40.75	0.62	0.95	10	6.6	3.901	-	3.901	0.00300	0.0500	1250	0.424	8.49
83328	83770	442	40.75	0.41	0.95	10	6.6	2.593	2.322	4.915	0.00300	0.0500	1250	0.463	9.26
83910	84087	177	40.75	0.17	0.95	10	6.6	1.038	-	1.038	0.00300	0.0500	1250	0.258	5.17
84087	84460	373	40.75	0.35	0.95	10	6.6	2.188	0.416	2.604	0.00200	0.0214	2921	0.286	13.38
87660	86360	1300	40.75	1.22	0.95	10	6.6	7.625	-	7.625	0.0116	0.0360	1736	0.374	10.40
86360	85860	500	40.75	0.47	0.95	10	6.6	2.933	5.034	7.966	0.0116	0.0165	3788	0.284	17.22
97120	96420	700	40.75	0.65	0.95	10	6.6	4.106	-	4.106	0.0136	0.0360	1736	0.288	8.00
96420	95700	720	40.75	0.67	0.95	10	6.6	4.223	2.361	6.584	0.0136	0.0128	4883	0.233	18.23
94840	94590	250	40.75	0.23	0.95	10	6.6	1.466	-	1.466	0.0136	0.0360	1736	0.196	5.44
94590	93950	640	40.75	0.60	0.95	10	6.6	3.754	0.620	4.374	0.0136	0.0200	3125	0.237	11.83

INLET CALCULATIONS (Grate Inlet Catch Basin)

Station	Inlet Type	D (ft)	Qi (cfs)	Qc= Qt-Qi	V (fps)	Lm (ft)	Lp (ft)
816+58	C-15.3 S	0.433	2.343	3.552	3.14	2.67	3.33
813+39	C-15.3 S	0.420	2.213	3.209	3.07	2.59	3.33
810+20	C-15.3 S	0.410	2.117	2.964	3.02	2.53	3.33
809+00	C-15.3 D	0.333	3.422	0.246	2.63	2.08	6.66
833+28	C-15.3 S	0.424	1.578	2.322	2.17	1.83	3.33
837+70	C-15.3 D	0.463	4.993	0.000	2.29	1.99	6.66
840+87	C-15.3 S	0.258	0.622	0.416	1.56	1.15	3.33
844+60	C-15.3 D	0.286	2.238	0.366	1.36	1.03	6.66
863+60	C-15.3 S	0.374	2.592	5.034	3.92	3.19	3.33
858+60	C-15.3 D	0.284	3.232	4.735	3.26	2.47	6.66
964+20	C-15.3 S	0.288	1.745	2.361	3.56	2.71	3.33
957+00	C-15.3 D	0.233	2.474	4.110	3.09	2.24	6.66
945+90	C-15.3 S	0.196	0.846	0.620	2.75	1.92	3.33
939+50	C-15.3 D	0.237	2.477	1.897	3.12	2.27	6.66

Notes: V : Approach velocity.
Lm : Minimum grate length required.
Lp : Length of grate provided.
T : Ponding Width
D : Depth of Flow
Qi : Discharge Intercepted
Qc = carryover

15"

FORMULA USED IN PAVEMENT DRAINAGE CALCULATIONS

(TABLE III)

$$D.A. = L \times W / 43560$$

$$Q = 0.95 \times I \times D.A.$$

$$D = \left[\frac{Q_t \times N \times S_x}{0.56 \times (S_o)^{0.5}} \right]^{3/8}$$

$$Q_i = Q_t - Q_c + [3 \times (L_p - 3.33) \times (D)^{1.5}]$$

$$Q_c = 0.56 \left(\frac{z}{n} \right) (D')^{8/3} (S_o)^{1/2}$$

$$D' = D - 1.47 \times S_x$$

$$V = \frac{1.12}{n} (S_o)^{1/2} (D)^{2/3}$$

$$L_m = \frac{V}{2} (D + D_b)^{0.5}$$

D_b = Thickness of Grate

Gutter Depression = 2"

TABLE V

SUN VALLEY PARKWAY PHASE II

SOUTH SIDE CHANNEL DESIGN SUMMARY

STATION	850+00	875+00	890+00	910+00	933+00	946+00	964+00	986+00	997+97
SLOPE(ft/ft)	.0015	.0015	.0015	.0015	.0015	.0015	.0030	.0040	
Channel Type	100Trap(LF)	100Trap(LF)	80Trap(LF)	80Trap(LF)	80Trap(LF)	80Trap(LF)	80Trap	50Trap	
Side Slopes	4:1	4:1	4:1	4:1	4:1	4:1	4:1	4:1	
Channel Depth(ft)	6.5	6.5	5.5	5.5	5.5	5.5	3.5	3.0	
Velocity(fps)VLOB	5	5	4	4	4	4			
VCH	12	12	11	11	10	10	5.5	5.	
VROB	5	5	4	4	4	4			
Water Depth(ft)	6	6	5	5	5	5	3	2.5	
Freeboard(ft)	.5	.5	.5	.5	.5	.5	.5	.5	
Design Flow(cfs)	3790	3360	2145	2108	1906	1735	1464	654	

100Trap = 100 foot Trapezoidal channel

LF = with lined low flow channel

VLOB = Velocity in Left Overbank

VCH = Velocity in Channel

VROB = Velocity in Right Overbank

TABLE IV

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

MEDIAN DRAINAGE WORKSHEET

LOCATION DATA
Highway: Sun Valley Parkway
Location: Phase II-A, II-B, II-C
Project No.: 850840-9

DESIGN DATA
Frequency = 100 years
P6 = 3.31 in. P24 = 4.28 in. P1 = 2.43 in.
AHW = 0.36 ft.

RUNOFF CALCULATIONS

From Station	To Station	L (ft.)	W (ft.)	D.A. (acr.)	C	Tc (min.)	I (in/hr)	Q (cfs)	Channel Type	So (ft/ft)	Z1	Z2	n	D (ft.)	V (fps)
43696	41386	2310	14.5	0.77	0.35	46.3	2.8	0.754	V	0.0056	20	20	0.03	0.21	0.83
43696	44564	868	14.5	0.29	0.35	24.9	4.3	0.435	V	0.0031	20	20	0.03	0.19	0.58
46305	44564	1741	14.5	0.58	0.35	33.1	4.6	0.933	V	0.0056	20	20	0.03	0.23	0.88
46305	47369	1064	14.5	0.35	0.35	29.9	4.0	0.496	V	0.0030	20	20	0.03	0.20	0.59
48496	48287	209	14.5	0.07	0.35	10.0	6.6	0.161	V	0.0025	20	20	0.03	0.14	0.42
48496	49008	512	14.5	0.17	0.35	13.9	5.8	0.346	V	0.0042	20	20	0.03	0.17	0.61
51355	49008	2347	14.5	0.78	0.35	49.6	2.8	0.766	V	0.0048	20	20	0.03	0.22	0.79
51356	52176	820	14.5	0.27	0.35	23.9	4.5	0.430	V	0.0030	20	20	0.03	0.19	0.57
53700	52176	1524	14.5	0.51	0.35	31.6	3.7	0.657	V	0.0056	20	20	0.03	0.20	0.80
55014	54429	585	14.5	0.19	0.35	16.8	5.3	0.361	V	0.0035	20	20	0.03	0.18	0.58
55014	55702	688	14.5	0.23	0.35	17.1	5.3	0.425	V	0.0046	20	20	0.03	0.18	0.67
57104	55702	1402	14.5	0.47	0.35	26.0	4.2	0.686	V	0.0073	20	20	0.03	0.20	0.90
57104	57492	388	14.5	0.13	0.35	12.7	6.0	0.271	V	0.0030	20	20	0.03	0.16	0.51
58900	57492	1408	14.5	0.47	0.35	38.7	3.3	0.541	V	0.0030	20	20	0.03	0.21	0.61
61154	59687	1467	14.5	0.49	0.35	40.2	3.2	0.547	V	0.0030	20	20	0.03	0.21	0.61
61154	62171	1017	14.5	0.34	0.35	29.1	3.9	0.462	V	0.0030	20	20	0.03	0.20	0.58

INLET CALCULATIONS (Median Catch Basin)

Station	Inlet Type	Q (cfs)	HW (ft)	Grate Elev.	DHW Elev.	Dike Elev.
413+86	C-15.8	0.754	0.143	1399.55	1399.69	1399.91
445+64	C-15.8	1.368	0.213	1412.09	-	-
473+69	C-15.8	0.496	0.108	1418.10	-	-
482+87	C-15.8	0.161	0.051	1420.25	1420.30	1420.61
490+08	C-15.8	1.112	0.186	1419.10	-	-
521+76	C-15.8	1.087	0.183	1426.87	-	-
544+29	C-15.8	0.361	0.088	1436.90	1436.99	1437.26
557+02	C-15.8	1.111	0.185	1437.45	-	-
574+92	C-15.8	0.271	0.072	1445.29	-	-
596+87	C-15.8	0.547	0.116	1449.81	-	-
621+71	C-15.8	0.462	0.103	1450.98	-	-

TABLE IV (cont.)

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

MEDIAN DRAINAGE WORKSHEET

LOCATION DATA
Highway Sun Valley Parkway
Location Phase II-A, II-B, II-C (continue)
Project No. 850840-9

DESIGN DATA
Frequency = 100 years
P6 = 3.31 in. P24 = 4.28 in. P1 = 2.43 in.
AHW = 0.36 ft.

RUNOFF CALCULATIONS

From Station	To Station	L (ft.)	W (ft.)	D.A. (acr.)	C	Tc (min.)	I (in/hr)	Q (cfs)	Channel Type	So (ft/ft)	Z1	Z2	n	D (ft.)	V (fps)
63598	62942	656	14.5	0.22	0.35	12.1	6.2	0.474	V	0.0096	20	20	0.03	0.16	0.91
63598	64576	978	14.5	0.33	0.35	28.1	4.0	0.456	V	0.0030	20	20	0.03	0.20	0.58
65100	64576	524	14.5	0.17	0.35	16.4	5.3	0.324	V	0.0030	20	20	0.03	0.17	0.53
65100	65885	785	14.5	0.26	0.35	18.9	5.0	0.457	V	0.0048	20	20	0.03	0.18	0.69
67313	65885	1428	14.5	0.48	0.35	31.2	3.8	0.632	V	0.0050	20	20	0.03	0.20	0.76
68200	71342	3142	14.5	1.05	0.35	63.2	2.4	0.879	V	0.0050	20	20	0.03	0.23	0.83
72149	71342	807	14.5	0.27	0.35	21.7	4.7	0.442	V	0.0030	20	10	0.03	0.22	0.62
72149	72577	428	14.5	0.14	0.35	12.7	6.1	0.304	V	0.0030	20	10	0.03	0.19	0.56
73100	72577	523	14.5	0.17	0.35	13.7	5.9	0.360	V	0.0037	20	10	0.03	0.19	0.64
76300	73800	2500	14.5	0.83	0.35	37.4	3.3	0.961	V	0.0086	20	10	0.03	0.24	1.11
78200	76300	1900	14.5	0.63	0.35	33.3	3.6	0.797	V	0.0064	20	10	0.03	0.24	0.95
81339	78909	2430	14.5	0.81	0.35	48.6	2.8	0.793	V	0.0045	20	10	0.03	0.25	0.83
82663	81339	1324	14.5	0.44	0.35	24.6	4.4	0.679	V	0.0061	20	10	0.03	0.22	0.90
82663	83435	772	14.5	0.26	0.35	21.0	4.7	0.423	V	0.0030	20	10	0.03	0.21	0.61

INLET CALCULATIONS (Median Catch Basin)

Station	Inlet Type	Q (cfs)	HW (ft)	Grate Elev.	DHW Elev.	Dike Elev.
629+42	C-15.8	0.474	0.105	1454.67	1454.78	1455.03
645+76	C-15.8	0.779	0.146	1456.29	-	-
658+85	C-15.8	1.089	0.183	1454.40	-	-
713+42	C-15.8	1.320	0.208	1442.45	-	-
725+77	C-15.8	0.664	0.132	1444.50	-	-
738+00	C-15.8	0.961	0.168	1451.07	1451.24	1451.43
763+00	C-15.8	0.797	0.149	1471.99	1472.14	1472.35
789+00	C-15.8	0.793	0.148	1486.33	1486.48	1486.69
813+39	C-15.8	0.679	0.134	1497.90	1498.03	1498.26
834+35	C-15.8	0.423	0.097	1502.49	1502.59	1502.85

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

MEDIAN DRAINAGE WORKSHEET

LOCATION DATA
Highway: Sun Valley Parkway
Location: Phase II-A, II-B, II-C (continue)
Project No.: 850840-9

DESIGN DATA
Frequency = 100 years
P6 = 3.31 in. P24 = 4.28 in. P1 = 2.43 in.
AHW = 0.36 ft.

RUNOFF CALCULATIONS

From Station	To Station	L (ft.)	W (ft.)	D.A. (acr.)	C	Tc (min.)	I (in/hr)	Q (cfs)	Channel Type	So (ft/ft)	Z1	Z2	n	D (ft.)	V (fps)
84240	84615	375	14.5	0.12	0.35	12.2	6.3	0.275	V	0.0030	20	20	0.03	0.16	0.51
86360	84615	1745	14.5	0.58	0.35	29.9	3.9	0.793	V	0.0082	20	20	0.03	0.20	0.97
88800	86360	2440	14.5	0.81	0.35	36.8	3.4	0.967	V	0.0101	20	20	0.03	0.21	1.10
94200	89575	4625	14.5	1.54	0.35	64.0	2.4	1.293	V	0.0105	20	20	0.03	0.23	1.21
97048	94880	2168	14.5	0.72	0.35	28.9	3.9	0.985	V	0.0139	20	20	0.03	0.20	1.25
99500	97048	2452	14.5	0.82	0.35	34.0	3.5	1.000	V	0.0124	20	20	0.03	0.20	1.20
101402	100350	1052	14.5	0.35	0.35	20.0	4.8	0.588	V	0.0076	20	20	0.03	0.18	0.88
102310	101402	908	14.5	0.30	0.35	26.2	4.2	0.444	V	0.0030	20	20	0.03	0.20	0.58

INLET CALCULATIONS (Median Catch Basin)

Station	Inlet Type	Q (cfs)	HW (ft)	Grate Elev.	DHW Elev.	Dike Elev.
846+15	C-15.8	1.068	0.181	1499.80	-	-
863+60	C-15.8	0.967	0.169	1514.15	1514.32	1514.51
895+75	C-15.8	1.293	0.205	1545.50	1545.71	1545.86
948+80	C-15.8	0.985	0.171	1603.30	1603.47	1603.66
970+48	C-15.8	1.000	0.173	1632.96	1633.13	1633.32
1003+50	C-15.8	0.588	0.121	1670.36	1670.48	1670.72
1023+10	C-15.8	0.444	0.101	1674.74	-	-

WHITE TANK

850840-9

PARKWAY - CONTRACT 9

STA 410+00 - 1024+53

HYDROLOGY

SUMMARY OF CONTRIB. AREAS

TABLE VI

SECTION STA 410+00 - 715+00 AREA 1 - 49

AREA	AC	SM	L	ELTOP	EL PKWY	STA PKWY	S %	HYDR. METH. USED
1	941.0	1.47	21,000	2000	1397	413+00	2.9	HEC-1
2	11.9	0.019	1,300	1,420	1399	425+00	1.6	RAT.
3	344.9	0.54	15,500	1,730	1400	431+00	2.1	HEC-1
4	26.6	0.04	3,100	1440	1400	437+00	1.3	RAT
5	145.0	0.22	8,500	1560	1395	444+00	1.9	HEC-1
6	79.9	0.12	6700	1520	1395	446+00	1.9	RAT
7	362.7	0.57	15500	1725	1395	454+00	2.1	HEC-1
8	80.8	0.12	7200	1520	1400	461+00	1.6	RAT
9	28.4	0.04	2600	1440	1405	469+00	1.4	RAT
10	42.2	0.06	5000	1480	1405	474+00	1.5	RAT
11	93.6	0.14	6200	1520	1410	477+00	1.6	HEC-1
12	1818	2.84	10500	3960	2000	481+00	18.6	HEC-1
	1058	1.65	22200	2000	1405		2.6	HEC-1
13	182	0.28	10000	1600	1410	493+00	1.9	HEC-1
14	55	0.086	3000	1460	1416	502+00	1.5	RAT
15	562.9	0.88	21800	2444	1412	514+00	4.7	HEC-1
16	412.3	0.64	11000	1620	1424	519+00	1.7	HEC-1
17	41.3	0.06	4800	1500	1423	525+00	1.6	RAT
18	22.9	0.03	2000	1450	1425	531+00	1.2	RAT
19	168	0.26	9000	1580	1428	539+00	1.7	HEC-1
20	56	0.08	5500	1520	1430	543+00	1.6	RAT
21	69.8	0.10	4700	1510	1433	549+00	1.6	RAT
22	27.5	0.04	3000	1420	1430	554+00	1.7	RAT
23	53.2	0.08	4000	1490	1435	562+00	1.4	RAT
24	13.7	0.02	800	1440	1435	568+00	0.6	RAT

TABLE VI (cont.)

		SECTION STA 715+00 - 1024+53 (AREA WAGNER WASH)						
(A)	125	0.19	6000	1558	1570	ROUTED VIA WAGNER WASH	0.8	HEC-1
(B)	272	0.42	14000	1800	1520		2.1	HEC-1
(C)	1029	1.60	16500	1800	1525		1.7	HEC-1
(D)	26	0.04	2800	1595	1555		1.0	HEC-1
(E)	56	0.08	3000	1605	1562		1.4	HEC-1
(F)	92	0.14	3800	1622	1582		1.0	HEC-1
(G)	102	0.16	4500	1680	1600		1.8	HEC-1
(H)	167	0.26	7000	1755	1620	TO STA 721+00	1.9	HEC-1
(I)	586	0.91	18000	2000	1670		1.9	HEC-1
(J)	403	0.63	13800	2000	1670		2.3	HEC-1
(K)	66	0.10	6000	1780	1675		1.7	HEC-1
(K1)	541	0.85	9000	1675	1569	ROUTED VIA WAGNER WASH TO 850+	1.2	HEC-1
(J1)	432	0.67	8500	1670	1560		1.3	HEC-1
(I1)	604	0.94	8200	1640	1560		1.2	HEC-1
(F1)	275	0.43	6500	1600	1520		1.2	HEC-1
(E1)	124	0.19	4200	1560	1520		1.0	HEC-1
(D1)	128	0.20	4000	1550	1575		0.9	HEC-1
(B1)	64	0.10	2700	1545	1570		1.3	HEC-1
(O)	128	0.20	3500	1540	1575	STA 850+	0.7	HEC-1
(P)	175	0.27	4000	1540	1572		0.7	HEC-1
(R)	92	0.14	5500	1540	1570		0.6	HEC-1
(S)	213	0.33	6000	1540	1505		0.6	HEC-1
(T)	315	0.49	7200	1550	1520	VIA WAGNER WASH TO 721+00	1.5	HEC-1
(U)	314	0.49	8500	1550	1520		1.5	HEC-1
(V)	53	0.08	2500	1520	1480		1.6	HEC-1
(X)	43	0.07	2600	1495	1475		0.8	HEC-1
(Y)	342	0.53	2000	1480	1475		0.5	HEC-1
(Z)	53	0.08	2500	1480	1440		1.6	HEC-1
(L)	758	1.18	16500	2000	1520		2.9	HEC-1
(M)	1545	2.41	26000	2200	1480		2.7	HEC-1
(N)	1409	2.20	21000	1880	1440		2.1	HEC-1

SUMMARY OF CONTRIB. AREAS

AREA	AC	SM	L	EL TOP	EL PKWY	STA. PKWY	S%	HYDR. METH. USED
25	1685	2.63	23500	2600	1435	577+00	5.0	HEC-1
26	768	1.20	22800	2714	1440	580+00	5.6	HEC-1
27	11	0.02	1000	1450	1440	586+00	1.0	RAT
28	20.2	0.03	1500	1465	1440	591+00	1.6	RAT
29	9.2	0.01	800	1455	1440	599+00	1.9	RAT
30	57.8	0.09	4700	1520	1440	602+00	1.7	RAT
31	40.4	0.06	3100	1490	1440	605+00	1.6	RAT
32	12.4	0.03	1800	1475	1442	611+00	1.8	RAT
33	798	1.24	21000	2640	1435	618+00	5.7	HEC-1
34	15.6	0.02	2200	1480	1445	621+00	1.6	RAT
35	12.4	0.03	2700	1485	1445	628+00	1.5	RAT
36	1026	1.60	19800	2303	1445	631+00	4.3	HEC-1
37	13.7	0.02	1000	1462	1445	638+00	1.7	RAT
38	99.1	0.15	4100	1520	1448	645+00	1.7	HEC-1
39	7.3	0.01	600	1460	1450	652+00	1.6	RAT
40	25.7	0.04	3100	1500	1446	657+00	1.7	RAT
41	22.9	0.03	2800	1488	1445	659+00	1.5	RAT
42	143.2	0.22	9400	1600	1445	665+00	1.6	HEC-1
43	7.3	0.01	1100	1460	1445	669+00	1.4	RAT
44	436.1	0.68	13200	1900	1446	676+00	3.4	HEC-1
45	569	0.89	20300	2303	1450	683+00	4.2	HEC-1
46	22.9	0.03	2000	1476	1450	690+00	1.3	RAT
47	99.2	0.15	6000	1525	1450	701+00	1.3	RAT
48	56.9	0.08	5000	1510	1446	705+00	1.3	RAT
49	277.3	0.43	14500	1680	1440	710+00	1.7	HEC-1

TABLE VII

Sun Valley Parkway
Phase II-A, II-B, II-C
Culvert Outlet Scour Calculation

CULVERT LOCATION	SIZE C.B.C. (ft)	SIZE Pipe (in)	SIZE Equ. D (in)	PEAK Q (cfs)	K C.B.C.	K Pipe	t (min)	To (min)	SCOUR Depth Hs (ft)	SCOUR Width Ws (ft)	SCOUR Length Ls (ft)	SCOUR Max. 0.4 * Ls
413+19	3- 10 x 3			126	0.752	-	30	316	6.04	24.62	40.47	16.19
416+36	6- 10 x 3			128	0.764	-	30	316	5.82	24.79	40.97	16.39
446+24	1- 8 x 4			150	0.826	-	30	316	6.49	27.16	44.16	17.66
454+01	2- 8 x 4			216	1.190	-	30	316	6.51	32.36	53.54	21.41
460+45	1- 6 x 4			100	0.789	-	30	316	2.93	18.21	36.53	14.61
463+30		2-35x 24	30	21	-	0.374	30	316	2.73	7.08	12.97	5.19
473+45	1- 8 x 3			164	1.294	-	30	316	6.72	32.06	49.71	19.88
477+00	1- 6 x 3			96	1.085	-	30	316	5.40	24.56	38.86	15.54
480+11	6- 10 x 4			352	1.467	-	30	316	6.41	37.66	60.81	24.33
481+11	6- 10 x 4			352	1.467	-	30	316	6.41	37.66	60.81	24.33
482+66	6- 10 x 4			352	1.467	-	30	316	10.73	51.10	72.63	29.05
492+78	1- 10 x 3			215	1.284	-	30	316	9.14	40.15	57.94	23.18
512+67	4- 10 x 4			209	0.871	-	30	316	7.42	31.52	50.93	20.37
518+75	6- 12 x 5			312	0.783	-	30	316	8.14	35.51	58.93	23.57
539+44	1- 10 x 3			197	1.176	-	30	316	7.87	35.06	53.28	21.31
549+16	1- 6 x 4			150	1.184	-	30	316	9.72	33.17	48.88	19.55
577+13	3- 10 x 5			293	0.924	-	30	316	9.57	37.76	59.10	23.64
580+67	4- 10 x 4			286	1.192	-	30	316	5.37	32.16	55.85	22.34
595+12		1-28x 20	24	19	-	0.592	30	316	2.67	8.73	14.73	5.89
598+34		1-42x 29	36	19	-	0.215	30	316	2.59	5.49	11.00	4.40
602+10		2-49x 33	42	62	-	0.477	30	316	3.88	12.26	21.38	8.55
605+95		3-42x 29	36	34	-	0.384	30	316	2.78	9.67	17.21	6.88
611+51		2-35x 24	30	17	-	0.303	30	316	1.91	7.11	12.86	5.14
614+57		1-28x 20	24	24	-	0.748	30	316	2.91	10.57	17.17	6.87
620+99		1-28x 20	24	16	-	0.498	30	316	2.72	7.28	12.80	5.12
624+66		2-28x 20	24	15	-	0.467	30	316	2.51	7.07	12.48	4.99
628+00		2-35x 24	30	25	-	0.446	30	316	2.94	8.16	14.55	5.82
631+28	4- 10 x 3			174	1.039	-	30	316	7.93	32.39	49.61	19.84
632+12	4- 10 x 3			174	1.039	-	30	316	7.90	32.39	49.56	19.82
637+84		2-35x 24	30	25	-	0.446	30	316	1.04	6.81	16.69	6.68
645+73	1- 10 x 3			122	0.728	-	30	316	6.49	24.08	39.36	15.74
665+04	1- 10 x 3			158	0.943	-	30	316	7.20	29.49	46.35	18.54
676+30	3- 10 x 3			197	1.176	-	30	316	8.85	37.05	54.46	21.78
683+64	4- 10 x 3			194	1.158	-	30	316	8.59	36.11	53.61	21.45
789+61	1- 10 x 4			261	1.087	-	30	316	7.48	35.51	57.51	23.01
839+23	2- 10 x 3			164	0.979	-	30	316	8.26	31.30	47.81	19.12
1015+84		1-57x 38	48	111	-	0.611	30	316	4.63	17.33	29.20	11.68

Note: Equ. D = Equivalent Circular Pipe Diameter

Sun Valley Parkway
Phase II-A, II-B, II-C
Coefficients for Culvert Outlets Scour

CULVERT LOCATION	SIZE C.B.C. (ft)	SIZE Pipe (in)	SIZE Equ. D (in)	DEPTH α	DEPTH β	DEPTH θ	WIDTH α	WIDTH β	WIDTH θ	LENGTH α	LENGTH β	LENGTH θ
413+19	3-10 x 3			2.194	0.421	0.094	9.719	0.706	0.095	17.712	0.588	0.153
416+36	6-10 x 3			2.099	0.429	0.093	9.354	0.667	0.085	17.870	0.566	0.158
446+24	1- 8 x 4			2.194	0.421	0.094	9.719	0.706	0.095	17.710	0.588	0.153
454+01	2- 8 x 4			1.860	0.450	0.090	8.440	0.570	0.060	18.280	0.510	0.170
460+45	1- 6 x 4			1.220	0.850	0.070	7.250	0.760	0.060	12.770	0.410	0.040
463+30		2-35x 24	30	2.529	0.392	0.098	10.999	0.842	0.130	17.144	0.666	0.135
475+45	1- 8 x 3			2.171	0.423	0.094	9.628	0.696	0.093	17.750	0.582	0.154
477+00	1- 6 x 3			2.171	0.423	0.094	9.628	0.696	0.093	17.750	0.582	0.154
480+11	6-10 x 4			1.220	0.850	0.070	7.250	0.760	0.060	12.770	0.410	0.040
481+11	6-10 x 4			1.220	0.850	0.070	7.250	0.760	0.060	12.770	0.410	0.040
482+66	6-10 x 4			2.615	0.384	0.099	11.328	0.877	0.139	17.000	0.686	0.131
492+78	1-10 x 3			2.720	0.375	0.100	11.730	0.920	0.150	16.820	0.710	0.125
512+67	4-10 x 4			2.194	0.421	0.094	9.719	0.706	0.095	17.710	0.588	0.153
518+75	6-12 x 5			2.051	0.433	0.092	9.171	0.648	0.080	17.956	0.554	0.160
539+44	1-10 x 3			2.386	0.404	0.096	10.450	0.784	0.115	17.388	0.632	0.143
549+16	1- 6 x 4			2.696	0.377	0.010	11.640	0.910	0.148	16.860	0.704	0.126
577+13	3-10 x 5			2.481	0.396	0.097	10.820	0.823	0.125	17.230	0.654	0.138
580+67	4-10 x 4			1.220	0.850	0.070	7.250	0.760	0.060	12.770	0.410	0.040
595+12		1-28x 20	24	2.481	0.396	0.097	10.820	0.823	0.125	17.230	0.654	0.138
598+34		1-42x 29	36	2.481	0.396	0.097	10.820	0.823	0.125	17.230	0.654	0.138
602+10		2-49x 33	42	2.386	0.404	0.096	10.450	0.784	0.115	17.388	0.632	0.143
605+95		3-42x 29	36	2.147	0.425	0.093	9.540	0.687	0.090	17.790	0.576	0.155
611+51		2-35x 24	30	2.000	0.438	0.092	8.980	0.628	0.075	18.040	0.543	0.163
614+57		1-28x 20	24	2.462	0.398	0.097	10.740	0.815	0.123	17.260	0.650	0.139
620+99		1-28x 20	24	2.690	0.378	0.100	11.600	0.906	0.147	16.880	0.702	0.127
624+66		2-28x 20	24	2.550	0.390	0.098	11.090	0.852	0.133	17.104	0.671	0.134
628+00		2-35x 24	30	2.540	0.390	0.098	11.050	0.848	0.132	17.120	0.669	0.134
631+28	4-10 x 3			2.540	0.390	0.098	11.050	0.848	0.132	17.120	0.669	0.134
632+12	4-10 x 3			2.530	0.392	0.098	11.000	0.842	0.130	17.144	0.666	0.135
637+84		2-35x 24	30	1.220	0.850	0.070	7.250	0.760	0.060	12.770	0.410	0.040
645+73	1-10 x 3			2.386	0.404	0.096	10.450	0.784	0.115	17.388	0.632	0.143
665+04	1-10 x 3			2.386	0.404	0.096	10.450	0.784	0.115	17.388	0.632	0.143
676+30	3-10 x 3			2.720	0.375	0.100	11.730	0.920	0.150	16.820	0.710	0.125
683+64	4-10 x 3			2.640	0.381	0.099	11.456	0.891	0.143	16.942	0.693	0.129
789+61	1-10 x 4			2.003	0.438	0.092	8.988	0.628	0.075	18.037	0.543	0.163
839+23	2-10 x 3			2.720	0.375	0.100	11.730	0.920	0.150	16.820	0.710	0.125
1015+84		1-57x 38	48	2.242	0.417	0.094	9.902	0.726	0.100	17.631	0.599	0.150

Note: Equ. D = Equivalent Circular Pipe Diameter

TABLE VIII

VALUES OF THE ROUGHNESS COEFFICIENT *n* (*continued*) *

Type of channel and description	Minimum	Normal	Maximum
C. EXCAVATED OR DREDGED			
a. Earth, straight and uniform			
1. Clean, recently completed	0.016	0.018	0.020
2. Clean, after weathering	0.018	0.022	0.025
3. Gravel, uniform section, clean	0.022	0.025	0.030
4. With short grass, few weeds	0.022	0.027	0.033
b. Earth, winding and sluggish			
1. No vegetation	0.023	0.025	0.030
2. Grass, some weeds	0.025	0.030	0.033
3. Dense weeds or aquatic plants in deep channels	0.030	0.035	0.040
4. Earth bottom and rubble sides	0.028	0.030	0.035
5. Stony bottom and weedy banks	0.025	0.035	0.040
6. Cobble bottom and clean sides	0.030	0.040	0.050
c. Dragline-excavated or dredged			
1. No vegetation	0.025	0.028	0.033
2. Light brush on banks	0.035	0.050	0.060
d. Rock cuts			
1. Smooth and uniform	0.025	0.035	0.040
2. Jagged and irregular	0.035	0.040	0.050
e. Channels not maintained, weeds and brush uncut			
1. Dense weeds, high as flow depth	0.050	0.080	0.120
2. Clean bottom, brush on sides	0.040	0.050	0.080
3. Same, highest stage of flow	0.045	0.070	0.110
4. Dense brush, high stage	0.080	0.100	0.140
D. NATURAL STREAMS			
D-1. Minor streams (top width at flood stage <100 ft)			
a. Streams on plain			
1. Clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
2. Same as above, but more stones and weeds	0.030	0.035	0.040
3. Clean, winding, some pools and shoals	0.033	0.040	0.045
4. Same as above, but some weeds and stones	0.035	0.045	0.050
5. Same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
6. Same as 4, but more stones	0.045	0.050	0.060
7. Sluggish reaches, weedy, deep pools	0.050	0.070	0.080
8. Very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150

* CHOW

B. FIGURES

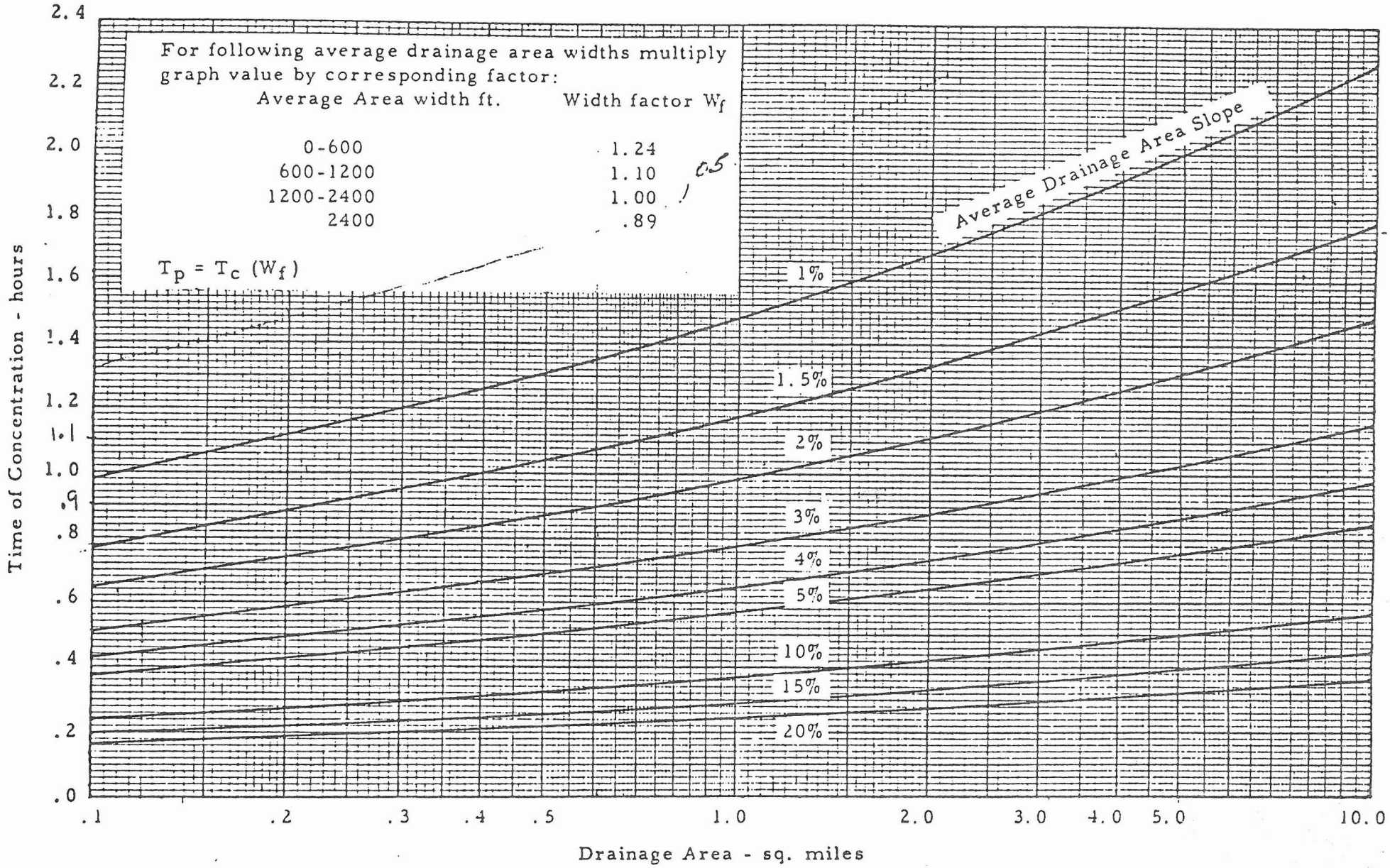
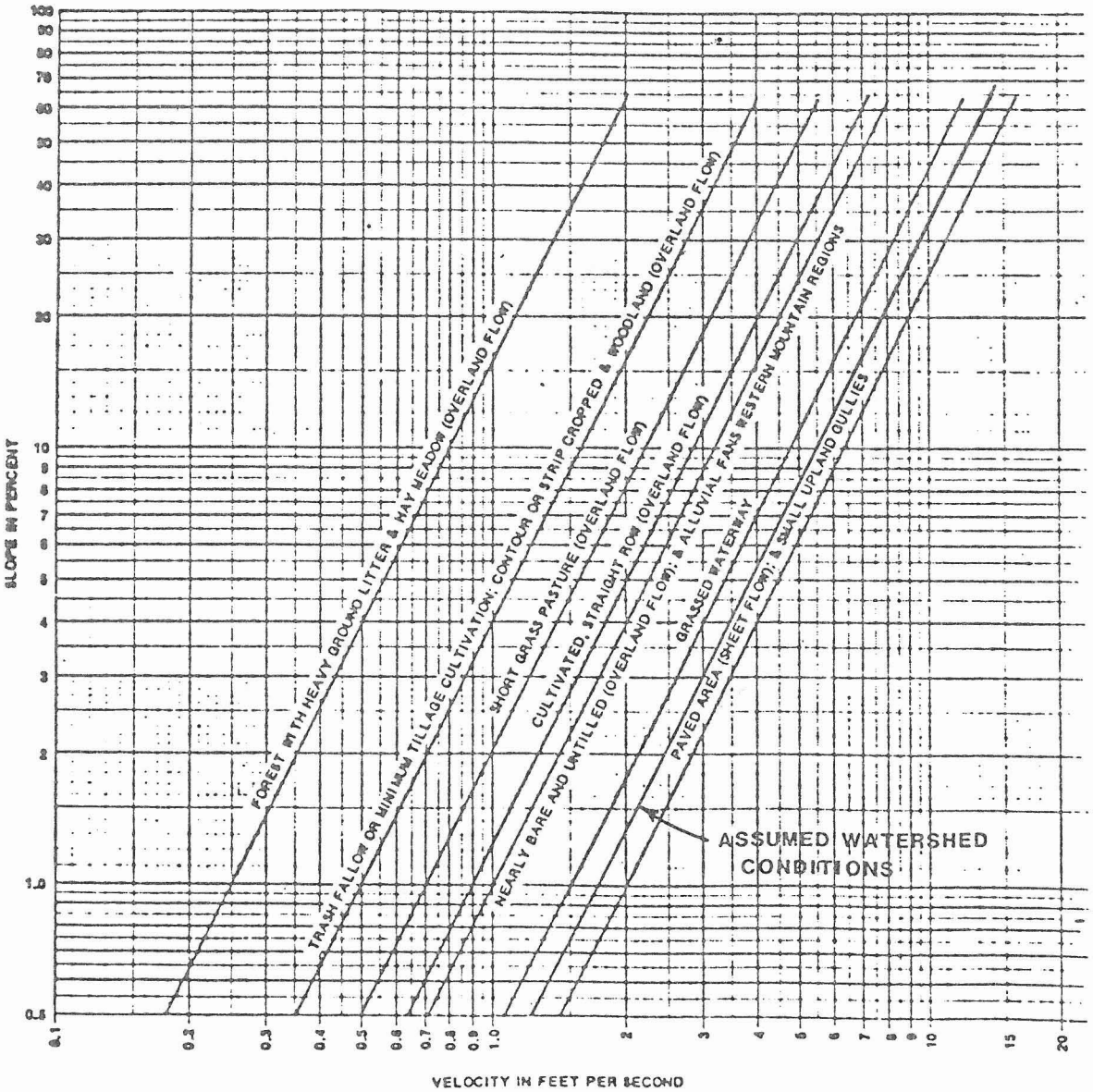


Fig. 2-5

TIME OF CONCENTRATION
FOR
DRAINAGE AREAS LESS THAN 10 SQ. MILES

Soil Conservation Service



Overland flow velocities for upland method of estimating T_c

FIGURE 2-8

RUNOFF COEFFICIENT "C" FOR THE RATIONAL METHOD
USING SCS CURVE NUMBERS AND PRECIPITATION DATA

This figure is a graphic representation of the information provided in paragraphs 6a and 6b of Section I, Part J of the December 1973 Hydrologic and Hydraulic Training Session Manual prepared by the Arizona Highway Department to supplement its manual titled "Hydrologic Design for Highway Drainage in Arizona."

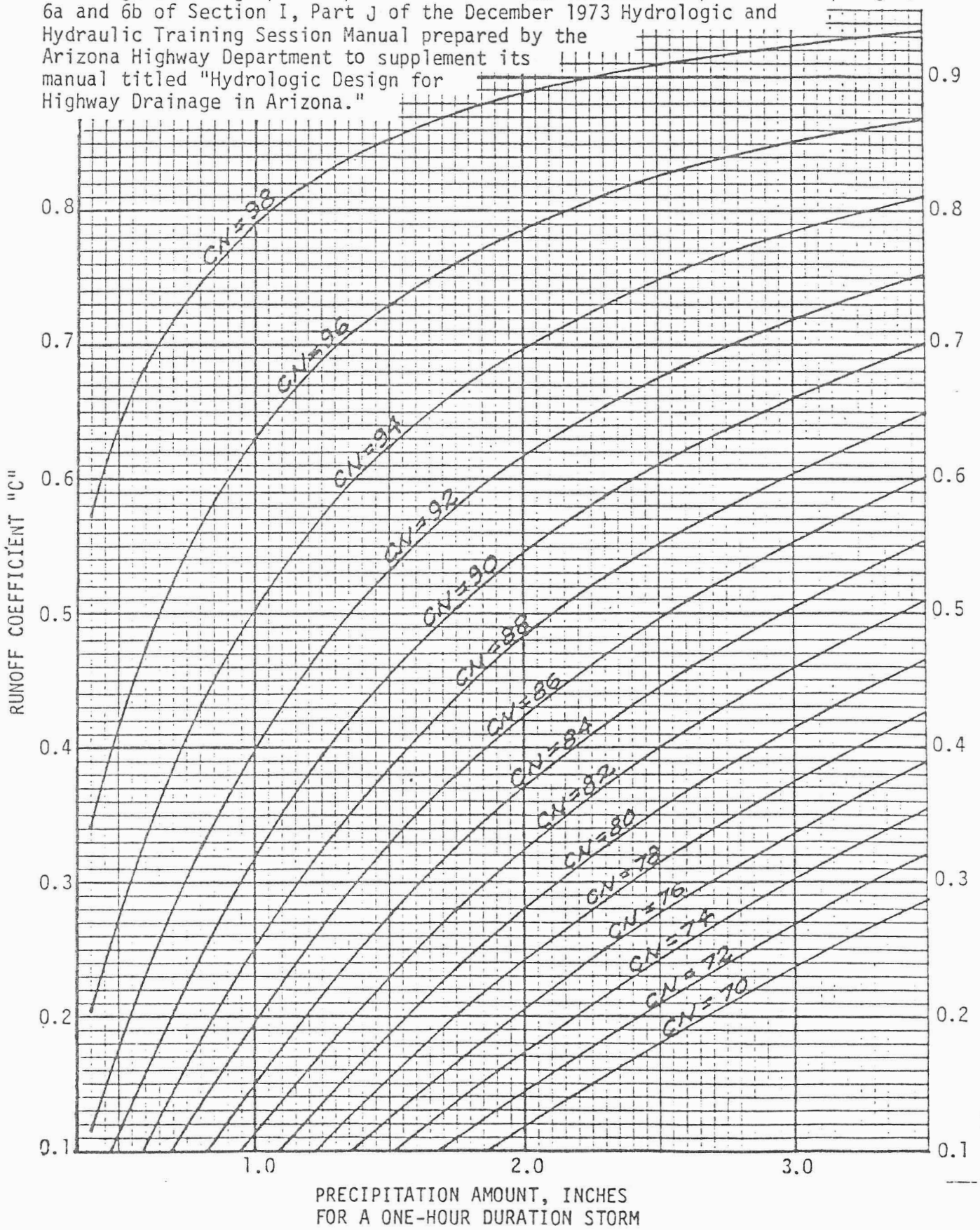
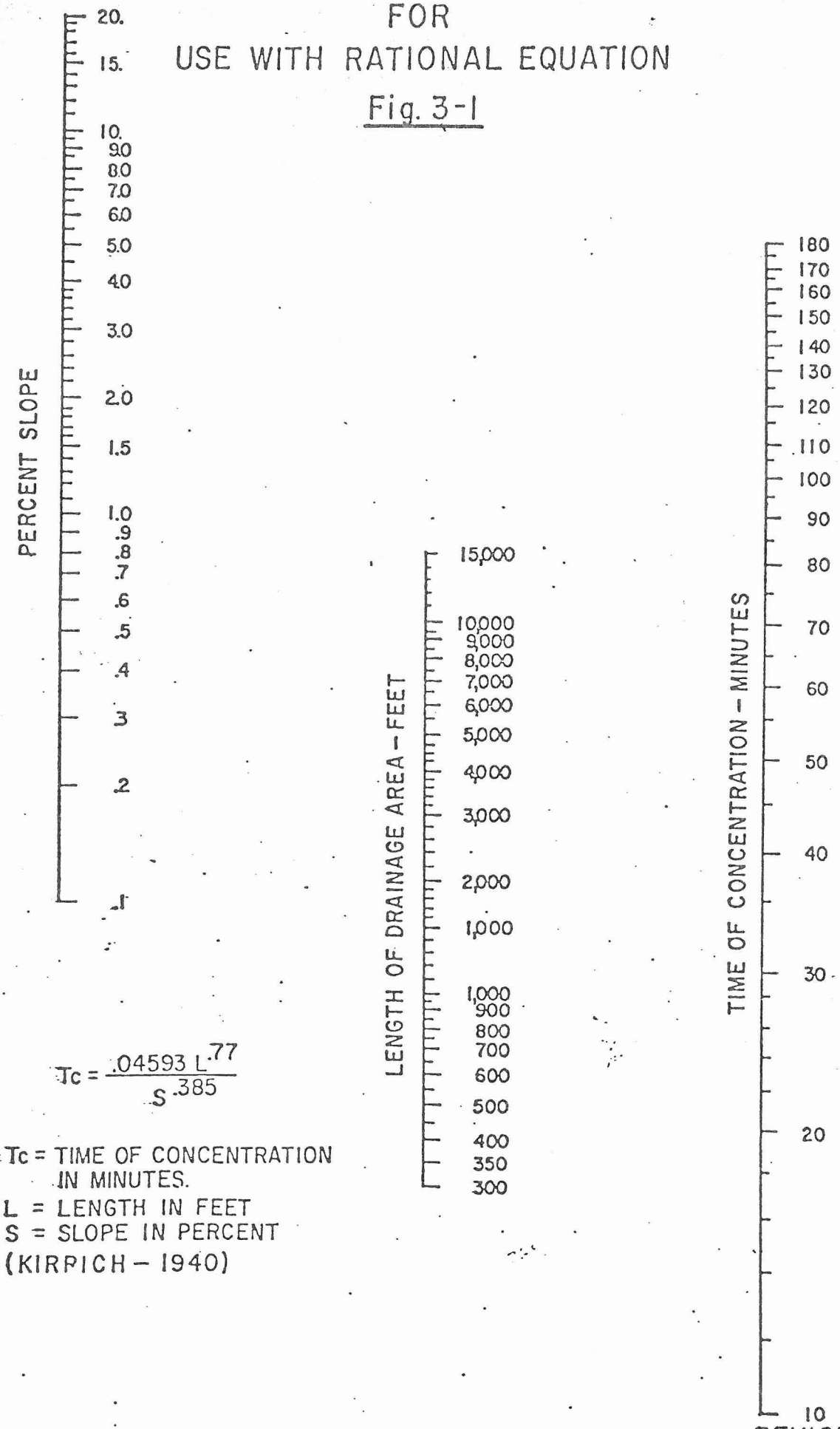


FIGURE 2-21

TIME OF CONCENTRATION FOR USE WITH RATIONAL EQUATION

Fig. 3-1



$$T_c = \frac{.04593\, L^{.77}}{S^{.385}}$$

T_c = TIME OF CONCENTRATION IN MINUTES.

L = LENGTH IN FEET

S = SLOPE IN PERCENT

(KIRPICH – 1940)

REVISED 5-1-75

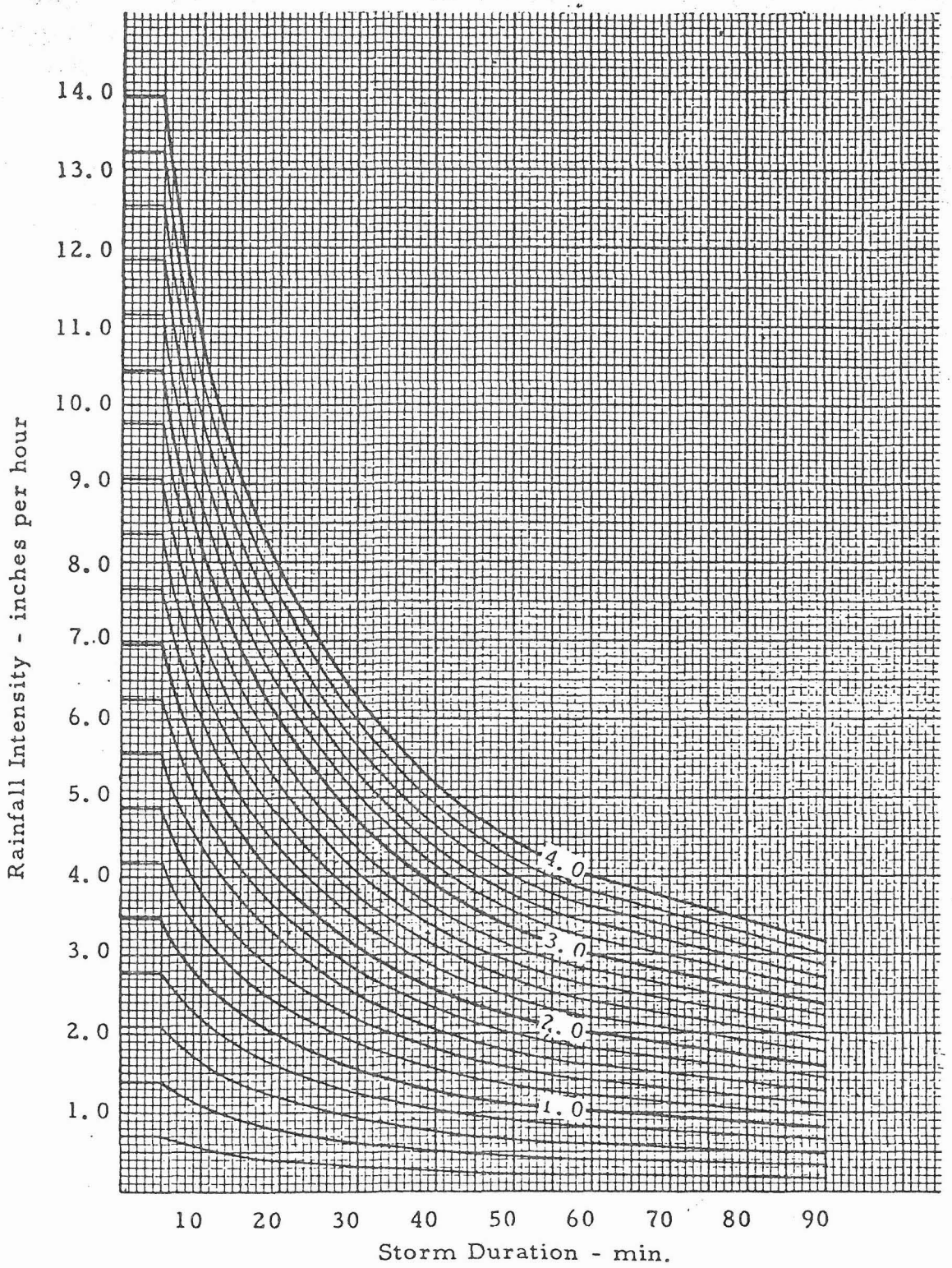


Fig. 3-2

STANDARD DURATION RAINFALL - INTENSITY CURVES

Based on:
Weather Bureau
Technical Paper No. 40

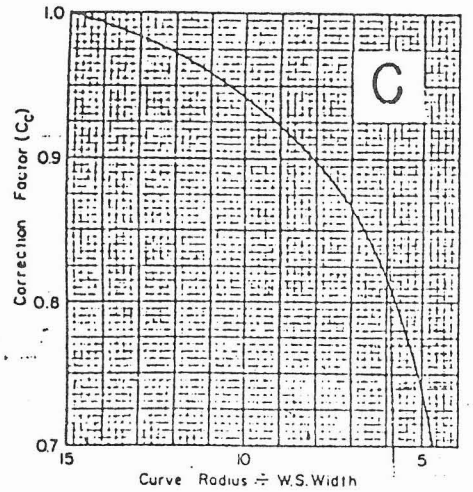
Streets	
Asphaltic	0.70 - 0.95
Concrete	0.80 - 0.95
Gravel roadways & shoulders	0.40 - 0.60
Industrial Areas	
Flat commercial - about 90% of area impervious	0.80
Heavy areas	0.60 - 0.90
Light areas	0.50 - 0.80
Business Areas	
Downtown areas	0.70 - 0.95
Neighborhood areas	0.50 - 0.70
Residential Areas	
Lawns - flat	0.05 - 0.15
- steep	0.15 - 0.35
Suburban areas	0.25 - 0.40
Single family areas	0.30 - 0.50
Multi-unit areas	0.40 - 0.60
Apartment areas	0.50 - 0.70
Parks, Cemeteries	0.10 - 0.25
Playgrounds	0.20 - 0.35

Fig. 3-3

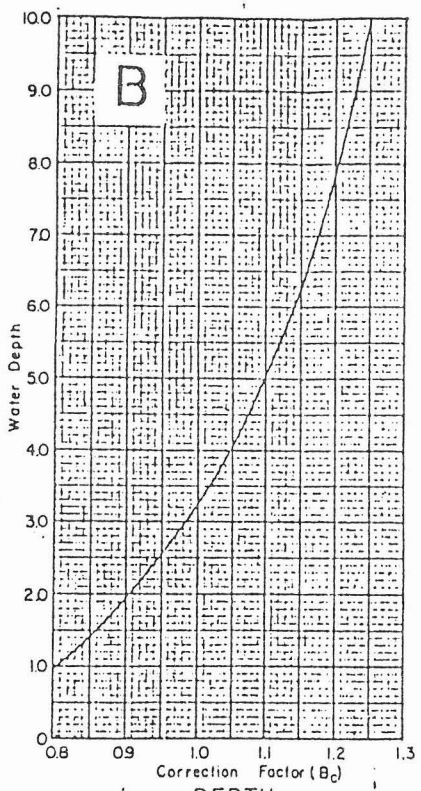
VALUES OF RUNOFF COEFFICIENT C

HYDRAULIC DESIGN: Permissible Velocities, Non-Cohesive Soil

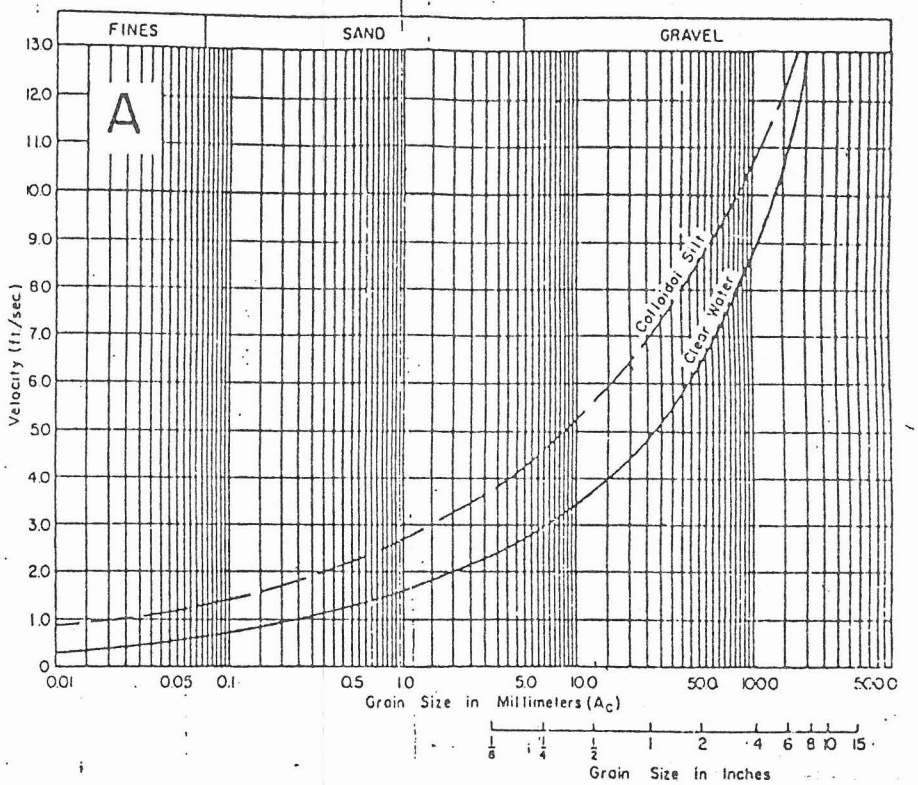
FIG. 6.3



ALIGNMENT



DEPTH



MATERIAL:

EXAMPLE:

Determine permissible clear water velocity 5'-0" deep in an unlined channel with a coarse gravel ($d_{75} = \frac{1}{2}$") invert, straight alignment.

Permissible velocity = $A_c B_c C_c$
= (3.6)(1.1)(1.0)
= 3.96 ft./sec.

Figure 6-3

PRELIMINARY

REFERENCE: Design of Stable Channels A S C E Trans. Vol. 120 1955

U. S. DEPARTMENT of AGRICULTURE
SOIL CONSERVATION SERVICE
ENGINEERING and WATERSHED PLANNING UNIT
PORTLAND, OREGON

STANDARD DWG. NO.
7-N-20104
SHEET 1 OF 1
DATE: 6-58

C. DESIGN DATA SHEETS

HYDROLOGIC DESIGN DATA

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (A)

DESIGN DATA:

Design Frequency	100	years
Drainage Area	0.19	square miles
Drainage Length	6000	feet
Elevation		
Top of Drainage Area	1558	feet
At Structure	1510	feet
Drainage Area Slope	0.8	%
Drainage Width	907	feet
Width factor W_f	1.1	
Vegetative Cover Type	Dec.-br.	
Vegetative Cover Density	10	%
Soil Group	B	
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.55	inches
Curve Number		86	
Runoff	Q =	1.25	inches
Time of Concentration	Tc	1.16	hours
Time of Peak	Tp = (Tc)(W_f)	1.27	hours
Peak Discharge	$Qp = \frac{484\ AQ}{Tp}$ =		
	=	HEC 1 / 151	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (B)

DESIGN DATA:

Design Frequency	100	years
Drainage Area	0.42	square miles
Drainage Length	13000	feet
Elevation		
Top of Drainage Area	1800	feet
At Structure	1520	feet
Drainage Area Slope	2.1	%
Drainage Width	911	feet
Width factor W_f	1.1	
Vegetative Cover Type	Des. 60	
Vegetative Cover Density	10	%
Soil Group	B	
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.55	inches
Curve Number		86	
Runoff	Q =	1.25	inches
Time of Concentration	Tc	0.82	hours
Time of Peak	$Tp = (Tc)(W_f)$	0.90	hours

Peak Discharge $Qp = \frac{484\ AQ}{Tp} =$

= HEC1 / 430 cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (C)

DESIGN DATA:

Design Frequency	100	years
Drainage Area	1.60	square miles
Drainage Length	16500	feet
Elevation		
Top of Drainage Area	1800	feet
At Structure	1525	feet
Drainage Area Slope	1.7	%
Drainage Width	2716	feet
Width factor W_f	0.29	
Vegetative Cover Type	Des. br	
Vegetative Cover Density	10	%
Soil Group	B	
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.85	inches
Curve Number		86	
Runoff	Q =	1.25	inches
Time of Concentration	Tc	1.2	hours
Time of Peak	$Tp = (Tc)(W_f)$	1.07	hours

Peak Discharge $Qp = \frac{484\ AQ}{Tp} =$

= HEC 1 cfs
1215

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (D)

DESIGN DATA:

Design Frequency	100	years
Drainage Area	0.04	square miles
Drainage Length	2000	feet
Elevation		
Top of Drainage Area	1575	feet
At Structure	1555	feet
Drainage Area Slope	1.0	%
Drainage Width	566	feet
Width factor W_f	1.24	
Vegetative Cover Type	Des. br	
Vegetative Cover Density	10	%
Soil Group	B	
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.55	inches
Curve Number		86	
Runoff	Q =	1.25	inches
Time of Concentration	Tc	0.96	hours
Time of Peak	$Tp = (Tc)(W_f)$	1.19	hours
Peak Discharge	$Qp = \frac{484\ AQ}{Tp} =$		
	=	HEC1	cfs
		37	

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (E)

DESIGN DATA:

Design Frequency	100	years
Drainage Area	0.08	square miles
Drainage Length	3000	feet
Elevation		
Top of Drainage Area	1605	feet
At Structure	1562	feet
Drainage Area Slope	1.4	%
Drainage Width	813	feet
Width factor W_f	1.1	
Vegetative Cover Type	Dis. br	
Vegetative Cover Density	10	%
Soil Group	B	
Precipitation		
P = 6 hour =		inches
P = 24 hour =	-	inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.55	inches
Curve Number		86	
Runoff	Q =	1.25	inches
Time of Concentration	Tc	0.82	hours
Time of Peak	Tp = (Tc)(W_f)	0.90	hours
Peak Discharge	$Qp = \frac{484\ AQ}{Tp} =$		
	=	HEC1 / 82	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (F)

DESIGN DATA:

Design Frequency	100	years
Drainage Area	0.14	square miles
Drainage Length	3800	feet
Elevation		
Top of Drainage Area	1622	feet
At Structure	1582	feet
Drainage Area Slope	1.0	%
Drainage Width	1054	feet
Width factor W_f	1.1	
Vegetative Cover Type	Dcd. br	
Vegetative Cover Density	10	%
Soil Group	B	
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.55	inches
Curve Number		86	
Runoff	Q =	1.45	inches
Time of Concentration	Tc	1.05	hours
Time of Peak	$Tp = (Tc)(W_f)$	1.15	hours
Peak Discharge	$Qp = \frac{484\ AQ}{Tp} =$		
	=	HEC1 / 120	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (G)

DESIGN DATA:

Design Frequency	100	years
Drainage Area	0.16	square miles
Drainage Length	4500	feet
Elevation		
Top of Drainage Area	1620	feet
At Structure	1600	feet
Drainage Area Slope	1.8	%
Drainage Width	987	feet
Width factor W_f	1.1	
Vegetative Cover Type	Des. Gr	
Vegetative Cover Density	10	%
Soil Group	B	
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.55	inches
Curve Number		86	
Runoff	Q =	1.25	inches
Time of Concentration	Tc	0.76	hours
Time of Peak	Tp = (Tc)(W_f)	0.83	hours
Peak Discharge	$Qp = \frac{484\ AQ}{Tp} =$		
	=	HEC1 171	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (H)

DESIGN DATA:

Design Frequency	100	years
Drainage Area	0.26	square miles
Drainage Length	7000	feet
Elevation		
Top of Drainage Area	1755	feet
At Structure	1620	feet
Drainage Area Slope	1.9	%
Drainage Width	1039	feet
Width factor W_f	1.1	
Vegetative Cover Type	pes. br	
Vegetative Cover Density	10	%
Soil Group	B	
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.55	inches
Curve Number		86	
Runoff	Q =	1.25	inches
Time of Concentration	Tc	0.8	hours
Time of Peak	$Tp = (Tc)(W_f)$	0.88	hours
Peak Discharge	$Qp = \frac{484\ AQ}{Tp} =$		
	=	HEC 1	cfs
		271	

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (I)

DESIGN DATA:

Design Frequency	100	years
Drainage Area	0.91	square miles
Drainage Length	17000	feet
Elevation		
Top of Drainage Area	2000	feet
At Structure	1670	feet
Drainage Area Slope	1.9	%
Drainage Width	1501	feet
Width factor W_f	1.0	
Vegetative Cover Type	Ocs. br	
Vegetative Cover Density	10	%
Soil Group	B	
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.55	inches
Curve Number		86	
Runoff	Q =	1.25	inches
Time of Concentration	Tc	1.0	hours
Time of Peak	Tp = (Tc)(W_f)	1.0	hours
Peak Discharge	$Qp = \frac{484\ AQ}{Tp} =$		
	=	HEC1 800	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (J)

DESIGN DATA:

Design Frequency	100	years
Drainage Area	0.63	square miles
Drainage Length	15200	feet
Elevation		
Top of Drainage Area	2000	feet
At Structure	1670	feet
Drainage Area Slope	3.3	%
Drainage Width	1272	feet
Width factor W_f	1.0	
Vegetative Cover Type	pel hr	
Vegetative Cover Density	10	%
Soil Group	B	
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.55	inches
Curve Number		86	
Runoff	Q =	1.25	inches
Time of Concentration	Tc	0.8	hours
Time of Peak	Tp = (Tc)(W_f)	0.8	hours
Peak Discharge	$Qp = \frac{484\ AQ}{Tp} =$		
	=	HEC 1 / 654	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (K)

DESIGN DATA:

Design Frequency	100	years
Drainage Area	0.10	square miles
Drainage Length	6000	feet
Elevation		
Top of Drainage Area	1780	feet
At Structure	1645	feet
Drainage Area Slope	1.7	%
Drainage Width	479	feet
Width factor W_f	1.21	
Vegetative Cover Type	DCS-61	
Vegetative Cover Density	10	%
Soil Group	B	
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.55	inches
Curve Number		86	
Runoff	Q =	1.25	inches
Time of Concentration	Tc	0.74	hours
Time of Peak	Tp = (Tc)(W_f)	0.91	hours
Peak Discharge	$Qp = \frac{484\ AQ}{Tp} =$		
	=	HEC 1 / 111	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

Tc = 0.095 / S^0.5

LOCATION DATA:

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (1)

DESIGN DATA:

Design Frequency	100	years
Drainage Area	1.47	square miles
Drainage Length	21,000	feet
Elevation		
Top of Drainage Area	2000	feet
At Structure	1397	feet
Drainage Area Slope	2.9	%
Drainage Width	1,951	feet
Width factor W_f	1.0	
Vegetative Cover Type	Des. Gr.	
Vegetative Cover Density	10	%
Soil Group	B	
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.55	inches
Curve Number		86	Urban.
Runoff	Q =	1.25	inches
Time of Concentration	Tc	0.84	hours 1.08
Time of Peak	Tp = (Tc)(W_f)	0.84	hours

Peak Discharge $Qp = \frac{484\,AQ}{Tp} =$

= HEC1 cfs
1469

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway GW SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (2)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	11.9	acres
	A_2		acres
	A_3		acres
Drainage Length		1300	feet
Elevation			
Top of Drainage Area		1420	feet
At Structure		1399	feet
Drainage Area Slope		1.6	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	6.7	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.5	
Peak Discharge Qp = CiA =		39.9	cfs

C# 86
Devel.

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (3)

DESIGN DATA:

Design Frequency	100	years
Drainage Area	0.54	square miles
Drainage Length	15500	feet
Elevation		
Top of Drainage Area	1730	feet
At Structure	1400	feet
Drainage Area Slope	2.1	%
Drainage Width	983	feet
Width factor W_f	1.1	
Vegetative Cover Type	Des. br	
Vegetative Cover Density	10	%
Soil Group	B	
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.55	inches
Curve Number		86	
Runoff	Q =	1.25	inches
Time of Concentration	Tc	0.86	hours 0.97
Time of Peak	$Tp = (Tc)(W_f)$	0.94	hours

Peak Discharge $Qp = \frac{484\ AQ}{Tp} =$

= HEC1 cfs
530

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (4)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	26.6	acres
	A_2		acres
	A_3		acres
Drainage Length		3100	feet
Elevation			
Top of Drainage Area		1440	feet
At Structure		1400	feet
Drainage Area Slope		1.3	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	20	minutes
Rainfall Intensity	i	5.0	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.5	
Peak Discharge Qp = CiA =		66.5	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA - (5)

DESIGN DATA:

Design Frequency	100	years
Drainage Area	0.22	square miles
Drainage Length	8500	feet
Elevation		
Top of Drainage Area	1560	feet
At Structure	1395	feet
Drainage Area Slope	1.9	%
Drainage Width	743	feet
Width factor W_f	1.1	
Vegetative Cover Type	Dec. br	
Vegetative Cover Density	10	%
Soil Group	B	
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.55	inches
Curve Number		86	
Runoff	Q =	1.25	inches
Time of Concentration	Tc	0.78	hours
Time of Peak	$Tp = (Tc)(W_f)$	0.86	hours
Peak Discharge	$Qp = \frac{484\ AQ}{Tp} =$		
	=	HEC1	cfs
		232	

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (6)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	79.9	acres
	A_2		acres
	A_3		acres
Drainage Length		6700	feet
Elevation			
Top of Drainage Area		1520	feet
At Structure		1395	feet
Drainage Area Slope		1.9	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	32	minutes
Rainfall Intensity	i	3.45	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.5	
Peak Discharge Qp = CiA =		149.8	cfs

Computed by GT Date 12/86/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA - (7)

DESIGN DATA:

Design Frequency	100	years
Drainage Area	0.57	square miles
Drainage Length	15500	feet
Elevation		
Top of Drainage Area	1725	feet
At Structure	1395	feet
Drainage Area Slope	2.1	%
Drainage Width	1019	feet
Width factor W_f	1.1	
Vegetative Cover Type	Des. br	
Vegetative Cover Density	10	%
Soil Group	B	
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.55	inches
Curve Number		86	
Runoff	Q =	1.25	inches
Time of Concentration	Tc	0.86	hours
Time of Peak	Tp = (Tc)(W_f)	0.94	hours
Peak Discharge	$Qp = \frac{484\ AQ}{Tp} =$		
	=	HEC 1	cfs
		559	

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (8)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	80.8	acres
	A_2		acres
	A_3		acres
Drainage Length		7300	feet
Elevation			
Top of Drainage Area		1520	feet
At Structure		1400	feet
Drainage Area Slope		1.6	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	36	minutes
Rainfall Intensity	i	3.5	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.5	
Peak Discharge Qp = CiA =		141.4	cfs

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ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (9)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	28.4	acres
	A_2		acres
	A_3		acres
Drainage Length		2600	feet
Elevation			
Top of Drainage Area		1440	feet
At Structure		1405	feet
Drainage Area Slope		1.4	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	17	minutes
Rainfall Intensity	i	5.4	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.5	
Peak Discharge Qp = CiA =		76.7	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (10)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	42.2	acres
	A_2		acres
	A_3		acres
Drainage Length		5000	feet
Elevation			
Top of Drainage Area		1480	feet
At Structure		1405	feet
Drainage Area Slope		1.5	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	28	minutes
Rainfall Intensity	i	4.1	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.5	
Peak Discharge Qp = CiA =		86.5	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (11)

DESIGN DATA:

Design Frequency	100	years
Drainage Area	0.14	square miles
Drainage Length	6800	feet
Elevation		
Top of Drainage Area	1520	feet
At Structure	1410	feet
Drainage Area Slope	1.6	%
Drainage Width	599	feet
Width factor W_f	1.24	
Vegetative Cover Type	Des. br	
Vegetative Cover Density	10	%
Soil Group	B	
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.55	inches
Curve Number		86	
Runoff	Q =	1.25	inches
Time of Concentration	Tc	0.8	hours
Time of Peak	Tp = (Tc)(W_f)	0.99	hours
Peak Discharge	$Qp = \frac{484\ AQ}{Tp} =$		
	=	HEC1	cfs
		126	

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (12)

DESIGN DATA:

Design Frequency		100	years
Drainage Area	2.84	1.65	square miles
Drainage Length	10,500	22,200	feet
Elevation			
Top of Drainage Area	3960	2000	feet
At Structure	2000	1405	feet
Drainage Area Slope	18.6	2.6	%
Drainage Width	7542	2075	feet
Width factor W_f	0.89	1.0	
Vegetative Cover Type		Des. br	
Vegetative Cover Density		10	%
Soil Group	D	B	
Precipitation			
P = 6 hour =			inches
P = 24 hour =			inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =		2.55	inches
Curve Number		93	86	
Runoff	Q =		1.25	inches 1.18
Time of Concentration	Tc	0.31	0.90	hours
Time of Peak	Tp = (Tc)(W_f)	0.27	0.9	hours
Peak Discharge	$Qp = \frac{484\ AQ}{Tp}$ =			
	=	HEC1	HEC1	cfs
		5648	2655	
			7534	

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (13)

DESIGN DATA:

Design Frequency	100	years
Drainage Area	0.28	square miles
Drainage Length	10000	feet
Elevation		
Top of Drainage Area	1600	feet
At Structure	1410	feet
Drainage Area Slope	1.9	%
Drainage Width	792	feet
Width factor W_f	1.1	
Vegetative Cover Type	DCS-DI.	
Vegetative Cover Density	10	%
Soil Group	B	
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.55	inches
Curve Number		86	
Runoff	Q =	1.25	inches
Time of Concentration	Tc	0.82	hours 0.72
Time of Peak	$Tp = (Tc)(W_f)$	0.90	hours
Peak Discharge	$Qp = \frac{484\,AQ}{Tp} =$	188	
	=	HEC1 279	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (14)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1		acres
	A_2		acres
	A_3	55	acres
Drainage Length		3000	feet
Elevation			
Top of Drainage Area		1460	feet
At Structure		1416	feet
Drainage Area Slope		1.5	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	19	minutes
Rainfall Intensity	i	5.1	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.5	
Peak Discharge Qp = CiA =		140	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (15)

DESIGN DATA:

Design Frequency	100	years
Drainage Area	0.88	square miles
Drainage Length	21800	feet
Elevation		
Top of Drainage Area	2444	feet
At Structure	1422	feet
Drainage Area Slope	4.7	%
Drainage Width	1124	feet
Width factor W_f	1.1	
Vegetative Cover Type	Des. Br	
Vegetative Cover Density	10	%
Soil Group	B	
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.55	inches
Curve Number		86	
Runoff	Q =	1.25	inches
Time of Concentration	Tc	0.57	hours
Time of Peak	Tp = (Tc)(W_f)	0.63	hours
Peak Discharge	$Qp = \frac{484\ AQ}{Tp} =$		
	=	HEC1 1132	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (16)

DESIGN DATA:

Design Frequency	100	years
Drainage Area	0.64	square miles
Drainage Length	11,000	feet
Elevation		
Top of Drainage Area	1620	feet
At Structure	1424	feet
Drainage Area Slope	1.7	%
Drainage Width	1632	feet
Width factor W_f	1.0	
Vegetative Cover Type	Des. br	
Vegetative Cover Density	10	%
Soil Group	B	
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.55	inches
Curve Number		86	
Runoff	Q =	1.25	inches
Time of Concentration	Tc	1.04	hours
Time of Peak	$Tp = (Tc)(W_f)$	1.04	hours
Peak Discharge	$Qp = \frac{484\ AQ}{Tp} =$		
	=	HEC-1 551	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 8T0840-9 Station
Name of Stream AREA (17)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	41.3	acres
	A_2		acres
	A_3		acres
Drainage Length		4800	feet
Elevation			
Top of Drainage Area		1500	feet
At Structure		1423	feet
Drainage Area Slope		1.6	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	26	minutes
Rainfall Intensity	i	4.3	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.5	
Peak Discharge Qp = CiA =		89	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (18)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	22.9	acres
	A_2		acres
	A_3		acres
Drainage Length		2000	feet
Elevation			
Top of Drainage Area		1450	feet
At Structure		1425	feet
Drainage Area Slope		1.2	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	15	minutes
Rainfall Intensity	i	5.7	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.5	
Peak Discharge Qp = CiA =		65	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (19)

DESIGN DATA:

Design Frequency	100	years
Drainage Area	0.26	square miles
Drainage Length	9000	feet
Elevation		
Top of Drainage Area	1580	feet
At Structure	1428	feet
Drainage Area Slope	1.7	%
Drainage Width	813	feet
Width factor W_f	1.1	
Vegetative Cover Type	Des. Gr	
Vegetative Cover Density	10	%
Soil Group	B	
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.55	inches
Curve Number		86	
Runoff	Q =	1.25	inches
Time of Concentration	Tc	0.86	hours
Time of Peak	$Tp = (Tc)(W_f)$	0.95	hours
Peak Discharge	$Qp = \frac{484\ AQ}{Tp} =$		
	=	HEC 1	cfs
		256	

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (20)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	56	acres
	A_2		acres
	A_3		acres
Drainage Length		5500	feet
Elevation			
Top of Drainage Area		1520	feet
At Structure		1430	feet
Drainage Area Slope		1.6	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	29	minutes
Rainfall Intensity	i	4.0	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.5	
Peak Discharge Qp = CiA =		112	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (21)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1		acres
	A_2	69.8	acres
	A_3		acres
Drainage Length		4700	feet
Elevation			
Top of Drainage Area		1510	feet
At Structure		1433	feet
Drainage Area Slope		1.6	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	26	minutes
Rainfall Intensity	i	4.3	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.5	
Peak Discharge Qp = CiA =		150	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (22)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1		acres
	A_2	27.5	acres
	A_3		acres
Drainage Length		5000	feet
Elevation			
Top of Drainage Area		1480	feet
At Structure		1430	feet
Drainage Area Slope		1.7	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	18	minutes
Rainfall Intensity	i	5.2	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.5	
Peak Discharge Qp = CiA =		72	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (23)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	53.2	acres
	A_2		acres
	A_3		acres
Drainage Length		4000	feet
Elevation			
Top of Drainage Area		1490	feet
At Structure		1455	feet
Drainage Area Slope		1.4	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	24	minutes
Rainfall Intensity	i	4.5	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.5	
Peak Discharge Qp = CiA =		120	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (24)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	13.9	acres
	A_2		acres
	A_3		acres
Drainage Length		800	feet
Elevation			
Top of Drainage Area		1440	feet
At Structure		1435	feet
Drainage Area Slope		0.6	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	6.7	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.5	
Peak Discharge Qp = CiA =		46	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (25)

DESIGN DATA:

Design Frequency	100	years
Drainage Area	2.63	square miles
Drainage Length	23500	feet
Elevation		
Top of Drainage Area	2600	feet
At Structure	1435	feet
Drainage Area Slope	5.0	%
Drainage Width	3123	feet
Width factor W_f	~~Des-brush~~ 0.89	
Vegetative Cover Type	Des-brush	
Vegetative Cover Density	10	%
Soil Group	B	
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.55	inches
Curve Number		86	Urban
Runoff	Q =	1.25	inches
Time of Concentration	Tc	0.68	hours
Time of Peak	$T_p = (T_c)(W_f)$	0.61	hours

Peak Discharge $Q_p = \frac{484\ AQ}{T_p} =$

= HEC 1 cfs
2,962

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (26)

DESIGN DATA:

Design Frequency	100	years
Drainage Area	1.20	square miles
Drainage Length	22800	feet
Elevation		
Top of Drainage Area	2714	feet
At Structure	1440	feet
Drainage Area Slope	5.6	%
Drainage Width	1467	feet
Width factor W_f	1.0	
Vegetative Cover Type	Des. Br.	
Vegetative Cover Density	10	%
Soil Group	B	
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.55	inches
Curve Number		86	
Runoff	Q =	1.25	inches
Time of Concentration	Tc	0.56	hours
Time of Peak	Tp = (Tc)(W_f)	0.56	hours
Peak Discharge	$Qp = \frac{484\,AQ}{Tp} =$		
	=	HEC-1	cfs
		1538	

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (27)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1		acres
	A_2	11	acres
	A_3		acres
Drainage Length		1000	feet
Elevation			
Top of Drainage Area		1450	feet
At Structure		1440	feet
Drainage Area Slope		1.0	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	9	minutes
Rainfall Intensity	i	7.1	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.5	
Peak Discharge Qp = CiA =		39	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (28)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1		acres
	A_2	20.2	acres
	A_3		acres
Drainage Length		1500	feet
Elevation			
Top of Drainage Area		1465	feet
At Structure		1440	feet
Drainage Area Slope		1.6	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	11	minutes
Rainfall Intensity	i	6.5	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.5	
Peak Discharge Qp = CiA =		66	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (29)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1		acres
	A_2	9.2	acres
	A_3		acres
Drainage Length		800	feet
Elevation			
Top of Drainage Area		1455	feet
At Structure		1440	feet
Drainage Area Slope		1.9	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	6	minutes
Rainfall Intensity	i	8.3	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.5	
Peak Discharge Qp = CiA =		38	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (30)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1		acres
	A_2	57.8	acres
	A_3		acres
Drainage Length		4700	feet
Elevation			
Top of Drainage Area		1520	feet
At Structure		1440	feet
Drainage Area Slope		1.5	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	25	minutes
Rainfall Intensity	i	4.3	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.5	
Peak Discharge Qp = CiA =		124	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (B1)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1		acres
	A_2	40.4	acres
	A_3		acres
Drainage Length		3100	feet
Elevation			
Top of Drainage Area		1490	feet
At Structure		1440	feet
Drainage Area Slope		1.6	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	19	minutes
Rainfall Intensity	i	5.1	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.5	
Peak Discharge Qp = CiA =		103	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 250840-9 Station
Name of Stream AREA (32)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1		acres
	A_2	18.4	acres
	A_3		acres
Drainage Length		1800	feet
Elevation			
Top of Drainage Area		1475	feet
At Structure		1442	feet
Drainage Area Slope		1.8	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	12	minutes
Rainfall Intensity	i	6.3	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.5	
Peak Discharge Qp = CiA =		58	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (33)

DESIGN DATA:

Design Frequency	100	years
Drainage Area	1.24	square miles
Drainage Length	21000	feet
Elevation		
Top of Drainage Area	2640	feet
At Structure	1435	feet
Drainage Area Slope	5.7	%
Drainage Width	1655	feet
Width factor W_f	1.0	
Vegetative Cover Type	Des. Nv	
Vegetative Cover Density	10	%
Soil Group	B	
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.55	inches
Curve Number		86	
Runoff	Q =	1.25	inches
Time of Concentration	Tc	0.58	hours
Time of Peak	Tp = (Tc)(W_f)	0.58	hours
Peak Discharge	$Qp = \frac{484\ AQ}{Tp} =$		
	=	HEC 1 1565	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (34)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1		acres
	A_2	15.6	acres
	A_3		acres
Drainage Length		2200	feet
Elevation			
Top of Drainage Area		1480	feet
At Structure		1445	feet
Drainage Area Slope		1.6	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	14	minutes
Rainfall Intensity	i	5.9	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.5	
Peak Discharge Qp = CiA =		46	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (3.5)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1		acres
	A_2	18.4	acres
	A_3		acres
Drainage Length		2700	feet
Elevation			
Top of Drainage Area		1485	feet
At Structure		1445	feet
Drainage Area Slope		1.5	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	17	minutes
Rainfall Intensity	i	5.4	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.5	
Peak Discharge Qp = CiA =		50	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (36)

DESIGN DATA:

Design Frequency	100	years
Drainage Area	1.60	square miles
Drainage Length	19800	feet
Elevation		
Top of Drainage Area	2303	feet
At Structure	1945	feet
Drainage Area Slope	4.3	%
Drainage Width	2259 ~~[illegible]~~	feet
Width factor W_f	1.0	
Vegetative Cover Type	Des-br	
Vegetative Cover Density	10	%
Soil Group	B	
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.55	inches
Curve Number		86	
Runoff	Q =	1.25	inches
Time of Concentration	Tc	0.68	hours
Time of Peak	Tp = (Tc)(W_f)	0.68	hours
Peak Discharge	$Qp = \frac{484\ AQ}{Tp} =$		
	=	HEC-1	cfs
		1820	

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA 37

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	13.7	acres
	A_2		acres
	A_3		acres
Drainage Length		1000	feet
Elevation			
Top of Drainage Area		1462	feet
At Structure		1445	feet
Drainage Area Slope		1.7	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	8	minutes
Rainfall Intensity	i	7.3	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.5	
Peak Discharge Qp = CiA =		50	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD, PART I

LOCATION DATA:

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (38)

DESIGN DATA:

Design Frequency	100	years
Drainage Area	0.15	square miles
Drainage Length	4100	feet
Elevation		
Top of Drainage Area	1520	feet
At Structure	1498	feet
Drainage Area Slope	1.7	%
Drainage Width	1052	feet
Width factor W_f	1.1	
Vegetative Cover Type	Des. br	
Vegetative Cover Density	10	%
Soil Group	B	
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.55	inches
Curve Number		86	
Runoff	Q =	1.25	inches
Time of Concentration	Tc	0.79	hours
Time of Peak	$Tp = (Tc)(W_f)$	0.87	hours

Peak Discharge $Qp = \frac{484\ AQ}{Tp} =$

= HEC 1 cfs
158

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 050840-9 Station
Name of Stream AREA (39)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	7.3	acres
	A_2		acres
	A_3		acres
Drainage Length		600	feet
Elevation			
Top of Drainage Area		1460	feet
At Structure		1450	feet
Drainage Area Slope		1.6	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.15	inches
Time of Concentration	Tc	5	minutes
Rainfall Intensity	i	8.8	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.5	
Peak Discharge Qp = CiA =		32	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (40)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	25.7	acres
	A_2		acres
	A_3		acres
Drainage Length		3100	feet
Elevation			
Top of Drainage Area		1500	feet
At Structure		1446	feet
Drainage Area Slope		1.7	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	18	minutes
Rainfall Intensity	i	5.3	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.5	
Peak Discharge Qp = CiA =		68	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (91)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	22.9	acres
	A_2		acres
	A_3		acres
Drainage Length		2800	feet
Elevation			
Top of Drainage Area		1488	feet
At Structure		1445	feet
Drainage Area Slope		1.5	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	18	minutes
Rainfall Intensity	i	5.3	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.5	
Peak Discharge Qp = CiA =		61	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (42)

DESIGN DATA:

Design Frequency	100	years
Drainage Area	8.22	square miles
Drainage Length	9400	feet
Elevation		
Top of Drainage Area	1600	feet
At Structure	1445	feet
Drainage Area Slope	1.6	%
Drainage Width	663	feet
Width factor W_f	1.1	
Vegetative Cover Type	Des. Gr	
Vegetative Cover Density	10	%
Soil Group	B	
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.55	inches
Curve Number		86	
Runoff	Q =	1.25	inches
Time of Concentration	Tc	0.87 ~~1.33~~	hours
Time of Peak	$Tp = (Tc)(W_f)$	0.96	hours
Peak Discharge	$Qp = \frac{484\ AQ}{Tp} =$		
	=	HEC-1 217	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (44)

DESIGN DATA:

Design Frequency	100	years
Drainage Area	0.68	square miles
Drainage Length	13800	feet
Elevation		
Top of Drainage Area	1900	feet
At Structure	1446	feet
Drainage Area Slope	3.4	%
Drainage Width	1432	feet
Width factor W_f	1.0	
Vegetative Cover Type	Des. bo	
Vegetative Cover Density	10	%
Soil Group	B	
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.55	inches
Curve Number		86	
Runoff	Q =	1.25	inches
Time of Concentration	Tc	0.68	hours
Time of Peak	$Tp = (Tc)(W_f)$	0.68	hours
Peak Discharge	$Qp = \frac{484\ AQ}{Tp} =$		
	=	HEC 1	cfs
		780	

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (45)

DESIGN DATA:

Design Frequency	100	years
Drainage Area	0.89	square miles
Drainage Length	20300	feet
Elevation		
Top of Drainage Area	2303	feet
At Structure	1450	feet
Drainage Area Slope	4.2	%
Drainage Width	1220	feet
Width factor W_f	1.0	
Vegetative Cover Type	Decidu	
Vegetative Cover Density	10	%
Soil Group	B	
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.55	inches
Curve Number		86	
Runoff	Q =	1.25	inches
Time of Concentration	Tc	0.62	hours
Time of Peak	Tp = (Tc)(W_f)	0.62	hours
Peak Discharge	$Qp = \frac{484\ AQ}{Tp} =$		
	=	HEC1	cfs
		1086	

Computed by CJT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (46)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	22.9	acres
	A_2		acres
	A_3		acres
Drainage Length		2000	feet
Elevation			
Top of Drainage Area		1476	feet
At Structure		1450	feet
Drainage Area Slope		1.3	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	15	minutes
Rainfall Intensity	i	5.7	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.5	
Peak Discharge Qp = CiA =		65	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (47)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	99.2	acres
	A_2		acres
	A_3		acres
Drainage Length		6000	feet
Elevation			
Top of Drainage Area		1525	feet
At Structure		1450	feet
Drainage Area Slope		1.3	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	34	minutes
Rainfall Intensity	i	3.6	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.5	
Peak Discharge Qp = CiA =		179	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA (48)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1		acres
	A_2	56.9	acres
	A_3		acres
Drainage Length		5000	feet
Elevation			
Top of Drainage Area		1510	feet
At Structure		1446	feet
Drainage Area Slope		1.3	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	29	minutes
Rainfall Intensity	i	4.0	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.5	
Peak Discharge Qp = CiA =		113	cfs

Computed by GT Date 12/18/86

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway SUN VALLEY PARKWAY County MARICOPA
Location PHASE II
Project No. 850840-9 Station
Name of Stream AREA 49

DESIGN DATA:

Design Frequency	100	years
Drainage Area	0.43	square miles
Drainage Length	14500	feet
Elevation		
Top of Drainage Area	1680	feet
At Structure	1440	feet
Drainage Area Slope	1.7	%
Drainage Width	832	feet
Width factor W_f	1.1	
Vegetative Cover Type	Des. br	
Vegetative Cover Density	10	%
Soil Group	B	
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.55	inches
Curve Number		86	
Runoff	Q =	1.25	inches
Time of Concentration	Tc	0.96	hours
Time of Peak	Tp = (Tc)(W_f)	1.05	hours

Peak Discharge $Qp = \frac{484\ AQ}{Tp} =$

= HEC1 / 390 cfs

Computed by GT Date 12/18/86

CULVERT DESIGN

PROJECT: SUN VALLEY
Ph. II.

DESIGNER: GT

DATE: 3-17-87

HYDROLOGIC AND CHANNEL INFORMATION

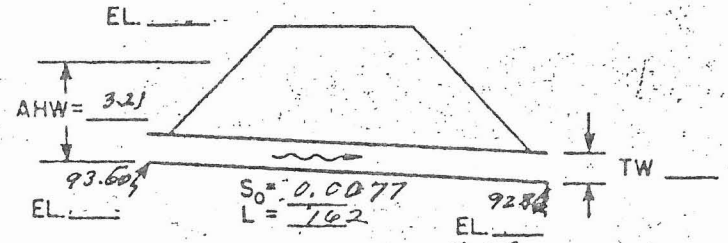
Q_{100} = 1469
+ 3-10/3 CBC

Q_1 = _____ TW_1 = _____
Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 413+19



MEAN STREAM VELOCITY = 4.06
(1.5×) MAX. STREAM VELOCITY = 6.10

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT.		OUTLET CONTROL HW=H + h_o − LS_o								CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
HOWL'S 3-10X3	163	3.0	1.07	3.21	0.4	0.8	2.0	2.5	1.7	2.5	0.60	2.75	3.21	8.1		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY
Ph. II.

DESIGNER: GT

DATE: 3-17-87

HYDROLOGIC AND CHANNEL INFORMATION

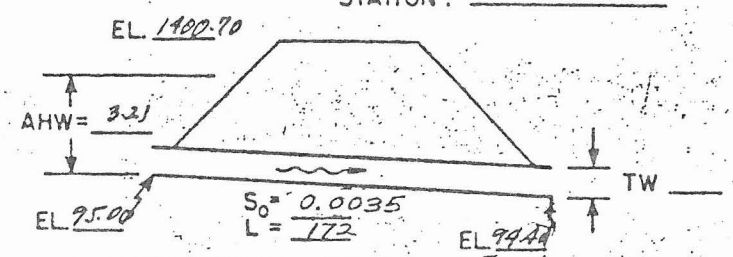
Q_{100} = 1469
6-10/3 CBC

Q_1 = _____ TW_1 = _____
Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 416+36



MEAN STREAM VELOCITY = 5.11
MAX. STREAM VELOCITY = 7.67

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. $\frac{HW}{D}$	HW	OUTLET CONTROL $HW=H+h_o-LS_o$: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
HOWE'S 6-10x3	163	3.0	1.07	3.21	0.4	0.85	2.0	2.5	1.7	2.5	0.60	2.75	3.21	8.1		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: G.T

DATE: 3-17-87

HYDROLOGIC AND CHANNEL INFORMATION

Q100 = 40 cfs

Dble 36" x 22" ~~CMP~~ CSP

(35" x 24")

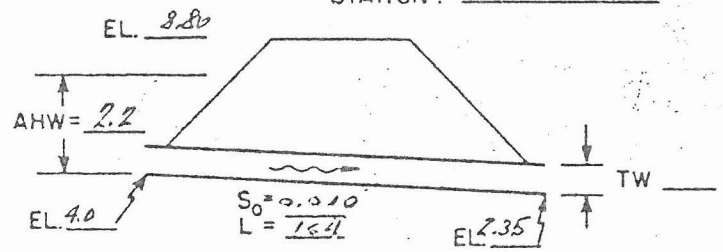
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 425+35



MEAN STREAM VELOCITY = 3.3

MAX. STREAM VELOCITY = 4.95

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT.		OUTLET CONTROL HW=H + h_o − LS_o								CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			HW/D	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
2 − 35 x 24 HPWL's	20	2.0	1.1	2.2	0.5	1.79	1.15	1.57	1.1	1.57	~~1.5~~	2.86	~~2.86~~	6.6		
											1.65	1.71	2.2			

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY PH II

DESIGNER: G.T.

DATE: 3-17-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 530

~~Dble 10/3~~ CBC

Dble 8/4 CBC

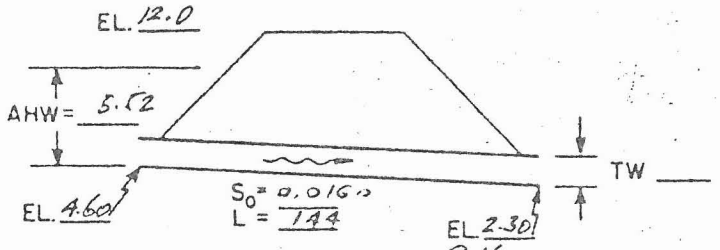
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 4307 82



MEAN STREAM VELOCITY = 8.4

MAX. STREAM VELOCITY = 12.6

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. $\frac{HW}{D}$	HW	OUTLET CONTROL $HW = H + h_o - LS_o$: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
HOWL'S		Dble 10/3	1.69	5.07	0.4	2.18	2.75	2.87	2.5	2.87	2.3	2.77	5.07	9.6		
HOWL'S		Dble 8/4	1.38	5.52	0.4	1.87	3.3	3.65	2.5	3.65	2.3	3.22	5.52	10.0		OK

SUMMARY & RECOMMENDATIONS: USE Dble 8/4 (4' VERT REQ'D BY MCHD)

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: GT

DATE: 3-17-84

HYDROLOGIC AND CHANNEL INFORMATION

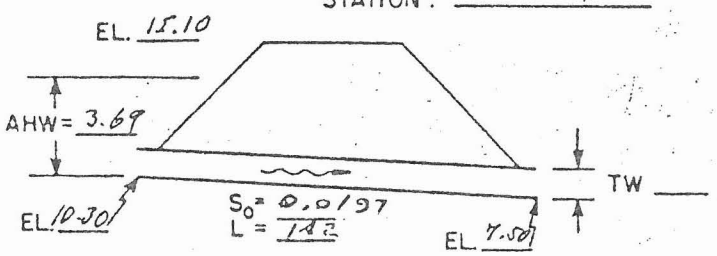
Q_{100} = 67
Dble 36" x 22" CSP
(35" x 24")

Q_1 = _____ TW_1 = _____
Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 437+19



MEAN STREAM VELOCITY = 5.0
MAX. STREAM VELOCITY = 7.5

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT.		OUTLET CONTROL HW=H + h_o - LS_o								CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			HW/D	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
2-35x24 HDWL 5	67/2	2.0	1.82	3.64	0.5	4.73	1.52	1.76	1.6	1.76	2.80	3.69	3.69	8.4		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: GT

DATE: 3-17-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 232

8/3 CBC

8/4 CBC

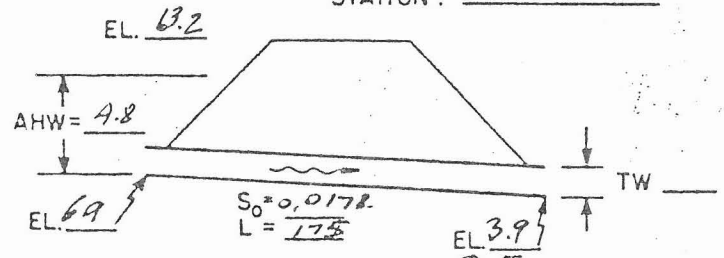
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 443+84



MEAN STREAM VELOCITY = 8.5

MAX. STREAM VELOCITY = 12.75

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. $\frac{HW}{D}$	HW	OUTLET CONTROL HW=H + h_o − LS_o: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
HDWL's		8/3	1.88	5.64	0.4	2.83	3.0	3.0	2.6	3.0	3.0	2.83	5.64	9.6		
HDWL's		8/4	1.2	4.8	0.4	1.49	3.0	3.5	2.6	3.5	3.0	1.99	4.8	9.6		OK

SUMMARY & RECOMMENDATIONS:

USE 8/4 CBC

Figure 7

PROJECT: SUN VALLEY PH. II

DESIGNER: GT

DATE: 3-17-87

HYDROLOGIC AND CHANNEL INFORMATION

Q100 = 150

8/3 CBC

8/4 CBC

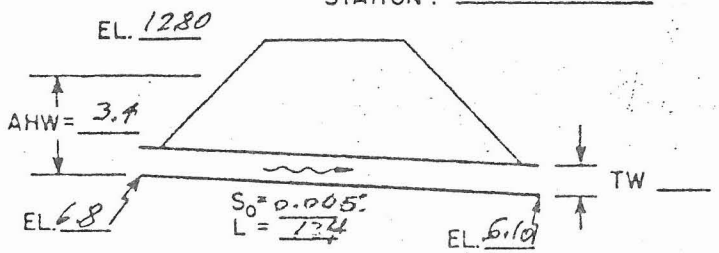
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 446+24



MEAN STREAM VELOCITY = 4.7

MAX. STREAM VELOCITY = 7.05

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. HW/D	INLET CONT. HW	OUTLET CONTROL HW=H+h_o−LS_o: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
HDWL'S		8/3	1.22	3.66	0.4	1.09	2.3	2.65	2.1	2.65	1.7	2.09	3.66	8.1		
HDWL'S		8/4	0.85	3.40	0.4	0.58	2.3	3.25	2.1	3.25	1.7	2.13	3.40	8.1		USE

SUMMARY & RECOMMENDATIONS:

USE 8/4

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: GT

DATE: 3-17-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 559

Dble 10/3 CBC

Dble 8/4 CBC

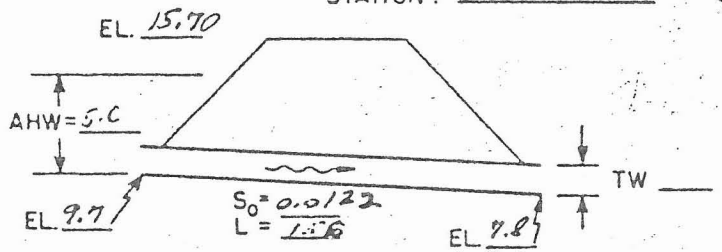
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 454+01



MEAN STREAM VELOCITY = 6.47

MAX. STREAM VELOCITY = 9.7

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT.		OUTLET CONTROL HW=H + h_o - LS_o								CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			HW/D	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
HDWL'S		Dble 10/3	1.75	5.25	0.4	2.46	3.0	3.0	2.6	3.0	1.9	3.56	5.25	9.3		
HDWL'S		Dble 8/4	1.4	5.60	0.4	2.12	3.4	3.7	2.6	3.7	1.9	3.92	5.60	11.2		USE

SUMMARY & RECOMMENDATIONS:

USE DOUBLE 8/4

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: GT

DATE: 3-17-87

HYDROLOGIC AND CHANNEL INFORMATION

6+4 CBC

Q_{100} = 98

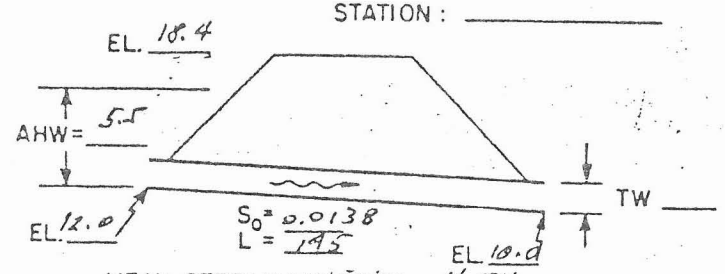
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 460+45



MEAN STREAM VELOCITY = 4.54

MAX. STREAM VELOCITY = 6.81

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. $\frac{HW}{D}$	HW	OUTLET CONTROL $HW = H + h_o - LS_o$: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
HDWL'S	98	6+4	1.37	5.5	0.4	1.95	3.3	3.65	2.4	3.65	2.0	3.6	5.5	10.0		AVAIL HW ~5.5
~~HDWL'S~~	~~70~~	~~PBCE 36"+22"~~	~~1.95~~	~~3.90~~	~~0.5~~	~~4.21~~	~~1.86~~	~~1.98~~	~~1.5~~	~~1.78~~	~~1.15~~	~~1.84~~	~~1.84~~	~~10.0~~		~~AVAIL HW 4.9~~

SUMMARY & RECOMMENDATIONS: USE 6x4 INSTEAD OF 8x3 CBC

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: GT

DATE: 3-17-87

HYDROLOGIC AND CHANNEL INFORMATION

Dble 36" x 22" CSP
(35" x 24")
Q_{100} = 70

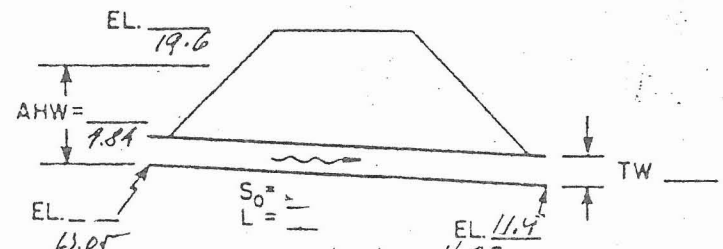
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 463+30



MEAN STREAM VELOCITY = 4.39

MAX. STREAM VELOCITY = 6.58

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. HW/D	INLET CONT. HW	OUTLET CONTROL HW=H+h_o−LS_o: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
~~HDWL's~~	~~98~~	~~6x4~~	~~1.27~~	~~5.5~~	~~0.4~~	~~1.95~~	~~3.3~~	~~3.65~~	~~3.4~~	~~3.65~~	~~2.0~~	~~3.6~~	~~5.5~~	~~10.0~~		~~AVAIL HW 5.5~~
HDWL's	70	Dble 36"x22"	1.95	3.90	0.5	4.21	1.56	1.98	1.5	1.78	1.15	4.84	4.84	10.0		AVAIL HW 4.9

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY PH II

DESIGNER: GT

DATE: 3-17-87

HYDROLOGIC AND CHANNEL INFORMATION

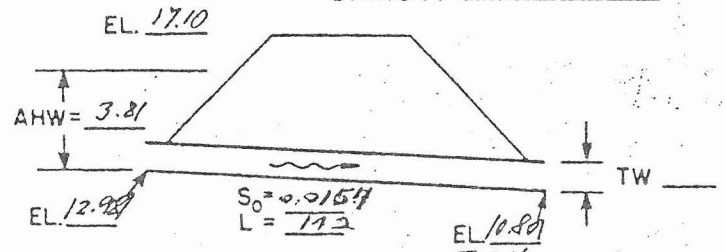
Q_{100} = 164 cfs
8/3 CBC

Q_1 = _____ TW_1 = _____
Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 473+45



MEAN STREAM VELOCITY = 5.24
MAX. STREAM VELOCITY = 7.86

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. $\frac{HW}{D}$	HW	OUTLET CONTROL $HW = H + h_o - LS_o$: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
HEADWALLS		8/3	1.27	3.81	0.4	1.33	2.35	2.67	2.50	2.67	2.28	2.72	3.81	8.7		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: GT

DATE: 3-17-87

HYDROLOGIC AND CHANNEL INFORMATION

Q100 = 126 cfs

6/3 CBC

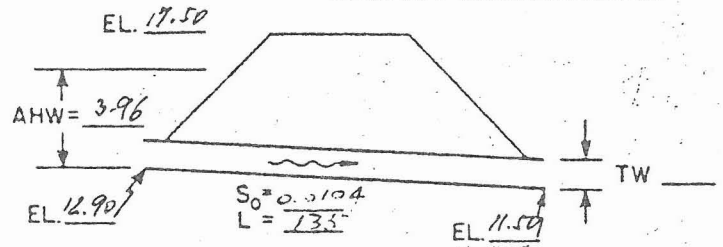
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 477+00



MEAN STREAM VELOCITY = 4.35

MAX. STREAM VELOCITY = 6.53

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. HW/D	INLET CONT. HW	OUTLET CONTROL HW=H+h_o−LS_o: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
HEADWALLS			1.32	3.96	04	1.45	2A	2.7	2.2	2.7	14	2.75	3.96	8.7		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: GT

DATE: 3-17-87

HYDROLOGIC AND CHANNEL INFORMATION

Q100 = ~~[illegible]~~ 6723 cfs

TRIPLE SIX 10/4 CBC

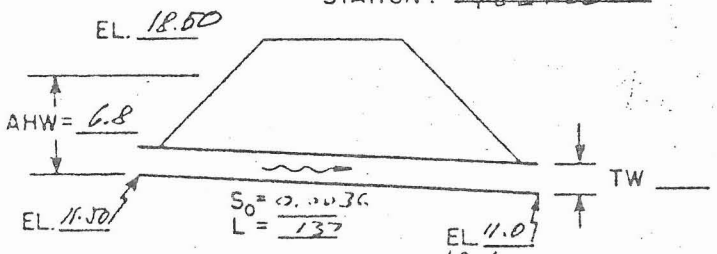
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 480+11 481+11 ~~482+66~~



MEAN STREAM VELOCITY = 10.6

MAX. STREAM VELOCITY = 16.0

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. HW/D	INLET CONT. HW	OUTLET CONTROL HW=H+h_o−LS_o: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
~~HEADWALLS~~	~~41.8~~	~~TRIP. 6-10/4~~	~~1.17~~	~~6.80~~	~~0.5~~	~~3.05~~	~~3.7~~	~~3.85~~	~~3.1~~	~~3.85~~	~~0.5~~	~~6.4~~	~~6.8~~	~~11.2~~		
HEADWALLS	37.3	TRIP 6-10/4	1.52	6.08	0.4	2.30	3.6	3.80	3.0	3.80	0.5	5.6	6.08	10.3		*

SUMMARY & RECOMMENDATIONS: * REVISED Q100 - SEE NEW HEC-1 RUN

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: C.T.

DATE: 3-17-87

HYDROLOGIC AND CHANNEL INFORMATION

36" x 22" CSP
(35" x 24")

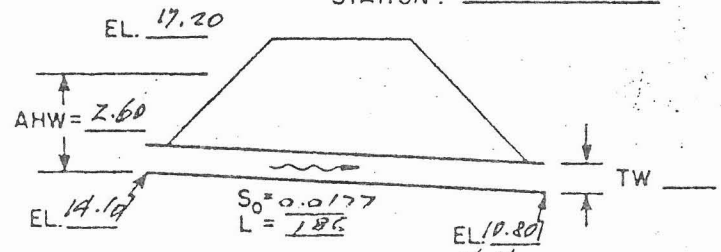
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 489+72



MEAN STREAM VELOCITY = 4.4
MAX. STREAM VELOCITY = 6.6

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT.		OUTLET CONTROL HW=H + h_o - LS_o								CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
END SECT.	24	36"x24	1.30	2.60	0.5	2.29	1.3	1.65	1.2	1.65	3.3	0.64	2.60	6.8		AVAIL. HW = 2.60

SUMMARY & RECOMMENDATIONS: REQ'D BY EXIST. GROUND CONFIG.

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: GT

DATE: 3-17-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 279 cfs

10/3 CBC

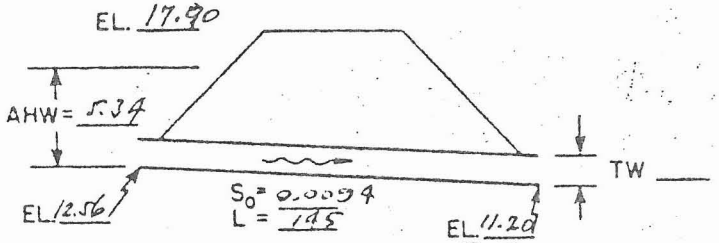
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 492+78



MEAN STREAM VELOCITY = 5.5

MAX. STREAM VELOCITY = 8.25

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION										CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			INLET CONT.		OUTLET CONTROL $HW = H + h_o - LS_o$											
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
HEADW.			1.78	5.34	0.4	2.41	3.0	3.0	2.7	3.0	1.36	4.05	5.34	9.3		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: GT

DATE: 3-17-87

HYDROLOGIC AND CHANNEL INFORMATION

24" CSP

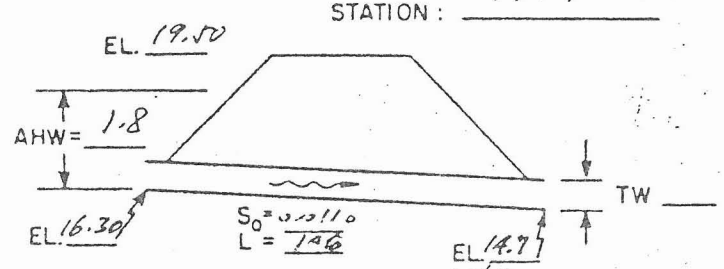
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 496+82



MEAN STREAM VELOCITY = N/A

MAX. STREAM VELOCITY = _____

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION										CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			INLET CONT.		OUTLET CONTROL $HW = H + h_o - LS_o$											
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
END SECT	11	24"	0.9	1.8	0.5	1.12	1.1	1.55	1.0	1.55	1.6	1.07	1.8	7.8		

SUMMARY & RECOMMENDATIONS:

N/A = Drainage + Q too small to worry about scour

Figure 7

PROJECT: SUN VALLEY Ph. II

DESIGNER: GT

DATE: 3-17-87

HYDROLOGIC AND CHANNEL INFORMATION

(43"+27) CBP 42"x29"

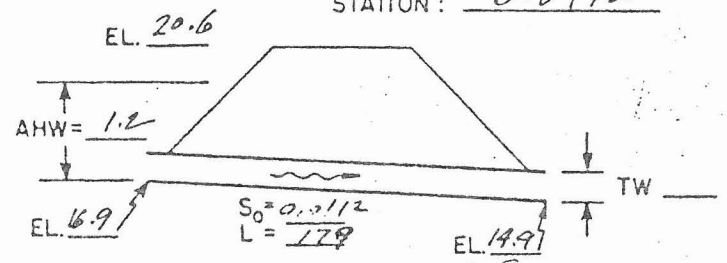
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 500+12



MEAN STREAM VELOCITY = 2.9

MAX. STREAM VELOCITY = 4.35

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT.		OUTLET CONTROL HW=H + h_o - LS_o								CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
END SECT.	10	42x29	0.5	1.2	0.5	0.17	0.7	1.56	0.6	1.56	2.0	–	1.2	5.0		TOGETHER W. 496+82

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY PH II

DESIGNER: GT

DATE: 3-17-87

HYDROLOGIC AND CHANNEL INFORMATION

Dble 42"x29" CSP

Q_{100} = 100

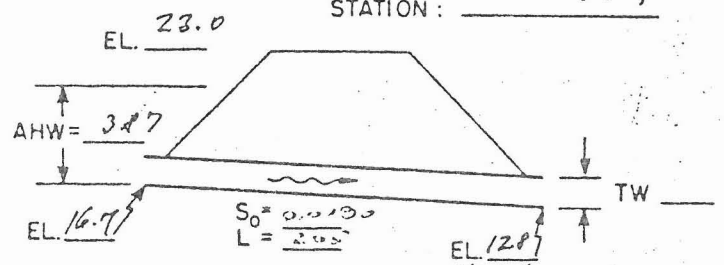
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 505+04



MEAN STREAM VELOCITY = 4.74

MAX. STREAM VELOCITY = 7.11

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. HW/D	INLET CONT. HW	OUTLET CONTROL HW=H + h_o - LS_o: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
HDWS	100	Dble 42"x29"	1.6	3.87	0.4	3.54	1.91	2.16	1.8	2.16	3.9	1.80	3.87	9.6		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: ST

DATE: 3-17-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 1132 cfs

~~4 - 10/3 CBC~~

4 - 10/4 CBC

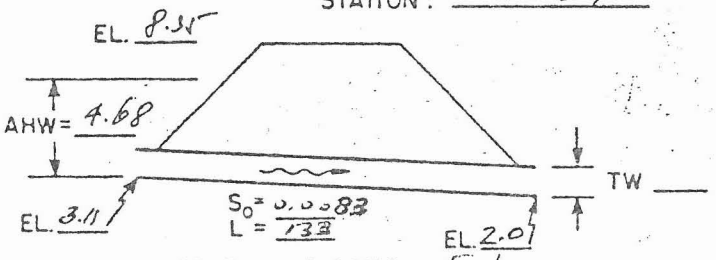
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 512+67



MEAN STREAM VELOCITY = 5.1

MAX. STREAM VELOCITY = 7.6

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT.		OUTLET CONTROL HW=H + h_o - LS_o								CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
HEADWALLS		4-10/3	1.8	5.4	0.4	2.42	3.0	3.0	2.4	3.0	1.0	4.42	5.4	9.4		
"	1132	4-10/4	1.17	4.68	0.4	1.41	3.0	3.5	2.4	3.5	1.11	3.80	4.68	9.7		USE

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: GT

DATE: 3-17-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 2449

6-12/5 CBC

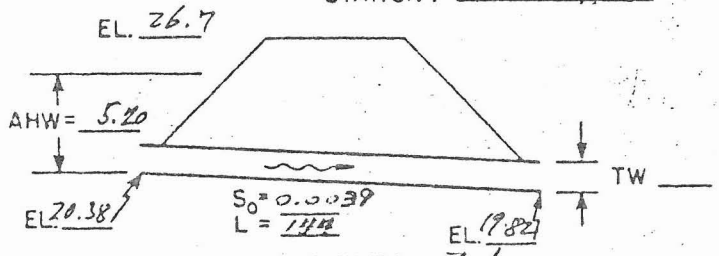
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 518+75



MEAN STREAM VELOCITY = 7.1

MAX. STREAM VELOCITY = 10.6

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. $\frac{HW}{D}$	HW	OUTLET CONTROL $HW = H + h_o - LS_o$: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
~~HEADW.~~			~~1.04~~	~~5.20~~	~~0.4~~	~~1.17~~	~~3.35~~	~~4.17~~	~~3.1~~	~~4.17~~	~~0.4~~	~~4.94~~	~~5.2~~	~~10.1~~		
HEADW.			1.05	5.20	0.4	1.17	3.35	4.17	3.1	4.17	0.56	4.78	5.2	10.1		USE

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: G.T.

DATE: 3-13-87

HYDROLOGIC AND CHANNEL INFORMATION

Q100 = 89

58" x 36" CSP

(57" x 38")

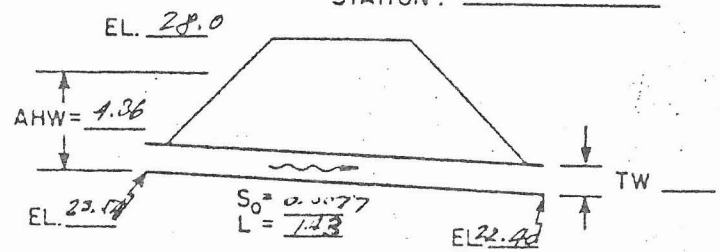
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 525+44



MEAN STREAM VELOCITY = 3.7

MAX. STREAM VELOCITY = 5.5

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. $\frac{HW}{D}$	HW	OUTLET CONTROL $HW = H + h_o - LS_o$: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
~~HEADW~~ END SECT			1.38	4.36	0.5	2.73	2.2	2.68	2.1	2.68	1.14	4.27	4.36	8.4		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: GT

DATE: 3-18-87

HYDROLOGIC AND CHANNEL INFORMATION

$Q_{100} = 65$

58" + 36" CMP

(57" + 38")

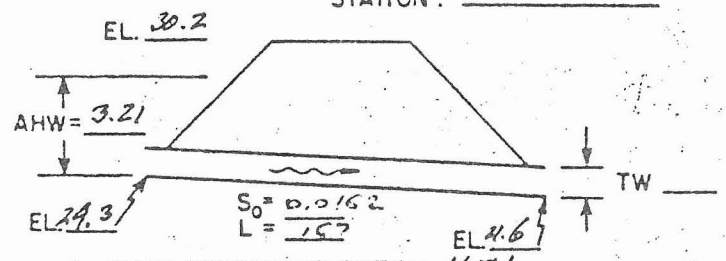
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 530+05



MEAN STREAM VELOCITY = 4.71

MAX. STREAM VELOCITY = 7.06

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT.		OUTLET CONTROL HW=H + h_o − LS_o								CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
HEADW. END 5			1.07	3.21	0.5	1.85	1.85	2.42	1.75	2.42	2.7	1.57	3.21	6.5		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: GT

DATE: 3-18-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 256

10/3 CBC

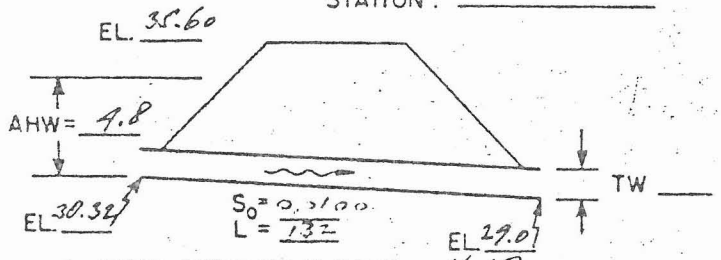
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 539+44



MEAN STREAM VELOCITY = 4.13

MAX. STREAM VELOCITY = 6.2

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION										CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			INLET CONT.		OUTLET CONTROL $HW = H + h_o - LS_o$											
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
HOWL'S			1.6	4.8	0.4	2.0	2.7	2.85	2.5	2.85	1.32	3.53	4.8	9.4		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: G. T.

DATE: 3-18-87

HYDROLOGIC AND CHANNEL INFORMATION

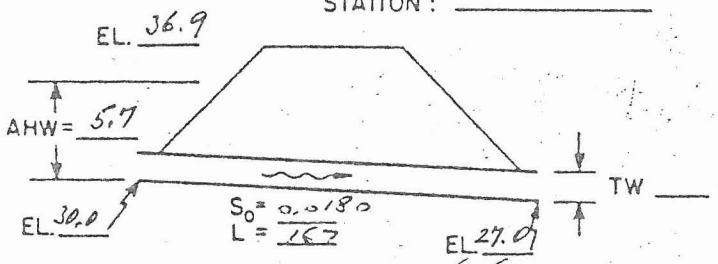
Q_{100} = 112 cfs
58" + 36" CMP
(57" + 38")

Q_1 = _____ TW_1 = _____
Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 544+13



MEAN STREAM VELOCITY = 6.6
MAX. STREAM VELOCITY = 9.9

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. $\frac{HW}{D}$	HW	OUTLET CONTROL $HW = H + h_o - LS_o$: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
END SEC.			1.9	5.7	0.5	5.56	2.5	2.75	2.4	2.75	3.0	5.31	5.7	11.2		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY PK II

DESIGNER: GT

DATE: 3-18-87

HYDROLOGIC AND CHANNEL INFORMATION

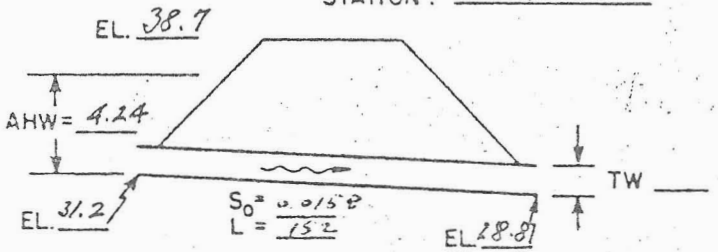
Q_{100} = 150
6/3 CBC
6/4 CBC

Q_1 = _____ TW_1 = _____
Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 549+16



MEAN STREAM VELOCITY = 5.15
MAX. STREAM VELOCITY = 8.2

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. $\frac{HW}{D}$	HW	OUTLET CONTROL $HW=H+h_o-LS_o$: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
HEADW.		6/3	1.57	4.71	0.4	2.11	2.7	2.85	2.7	2.85	2.4	2.56	4.71	9.2		
HDWL'S		6/4	1.06	4.24	0.4	1.14	2.7	3.25	2.7	3.25	2.4	1.99	4.24	9.2		USE

SUMMARY & RECOMMENDATIONS: PER MCHD REQUEST USE 6/4

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: G.T.

DATE: 3-18-87

HYDROLOGIC AND CHANNEL INFORMATION

35" x 24" CSP

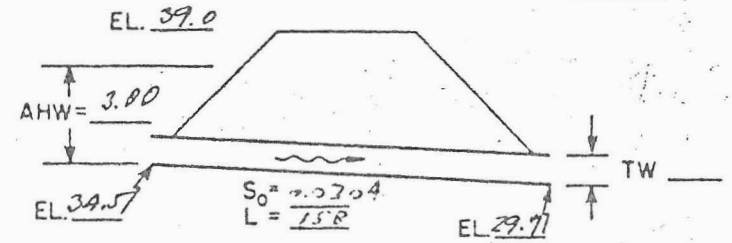
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 550+67



MEAN STREAM VELOCITY = N/A

MAX. STREAM VELOCITY = _____

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. $\frac{HW}{D}$	HW	OUTLET CONTROL $HW = H + h_o - LS_o$: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
END SECT.	28		1.5	3.00	0.5	2.78	1.32	1.66	1.2	1.16	4.8	—	3.00	8.0		AVAIL HW 3'

SUMMARY & RECOMMENDATIONS:
N/A : Drainage Area and Q too small to worry about scour.

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: GT

DATE: 3-18-87

HYDROLOGIC AND CHANNEL INFORMATION

28" + 20" CSP

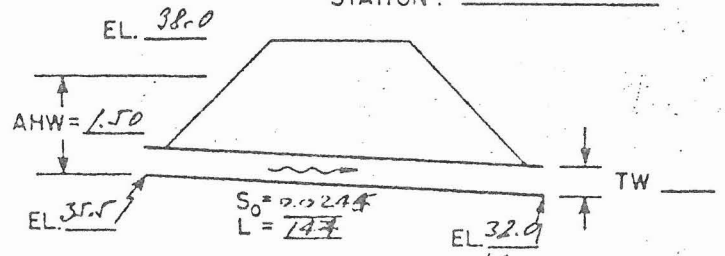
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 552+75



MEAN STREAM VELOCITY = N/A

MAX. STREAM VELOCITY = _____

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION										CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			INLET CONT.		OUTLET CONTROL $HW = H + h_o - LS_o$											
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
END SECT.	11		1.0	1.50	0.5	1.17	0.89	1.44	0.2	1.44	3.5	-	1.50	5.5		AVAIL HW = 1.5

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: GT

DATE: 3-18-87

HYDROLOGIC AND CHANNEL INFORMATION

28" x 20" CSP

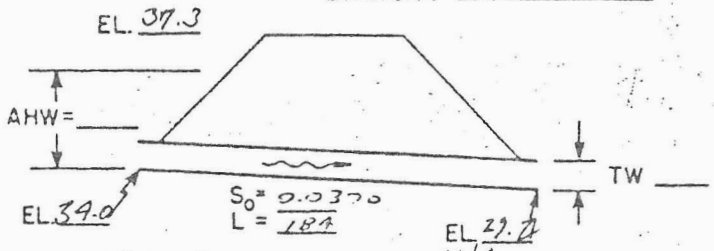
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 555+08



MEAN STREAM VELOCITY = N/A

MAX. STREAM VELOCITY = _____

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. $\frac{HW}{D}$	HW	OUTLET CONTROL $HW=H+h_o-LS_o$: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
END SEC.	12		1.13	1.7	0.5	1.41	1.0	1.5	0.9	1.5	6.8	–	1.7	4.1		ANAL. HW, 1.7'

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY PH II

DESIGNER: ~~3-18-87~~ GT

DATE: 3-18-87

HYDROLOGIC AND CHANNEL INFORMATION

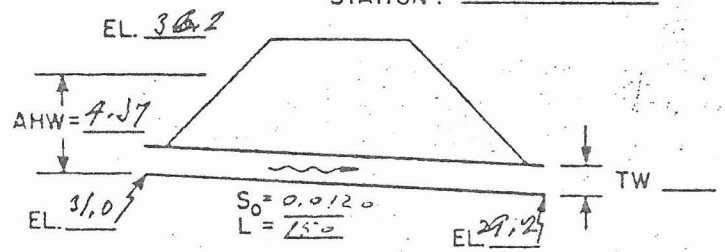
Q_{100} = 72 cfs
50" + 31" CMP
(49" + 33")

Q_1 = _____ TW_1 = _____
Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 557+40



MEAN STREAM VELOCITY = 2.78
MAX. STREAM VELOCITY = 4.2

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT.		OUTLET CONTROL HW=H + h_o − LS_o								CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
END S.	72		1.7	4.37	0.5	2.57	2.1	2.34	2.1	2.34	1.80	3.11	4.37	8.4		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: GT

DATE: 3-18-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 120

6/3 CBC

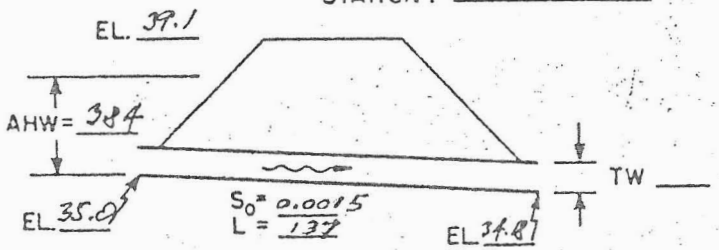
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 561+95



MEAN STREAM VELOCITY = 3.9

MAX. STREAM VELOCITY = 5.85

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT.		OUTLET CONTROL HW=H + h_o − LS_o								CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
HOWL'S	120		1.28	3.84	0.4	0.35	2.35	2.62	2.1	2.62	0.82	2.15	3.84	8.5		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Pk. II

DESIGNER: GT

DATE: 3-18-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 46

43" x 27" CMP

(42" x 29")

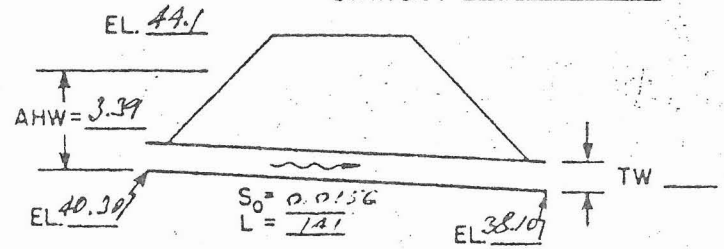
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 568+23



MEAN STREAM VELOCITY = 3.85

MAX. STREAM VELOCITY = 5.80

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT.		OUTLET CONTROL $HW = H + h_o - LS_o$								CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
END SECT.			1.51	3.39	0.5	3.43	1.7	1.97	1.6	1.97	2.12	3.2	3.39	7.6		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY PH II

DESIGNER: GT

DATE: 3-18-87

HYDROLOGIC AND CHANNEL INFORMATION

Q100 = 1123

3-10/5 CBC

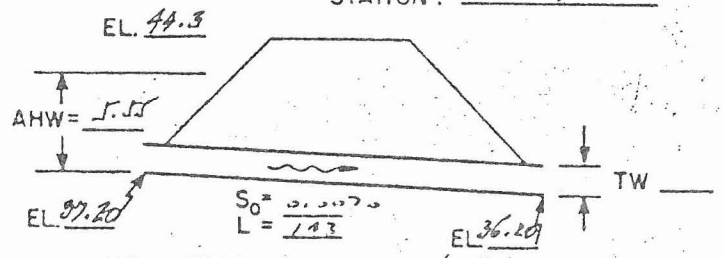
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 577+13



MEAN STREAM VELOCITY = 6.23

MAX. STREAM VELOCITY = 9.35

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT.		OUTLET CONTROL HW=H + h_o − LS_o								CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
HDWL'S	1123		1.11	5.55	0.4	1.42	3.5	4.25	3.4	4.25	1.0	4.67	5.55	9.35		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY
Ph II

DESIGNER: GT

DATE: 3-18-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 1538

4 - 10/4 CBC

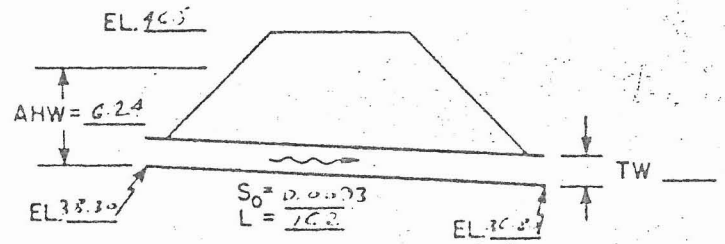
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 580 + 67



MEAN STREAM VELOCITY = 5.9

MAX. STREAM VELOCITY = 8.8

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT.		OUTLET CONTROL HW=H + h_o - LS_o								CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
HEADWALLS			1.56	6.24	0.4	2.52	3.7	3.85	3.3	3.85	1.50	4.89	6.24	10.1		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: G.T.

DATE: 3-18-37

HYDROLOGIC AND CHANNEL INFORMATION

$Q_{100} = 39$

43" x 27"

(42" x 29")

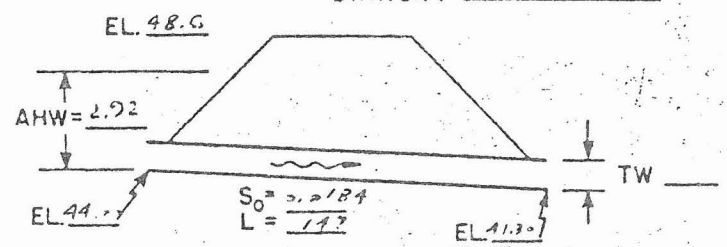
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 586+29



MEAN STREAM VELOCITY = 3.5

MAX. STREAM VELOCITY = 5.25

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT.		OUTLET CONTROL $HW = H + h_o - LS_o$								CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
END SECT.			1.3	2.92	0.5	2.56	1.58	1.91	1.7	1.91	2.7	1.77	2.92	7.8		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY PH II

DESIGNER: GT

DATE: 3-18-87

HYDROLOGIC AND CHANNEL INFORMATION

$Q_{100} = 66$

Dble 43" + 27"

(42" + 29")

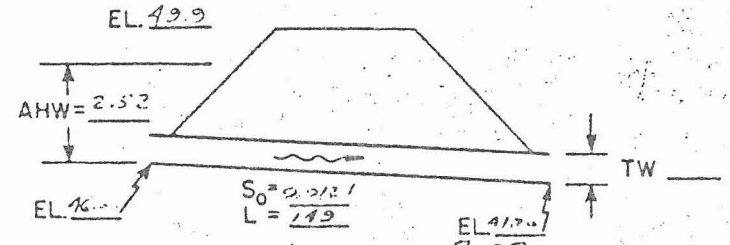
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 590+82



MEAN STREAM VELOCITY = 3.03

MAX. STREAM VELOCITY = 4.54

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT.		OUTLET CONTROL HW=H + h_o − LS_o								CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
HEADWL			1.12	2.52	0.4	1.8	1.42	1.83	1.5	1.83	1.80	1.83	2.52	2.3		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: GT

DATE: 3-18-87

HYDROLOGIC AND CHANNEL INFORMATION

Q100 = 38

29"+18" (28"+20")

48"+27" (42"+29")

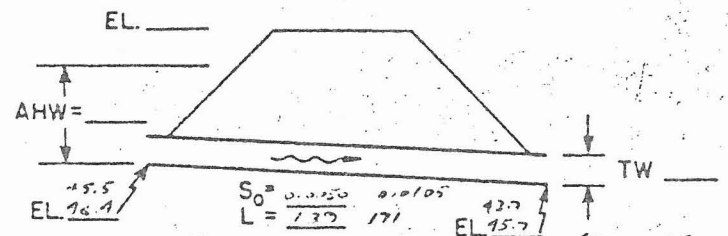
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 595+12 ① 598+34 ②



MEAN STREAM VELOCITY = ① 4.02 ② 3.99

MAX. STREAM VELOCITY = 6.03 5.98

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. HW/D	INLET CONT. HW	OUTLET CONTROL HW=H+h_o−LS_o: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
① END SEC.	11	28" x 20"	1.5	1.5	0.5	1.13	0.92	1.29	0.9	1.29	1.8	0.62	1.5	6.8		ATACL. HW 1.6
② END SEC.	29	42" x 29"	1.03	2.5	0.5	1.23	1.33	1.79	1.1	1.79	0.7	2.32	2.5	9.6		" 2.5

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: GT

DATE: 3-18-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 124

Dble 50"+31" (49"+38")

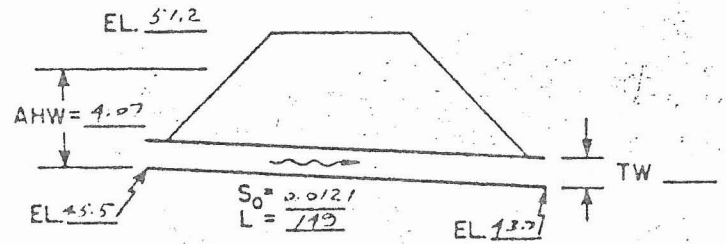
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 602+10



MEAN STREAM VELOCITY = 3.3

MAX. STREAM VELOCITY = 4.95

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT.		OUTLET CONTROL $HW = H + h_o - LS_o$								CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
HEADWL			1.48	4.07	0.4	2.95	1.9	2.32	2.0	2.32	1.8	3.47	4.07	10.3		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: GT

DATE: 3-18-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 103

3 - 43"+27" (42"+29")

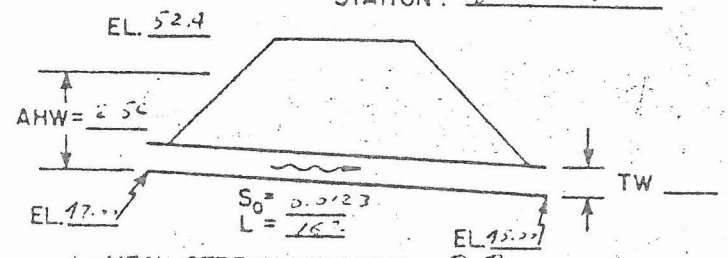
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 605+95



MEAN STREAM VELOCITY = 3.3

MAX. STREAM VELOCITY = 4.95

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. HW/D	INLET CONT. HW	OUTLET CONTROL HW=H+h_o-LS_o: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
HDWL'S			1.14	2.56	0.4	2.06	1.5	1.87	1.65	1.87	2.0	1.93	2.56	6.8		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY PH II

DESIGNER: GT

DATE: 3-19-87

HYDROLOGIC AND CHANNEL INFORMATION

$Q_{100} = 58$

Dble 36" x 22" (35" x 24")

29" x 18" (28" x 20")

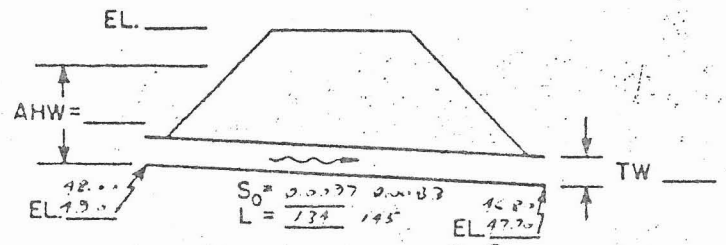
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 611+51 614+57



MEAN STREAM VELOCITY = 2.9

MAX. STREAM VELOCITY = 4.35

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. $\frac{HW}{D}$	HW	OUTLET CONTROL $HW = H + h_o - LS_o$: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
HDWL'S	2x232	25" x 24"	1.25	2.5	0.4	1.63	1.3	1.65	1.25	1.65	1.2	2.08	2.5			AVAIL. HW 2.5'
END SECT	17	28"/20"	1.61	2.7	0.5	2.85	1.16	1.41	1.1	1.41	1.3	2.96	2.96			AVAIL HW 2.7'

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY PH. II

DESIGNER: G.T.

DATE: 3 19-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 1565

4 - 10/4 CBC

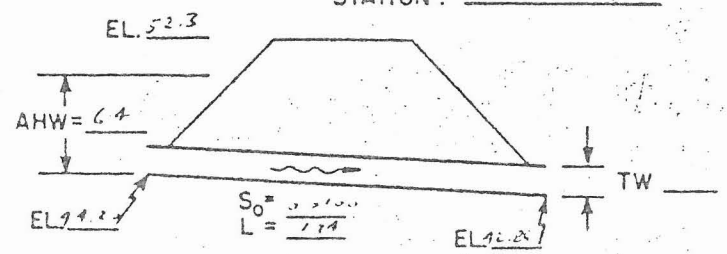
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 618+19



MEAN STREAM VELOCITY = 6.9

MAX. STREAM VELOCITY = 10.35

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT.		OUTLET CONTROL $HW = H + h_o - LS_o$								CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
HOWL			1.6	6.4	0.4	2.7	3.7	3.85	3.5	3.85	1.34	5.02	6.4	10.2		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY
PH II

DESIGNER: G. T.

DATE: 3 19-87

HYDROLOGIC AND CHANNEL INFORMATION

$Q_{100} = 46$

29"×18" (48"×20")

Dble 29"×18" (28"+20")

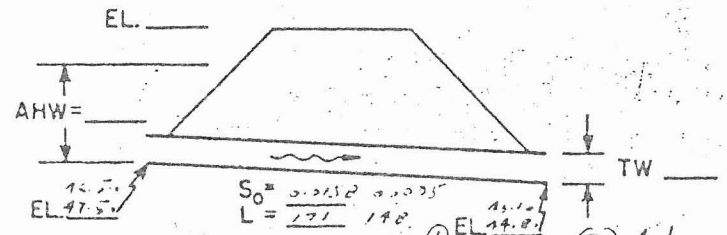
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: ① 620+99 ② 624+66



MEAN STREAM VELOCITY = 3.5

MAX. STREAM VELOCITY = 5.25

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. HW/D	INLET CONT. HW	OUTLET CONTROL HW=H+h_o−LS_o: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
END.J.	12	29/18	1.1	~~1.4~~ 1.7	0.5	1.48	1.05	1.25	0.95	1.25	1.5	1.33	1.7	6.0		AVAIL HW 1.7
HEADWL	2×15	2×29×18	1.4	~~3.8~~ 2.1	0.4	1.89	1.12	1.36	1.05	1.80	2.7	0.49	2.1	6.8		AVAIL. HW 2.1

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: G.T.

DATE: 3-12-87

HYDROLOGIC AND CHANNEL INFORMATION

$Q_{100} = 50$

Dble 36"+22" (35"+24")

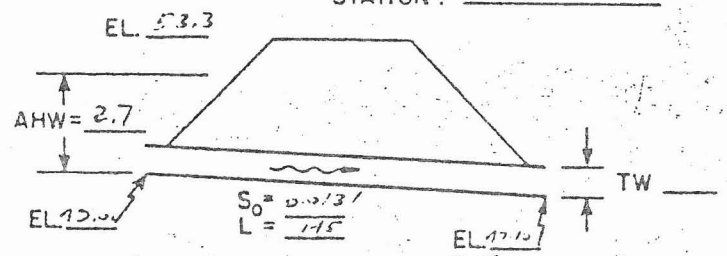
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 628+00



MEAN STREAM VELOCITY = 2.5

MAX. STREAM VELOCITY = 3.75

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. $\frac{HW}{D}$	HW	OUTLET CONTROL $HW = H + h_o - LS_o$: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
HEADWL			1.38	2.7	0.4	2.56	1.32	1.61	1.5	1.61	1.9	2.26	2.7	7.1		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: GT

DATE: 3-19-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 910 (1/2 SPLIT)

A-10/3 CBC

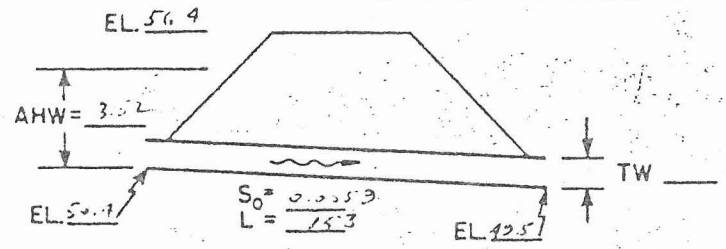
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 631+28



MEAN STREAM VELOCITY = 3.6

MAX. STREAM VELOCITY = 5.4

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION										CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			INLET CONT.		OUTLET CONTROL $HW = H + h_o - LS_o$											
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
HEADW'S			1.47	4.41	0.9	162	2.6	2.8	2.5	2.8	0.9	3.52	4.41	8.7		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY
FA II

DESIGNER: G.T.

DATE: 3-19-87

HYDROLOGIC AND CHANNEL INFORMATION

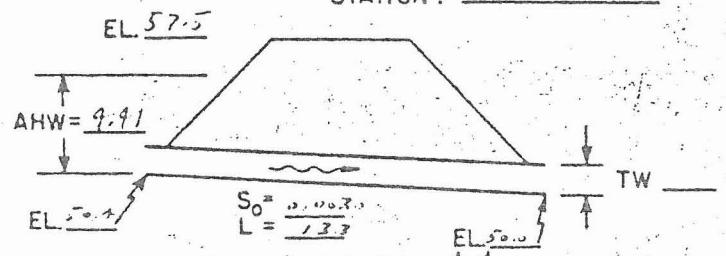
Q100 = 910 (1/2 SPLIT)
A-10/3 CBC

Q_1 = _____ TW_1 = _____
Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 632+12



MEAN STREAM VELOCITY = 4.4
MAX. STREAM VELOCITY = 6.6

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. HW/D	INLET CONT. HW	OUTLET CONTROL HW=H+h_o−LS_o: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
HEADW			1.47	9.41	0.4	1.57	2.6	2.8	2.5	2.8	0.4	3.97	4.41	8.7		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: G.T.

DATE: 3-19-97

HYDROLOGIC AND CHANNEL INFORMATION

Q100 = 50

Dble 36" + 22" (35" + 24")

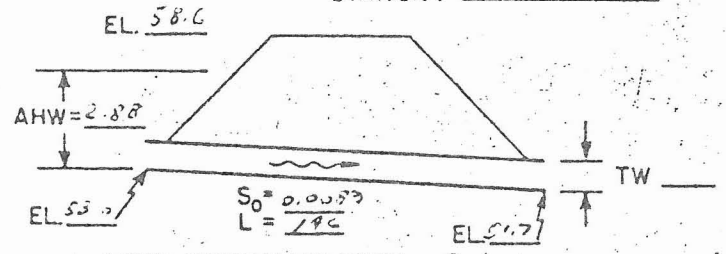
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 637+84



MEAN STREAM VELOCITY = 3.1

MAX. STREAM VELOCITY = 4.65

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. HW/D	INLET CONT. HW	OUTLET CONTROL HW=H+h_0−LS_0: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_0	LS_0	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
HEADWALL'S			1.35	2.7	0.4	2.52	1.32	1.66	1.2	1.66	1.3	2.88	2.88	6.7		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY PH. II

DESIGNER: G.T.

DATE: 3-12-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 158

10/3 CBC

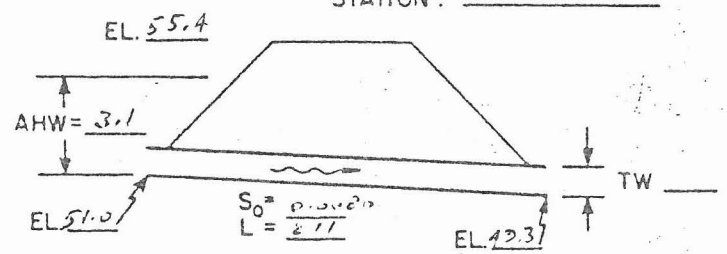
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 645+73



MEAN STREAM VELOCITY = 4.02

MAX. STREAM VELOCITY = 6.03

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION										CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			INLET CONT.		OUTLET CONTROL $HW = H + h_o - LS_o$											
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
HEADW			1.03	3.1	0.4	0.85	2.0	2.5	2.1	2.5	1.7	1.65	3.1	7.9		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: B.T.

DATE: 3-13-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 32

43"x27" (42"x29")

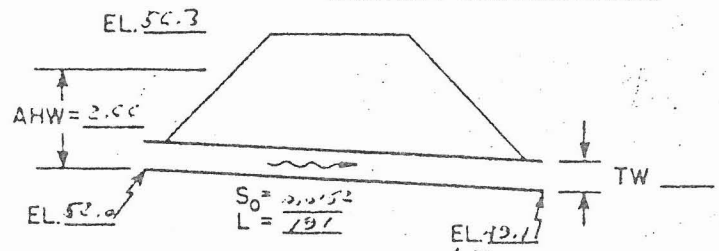
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 652+10



MEAN STREAM VELOCITY = 4.7

MAX. STREAM VELOCITY = 7.05

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT.		OUTLET CONTROL HW=H + h_o - LS_o								CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
END SECT			1.1	2.66	0.5	2.04	1.35	1.89	1.4	1.89	2.9	1.03	2.66	5.8		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY PH II

DESIGNER: G.T.

DATE: 3-19-87

HYDROLOGIC AND CHANNEL INFORMATION

$Q_{100} = 68$

Dble 43" x 27" (42" x 29")

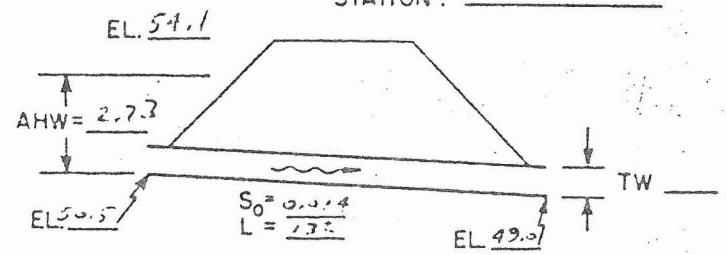
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 656+83



MEAN STREAM VELOCITY = 3.92

MAX. STREAM VELOCITY = 5.88

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT.		OUTLET CONTROL HW=H + h_o - LS_o								CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
HDWL'S			1.13	2.73	0.4	1.75	1.46	1.94	1.3	1.94	1.5	2.19	2.73	6.8		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: CT

DATE: 3-19-87

HYDROLOGIC AND CHANNEL INFORMATION

Q100 - 26

36" + 22" (35" + 24")

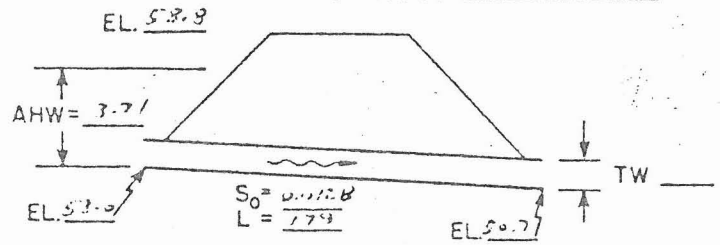
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 670 + 28



MEAN STREAM VELOCITY = 3.03

MAX. STREAM VELOCITY = 4.50

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT.		OUTLET CONTROL HW=H + h_o - LS_o								CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
END SECT			1.4	2.8	0.5	3.24	1.35	1.77	1.5	1.77	1.3	3.71	3.71	7.4		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: G.T.

DATE: 3-19-87

HYDROLOGIC AND CHANNEL INFORMATION

Q100 = 217

10/3 CBC

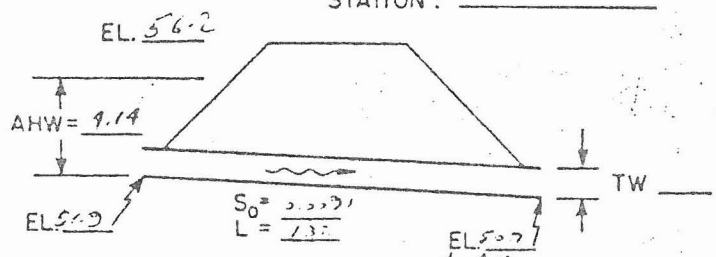
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 665+04



MEAN STREAM VELOCITY = 4.45

MAX. STREAM VELOCITY = 6.70

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT.		OUTLET CONTROL HW=H + h_o − LS_o								CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
HEADWALS			1.38	4.14	0.4	1.43	2.4	2.7	2.3	2.7	1.2	2.93	4.14	9.0		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Ph. II

DESIGNER: G.T.

DATE: 3-13-87

HYDROLOGIC AND CHANNEL INFORMATION

Q100 = 61

36/e 43" x 27" (42" x 29")

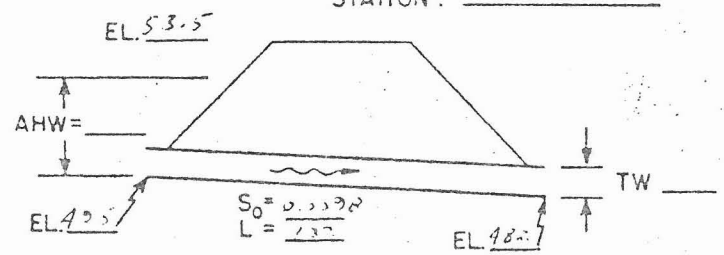
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 658+94



MEAN STREAM VELOCITY = 3.1

MAX. STREAM VELOCITY = 4.65

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. $\frac{HW}{D}$	HW	OUTLET CONTROL $HW = H + h_o - LS_o$: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
HOWL			1.05	2.55	0.4	1.41	1.32	1.87	1.25	1.87	1.3	1.98	2.55	6.1		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: G.T.

DATE: 3-19-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 780

3 - 10/3 CBC

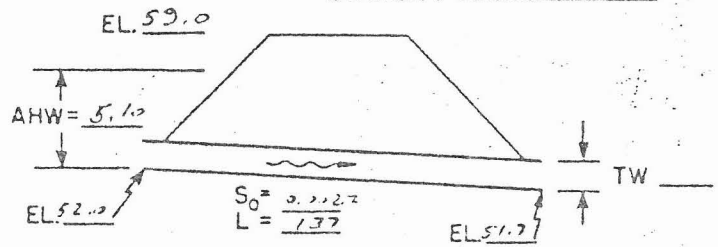
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 676+30



MEAN STREAM VELOCITY = 4.1

MAX. STREAM VELOCITY = 6.1

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT.		OUTLET CONTROL $HW = H + h_o - LS_o$								CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
HEADW'S			1.7	5.10	0.4	2.35	2.75	2.87	2.6	2.87	0.3	4.92	5.10	9.4		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: G.T.

DATE: 3-19-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 1086

A-10/3 CBC

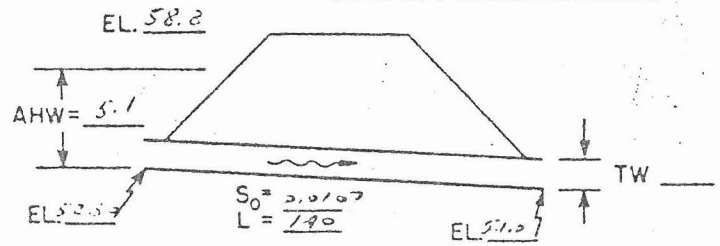
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 683+64



MEAN STREAM VELOCITY = 4.2

MAX. STREAM VELOCITY = 6.3

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. $\frac{HW}{D}$	HW	OUTLET CONTROL $HW = H + h_o - LS_o$: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
HEADW'S			1.7	5.10	0.4	2.27	2.8	2.9	2.6	2.9	1.5	3.67	5.1	9.6		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY PH II

DESIGNER: GT

DATE: 3-17-87

HYDROLOGIC AND CHANNEL INFORMATION

$Q_{100} = 65$

58" x 36" (57" x 38")

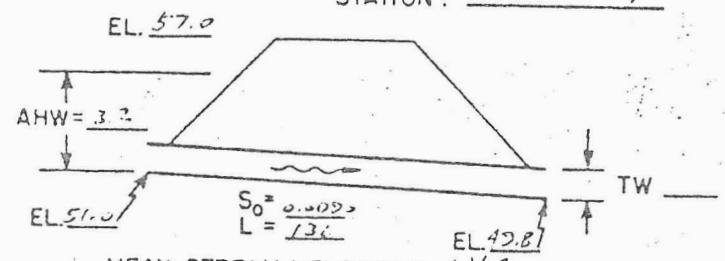
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 690 + 29



MEAN STREAM VELOCITY = N/A

MAX. STREAM VELOCITY = _____

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT.		OUTLET CONTROL HW=H + h_o - LS_o								CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
END SEC			1.07	3.2	0.5	1.62	1.85	2.42	1.9	2.42	2.2	1.84	3.2	8.1		

SUMMARY & RECOMMENDATIONS:
N/A - Drainage Area too small to worry about scour.

Figure 7

PROJECT: SUN VALLEY PH. II

DESIGNER: G.T.

DATE: 3-13-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 30

Dble 29"x18" (28"x20")

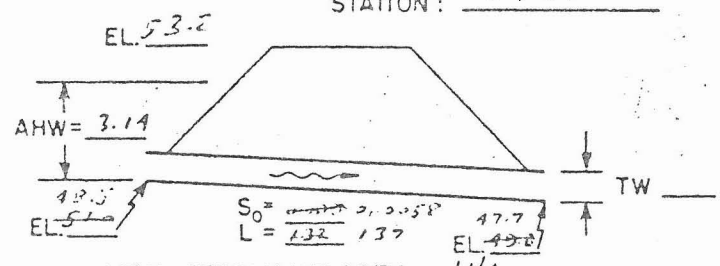
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 698+00



MEAN STREAM VELOCITY = N/A

MAX. STREAM VELOCITY = _____

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT.		OUTLET CONTROL HW=H + h_o − LS_o								CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
END SEC			1.3	1.95	0.5	2.66	1.07	1.28	1.1	1.28	1.8	3.14	3.14	7.5		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: G.T.

DATE: 3-19-87

HYDROLOGIC AND CHANNEL INFORMATION

WAGNER WASH SOOTH CROSSING - SEE HEC-2

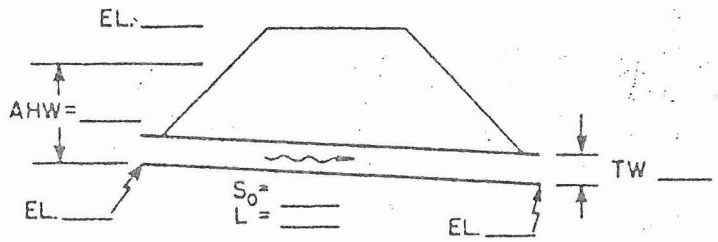
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 716+43 - 724+74



MEAN STREAM VELOCITY = _____

MAX. STREAM VELOCITY = _____

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION										CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			INLET CONT.		OUTLET CONTROL $HW=H+h_o-LS_o$											
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: G.T.

DATE: 3-19-87

HYDROLOGIC AND CHANNEL INFORMATION

2 - 36" x 22" C.S.P. (35x24)

50

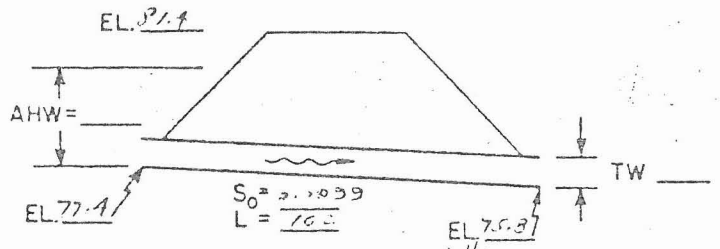
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 774-97



MEAN STREAM VELOCITY = N/A

MAX. STREAM VELOCITY = _____

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. HW/D	INLET CONT. HW	OUTLET CONTROL HW=H+h_o-LS_o: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
HEADW	2x 25		1.4	2.8	0.4	2.08	1.32	1.66	1.2	1.66	1.6	2.14	2.8	7.1		AVAIL. HW 2.8
				REQ'D BY EXIST. GROUND												

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: J. G.T.

DATE: 3-20-87

HYDROLOGIC AND CHANNEL INFORMATION

2 - 20" x 18" C.S.P.

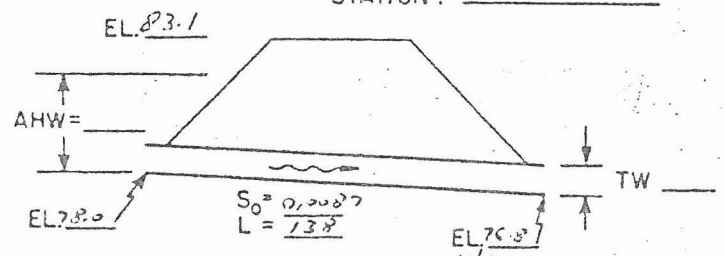
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 781+82



MEAN STREAM VELOCITY = N/A

MAX. STREAM VELOCITY = _____

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. HW/D	INLET CONT. HW	OUTLET CONTROL HW=H+h_o−LS_o: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
				REQ'D BY EXIST. GROUND												AVAIL. HW 2.2
HEADW'S	2x 14		1.31	2.2	0.4	1.96	0.93	1.30	0.8	1.30	1.2	2.06	2.2 ~~1.8~~	10.9 ~~12~~		4

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY PH II

DESIGNER: C T

DATE: 3-20-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 236

10/3 CBC

10/4 CBC

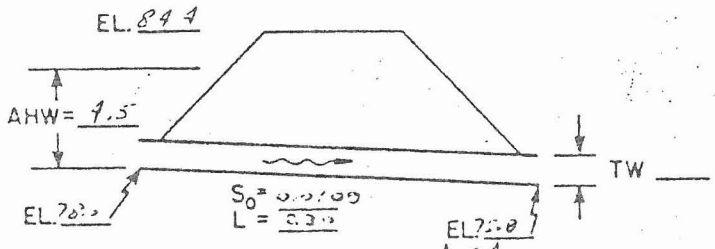
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 784+61



MEAN STREAM VELOCITY = 4.04

MAX. STREAM VELOCITY = 6.06

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT.		OUTLET CONTROL HW=H + h_o − LS_o								CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			HW/D	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
HEADW'S		10/3	1.5	4.5	0.4	1.96	2.7	2.85	2.6	2.85	2.20	2.61	4.5	8.7		
HEADW'S		10/4	1.01	4.04	0.4	1.03	2.7	3.35	2.6	3.35	2.2	2.18	4.04	8.7		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY PH II

DESIGNER: GT

DATE: 7-20-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 384

Table 10/3 CBC

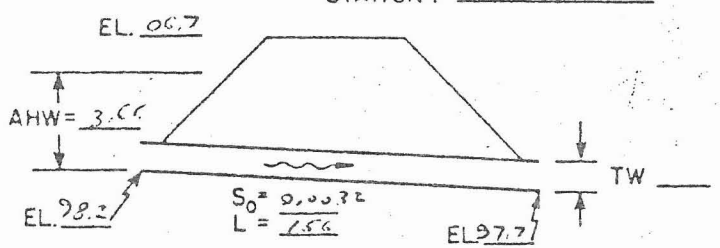
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 824+91



MEAN STREAM VELOCITY = 6.0

MAX. STREAM VELOCITY = 9.0

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. HW/D	INLET CONT. HW	OUTLET CONTROL HW=H+h_o−LS_o: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
HEADW'S			1.22	3.66	0.4	1.12	2.3	2.65	2.1	2.65	0.5	3.27	3.66	8.3		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: G.F.

DATE: 3-20-87

HYDROLOGIC AND CHANNEL INFORMATION

Q100 = 423

Dble 10/3 CBC

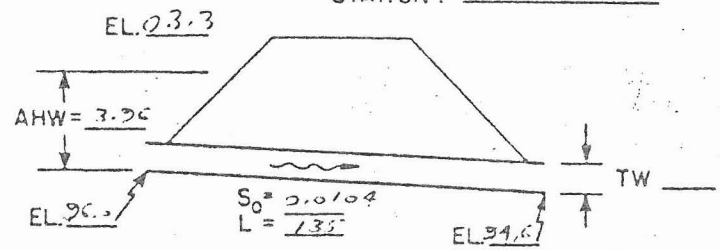
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 839+23



MEAN STREAM VELOCITY = 4.37

MAX. STREAM VELOCITY = 6.56

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. $\frac{HW}{D}$	HW	OUTLET CONTROL $HW = H + h_o - LS_o$: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
HSW's			1.32	3.96	0.4	1.36	2.4	2.7	2.1	2.7	1.4	2.66	3.96	8.8		

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY FA II

DESIGNER: G.T

DATE: 3-20-87

HYDROLOGIC AND CHANNEL INFORMATION

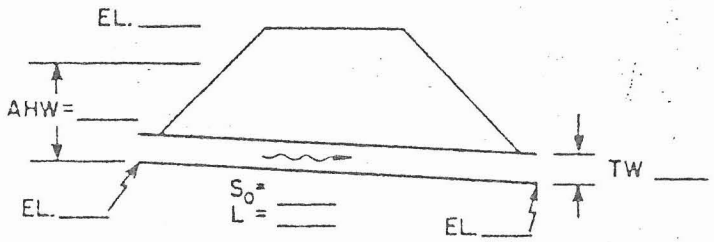
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 849+39



MEAN STREAM VELOCITY = 10.02

MAX. STREAM VELOCITY = 15

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT.		OUTLET CONTROL $HW = H + h_o - LS_o$								CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
				WAGNER WASH NORTH CROSSING												
						SEE HEC-2										

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: SUN VALLEY Ph II

DESIGNER: G.T.

DATE: 3-20-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 111

58"x36" (57"x38")

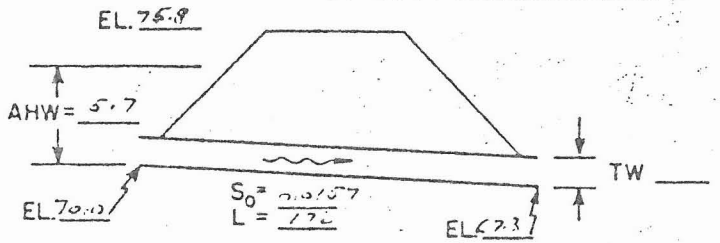
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: 1015+84



MEAN STREAM VELOCITY = 5.3

MAX. STREAM VELOCITY = 7.95

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT.		OUTLET CONTROL HW=H + h_o - LS_o								CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			HW/D	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
HEADW			1.9	5.7	0.4	5.45	2.5	2.75	2.3	2.75	2.7	5.5	5.7	10.5		

SUMMARY & RECOMMENDATIONS:

Figure 7

CHANNEL CALCULATIONS

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS

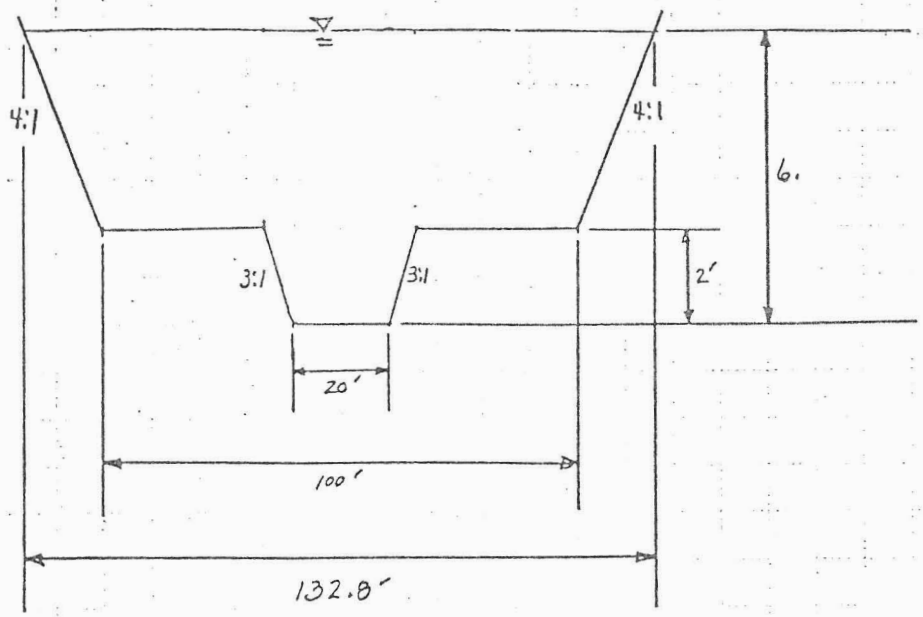
CHANNEL BELOW AREAS 47-49 END SECTION

DISCHARGE IS = 612 CFS
BOTTOM WIDTH IS = 30 FT
SLOPE IS = .0061 FT/FT
SIDE SLOPE (Z1) = 4
SIDE SLOPE (Z2) = 4
MANNING'S N = .03
TOP WIDTH IS = 50.05 FT
AREA IS = 100.33 SQ FT
WETTED PERIMETER IS = 50.67 FT
HYDRAULIC RADIUS IS = 1.98 FT
NORMAL DEPTH IS = 2.51 FT
VELOCITY IS = 6.1 FPS
FROUDE NUMBER IS = .76

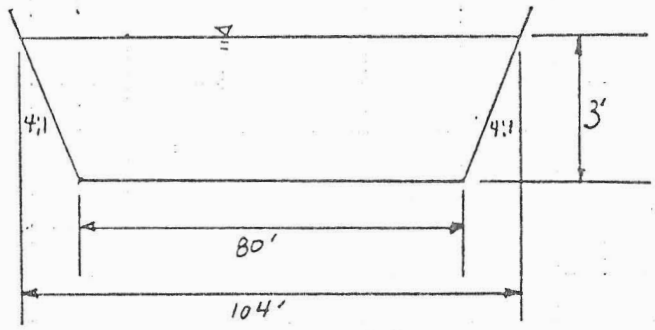
NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS

CHANNEL BELOW AREAS 47-49 INITIAL SECTION

DISCHARGE IS = 149 CFS
BOTTOM WIDTH IS = 10 FT
SLOPE IS = .005 FT/FT
SIDE SLOPE (Z1) = 4
SIDE SLOPE (Z2) = 4
MANNING'S N = .03
TOP WIDTH IS = 25.7 FT
AREA IS = 35.03 SQ FT
WETTED PERIMETER IS = 26.18 FT
HYDRAULIC RADIUS IS = 1.34 FT
NORMAL DEPTH IS = 1.96 FT
VELOCITY IS = 4.25 FPS
FROUDE NUMBER IS = .64



Typical Section
STA 850+00 - 964+00



Typical Section
STA 964+00 - 997+97

Hydraulic Jump Analysis
At Drop Structure

Initial Depth = 5.58 ft (From HEC2)
Sequent Depth = 6.06 ft. (From HEC2)

Check Sequent Depth: (From City of Scottsdale Manual Section 3)

$H1 = D1 + V1^2/2g$

H1 = 8.29

D1/H1 = 0.67

ZH1/b = 0.45

From Figure 3-13

D2/H1 = 0.75

D2 = 6.22

From Figure 3-14 obtain length of jump

When $F1 = V/(gDm)^{0.5}$
F1 = 1.02

$\frac{L}{Y2} = 3.2$ L = 19.9 ≈ 20 ft.

TABLE OF VALUES FOR D_2/H_1

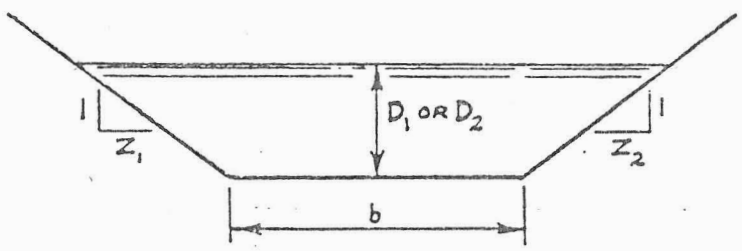
$\frac{D_1}{H_1}$	ZH_1/b											
	0	.10	.20	.30	.40	.50	.60	.70	.80	.90	1.0	10
.05	.41	.41	.40	.39	.39	.38	.38	.37	.37	.36	.36	.31
.10	.56	.55	.55	.54	.53	.53	.52	.52	.51	.51	.50	.42
.15	.65	.64	.64	.63	.62	.62	.61	.61	.61	.60	.60	.52
.20	.71	.70	.70	.69	.69	.69	.68	.68	.68	.67	.67	.60
.25	.75	.75	.74	.74	.74	.73	.73	.73	.73	.73	.72	.66
.30	.78	.78	.78	.78	.77	.77	.77	.77	.77	.77	.77	.72
.35	.79	.80	.80	.80	.80	.80	.80	.80	.80	.80	.80	.76
.40	.80	.80	.81	.81	.81	.82	.82	.82	.82	.82	.82	.80
.45	.80	.80	.81	.82	.82	.83	.83	.83	.83	.83	.83	.84
.50	.78	.79	.80	.80	.81	.82	.83	.83	.83	.84	.84	.86
.55	.76	.77	.78	.79	.80	.81	.82	.83	.83	.83	.84	.87
.60	.73	.74	.76	.77	.79	.80	.81	.81	.82	.82	.83	.87
.65	.69	.71	.73	.74	.76	.77	.78	.79	.80	.80	.81	.87
.70	-	-	-	-	.72	.73	.74	.75	.76	.77	.78	.85

D_1 = Depth before jump

D_2 = Depth after jump

$Z = (Z_1 + Z_2)/2$

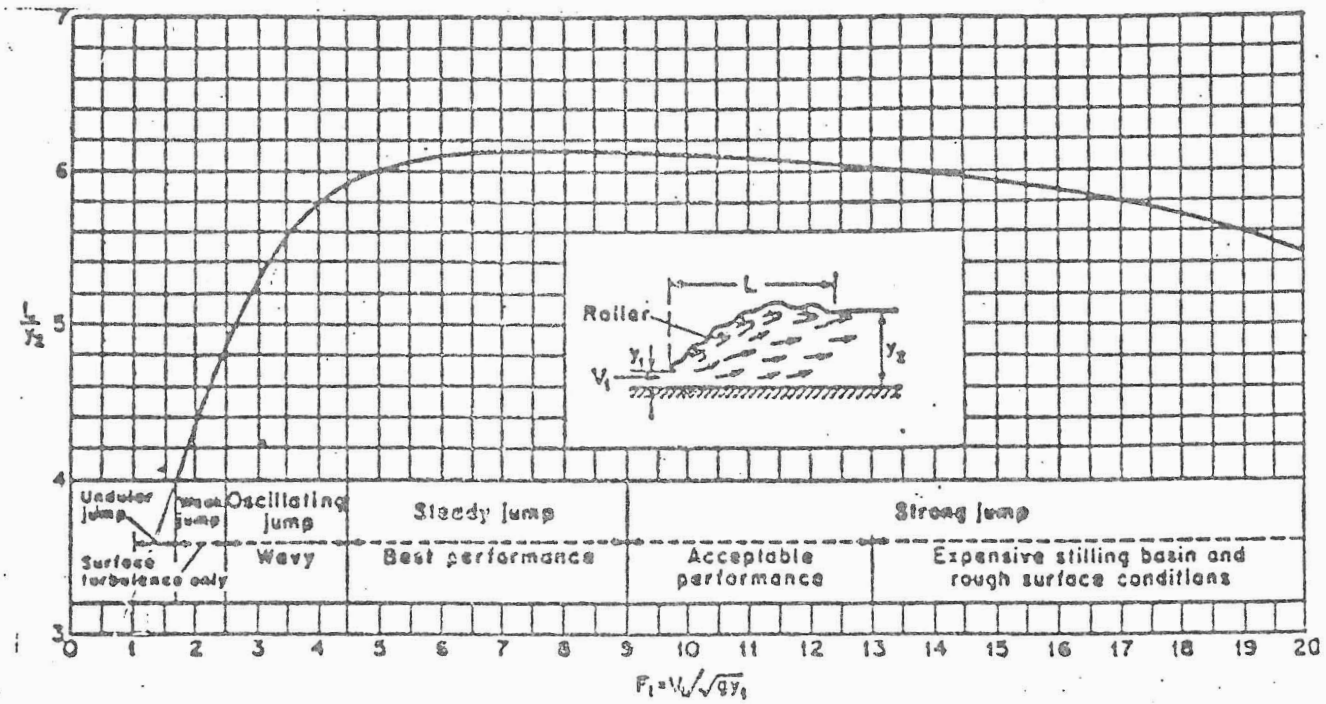
$H_1 = D_1 + V_1^2/2g$



THE VALUES FOR D_2/H_1 IN THE TABLE SHOWN ABOVE ARE APPROPRIATE FOR TRAPEZOIDAL CHANNELS WITH SMALL BOTTOM SLOPES (LESS THAN 0.05 FT./FT.)

HYDRAULIC JUMP DEPTH RELATIONSHIPS FOR TRAPEZOIDAL CHANNELS WITH SMALL BOTTOM SLOPES

FIGURE 3-13



HYDRAULIC JUMP LENGTH IN TERMS OF THE SEQUENT DEPTH IN HORIZONTAL, RECTANGULAR CHANNELS

This graph may be used for channels with small slopes and for other than rectangular cross-sections. For slopes up to 5 percent reduce L/Y_2 by 4 percent for each percent of slope. For other than rectangular channels substitute D_m for Y_1 in the Froude Number calculation.

FIGURE 3-14

ROADSIDE DITCH CALCULATIONS

```
**********DESCRIPTION OF RESULTS*****************************************
* TEST FOR MAX SLOPE W/BW=5,D=1,SS=4:1 FOR V<5.0 FPS                    *
*                                                                        *
*                                                                        *
**************************************************************************

**************************************************************************
))))CHANNEL INPUT INFORMATION((((
--------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .017500
    MANNINGS FRICTION FACTOR =  .0300
==========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
--------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     45.58
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =      .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.06
    UNIFORM FROUDE NUMBER =    1.073
    PRESSURE + MOMENTUM(POUNDS) =          686.51
    AVERAGED VELOCITY HEAD(FEET) =       .398
    SPECIFIC ENERGY(FEET) =      1.398
==========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
--------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        13.31
    CRITICAL FLOW AREA(SQUARE FEET) =           9.50
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .71
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.80
    CRITICAL DEPTH(FEET) =     1.04
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          684.90
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .357
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.395
```

```
**********DESCRIPTION OF RESULTS*****************************************
* TEST FOR MAX SLOPE FOR D = 1.5' B=5' SS=4:1                            *
*                                                                        *
*                                                                        *
**************************************************************************

**************************************************************************
))))CHANNEL INPUT INFORMATION((((
--------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .011000
    MANNINGS FRICTION FACTOR =  .0300
==========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
--------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     82.83
    FLOW TOP- WIDTH(FEET) =        17.00
    FLOW AREA(SQUARE FEET) =          16.50
    HYDRAULIC DEPTH(FEET) =      .97
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.02
    UNIFORM FROUDE NUMBER =     .898
    PRESSURE + MOMENTUM(POUNDS) =         1437.68
    AVERAGED VELOCITY HEAD(FEET) =       .391
    SPECIFIC ENERGY(FEET) =      1.891
==========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
--------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        16.36
    CRITICAL FLOW AREA(SQUARE FEET) =          15.16
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .93
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.46
    CRITICAL DEPTH(FEET) =     1.42
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         1429.57
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .463
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.883
```

```
**********DESCRIPTION OF RESULTS*****************************************
* TEST FOR MAX SLOPE FOR B=5' D=2.0' SS=4:1                              *
*                                                                        *
*                                                                        *
**************************************************************************

**************************************************************************
))))CHANNEL INPUT INFORMATION((((
--------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .008000
    MANNINGS FRICTION FACTOR =  .0300
==========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
--------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    130.78
    FLOW TOP- WIDTH(FEET) =        21.00
    FLOW AREA(SQUARE FEET) =          26.00
    HYDRAULIC DEPTH(FEET) =     1.24
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.03
    UNIFORM FROUDE NUMBER =     .797
    PRESSURE + MOMENTUM(POUNDS) =         2564.39
    AVERAGED VELOCITY HEAD(FEET) =        .393
    SPECIFIC ENERGY(FEET) =      2.393
==========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
--------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        19.30
    CRITICAL FLOW AREA(SQUARE FEET) =          21.71
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.12
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.02
    CRITICAL DEPTH(FEET) =     1.79
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         2499.75
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .564
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.351


**********DESCRIPTION OF RESULTS*****************************************
* 418+50                                                                 *
*                                                                        *
*                                                                        *
**************************************************************************

**************************************************************************
))))CHANNEL INPUT INFORMATION((((
--------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .005000
    MANNINGS FRICTION FACTOR =  .0300
==========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
--------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     24.36
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =      .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     2.71
    UNIFORM FROUDE NUMBER =     .573
    PRESSURE + MOMENTUM(POUNDS) =          367.00
    AVERAGED VELOCITY HEAD(FEET) =       .114
    SPECIFIC ENERGY(FEET) =      1.114
==========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
--------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        10.90
    CRITICAL FLOW AREA(SQUARE FEET) =           5.87
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .54
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.15
    CRITICAL DEPTH(FEET) =      .74
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          314.40
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .268
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.006
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 419+50                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .024000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    122.35
    FLOW TOP- WIDTH(FEET) =        17.00
    FLOW AREA(SQUARE FEET) =          16.50
    HYDRAULIC DEPTH(FEET) =       .97
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.42
    UNIFORM FROUDE NUMBER =    1.326
    PRESSURE + MOMENTUM(POUNDS) =         2390.08
    AVERAGED VELOCITY HEAD(FEET) =       .854
    SPECIFIC ENERGY(FEET) =      2.354
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        18.84
    CRITICAL FLOW AREA(SQUARE FEET) =          20.62
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.09
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.93
    CRITICAL DEPTH(FEET) =     1.73
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         2304.53
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .547
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.277


**********DESCRIPTION OF RESULTS*****************************************
* 420+40                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .005000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    169.34
    FLOW TOP- WIDTH(FEET) =        25.00
    FLOW AREA(SQUARE FEET) =          37.50
    HYDRAULIC DEPTH(FEET) =     1.50
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.52
    UNIFORM FROUDE NUMBER =      .650
    PRESSURE + MOMENTUM(POUNDS) =         3756.94
    AVERAGED VELOCITY HEAD(FEET) =       .317
    SPECIFIC ENERGY(FEET) =      2.817
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        21.24
    CRITICAL FLOW AREA(SQUARE FEET) =          26.64
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.25
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.36
    CRITICAL DEPTH(FEET) =     2.03
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         3425.43
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .628
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.658
```

```
**********DESCRIPTION OF RESULTS*********************************************
* 421+50                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .020700
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    344.56
    FLOW TOP- WIDTH(FEET) =        25.00
    FLOW AREA(SQUARE FEET) =          37.50
    HYDRAULIC DEPTH(FEET) =     1.50
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     9.19
    UNIFORM FROUDE NUMBER =    1.322
    PRESSURE + MOMENTUM(POUNDS) =         8410.22
    AVERAGED VELOCITY HEAD(FEET) =      1.311
    SPECIFIC ENERGY(FEET) =      3.811
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        27.82
    CRITICAL FLOW AREA(SQUARE FEET) =          46.81
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.68
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.36
    CRITICAL DEPTH(FEET) =     2.85
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         8115.46
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .841
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.694
=============================================================================


**********DESCRIPTION OF RESULTS*********************************************
* 423+00                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .011100
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     36.30
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =      .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.03
    UNIFORM FROUDE NUMBER =     .854
    PRESSURE + MOMENTUM(POUNDS) =          522.92
    AVERAGED VELOCITY HEAD(FEET) =       .253
    SPECIFIC ENERGY(FEET) =      1.253
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        12.35
    CRITICAL FLOW AREA(SQUARE FEET) =           7.97
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .65
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.55
    CRITICAL DEPTH(FEET) =      .92
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          516.58
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .322
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.241
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 425+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   3.75
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .020800
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    875.22
    FLOW TOP- WIDTH(FEET) =        35.00
    FLOW AREA(SQUARE FEET) =          75.00
    HYDRAULIC DEPTH(FEET) =     2.14
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    11.67
    UNIFORM FROUDE NUMBER =    1.405
    PRESSURE + MOMENTUM(POUNDS) =        26373.61
    AVERAGED VELOCITY HEAD(FEET) =      2.115
    SPECIFIC ENERGY(FEET) =      5.865
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        39.99
    CRITICAL FLOW AREA(SQUARE FEET) =          98.39
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     2.46
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     8.90
    CRITICAL DEPTH(FEET) =     4.37
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        25033.00
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =      1.229
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      5.603


**********DESCRIPTION OF RESULTS*****************************************
* 427+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   4.50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .010600
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    961.34
    FLOW TOP- WIDTH(FEET) =        41.00
    FLOW AREA(SQUARE FEET) =         103.50
    HYDRAULIC DEPTH(FEET) =     2.52
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     9.29
    UNIFORM FROUDE NUMBER =    1.030
    PRESSURE + MOMENTUM(POUNDS) =        28044.38
    AVERAGED VELOCITY HEAD(FEET) =      1.340
    SPECIFIC ENERGY(FEET) =      5.840
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        41.48
    CRITICAL FLOW AREA(SQUARE FEET) =         105.96
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     2.55
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     9.07
    CRITICAL DEPTH(FEET) =     4.56
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        28032.48
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =      1.278
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      5.838
```

```
**********DESCRIPTION OF RESULTS*********************************************
* 432+00                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .024000
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    226.52
    FLOW TOP- WIDTH(FEET) =        21.00
    FLOW AREA(SQUARE FEET) =          26.00
    HYDRAULIC DEPTH(FEET) =     1.24
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     8.71
    UNIFORM FROUDE NUMBER =    1.380
    PRESSURE + MOMENTUM(POUNDS) =         5113.97
    AVERAGED VELOCITY HEAD(FEET) =      1.179
    SPECIFIC ENERGY(FEET) =      3.179
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        23.70
    CRITICAL FLOW AREA(SQUARE FEET) =          33.55
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.42
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.75
    CRITICAL DEPTH(FEET) =     2.34
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         4879.34
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .708
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.046


**********DESCRIPTION OF RESULTS*********************************************
* 433+50                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .005000
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     55.85
    FLOW TOP- WIDTH(FEET) =        17.00
    FLOW AREA(SQUARE FEET) =          16.50
    HYDRAULIC DEPTH(FEET) =      .97
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.38
    UNIFORM FROUDE NUMBER =     .605
    PRESSURE + MOMENTUM(POUNDS) =          998.11
    AVERAGED VELOCITY HEAD(FEET) =       .178
    SPECIFIC ENERGY(FEET) =      1.678
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        14.26
    CRITICAL FLOW AREA(SQUARE FEET) =          11.15
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .78
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.01
    CRITICAL DEPTH(FEET) =     1.16
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          880.27
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .390
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.547
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 435+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .005000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     55.85
    FLOW TOP- WIDTH(FEET) =        17.00
    FLOW AREA(SQUARE FEET) =          16.50
    HYDRAULIC DEPTH(FEET) =      .97
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.38
    UNIFORM FROUDE NUMBER =     .605
    PRESSURE + MOMENTUM(POUNDS) =          998.11
    AVERAGED VELOCITY HEAD(FEET) =       .178
    SPECIFIC ENERGY(FEET) =      1.678
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        14.26
    CRITICAL FLOW AREA(SQUARE FEET) =          11.15
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .78
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.01
    CRITICAL DEPTH(FEET) =     1.16
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          880.27
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .390
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.547
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 439+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .003500
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     20.38
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =      .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     2.26
    UNIFORM FROUDE NUMBER =     .480
    PRESSURE + MOMENTUM(POUNDS) =          328.66
    AVERAGED VELOCITY HEAD(FEET) =       .080
    SPECIFIC ENERGY(FEET) =      1.080
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        10.33
    CRITICAL FLOW AREA(SQUARE FEET) =          5.11
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .49
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.99
    CRITICAL DEPTH(FEET) =      .67
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          251.51
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .247
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =       .914
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 441+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .003100
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     19.18
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =       .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     2.13
    UNIFORM FROUDE NUMBER =     .451
    PRESSURE + MOMENTUM(POUNDS) =          318.44
    AVERAGED VELOCITY HEAD(FEET) =       .071
    SPECIFIC ENERGY(FEET) =      1.071
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        10.16
    CRITICAL FLOW AREA(SQUARE FEET) =           4.89
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .48
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.92
    CRITICAL DEPTH(FEET) =      .64
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          233.09
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .239
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =       .884
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 442+30                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .037900
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     67.07
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =       .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.45
    UNIFORM FROUDE NUMBER =    1.578
    PRESSURE + MOMENTUM(POUNDS) =         1207.94
    AVERAGED VELOCITY HEAD(FEET) =       .862
    SPECIFIC ENERGY(FEET) =      1.862
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        15.19
    CRITICAL FLOW AREA(SQUARE FEET) =          12.87
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .85
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.21
    CRITICAL DEPTH(FEET) =     1.27
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         1103.08
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .422
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.696
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 443+30                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .043200
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     71.61
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =      .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.96
    UNIFORM FROUDE NUMBER =    1.685
    PRESSURE + MOMENTUM(POUNDS) =         1343.41
    AVERAGED VELOCITY HEAD(FEET) =       .983
    SPECIFIC ENERGY(FEET) =      1.983
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        15.54
    CRITICAL FLOW AREA(SQUARE FEET) =          13.53
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .87
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.29
    CRITICAL DEPTH(FEET) =     1.32
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         1195.52
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .435
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.752


**********DESCRIPTION OF RESULTS*****************************************
* 444+50                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.75
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .069400
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    288.59
    FLOW TOP- WIDTH(FEET) =        19.00
    FLOW AREA(SQUARE FEET) =          21.00
    HYDRAULIC DEPTH(FEET) =     1.11
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    13.74
    UNIFORM FROUDE NUMBER =    2.304
    PRESSURE + MOMENTUM(POUNDS) =         8609.15
    AVERAGED VELOCITY HEAD(FEET) =      2.933
    SPECIFIC ENERGY(FEET) =      4.683
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        25.99
    CRITICAL FLOW AREA(SQUARE FEET) =          40.66
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.56
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.10
    CRITICAL DEPTH(FEET) =     2.62
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         6546.56
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .782
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.406
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 445+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .003900
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     21.52
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =      .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     2.39
    UNIFORM FROUDE NUMBER =     .506
    PRESSURE + MOMENTUM(POUNDS) =          338.89
    AVERAGED VELOCITY HEAD(FEET) =       .089
    SPECIFIC ENERGY(FEET) =      1.089
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        10.50
    CRITICAL FLOW AREA(SQUARE FEET) =           5.33
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .51
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.04
    CRITICAL DEPTH(FEET) =      .69
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          269.15
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .253
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =       .941
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 445+65                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .027500
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     57.14
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =      .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.35
    UNIFORM FROUDE NUMBER =    1.345
    PRESSURE + MOMENTUM(POUNDS) =          942.11
    AVERAGED VELOCITY HEAD(FEET) =       .626
    SPECIFIC ENERGY(FEET) =      1.626
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        14.37
    CRITICAL FLOW AREA(SQUARE FEET) =          11.35
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .79
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.03
    CRITICAL DEPTH(FEET) =     1.17
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          905.38
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .393
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.565
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 448+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   4.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .004900
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    494.37
    FLOW TOP- WIDTH(FEET) =        37.00
    FLOW AREA(SQUARE FEET) =          84.00
    HYDRAULIC DEPTH(FEET) =     2.27
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.89
    UNIFORM FROUDE NUMBER =     .688
    PRESSURE + MOMENTUM(POUNDS) =        13459.25
    AVERAGED VELOCITY HEAD(FEET) =       .538
    SPECIFIC ENERGY(FEET) =      4.538
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        31.98
    CRITICAL FLOW AREA(SQUARE FEET) =          62.36
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.95
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.93
    CRITICAL DEPTH(FEET) =     3.37
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        12561.09
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .976
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      4.348


**********DESCRIPTION OF RESULTS*****************************************
* 449+80                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .047300
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    318.00
    FLOW TOP- WIDTH(FEET) =        21.00
    FLOW AREA(SQUARE FEET) =          26.00
    HYDRAULIC DEPTH(FEET) =     1.24
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    12.23
    UNIFORM FROUDE NUMBER =    1.937
    PRESSURE + MOMENTUM(POUNDS) =         8826.79
    AVERAGED VELOCITY HEAD(FEET) =      2.323
    SPECIFIC ENERGY(FEET) =      4.323
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        26.98
    CRITICAL FLOW AREA(SQUARE FEET) =          43.94
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.63
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.24
    CRITICAL DEPTH(FEET) =     2.75
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         7363.83
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .813
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.561
```

```
**********DESCRIPTION OF RESULTS*********************************************
* 451+50                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.60
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .006000
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     70.10
    FLOW TOP- WIDTH(FEET) =        17.80
    FLOW AREA(SQUARE FEET) =          18.24
    HYDRAULIC DEPTH(FEET) =     1.02
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.84
    UNIFORM FROUDE NUMBER =     .669
    PRESSURE + MOMENTUM(POUNDS) =         1262.26
    AVERAGED VELOCITY HEAD(FEET) =       .229
    SPECIFIC ENERGY(FEET) =      1.829
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        15.42
    CRITICAL FLOW AREA(SQUARE FEET) =          13.31
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .86
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.27
    CRITICAL DEPTH(FEET) =     1.30
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         1164.62
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .431
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.734
```

```
**********DESCRIPTION OF RESULTS*********************************************
* 453+40                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .038500
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     67.60
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =      .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.51
    UNIFORM FROUDE NUMBER =    1.591
    PRESSURE + MOMENTUM(POUNDS) =         1223.27
    AVERAGED VELOCITY HEAD(FEET) =       .876
    SPECIFIC ENERGY(FEET) =      1.876
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        15.23
    CRITICAL FLOW AREA(SQUARE FEET) =          12.94
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .85
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.22
    CRITICAL DEPTH(FEET) =     1.28
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         1113.79
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .424
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.703
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 454+72                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .013300
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     39.73
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =      .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.41
    UNIFORM FROUDE NUMBER =     .935
    PRESSURE + MOMENTUM(POUNDS) =          579.15
    AVERAGED VELOCITY HEAD(FEET) =       .303
    SPECIFIC ENERGY(FEET) =      1.303
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        12.72
    CRITICAL FLOW AREA(SQUARE FEET) =          8.54
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .67
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.65
    CRITICAL DEPTH(FEET) =      .96
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          577.89
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .336
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.300
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 456+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   3.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .005600
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    270.85
    FLOW TOP- WIDTH(FEET) =        29.00
    FLOW AREA(SQUARE FEET) =          51.00
    HYDRAULIC DEPTH(FEET) =     1.76
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.31
    UNIFORM FROUDE NUMBER =     .706
    PRESSURE + MOMENTUM(POUNDS) =         6437.91
    AVERAGED VELOCITY HEAD(FEET) =       .438
    SPECIFIC ENERGY(FEET) =      3.438
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        25.36
    CRITICAL FLOW AREA(SQUARE FEET) =          38.64
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.52
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.01
    CRITICAL DEPTH(FEET) =     2.55
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         6061.71
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .763
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.308
```

```
**********DESCRIPTION OF RESULTS*********************************************
* 457+50                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .021600
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    214.89
    FLOW TOP- WIDTH(FEET) =        21.00
    FLOW AREA(SQUARE FEET) =          26.00
    HYDRAULIC DEPTH(FEET) =     1.24
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     8.27
    UNIFORM FROUDE NUMBER =    1.309
    PRESSURE + MOMENTUM(POUNDS) =         4731.53
    AVERAGED VELOCITY HEAD(FEET) =      1.061
    SPECIFIC ENERGY(FEET) =      3.061
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        23.24
    CRITICAL FLOW AREA(SQUARE FEET) =          32.20
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.39
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.67
    CRITICAL DEPTH(FEET) =     2.28
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         4576.82
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .691
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.972
```

```
**********DESCRIPTION OF RESULTS*********************************************
* 459+00                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .005600
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     25.78
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =      .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     2.86
    UNIFORM FROUDE NUMBER =     .607
    PRESSURE + MOMENTUM(POUNDS) =          382.34
    AVERAGED VELOCITY HEAD(FEET) =       .127
    SPECIFIC ENERGY(FEET) =      1.127
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        11.09
    CRITICAL FLOW AREA(SQUARE FEET) =          6.13
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .55
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.21
    CRITICAL DEPTH(FEET) =      .76
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          337.46
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .275
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.036
=============================================================================
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 460+80                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   3.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =      .00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .055600
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    539.95
    FLOW TOP- WIDTH(FEET) =        24.00
    FLOW AREA(SQUARE FEET) =          36.00
    HYDRAULIC DEPTH(FEET) =     1.50
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    15.00
    UNIFORM FROUDE NUMBER =    2.158
    PRESSURE + MOMENTUM(POUNDS) =        17940.56
    AVERAGED VELOCITY HEAD(FEET) =      3.493
    SPECIFIC ENERGY(FEET) =      6.493
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        32.64
    CRITICAL FLOW AREA(SQUARE FEET) =          66.60
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     2.04
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     8.11
    CRITICAL DEPTH(FEET) =     4.08
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        14135.08
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =      1.021
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      5.101
```

```
**********DESCRIPTION OF RESULTS*****************************************
* STA 461+70                                                            *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.20
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =      .00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .015900
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     25.08
    FLOW TOP- WIDTH(FEET) =         9.60
    FLOW AREA(SQUARE FEET) =           5.76
    HYDRAULIC DEPTH(FEET) =      .60
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.35
    UNIFORM FROUDE NUMBER =     .991
    PRESSURE + MOMENTUM(POUNDS) =          355.41
    AVERAGED VELOCITY HEAD(FEET) =       .294
    SPECIFIC ENERGY(FEET) =      1.494
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =         9.57
    CRITICAL FLOW AREA(SQUARE FEET) =           5.72
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .60
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.39
    CRITICAL DEPTH(FEET) =     1.20
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          355.39
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .299
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.494
```

```
**********DESCRIPTION OF RESULTS*****************************************
* STA 462+75                                                            *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   3.40
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =       .00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .044400
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    673.70
    FLOW TOP- WIDTH(FEET) =        27.20
    FLOW AREA(SQUARE FEET) =          46.24
    HYDRAULIC DEPTH(FEET) =     1.70
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    14.57
    UNIFORM FROUDE NUMBER =    1.969
    PRESSURE + MOMENTUM(POUNDS) =        22291.33
    AVERAGED VELOCITY HEAD(FEET) =      3.296
    SPECIFIC ENERGY(FEET) =      6.696
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        35.68
    CRITICAL FLOW AREA(SQUARE FEET) =          79.55
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     2.23
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     8.47
    CRITICAL DEPTH(FEET) =     4.46
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        18435.40
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =      1.114
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      5.573
```

```
**********DESCRIPTION OF RESULTS*****************************************
* STA 464+00                                                            *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.70
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =       .00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .031400
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    306.38
    FLOW TOP- WIDTH(FEET) =        21.60
    FLOW AREA(SQUARE FEET) =          29.16
    HYDRAULIC DEPTH(FEET) =     1.35
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    10.51
    UNIFORM FROUDE NUMBER =    1.594
    PRESSURE + MOMENTUM(POUNDS) =         7875.94
    AVERAGED VELOCITY HEAD(FEET) =      1.714
    SPECIFIC ENERGY(FEET) =      4.414
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        26.03
    CRITICAL FLOW AREA(SQUARE FEET) =          42.33
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.63
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.24
    CRITICAL DEPTH(FEET) =     3.25
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         7161.63
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .813
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      4.067
=========================================================================
```

```
**********DESCRIPTION OF RESULTS*****************************************
* STA 473+00                                                            *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.40
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .012700
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     77.05
    FLOW TOP- WIDTH(FEET) =        16.20
    FLOW AREA(SQUARE FEET) =          14.84
    HYDRAULIC DEPTH(FEET) =      .92
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.19
    UNIFORM FROUDE NUMBER =     .956
    PRESSURE + MOMENTUM(POUNDS) =         1309.23
    AVERAGED VELOCITY HEAD(FEET) =       .419
    SPECIFIC ENERGY(FEET) =      1.819
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        15.94
    CRITICAL FLOW AREA(SQUARE FEET) =          14.32
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .90
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.38
    CRITICAL DEPTH(FEET) =     1.37
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         1307.94
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .450
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.817
```

```
**********DESCRIPTION OF RESULTS*****************************************
* STA 489+30                                                            *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.80
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .038600
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    228.65
    FLOW TOP- WIDTH(FEET) =        19.40
    FLOW AREA(SQUARE FEET) =          21.96
    HYDRAULIC DEPTH(FEET) =     1.13
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    10.41
    UNIFORM FROUDE NUMBER =    1.725
    PRESSURE + MOMENTUM(POUNDS) =         5604.25
    AVERAGED VELOCITY HEAD(FEET) =      1.683
    SPECIFIC ENERGY(FEET) =      3.483
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        23.78
    CRITICAL FLOW AREA(SQUARE FEET) =          33.77
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.42
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.77
    CRITICAL DEPTH(FEET) =     2.35
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         4935.19
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .712
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.059
```

```
**********DESCRIPTION OF RESULTS*****************************************
* STA 491+00                                                            *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.30
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .014800
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     71.33
    FLOW TOP- WIDTH(FEET) =        15.40
    FLOW AREA(SQUARE FEET) =          13.26
    HYDRAULIC DEPTH(FEET) =      .86
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.38
    UNIFORM FROUDE NUMBER =    1.022
    PRESSURE + MOMENTUM(POUNDS) =         1190.10
    AVERAGED VELOCITY HEAD(FEET) =       .449
    SPECIFIC ENERGY(FEET) =     1.749
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        15.52
    CRITICAL FLOW AREA(SQUARE FEET) =          13.49
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .87
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.29
    CRITICAL DEPTH(FEET) =     1.31
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         1189.84
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .434
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.749


**********DESCRIPTION OF RESULTS*****************************************
* STA 492+30                                                            *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.80
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .025400
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    185.48
    FLOW TOP- WIDTH(FEET) =        19.40
    FLOW AREA(SQUARE FEET) =          21.96
    HYDRAULIC DEPTH(FEET) =     1.13
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     8.45
    UNIFORM FROUDE NUMBER =    1.399
    PRESSURE + MOMENTUM(POUNDS) =         4026.54
    AVERAGED VELOCITY HEAD(FEET) =      1.108
    SPECIFIC ENERGY(FEET) =      2.908
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        21.98
    CRITICAL FLOW AREA(SQUARE FEET) =          28.65
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.30
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.47
    CRITICAL DEPTH(FEET) =     2.12
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         3826.73
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .651
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.774
=========================================================================
```

```
**********DESCRIPTION OF RESULTS*********************************************
* STA 493+20                                                                 *
*                                                                            *
*                                                                            *
******************************************************************************

******************************************************************************
))))CHANNEL INPUT INFORMATION((((
------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   4.40
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .006400
    MANNINGS FRICTION FACTOR =  .0300
==============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    708.07
    FLOW TOP- WIDTH(FEET) =      40.20
    FLOW AREA(SQUARE FEET) =          99.44
    HYDRAULIC DEPTH(FEET) =     2.47
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.12
    UNIFORM FROUDE NUMBER =     .798
    PRESSURE + MOMENTUM(POUNDS) =        19877.95
    AVERAGED VELOCITY HEAD(FEET) =       .787
    SPECIFIC ENERGY(FEET) =      5.187
==============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        36.79
    CRITICAL FLOW AREA(SQUARE FEET) =          83.01
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     2.26
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     8.53
    CRITICAL DEPTH(FEET) =     3.97
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        19385.31
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =      1.130
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      5.103
```

```
**********DESCRIPTION OF RESULTS*********************************************
* STA 493+70                                                                 *
*                                                                            *
*                                                                            *
******************************************************************************

******************************************************************************
))))CHANNEL INPUT INFORMATION((((
------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   3.10
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .062500
    MANNINGS FRICTION FACTOR =  .0300
==============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    975.49
    FLOW TOP- WIDTH(FEET) =        29.80
    FLOW AREA(SQUARE FEET) =          53.94
    HYDRAULIC DEPTH(FEET) =     1.81
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    18.08
    UNIFORM FROUDE NUMBER =    2.369
    PRESSURE + MOMENTUM(POUNDS) =        30165.08
    AVERAGED VELOCITY HEAD(FEET) =      5.079
    SPECIFIC ENERGY(FEET) =      8.179
==============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        41.73
    CRITICAL FLOW AREA(SQUARE FEET) =         107.25
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     2.57
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     9.10
    CRITICAL DEPTH(FEET) =     4.59
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        28530.77
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =      1.285
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      5.875
```

```
**********DESCRIPTION OF RESULTS*********************************************
* STA 496+30                                                                 *
*                                                                            *
*                                                                            *
******************************************************************************

******************************************************************************
))))CHANNEL INPUT INFORMATION((((
------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.20
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .022500
    MANNINGS FRICTION FACTOR =  .0300
==============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    270.33
    FLOW TOP- WIDTH(FEET) =        22.60
    FLOW AREA(SQUARE FEET) =          30.36
    HYDRAULIC DEPTH(FEET) =     1.34
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     8.90
    UNIFORM FROUDE NUMBER =    1.354
    PRESSURE + MOMENTUM(POUNDS) =         6305.60
    AVERAGED VELOCITY HEAD(FEET) =      1.231
    SPECIFIC ENERGY(FEET) =      3.431
==============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        25.34
    CRITICAL FLOW AREA(SQUARE FEET) =          38.58
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.52
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.01
    CRITICAL DEPTH(FEET) =     2.54
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         6047.62
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .763
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.305
```

```
**********DESCRIPTION OF RESULTS*********************************************
* STA 497+20                                                                 *
*                                                                            *
*                                                                            *
******************************************************************************

******************************************************************************
))))CHANNEL INPUT INFORMATION((((
------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.60
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .018200
    MANNINGS FRICTION FACTOR =  .0300
==============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    352.84
    FLOW TOP- WIDTH(FEET) =        25.80
    FLOW AREA(SQUARE FEET) =          40.04
    HYDRAULIC DEPTH(FEET) =     1.55
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     8.81
    UNIFORM FROUDE NUMBER =    1.247
    PRESSURE + MOMENTUM(POUNDS) =         8542.44
    AVERAGED VELOCITY HEAD(FEET) =      1.206
    SPECIFIC ENERGY(FEET) =      3.806
==============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        28.07
    CRITICAL FLOW AREA(SQUARE FEET) =          47.68
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.70
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.40
    CRITICAL DEPTH(FEET) =     2.98
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         8352.30
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .850
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.734
```

```
**********DESCRIPTION OF RESULTS*****************************************
* STA                                                                  *
* 498+00                                                               *
*                                                                      *
************************************************************************

************************************************************************
))))CHANNEL INPUT INFORMATION((((
------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.20
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .005000
    MANNINGS FRICTION FACTOR =  .0300
========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    127.44
    FLOW TOP- WIDTH(FEET) =        22.60
    FLOW AREA(SQUARE FEET) =          30.36
    HYDRAULIC DEPTH(FEET) =     1.34
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.20
    UNIFORM FROUDE NUMBER =     .638
    PRESSURE + MOMENTUM(POUNDS) =         2677.54
    AVERAGED VELOCITY HEAD(FEET) =       .274
    SPECIFIC ENERGY(FEET) =      2.474
========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        19.12
    CRITICAL FLOW AREA(SQUARE FEET) =          21.30
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.11
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.98
    CRITICAL DEPTH(FEET) =     1.77
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         2421.92
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .556
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.322
```

```
**********DESCRIPTION OF RESULTS*****************************************
* STA  499+50                                                          *
*                                                                      *
*                                                                      *
************************************************************************

************************************************************************
))))CHANNEL INPUT INFORMATION((((
------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   3.20
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .005300
    MANNINGS FRICTION FACTOR =  .0300
========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    305.59
    FLOW TOP- WIDTH(FEET) =        30.60
    FLOW AREA(SQUARE FEET) =          56.96
    HYDRAULIC DEPTH(FEET) =     1.86
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.37
    UNIFORM FROUDE NUMBER =     .693
    PRESSURE + MOMENTUM(POUNDS) =         7500.97
    AVERAGED VELOCITY HEAD(FEET) =       .447
    SPECIFIC ENERGY(FEET) =      3.647
========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        26.56
    CRITICAL FLOW AREA(SQUARE FEET) =          42.54
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.60
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.18
    CRITICAL DEPTH(FEET) =     2.70
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         7017.10
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .801
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.497
```

```
**********DESCRIPTION OF RESULTS*********************************************
* STA 500+60                                                                 *
*                                                                            *
*                                                                            *
******************************************************************************

******************************************************************************
))))CHANNEL INPUT INFORMATION((((
------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.70
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .038300
    MANNINGS FRICTION FACTOR =  .0300
==============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    557.35
    FLOW TOP- WIDTH(FEET) =      26.60
    FLOW AREA(SQUARE FEET) =          42.66
    HYDRAULIC DEPTH(FEET) =     1.60
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    13.07
    UNIFORM FROUDE NUMBER =    1.018
    PRESSURE + MOMENTUM(POUNDS) =        16886.27
    AVERAGED VELOCITY HEAD(FEET) =      2.651
    SPECIFIC ENERGY(FEET) =      5.351
==============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        33.51
    CRITICAL FLOW AREA(SQUARE FEET) =          68.60
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     2.05
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     8.12
    CRITICAL DEPTH(FEET) =     3.56
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        14519.79
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =      1.025
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      4.588


**********DESCRIPTION OF RESULTS*********************************************
* STA 502+30                                                                 *
*                                                                            *
*                                                                            *
******************************************************************************

******************************************************************************
))))CHANNEL INPUT INFORMATION((((
------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.80
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .023700
    MANNINGS FRICTION FACTOR =  .0300
==============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    179.16
    FLOW TOP- WIDTH(FEET) =        19.40
    FLOW AREA(SQUARE FEET) =          21.96
    HYDRAULIC DEPTH(FEET) =     1.13
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     8.16
    UNIFORM FROUDE NUMBER =    1.351
    PRESSURE + MOMENTUM(POUNDS) =         3823.35
    AVERAGED VELOCITY HEAD(FEET) =      1.034
    SPECIFIC ENERGY(FEET) =      2.834
==============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        21.70
    CRITICAL FLOW AREA(SQUARE FEET) =          27.86
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.28
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.43
    CRITICAL DEPTH(FEET) =     2.09
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         3668.79
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .642
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.729
```

```
**********DESCRIPTION OF RESULTS*****************************************
* STA 503+60                                                            *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   3.20
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .003000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    229.92
    FLOW TOP- WIDTH(FEET) =        30.60
    FLOW AREA(SQUARE FEET) =          56.96
    HYDRAULIC DEPTH(FEET) =     1.86
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.04
    UNIFORM FROUDE NUMBER =     .521
    PRESSURE + MOMENTUM(POUNDS) =         6122.17
    AVERAGED VELOCITY HEAD(FEET) =       .253
    SPECIFIC ENERGY(FEET) =      3.453
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        23.84
    CRITICAL FLOW AREA(SQUARE FEET) =          33.94
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.42
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.77
    CRITICAL DEPTH(FEET) =     2.35
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         4968.38
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .712
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.067


**********DESCRIPTION OF RESULTS*****************************************
* STA506+60                                                             *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .004900
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    167.64
    FLOW TOP- WIDTH(FEET) =        25.00
    FLOW AREA(SQUARE FEET) =          37.50
    HYDRAULIC DEPTH(FEET) =     1.50
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.47
    UNIFORM FROUDE NUMBER =     .643
    PRESSURE + MOMENTUM(POUNDS) =         3727.30
    AVERAGED VELOCITY HEAD(FEET) =       .310
    SPECIFIC ENERGY(FEET) =      2.810
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        21.16
    CRITICAL FLOW AREA(SQUARE FEET) =          26.43
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.25
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.34
    CRITICAL DEPTH(FEET) =     2.02
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         3383.55
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .625
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.645
=========================================================================
```

```
**********DESCRIPTION OF RESULTS*****************************************
* STA 508+40                                                            *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =      5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .037700
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     66.90
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =      .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.43
    UNIFORM FROUDE NUMBER =    1.574
    PRESSURE + MOMENTUM(POUNDS) =         1202.82
    AVERAGED VELOCITY HEAD(FEET) =       .858
    SPECIFIC ENERGY(FEET) =      1.858
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        15.18
    CRITICAL FLOW AREA(SQUARE FEET) =          12.83
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .85
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.21
    CRITICAL DEPTH(FEET) =     1.27
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         1099.50
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .422
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.694


**********DESCRIPTION OF RESULTS*****************************************
* 511 +00                                                               *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =      .00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .006600
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =      9.94
    FLOW TOP- WIDTH(FEET) =        8.00
    FLOW AREA(SQUARE FEET) =           4.00
    HYDRAULIC DEPTH(FEET) =      .50
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     2.48
    UNIFORM FROUDE NUMBER =     .619
    PRESSURE + MOMENTUM(POUNDS) =          131.04
    AVERAGED VELOCITY HEAD(FEET) =       .096
    SPECIFIC ENERGY(FEET) =      1.096
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =         6.61
    CRITICAL FLOW AREA(SQUARE FEET) =           2.73
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .41
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.64
    CRITICAL DEPTH(FEET) =      .83
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          117.01
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .206
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.032
```

```
**********DESCRIPTION OF RESULTS*********************************************
* 513+50                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .005700
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     26.01
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =      .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     2.89
    UNIFORM FROUDE NUMBER =     .612
    PRESSURE + MOMENTUM(POUNDS) =          384.89
    AVERAGED VELOCITY HEAD(FEET) =       .130
    SPECIFIC ENERGY(FEET) =      1.130
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        11.11
    CRITICAL FLOW AREA(SQUARE FEET) =           6.16
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .55
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.23
    CRITICAL DEPTH(FEET) =      .76
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          341.20
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .277
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.041


**********DESCRIPTION OF RESULTS*********************************************
* 514+47                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =      .00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .055600
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     28.84
    FLOW TOP- WIDTH(FEET) =         8.00
    FLOW AREA(SQUARE FEET) =           4.00
    HYDRAULIC DEPTH(FEET) =      .50
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.21
    UNIFORM FROUDE NUMBER =    1.797
    PRESSURE + MOMENTUM(POUNDS) =          486.22
    AVERAGED VELOCITY HEAD(FEET) =       .807
    SPECIFIC ENERGY(FEET) =      1.807
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        10.12
    CRITICAL FLOW AREA(SQUARE FEET) =           6.40
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .63
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.51
    CRITICAL DEPTH(FEET) =     1.26
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          420.27
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .315
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.580
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 516+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =       .00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .003000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =      6.70
    FLOW TOP- WIDTH(FEET) =         8.00
    FLOW AREA(SQUARE FEET) =           4.00
    HYDRAULIC DEPTH(FEET) =      .50
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     1.67
    UNIFORM FROUDE NUMBER =     .417
    PRESSURE + MOMENTUM(POUNDS) =          104.95
    AVERAGED VELOCITY HEAD(FEET) =       .044
    SPECIFIC ENERGY(FEET) =      1.044
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =         5.64
    CRITICAL FLOW AREA(SQUARE FEET) =           1.99
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .35
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.37
    CRITICAL DEPTH(FEET) =      .70
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =           72.91
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .177
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =       .881
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 517+80                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .008000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     74.09
    FLOW TOP- WIDTH(FEET) =        17.00
    FLOW AREA(SQUARE FEET) =          16.50
    HYDRAULIC DEPTH(FEET) =      .97
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.49
    UNIFORM FROUDE NUMBER =     .803
    PRESSURE + MOMENTUM(POUNDS) =         1276.50
    AVERAGED VELOCITY HEAD(FEET) =       .313
    SPECIFIC ENERGY(FEET) =      1.813
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        15.73
    CRITICAL FLOW AREA(SQUARE FEET) =          13.90
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .88
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.33
    CRITICAL DEPTH(FEET) =     1.34
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         1246.56
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .441
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.782
```

```
**********DESCRIPTION OF RESULTS*********************************************
* 520+00                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   4.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .005300
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    514.16
    FLOW TOP- WIDTH(FEET) =        37.00
    FLOW AREA(SQUARE FEET) =          84.00
    HYDRAULIC DEPTH(FEET) =     2.27
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.12
    UNIFORM FROUDE NUMBER =     .716
    PRESSURE + MOMENTUM(POUNDS) =        13919.54
    AVERAGED VELOCITY HEAD(FEET) =       .582
    SPECIFIC ENERGY(FEET) =      4.582
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        32.48
    CRITICAL FLOW AREA(SQUARE FEET) =          64.35
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.98
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.99
    CRITICAL DEPTH(FEET) =     3.43
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        13171.15
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .991
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      4.426
```

```
**********DESCRIPTION OF RESULTS*********************************************
* 522+00                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.81
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .005500
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    231.22
    FLOW TOP- WIDTH(FEET) =        27.48
    FLOW AREA(SQUARE FEET) =          45.63
    HYDRAULIC DEPTH(FEET) =     1.66
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.07
    UNIFORM FROUDE NUMBER =     .693
    PRESSURE + MOMENTUM(POUNDS) =         5348.13
    AVERAGED VELOCITY HEAD(FEET) =       .399
    SPECIFIC ENERGY(FEET) =      3.209
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        23.89
    CRITICAL FLOW AREA(SQUARE FEET) =          34.12
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.43
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.78
    CRITICAL DEPTH(FEET) =     2.36
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         5002.62
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .713
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.075
```

```
**********DESCRIPTION OF RESULTS*********************************************
* 524+00                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .005600
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     25.78
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =       .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     2.86
    UNIFORM FROUDE NUMBER =     .607
    PRESSURE + MOMENTUM(POUNDS) =          382.34
    AVERAGED VELOCITY HEAD(FEET) =       .127
    SPECIFIC ENERGY(FEET) =      1.127
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        11.09
    CRITICAL FLOW AREA(SQUARE FEET) =           6.13
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .55
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.21
    CRITICAL DEPTH(FEET) =       .76
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          337.46
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .275
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.036


**********DESCRIPTION OF RESULTS*********************************************
* 525+20                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.30
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .063200
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    147.41
    FLOW TOP- WIDTH(FEET) =        15.40
    FLOW AREA(SQUARE FEET) =          13.26
    HYDRAULIC DEPTH(FEET) =       .86
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    11.12
    UNIFORM FROUDE NUMBER =    2.111
    PRESSURE + MOMENTUM(POUNDS) =         3622.10
    AVERAGED VELOCITY HEAD(FEET) =      1.919
    SPECIFIC ENERGY(FEET) =      3.219
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        20.17
    CRITICAL FLOW AREA(SQUARE FEET) =          23.87
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.18
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.18
    CRITICAL DEPTH(FEET) =     1.90
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         2892.77
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .592
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.489
```

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**********DESCRIPTION OF RESULTS*****************************************
* 525+75                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .062200
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    196.97
    FLOW TOP- WIDTH(FEET) =        17.00
    FLOW AREA(SQUARE FEET) =          16.50
    HYDRAULIC DEPTH(FEET) =       .97
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    11.94
    UNIFORM FROUDE NUMBER =    2.135
    PRESSURE + MOMENTUM(POUNDS) =         5188.67
    AVERAGED VELOCITY HEAD(FEET) =      2.213
    SPECIFIC ENERGY(FEET) =      3.713
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        22.48
    CRITICAL FLOW AREA(SQUARE FEET) =          30.02
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.34
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.56
    CRITICAL DEPTH(FEET) =     2.19
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         4117.14
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .668
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.853


**********DESCRIPTION OF RESULTS*****************************************
* 527+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .006500
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     27.78
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =       .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.09
    UNIFORM FROUDE NUMBER =     .654
    PRESSURE + MOMENTUM(POUNDS) =          405.34
    AVERAGED VELOCITY HEAD(FEET) =        .148
    SPECIFIC ENERGY(FEET) =      1.148
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        11.34
    CRITICAL FLOW AREA(SQUARE FEET) =           6.48
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =       .57
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.29
    CRITICAL DEPTH(FEET) =       .79
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          370.33
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .286
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.078
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 529+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.60
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .005200
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     65.26
    FLOW TOP- WIDTH(FEET) =        17.80
    FLOW AREA(SQUARE FEET) =          18.24
    HYDRAULIC DEPTH(FEET) =     1.02
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.58
    UNIFORM FROUDE NUMBER =     .623
    PRESSURE + MOMENTUM(POUNDS) =        1192.64
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .84
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.19
    CRITICAL DEPTH(FEET) =     1.26
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         1066.50
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .418
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.673


**********DESCRIPTION OF RESULTS*****************************************
* 529+70                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .058100
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    352.44
    FLOW TOP- WIDTH(FEET) =        21.00
    FLOW AREA(SQUARE FEET) =          26.00
    HYDRAULIC DEPTH(FEET) =     1.24
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    13.56
    UNIFORM FROUDE NUMBER =    2.147
    PRESSURE + MOMENTUM(POUNDS) =        10547.76
    AVERAGED VELOCITY HEAD(FEET) =      2.853
    SPECIFIC ENERGY(FEET) =      4.853
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        28.07
    CRITICAL FLOW AREA(SQUARE FEET) =          47.68
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.70
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.39
    CRITICAL DEPTH(FEET) =     2.88
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         8340.74
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .848
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.732
```

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**********DESCRIPTION OF RESULTS*****************************************
* 530+50                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   5.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    10.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .002700
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    790.15
    FLOW TOP- WIDTH(FEET) =        50.00
    FLOW AREA(SQUARE FEET) =         150.00
    HYDRAULIC DEPTH(FEET) =     3.00
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.27
    UNIFORM FROUDE NUMBER =     .536
    PRESSURE + MOMENTUM(POUNDS) =        26266.02
    AVERAGED VELOCITY HEAD(FEET) =       .431
    SPECIFIC ENERGY(FEET) =      5.431
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        39.55
    CRITICAL FLOW AREA(SQUARE FEET) =          91.53
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     2.31
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     8.63
    CRITICAL DEPTH(FEET) =     3.69
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        21671.02
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =      1.157
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      4.851


**********DESCRIPTION OF RESULTS*****************************************
* 534+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .005600
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     25.78
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =      .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     2.86
    UNIFORM FROUDE NUMBER =     .607
    PRESSURE + MOMENTUM(POUNDS) =          302.34
    AVERAGED VELOCITY HEAD(FEET) =       .127
    SPECIFIC ENERGY(FEET) =      1.127
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        11.09
    CRITICAL FLOW AREA(SQUARE FEET) =          6.13
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .55
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.21
    CRITICAL DEPTH(FEET) =      .76
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          337.46
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .275
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.036
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 535+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .005900
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     26.46
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =      .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     2.94
    UNIFORM FROUDE NUMBER =     .623
    PRESSURE + MOMENTUM(POUNDS) =          390.01
    AVERAGED VELOCITY HEAD(FEET) =       .134
    SPECIFIC ENERGY(FEET) =      1.134
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        11.17
    CRITICAL FLOW AREA(SQUARE FEET) =           6.24
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .56
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.24
    CRITICAL DEPTH(FEET) =      .77
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          348.63
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .280
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.051
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 540+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .054700
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    560.11
    FLOW TOP- WIDTH(FEET) =        25.00
    FLOW AREA(SQUARE FEET) =          37.50
    HYDRAULIC DEPTH(FEET) =     1.50
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    14.94
    UNIFORM FROUDE NUMBER =    2.149
    PRESSURE + MOMENTUM(POUNDS) =        18487.41
    AVERAGED VELOCITY HEAD(FEET) =      3.464
    SPECIFIC ENERGY(FEET) =      5.964
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        33.58
    CRITICAL FLOW AREA(SQUARE FEET) =          68.92
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     2.05
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     8.13
    CRITICAL DEPTH(FEET) =     3.57
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        14606.64
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =      1.026
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      4.598
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 542+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .003500
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     20.38
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =      .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     2.26
    UNIFORM FROUDE NUMBER =     .480
    PRESSURE + MOMENTUM(POUNDS) =          328.66
    AVERAGED VELOCITY HEAD(FEET) =       .080
    SPECIFIC ENERGY(FEET) =      1.080
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        10.33
    CRITICAL FLOW AREA(SQUARE FEET) =           5.11
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .49
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.99
    CRITICAL DEPTH(FEET) =      .67
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          251.51
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .247
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =       .914
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 543+50                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   4.50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .016300
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =   1192.11
    FLOW TOP- WIDTH(FEET) =        41.00
    FLOW AREA(SQUARE FEET) =         103.50
    HYDRAULIC DEPTH(FEET) =     2.52
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    11.52
    UNIFORM FROUDE NUMBER =    1.278
    PRESSURE + MOMENTUM(POUNDS) =        37349.24
    AVERAGED VELOCITY HEAD(FEET) =      2.060
    SPECIFIC ENERGY(FEET) =      6.560
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        45.14
    CRITICAL FLOW AREA(SQUARE FEET) =         125.79
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     2.79
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     9.48
    CRITICAL DEPTH(FEET) =     5.02
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        36330.74
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =      1.395
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      6.412
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 544+50                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .024400
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    228.40
    FLOW TOP- WIDTH(FEET) =        21.00
    FLOW AREA(SQUARE FEET) =          26.00
    HYDRAULIC DEPTH(FEET) =     1.24
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    8.78
    UNIFORM FROUDE NUMBER =    1.391
    PRESSURE + MOMENTUM(POUNDS) =      5177.71
    AVERAGED VELOCITY HEAD(FEET) =    1.198
    SPECIFIC ENERGY(FEET) =      3.198
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        23.78
    CRITICAL FLOW AREA(SQUARE FEET) =          33.77
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.42
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.76
    CRITICAL DEPTH(FEET) =     2.35
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         4928.57
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .710
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.057
```

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**********DESCRIPTION OF RESULTS*****************************************
* 546+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .003500
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     20.38
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =      .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     2.26
    UNIFORM FROUDE NUMBER =     .480
    PRESSURE + MOMENTUM(POUNDS) =          328.66
    AVERAGED VELOCITY HEAD(FEET) =       .080
    SPECIFIC ENERGY(FEET) =      1.080
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        10.33
    CRITICAL FLOW AREA(SQUARE FEET) =           5.11
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .49
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.99
    CRITICAL DEPTH(FEET) =      .67
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          251.51
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .247
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =       .914
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 549+60                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   3.75
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .084200
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =   1760.92
    FLOW TOP- WIDTH(FEET) =        35.00
    FLOW AREA(SQUARE FEET) =          75.00
    HYDRAULIC DEPTH(FEET) =     2.14
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    23.48
    UNIFORM FROUDE NUMBER =    2.827
    PRESSURE + MOMENTUM(POUNDS) =        86702.23
    AVERAGED VELOCITY HEAD(FEET) =      8.560
    SPECIFIC ENERGY(FEET) =     12.310
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        52.67
    CRITICAL FLOW AREA(SQUARE FEET) =         171.85
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     3.26
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =    10.25
    CRITICAL DEPTH(FEET) =     5.96
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        58115.09
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =      1.630
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      7.590
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 550+20                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .052300
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    334.39
    FLOW TOP- WIDTH(FEET) =        21.00
    FLOW AREA(SQUARE FEET) =          26.00
    HYDRAULIC DEPTH(FEET) =     1.24
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    12.86
    UNIFORM FROUDE NUMBER =    2.037
    PRESSURE + MOMENTUM(POUNDS) =         9623.53
    AVERAGED VELOCITY HEAD(FEET) =      2.568
    SPECIFIC ENERGY(FEET) =      4.568
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        27.50
    CRITICAL FLOW AREA(SQUARE FEET) =          45.69
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.66
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.32
    CRITICAL DEPTH(FEET) =     2.81
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         7826.04
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =        .832
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.644
```

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**********DESCRIPTION OF RESULTS*****************************************
* 551+25                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .037500
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    283.15
    FLOW TOP- WIDTH(FEET) =        21.00
    FLOW AREA(SQUARE FEET) =          26.00
    HYDRAULIC DEPTH(FEET) =     1.24
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    10.89
    UNIFORM FROUDE NUMBER =    1.725
    PRESSURE + MOMENTUM(POUNDS) =         7265.17
    AVERAGED VELOCITY HEAD(FEET) =      1.842
    SPECIFIC ENERGY(FEET) =      3.842
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        25.80
    CRITICAL FLOW AREA(SQUARE FEET) =          40.04
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.55
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.07
    CRITICAL DEPTH(FEET) =     2.60
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         6397.13
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .777
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.377
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 552+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .004600
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     23.37
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =      .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     2.60
    UNIFORM FROUDE NUMBER =     .550
    PRESSURE + MOMENTUM(POUNDS) =          356.78
    AVERAGED VELOCITY HEAD(FEET) =       .105
    SPECIFIC ENERGY(FEET) =      1.105
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        10.75
    CRITICAL FLOW AREA(SQUARE FEET) =          5.66
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .53
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.13
    CRITICAL DEPTH(FEET) =      .72
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          298.44
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .265
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =       .983
```

```
**********DESCRIPTION OF RESULTS*********************************************
* 552+50                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .043200
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    303.91
    FLOW TOP- WIDTH(FEET) =        21.00
    FLOW AREA(SQUARE FEET) =          26.00
    HYDRAULIC DEPTH(FEET) =     1.24
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    11.69
    UNIFORM FROUDE NUMBER =    1.851
    PRESSURE + MOMENTUM(POUNDS) =         8173.46
    AVERAGED VELOCITY HEAD(FEET) =      2.122
    SPECIFIC ENERGY(FEET) =      4.122
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        26.51
    CRITICAL FLOW AREA(SQUARE FEET) =          42.35
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.60
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.18
    CRITICAL DEPTH(FEET) =     2.69
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         6970.12
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .800
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.488
```

```
**********DESCRIPTION OF RESULTS*********************************************
* 554+00                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .004600
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     23.37
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =      .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     2.60
    UNIFORM FROUDE NUMBER =     .550
    PRESSURE + MOMENTUM(POUNDS) =          356.78
    AVERAGED VELOCITY HEAD(FEET) =       .105
    SPECIFIC ENERGY(FEET) =      1.105
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        10.75
    CRITICAL FLOW AREA(SQUARE FEET) =           5.66
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .53
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.13
    CRITICAL DEPTH(FEET) =      .72
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          298.44
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .265
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =       .983
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 554+80                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .040000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    292.43
    FLOW TOP- WIDTH(FEET) =        21.00
    FLOW AREA(SQUARE FEET) =          26.00
    HYDRAULIC DEPTH(FEET) =     1.24
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    11.25
    UNIFORM FROUDE NUMBER =    1.781
    PRESSURE + MOMENTUM(POUNDS) =         7663.55
    AVERAGED VELOCITY HEAD(FEET) =      1.964
    SPECIFIC ENERGY(FEET) =      3.964
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        26.12
    CRITICAL FLOW AREA(SQUARE FEET) =          41.09
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.57
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.12
    CRITICAL DEPTH(FEET) =     2.64
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         6652.42
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .786
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.427
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 555+40                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .037700
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    153.35
    FLOW TOP- WIDTH(FEET) =        17.00
    FLOW AREA(SQUARE FEET) =          16.50
    HYDRAULIC DEPTH(FEET) =      .97
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     9.29
    UNIFORM FROUDE NUMBER =    1.662
    PRESSURE + MOMENTUM(POUNDS) =         3393.76
    AVERAGED VELOCITY HEAD(FEET) =      1.341
    SPECIFIC ENERGY(FEET) =      2.841
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        20.40
    CRITICAL FLOW AREA(SQUARE FEET) =          24.65
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.20
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.22
    CRITICAL DEPTH(FEET) =     1.93
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         3035.52
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .601
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.536
```

```
**********DESCRIPTION OF RESULTS*********************************************
* 556+00                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .005000
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     24.36
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =      .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     2.71
    UNIFORM FROUDE NUMBER =     .573
    PRESSURE + MOMENTUM(POUNDS) =          367.00
    AVERAGED VELOCITY HEAD(FEET) =       .114
    SPECIFIC ENERGY(FEET) =      1.114
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        10.90
    CRITICAL FLOW AREA(SQUARE FEET) =           5.87
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .54
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.15
    CRITICAL DEPTH(FEET) =      .74
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          314.40
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .268
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.006
```

```
**********DESCRIPTION OF RESULTS*********************************************
* 556+70                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .005000
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     55.85
    FLOW TOP- WIDTH(FEET) =        17.00
    FLOW AREA(SQUARE FEET) =          16.50
    HYDRAULIC DEPTH(FEET) =      .97
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.38
    UNIFORM FROUDE NUMBER =     .605
    PRESSURE + MOMENTUM(POUNDS) =          998.11
    AVERAGED VELOCITY HEAD(FEET) =       .178
    SPECIFIC ENERGY(FEET) =      1.678
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        14.26
    CRITICAL FLOW AREA(SQUARE FEET) =          11.15
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .78
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.01
    CRITICAL DEPTH(FEET) =     1.16
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          880.27
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .390
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.547
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 557+20                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   3.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .024000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    560.71
    FLOW TOP- WIDTH(FEET) =        29.00
    FLOW AREA(SQUARE FEET) =          51.00
    HYDRAULIC DEPTH(FEET) =     1.76
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    10.99
    UNIFORM FROUDE NUMBER =    1.461
    PRESSURE + MOMENTUM(POUNDS) =        15596.86
    AVERAGED VELOCITY HEAD(FEET) =      1.877
    SPECIFIC ENERGY(FEET) =      4.877
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        33.60
    CRITICAL FLOW AREA(SQUARE FEET) =          69.00
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     2.05
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     8.13
    CRITICAL DEPTH(FEET) =     3.58
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        14625.56
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =      1.025
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      4.600


**********DESCRIPTION OF RESULTS*****************************************
* 557+80                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   3.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .032800
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    655.50
    FLOW TOP- WIDTH(FEET) =        29.00
    FLOW AREA(SQUARE FEET) =          51.00
    HYDRAULIC DEPTH(FEET) =     1.76
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    12.85
    UNIFORM FROUDE NUMBER =    1.708
    PRESSURE + MOMENTUM(POUNDS) =        19977.22
    AVERAGED VELOCITY HEAD(FEET) =      2.565
    SPECIFIC ENERGY(FEET) =      5.565
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        35.70
    CRITICAL FLOW AREA(SQUARE FEET) =          78.09
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     2.19
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     8.39
    CRITICAL DEPTH(FEET) =     3.84
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        17661.67
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =      1.094
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      4.932
```

```
**********DESCRIPTION OF RESULTS*********************************************
* 558+30                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .056800
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    188.23
    FLOW TOP- WIDTH(FEET) =        17.00
    FLOW AREA(SQUARE FEET) =          16.50
    HYDRAULIC DEPTH(FEET) =       .97
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    11.41
    UNIFORM FROUDE NUMBER =    2.041
    PRESSURE + MOMENTUM(POUNDS) =          4793.05
    AVERAGED VELOCITY HEAD(FEET) =      2.021
    SPECIFIC ENERGY(FEET) =      3.521
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        22.10
    CRITICAL FLOW AREA(SQUARE FEET) =          28.96
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.31
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.50
    CRITICAL DEPTH(FEET) =     2.14
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          3895.91
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .656
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.793


**********DESCRIPTION OF RESULTS*********************************************
* 559+00                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .007300
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     29.44
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =       .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.27
    UNIFORM FROUDE NUMBER =     .693
    PRESSURE + MOMENTUM(POUNDS) =          425.79
    AVERAGED VELOCITY HEAD(FEET) =       .166
    SPECIFIC ENERGY(FEET) =      1.166
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        11.55
    CRITICAL FLOW AREA(SQUARE FEET) =          6.78
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .59
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.34
    CRITICAL DEPTH(FEET) =      .82
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          398.10
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .293
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.112
=============================================================================
```

```
**********DESCRIPTION OF RESULTS*****************************************
* STA 578+00                                                            *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   4.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .051300
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =   1599.62
    FLOW TOP- WIDTH(FEET) =        37.00
    FLOW AREA(SQUARE FEET) =          84.00
    HYDRAULIC DEPTH(FEET) =     2.27
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    19.04
    UNIFORM FROUDE NUMBER =    2.227
    PRESSURE + MOMENTUM(POUNDS) =        66851.97
    AVERAGED VELOCITY HEAD(FEET) =      5.631
    SPECIFIC ENERGY(FEET) =      9.631
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        50.71
    CRITICAL FLOW AREA(SQUARE FEET) =         159.15
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     3.14
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =    10.05
    CRITICAL DEPTH(FEET) =     5.71
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        51768.36
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =      1.569
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      7.282
```

```
**********DESCRIPTION OF RESULTS*****************************************
* STA 579+00                                                            *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   4.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .026700
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =   1154.02
    FLOW TOP- WIDTH(FEET) =        37.00
    FLOW AREA(SQUARE FEET) =          84.00
    HYDRAULIC DEPTH(FEET) =     2.27
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    13.74
    UNIFORM FROUDE NUMBER =    1.607
    PRESSURE + MOMENTUM(POUNDS) =        38544.63
    AVERAGED VELOCITY HEAD(FEET) =      2.931
    SPECIFIC ENERGY(FEET) =      6.931
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        44.57
    CRITICAL FLOW AREA(SQUARE FEET) =         122.58
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     2.75
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     9.41
    CRITICAL DEPTH(FEET) =     4.95
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        34936.61
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =      1.376
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      6.322
=========================================================================
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 581+60                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   3.50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    10.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .060000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =   1703.82
    FLOW TOP- WIDTH(FEET) =        38.00
    FLOW AREA(SQUARE FEET) =          84.00
    HYDRAULIC DEPTH(FEET) =     2.21
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    20.28
    UNIFORM FROUDE NUMBER =    2.404
    PRESSURE + MOMENTUM(POUNDS) =        74362.13
    AVERAGED VELOCITY HEAD(FEET) =      6.389
    SPECIFIC ENERGY(FEET) =      9.889
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        52.85
    CRITICAL FLOW AREA(SQUARE FEET) =         168.31
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     3.18
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =    10.12
    CRITICAL DEPTH(FEET) =     3.36
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        55159.02
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =      1.591
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      6.947


**********DESCRIPTION OF RESULTS*****************************************
* STA 584+00                                                            *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.25
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .007500
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     46.85
    FLOW TOP- WIDTH(FEET) =        15.00
    FLOW AREA(SQUARE FEET) =          12.50
    HYDRAULIC DEPTH(FEET) =       .83
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.75
    UNIFORM FROUDE NUMBER =     .723
    PRESSURE + MOMENTUM(POUNDS) =          746.47
    AVERAGED VELOCITY HEAD(FEET) =       .218
    SPECIFIC ENERGY(FEET) =      1.468
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        13.42
    CRITICAL FLOW AREA(SQUARE FEET) =           9.70
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =       .72
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.83
    CRITICAL DEPTH(FEET) =     1.05
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          708.53
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .363
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.415
```

```
**********DESCRIPTION OF RESULTS*****************************************
* STA 587+40                                                            *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .012000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     86.52
    FLOW TOP- WIDTH(FEET) =        17.00
    FLOW AREA(SQUARE FEET) =          16.50
    HYDRAULIC DEPTH(FEET) =      .97
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.24
    UNIFORM FROUDE NUMBER =     .938
    PRESSURE + MOMENTUM(POUNDS) =         1510.94
    AVERAGED VELOCITY HEAD(FEET) =       .427
    SPECIFIC ENERGY(FEET) =      1.927
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        16.61
    CRITICAL FLOW AREA(SQUARE FEET) =          15.67
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .94
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.52
    CRITICAL DEPTH(FEET) =     1.45
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         1507.93
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .473
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.924


**********DESCRIPTION OF RESULTS*****************************************
* 591+40                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   4.37
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    10.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .023200
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =   1716.89
    FLOW TOP- WIDTH(FEET) =        44.96
    FLOW AREA(SQUARE FEET) =         120.09
    HYDRAULIC DEPTH(FEET) =     2.67
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    14.30
    UNIFORM FROUDE NUMBER =    1.542
    PRESSURE + MOMENTUM(POUNDS) =        60469.49
    AVERAGED VELOCITY HEAD(FEET) =      3.174
    SPECIFIC ENERGY(FEET) =      7.544
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        53.00
    CRITICAL FLOW AREA(SQUARE FEET) =         169.32
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     3.19
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =    10.14
    CRITICAL DEPTH(FEET) =     5.38
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        55672.07
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =      1.597
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      6.972
```

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**********DESCRIPTION OF RESULTS*****************************************
* 592+80                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.55
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    10.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .003000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    195.93
    FLOW TOP- WIDTH(FEET) =        30.40
    FLOW AREA(SQUARE FEET) =          51.51
    HYDRAULIC DEPTH(FEET) =     1.69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.80
    UNIFORM FROUDE NUMBER =     .515
    PRESSURE + MOMENTUM(POUNDS) =         4852.65
    AVERAGED VELOCITY HEAD(FEET) =       .225
    SPECIFIC ENERGY(FEET) =      2.775
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        24.31
    CRITICAL FLOW AREA(SQUARE FEET) =          30.70
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.26
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.38
    CRITICAL DEPTH(FEET) =     1.79
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         3898.89
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .632
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.422


**********DESCRIPTION OF RESULTS*****************************************
* 594+05                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.64
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .012500
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    106.63
    FLOW TOP- WIDTH(FEET) =        18.12
    FLOW AREA(SQUARE FEET) =          18.96
    HYDRAULIC DEPTH(FEET) =     1.05
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.62
    UNIFORM FROUDE NUMBER =     .969
    PRESSURE + MOMENTUM(POUNDS) =         1940.72
    AVERAGED VELOCITY HEAD(FEET) =       .491
    SPECIFIC ENERGY(FEET) =      2.131
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        17.92
    CRITICAL FLOW AREA(SQUARE FEET) =          18.51
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.03
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.76
    CRITICAL DEPTH(FEET) =     1.62
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         1947.79
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .515
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.130
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 594+40                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .003000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     18.87
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =      .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     2.10
    UNIFORM FROUDE NUMBER =     .444
    PRESSURE + MOMENTUM(POUNDS) =          315.88
    AVERAGED VELOCITY HEAD(FEET) =       .068
    SPECIFIC ENERGY(FEET) =      1.068
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        10.10
    CRITICAL FLOW AREA(SQUARE FEET) =           4.82
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .48
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.92
    CRITICAL DEPTH(FEET) =      .64
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          228.34
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .238
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =       .876
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 594+90                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.94
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .025800
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    219.79
    FLOW TOP- WIDTH(FEET) =        20.52
    FLOW AREA(SQUARE FEET) =           24.75
    HYDRAULIC DEPTH(FEET) =     1.21
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     8.88
    UNIFORM FROUDE NUMBER =    1.425
    PRESSURE + MOMENTUM(POUNDS) =          4976.46
    AVERAGED VELOCITY HEAD(FEET) =      1.224
    SPECIFIC ENERGY(FEET) =      3.164
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        23.43
    CRITICAL FLOW AREA(SQUARE FEET) =           32.76
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.40
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.71
    CRITICAL DEPTH(FEET) =     2.30
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          4703.93
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .699
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.003
```

```
**********DESCRIPTION OF RESULTS*********************************************
* 595+70                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.60
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .009100
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     86.33
    FLOW TOP- WIDTH(FEET) =        17.80
    FLOW AREA(SQUARE FEET) =          18.24
    HYDRAULIC DEPTH(FEET) =     1.02
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.73
    UNIFORM FROUDE NUMBER =     .824
    PRESSURE + MOMENTUM(POUNDS) =         1532.02
    AVERAGED VELOCITY HEAD(FEET) =       .348
    SPECIFIC ENERGY(FEET) =      1.948
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        16.61
    CRITICAL FLOW AREA(SQUARE FEET) =          15.67
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .94
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.51
    CRITICAL DEPTH(FEET) =     1.45
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         1503.97
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .471
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.922


**********DESCRIPTION OF RESULTS*********************************************
* 596+60                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.72
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .013800
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    124.01
    FLOW TOP- WIDTH(FEET) =        18.76
    FLOW AREA(SQUARE FEET) =          20.43
    HYDRAULIC DEPTH(FEET) =     1.09
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.07
    UNIFORM FROUDE NUMBER =    1.025
    PRESSURE + MOMENTUM(POUNDS) =         2343.36
    AVERAGED VELOCITY HEAD(FEET) =       .572
    SPECIFIC ENERGY(FEET) =      2.292
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        18.93
    CRITICAL FLOW AREA(SQUARE FEET) =          20.84
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.10
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.95
    CRITICAL DEPTH(FEET) =     1.74
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         2342.69
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .550
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.291
```

```
**********DESCRIPTION OF RESULTS*********************************************
* 597+30                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.48
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .005500
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    174.44
    FLOW TOP- WIDTH(FEET) =        24.84
    FLOW AREA(SQUARE FEET) =          37.00
    HYDRAULIC DEPTH(FEET) =     1.49
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.71
    UNIFORM FROUDE NUMBER =     .681
    PRESSURE + MOMENTUM(POUNDS) =         3822.20
    AVERAGED VELOCITY HEAD(FEET) =       .345
    SPECIFIC ENERGY(FEET) =      2.825
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        21.49
    CRITICAL FLOW AREA(SQUARE FEET) =          27.30
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.27
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.39
    CRITICAL DEPTH(FEET) =     2.06
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         3551.39
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .634
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.695


**********DESCRIPTION OF RESULTS*********************************************
* 598+70                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.16
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .043100
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    359.32
    FLOW TOP- WIDTH(FEET) =        22.28
    FLOW AREA(SQUARE FEET) =          29.46
    HYDRAULIC DEPTH(FEET) =     1.32
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    12.20
    UNIFORM FROUDE NUMBER =    1.869
    PRESSURE + MOMENTUM(POUNDS) =        10058.38
    AVERAGED VELOCITY HEAD(FEET) =      2.310
    SPECIFIC ENERGY(FEET) =      4.470
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        28.28
    CRITICAL FLOW AREA(SQUARE FEET) =          48.42
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.71
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.42
    CRITICAL DEPTH(FEET) =     2.91
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         8538.23
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .855
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.765
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 601+10                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   3.38
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .005400
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    350.06
    FLOW TOP- WIDTH(FEET) =        32.04
    FLOW AREA(SQUARE FEET) =          62.60
    HYDRAULIC DEPTH(FEET) =     1.95
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.59
    UNIFORM FROUDE NUMBER =     .705
    PRESSURE + MOMENTUM(POUNDS) =         8788.51
    AVERAGED VELOCITY HEAD(FEET) =       .486
    SPECIFIC ENERGY(FEET) =      3.866
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        27.99
    CRITICAL FLOW AREA(SQUARE FEET) =          47.41
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.69
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.38
    CRITICAL DEPTH(FEET) =     2.87
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         8272.51
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .846
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.721


**********DESCRIPTION OF RESULTS*****************************************
* 602+60                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.55
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .046600
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    540.47
    FLOW TOP- WIDTH(FEET) =        25.40
    FLOW AREA(SQUARE FEET) =          38.76
    HYDRAULIC DEPTH(FEET) =     1.53
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    13.94
    UNIFORM FROUDE NUMBER =    1.989
    PRESSURE + MOMENTUM(POUNDS) =        16998.54
    AVERAGED VELOCITY HEAD(FEET) =      3.019
    SPECIFIC ENERGY(FEET) =      5.569
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        33.12
    CRITICAL FLOW AREA(SQUARE FEET) =          67.01
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     2.02
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     8.07
    CRITICAL DEPTH(FEET) =     3.52
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        13990.05
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =      1.010
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      4.526
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 603+40                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .003000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     18.87
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =            9.00
    HYDRAULIC DEPTH(FEET) =       .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     2.10
    UNIFORM FROUDE NUMBER =     .444
    PRESSURE + MOMENTUM(POUNDS) =          315.88
    AVERAGED VELOCITY HEAD(FEET) =       .068
    SPECIFIC ENERGY(FEET) =      1.068
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        10.10
    CRITICAL FLOW AREA(SQUARE FEET) =           4.82
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .48
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.92
    CRITICAL DEPTH(FEET) =      .64
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          228.34
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .238
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =       .876
```

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**********DESCRIPTION OF RESULTS*****************************************
* 605+20                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   3.61
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .001900
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    242.00
    FLOW TOP- WIDTH(FEET) =        33.88
    FLOW AREA(SQUARE FEET) =          70.18
    HYDRAULIC DEPTH(FEET) =     2.07
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.45
    UNIFORM FROUDE NUMBER =     .422
    PRESSURE + MOMENTUM(POUNDS) =         7564.44
    AVERAGED VELOCITY HEAD(FEET) =       .185
    SPECIFIC ENERGY(FEET) =      3.795
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        24.31
    CRITICAL FLOW AREA(SQUARE FEET) =          35.38
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.46
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.84
    CRITICAL DEPTH(FEET) =     2.41
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         5287.36
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .727
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.141
```

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**********DESCRIPTION OF RESULTS*********************************************
* 604+50                                                                    *
*                                                                           *
*                                                                           *
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*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.67
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     2.50
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .031900
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    396.15
    FLOW TOP- WIDTH(FEET) =        23.86
    FLOW AREA(SQUARE FEET) =          35.19
    HYDRAULIC DEPTH(FEET) =     1.47
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    11.26
    UNIFORM FROUDE NUMBER =    1.634
    PRESSURE + MOMENTUM(POUNDS) =        10781.66
    AVERAGED VELOCITY HEAD(FEET) =      1.968
    SPECIFIC ENERGY(FEET) =      4.638
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        28.96
    CRITICAL FLOW AREA(SQUARE FEET) =          52.04
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.80
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.61
    CRITICAL DEPTH(FEET) =     3.31
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         9709.02
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .900
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      4.208
```

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**********DESCRIPTION OF RESULTS*********************************************
* 606+40                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   3.55
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .019500
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    745.57
    FLOW TOP- WIDTH(FEET) =        33.40
    FLOW AREA(SQUARE FEET) =          68.16
    HYDRAULIC DEPTH(FEET) =     2.04
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    10.94
    UNIFORM FROUDE NUMBER =    1.349
    PRESSURE + MOMENTUM(POUNDS) =        21492.57
    AVERAGED VELOCITY HEAD(FEET) =      1.858
    SPECIFIC ENERGY(FEET) =      5.408
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        37.55
    CRITICAL FLOW AREA(SQUARE FEET) =          86.56
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     2.31
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     8.61
    CRITICAL DEPTH(FEET) =     4.07
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        20631.06
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =      1.152
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      5.221
```

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**********DESCRIPTION OF RESULTS*****************************************
* 608+70                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.27
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .004700
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    132.41
    FLOW TOP- WIDTH(FEET) =      23.16
    FLOW AREA(SQUARE FEET) =          31.96
    HYDRAULIC DEPTH(FEET) =     1.38
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.14
    UNIFORM FROUDE NUMBER =     .621
    PRESSURE + MOMENTUM(POUNDS) =         2840.12
    AVERAGED VELOCITY HEAD(FEET) =       .267
    SPECIFIC ENERGY(FEET) =      2.537
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        19.39
    CRITICAL FLOW AREA(SQUARE FEET) =          21.94
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.13
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.04
    CRITICAL DEPTH(FEET) =     1.80
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         2537.91
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .566
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.365


**********DESCRIPTION OF RESULTS*****************************************
* 610+85                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   3.17
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .009000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    389.68
    FLOW TOP- WIDTH(FEET) =        30.36
    FLOW AREA(SQUARE FEET) =          56.05
    HYDRAULIC DEPTH(FEET) =     1.85
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.95
    UNIFORM FROUDE NUMBER =     .902
    PRESSURE + MOMENTUM(POUNDS) =         9468.43
    AVERAGED VELOCITY HEAD(FEET) =       .751
    SPECIFIC ENERGY(FEET) =      3.921
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        29.18
    CRITICAL FLOW AREA(SQUARE FEET) =          51.64
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.77
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.55
    CRITICAL DEPTH(FEET) =     3.02
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         9419.26
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .884
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.906
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**********DESCRIPTION OF RESULTS*****************************************
* 611+23                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   3.52
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .004900
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    366.43
    FLOW TOP- WIDTH(FEET) =        33.16
    FLOW AREA(SQUARE FEET) =          67.16
    HYDRAULIC DEPTH(FEET) =     2.03
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.46
    UNIFORM FROUDE NUMBER =     .676
    PRESSURE + MOMENTUM(POUNDS) =         9435.77
    AVERAGED VELOCITY HEAD(FEET) =       .462
    SPECIFIC ENERGY(FEET) =      3.982
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        28.49
    CRITICAL FLOW AREA(SQUARE FEET) =          49.16
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.73
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.45
    CRITICAL DEPTH(FEET) =     2.94
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         8743.20
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .863
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.799
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 611+86                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   3.14
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .011000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    421.48
    FLOW TOP- WIDTH(FEET) =        30.12
    FLOW AREA(SQUARE FEET) =          55.14
    HYDRAULIC DEPTH(FEET) =     1.83
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.64
    UNIFORM FROUDE NUMBER =     .996
    PRESSURE + MOMENTUM(POUNDS) =         10357.42
    AVERAGED VELOCITY HEAD(FEET) =       .907
    SPECIFIC ENERGY(FEET) =      4.047
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        30.07
    CRITICAL FLOW AREA(SQUARE FEET) =          54.96
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.83
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.67
    CRITICAL DEPTH(FEET) =     3.13
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         10357.32
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .913
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      4.047
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 613+45                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .009800
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     34.11
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =       .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.79
    UNIFORM FROUDE NUMBER =      .803
    PRESSURE + MOMENTUM(POUNDS) =          489.69
    AVERAGED VELOCITY HEAD(FEET) =       .223
    SPECIFIC ENERGY(FEET) =      1.223
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        12.10
    CRITICAL FLOW AREA(SQUARE FEET) =           7.60
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =       .63
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.49
    CRITICAL DEPTH(FEET) =       .89
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          478.13
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .313
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.201
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 614+36                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.72
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .052600
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    664.17
    FLOW TOP- WIDTH(FEET) =        26.76
    FLOW AREA(SQUARE FEET) =          43.19
    HYDRAULIC DEPTH(FEET) =     1.61
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    15.38
    UNIFORM FROUDE NUMBER =    2.133
    PRESSURE + MOMENTUM(POUNDS) =        22619.15
    AVERAGED VELOCITY HEAD(FEET) =      3.671
    SPECIFIC ENERGY(FEET) =      6.391
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        35.89
    CRITICAL FLOW AREA(SQUARE FEET) =          78.94
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     2.20
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     8.41
    CRITICAL DEPTH(FEET) =     3.86
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        17943.97
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =      1.099
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      4.960
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 614+79                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.55
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .062800
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    627.42
    FLOW TOP- WIDTH(FEET) =        25.40
    FLOW AREA(SQUARE FEET) =          38.76
    HYDRAULIC DEPTH(FEET) =     1.53
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    16.19
    UNIFORM FROUDE NUMBER =    2.309
    PRESSURE + MOMENTUM(POUNDS) =        22075.66
    AVERAGED VELOCITY HEAD(FEET) =      4.069
    SPECIFIC ENERGY(FEET) =      6.619
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        35.09
    CRITICAL FLOW AREA(SQUARE FEET) =          75.39
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     2.15
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     8.32
    CRITICAL DEPTH(FEET) =     3.76
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        16752.35
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =      1.076
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      4.837
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 615+55                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .003000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     18.87
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =      .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     2.10
    UNIFORM FROUDE NUMBER =     .444
    PRESSURE + MOMENTUM(POUNDS) =          315.88
    AVERAGED VELOCITY HEAD(FEET) =       .068
    SPECIFIC ENERGY(FEET) =      1.068
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        10.10
    CRITICAL FLOW AREA(SQUARE FEET) =           4.82
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =       .48
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.92
    CRITICAL DEPTH(FEET) =      .64
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          228.34
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .238
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =       .876
```

```
**********DESCRIPTION OF RESULTS*********************************************
* 617+38                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.63
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .058600
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    649.71
    FLOW TOP- WIDTH(FEET) =        26.04
    FLOW AREA(SQUARE FEET) =           40.82
    HYDRAULIC DEPTH(FEET) =     1.57
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    15.92
    UNIFORM FROUDE NUMBER =    2.240
    PRESSURE + MOMENTUM(POUNDS) =        22633.70
    AVERAGED VELOCITY HEAD(FEET) =      3.934
    SPECIFIC ENERGY(FEET) =      6.564
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        35.58
    CRITICAL FLOW AREA(SQUARE FEET) =          77.58
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     2.18
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     8.37
    CRITICAL DEPTH(FEET) =     3.82
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        17473.60
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =      1.089
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      4.912
```

```
**********DESCRIPTION OF RESULTS*********************************************
* 619+28                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   3.33
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .028800
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    780.99
    FLOW TOP- WIDTH(FEET) =        31.64
    FLOW AREA(SQUARE FEET) =           61.01
    HYDRAULIC DEPTH(FEET) =     1.93
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    12.80
    UNIFORM FROUDE NUMBER =    1.625
    PRESSURE + MOMENTUM(POUNDS) =        24177.55
    AVERAGED VELOCITY HEAD(FEET) =      2.545
    SPECIFIC ENERGY(FEET) =      5.875
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        38.24
    CRITICAL FLOW AREA(SQUARE FEET) =          89.81
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     2.35
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     8.70
    CRITICAL DEPTH(FEET) =     4.15
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        21819.43
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =      1.174
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      5.329
=============================================================================
```

```
**********DESCRIPTION OF RESULTS*****************************************
* STA 620+40                                                            *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .017200
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    191.76
    FLOW TOP- WIDTH(FEET) =        21.00
    FLOW AREA(SQUARE FEET) =          26.00
    HYDRAULIC DEPTH(FEET) =     1.24
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.38
    UNIFORM FROUDE NUMBER =    1.168
    PRESSURE + MOMENTUM(POUNDS) =         4030.40
    AVERAGED VELOCITY HEAD(FEET) =        .845
    SPECIFIC ENERGY(FEET) =      2.845
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        22.25
    CRITICAL FLOW AREA(SQUARE FEET) =          29.38
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.32
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.53
    CRITICAL DEPTH(FEET) =     2.16
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         3984.99
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .661
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.818
```

```
**********DESCRIPTION OF RESULTS*****************************************
* STA 671+00                                                            *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .043300
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     71.69
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =      .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.97
    UNIFORM FROUDE NUMBER =    1.687
    PRESSURE + MOMENTUM(POUNDS) =         1345.96
    AVERAGED VELOCITY HEAD(FEET) =        .985
    SPECIFIC ENERGY(FEET) =      1.985
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        13.54
    CRITICAL FLOW AREA(SQUARE FEET) =          13.53
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .97
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.30
    CRITICAL DEPTH(FEET) =     1.32
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         1197.22
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .436
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.753
```

```
**********DESCRIPTION OF RESULTS*********************************************
* STA 672+00                                                                 *
*                                                                            *
*                                                                            *
******************************************************************************

******************************************************************************
))))CHANNEL INPUT INFORMATION((((
------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .019300
    MANNINGS FRICTION FACTOR =  .0300
==============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     47.87
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =       .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.32
    UNIFORM FROUDE NUMBER =    1.126
    PRESSURE + MOMENTUM(POUNDS) =          732.51
    AVERAGED VELOCITY HEAD(FEET) =       .439
    SPECIFIC ENERGY(FEET) =      1.439
==============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        13.54
    CRITICAL FLOW AREA(SQUARE FEET) =           9.89
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .73
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.84
    CRITICAL DEPTH(FEET) =     1.07
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          727.64
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .364
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.431
```

```
**********DESCRIPTION OF RESULTS*********************************************
* STA 675+80                                                                 *
*                                                                            *
*                                                                            *
******************************************************************************

******************************************************************************
))))CHANNEL INPUT INFORMATION((((
------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .017200
    MANNINGS FRICTION FACTOR =  .0300
==============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    103.58
    FLOW TOP- WIDTH(FEET) =        17.00
    FLOW AREA(SQUARE FEET) =          16.50
    HYDRAULIC DEPTH(FEET) =       .97
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.28
    UNIFORM FROUDE NUMBER =    1.123
    PRESSURE + MOMENTUM(POUNDS) =         1891.90
    AVERAGED VELOCITY HEAD(FEET) =       .612
    SPECIFIC ENERGY(FEET) =      2.112
==============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        17.73
    CRITICAL FLOW AREA(SQUARE FEET) =          18.09
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.02
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.73
    CRITICAL DEPTH(FEET) =     1.59
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         1879.92
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .509
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.101
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 690+80                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .035000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    147.76
    FLOW TOP- WIDTH(FEET) =        17.00
    FLOW AREA(SQUARE FEET) =          16.50
    HYDRAULIC DEPTH(FEET) =      .97
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     8.96
    UNIFORM FROUDE NUMBER =    1.602
    PRESSURE + MOMENTUM(POUNDS) =         3195.95
    AVERAGED VELOCITY HEAD(FEET) =      1.245
    SPECIFIC ENERGY(FEET) =      2.745
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        20.19
    CRITICAL FLOW AREA(SQUARE FEET) =          23.92
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.18
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.18
    CRITICAL DEPTH(FEET) =     1.90
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         2901.10
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .593
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.492


**********DESCRIPTION OF RESULTS*****************************************
* 692+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =    .50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .003000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =      5.01
    FLOW TOP- WIDTH(FEET) =         9.00
    FLOW AREA(SQUARE FEET) =           3.50
    HYDRAULIC DEPTH(FEET) =      .39
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     1.43
    UNIFORM FROUDE NUMBER =     .405
    PRESSURE + MOMENTUM(POUNDS) =            63.32
    AVERAGED VELOCITY HEAD(FEET) =       .032
    SPECIFIC ENERGY(FEET) =       .532
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =         7.32
    CRITICAL FLOW AREA(SQUARE FEET) =           1.78
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .24
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     2.81
    CRITICAL DEPTH(FEET) =      .29
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =           42.42
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .123
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =       .412
=========================================================================
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 693+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =     .80
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .019000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     30.63
    FLOW TOP- WIDTH(FEET) =        11.40
    FLOW AREA(SQUARE FEET) =           6.56
    HYDRAULIC DEPTH(FEET) =       .58
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.67
    UNIFORM FROUDE NUMBER =    1.085
    PRESSURE + MOMENTUM(POUNDS) =          419.68
    AVERAGED VELOCITY HEAD(FEET) =       .339
    SPECIFIC ENERGY(FEET) =      1.139
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        11.69
    CRITICAL FLOW AREA(SQUARE FEET) =           6.97
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =       .60
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.39
    CRITICAL DEPTH(FEET) =       .84
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          418.36
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .300
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.135


**********DESCRIPTION OF RESULTS*****************************************
* 694+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =     .50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .012100
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     10.07
    FLOW TOP- WIDTH(FEET) =         9.00
    FLOW AREA(SQUARE FEET) =           3.50
    HYDRAULIC DEPTH(FEET) =       .39
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     2.88
    UNIFORM FROUDE NUMBER =     .813
    PRESSURE + MOMENTUM(POUNDS) =          105.53
    AVERAGED VELOCITY HEAD(FEET) =       .129
    SPECIFIC ENERGY(FEET) =       .629
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =         8.54
    CRITICAL FLOW AREA(SQUARE FEET) =           2.99
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =       .35
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.36
    CRITICAL DEPTH(FEET) =       .44
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          103.34
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .176
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =       .618
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 696+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =    .80
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .003000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     12.17
    FLOW TOP- WIDTH(FEET) =        11.40
    FLOW AREA(SQUARE FEET) =           6.56
    HYDRAULIC DEPTH(FEET) =      .58
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     1.86
    UNIFORM FROUDE NUMBER =     .431
    PRESSURE + MOMENTUM(POUNDS) =          186.21
    AVERAGED VELOCITY HEAD(FEET) =       .053
    SPECIFIC ENERGY(FEET) =       .853
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =         8.96
    CRITICAL FLOW AREA(SQUARE FEET) =           3.45
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .39
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.53
    CRITICAL DEPTH(FEET) =      .49
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          131.43
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .193
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =       .688


**********DESCRIPTION OF RESULTS*****************************************
* 697+50                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .011900
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    159.50
    FLOW TOP- WIDTH(FEET) =        21.00
    FLOW AREA(SQUARE FEET) =          26.00
    HYDRAULIC DEPTH(FEET) =     1.24
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.13
    UNIFORM FROUDE NUMBER =     .972
    PRESSURE + MOMENTUM(POUNDS) =         3185.85
    AVERAGED VELOCITY HEAD(FEET) =       .584
    SPECIFIC ENERGY(FEET) =      2.584
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        20.78
    CRITICAL FLOW AREA(SQUARE FEET) =          25.43
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.22
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.27
    CRITICAL DEPTH(FEET) =     1.97
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         3184.57
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .611
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.584
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 701+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =     .50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    10.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .005000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     11.88
    FLOW TOP- WIDTH(FEET) =        14.00
    FLOW AREA(SQUARE FEET) =           6.00
    HYDRAULIC DEPTH(FEET) =      .43
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     1.98
    UNIFORM FROUDE NUMBER =     .533
    PRESSURE + MOMENTUM(POUNDS) =          133.96
    AVERAGED VELOCITY HEAD(FEET) =       .061
    SPECIFIC ENERGY(FEET) =       .561
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        12.70
    CRITICAL FLOW AREA(SQUARE FEET) =           3.83
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .30
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.10
    CRITICAL DEPTH(FEET) =      .34
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          110.09
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .149
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =       .487
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 702+50                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.20
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    10.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .019100
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    112.72
    FLOW TOP- WIDTH(FEET) =        19.60
    FLOW AREA(SQUARE FEET) =          17.76
    HYDRAULIC DEPTH(FEET) =      .91
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.35
    UNIFORM FROUDE NUMBER =    1.175
    PRESSURE + MOMENTUM(POUNDS) =         1979.33
    AVERAGED VELOCITY HEAD(FEET) =       .625
    SPECIFIC ENERGY(FEET) =      1.825
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        20.52
    CRITICAL FLOW AREA(SQUARE FEET) =          20.06
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .98
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.62
    CRITICAL DEPTH(FEET) =     1.31
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         1955.63
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .490
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.805
```

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**********DESCRIPTION OF RESULTS*****************************************
* 703+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   3.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    10.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .002500
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    250.75
    FLOW TOP- WIDTH(FEET) =        34.00
    FLOW AREA(SQUARE FEET) =          66.00
    HYDRAULIC DEPTH(FEET) =     1.94
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.80
    UNIFORM FROUDE NUMBER =     .481
    PRESSURE + MOMENTUM(POUNDS) =         6900.48
    AVERAGED VELOCITY HEAD(FEET) =       .224
    SPECIFIC ENERGY(FEET) =      3.224
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        26.37
    CRITICAL FLOW AREA(SQUARE FEET) =          37.23
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.41
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.74
    CRITICAL DEPTH(FEET) =     2.05
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         5293.58
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .705
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.751


**********DESCRIPTION OF RESULTS*****************************************
* 704+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.40
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    10.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .013100
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    361.62
    FLOW TOP- WIDTH(FEET) =        29.20
    FLOW AREA(SQUARE FEET) =          47.04
    HYDRAULIC DEPTH(FEET) =     1.61
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.69
    UNIFORM FROUDE NUMBER =    1.067
    PRESSURE + MOMENTUM(POUNDS) =         8334.63
    AVERAGED VELOCITY HEAD(FEET) =       .918
    SPECIFIC ENERGY(FEET) =      3.318
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        29.87
    CRITICAL FLOW AREA(SQUARE FEET) =          49.50
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.66
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.31
    CRITICAL DEPTH(FEET) =     2.48
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         8317.76
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .829
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.312
```

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**********DESCRIPTION OF RESULTS*****************************************
* 704+50 .                                                              *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.80
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    10.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .013100
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    496.86
    FLOW TOP- WIDTH(FEET) =        32.40
    FLOW AREA(SQUARE FEET) =          59.36
    HYDRAULIC DEPTH(FEET) =     1.83
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     8.37
    UNIFORM FROUDE NUMBER =    1.090
    PRESSURE + MOMENTUM(POUNDS) =        12331.79
    AVERAGED VELOCITY HEAD(FEET) =      1.088
    SPECIFIC ENERGY(FEET) =      3.888
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        33.41
    CRITICAL FLOW AREA(SQUARE FEET) =          63.53
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.90
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.82
    CRITICAL DEPTH(FEET) =     2.93
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        12288.58
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .950
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.876


**********DESCRIPTION OF RESULTS*****************************************
* 705+20                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.70
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    10.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .007500
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    348.60
    FLOW TOP- WIDTH(FEET) =        31.60
    FLOW AREA(SQUARE FEET) =          56.16
    HYDRAULIC DEPTH(FEET) =     1.78
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.21
    UNIFORM FROUDE NUMBER =      .821
    PRESSURE + MOMENTUM(POUNDS) =         8105.30
    AVERAGED VELOCITY HEAD(FEET) =       .598
    SPECIFIC ENERGY(FEET) =      3.298
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        29.48
    CRITICAL FLOW AREA(SQUARE FEET) =          48.08
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.63
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.25
    CRITICAL DEPTH(FEET) =     2.44
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         7950.34
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .816
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.252
```

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**********DESCRIPTION OF RESULTS*****************************************
* 706+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.60
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    10.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .010600
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    383.33
    FLOW TOP- WIDTH(FEET) =        30.80
    FLOW AREA(SQUARE FEET) =          53.04
    HYDRAULIC DEPTH(FEET) =     1.72
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.23
    UNIFORM FROUDE NUMBER =     .971
    PRESSURE + MOMENTUM(POUNDS) =         8940.03
    AVERAGED VELOCITY HEAD(FEET) =       .811
    SPECIFIC ENERGY(FEET) =      3.411
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        30.48
    CRITICAL FLOW AREA(SQUARE FEET) =          51.80
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.70
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.40
    CRITICAL DEPTH(FEET) =     2.56
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         8936.16
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .850
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.410


**********DESCRIPTION OF RESULTS*****************************************
* 708+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.70
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    10.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .003500
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    238.14
    FLOW TOP- WIDTH(FEET) =        31.60
    FLOW AREA(SQUARE FEET) =          56.16
    HYDRAULIC DEPTH(FEET) =     1.78
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.24
    UNIFORM FROUDE NUMBER =     .561
    PRESSURE + MOMENTUM(POUNDS) =         5868.93
    AVERAGED VELOCITY HEAD(FEET) =       .279
    SPECIFIC ENERGY(FEET) =      2.979
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        25.92
    CRITICAL FLOW AREA(SQUARE FEET) =          35.73
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.38
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.66
    CRITICAL DEPTH(FEET) =     1.99
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         4966.04
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .690
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.679
```

```
**********DESCRIPTION OF RESULTS*********************************************
* 709+10                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.90
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    10.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .012000
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    511.67
    FLOW TOP- WIDTH(FEET) =        33.20
    FLOW AREA(SQUARE FEET) =          62.64
    HYDRAULIC DEPTH(FEET) =     1.89
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     8.17
    UNIFORM FROUDE NUMBER =    1.048
    PRESSURE + MOMENTUM(POUNDS) =        12752.53
    AVERAGED VELOCITY HEAD(FEET) =      1.036
    SPECIFIC ENERGY(FEET) =      3.936
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        33.76
    CRITICAL FLOW AREA(SQUARE FEET) =          64.97
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.92
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.88
    CRITICAL DEPTH(FEET) =     2.97
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        12739.15
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =        .963
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.933


**********DESCRIPTION OF RESULTS*********************************************
* 709+90                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   3.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    30.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .012000
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =   1191.91
    FLOW TOP- WIDTH(FEET) =        54.00
    FLOW AREA(SQUARE FEET) =         126.00
    HYDRAULIC DEPTH(FEET) =     2.33
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     9.46
    UNIFORM FROUDE NUMBER =    1.091
    PRESSURE + MOMENTUM(POUNDS) =        32520.17
    AVERAGED VELOCITY HEAD(FEET) =      1.390
    SPECIFIC ENERGY(FEET) =      4.390
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        55.26
    CRITICAL FLOW AREA(SQUARE FEET) =         134.62
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     2.44
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     8.85
    CRITICAL DEPTH(FEET) =     3.16
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        32403.93
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =      1.217
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      4.375
```

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**********DESCRIPTION OF RESULTS*****************************************
* 712+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   3.40
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    30.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .006000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =   1062.79
    FLOW TOP- WIDTH(FEET) =        57.20
    FLOW AREA(SQUARE FEET) =         148.24
    HYDRAULIC DEPTH(FEET) =     2.59
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.17
    UNIFORM FROUDE NUMBER =     .785
    PRESSURE + MOMENTUM(POUNDS) =        28856.02
    AVERAGED VELOCITY HEAD(FEET) =       .798
    SPECIFIC ENERGY(FEET) =      4.198
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        53.62
    CRITICAL FLOW AREA(SQUARE FEET) =         123.46
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     2.30
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     8.61
    CRITICAL DEPTH(FEET) =     2.95
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        28032.47
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =      1.151
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      4.103


**********DESCRIPTION OF RESULTS*****************************************
* 715+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   4.70
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    30.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .004200
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =   1643.77
    FLOW TOP- WIDTH(FEET) =        67.60
    FLOW AREA(SQUARE FEET) =         229.36
    HYDRAULIC DEPTH(FEET) =     3.39
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.17
    UNIFORM FROUDE NUMBER =     .686
    PRESSURE + MOMENTUM(POUNDS) =        52143.66
    AVERAGED VELOCITY HEAD(FEET) =       .798
    SPECIFIC ENERGY(FEET) =      5.498
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        60.39
    CRITICAL FLOW AREA(SQUARE FEET) =         171.71
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     2.84
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     9.57
    CRITICAL DEPTH(FEET) =     3.80
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        48566.41
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =      1.423
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      5.222
```

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**********DESCRIPTION OF RESULTS*********************************************
* 727+00                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    10.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .003000
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    119.83
    FLOW TOP- WIDTH(FEET) =        26.00
    FLOW AREA(SQUARE FEET) =          36.00
    HYDRAULIC DEPTH(FEET) =     1.38
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.33
    UNIFORM FROUDE NUMBER =     .498
    PRESSURE + MOMENTUM(POUNDS) =         2686.50
    AVERAGED VELOCITY HEAD(FEET) =       .172
    SPECIFIC ENERGY(FEET) =      2.172
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        20.90
    CRITICAL FLOW AREA(SQUARE FEET) =          21.05
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.01
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.69
    CRITICAL DEPTH(FEET) =     1.36
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         2111.42
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .503
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.866


**********DESCRIPTION OF RESULTS*********************************************
* 728+00                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    10.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .003000
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    119.83
    FLOW TOP- WIDTH(FEET) =        26.00
    FLOW AREA(SQUARE FEET) =          36.00
    HYDRAULIC DEPTH(FEET) =     1.38
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.33
    UNIFORM FROUDE NUMBER =     .498
    PRESSURE + MOMENTUM(POUNDS) =         2686.50
    AVERAGED VELOCITY HEAD(FEET) =       .172
    SPECIFIC ENERGY(FEET) =      2.172
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        20.90
    CRITICAL FLOW AREA(SQUARE FEET) =          21.05
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.01
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.69
    CRITICAL DEPTH(FEET) =     1.36
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         2111.42
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .503
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.866
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 729+50                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    10.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .014400
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    149.51
    FLOW TOP- WIDTH(FEET) =        22.00
    FLOW AREA(SQUARE FEET) =          24.00
    HYDRAULIC DEPTH(FEET) =     1.09
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.23
    UNIFORM FROUDE NUMBER =    1.051
    PRESSURE + MOMENTUM(POUNDS) =         2787.66
    AVERAGED VELOCITY HEAD(FEET) =        .603
    SPECIFIC ENERGY(FEET) =      2.103
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        22.33
    CRITICAL FLOW AREA(SQUARE FEET) =          24.92
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.12
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.00
    CRITICAL DEPTH(FEET) =     1.54
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         2784.37
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =        .559
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.100
=========================================================================


**********DESCRIPTION OF RESULTS*****************************************
* STA 731+00                                                            *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    10.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .002600
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    111.55
    FLOW TOP- WIDTH(FEET) =        26.00
    FLOW AREA(SQUARE FEET) =          36.00
    HYDRAULIC DEPTH(FEET) =     1.38
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.10
    UNIFORM FROUDE NUMBER =     .464
    PRESSURE + MOMENTUM(POUNDS) =         2583.45
    AVERAGED VELOCITY HEAD(FEET) =        .149
    SPECIFIC ENERGY(FEET) =      2.149
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        20.46
    CRITICAL FLOW AREA(SQUARE FEET) =          19.92
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .97
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.60
    CRITICAL DEPTH(FEET) =     1.31
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         1930.33
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =        .487
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.795
```

```
**********DESCRIPTION OF RESULTS*****************************************
* STA 733+00                                                            *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    10.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .003000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    119.83
    FLOW TOP- WIDTH(FEET) =        26.00
    FLOW AREA(SQUARE FEET) =          36.00
    HYDRAULIC DEPTH(FEET) =     1.38
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.33
    UNIFORM FROUDE NUMBER =     .498
    PRESSURE + MOMENTUM(POUNDS) =         2686.50
    AVERAGED VELOCITY HEAD(FEET) =        .172
    SPECIFIC ENERGY(FEET) =      2.172
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        20.90
    CRITICAL FLOW AREA(SQUARE FEET) =          21.05
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.01
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.69
    CRITICAL DEPTH(FEET) =     1.36
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         2111.42
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =        .503
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.866
```

```
**********DESCRIPTION OF RESULTS*****************************************
* STA 739+00                                                            *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .011000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    153.35
    FLOW TOP- WIDTH(FEET) =        21.00
    FLOW AREA(SQUARE FEET) =          26.00
    HYDRAULIC DEPTH(FEET) =     1.24
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.90
    UNIFORM FROUDE NUMBER =     .734
    PRESSURE + MOMENTUM(POUNDS) =         3042.44
    AVERAGED VELOCITY HEAD(FEET) =        .540
    SPECIFIC ENERGY(FEET) =      2.540
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        20.48
    CRITICAL FLOW AREA(SQUARE FEET) =          24.65
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.20
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.22
    CRITICAL DEPTH(FEET) =     1.27
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         3035.58
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =        .601
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.536
```

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**********DESCRIPTION OF RESULTS*****************************************
* 744+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.60
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .008700
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    243.95
    FLOW TOP- WIDTH(FEET) =        25.80
    FLOW AREA(SQUARE FEET) =          40.04
    HYDRAULIC DEPTH(FEET) =     1.55
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.09
    UNIFORM FROUDE NUMBER =     .862
    PRESSURE + MOMENTUM(POUNDS) =         5397.23
    AVERAGED VELOCITY HEAD(FEET) =        .576
    SPECIFIC ENERGY(FEET) =      3.176
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        24.39
    CRITICAL FLOW AREA(SQUARE FEET) =          35.61
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.46
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.85
    CRITICAL DEPTH(FEET) =     2.42
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         5339.11
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .729
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.152


**********DESCRIPTION OF RESULTS*****************************************
* 747+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.18
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .017800
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    235.65
    FLOW TOP- WIDTH(FEET) =        22.44
    FLOW AREA(SQUARE FEET) =          29.91
    HYDRAULIC DEPTH(FEET) =     1.33
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.88
    UNIFORM FROUDE NUMBER =    1.203
    PRESSURE + MOMENTUM(POUNDS) =         5201.27
    AVERAGED VELOCITY HEAD(FEET) =        .964
    SPECIFIC ENERGY(FEET) =      3.144
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        24.06
    CRITICAL FLOW AREA(SQUARE FEET) =          34.63
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.44
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.80
    CRITICAL DEPTH(FEET) =     2.36
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         5119.28
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .719
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.102
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 756+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .014400
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     41.34
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =      .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.59
    UNIFORM FROUDE NUMBER =     .973
    PRESSURE + MOMENTUM(POUNDS) =          607.27
    AVERAGED VELOCITY HEAD(FEET) =       .328
    SPECIFIC ENERGY(FEET) =      1.328
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        12.89
    CRITICAL FLOW AREA(SQUARE FEET) =           8.82
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .68
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.69
    CRITICAL DEPTH(FEET) =      .99
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          607.05
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .341
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.327


**********DESCRIPTION OF RESULTS*****************************************
* 758+50                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    10.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .008600
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    202.88
    FLOW TOP- WIDTH(FEET) =        26.00
    FLOW AREA(SQUARE FEET) =          36.00
    HYDRAULIC DEPTH(FEET) =     1.38
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.64
    UNIFORM FROUDE NUMBER =     .844
    PRESSURE + MOMENTUM(POUNDS) =         4129.24
    AVERAGED VELOCITY HEAD(FEET) =       .493
    SPECIFIC ENERGY(FEET) =      2.493
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        24.60
    CRITICAL FLOW AREA(SQUARE FEET) =          31.57
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.28
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.43
    CRITICAL DEPTH(FEET) =     1.83
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         4071.23
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .641
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.466
```

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**********DESCRIPTION OF RESULTS*****************************************
* 765+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    10.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .008600
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    202.88
    FLOW TOP- WIDTH(FEET) =        26.00
    FLOW AREA(SQUARE FEET) =          36.00
    HYDRAULIC DEPTH(FEET) =     1.38
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.64
    UNIFORM FROUDE NUMBER =     .844
    PRESSURE + MOMENTUM(POUNDS) =         4129.24
    AVERAGED VELOCITY HEAD(FEET) =       .493
    SPECIFIC ENERGY(FEET) =     2.493
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        24.60
    CRITICAL FLOW AREA(SQUARE FEET) =          31.57
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.28
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.43
    CRITICAL DEPTH(FEET) =     1.83
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         4071.23
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .641
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =     2.466


**********DESCRIPTION OF RESULTS*****************************************
* 770+50                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.53
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     7.50
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .019000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    145.66
    FLOW TOP- WIDTH(FEET) =        19.74
    FLOW AREA(SQUARE FEET) =          20.84
    HYDRAULIC DEPTH(FEET) =     1.06
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.99
    UNIFORM FROUDE NUMBER =    1.199
    PRESSURE + MOMENTUM(POUNDS) =         2818.91
    AVERAGED VELOCITY HEAD(FEET) =       .759
    SPECIFIC ENERGY(FEET) =     2.289
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        20.98
    CRITICAL FLOW AREA(SQUARE FEET) =          23.98
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.14
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.07
    CRITICAL DEPTH(FEET) =     1.68
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         2776.06
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .573
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =     2.257
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**********DESCRIPTION OF RESULTS*****************************************
* 795+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .003000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     18.87
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =      .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     2.10
    UNIFORM FROUDE NUMBER =     .444
    PRESSURE + MOMENTUM(POUNDS) =          315.88
    AVERAGED VELOCITY HEAD(FEET) =       .068
    SPECIFIC ENERGY(FEET) =      1.068
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        10.10
    CRITICAL FLOW AREA(SQUARE FEET) =           4.82
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .48
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.92
    CRITICAL DEPTH(FEET) =      .64
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          228.34
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .238
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =       .876


**********DESCRIPTION OF RESULTS*****************************************
* 801+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.20
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .003000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     27.25
    FLOW TOP- WIDTH(FEET) =        14.60
    FLOW AREA(SQUARE FEET) =           11.76
    HYDRAULIC DEPTH(FEET) =      .81
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     2.32
    UNIFORM FROUDE NUMBER =     .455
    PRESSURE + MOMENTUM(POUNDS) =          490.81
    AVERAGED VELOCITY HEAD(FEET) =       .083
    SPECIFIC ENERGY(FEET) =      1.283
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        11.28
    CRITICAL FLOW AREA(SQUARE FEET) =           6.40
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .57
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.26
    CRITICAL DEPTH(FEET) =      .79
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          361.65
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .282
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.067
```

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**********DESCRIPTION OF RESULTS*****************************************
* 804+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.99
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .002300
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     69.36
    FLOW TOP- WIDTH(FEET) =        20.92
    FLOW AREA(SQUARE FEET) =          25.79
    HYDRAULIC DEPTH(FEET) =     1.23
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     2.69
    UNIFORM FROUDE NUMBER =     .427
    PRESSURE + MOMENTUM(POUNDS) =         1634.93
    AVERAGED VELOCITY HEAD(FEET) =       .112
    SPECIFIC ENERGY(FEET) =      2.102
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        15.37
    CRITICAL FLOW AREA(SQUARE FEET) =          13.20
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .86
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.26
    CRITICAL DEPTH(FEET) =     1.30
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         1149.50
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .429
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.725



**********DESCRIPTION OF RESULTS*****************************************
* 806+50                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .010000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     34.45
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =      .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.83
    UNIFORM FROUDE NUMBER =     .811
    PRESSURE + MOMENTUM(POUNDS) =          494.80
    AVERAGED VELOCITY HEAD(FEET) =       .228
    SPECIFIC ENERGY(FEET) =      1.228
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        12.14
    CRITICAL FLOW AREA(SQUARE FEET) =           7.65
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .63
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.50
    CRITICAL DEPTH(FEET) =      .89
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          484.17
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .315
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.208
=========================================================================
```

```
**********DESCRIPTION OF RESULTS*********************************************
* 807+00                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.70
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .003000
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    155.99
    FLOW TOP- WIDTH(FEET) =        26.60
    FLOW AREA(SQUARE FEET) =          42.66
    HYDRAULIC DEPTH(FEET) =     1.60
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.66
    UNIFORM FROUDE NUMBER =     .509
    PRESSURE + MOMENTUM(POUNDS) =         3880.20
    AVERAGED VELOCITY HEAD(FEET) =        .208
    SPECIFIC ENERGY(FEET) =      2.908
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        20.61
    CRITICAL FLOW AREA(SQUARE FEET) =          24.99
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.21
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.24
    CRITICAL DEPTH(FEET) =     1.95
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         3099.27
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .605
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.556


**********DESCRIPTION OF RESULTS*********************************************
* 808+00                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .020500
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     49.33
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =      .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.48
    UNIFORM FROUDE NUMBER =    1.161
    PRESSURE + MOMENTUM(POUNDS) =          763.19
    AVERAGED VELOCITY HEAD(FEET) =       .467
    SPECIFIC ENERGY(FEET) =      1.467
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        13.67
    CRITICAL FLOW AREA(SQUARE FEET) =          10.11
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .74
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.88
    CRITICAL DEPTH(FEET) =     1.08
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          755.27
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .369
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.453
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 809+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.52
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .004600
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    165.36
    FLOW TOP- WIDTH(FEET) =        25.16
    FLOW AREA(SQUARE FEET) =          38.00
    HYDRAULIC DEPTH(FEET) =     1.51
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.35
    UNIFORM FROUDE NUMBER =     .624
    PRESSURE + MOMENTUM(POUNDS) =         3716.45
    AVERAGED VELOCITY HEAD(FEET) =       .294
    SPECIFIC ENERGY(FEET) =      2.814
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        21.05
    CRITICAL FLOW AREA(SQUARE FEET) =          26.13
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.24
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.33
    CRITICAL DEPTH(FEET) =     2.01
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         3327.47
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .622
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.628


**********DESCRIPTION OF RESULTS*****************************************
*                                                                       *
*                                                                       *
* 813+00                                                                *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.85
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .006000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    249.39
    FLOW TOP- WIDTH(FEET) =        27.80
    FLOW AREA(SQUARE FEET) =          46.74
    HYDRAULIC DEPTH(FEET) =     1.68
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.34
    UNIFORM FROUDE NUMBER =     .725
    PRESSURE + MOMENTUM(POUNDS) =         5771.75
    AVERAGED VELOCITY HEAD(FEET) =       .442
    SPECIFIC ENERGY(FEET) =      3.292
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        24.58
    CRITICAL FLOW AREA(SQUARE FEET) =          36.20
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.47
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.89
    CRITICAL DEPTH(FEET) =     2.45
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         5483.85
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .737
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.185
```

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**********DESCRIPTION OF RESULTS*****************************************
* 817+00                                                                *
*                                                                       *
*                                                                       *
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*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.25
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .022800
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    285.98
    FLOW TOP- WIDTH(FEET) =        23.00
    FLOW AREA(SQUARE FEET) =          31.50
    HYDRAULIC DEPTH(FEET) =     1.37
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     9.08
    UNIFORM FROUDE NUMBER =    1.367
    PRESSURE + MOMENTUM(POUNDS) =         6768.96
    AVERAGED VELOCITY HEAD(FEET) =      1.280
    SPECIFIC ENERGY(FEET) =      3.530
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        25.90
    CRITICAL FLOW AREA(SQUARE FEET) =          40.35
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.56
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.09
    CRITICAL DEPTH(FEET) =     2.61
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         6474.91
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .780
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.392


**********DESCRIPTION OF RESULTS*****************************************
* 819+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .006000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     26.69
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =       .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     2.97
    UNIFORM FROUDE NUMBER =     .628
    PRESSURE + MOMENTUM(POUNDS) =          392.56
    AVERAGED VELOCITY HEAD(FEET) =       .137
    SPECIFIC ENERGY(FEET) =      1.137
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        11.21
    CRITICAL FLOW AREA(SQUARE FEET) =           6.29
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =       .56
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.24
    CRITICAL DEPTH(FEET) =       .78
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          352.30
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .280
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.056
```

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**********DESCRIPTION OF RESULTS*****************************************
* 822+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .006500
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     27.78
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =      .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.09
    UNIFORM FROUDE NUMBER =     .654
    PRESSURE + MOMENTUM(POUNDS) =          405.34
    AVERAGED VELOCITY HEAD(FEET) =       .148
    SPECIFIC ENERGY(FEET) =      1.148
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        11.34
    CRITICAL FLOW AREA(SQUARE FEET) =          6.48
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .57
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.29
    CRITICAL DEPTH(FEET) =      .79
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          370.33
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .286
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.078


**********DESCRIPTION OF RESULTS*****************************************
* 828+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   3.50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .004700
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    354.14
    FLOW TOP- WIDTH(FEET) =        33.00
    FLOW AREA(SQUARE FEET) =          66.50
    HYDRAULIC DEPTH(FEET) =     2.02
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.33
    UNIFORM FROUDE NUMBER =     .661
    PRESSURE + MOMENTUM(POUNDS) =         9132.98
    AVERAGED VELOCITY HEAD(FEET) =       .440
    SPECIFIC ENERGY(FEET) =      3.940
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        28.11
    CRITICAL FLOW AREA(SQUARE FEET) =          47.81
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.70
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.41
    CRITICAL DEPTH(FEET) =     2.89
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         8389.56
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .852
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.740
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**********DESCRIPTION OF RESULTS*****************************************
* 832+00                                                                *
*                                                                       *
*                                                                       *
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*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .003000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     18.87
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =      .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     2.10
    UNIFORM FROUDE NUMBER =     .444
    PRESSURE + MOMENTUM(POUNDS) =          315.88
   AVERAGED VELOCITY HEAD(FEET) =       .068
   SPECIFIC ENERGY(FEET) =      1.068
=========================================================================
   CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
   CRITICAL FLOW TOP-WIDTH(FEET) =        10.10
   CRITICAL FLOW AREA(SQUARE FEET) =           4.82
   CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .48
   CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.92
   CRITICAL DEPTH(FEET) =      .64
   CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          228.34
   AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .238
   CRITICAL FLOW SPECIFIC ENERGY(FEET) =       .876
```

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**********DESCRIPTION OF RESULTS*****************************************
* 837+00                                                                *
*                                                                       *
*                                                                       *
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*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
   NORMAL DEPTH(FEET) =   2.50
   CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
   BASEWIDTH(FEET) =     5.00
   CONSTANT CHANNEL SLOPE(FEET/FEET) =  .003000
   MANNINGS FRICTION FACTOR =  .0300
=========================================================================
   NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
   ))))) NORMAL DEPTH FLOW(CFS) =    131.17
   FLOW TOP- WIDTH(FEET) =        25.00
   FLOW AREA(SQUARE FEET) =          37.50
   HYDRAULIC DEPTH(FEET) =     1.50
   FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.50
   UNIFORM FROUDE NUMBER =     .503
   PRESSURE + MOMENTUM(POUNDS) =         3164.16
   AVERAGED VELOCITY HEAD(FEET) =       .190
   SPECIFIC ENERGY(FEET) =      2.690
=========================================================================
   CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
   CRITICAL FLOW TOP-WIDTH(FEET) =        19.31
   CRITICAL FLOW AREA(SQUARE FEET) =          21.75
   CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.13
   CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.03
   CRITICAL DEPTH(FEET) =     1.79
   CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         2508.91
   AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .565
   CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.354
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 842+00                                                                *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.40
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .003000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    119.73
    FLOW TOP- WIDTH(FEET) =        24.20
    FLOW AREA(SQUARE FEET) =          35.04
    HYDRAULIC DEPTH(FEET) =     1.45
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.42
    UNIFORM FROUDE NUMBER =     .500
    PRESSURE + MOMENTUM(POUNDS) =         2841.53
    AVERAGED VELOCITY HEAD(FEET) =       .181
    SPECIFIC ENERGY(FEET) =      2.581
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        18.69
    CRITICAL FLOW AREA(SQUARE FEET) =          20.26
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.08
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.91
    CRITICAL DEPTH(FEET) =     1.71
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         2244.29
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .542
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.253


**********DESCRIPTION OF RESULTS*****************************************
* 844+48.02                                                             *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .007200
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    203.21
    FLOW TOP- WIDTH(FEET) =        25.00
    FLOW AREA(SQUARE FEET) =          37.50
    HYDRAULIC DEPTH(FEET) =     1.50
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.42
    UNIFORM FROUDE NUMBER =     .780
    PRESSURE + MOMENTUM(POUNDS) =         4408.99
    AVERAGED VELOCITY HEAD(FEET) =       .456
    SPECIFIC ENERGY(FEET) =      2.956
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        22.75
    CRITICAL FLOW AREA(SQUARE FEET) =          30.78
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.35
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.60
    CRITICAL DEPTH(FEET) =     2.22
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         4276.18
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .677
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.895
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**********DESCRIPTION OF RESULTS*****************************************
* 1001+00                                                               *
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*                                                                       *
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*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    10.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .006300
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     46.13
    FLOW TOP- WIDTH(FEET) =        18.00
    FLOW AREA(SQUARE FEET) =          14.00
    HYDRAULIC DEPTH(FEET) =      .78
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.30
    UNIFORM FROUDE NUMBER =     .658
    PRESSURE + MOMENTUM(POUNDS) =          689.78
    AVERAGED VELOCITY HEAD(FEET) =       .169
    SPECIFIC ENERGY(FEET) =     1.169
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        16.25
    CRITICAL FLOW AREA(SQUARE FEET) =          10.25
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .63
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.50
    CRITICAL DEPTH(FEET) =      .78
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          632.30
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .315
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.096


**********DESCRIPTION OF RESULTS*****************************************
* 1004+00                                                               *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     7.50
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .008000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     41.32
    FLOW TOP- WIDTH(FEET) =        15.50
    FLOW AREA(SQUARE FEET) =          11.50
    HYDRAULIC DEPTH(FEET) =      .74
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.59
    UNIFORM FROUDE NUMBER =     .735
    PRESSURE + MOMENTUM(POUNDS) =          604.90
    AVERAGED VELOCITY HEAD(FEET) =       .200
    SPECIFIC ENERGY(FEET) =     1.200
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        14.20
    CRITICAL FLOW AREA(SQUARE FEET) =          9.09
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .64
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.54
    CRITICAL DEPTH(FEET) =      .84
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          577.10
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .321
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.159
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 1008+00                                                               *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .007600
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     30.04
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =      .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.34
    UNIFORM FROUDE NUMBER =     .707
    PRESSURE + MOMENTUM(POUNDS) =          433.46
    AVERAGED VELOCITY HEAD(FEET) =       .173
    SPECIFIC ENERGY(FEET) =      1.173
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        11.63
    CRITICAL FLOW AREA(SQUARE FEET) =           6.89
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .59
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.36
    CRITICAL DEPTH(FEET) =      .83
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          408.21
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .295
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.124


**********DESCRIPTION OF RESULTS*****************************************
* 1011+00                                                               *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .005700
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     26.01
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =      .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     2.89
    UNIFORM FROUDE NUMBER =     .612
    PRESSURE + MOMENTUM(POUNDS) =          384.89
    AVERAGED VELOCITY HEAD(FEET) =       .130
    SPECIFIC ENERGY(FEET) =      1.130
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        11.11
    CRITICAL FLOW AREA(SQUARE FEET) =           6.16
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .55
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.23
    CRITICAL DEPTH(FEET) =      .76
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          341.20
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .277
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.041
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 1014+50                                                               *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =     .50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .068600
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     23.97
    FLOW TOP- WIDTH(FEET) =         9.00
    FLOW AREA(SQUARE FEET) =           3.50
    HYDRAULIC DEPTH(FEET) =       .39
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.85
    UNIFORM FROUDE NUMBER =    1.936
    PRESSURE + MOMENTUM(POUNDS) =          367.63
    AVERAGED VELOCITY HEAD(FEET) =       .729
    SPECIFIC ENERGY(FEET) =      1.229
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        10.85
    CRITICAL FLOW AREA(SQUARE FEET) =           5.79
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .53
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.14
    CRITICAL DEPTH(FEET) =      .73
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          308.15
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .266
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =       .997


**********DESCRIPTION OF RESULTS*****************************************
* 1022+00                                                               *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .003000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     18.87
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =       .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     2.10
    UNIFORM FROUDE NUMBER =      .444
    PRESSURE + MOMENTUM(POUNDS) =          315.88
    AVERAGED VELOCITY HEAD(FEET) =       .068
    SPECIFIC ENERGY(FEET) =      1.068
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        10.10
    CRITICAL FLOW AREA(SQUARE FEET) =           4.82
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .48
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.92
    CRITICAL DEPTH(FEET) =      .64
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          228.34
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .238
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =       .876
```

NATURAL CHANNEL VELOCITY CALCULATIONS

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 437+16

DISCHARGE IS = 67 CFS
BOTTOM WIDTH IS = 5 FT
SLOPE IS = .018 FT/FT
SIDE SLOPE (Z1) = 5.2
SIDE SLOPE (Z2) = 3.5
MANNING'S N = .035
TOP WIDTH IS = 16.08 FT
AREA IS = 13.43 SQ FT
WETTED PERIMETER IS = 16.38 FT
HYDRAULIC RADIUS IS = .82 FT
NORMAL DEPTH IS = 1.27 FT
VELOCITY IS = 4.99 FPS
FROUDE NUMBER IS = .96

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 442+70

DISCHARGE IS = 232 CFS
BOTTOM WIDTH IS = 12 FT
SLOPE IS = .041 FT/FT
SIDE SLOPE (Z1) = 3.2
SIDE SLOPE (Z2) = 8
MANNING'S N = .035
TOP WIDTH IS = 27.49 FT
AREA IS = 27.3 SQ FT
WETTED PERIMETER IS = 27.79 FT
HYDRAULIC RADIUS IS = .98 FT
NORMAL DEPTH IS = 1.38 FT
VELOCITY IS = 8.5 FPS
FROUDE NUMBER IS = 1.5

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 446+28

DISCHARGE IS = 150 CFS
BOTTOM WIDTH IS = 14 FT
SLOPE IS = .012 FT/FT
SIDE SLOPE (Z1) = 9.3
SIDE SLOPE (Z2) = 2.7
MANNING'S N = .035
TOP WIDTH IS = 31 FT
AREA IS = 31.88 SQ FT
WETTED PERIMETER IS = 31.33 FT
HYDRAULIC RADIUS IS = 1.02 FT
NORMAL DEPTH IS = 1.42 FT
VELOCITY IS = 4.71 FPS
FROUDE NUMBER IS = .82

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 454+64

DISCHARGE IS = 559 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .014 FT/FT
SIDE SLOPE (Z1) = 13.9
SIDE SLOPE (Z2) = 6.1
MANNING'S N = .035
TOP WIDTH IS = 58.79 FT
AREA IS = 86.42 SQ FT
WETTED PERIMETER IS = 59.14 FT
HYDRAULIC RADIUS IS = 1.46 FT
NORMAL DEPTH IS = 2.94 FT
VELOCITY IS = 6.47 FPS
FROUDE NUMBER IS = .94

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 460+65

DISCHARGE IS = ~~142~~ 98 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .014 FT/FT
SIDE SLOPE (Z1) = 6.4
SIDE SLOPE (Z2) = 8
MANNING'S N = .035
TOP WIDTH IS = 28.67 FT
AREA IS = 28.54 SQ FT
WETTED PERIMETER IS = 28.95 FT
HYDRAULIC RADIUS IS = .99 FT
NORMAL DEPTH IS = 1.99 FT
VELOCITY IS = ~~4.98~~ FPS 4.54
FROUDE NUMBER IS = .88

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 463 30

DISCHARGE IS = 70 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .014 FT/FT
SIDE SLOPE (Z1) = 4.6
SIDE SLOPE (Z2) = 7
MANNING'S N = .035
TOP WIDTH IS = 19.24 FT
AREA IS = 15.95 SQ FT
WETTED PERIMETER IS = 19.53 FT
HYDRAULIC RADIUS IS = .82 FT
NORMAL DEPTH IS = 1.66 FT
VELOCITY IS = 4.39 FPS
FROUDE NUMBER IS = .85

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 473 92

DISCHARGE IS = 164 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .011 FT/FT
SIDE SLOPE (Z1) = 4.7
SIDE SLOPE (Z2) = 4.7
MANNING'S N = .035
TOP WIDTH IS = 24.33 FT
AREA IS = 31.48 SQ FT
WETTED PERIMETER IS = 24.87 FT
HYDRAULIC RADIUS IS = 1.27 FT
NORMAL DEPTH IS = 2.59 FT
VELOCITY IS = 5.21 FPS
FROUDE NUMBER IS = .81

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 476+77

DISCHARGE IS = 126 CFS
BOTTOM WIDTH IS = 8 FT
SLOPE IS = .0095 FT/FT
SIDE SLOPE (Z1) = 5.2
SIDE SLOPE (Z2) = 5.9
MANNING'S N = .035
TOP WIDTH IS = 26.59 FT
AREA IS = 28.97 SQ FT
WETTED PERIMETER IS = 26.89 FT
HYDRAULIC RADIUS IS = 1.08 FT
NORMAL DEPTH IS = 1.68 FT
VELOCITY IS = 4.35 FPS
FROUDE NUMBER IS = .73

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS

CHANNEL 477 00

DISCHARGE IS = 126 CFS
BOTTOM WIDTH IS = 8 FT
SLOPE IS = .0095 FT/FT
SIDE SLOPE (Z1) = 5.2
SIDE SLOPE (Z2) = 5.9
MANNING'S N = .035
TOP WIDTH IS = 26.59 FT
AREA IS = 28.97 SQ FT
WETTED PERIMETER IS = 26.89 FT
HYDRAULIC RADIUS IS = 1.08 FT
NORMAL DEPTH IS = 1.68 FT
VELOCITY IS = 4.35 FPS
FROUDE NUMBER IS = .73

FILENAME IS SV480

480

CROSS SECTION ID NUMBER IS 1

1

NUMBER OF CROSS SECTION COORDINATE POINTS IS 24

COORDINATE ID NO.	STATION X(I)	ELEVATION Y(I)
1	0.00	16.00
2	109.00	15.00
3	139.00	14.00
4	164.00	11.00
5	176.00	10.60
6	182.00	11.00
7	193.00	13.00
8	214.00	13.20
9	240.00	13.00
10	250.00	11.70
11	260.00	13.00
12	260.00	13.10
13	270.00	13.00
14	265.00	13.10
15	285.00	12.00
16	292.00	12.30
17	299.00	12.00
18	305.00	11.00
19	312.00	10.80
20	322.00	11.00
21	333.00	12.00
22	344.00	12.60
23	360.00	13.00
24	396.00	16.00

WATER SURFACE ELEV FT	AREA SQ FT	WETTED PERIMETER FT	TOP WIDTH FT	HYD RADIUS FT	HYD DEPTH FT	SECTION FACTOR FT	CRITICAL FLOW CFS
11.00	5.3	35.0	35.0	0.2	0.2	1.5	11.7
11.50	26.7	50.6	50.4	0.5	0.5	17.4	110.0
12.00	56.4	70.8	70.4	0.8	0.8	48.5	286.4
12.50	104.7	117.8	117.3	0.9	0.9	96.8	561.7
13.00	173.4	159.5	158.8	1.1	1.1	183.2	1027.7
13.50	277.2	233.7	222.8	1.2	1.2	310.6	1754.3
14.00	391.2	243.9	233.0	1.6	1.7	535.9	2875.8
14.50	512.9	264.9	254.0	1.9	2.0	796.7	4135.8
15.00	645.2	285.9	275.0	2.3	2.3	1109.8	5607.3
15.50	797.8	346.5	335.5	2.3	2.4	1391.1	6980.8
16.00	980.7	407.0	396.0	2.4	2.5	1762.5	8756.9

$Q = SF \frac{1.49 S^{1/2}}{n}$

$n = .03$
$s = .02$

$Q = SF(6.17)$

4915
6846 v = 10.6
8581 v = 10.7

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 490 78

DISCHARGE IS = 24 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .02 FT/FT
SIDE SLOPE (Z1) = 3
SIDE SLOPE (Z2) = 3.5
MANNING'S N = .035
TOP WIDTH IS = 8.45 FT
AREA IS = 5.49 SQ FT
WETTED PERIMETER IS = 8.84 FT
HYDRAULIC RADIUS IS = .62 FT
NORMAL DEPTH IS = 1.3 FT
VELOCITY IS = 4.37 FPS
FROUDE NUMBER IS = .96

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 492+61

DISCHARGE IS = 279 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .014 FT/FT
SIDE SLOPE (Z1) = 5.4
SIDE SLOPE (Z2) = 4.2
MANNING'S N = .035
TOP WIDTH IS = 28.75 FT
AREA IS = 43.05 SQ FT
WETTED PERIMETER IS = 29.38 FT
HYDRAULIC RADIUS IS = 1.47 FT
NORMAL DEPTH IS = 2.99 FT
VELOCITY IS = 6.48 FPS
FROUDE NUMBER IS = .93

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 499+09

DISCHARGE IS = 48 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .009 FT/FT
SIDE SLOPE (Z1) = 10
SIDE SLOPE (Z2) = 12.6
MANNING'S N = .035
TOP WIDTH IS = 27.44 FT
AREA IS = 16.66 SQ FT
WETTED PERIMETER IS = 27.55 FT
HYDRAULIC RADIUS IS = .6 FT
NORMAL DEPTH IS = 1.21 FT
VELOCITY IS = 2.88 FPS
FROUDE NUMBER IS = .65

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 503+83

DISCHARGE IS = 100 CFS
BOTTOM WIDTH IS = 6 FT
SLOPE IS = .023 FT/FT
SIDE SLOPE (Z1) = 19
SIDE SLOPE (Z2) = 6.4
MANNING'S N = .035
TOP WIDTH IS = 33.28 FT
AREA IS = 21.1 SQ FT
WETTED PERIMETER IS = 33.39 FT
HYDRAULIC RADIUS IS = .63 FT
NORMAL DEPTH IS = 1.07 FT
VELOCITY IS = 4.74 FPS
FROUDE NUMBER IS = 1.05

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 412+29

DISCHARGE IS = 525 CFS
BOTTOM WIDTH IS = 56 FT
SLOPE IS = .0136 FT/FT
SIDE SLOPE (Z1) = 66.7
SIDE SLOPE (Z2) = 38.2
MANNING'S N = .035
TOP WIDTH IS = 173.94 FT
AREA IS = 129.25 SQ FT
WETTED PERIMETER IS = 173.96 FT
HYDRAULIC RADIUS IS = .74 FT
NORMAL DEPTH IS = 1.12 FT
VELOCITY IS = 4.06 FPS
FROUDE NUMBER IS = .83

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 415+27

DISCHARGE IS = 1080 CFS
BOTTOM WIDTH IS = 100 FT
SLOPE IS = .0128 FT/FT
SIDE SLOPE (Z1) = 40
SIDE SLOPE (Z2) = 24
MANNING'S N = .035
TOP WIDTH IS = 192.48 FT
AREA IS = 211.31 SQ FT
WETTED PERIMETER IS = 192.53 FT
HYDRAULIC RADIUS IS = 1.1 FT
NORMAL DEPTH IS = 1.44 FT
VELOCITY IS = 5.11 FPS
FROUDE NUMBER IS = .86

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 424+39

DISCHARGE IS = 40 CFS
BOTTOM WIDTH IS = 7 FT
SLOPE IS = .0154 FT/FT
SIDE SLOPE (Z1) = 11.4
SIDE SLOPE (Z2) = 11.4
MANNING'S N = .035
TOP WIDTH IS = 24.56 FT
AREA IS = 12.16 SQ FT
WETTED PERIMETER IS = 24.63 FT
HYDRAULIC RADIUS IS = .49 FT
NORMAL DEPTH IS = .77 FT
VELOCITY IS = 3.29 FPS
FROUDE NUMBER IS = .82

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 430+56

DISCHARGE IS = 530 CFS
BOTTOM WIDTH IS = 5 FT
SLOPE IS = .017 FT/FT
SIDE SLOPE (Z1) = 4.4
SIDE SLOPE (Z2) = 4.2
MANNING'S N = .035
TOP WIDTH IS = 33.4 FT
AREA IS = 63.4 SQ FT
WETTED PERIMETER IS = 34.16 FT
HYDRAULIC RADIUS IS = 1.86 FT
NORMAL DEPTH IS = 3.3 FT
VELOCITY IS = 8.36 FPS
FROUDE NUMBER IS = 1.07

FILENAME IS SV512

512+67

CROSS SECTION ID NUMBER IS 1

512

NUMBER OF CROSS SECTION COORDINATE POINTS IS 9

COORDINATE ID NO.	STATION X(I)	ELEVATION Y(I)
1	0.00	23.50
2	12.00	23.00
3	28.00	23.00
4	50.00	21.40
5	68.00	23.30
6	80.00	22.00
7	88.00	21.80
8	101.00	23.00
9	116.00	23.50

WATER SURFACE ELEV FT	AREA SQ FT	WETTED PERIMETER FT	TOP WIDTH FT	HYD RADIUS FT	HYD DEPTH FT	SECTION FACTOR FT	CRITICAL FLOW CFS	Q	V
22.00	5.2	24.2	24.1	0.2	0.2	1.9	13.7		
22.50	22.7	45.9	45.7	0.5	0.5	14.2	90.5		
23.00	50.9	67.6	67.4	0.8	0.8	42.2	251.3		
23.50	101.4	116.3	116.0	0.9	0.9	92.5	537.6	513	5.1

$Q = 5.55 \times SF$

FILENAME IS SV517

517

CROSS SECTION ID NUMBER IS 1

517

NUMBER OF CROSS SECTION COORDINATE POINTS IS 15

COORDINATE ID NO.	STATION X(I)	ELEVATION Y(I)
1	0.00	24.30
2	10.00	24.00
3	36.00	20.80
4	48.00	20.00
5	54.00	20.00
6	67.00	21.30
7	86.00	19.20
8	104.00	21.00
9	116.00	21.30
10	127.00	21.00
11	154.00	19.00
12	160.00	19.00
13	178.00	21.00
14	199.00	22.00
15	214.00	24.40

WATER SURFACE ELEV FT	AREA SQ FT	WETTED PERIMETER FT	TOP WIDTH FT	HYD RADIUS FT	HYD DEPTH FT	SECTION FACTOR FT	CRITICAL FLOW CFS	Q	V
21.00	106.2	115.4	114.9	0.9	0.9	100.5	579.5	468	4.4
22.00	260.1	173.3	172.8	1.5	1.5	340.9	1811.0	1589	6.1
23.00	440.0	187.9	187.1	2.3	2.4	776.1	3829.1	3619	8.2
24.00	634.4	202.4	201.5	3.1	3.1	1358.7	6386.8		
24.30	696.6	214.3	213.4	3.3	3.3	1528.7	7141.9		

$Q = SF \frac{1.49 S^{\frac{1}{2}}}{n} = \frac{1.49(.012)}{.035}$

$SF \times 4.66$

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 525+15

DISCHARGE IS = 89 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .01 FT/FT
SIDE SLOPE (Z1) = 4.9
SIDE SLOPE (Z2) = 12.9
MANNING'S N = .035
TOP WIDTH IS = 29.24 FT
AREA IS = 24.02 SQ FT
WETTED PERIMETER IS = 29.47 FT
HYDRAULIC RADIUS IS = .82 FT
NORMAL DEPTH IS = 1.64 FT
VELOCITY IS = 3.7 FPS
FROUDE NUMBER IS = .72

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 529+84

DISCHARGE IS = 65 CFS
BOTTOM WIDTH IS = 6 FT
SLOPE IS = .019 FT/FT
SIDE SLOPE (Z1) = 6.7
SIDE SLOPE (Z2) = 5
MANNING'S N = .035
TOP WIDTH IS = 18.95 FT
AREA IS = 13.81 SQ FT
WETTED PERIMETER IS = 19.14 FT
HYDRAULIC RADIUS IS = .72 FT
NORMAL DEPTH IS = 1.11 FT
VELOCITY IS = 4.71 FPS
FROUDE NUMBER IS = .97

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 539+50

DISCHARGE IS = 256 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .01 FT/FT
SIDE SLOPE (Z1) = 20.6
SIDE SLOPE (Z2) = 13.1
MANNING'S N = .035
TOP WIDTH IS = 64.67 FT
AREA IS = 62.06 SQ FT
WETTED PERIMETER IS = 64.79 FT
HYDRAULIC RADIUS IS = .96 FT
NORMAL DEPTH IS = 1.92 FT
VELOCITY IS = 4.13 FPS
FROUDE NUMBER IS = .74

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 544+13

DISCHARGE IS = 112 CFS
BOTTOM WIDTH IS = 12 FT
SLOPE IS = .046 FT/FT
SIDE SLOPE (Z1) = 13.3
SIDE SLOPE (Z2) = 5.3
MANNING'S N = .035
TOP WIDTH IS = 27.93 FT
AREA IS = 17.1 SQ FT
WETTED PERIMETER IS = 28.05 FT
HYDRAULIC RADIUS IS = .61 FT
NORMAL DEPTH IS = .86 FT
VELOCITY IS = 6.55 FPS
FROUDE NUMBER IS = 1.47

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 549+16

DISCHARGE IS = 150 CFS
BOTTOM WIDTH IS = 7 FT
SLOPE IS = .016 FT/FT
SIDE SLOPE (Z1) = 6.25
SIDE SLOPE (Z2) = 5.8
MANNING'S N = .035
TOP WIDTH IS = 26.7 FT
AREA IS = 27.54 SQ FT
WETTED PERIMETER IS = 26.97 FT
HYDRAULIC RADIUS IS = 1.02 FT
NORMAL DEPTH IS = 1.63 FT
VELOCITY IS = 5.45 FPS
FROUDE NUMBER IS = .95

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 557+73

DISCHARGE IS = 72 CFS
BOTTOM WIDTH IS = 52 FT
SLOPE IS = .014 FT/FT
SIDE SLOPE (Z1) = 13.3
SIDE SLOPE (Z2) = 10.8
MANNING'S N = .035
TOP WIDTH IS = 62.87 FT
AREA IS = 25.9 SQ FT
WETTED PERIMETER IS = 62.91 FT
HYDRAULIC RADIUS IS = .41 FT
NORMAL DEPTH IS = .45 FT
VELOCITY IS = 2.78 FPS
FROUDE NUMBER IS = .76

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 562+21

DISCHARGE IS = 120 CFS
BOTTOM WIDTH IS = 28 FT
SLOPE IS = .012 FT/FT
SIDE SLOPE (Z1) = 5.5
SIDE SLOPE (Z2) = 7.8
MANNING'S N = .035
TOP WIDTH IS = 40.04 FT
AREA IS = 30.8 SQ FT
WETTED PERIMETER IS = 40.18 FT
HYDRAULIC RADIUS IS = .77 FT
NORMAL DEPTH IS = .91 FT
VELOCITY IS = 3.9 FPS
FROUDE NUMBER IS = .78

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 568+15

DISCHARGE IS = 46 CFS
BOTTOM WIDTH IS = 10 FT
SLOPE IS = .017 FT/FT
SIDE SLOPE (Z1) = 4.8
SIDE SLOPE (Z2) = 8.6
MANNING'S N = .035
TOP WIDTH IS = 20.5 FT
AREA IS = 11.96 SQ FT
WETTED PERIMETER IS = 20.63 FT
HYDRAULIC RADIUS IS = .58 FT
NORMAL DEPTH IS = .78 FT
VELOCITY IS = 3.85 FPS
FROUDE NUMBER IS = .89

FILENAME IS 577

577

CROSS SECTION ID NUMBER IS 1

1

NUMBER OF CROSS SECTION COORDINATE POINTS IS 11

COORDINATE ID NO.	STATION X(I)	ELEVATION Y(I)
1	0.00	39.00
2	100.00	38.00
3	116.00	36.70
4	149.00	37.90
5	198.00	36.00
6	212.00	37.00
7	224.00	37.00
8	236.00	35.50
9	248.00	37.00
10	268.00	38.00
11	286.00	40.00

$Q = \frac{1.49}{n} S^{1/2} (SF)$ $S = .01$ $n = .03$

$= 4.946 (SF)$

$V = Q/A$

WATER SURFACE ELEV FT	AREA SQ FT	WETTED PERIMETER FT	TOP WIDTH FT	HYD RADIUS FT	HYD DEPTH FT	SECTION FACTOR FT	CRITICAL FLOW CFS	Q	X
36.00	2.0	8.1	8.0	0.2	0.3	0.8	5.7		
36.50	13.0	36.0	35.9	0.4	0.4	6.6	44.3		
37.00	39.7	76.0	75.7	0.5	0.5	25.7	163.0		
37.50	94.3	130.8	130.5	0.7	0.7	75.7	454.5		
37.60	107.7	139.4	139.1	0.8	0.8	90.7	538.0	445	
37.80	137.3	156.6	156.2	0.9	0.9	125.7	730.1	621	
38.00	169.9	168.4	168.0	1.0	1.0	171.0	970.0	845	
38.20	205.7	190.2	189.8	1.1	1.1	216.8	1215.4	1068	
38.40	245.9	212.0	211.6	1.2	1.2	271.4	1503.9	1343	
38.60	290.4	233.8	233.4	1.2	1.2	335.5	1837.8	1657	
38.80	339.2	255.6	255.2	1.3	1.3	409.7	2219.4	2023	
39.00	392.4	277.4	277.0	1.4	1.4	494.6	2650.7	2443	6.2

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 579+78

DISCHARGE IS = 1538 CFS
BOTTOM WIDTH IS = 124 FT
SLOPE IS = .01 FT/FT
SIDE SLOPE (Z1) = 12.5
SIDE SLOPE (Z2) = 8.1
MANNING'S N = .035
TOP WIDTH IS = 161.85 FT
AREA IS = 262.57 SQ FT
WETTED PERIMETER IS = 162.03 FT
HYDRAULIC RADIUS IS = 1.62 FT
NORMAL DEPTH IS = 1.84 FT
VELOCITY IS = 5.86 FPS
FROUDE NUMBER IS = .81

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 585+89

DISCHARGE IS = 39 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .02 FT/FT
SIDE SLOPE (Z1) = 11.7
SIDE SLOPE (Z2) = 15.8
MANNING'S N = .035
TOP WIDTH IS = 24.7 FT
AREA IS = 11.09 SQ FT
WETTED PERIMETER IS = 24.77 FT
HYDRAULIC RADIUS IS = .45 FT
NORMAL DEPTH IS = .9 FT
VELOCITY IS = 3.52 FPS
FROUDE NUMBER IS = .92

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 590+43

DISCHARGE IS = 66 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .012 FT/FT
SIDE SLOPE (Z1) = 33.9
SIDE SLOPE (Z2) = 5.3
MANNING'S N = .035
TOP WIDTH IS = 41.33 FT
AREA IS = 21.78 SQ FT
WETTED PERIMETER IS = 41.44 FT
HYDRAULIC RADIUS IS = .53 FT
NORMAL DEPTH IS = 1.05 FT
VELOCITY IS = 3.03 FPS
FROUDE NUMBER IS = .74

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 599+37

DISCHARGE IS = 38 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .024 FT/FT
SIDE SLOPE (Z1) = 15.8
SIDE SLOPE (Z2) = 5.3
MANNING'S N = .035
TOP WIDTH IS = 20.05 FT
AREA IS = 9.53 SQ FT
WETTED PERIMETER IS = 20.17 FT
HYDRAULIC RADIUS IS = .47 FT
NORMAL DEPTH IS = .95 FT
VELOCITY IS = 3.99 FPS
FROUDE NUMBER IS = 1.02

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 594+65

DISCHARGE IS = 38 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .017 FT/FT
SIDE SLOPE (Z1) = 6
SIDE SLOPE (Z2) = 6
MANNING'S N = .035
TOP WIDTH IS = 15.06 FT
AREA IS = 9.45 SQ FT
WETTED PERIMETER IS = 15.27 FT
HYDRAULIC RADIUS IS = .62 FT
NORMAL DEPTH IS = 1.26 FT
VELOCITY IS = 4.02 FPS
FROUDE NUMBER IS = .89

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 601+50

DISCHARGE IS = 124 CFS
BOTTOM WIDTH IS = 40 FT
SLOPE IS = .014 FT/FT
SIDE SLOPE (Z1) = 37.5
SIDE SLOPE (Z2) = 11
MANNING'S N = .035
TOP WIDTH IS = 72.73 FT
AREA IS = 38.04 SQ FT
WETTED PERIMETER IS = 72.77 FT
HYDRAULIC RADIUS IS = .52 FT
NORMAL DEPTH IS = .67 FT
VELOCITY IS = 3.26 FPS
FROUDE NUMBER IS = .79

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 605+07

DISCHARGE IS = 103 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .011 FT/FT
SIDE SLOPE (Z1) = 5.2
SIDE SLOPE (Z2) = 33
MANNING'S N = .035
TOP WIDTH IS = 48.84 FT
AREA IS = 31.23 SQ FT
WETTED PERIMETER IS = 48.98 FT
HYDRAULIC RADIUS IS = .64 FT
NORMAL DEPTH IS = 1.28 FT
VELOCITY IS = 3.3 FPS
FROUDE NUMBER IS = .73

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 611+51

DISCHARGE IS = 58 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .01 FT/FT
SIDE SLOPE (Z1) = 16
SIDE SLOPE (Z2) = 16
MANNING'S N = .035
TOP WIDTH IS = 35.88 FT
AREA IS = 20.12 SQ FT
WETTED PERIMETER IS = 35.95 FT
HYDRAULIC RADIUS IS = .56 FT
NORMAL DEPTH IS = 1.12 FT
VELOCITY IS = 2.88 FPS
FROUDE NUMBER IS = .68

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 614+40

DISCHARGE IS = 58 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .017 FT/FT
SIDE SLOPE (Z1) = 10.7
SIDE SLOPE (Z2) = 13.6
MANNING'S N = .035
TOP WIDTH IS = 27.36 FT
AREA IS = 15.4 SQ FT
WETTED PERIMETER IS = 27.45 FT
HYDRAULIC RADIUS IS = .56 FT
NORMAL DEPTH IS = 1.13 FT
VELOCITY IS = 3.77 FPS
FROUDE NUMBER IS = .88

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 618+30

DISCHARGE IS = 1565 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .013 FT/FT
SIDE SLOPE (Z1) = 13
SIDE SLOPE (Z2) = 26
MANNING'S N = .035
TOP WIDTH IS = 132.99 FT
AREA IS = 226.75 SQ FT
WETTED PERIMETER IS = 133.19 FT
HYDRAULIC RADIUS IS = 1.7 FT
NORMAL DEPTH IS = 3.41 FT
VELOCITY IS = 6.9 FPS
FROUDE NUMBER IS = .93

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 620+02

DISCHARGE IS = 46 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .013 FT/FT
SIDE SLOPE (Z1) = 8.4
SIDE SLOPE (Z2) = 8.7
MANNING'S N = .035
TOP WIDTH IS = 21.19 FT
AREA IS = 13.13 SQ FT
WETTED PERIMETER IS = 21.34 FT
HYDRAULIC RADIUS IS = .62 FT
NORMAL DEPTH IS = 1.24 FT
VELOCITY IS = 3.5 FPS
FROUDE NUMBER IS = .78

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 624+00

DISCHARGE IS = 46 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .018 FT/FT
SIDE SLOPE (Z1) = 6.3
SIDE SLOPE (Z2) = 7.9
MANNING'S N = .035
TOP WIDTH IS = 17.77 FT
AREA IS = 11.11 SQ FT
WETTED PERIMETER IS = 17.94 FT
HYDRAULIC RADIUS IS = .62 FT
NORMAL DEPTH IS = 1.25 FT
VELOCITY IS = 4.14 FPS
FROUDE NUMBER IS = .92

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 627+40

DISCHARGE IS = 50 CFS
BOTTOM WIDTH IS = 54 FT
SLOPE IS = .018 FT/FT
SIDE SLOPE (Z1) = 24
SIDE SLOPE (Z2) = 27
MANNING'S N = .035
TOP WIDTH IS = 70.55 FT
AREA IS = 20.2 SQ FT
WETTED PERIMETER IS = 70.56 FT
HYDRAULIC RADIUS IS = .29 FT
NORMAL DEPTH IS = .32 FT
VELOCITY IS = 2.47 FPS
FROUDE NUMBER IS = .81

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 630+50

DISCHARGE IS = 910 CFS
BOTTOM WIDTH IS = 15 FT
SLOPE IS = .035 FT/FT
SIDE SLOPE (Z1) = 9
SIDE SLOPE (Z2) = 10
MANNING'S N = .035
TOP WIDTH IS = 59.91 FT
AREA IS = 88.54 SQ FT
WETTED PERIMETER IS = 60.16 FT
HYDRAULIC RADIUS IS = 1.47 FT
NORMAL DEPTH IS = 2.36 FT
VELOCITY IS = 10.28 FPS
FROUDE NUMBER IS = 1.49

FILENAME IS SV631

631

CROSS SECTION ID NUMBER IS 1

631

NUMBER OF CROSS SECTION COORDINATE POINTS IS 10

COORDINATE ID NO.	STATION X(I)	ELEVATION Y(I)
1	0.00	52.00
2	44.00	50.80
3	62.00	51.20
4	68.00	51.10
5	73.00	50.00
6	82.00	49.90
7	93.00	50.00
8	107.00	50.90
9	137.00	51.60
10	202.00	52.00

WATER SURFACE ELEV FT	AREA SQ FT	WETTED PERIMETER FT	TOP WIDTH FT	HYD RADIUS FT	HYD DEPTH FT	SECTION FACTOR FT	CRITICAL FLOW CFS
50.00	1.0	20.0	20.0	0.0	0.0	0.1	1.3
50.50	13.5	30.1	30.1	0.4	0.4	7.9	51.4
50.80	23.4	36.2	36.1	0.6	0.6	17.5	107.2
51.00	32.8	59.3	59.2	0.6	0.6	22.1	138.7
51.20	47.5	90.7	90.5	0.5	0.5	30.9	195.3
51.40	67.2	106.6	106.4	0.6	0.6	49.4	303.1
51.60	90.1	122.5	122.3	0.7	0.7	73.4	438.7
51.80	118.5	162.3	162.2	0.7	0.7	96.1	575.1
52.00	155.0	202.2	202.0	0.8	0.8	129.8	770.1
51.20	47.5	90.7	90.5	0.5	0.5	30.9	195.3

$$Q = SF \times \frac{1.49\, S^{1/2}}{n}$$

$S = 0.0144$

$= 5.1086(SF)$

$v = 4.39$

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 638+37

DISCHARGE IS = 50 CFS
BOTTOM WIDTH IS = 15 FT
SLOPE IS = .013 FT/FT
SIDE SLOPE (Z1) = 12
SIDE SLOPE (Z2) = 13
MANNING'S N = .035
TOP WIDTH IS = 32.25 FT
AREA IS = 16.3 SQ FT
WETTED PERIMETER IS = 32.3 FT
HYDRAULIC RADIUS IS = .5 FT
NORMAL DEPTH IS = .69 FT
VELOCITY IS = 3.07 FPS
FROUDE NUMBER IS = .76

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 644+09

DISCHARGE IS = 158 CFS
BOTTOM WIDTH IS = 43 FT
SLOPE IS = .019 FT/FT
SIDE SLOPE (Z1) = 27
SIDE SLOPE (Z2) = 10
MANNING'S N = .035
TOP WIDTH IS = 68.97 FT
AREA IS = 39.3 SQ FT
WETTED PERIMETER IS = 69.02 FT
HYDRAULIC RADIUS IS = .57 FT
NORMAL DEPTH IS = .7 FT
VELOCITY IS = 4.02 FPS
FROUDE NUMBER IS = .94

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 653+25

DISCHARGE IS = 32 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .032 FT/FT
SIDE SLOPE (Z1) = 6.6
SIDE SLOPE (Z2) = 8
MANNING'S N = .035
TOP WIDTH IS = 14.16 FT
AREA IS = 6.87 SQ FT
WETTED PERIMETER IS = 14.3 FT
HYDRAULIC RADIUS IS = .48 FT
NORMAL DEPTH IS = .97 FT
VELOCITY IS = 4.66 FPS
FROUDE NUMBER IS = 1.18

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 656+78

DISCHARGE IS = 68 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .02 FT/FT
SIDE SLOPE (Z1) = 16
SIDE SLOPE (Z2) = 15
MANNING'S N = .035
TOP WIDTH IS = 32.79 FT
AREA IS = 17.34 SQ FT
WETTED PERIMETER IS = 32.86 FT
HYDRAULIC RADIUS IS = .53 FT
NORMAL DEPTH IS = 1.06 FT
VELOCITY IS = 3.92 FPS
FROUDE NUMBER IS = .95

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 659+74

DISCHARGE IS = 61 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .012 FT/FT
SIDE SLOPE (Z1) = 20
SIDE SLOPE (Z2) = 13
MANNING'S N = .035
TOP WIDTH IS = 36.02 FT
AREA IS = 19.66 SQ FT
WETTED PERIMETER IS = 36.09 FT
HYDRAULIC RADIUS IS = .54 FT
NORMAL DEPTH IS = 1.09 FT
VELOCITY IS = 3.1 FPS
FROUDE NUMBER IS = .74

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 664+99

DISCHARGE IS = 217 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .014 FT/FT
SIDE SLOPE (Z1) = 9
SIDE SLOPE (Z2) = 26
MANNING'S N = .035
TOP WIDTH IS = 58.44 FT
AREA IS = 48.79 SQ FT
WETTED PERIMETER IS = 58.57 FT
HYDRAULIC RADIUS IS = .83 FT
NORMAL DEPTH IS = 1.67 FT
VELOCITY IS = 4.45 FPS
FROUDE NUMBER IS = .86

676

CROSS SECTION ID NUMBER IS 1

1

NUMBER OF CROSS SECTION COORDINATE POINTS IS 12

COORDINATE ID NO.	STATION X(I)	ELEVATION Y(I)
1	0.00	54.00
2	46.00	52.10
3	61.00	52.00
4	80.00	52.20
5	93.00	52.00
6	106.00	51.20
7	122.00	52.10
8	137.00	52.10
9	152.00	51.00
10	170.00	51.40
11	252.00	52.40
12	356.00	54.00

WATER SURFACE ELEV FT	AREA SQ FT	WETTED PERIMETER FT	TOP WIDTH FT	HYD RADIUS FT	HYD DEPTH FT	SECTION FACTOR FT	CRITICAL FLOW CFS	Q	V
51.50	9.0	43.3	43.2	0.2	0.2	3.2	23.5		
52.00	46.9	108.2	108.1	0.4	0.4	26.8	175.1		
52.50	140.0	222.3	222.2	0.6	0.6	102.8	630.4	479	3.42
52.80	210.6	249.1	248.9	0.8	0.8	188.4	1099.4	878	4.18
53.00	262.2	266.9	266.8	1.0	1.0	259.1	1475.0		
53.25	331.7	289.2	289.1	1.1	1.1	363.4	2016.1		
53.50	406.8	311.5	311.4	1.3	1.3	485.9	2637.9		
53.75	487.4	333.8	333.7	1.5	1.5	627.2	3342.4		
54.00	573.6	356.2	356.0	1.6	1.6	788.1	4131.6		

$Q = \frac{1.49 S^{1/2}}{n}(SF)$ $S = .012$ $n = .03$

$Q = 4.6635(SF)$

$Q_{100} = 78$

$V = Q/A$

FILENAME IS 683

683

CROSS SECTION ID NUMBER IS 1

1

NUMBER OF CROSS SECTION COORDINATE POINTS IS 13

COORDINATE ID NO.	STATION X(I)	ELEVATION Y(I)
1	0.00	52.20
2	62.00	51.30
3	80.00	51.20
4	120.00	51.70
5	131.00	51.60
6	143.00	51.00
7	150.00	50.20
8	155.00	51.00
9	170.00	51.70
10	182.00	50.40
11	192.00	51.20
12	224.00	52.00
13	235.00	53.00

WATER SURFACE ELEV FT	AREA SQ FT	WETTED PERIMETER FT	TOP WIDTH FT	HYD RADIUS FT	HYD DEPTH FT	SECTION FACTOR FT	CRITICAL FLOW CFS	Q	V
50.60	1.6	10.4	10.3	0.2	0.2	0.5	3.7		
50.80	4.4	17.8	17.7	0.2	0.3	1.8	12.6		
51.00	8.7	25.2	25.0	0.3	0.3	4.3	29.2		
51.20	15.0	37.9	37.7	0.4	0.4	8.1	53.6		
51.40	29.0	96.9	96.7	0.3	0.3	13.0	90.0		
51.60	53.1	144.8	144.6	0.4	0.4	27.2	182.6		
51.80	87.5	188.7	188.4	0.5	0.5	52.4	338.4		
52.00	127.4	210.5	210.2	0.6	0.6	91.1	562.6		
52.20	171.0	226.5	226.2	0.8	0.8	141.8	843.8	714	4.12

$Q = \frac{1.49 S^{1/2}}{n} SF$

$S = .014$

$n = .035$

$Q = 5.037(SF)$

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 784+61

DISCHARGE IS = 1086 CFS
BOTTOM WIDTH IS = 96 FT
SLOPE IS = .009 FT/FT
SIDE SLOPE (Z1) = 73
SIDE SLOPE (Z2) = 43
MANNING'S N = .035
TOP WIDTH IS = 267.54 FT
AREA IS = 268.79 SQ FT
WETTED PERIMETER IS = 267.56 FT
HYDRAULIC RADIUS IS = 1 FT
NORMAL DEPTH IS = 1.48 FT
VELOCITY IS = 4.04 FPS
FROUDE NUMBER IS = .71

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 824+91

DISCHARGE IS = 384 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .05 FT/FT
SIDE SLOPE (Z1) = 8.5
SIDE SLOPE (Z2) = 118
MANNING'S N = .035
TOP WIDTH IS = 127.23 FT
AREA IS = 63.98 SQ FT
WETTED PERIMETER IS = 127.3 FT
HYDRAULIC RADIUS IS = .5 FT
NORMAL DEPTH IS = 1.01 FT
VELOCITY IS = 6 FPS
FROUDE NUMBER IS = 1.49

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 839+23

DISCHARGE IS = 423 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .016 FT/FT
SIDE SLOPE (Z1) = 41
SIDE SLOPE (Z2) = 49
MANNING'S N = .035
TOP WIDTH IS = 132.04 FT
AREA IS = 96.86 SQ FT
WETTED PERIMETER IS = 132.07 FT
HYDRAULIC RADIUS IS = .73 FT
NORMAL DEPTH IS = 1.47 FT
VELOCITY IS = 4.37 FPS
FROUDE NUMBER IS = .9

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 849+39

DISCHARGE IS = 2515 CFS
BOTTOM WIDTH IS = 40 FT
SLOPE IS = .012 FT/FT
SIDE SLOPE (Z1) = 3.86
SIDE SLOPE (Z2) = 5.2
MANNING'S N = .035
TOP WIDTH IS = 78.41 FT
AREA IS = 250.97 SQ FT
WETTED PERIMETER IS = 79.35 FT
HYDRAULIC RADIUS IS = 3.16 FT
NORMAL DEPTH IS = 4.24 FT
VELOCITY IS = 10.02 FPS
FROUDE NUMBER IS = .99

FILENAME IS 1014

1014

CROSS SECTION ID NUMBER IS 1

1

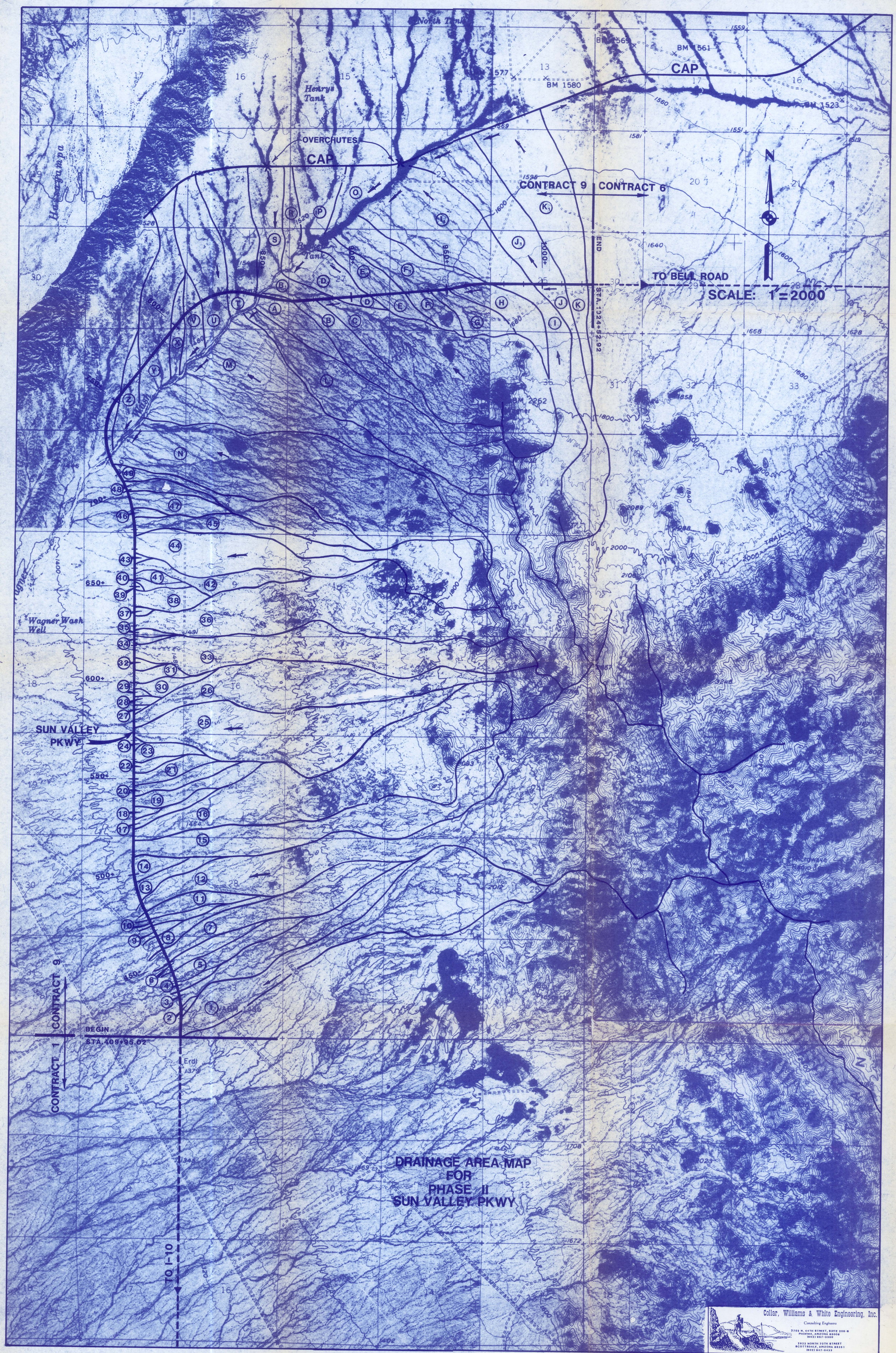
NUMBER OF CROSS SECTION COORDINATE POINTS IS 6

COORDINATE ID NO.	STATION X(I)	ELEVATION Y(I)
1	0.00	70.00
2	42.00	68.90
3	52.00	68.00
4	58.00	66.50
5	66.00	69.00
6	76.00	70.00

WATER SURFACE ELEV FT	AREA SQ FT	WETTED PERIMETER FT	TOP WIDTH FT	HYD RADIUS FT	HYD DEPTH FT	SECTION FACTOR FT	CRITICAL FLOW CFS	Q	V
67.50	3.6	7.5	7.2	0.5	0.5	2.2	14.4		
67.60	4.4	8.2	7.9	0.5	0.5	2.9	18.3		
67.80	6.1	9.7	9.4	0.6	0.7	4.5	27.8		
68.00	8.1	11.2	10.8	0.7	0.8	6.5	39.8		
68.20	10.5	14.1	13.7	0.7	0.8	8.7	52.6		
68.40	13.6	17.0	16.5	0.8	0.8	11.7	69.7		
68.60	17.2	19.9	19.4	0.9	0.9	15.5	91.6	86	
68.80	21.3	22.8	22.2	0.9	1.0	20.4	118.4	113	5.3
69.00	26.2	28.4	27.8	0.9	0.9	24.8	144.2		
69.20	32.7	38.1	37.5	0.9	0.9	29.6	173.5		
69.40	41.2	47.7	47.1	0.9	0.9	37.3	218.5		
69.60	51.6	57.4	56.7	0.9	0.9	48.0	278.9		
69.80	63.9	67.0	66.4	1.0	1.0	61.8	355.5		
70.00	78.1	76.7	76.0	1.0	1.0	79.1	449.3		

$Q = SF \frac{1.49}{n} S^{1/2}$

$= SF(5.55)$ $S = .017$, $n = .03$


CAP
OVERCHUTES
CAP
CONTRACT 9
CONTRACT 6
END
STA. 1024+52.92
TO BELL ROAD
SCALE: 1"=2000'
N
SUN VALLEY PKWY
CONTRACT 1
CONTRACT 9
BEGIN
STA. 409+95.02
TO I-10
DRAINAGE AREA MAP
FOR
PHASE II
SUN VALLEY PKWY
Collar, Williams & White Engineering, Inc.
Consulting Engineers
2702 N. 44TH STREET, SUITE 205-B
PHOENIX, ARIZONA 85008
(602) 957-3350
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(602) 947-8433
DESIGN PROJ. NO. 850840-9
SURVEY PROJ. NO.
PREPARED DATE MARCH 1987

EXHIBIT B