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DRAINAGE REPORT
SUN VALLEY PARKWAY PHASE I
CWW NO. 850840-6
MARICOPA COUNTY, ARIZONA

Prepared for
THE ADAMS GROUP
4520 NORTH CENTRAL AVENUE
SUITE 500
PHOENIX, ARIZONA 85012

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I. INTRODUCTION

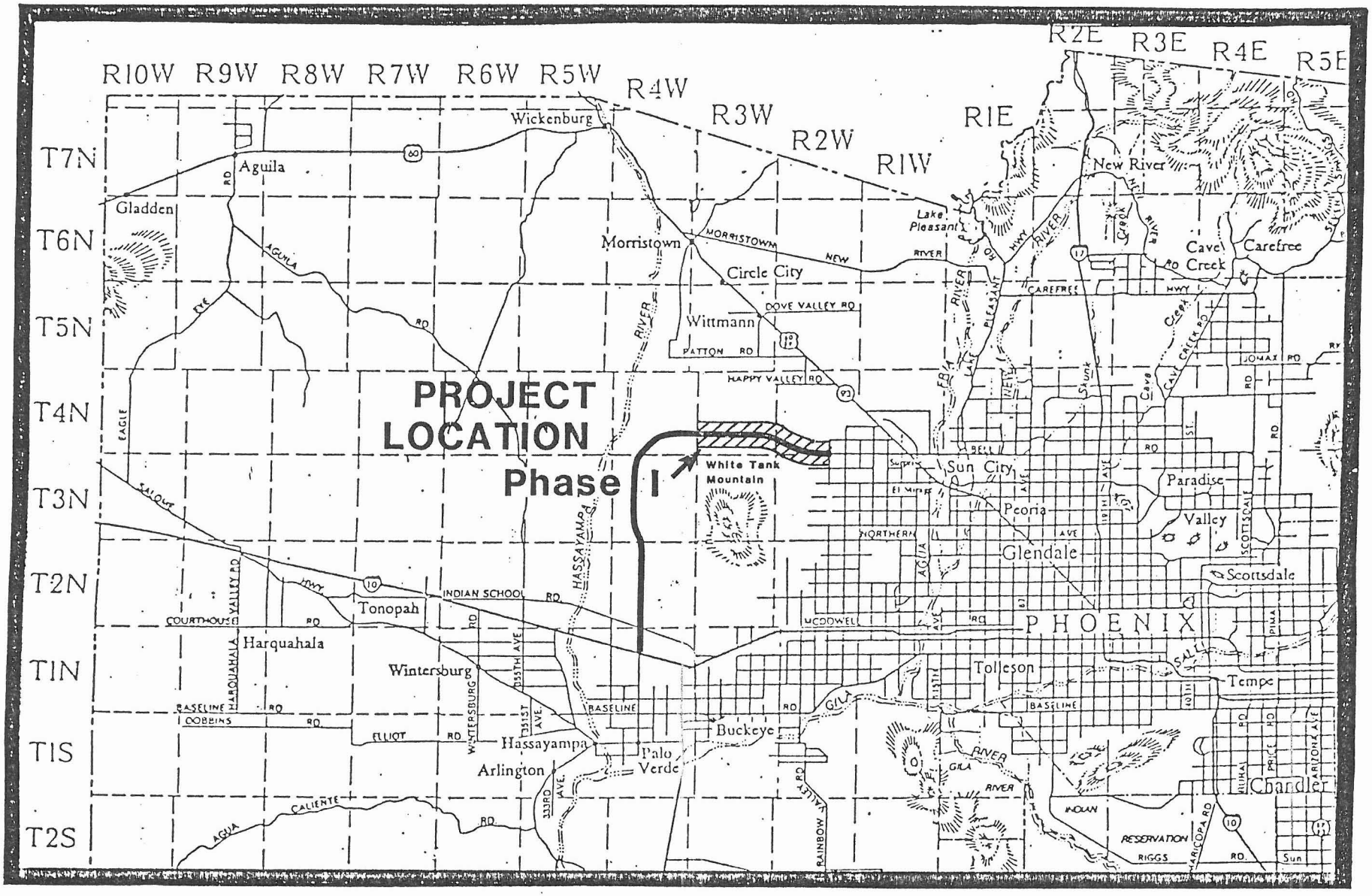
This drainage report is for Phase I of the Sun Valley Parkway. The extension of Bell Road from just east of the Beardsley canal for approximately 10 miles west to where Phase II begins. This is a portion of the development for the proposed master planned community of Sun Valley, Arizona. Collar, Williams & 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 Township 4 North and Range 2 and 3 West of Maricopa County and lies between the White Tank Mountains to the south and Trilby Wash 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 I crosses over Wagner Wash twice. The Beardsley Canal and McMicken Dam and through its reservoir area (Trilby Wash Basin). The area contributing runoff that crosses the road alignment consists of the northern side of the White Tank Mountains and the lower alluvial fan slopes at the base of the White Tanks. The land generally slopes to the north or northeast and drains mostly into Trilby Wash which runs into the normally dry Trilby Wash Basin, the flood control reservoir behind McMicken Dam.



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 some of the washes intersecting this section of the road are incised with well-defined, stable ridges in between, however, many washes crossing the road are wide and shallow braided channels or areas of overland sheet flow is unconcentrated and the contributing area often difficult to define.

The roadway in this phase is almost entirely located on state land leased for cattle grazing. The State Land Department in addition to the Maricopa County Highway Department, set its own design criteria for cattle crossing locations and sizes, fencing, drainage, and the location of median openings.

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 Phase I can be broken in three parts Station 0+00 to 260+00; 260+00 to 294+00 and 394+00 to 492+50.

Station 0+00 to 260+00: Consists of 8942 acres in which runoff is generated from the mountain slopes of the White Tanks which flows north towards Trilby Wash across the alignment of the proposed parkway. Runoff is partially contained in numerous washes during a low intensity storm, however higher runoff events overflow the banks and join sheet flows from adjacent flat areas without defined washes.

To accomodate the State Land Department's request to design the road with minimum impact on existing environment (minimize cuts and fills) and to handle the sheet flows intercepted along the proposed road, a series of collecting channels and detention basins were designed which collect and route flows to culverts located on the major existing washes. Easement constraints on the size limitation of the detention basins results in a negligible impact or peak flows during the 100 year event. They will, however, act as collector system and should reduce the peaks for the smaller more frequent runoff events.

Increased runoff in existing washes downstream of proosed culverts which is a natural consequence keeping the highway dry during a 100 year event and the associated high velocities and possible downstream erosion, concerned State Land Department. The series of upstream detention basins were proposed and approved as a means of minimizing the impact of the overland sheet flow that is intercepted by the road and diverted and added to the flows in the major washes.

Station 260+00 to 394+00: This area is located over highly irregular ground, where drainage requires numerous but easily located culvert crossings. Culverts were designed based on the allowable head that could be achieved by the existing ground configuration since the offsite drainage areas were too small to delineate separately on Exhibit II.

Station 394+00 to 492+50: This area is on relatively flat ground draining east into Trilby Wash Basin with the parkway centerline parallel to the natural direction of flow. Only two structures have been designed, one at Station 473+10, a Double 10/10 CBC sized to act as a leveling mechanism structure within the McMicken Dam reservoir area. The second structure is at Station 491+68 a bridge across the Beardsley Canal. Between Sta.390+00 and 412+00, the southside road fill is being rip-rapped and a shallow "vee" channel provided for flows coming out of Area 46. The braided wash flows northeasterly up against the shoulder for several hundreds of feet before turning to the southeast away from the parkway. The rip-rap and channel will carry the flow and protect the road until natural ground falls away from the road where the water will be directed away from the road at approximately Station 412+00.

The design speed limit of the parkway east of the dam crest was reduced to 60 MPH for this section to reduce the high fill necessary at the approach to crossing the dam if the design speed were maintained at 70 MPH.

Channels are 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 the road

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

A separate hydrologic/hydraulic design analysis report was done for the Flood Control District of Maricopa Conty and the Arizona Department of Water Resources to evaluate the effect of the proposed parkway on the dam and reservoir. An application for a safety permit has been filed with the Arizona Department of Water Resources for the project.

IV. ANALYSIS PROCEDURES

Watershed areas for the area draining across the project are delineated on Exhibit 2, the Drainage Area Map, which is a U.S.G.S. quadrangle map. Watershed boundaries were also confirmed with orthophoto quads 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 smaller watershed areas were determined using the Rational formula and the Corps of Engineers HEC-1 Computer Program with the SCS runoff curve number and dimensionless unit hydrograph options was used for the larger areas with more than one soil group type. The drainage areas on the slopes of the White Tank Mountains were assumed to have curve numbers of 92 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 0.43 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). See Table VI for assumed conditions. 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 of the parkway drainage structures so that significant upstream diversions from one area to another are not made. Natural conditions in some locations 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.

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. In many cases the 15 inch pipes can't maintain the minimum velocity of 3 fps desirable for silt carrying purposes because of the small discharges being intercepted, however, the small discharges will not cause much erosion and the medians should stablize after several rains and runoff should be silt free.

Pavement drainage and catch basin calculations are summarized in Table III. 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. Since the county requirement was only for the 10 year storm for pavement drainage, several areas where spread or inlet capacity slightly exceeded our design criteria was accepted.

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 (see individual culvert calculatin sheets). Natural channel velocity calculations are located in the appendix. 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 done when outlet velocity exceeded 1.5 times natural and the contributing area was greater than 64 acres. HEC-14 procedures were used, as recommended, results are shown in Table VII. Areas with an asterisk in Table VII 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.

Manning's "n" values for roughness used were: for natural channels at culvert crossings, 0.035; improved earthen channels 0.03; lined channels, 0.015; and pavement drainage .016; and natural channel routing in the HEC-1 modeling, 0.03. (Reference CHOW, Table VIII in Appendix.)

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

TABLE II

SUN VALLEY PARKWAY

PHASE I

CULVERTS AND DETENTIONS

CULVERT STA	SIZE	Q100	HW	NOTES
4+30.50	10/3 CBC	154	3.06	
16+17.50	3-49"X33"CSP	189	4.5	
26+06.25	10/3 CBC	230	4.3	
30+35.20	2-49"X33"CSP	48	2.0	
33+07.50	28"X20" CSP	15	2.0	
36+92.50	6-10/4 CBC	1100	3.4	
38+84.50	2-10/3 CBC	300	3.1	
45+39	10/8 CBC	29	-	CATTLE CROSSING
47+60.25	35"X24" CSP	30	2.75	
51+76.50	35"X24" CSP	28	2.6	
64+99	5-12/4 CBC	1380	4.0	THRU DETENTIONS
67+33	5-12/3 CBC	1140	3.6	THRU DETENTIONS
74+15	4-10/3 CBC	840	4	THRU DETENTIONS
79+21.50	10/3 CBC	160	3.2	THRU DETENTIONS
84+67	4-10/3 CBC	800	3.7	THRU DETENTIONS
99+09.75	10/3 CBC	150	3.1	THRU DETENTIONS
102+17	6-12/4 CBC	2016	4.7	THRU DETENTIONS
106+83+50	6-12/4 CBC	1944	4.5	THRU DETENTIONS
110+99	5-12/4 CBC	1800	5.0	THRU DETENTIONS
114+09	35"X24" CSP	30	3.0	
116+05.50	10/8 CBC	60	8.3	CATTLE CROSSING- CAP 650 CFS
124+23	2-42"X29" CSP	80	3.0	
127+67	35"X24" CSP	20	2.1	
136+16.50	3-42"X29" CSP	90	2.5	
146+50	3-8/3 CBC	456	3.6	THRU DETENTIONS
154+43.50	4-35"X24" CSP	120	4.2	
197+74.50	6-12/6 CBC	3024	6	THRU DETENTIONS CATTLE CROSSING
207+57.50	6-12/8 CBC	3960	7	THRU DETENTIONS CATTLE CROSSING
210+68.50	2-42"X29" CSP	32	1.5	
236+91	3-8/3 CBC	312	2.7	

TABLE II (cont.)

SUN VALLEY PARKWAY

PHASE I

CULVERTS AND DETENTIONS (CONT.)

CULVERT STA	SIZE	Q100	HW	NOTES
254+82.50	4-10/4 CBC	740	3.4	THRU DETENTIONS
260+98.50	6-12/6 CBC	2376	5	THRU DETENTIONS
264+99.50	2-42"X29" CSP	76	2.9	THRU DETENTIONS
279+17	4-8/3 CBC	512	3.1	
282+90	2-28"X20" CSP	22	1.77	
304+1.3	4-10/4 CBC	1200	4.9	
307+78.50	2-28"X20"CSP	30	2	
310+12.50	2-28"X20" CSP	34	2.4	
312+27	2-28"X20"CSP	28	1.9	
315+02.50	28"X20" CSP	15	2.0	
316+36.50	10/8 CBC	420	8.1	CATTLE CROSSING (FULL CAPACITY Q)
318+88	28"X20" CSP	12	1.7	
320+57.50	42"X29" CSP	65	5.5	DICTATED BY GROUND CONF.
322+99	42"X29" CSP	45	3.4	
324+95.50	28"X20" CSP	8	1.2	
327+30	42"X29" CSP	90	8.7	
328+91	42"X29" CSP	75	7.0	
336+58.50	49"X33" CSP	51	3.3	
341+76.50	2-10/8 CBC	1280	7.6	
347+26	3-10/3 CBC	600	3.7	
349+18	2-42"X29" CSP	76	2.9	
352+92	2-49"X33" CSP	134	3.8	
357+26	48" CSP	140	7.6	
369+17.50	72" CSP	290	8	
370+82	60" CSP	165	6.4	
373+07	28"X20" CSP	14	1.9	
374+90	28"X20" CSP	9	1.3	
378+96	36" CSP	78	6.9	DICTATED BY GROUND CONF.
379+85	24" CSP	30	4.5	
384+06	42"X29" CSP	21	1.8	
473+08	2-10/10 CBC			LEVELING DAM STRUCTURE.
491+68	BRIDGE			BEARDSLEY CANAL

TABLE III

Arizona Department of Transportation

PAVEMENT DRAINAGE CALCULATION REPORT

LOCATION DATA
Highway: Sun Valley Parkway
Location: Phase I-B
Project No.: 850840-6

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.)
37840	38500	660	40.75	0.62	0.95	10	6.6	3.871	-	3.871	0.0060	0.0330	1894	0.318	9.64
38500	39260	760	40.75	0.71	0.95	10	6.6	4.458	2.323	6.781	0.0158	0.0330	1894	0.327	9.92
39260	40020	760	40.75	0.71	0.95	10	6.6	4.458	4.358	8.816	0.0158	0.0330	1894	0.361	10.94
40020	40780	760	40.75	0.71	0.95	10	6.6	4.458	4.432	8.890	0.0158	0.0330	1894	0.362	10.98
40780	41080	300	40.75	0.28	0.95	10	6.6	1.760	4.490	6.249	0.0129	0.0330	1894	0.330	9.99
41080	41450	370	40.75	0.35	0.95	10	6.6	2.170	2.410	4.580	0.0129	0.0330	1894	0.293	8.89
41450	41928	478	40.75	0.45	0.95	10	6.6	2.804	2.668	5.472	0.0129	0.0263	2376	0.288	10.95

INLET CALCULATIONS (Grate Inlet Catch Basin)

Station	Inlet Type	D (ft)	Qi (cfs)	Qc= Qt-Qi	V (fps)	Lm (ft)	Lp (ft)
385+00	C-15.3 S	0.318	1.548	2.323	2.53	1.97	3.33
392+60	C-15.3 S	0.327	2.423	4.358	4.18	3.28	3.33
400+20	C-15.3 D	0.361	4.384	4.432	4.46	3.60	6.66
407+80	C-15.3 D	0.362	4.400	4.490	4.47	3.61	6.66
410+80	C-15.3 D	0.330	3.840	2.410	3.79	2.99	6.66
414+50	C-15.3 S	0.293	1.912	2.668	3.51	2.68	3.33
419+28	C-15.3 D	0.288	3.247	2.225	3.47	2.64	6.66

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

Clogging Factor = 50 %
Depth of Grate Bar = 0.29 ft.

S : Denote Single Grate Catch Basin
D : Denote Double Grate Catch Basin

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"

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

TABLE IV

MEDIAN DRAINAGE WORKSHEET

LOCATION DATA
Highway Sun Valley Parkway
Location Phase I-A
Project No. 850040-G

DESIGN DATA
Frequency = 100 years
P6 = 3.31 in. P24 = 4.20 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)
671	2000	1329	14.5	0.44	0.35	36.8	3.4	0.526	V	0.00300	20	20	0.03	0.21	0.60
2301	2000	301	14.5	0.10	0.35	10.3	6.6	0.231	V	0.00299	20	20	0.03	0.15	0.49
2400	4539	2139	14.5	0.71	0.35	35.8	3.4	0.847	V	0.00837	20	20	0.03	0.21	1.00
4539	5820	1281	14.5	0.43	0.35	22.6	4.5	0.672	V	0.00846	20	20	0.03	0.19	0.94
5820	7200	1380	14.5	0.46	0.35	33.1	2.7	0.434	V	0.00502	20	20	0.03	0.18	0.70
7200	8670	1470	14.5	0.49	0.35	27.4	4.0	0.685	V	0.00726	20	20	0.03	0.20	0.90
8799	10360	1561	14.5	0.52	0.35	33.3	3.6	0.655	V	0.00522	20	20	0.03	0.20	0.78
10360	11606	1246	14.5	0.41	0.35	21.6	4.7	0.682	V	0.00886	20	20	0.03	0.19	0.96
11606	13141	1535	14.5	0.51	0.35	30.0	3.7	0.662	V	0.00650	20	20	0.03	0.20	0.85
13268	15530	2262	14.5	0.75	0.35	34.3	3.6	0.949	V	0.01009	20	20	0.03	0.21	1.10
15530	16940	1410	14.5	0.47	0.35	21.9	4.7	0.772	V	0.01090	20	20	0.03	0.19	1.07
16940	18415	1475	14.5	0.49	0.35	29.0	3.9	0.670	V	0.00640	20	20	0.03	0.20	0.85
18543	20765	2222	14.5	0.74	0.35	33.5	3.6	0.932	V	0.01039	20	20	0.03	0.21	1.11
20765	22400	1635	14.5	0.54	0.35	27.3	4.1	0.701	V	0.00893	20	20	0.03	0.20	1.00

INLET CALCULATIONS (Median Catch Basin)

Station	Inlet Type	Q (cfs)	HW (ft)	Grate Elev.	DHW Elev.	Dike Elev.
20+00 s	C-15.8	0.758	0.144	1673.79	-	-
45+39	C-15.8	0.847	0.155	1657.24	1657.39	1657.60
58+20	C-15.8	0.672	0.133	1646.43	1646.56	1646.79
72+00	C-15.8	0.434	0.099	1646.43	1646.53	1646.79
86+70	C-15.8	0.685	0.099	1628.63	1628.73	1628.99
103+60	C-15.8	0.655	0.130	1619.40	1619.53	1619.76
116+06	C-15.8	0.682	0.134	1610.31	1610.44	1610.67
131+41	C-15.8	0.662	0.131	1600.32	1600.45	1600.68
155+30	C-15.8	0.949	0.167	1576.98	1577.15	1577.34
169+40	C-15.8	0.772	0.146	1561.80	1561.95	1562.16
184+15	C-15.8	0.670	0.132	1552.17	1552.30	1552.53
207+65	C-15.8	0.932	0.165	1530.53	1530.69	1530.89
224+00	C-15.8	0.701	0.147	1530.53	1530.68	1530.89

Notes: 1. Effective Parimeter of ADOT C - 15.00 Grate Catch Basin = 9.27 ft.

2. Clogging Factor = 50 %

3. s : Denote catch basin in sag.

TABLE IV (cont.)

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

MEDIAN DRAINAGE WORKSHEET

LOCATION DATA
Highway Sun Valley Parkway
Location Phase I-A (Continue)
Project No. 850040-6

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)
22400	24070	1670	14.5	0.56	0.35	28.4	3.9	0.759	V	0.00861	20	20	0.03	0.20	0.98
24197	26965	2768	14.5	0.92	0.35	51.9	2.7	0.871	V	0.00608	20	20	0.03	0.22	0.89
26965	29138	2173	14.5	0.72	0.35	41.5	3.1	0.785	V	0.00618	20	20	0.03	0.21	0.87
29262	29864	602	14.5	0.20	0.35	11.8	6.3	0.442	V	0.00850	20	20	0.03	0.16	0.85
31637	29864	1773	14.5	0.59	0.35	45.0	3.0	0.620	V	0.00340	20	20	0.03	0.22	0.66
32635	31637	998	14.5	0.33	0.35	27.0	4.1	0.477	V	0.00340	20	20	0.03	0.20	0.62
34211	32635	1576	14.5	0.52	0.35	40.5	3.2	0.588	V	0.00340	20	20	0.03	0.21	0.65
34211	35364	1153	14.5	0.38	0.35	19.2	4.9	0.658	V	0.00999	20	20	0.03	0.18	1.00
35549	36660	1111	14.5	0.37	0.35	17.1	5.2	0.673	V	0.01220	20	20	0.03	0.18	1.08

INLET CALCULATIONS (Median Catch Basin)

Station	Inlet Type	Q (cfs)	HW (ft)	Grate Elev.	DHW Elev.	Dike Elev.
240+70	C-15.8	0.759	0.144	1501.49	1501.63	1501.85
269+65	C-15.8	0.871	0.158	1484.32	1484.48	1484.68
291+38	C-15.8	0.785	0.147	1471.82	1471.97	1472.18
298+64 s	C-15.8	1.062	0.180	1465.57	-	-
316+37	C-15.8	0.477	0.106	1471.41	1471.52	1471.77
326+35	C-15.8	0.588	0.121	1474.90	1475.02	1475.26
353+64	C-15.8	0.658	0.131	1610.31	1610.44	1610.67
366+60	C-15.8	0.673	0.133	1600.32	1600.45	1600.68

Notes: 1. Effective Parimeter of ADOT C - 15.80
Grate Catch Basin = 9.27 ft.

2. Clogging Factor = 50 %

3. s : Denote catch basin in sag.

TABLE IV (cont.)

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

MEDIAN DRAINAGE WORKSHEET

LOCATION DATA
Highway Sun Valley Parkway
Location Phase I-B
Project No. 850840-6

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)
36660	38143	1483	14.5	0.49	0.35	29.8	3.9	0.674	V	0.00600	20	20	0.03	0.20	0.83
38143	40780	2637	14.5	0.88	0.35	33.8	3.5	1.075	V	0.01450	20	20	0.03	0.20	1.30
40780	41926	1146	14.5	0.38	0.35	17.1	5.2	0.694	V	0.01290	20	20	0.03	0.18	1.11
42052	44239	2187	14.5	0.73	0.35	31.3	4.0	1.019	V	0.01120	20	20	0.03	0.21	1.16
44912	46675	1763	14.5	0.59	0.35	44.0	3.0	0.616	V	0.00356	20	20	0.03	0.21	0.67
47407	46675	732	14.5	0.24	0.35	10.0	6.6	0.563	V	0.02000	20	20	0.03	0.15	1.25
47407	48524	1117	14.5	0.37	0.35	16.3	5.4	0.703	V	0.01375	20	20	0.03	0.18	1.14

INLET CALCULATIONS (Median Catch Basin)

Station	Inlet Type	Q (cfs)	HW (ft)	Grate Elev.	DHW Elev.	Dike Elev.
381+43	C-15.8	0.674	0.133	1449.08	1449.21	1449.44
407+80	C-15.8	1.075	0.182	1410.85	1411.03	1411.21
419+26	C-15.8	0.694	0.136	1395.41	1395.55	1395.77
442+39	C-15.8	1.019	0.175	1369.30	1369.48	1369.66
466+75 s	C-15.8	1.179	0.193	1356.73	-	-
485+24	C-15.8	0.703	0.137	1338.14	1338.28	1338.50

Notes: 1. Effective Parimeter of ADOT C - 15.80 Grate Catch Basin = 9.27 ft.

2. Clogging Factor = 50 %

3. s : Denote catch basin in sag.

TABLE V

PROJECT NAME SUN VALLEY PKWY - PHASE I.

JOB NO. 850840-(

DETENTION BASINS

DATE 3-87

	STA FROM	STA TO	LENGTH	AVER. WIDTH	AVER. MAX. DEP.	ACFT	INFLOW	
	58+00	64+00	600	70	1.5	1.44	1180	
	64+90	67+00	210	65	2.7	0.89	932	
	68+10	71+03	293	77	1.5	0.78	SHEET	
	71+26	73+17	191	78	2.2	0.75	"	
	74+18	78+70	452	70	1.8	1.31	"	
	79+30	83+54	424	71	1.4	0.97	"	
	93+62	98+74	514	62	1.2	0.88	221	
	99+38	101+30	194	74	2.7	0.89	41	
	107+07	110+17	310	78	2.4	1.33	573	
	143+08	145+90	282	72	2.6	1.21	480	
	186+05	190+78	473	81	1.8	1.58	SHEET	
	191+05	193+25	220	80	2.5	1.01	"	
	198+20	201+18	298	83	3.2	1.82	1361	
	201+50	205+84	434	83	5.0	4.13	1664	
	249+06	253+40	434	82	2.0	1.63	228	
	254+69	259+76	507	80	28	2.61	1771	

TABLE V (cont.)

PROJECT NAME SUN VALLEY PKWY - PHASE I.

JOB NO. 850890-

DETENTION BASIN - DIKE OVERFLOW - WEIR Q = CLD^1.5

DATE 3-87

	STA	EL. CREST	DEPTH	LENGTH CREST	C	FLOW CFS		
	64+00	40.5	2.5	96	3.087	1180		
	64+80	41.0	2.0	106		932		
	67+95	40.0	1.5	100		—		
	71+10	35.0	4.0	90		—		
	73+25	34.0	3.0	88		—		
	74+00	35.0	1.1	140		—		
	78+80	31.0	2.5	75		—		
	79+20	31.0	1.5	145		—		
	83+60	27.0	2.5	75		—		
	98+80	19.0	1.0	72		221		
	99+25	18.5	1.2	65		71		
	101+40	17.0	2.0	70		71		
	102+40	17.5	1.5	80		301		
	106+90	15.0	1.8	85		629		
	110+20	11.0	3.0	65		629		
	146+00	84.0	2.0	80		480		
	190+90	42.0	3.0	80		—		
	193+40	38.0	3.5	135		—		
	198+00	35.0	2.0	146		1281		
	201+25	30.0	4.0	90		1281		
	205+80	26.0	4.1	95		1584		
	253+50	90.0	3.0	80		1000		
	254+50	90.0	2.2	175		1771		
	259+95	84.0	4.0	75		1839		

TABLE VI

PROJECT NAME — Sun Valley Parkway Phase I

JOB NO. 850840-6

DATE Mar. 1987

HYDROLOGY DATA

	Acres	Sq. Mi.	L	Top Elev.	Bottom Elev.	Sta. Pkwy.	S %	Method Used
9	11.0	0.02	2400	1720	1674	1+20	1.9	Rational
10	19.8	0.03	2700	1720	1673	4+30	1.7	"
11	86.0	0.13	7500	1810	1675	5+50 → 9+50	1.8	"
12	23.0	0.04	4000	1740	1674	16+17	1.6	"
13	39.0	0.06	2800	1720	1674	22+40	1.6	"
14	138.0	0.21	10,000	1890	1669	26+06	2.2	"
15	10.3	0.02	1800	1700	1666	30+35	1.9	"
16	7.5	0.01	1300	1690	1667	33+07	1.7	"
(1)	972.8	1.52	25,200	3293	1660	—	6.5	Hec-1
17	8.9	0.01	1300	1680	1652	45+39	2.1	Rational
18	48.2	0.07	3500	1740	1650	47+60 → 51+76	2.5	"
(2)	595.2	0.93	19,400	2400	1640	—	3.9	Hec-1
19	134.3	0.21	6600	1850	1653	74+15	3.2	Rational
20	375.0	0.58	9000	2000	1629	84+67	4.1	"
21	184.0	0.29	8300	1700	1618	95+00	1.0	"
(3)	1894.4	2.96	24,800	3248	1615	—	6.6	Hec-1
22	29.6	0.05	4300	1680	1613	106+89	1.5	Rational
23	6.4	0.01	1600	1660	1600	110+99	3.1	"
24	11.5	0.02	1800	1660	1608	114+09	2.9	"
25	31.6	0.05	4600	1680	1604	116+05	1.6	"
26	56.9	0.09	6200	1720	1608	124+23 → 127+67	1.9	"
27	82.6	0.13	9000	1740	1599	→ 136+16	1.6	"
28	44.7	0.07	6500	1700	1599	136+16 →	1.5	"
29	372.0	0.58	13,500	2000	1584	146+50	3.0	"
30	59.7	0.09	6500	1700	1580	149+50 → 154+43	1.8	"
31	50.9	0.08	5700	1680	1575	154+43 →	1.8	"
32	41.3	0.06	4000	1620	1560	171+00	1.5	"
(4)	1740.8	2.72	20,000	3064	1550	—	7.6	Hec-1
33	47.7	0.07	5200	1800	1535	197+74	5.1	Rational
34	192.8	0.30	9000	1900	1523	204+00	4.1	"

TABLE VI (cont.)

PROJECT NAME – Sun Valley Parkway Phase I

JOB NO. 850840-6

DATE Mar. 1987

HYDROLOGY DATA

	Acres	Sq. Mi.	L	Top Elev.	Bottom Elev.	Sta. Pkwy.	S %	Method Used
(5)	340.0	0.60	11,600	2500	1525	–	8.4	Hec-1
35	138.0	0.22	2000	1540	1518	226+00	1.1	Rational
36	267.2	0.42	9200	2200	1447	236+72	7.6	"
37	135.9	0.21	5800	1600	1499	247+00	1.7	"
(6)	697.6	1.09	18,000	3171	1485	–	9.4	Hec-1
38	28.4	0.04	3000	1550	1481	257+00	2.3	Rational
39	91.8	0.14	2700	1800	1451	261+00	4.1	"
40	261.7	0.41	10,300	2650	1477	272+00	4.1	"
41	105.1	0.16	4800	1580	1470	279+00	2.1	"
(7)	633.6	0.99	11,600	2630	1465	–	10.0	Hec-1
42	82.6	0.13	3000	1560	1470	320+00	3.0	Rational
42A	N/A	N/A	N/A	N/A	N/A	312+27 → 336+52	N/A	Ground Configuration
43	36.7	0.06	3900	1600	1474	339+00	3.2	Rational
(8)	787.2	1.23	20,000	3160	1450	–	8.6	Hec-1
44	98.2	0.15	3000	1750	1445	368+00	10.0	Rational
45	27.5	0.04	2000	1460	1437	379+00	1.1	"
(4a)	208.0	0.325	12,000	2380	1420	396+00	8.0	Hec-1

TABLE VII

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

CULVERT LOCATION	SIZE C.B.C. (ft)	SIZE Pipe (in)	TW D (ft)	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
26+06	1- 10 x 3		2.20	177	1.558	-	30	316	8.90	44.09	63.97	25.59
36+93	6- 10 x 4		2.30	141	1.173	-	30	316	9.60	41.45	62.12	24.85
38+85	2- 10 x 3		1.90	116	1.220	-	30	316	11.01	38.14	55.84	22.34
64+88	4- 10 x 3		2.00	116	1.145	-	30	316	10.71	35.89	53.30	21.32
79+22	1- 10 x 3		1.70	123	1.496	-	30	316	11.69	45.38	64.01	25.60
84+67	4- 10 x 3		2.30	154	1.282	-	30	316	8.86	39.37	57.43	22.97
99+10	1- 10 x 3		1.90	116	1.220	-	30	316	8.97	38.33	55.91	22.36
102+11	5- 12 x 3		2.10	203	1.509	-	30	316	10.64	51.05	71.21	28.48
136+17		3-43x 27	1.20	28	-	2.741	30	316	6.98	45.98	57.11	22.84
146+51	3- 8 x 3		2.10	117	1.442	-	30	316	8.43	39.61	56.05	22.42
207+58	6- 12 x 8		4.30	291	0.882	-	30	316	14.21	50.87	79.42	31.77
236+73	3- 8 x 3		1.60	80	1.386	-	30	316	8.42	38.55	54.74	21.90
254+83	4- 10 x 4		2.20	135	1.185	-	30	316	10.10	42.83	63.07	25.23
260+99	6- 12 x 6		3.20	230	1.010	-	30	316	12.94	49.87	75.70	30.28
264+99		2-43x 27	1.40	29	-	2.130	30	316	6.42	37.18	48.24	19.29
279+17	4- 8 x 3		1.90	99	1.376	-	30	316	8.39	38.30	54.46	21.79
304+13	4- 10 x 4		2.80	231	1.503	-	30	316	11.20	53.62	74.85	29.94
327+30		1-43x 27	2.20	69	-	3.742	30	316	9.63	59.68	70.20	28.08
347+26	3- 10 x 3		2.10	154	1.436	-	30	316	7.48	37.19	58.31	23.33
352+92		2-50x 31	1.70	48	-	2.367	30	316	6.19	34.29	51.30	20.52
357+26		1- 48	3.10	108	-	3.131	30	316	6.28	89.21	109.66	43.87
369+18		1- 72	4.20	223	-	2.672	30	316	17.82	112.24	144.66	57.87
370+82		1- 60	3.60	127	-	2.304	30	316	14.02	82.47	109.17	43.67

Note: 1. TW : Tail Water Depth
2. Q : Average maximun flow in 30 minute duration time per one barrel
(15 minute each side of instaneous peak flow, assuming 77% of the instantaneous peak flow).

TABLE VII (cont.)

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

CULVERT LOCATION	SIZE C.B.C. (ft)	SIZE Pipe (in)	DEPTH α	DEPTH β	DEPTH θ	WIDTH α	WIDTH β	WIDTH θ	LENGTH α	LENGTH β	LENGTH θ
26+06	1- 10 x 3		2.410	0.402	0.096	10.560	0.796	0.118	17.340	0.639	0.141
39+93	6- 10 x 4		2.540	0.390	0.098	11.050	0.848	0.132	17.120	0.669	0.134
38+85	2- 10 x 3		2.700	0.377	0.010	11.640	0.910	0.148	16.860	0.704	0.126
64+08	4- 10 x 3		2.690	0.378	0.010	11.600	0.901	0.147	16.880	0.702	0.127
79+22	1- 10 x 3		2.650	0.381	0.010	11.460	0.891	0.143	16.940	0.693	0.129
84+67	4- 10 x 3		2.620	0.383	0.098	11.360	0.881	0.140	16.980	0.688	0.130
99+10	1- 10 x 3		2.720	0.375	0.100	11.730	0.920	0.150	16.820	0.710	0.125
102+11	5- 12 x 3		2.720	0.375	0.100	11.730	0.920	0.150	16.820	0.710	0.125
136+17		3-43x 27	2.680	0.378	0.100	11.580	0.904	0.146	16.800	0.701	0.127
146+51	3- 8 x 3		2.680	0.378	0.100	11.580	0.904	0.146	16.800	0.701	0.127
207+58	6- 12 x 8		2.720	0.375	0.100	11.730	0.920	0.150	16.820	0.710	0.125
236+73	3- 8 x 3		2.720	0.375	0.100	11.730	0.920	0.150	16.820	0.710	0.125
254+83	4- 10 x 4		2.680	0.378	0.100	11.580	0.904	0.146	16.800	0.701	0.127
260+99	6- 12 x 6		2.720	0.375	0.100	11.730	0.920	0.150	16.820	0.710	0.125
264+99		2-43x 27	2.720	0.375	0.100	11.730	0.920	0.150	16.820	0.710	0.125
279+17	4- 8 x 3		2.720	0.375	0.100	11.730	0.920	0.150	16.820	0.710	0.125
304+13	4- 10 x 4		2.720	0.375	0.100	11.730	0.920	0.150	16.820	0.710	0.125
327+30		1-43x 27	2.650	0.381	0.010	11.460	0.891	0.143	16.940	0.693	0.129
347+26	3- 10 x 3		2.050	0.433	0.092	9.170	0.648	0.080	17.960	0.554	0.160
352+92		2-50x 31	2.050	0.433	0.092	9.170	0.648	0.080	17.960	0.554	0.160
357+26		1-48	1.280	0.383	0.099	11.360	0.880	0.140	16.980	0.688	0.130
369+18		1-72	2.550	0.390	0.098	11.070	0.850	0.132	17.110	0.670	0.134
370+82		1-60	2.550	0.390	0.098	11.070	0.850	0.132	17.110	0.670	0.134

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

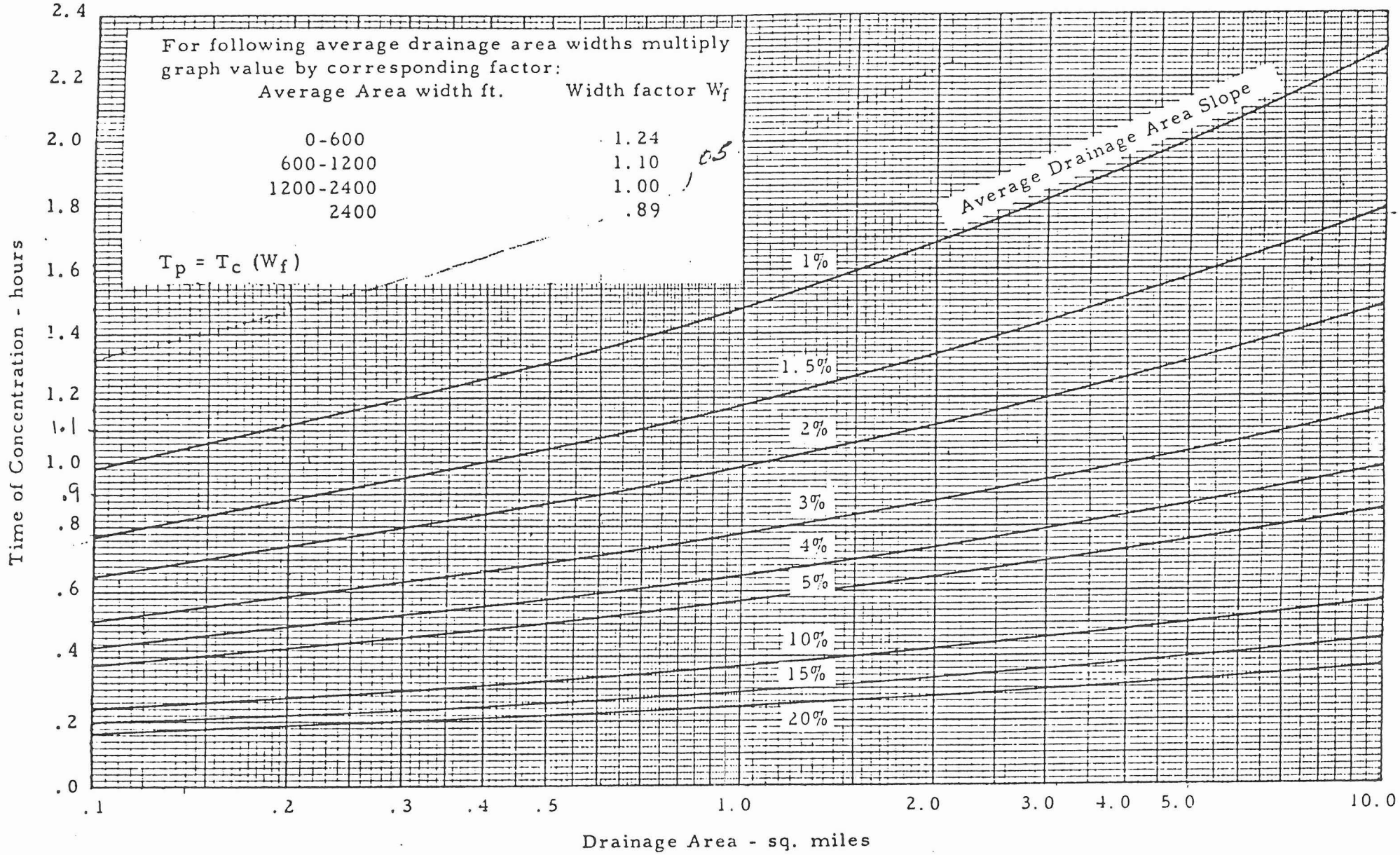


Fig. 2-5

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

Soil Conservation Service

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."

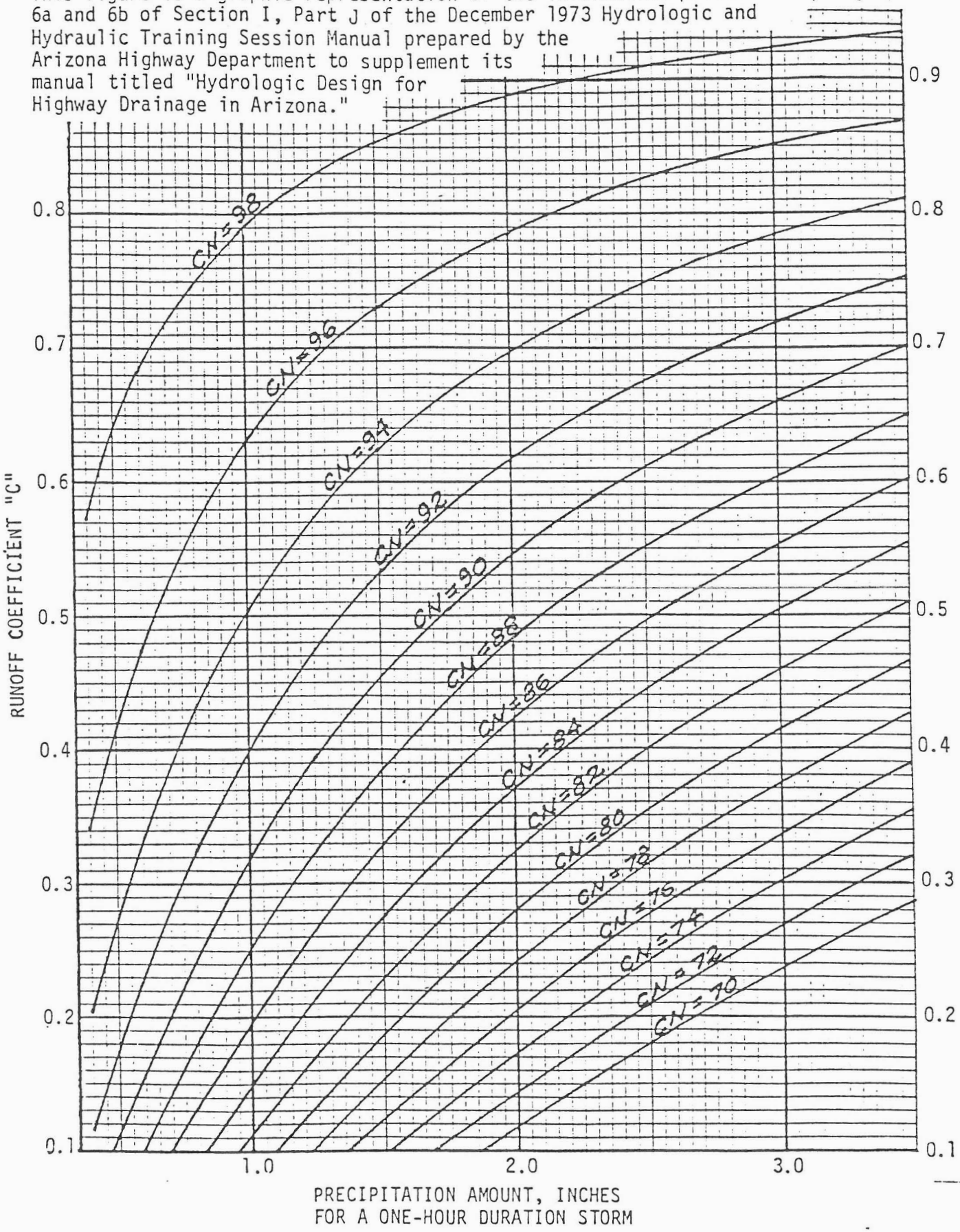
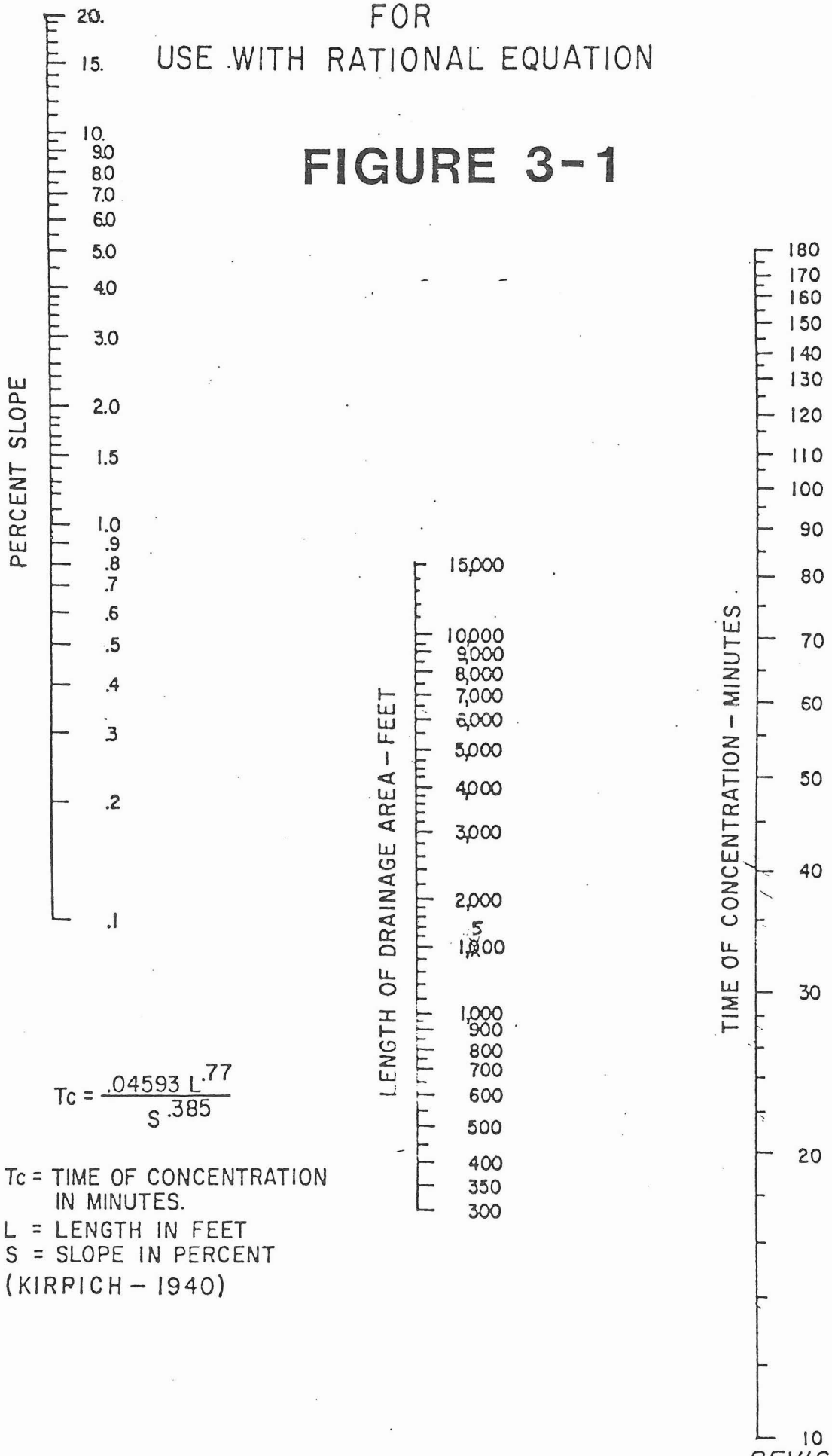


FIGURE 2-21

TIME OF CONCENTRATION FOR USE WITH RATIONAL EQUATION

FIGURE 3-1



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

Tc = TIME OF CONCENTRATION IN MINUTES.
L = LENGTH IN FEET
S = SLOPE IN PERCENT
(KIRPICH – 1940)

REVISED 5-1-75

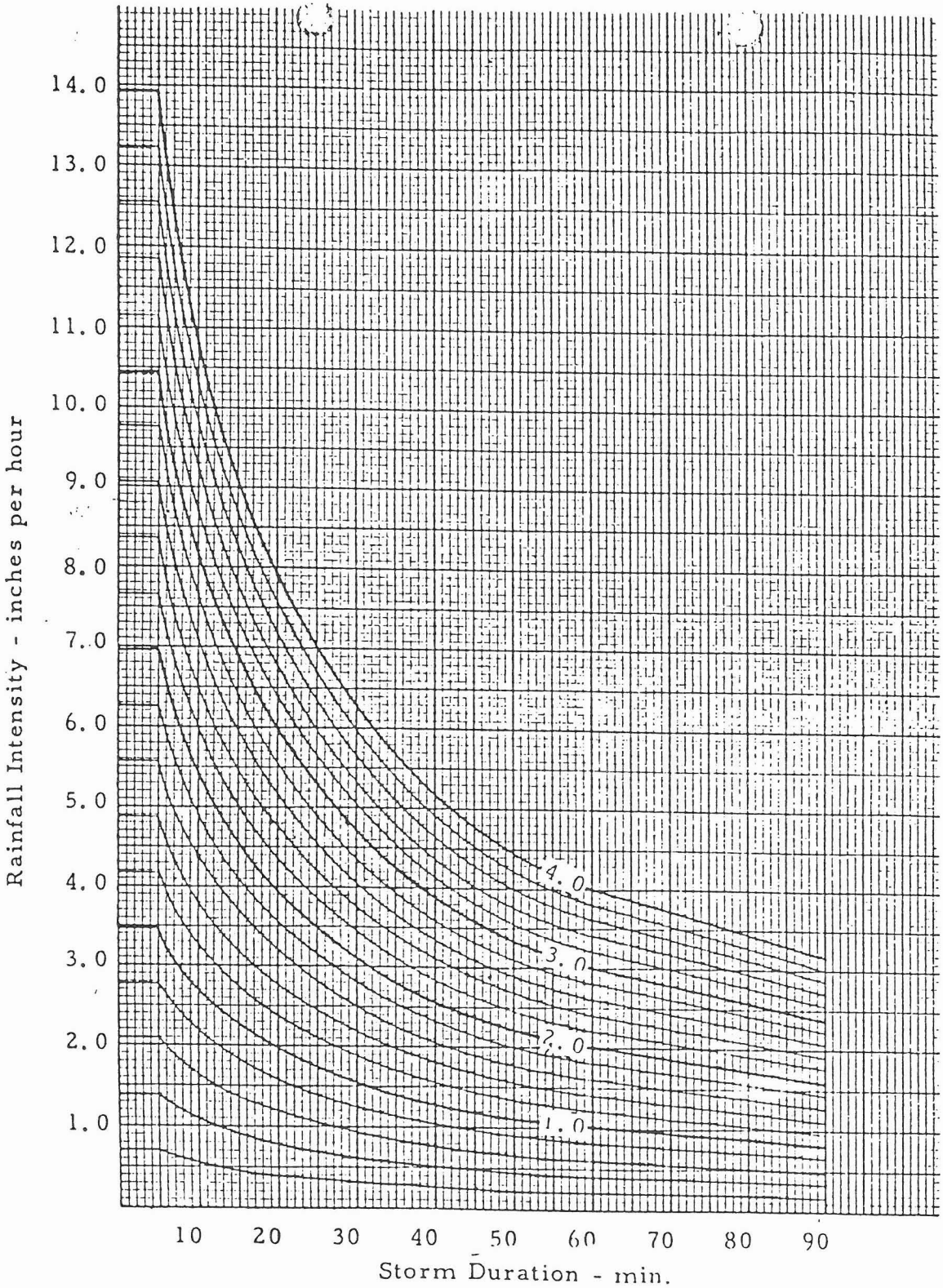


FIGURE 3-2

STANDARD DURATION RAINFALL - INTENSITY CURVES

Based on:
Weather Bureau
Technical Paper No. 4

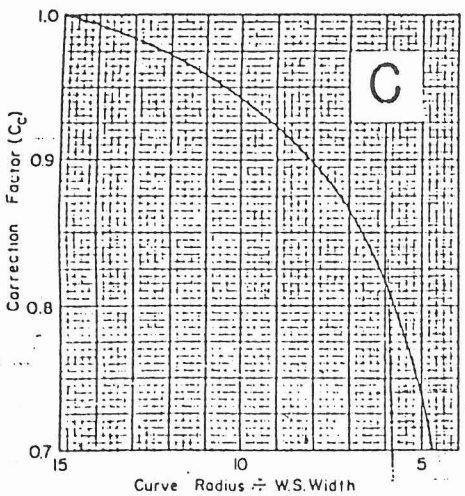
Streets	
Asphaltic	0.70 - 0.95
Concrete	0.80 - 0.95
Gravel roadways & shoulders	0.40 - 0.60
Industrial Areas	
Flat commercial - about 90% of area impervious	0.80
Heavy areas	0.60 - 0.90
Light areas	0.50 - 0.80
Business Areas	
Downtown areas	0.70 - 0.95
Neighborhood areas	0.50 - 0.70
Residential Areas	
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

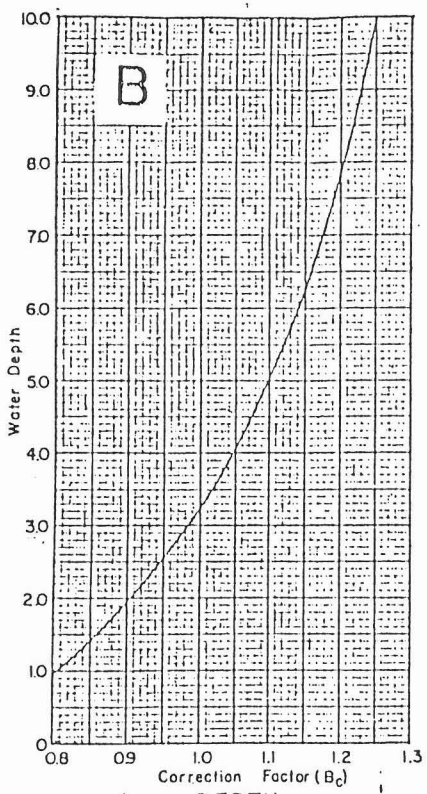
VALUES OF RUNOFF COEFFICIENT C

HYDRAULIC DESIGN: Permissible Velocities, Non-Cohesive Soil

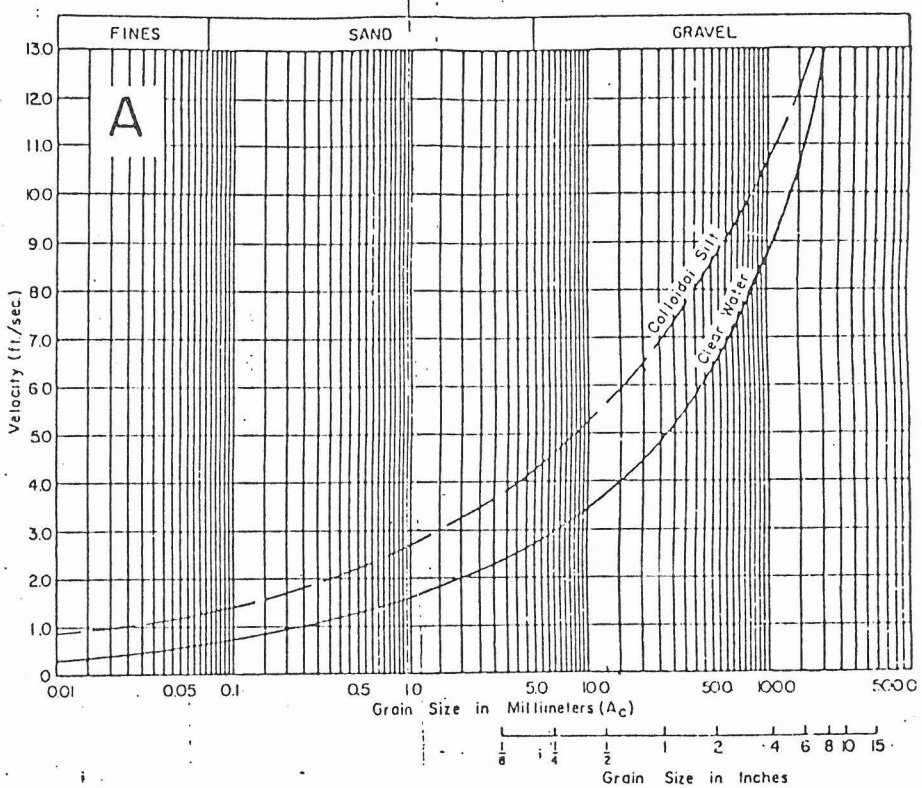
FIG. 6.3



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

HYDROLOGIC DESIGN

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase I
Project No. 850840-6 Station
Name of Stream STA 1+20

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	11	acres
	A_2		acres
	A_3		acres
Drainage Length		2400	feet
Elevation			
Top of Drainage Area		1720	feet
At Structure		1674	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	USBO BUCKEY
Time of Concentration	Tc	14	minutes	
Rainfall Intensity	i	6.0	inches/hour	
Runoff Coefficient	C_1			
	C_2			
	C_3			
Weighted Runoff Coefficient	C	0.43		(C#84)
Peak Discharge Qp = CiA =		28	cfs	

Computed by G.T. Date Dec, 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase I
Project No. 850840-6 Station
Name of Stream STA 4+30

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	19.8	acres
	A_2		acres
	A_3		acres
Drainage Length		2700	feet
Elevation			
Top of Drainage Area		1720	feet
At Structure		1673	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	17	minutes
Rainfall Intensity	i	5.4	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.43	
Peak Discharge Qp = CiA =		46	cfs

Computed by G. T. Date Dec. 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase II
Project No. 850840-6 Station
Name of Stream ← STA 5+50 – 9+50 →

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	86	acres
	A_2		acres
	A_3		acres
Drainage Length		7500	feet
Elevation			
Top of Drainage Area		1810	feet
At Structure		1675	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	35	minutes
Rainfall Intensity	i	3.6	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.43	
Peak Discharge Qp = CiA =		133	cfs

Computed by G. T. Date Dec. 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase I
Project No. 850840-6 Station
Name of Stream STA 16+17

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	23	acres
	A_2		acres
	A_3		acres
Drainage Length		4000	feet
Elevation			
Top of Drainage Area		1740	feet
At Structure		1674	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	23	minutes
Rainfall Intensity	i	4.6	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.43	
Peak Discharge Qp = CiA =		45	cfs

Computed by G.T. Date Dec. 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase I
Project No. 850840-6 Station
Name of Stream STA 22+40 →

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	39	acres
	A_2		acres
	A_3		acres
Drainage Length		2800	feet
Elevation			
Top of Drainage Area		1720	feet
At Structure		1674	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	17	minutes
Rainfall Intensity	i	5.4	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.43	
Peak Discharge Qp = CiA =		91	cfs

Computed by G.T. Date Dec. 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase I
Project No. F508 40-6 Station
Name of Stream → STA 26+06

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	138	acres
	A_2		acres
	A_3		acres
Drainage Length		10000	feet
Elevation			
Top of Drainage Area		1890	feet
At Structure		1669	feet
Drainage Area Slope		2.2	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	41	minutes
Rainfall Intensity	i	3.2	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.43	
Peak Discharge Qp = CiA =		190	cfs

Computed by G.T. Date Dec. 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location
Project No. 850840-6 Station
Name of Stream STA 30+35

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	10.3	acres
	A_2		acres
	A_3		acres
Drainage Length		1800	feet
Elevation			
Top of Drainage Area		1700	feet
At Structure		1666	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	12	minutes
Rainfall Intensity	i	6.4	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.43	
Peak Discharge Qp = CiA =		28	cfs

Computed by G.T. Date Dec. 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase II
Project No. 850840-6 Station
Name of Stream STA 33+09

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	7.5	acres
	A_2		acres
	A_3		acres
Drainage Length		1300	feet
Elevation			
Top of Drainage Area		1690	feet
At Structure		1667	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	9	minutes
Rainfall Intensity	i	7.5	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.43	
Peak Discharge Qp = CiA =		24	cfs

Computed by G.T. Date Dec. 1986

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. 850840-6 Station
Name of Stream (1) STA 36+92 - 38+84

DESIGN DATA:

Design Frequency	100	years
Drainage Area		square miles
Drainage Length		feet
Elevation		
Top of Drainage Area		feet
At Structure		feet
Drainage Area Slope		%
Drainage Width		feet
Width factor W_f		
Vegetative Cover Type		
Vegetative Cover Density		%
Soil Group		
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =		inches
Curve Number			
Runoff	Q =		inches
Time of Concentration	Tc		hours
Time of Peak	$Tp = (Tc)(W_f)$		hours
Peak Discharge	$Qp = \frac{484\ AQ}{Tp} =$		
	=	2627	cfs

SEE HEC-1

50% SPLIT TO (2)
1314

Computed by G.T. Date Dec. 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase I
Project No. 850840-6 Station
Name of Stream → STA 45+39

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	8.9	acres
	A_2		acres
	A_3		acres
Drainage Length		1300	feet
Elevation			
Top of Drainage Area		1680	feet
At Structure		1652	feet
Drainage Area Slope		2.1	%
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	7.5	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.43	
Peak Discharge Qp = CiA =		29	cfs

Computed by G. T. Date Dec. 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase I
Project No. 850840-6 Station
Name of Stream STA 47+60 → 51+76 →

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	48.2	acres
	A_2		acres
	A_3		acres
Drainage Length		3500	feet
Elevation			
Top of Drainage Area		1740	feet
At Structure		1650	feet
Drainage Area Slope		2.5	%
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	5.5	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.43	
Peak Discharge Qp = CiA =		114	cfs

Computed by G.T. Date Dec. 1986

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 I
Project No. 850840-6 Station
Name of Stream (2) ST+ 67+33 → DETENTION

DESIGN DATA:

Design Frequency	100	years
Drainage Area		square miles
Drainage Length		feet
Elevation		
Top of Drainage Area		feet
At Structure		feet
Drainage Area Slope		%
Drainage Width		feet
Width factor W_f		
Vegetative Cover Type		
Vegetative Cover Density		%
Soil Group		
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =		inches
Curve Number			
Runoff	Q =		inches
Time of Concentration	Tc		hours
Time of Peak	$Tp = (Tc)(W_f)$		hours
Peak Discharge	$Qp = \frac{484\ AQ}{Tp} =$		
	=	948	cfs

SEE HEC-1

+SPLIT (1) 2262

Computed by G. T. Date Dec. 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase I
Project No. 850840-6 Station
Name of Stream STA 74+15 DETENTION

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	134.3	acres
	A_2		acres
	A_3		acres
Drainage Length		6600	feet
Elevation			
Top of Drainage Area		1850	feet
At Structure		1653	feet
Drainage Area Slope		3.2	%
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	4.2	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.43	
Peak Discharge Qp = CiA =		242	cfs

Computed by G.T. Date Dec. 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase I
Project No. 850840-6 Station
Name of Stream STA 84+67

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	375	acres
	A_2		acres
	A_3		acres
Drainage Length		9000	feet
Elevation			
Top of Drainage Area		2000	feet
At Structure		1629	feet
Drainage Area Slope		4.1	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	30	minutes
Rainfall Intensity	i	4.0	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.43	
Peak Discharge Qp = CiA =		645	cfs

Computed by G.T. Date Dec. 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase I
Project No. 850840-6 Station
Name of Stream STA 95+00 – DETENTION

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	184	acres
	A_2		acres
	A_3		acres
Drainage Length		8300	feet
Elevation			
Top of Drainage Area		1700	feet
At Structure		1618	feet
Drainage Area Slope		1	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	48	minutes
Rainfall Intensity	i	2.8	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.43	
Peak Discharge Qp = CiA =		221	cfs

Computed by G.T. Date Dec. 1986

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 I
Project No. 850840-6 Station
Name of Stream (3) STA 99+09 → DETENT.

DESIGN DATA:

Design Frequency	100	years
Drainage Area		square miles
Drainage Length		feet
Elevation		
Top of Drainage Area		feet
At Structure		feet
Drainage Area Slope		%
Drainage Width		feet
Width factor W_f		
Vegetative Cover Type		
Vegetative Cover Density		%
Soil Group		
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =		inches
Curve Number			
Runoff	Q =		inches
Time of Concentration	Tc		hours
Time of Peak	$Tp = (Tc)(W_f)$		hours
Peak Discharge	$Qp = \frac{484\ AQ}{Tp} =$		
	=	4492	cfs SEE HEC-1

Computed by G.T. Date Dec. 1996

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase I
Project No. 850840-6 Station
Name of Stream STA 106+89 → DETENTION

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	29.6	acres
	A_2		acres
	A_3		acres
Drainage Length		4300	feet
Elevation			
Top of Drainage Area		1680	feet
At Structure		1613	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	4.4	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.43	
Peak Discharge Qp = CiA =		56	cfs

Computed by G.T. Date Dec. 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase I
Project No. 850840-6 Station
Name of Stream STA 110+99

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	6.4	acres
	A_2		acres
	A_3		acres
Drainage Length		1600	feet
Elevation			
Top of Drainage Area		1660	feet
At Structure		1600	feet
Drainage Area Slope		3.1	%
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	0.43	
Peak Discharge Qp = CiA =		20	cfs

Computed by G.T. Date Dec. 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase II
Project No. 850840-6 Station
Name of Stream STA 114+09

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	11.5	acres
	A_2		acres
	A_3		acres
Drainage Length		1800	feet
Elevation			
Top of Drainage Area		1660	feet
At Structure		1608	feet
Drainage Area Slope		2.9	%
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	0.43	
Peak Discharge Qp = CiA =		33	cfs

Computed by G.T. Date Dec. 1996

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase I
Project No. 850840-6 Station
Name of Stream STA 116+05

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	31.6	acres
	A_2		acres
	A_3		acres
Drainage Length		4600	feet
Elevation			
Top of Drainage Area		1680	feet
At Structure		1604	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	25	minutes
Rainfall Intensity	i	4.4	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.43	
Peak Discharge Qp = CiA =		60	cfs

Computed by G.T. Date Dec. 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase II
Project No. 850840-6 Station
Name of Stream STA 124+23 → 127+67 →

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	56.9	acres
	A_2		acres
	A_3		acres
Drainage Length		6200	feet
Elevation			
Top of Drainage Area		1720	feet
At Structure		1608	feet
Drainage Area Slope		1.9	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.5	inches
Time of Concentration	Tc	80	minutes
Rainfall Intensity	i	4.0	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.43	
Peak Discharge Qp = CiA =		98	cfs

Computed by G.T. Date Dec. 1956

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase I
Project No. 850840-6 Station
Name of Stream STA 136+16 → DETENT

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	82.6	acres
	A_2		acres
	A_3		acres
Drainage Length		9000	feet
Elevation			
Top of Drainage Area		1740	feet
At Structure		1579	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	43	minutes
Rainfall Intensity	i	3.1	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.43	
Peak Discharge Qp = CiA =		110	cfs

Computed by G. T. Date Dec. 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase I
Project No. 850840-6 Station
Name of Stream STA 136+16 →

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	44.7	acres
	A_2		acres
	A_3		acres
Drainage Length		6500	feet
Elevation			
Top of Drainage Area		1700	feet
At Structure		1599	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	34	minutes
Rainfall Intensity	i	3.7	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.43	
Peak Discharge Qp = CiA =		71	cfs

Computed by G.T. Date Dec. 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase II
Project No. 850840-6 Station
Name of Stream STA 146+50

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	372	acres
	A_2		acres
	A_3		acres
Drainage Length		13500	feet
Elevation			
Top of Drainage Area		2000	feet
At Structure		1584	feet
Drainage Area Slope		3	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	46	minutes
Rainfall Intensity	i	3.0	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.43	
Peak Discharge Qp = CiA =		480	cfs

Computed by G.T. Date Dec. 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase I
Project No. 850840-6 Station
Name of Stream STA 149+50 → 154+42

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	59.7	acres
	A_2		acres
	A_3		acres
Drainage Length		6500	feet
Elevation			
Top of Drainage Area		1700	feet
At Structure		1580	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	32	minutes
Rainfall Intensity	i	3.8	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.43	
Peak Discharge Qp = CiA =		98	cfs

Computed by G.T. Date Dec. 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase I
Project No. 850840-6 Station
Name of Stream STA 154+43 →

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	57.9	acres
	A_2		acres
	A_3		acres
Drainage Length		5700	feet
Elevation			
Top of Drainage Area		1680	feet
At Structure		1575	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	29	minutes
Rainfall Intensity	i	4.0	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.43	
Peak Discharge Qp = CiA =		101	cfs

Computed by G.T. Date Dec, 1996

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase I
Project No. 850840-6 Station
Name of Stream → STA 171+00 →

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	41.3	acres
	A_2		acres
	A_3		acres
Drainage Length		4000	feet
Elevation			
Top of Drainage Area		1620	feet
At Structure		1560	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	24	minutes
Rainfall Intensity	i	4.5	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.45	
Peak Discharge Qp = CiA =		80	cfs

Computed by G.T. Date Dec. 1996

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 I
Project No. 850840-6 Station
Name of Stream (4) STA 182+00 → DET.

DESIGN DATA:

Design Frequency	100	years
Drainage Area		square miles
Drainage Length		feet
Elevation		
Top of Drainage Area		feet
At Structure		feet
Drainage Area Slope		%
Drainage Width		feet
Width factor W_f		
Vegetative Cover Type		
Vegetative Cover Density		%
Soil Group		
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =		inches
Curve Number			
Runoff	Q =		inches
Time of Concentration	Tc		hours
Time of Peak	$Tp = (Tc)(W_f)$		hours
Peak Discharge	$Qp = \frac{484\,AQ}{Tp} =$		
	=	4198	cfs SEE HEC 1

Computed by G.T. Date Dec, 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase I
Project No. 850840-6 Station
Name of Stream STA 197+74

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	47.7	acres
	A_2		acres
	A_3		acres
Drainage Length		5200	feet
Elevation			
Top of Drainage Area		1800	feet
At Structure		1535	feet
Drainage Area Slope		51	%
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	0.43	
Peak Discharge Qp = CiA =		107	cfs

Computed by G. T. Date Dec. 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase I
Project No. 850840-6 Station
Name of Stream STA 204+00 DET.

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	192.8	acres
	A_2		acres
	A_3		acres
Drainage Length		9000	feet
Elevation			
Top of Drainage Area		1900	feet
At Structure		1523	feet
Drainage Area Slope		4.1	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	30	minutes
Rainfall Intensity	i	3.9	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.43	
Peak Discharge Qp = CiA =		323	cfs

Computed by G. T. Date Dec. 1986

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 I
Project No. 850840-6 Station
Name of Stream (5)

DESIGN DATA:

Design Frequency	100	years
Drainage Area		square miles
Drainage Length		feet
Elevation		
Top of Drainage Area		feet
At Structure		feet
Drainage Area Slope		%
Drainage Width		feet
Width factor W_f		
Vegetative Cover Type		
Vegetative Cover Density		%
Soil Group		
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =		inches
Curve Number			
Runoff	Q =		inches
Time of Concentration	Tc		hours
Time of Peak	$Tp = (Tc)(W_f)$		hours
Peak Discharge	$Qp = \frac{484\ AQ}{Tp} =$		
	=	1010	cfs

SEE HEC-1

Computed by G. T. Date Dec. 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase I
Project No. 850840-6 Station
Name of Stream STA 226+00 →

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	138	acres
	A_2		acres
	A_3		acres
Drainage Length		2000	feet
Elevation			
Top of Drainage Area		1540	feet
At Structure		1578	feet
Drainage Area Slope		61	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	16	minutes
Rainfall Intensity	i	5.6	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.43	
Peak Discharge Qp = CiA =		33	cfs

Computed by G. T. Date Dec. 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase II
Project No. 850840-6 Station
Name of Stream STA 236+72

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	267.2	acres
	A_2		acres
	A_3		acres
Drainage Length		9200	feet
Elevation			
Top of Drainage Area		2200	feet
At Structure		1447	feet
Drainage Area Slope		7.6	%
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	0.43	
Peak Discharge Qp = CiA =		517	cfs

Computed by G.T. Date Dec. 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase I
Project No. 850840-6 Station
Name of Stream STA 247+00

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	135.9	acres
	A_2		acres
	A_3		acres
Drainage Length		5800	feet
Elevation			
Top of Drainage Area		1600	feet
At Structure		1429	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	30	minutes
Rainfall Intensity	i	3.9	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.43	
Peak Discharge Qp = CiA =		228	cfs

Computed by G.T. Date Dec. 1986

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 I
Project No. 850 AO-6 Station
Name of Stream (6) STA 254+00

DESIGN DATA:

Design Frequency	100	years
Drainage Area		square miles
Drainage Length		feet
Elevation		
Top of Drainage Area		feet
At Structure		feet
Drainage Area Slope		%
Drainage Width		feet
Width factor W_f		
Vegetative Cover Type		
Vegetative Cover Density		%
Soil Group		
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =		inches
Curve Number			
Runoff	Q =		inches
Time of Concentration	Tc		hours
Time of Peak	$Tp = (Tc)(W_f)$		hours
Peak Discharge	$Qp = \frac{484\ AQ}{Tp} =$		
	=	2283	cfs SEE HEC-1

Computed by G.T. Date Dec. 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase I
Project No. 850840-6 Station
Name of Stream STA 257+00

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	28.4	acres
	A_2		acres
	A_3		acres
Drainage Length		3000	feet
Elevation			
Top of Drainage Area		1550	feet
At Structure		1481	feet
Drainage Area Slope		2.3	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	16	minutes
Rainfall Intensity	i	5.6	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.43	
Peak Discharge Qp = CiA =		68	cfs

Computed by G. T. Date Dec. 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase II
Project No. 850840-6 Station
Name of Stream STA 261+00

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	91.8	acres
	A_2		acres
	A_3		acres
Drainage Length		2700	feet
Elevation			
Top of Drainage Area		1800	feet
At Structure		1451	feet
Drainage Area Slope		4.1	%
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	0.43	
Peak Discharge Qp = CiA =		170	cfs

Computed by G.T. Date Dec. 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase II
Project No. 850840-6 Station
Name of Stream STA 272+00

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	261.7	acres
	A_2		acres
	A_3		acres
Drainage Length		10300	feet
Elevation			
Top of Drainage Area		2650	feet
At Structure		1477	feet
Drainage Area Slope		4.1	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	33	minutes
Rainfall Intensity	i	3.7	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.43	
Peak Discharge Qp = CiA =		416	cfs

Computed by G.T. Date Dec. 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase I
Project No. 850840-6 Station
Name of Stream STA 279+00

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	105.1	acres
	A_2		acres
	A_3		acres
Drainage Length		4800	feet
Elevation			
Top of Drainage Area		1580	feet
At Structure		1470	feet
Drainage Area Slope		2.1	%
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	4.6	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.43	
Peak Discharge Qp = CiA =		209	cfs

Computed by G.T. Date Dec. 1986

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 I
Project No. 850840-6 Station
Name of Stream (7) Sta 305+00

DESIGN DATA:

Design Frequency	100	years
Drainage Area		square miles
Drainage Length		feet
Elevation		
Top of Drainage Area		feet
At Structure		feet
Drainage Area Slope		%
Drainage Width		feet
Width factor W_f		
Vegetative Cover Type		
Vegetative Cover Density		%
Soil Group		
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =		inches
Curve Number			
Runoff	Q =		inches
Time of Concentration	Tc		hours
Time of Peak	$Tp = (Tc)(W_f)$		hours
Peak Discharge	$Qp = \frac{484\,AQ}{Tp} =$		
	=	1185	cfs SEE HEC-1

Computed by G. T. Date Dec. 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase I
Project No. 850240-6 Station
Name of Stream STA 020+00

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	826	acres
	A_2		acres
	A_3		acres
Drainage Length		3000	feet
Elevation			
Top of Drainage Area		1560	feet
At Structure		1470	feet
Drainage Area Slope		3.0	%
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	5.8	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.43	
Peak Discharge Qp = CiA =		206	cfs

Computed by G.T. Date Dec. 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase I
Project No. 850840-6 Station
Name of Stream STA 339+00

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	26.7	acres
	A_2		acres
	A_3		acres
Drainage Length		5900	feet
Elevation			
Top of Drainage Area		1600	feet
At Structure		1474	feet
Drainage Area Slope		3.2	%
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	0.43	
Peak Discharge Qp = CiA =		85	cfs

Computed by G.T. Date Dec. 1986

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 I
Project No. 850840-6 Station
Name of Stream (8) STA 350+00

DESIGN DATA:

Design Frequency	100	years
Drainage Area		square miles
Drainage Length		feet
Elevation		
Top of Drainage Area		feet
At Structure		feet
Drainage Area Slope		%
Drainage Width		feet
Width factor W_f		
Vegetative Cover Type		
Vegetative Cover Density		%
Soil Group		
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =		inches
Curve Number			
Runoff	Q =		inches
Time of Concentration	Tc		hours
Time of Peak	$Tp = (Tc)(W_f)$		hours
Peak Discharge	$Qp = \frac{484\ AQ}{Tp} =$		
	=	2545	cfs SEE HEC-1

Computed by G. T. Date Dec. 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase II
Project No. 850840-6 Station
Name of Stream STA 368+00

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	98.2	acres
	A_2		acres
	A_3		acres
Drainage Length		3000	feet
Elevation			
Top of Drainage Area		1750	feet
At Structure		1445	feet
Drainage Area Slope		10	%
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	0.43	
Peak Discharge Qp = CiA =		474	cfs

Computed by G.T. Date Dec. 1986

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Sun Valley Parkway County Maricopa
Location Phase I
Project No. 850840-6 Station
Name of Stream STA 379+00

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	27.5	acres
	A_2		acres
	A_3		acres
Drainage Length		2000	feet
Elevation			
Top of Drainage Area		1460	feet
At Structure		1437	feet
Drainage Area Slope		1.1	%
Precipitation			
P = 6-hour			inches
P = 24-hour			inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		2.55	inches
Time of Concentration	Tc	16	minutes
Rainfall Intensity	i	5.7	inches/hour
Runoff Coefficient	C_1		
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.43	
Peak Discharge Qp = CiA =		67	cfs

Computed by G. T. Date Dec. 1986

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 I
Project No. 850840-6 Station
Name of Stream (46) STA 396+00

DESIGN DATA:

Design Frequency	100	years
Drainage Area		square miles
Drainage Length		feet
Elevation		
Top of Drainage Area		feet
At Structure		feet
Drainage Area Slope		%
Drainage Width		feet
Width factor W_f		
Vegetative Cover Type		
Vegetative Cover Density		%
Soil Group		
Precipitation		
P = 6 hour =		inches
P = 24 hour =		inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =		inches
Curve Number			
Runoff	Q =		inches
Time of Concentration	Tc		hours
Time of Peak	Tp = (Tc)(W_f)		hours
Peak Discharge	$Qp = \frac{484\ AQ}{Tp} =$		
	=	377	cfs SEE HEC-1

Computed by G. T. Date Dec. 1986
Rev. Apr. '87

CULVERTS

PROJECT: SUN VALLEY PKWY TH 1.

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q100 = 154 *

10/3 CBC

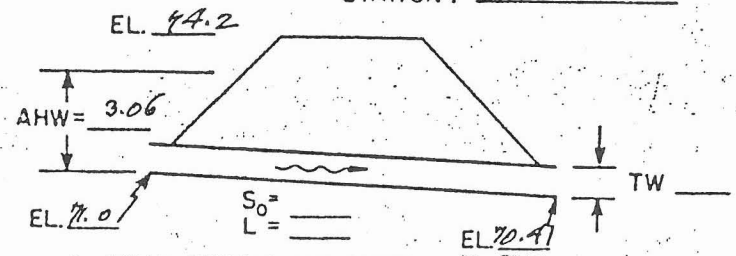
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 4+30.50



MEAN STREAM VELOCITY = 3.52

MAX. STREAM VELOCITY = 5.28

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
#DWL'S	154	10/3	1.02	3.06	0.4	1.06	1.96	2.5	1.6	2.5	0.6	2.96	2.06	7.9		

SUMMARY & RECOMMENDATIONS: * COLLECTING FLOWS FROM W & E

PROJECT: SUN VALLEY PKWY PHASE I

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 189

TRIPLE (50"+31") 49"x33" CSP

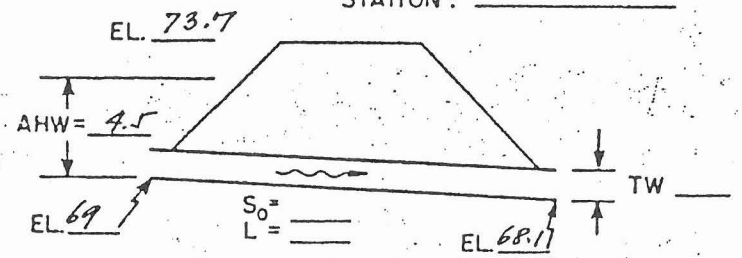
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 16+1950



MEAN STREAM VELOCITY = 2.77

MAX. STREAM VELOCITY = 4.16

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	189		1.34	3.70	0.4	3.06	1.93	2.34	1.90	2.34	0.9	4.5	4.5	8.2		

SUMMARY & RECOMMENDATIONS: INTERCEPTING FLOW WEST-EAST

PROJECT: SUN VALLEY PKWY. PHASE I.

DESIGNER: GT

DATE:

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = ~~250~~ 230

10' x 3' CBC

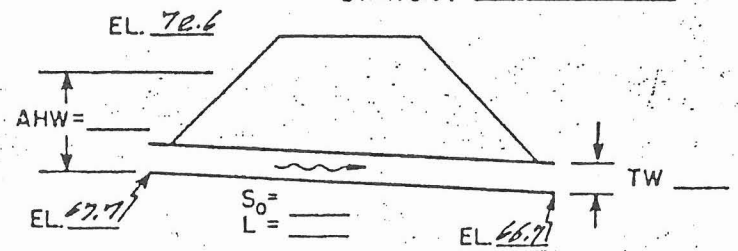
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 26+06.25



MEAN STREAM VELOCITY = 5.05

MAX. STREAM VELOCITY = 7.54

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				
HEADWS	~~250~~ 230		1.43	4.30	0.4	1.61	2.7	2.85	2.2	2.85	1.0	3.46	4.30	8.5		

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY PHASE I

DESIGNER: BT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

$Q_{100} = 48$

Dble (50" x 31") 49" + 33" CCP

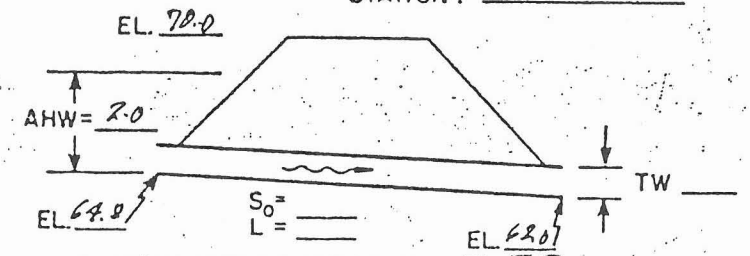
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 30+3550



MEAN STREAM VELOCITY = 2.59

MAX. STREAM VELOCITY = 3.89

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	2x24		0.7	2.0	0.4	0.46	1.6	2.17	1.3	2.17	2.0	0.62	2.0	2.7		

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY. PHASE I.

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

$Q_{100} = 15$

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

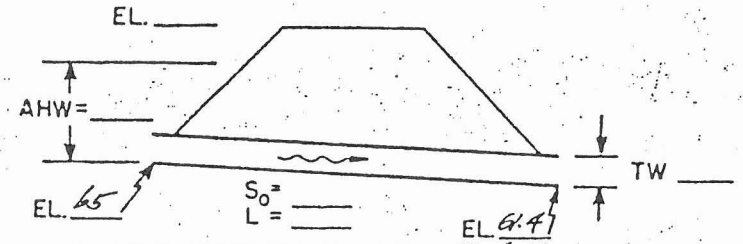
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 33+07.50



MEAN STREAM VELOCITY = 2.67

MAX. STREAM VELOCITY = 4.0

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.	15		1.3	2.0	0.5	4.02	1.11	1.30	0.9	1.30	3.6	1.72	2.0	7.5		

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY. PHASE I.

DESIGNER: CJ

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 1100

Six 10/4 CBC

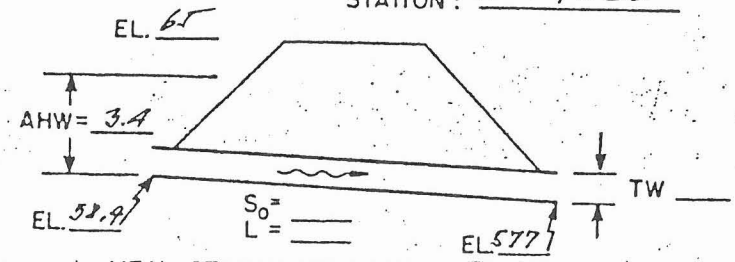
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 36+9250



MEAN STREAM VELOCITY = 5.10

MAX. STREAM VELOCITY = 7.65

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	1100		0.85	3.4	0.4	0.58	2.3	2.65	2.3	2.65	0.7	2.53	3.4	7.9		

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY. PH. I.

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 300

Table 10/3 CRC

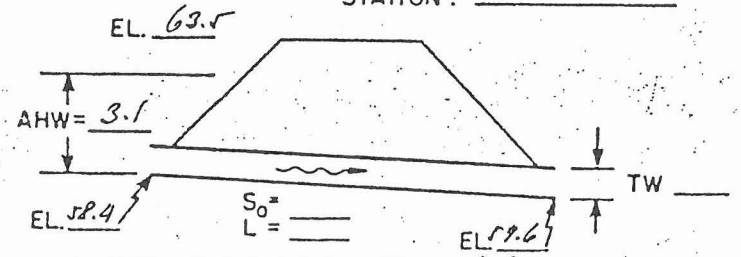
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 38+84.50



MEAN STREAM VELOCITY = 4.60

MAX. STREAM VELOCITY = 6.90

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
HDW's	300		1.03	3.1	0.4	~~[illegible]~~	2.0	2.5	1.9	2.5	0.8	~~[illegible]~~	3.1	7.5		
						0.71						2.41				

SUMMARY & RECOMMENDATIONS:

3.1

OR 49+39

PROJECT: SUN VALLEY PKWY I. Ph.

DESIGNER: CT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 29

10/8 CBC

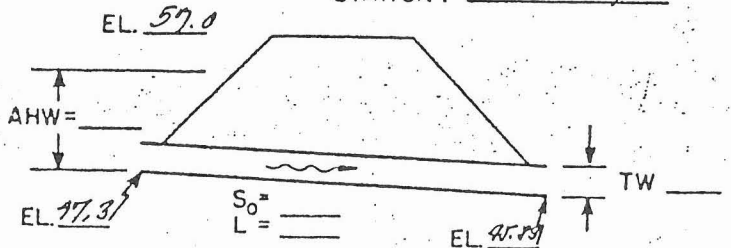
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 45+39



MEAN STREAM VELOCITY = 3.63

MAX. STREAM VELOCITY = 5.45

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	29				0.4		0.7				1.47			4.1		

SUMMARY & RECOMMENDATIONS:

CATTLE CROSSING

PROJECT: SUN VALLEY PKWY PHASE I

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 30

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

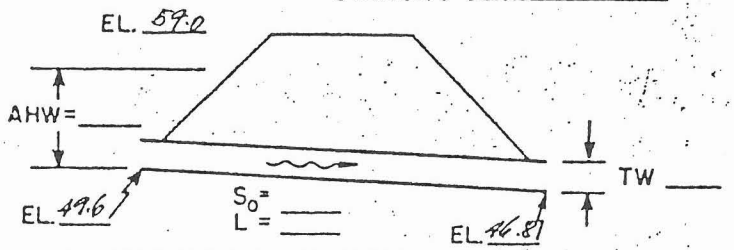
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 47+6025



MEAN STREAM VELOCITY = 3.84

MAX. STREAM VELOCITY = 5.76

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.	30		~~0.67~~	2.75	0.5	3.05	1.41	1.56	1.2	1.56	2.8	1.89	2.75	6.5		
			1.60													

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY PHASE I.

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

$Q_{100} = 28$

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

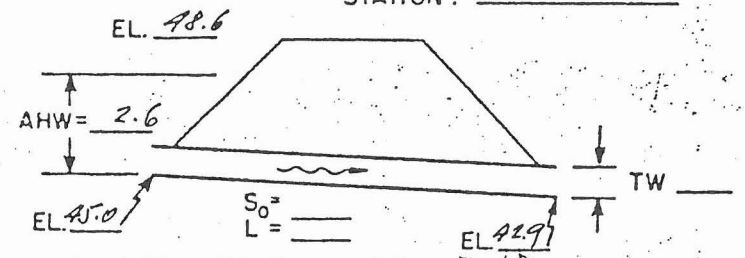
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 51+ 7650



MEAN STREAM VELOCITY = 3.18

MAX. STREAM VELOCITY = 4.71

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	28		1.55	2.6	0.5	2.57	1.4	1.53	1.3	1.53	2.1	1.60	2.6	7.0		

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY PHASE I

DESIGNER: BT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 1380

5 - 12/4 CBC

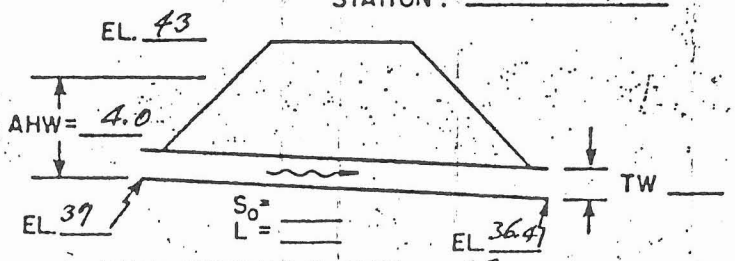
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 64+99



MEAN STREAM VELOCITY = 4.0

MAX. STREAM VELOCITY = 6.0

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	1380		1.0	4.0	0.4	0.76	2.65	3.37	2.3	3.37	0.6	3.53	4.0	8.1		

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY PHASE I

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 1140

5-12/3 CBC

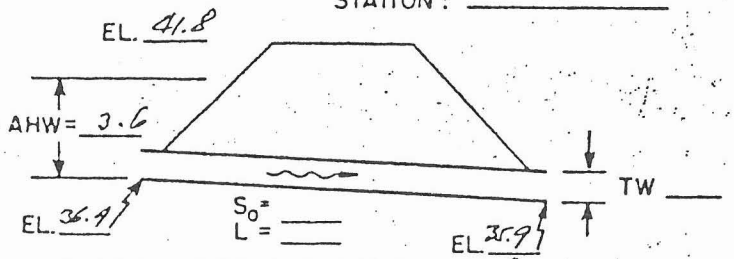
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 67+33



MEAN STREAM VELOCITY = 5.6

MAX. STREAM VELOCITY = 8.4

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	1140		1.2	3.6	0.4	~~3.4~~ 1.15	2.3	2.65	2.1	2.65	0.5	3.3	3.6	8.2		

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY. PHASE I.

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 840

4-10/3 CBC

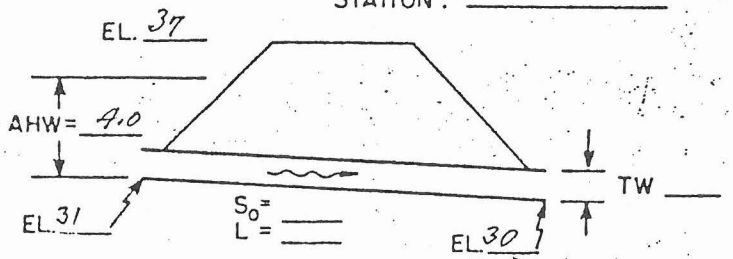
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 74+15



MEAN STREAM VELOCITY = 5.8

MAX. STREAM VELOCITY = 8.7

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	840		1.33	4.0	0.4	1.47	2.4	2.7	2.3	2.7	1.0	3.7	4.0	8.7		

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY. PHASE I.

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q100 = 160

10/3 CBC

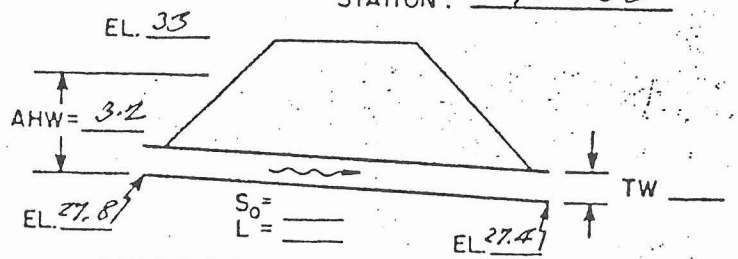
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 79+ 2150



MEAN STREAM VELOCITY = 3.09

MAX. STREAM VELOCITY = 4.64

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	160		1.06	3.2	0.4	0.83	2.0	2.5	17	2.5	0.4	2.93	3.2	8.0		

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY. PHASE I.

DESIGNER: GS

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Qdes = 800

4- 10/3 CBC

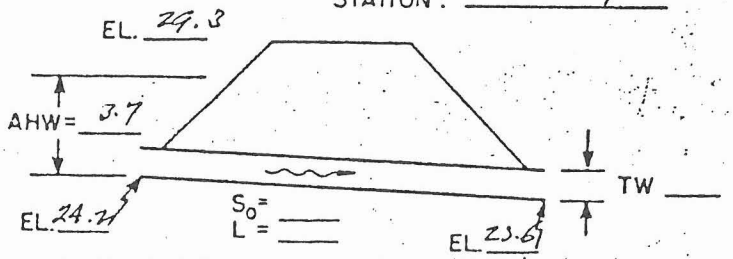
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 84+67



MEAN STREAM VELOCITY = 5.01

MAX. STREAM VELOCITY = 7.52

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				
HEADWL	800		1.23	3.7	0.4	1.92	2.35	2.65	2.3	2.65	0.6	3.38	3.7	8.5		

SUMMARY & RECOMMENDATIONS:

PROJECT: SON VALLEY PKWY PHASE I.

DESIGNER: OS

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

$Q_{100} = 150$

10/3 CBC

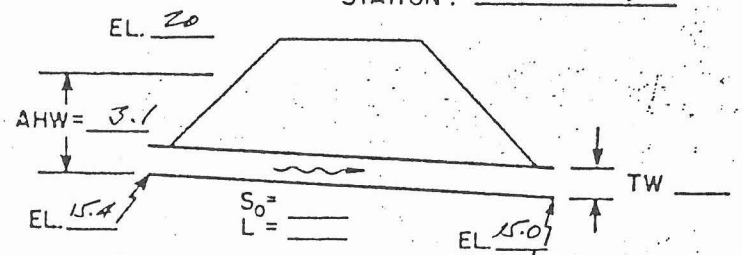
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 99+09.75



MEAN STREAM VELOCITY = 3.9

MAX. STREAM VELOCITY = 5.87

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	150		1.03	3.1	0.4	1.72	2.0	2.5	1.9	2.5	0.4	2.8	3.1	7.5		

SUMMARY & RECOMMENDATIONS:

PROJECT: SON VALLEY PKWY. PHASE I

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 2016

6-12/4 CBC

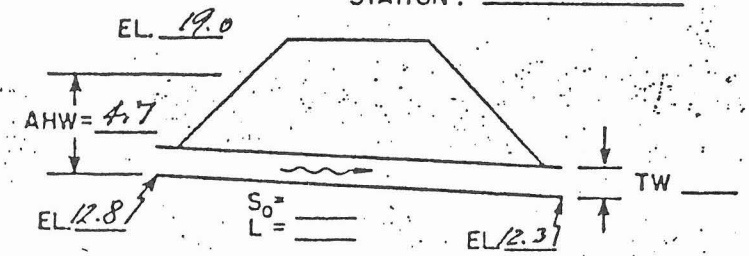
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 102+17



MEAN STREAM VELOCITY = 5.3

MAX. STREAM VELOCITY = 8.0

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
HOWLS	2016		1.17	4.7	.04	1.27	3.0	3.5	2.9	3.5	0.5	4.27	4.7	9.3		

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY PHASE I

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 1944

6 - 12/4 CBC

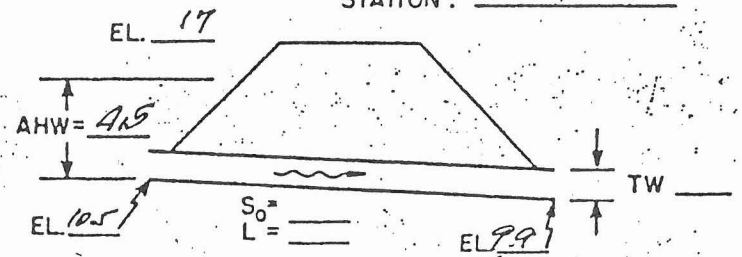
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 106+83.50



MEAN STREAM VELOCITY = 2.6

MAX. STREAM VELOCITY = 3.9

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
HEADWS	1944		1.12	4.5	0.4	1.19	2.8	3.4	2.7	3.4	0.6	3.99	4.5	9.6		

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY. PHASE I

DESIGNER: GT

DATE: 8-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 1800

5-12/4 CBC

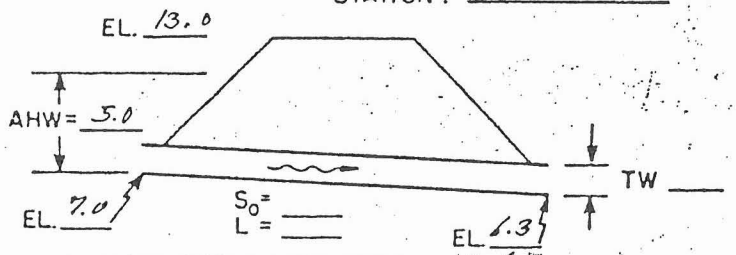
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 110+99



MEAN STREAM VELOCITY = 10.63

MAX. STREAM VELOCITY = 15.95

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	1800		1.25	5'	0.4	1.53	3.1	3.55	3.0	3.55	0.7	4.38	5'	9.6		

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY. PHASE I

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

$Q_{100} = 30$

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

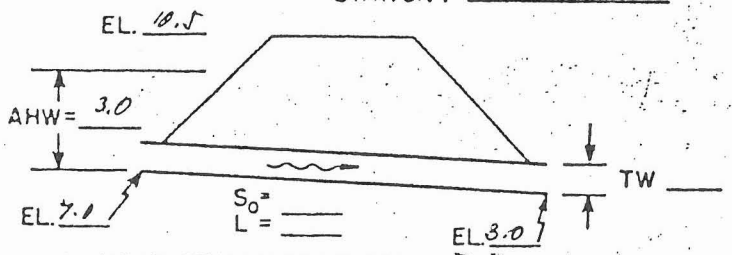
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 114+09



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				
END SEC	30		1.6	3.0	0.5	2.96	1.45	1.63	1.3	1.63	4.0	0.59	3.0	8.3		

SUMMARY & RECOMMENDATIONS:

PROJECT: Sun Valley Pkwy Ph. I

DESIGNER: G.T.

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 650 (60 *)

10 x 8 CBC

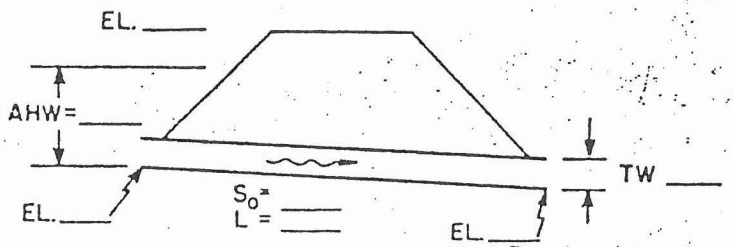
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 116+0550



MEAN STREAM VELOCITY = 3.19

MAX. STREAM VELOCITY = 4.79

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	650		1.03	8.3			5.0							13.0		
	60			—										—		

SUMMARY & RECOMMENDATIONS:

CATTLE CROSSING

* ACT Q = 60 cfs - 650 MAX. CAP.

PROJECT: SON VALLEY PKWY. PHASE I

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 80

Dble (43"x27") 42"x29" CSP

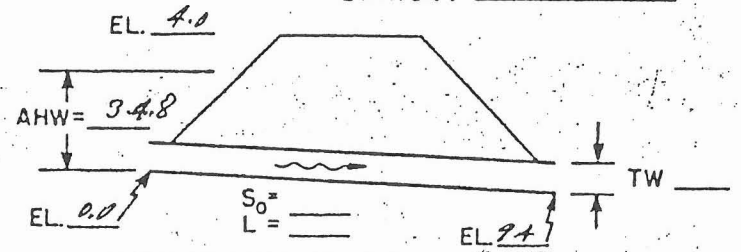
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 124+23



MEAN STREAM VELOCITY = 4.39

MAX. STREAM VELOCITY = 6.59

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				
HDWL	2+40		1.33	3.0	0.4	2.18	1.76	1.90	1.4	1.90	0.6	3.48	3.48	8.9		

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY. PHASE I.

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 20

(36"x22") 35"x 24" CEP

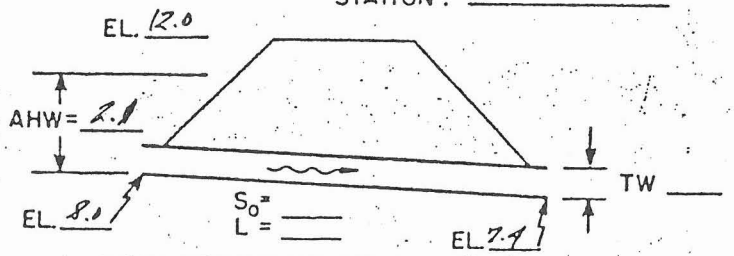
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 127+67



MEAN STREAM VELOCITY = 2.4

MAX. STREAM VELOCITY = 3.6

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
END SECT	20		1.1	2.0	0.5	1.25	1.15	1.48	1.1	1.48	0.6	2.1	2.1	6.6		

SUMMARY & RECOMMENDATIONS:

PROJECT: SON VALLEY PKWY. PHASE I.

DESIGNER: BT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

$Q_{100} = 90$

3- (43" x 29") 42" x 29" CSP

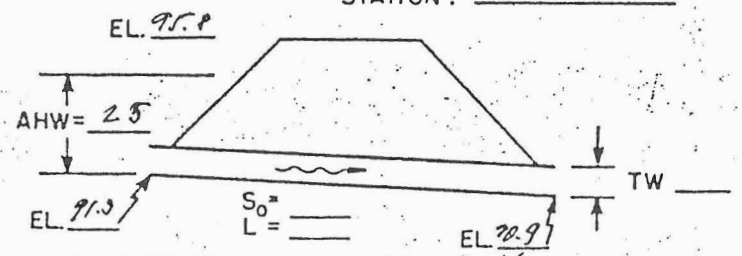
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 136+1650



MEAN STREAM VELOCITY = 3.16

MAX. STREAM VELOCITY = 4.74

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	3x80		1.02	2.3	0.4	1.15	1.32	1.78	1.2	1.78	0.4	2.5	2.5	7.5		

SUMMARY & RECOMMENDATIONS:

PROJECT: SON VALLEY PKWY. PHASE I

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 456

3-8/3 CBC

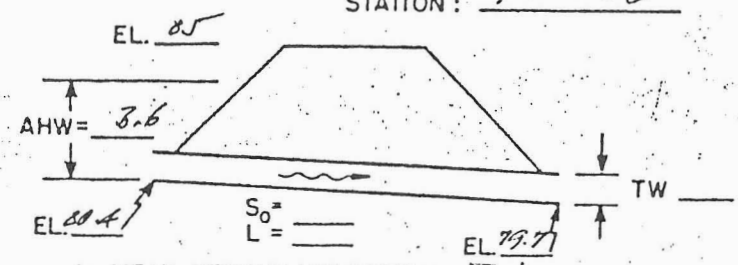
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 146+50



MEAN STREAM VELOCITY = 5.1

MAX. STREAM VELOCITY = 7.65

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
HEADW'S	456		1.20	3.6	0.4	1.13	2.3	2.65	2.1	2.65	0.7	3.00	3.6	8.2		

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY PHASE I

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 120

4-(36" x 22") 35" x 24" CSP

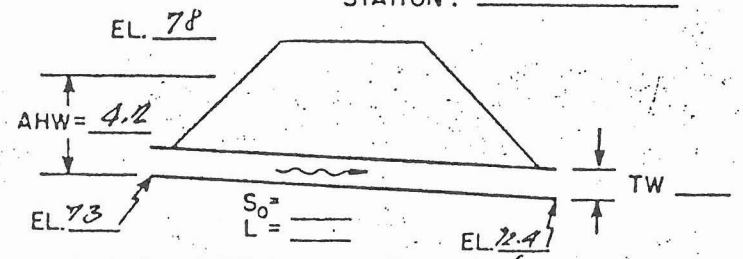
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 154 + 43.50



MEAN STREAM VELOCITY = 2.6

MAX. STREAM VELOCITY = 3.9

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
HEADW	4 x 30		1.64	3.0	0.4	3.18	1.46	1.64	1.3	1.64	0.6	4.2	4.2	8.1		

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY PHASE I

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 3024

6 - 12/6 CBC

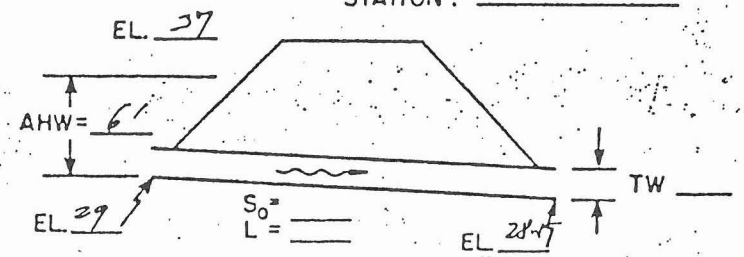
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 197+74.50



MEAN STREAM VELOCITY = 8.5

MAX. STREAM VELOCITY = 12.75

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				
HEADWS	3024		1.0	6	0.4	1.23	3.75	4.87	3.5	4.87	0.5	5.6	6.0	11.2		

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY PHASE I

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 3960

6-12/8 CBC

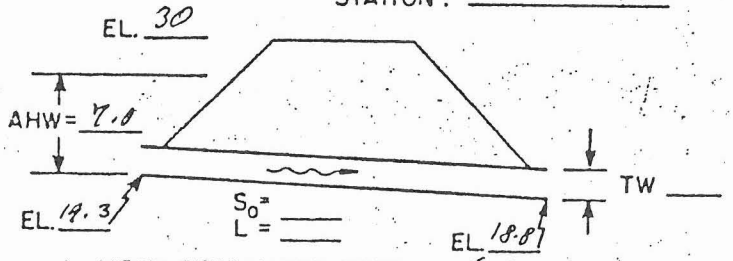
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 207+57.50



MEAN STREAM VELOCITY = 6.0

MAX. STREAM VELOCITY = 9.0

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				
HDW'S	3960		0.88	7'	0.9	1.16	4.5	6.25	4.3	6.25	0.5	6.9	7.0	12.2		

SUMMARY & RECOMMENDATIONS:

+ CATTLE CROSSING

PROJECT: SUN VALLEY PKWY PHASE I

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 32

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

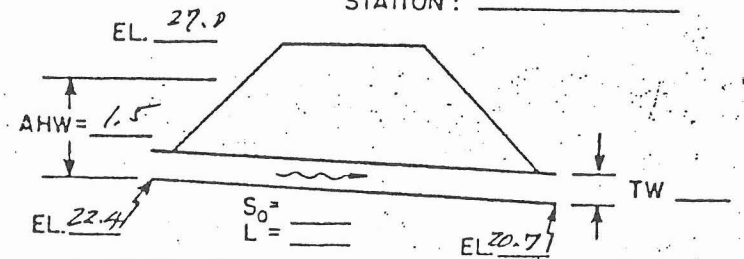
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 210+6850



MEAN STREAM VELOCITY = 2.38

MAX. STREAM VELOCITY = 3.57

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	2+16		0.67	1.5	0.4	0.63	0.91	1.58	0.9	1.58	1.7	0.51	1.5	5.3		

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY PHASE I

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 312

3 - 8/3 CBC

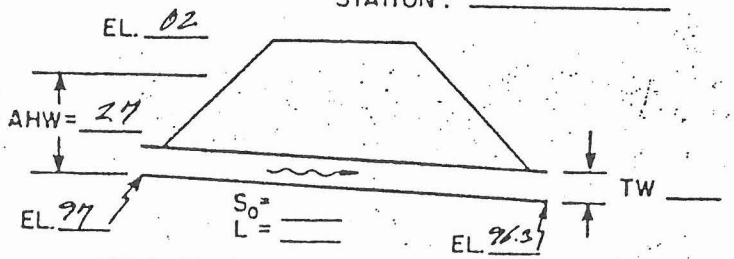
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 236+ 9/00



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
HDW's	312		0.9	2.7	0.4	0.59	1.7	2.35	1.6	2.35	0.7	2.24	2.7	7.6		

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY PHASE I

DESIGNER: GT

DATE: 8-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 740

4-10/4 CBC

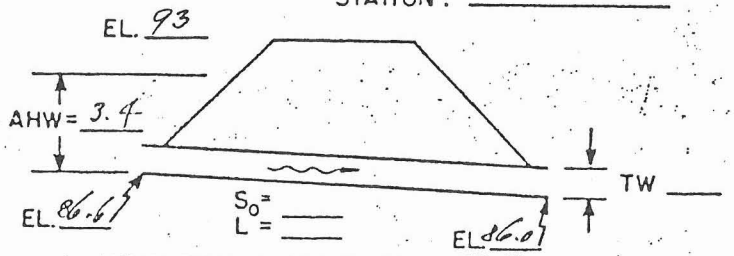
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 254+82.50



MEAN STREAM VELOCITY = 5.3

MAX. STREAM VELOCITY = 7.95

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. $\frac{HW}{D}$	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
HDW'L	740		0.85	3.4	0.4	0.59	2.3	3.15	2.2	3.15	0.6	3.14	3.4	8.0		

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY PHASE I

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 2376

6 = 12/6 CBC

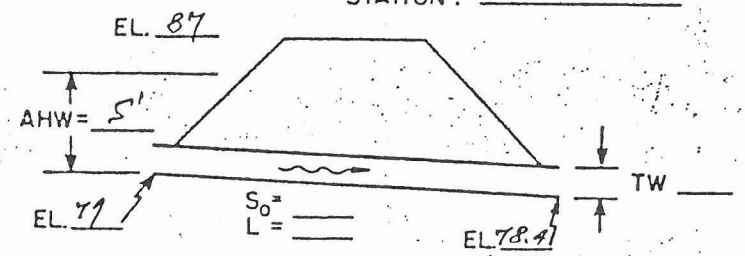
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 260+9850



MEAN STREAM VELOCITY = 4.5

MAX. STREAM VELOCITY = 6.75

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				
HDW'S	2376		0.83	5'	0.4	0.34	3.3	4.65	3.2	4.65	0.6	4.79	5.0	10.0		

SUMMARY & RECOMMENDATIONS:

PROJECT: SON VALLEY PKWY PHASE I.

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q100 = 76

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

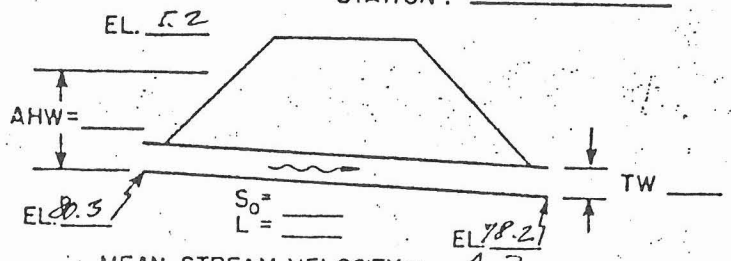
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 264+9950



MEAN STREAM VELOCITY = 4.2

MAX. STREAM VELOCITY = 6.3

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	2.38		1.29	2.9	0.4	1.84	1.53	1.89	1.4	1.89	2.1	1.63	2.9	9.5		

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY PHASE I

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

$Q_{100} = 512$

A-8/3 C&C

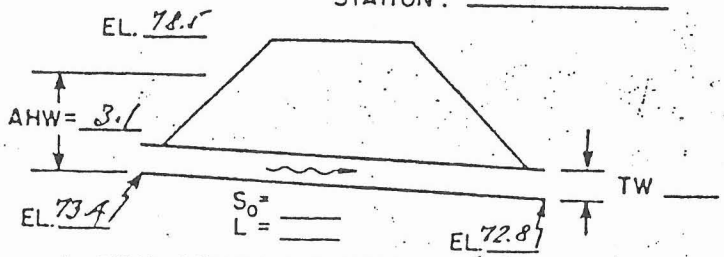
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 279+17



MEAN STREAM VELOCITY = 4.3

MAX. STREAM VELOCITY = 6.45

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				
HDWL'S	512		1.03	3.1	0.4	0.79	2.0	2.5	1.9	2.5	0.6	2.69	3.1	8.0		

SUMMARY & RECOMMENDATIONS:

PROJECT: SON VALLEY PKWY PHASE I

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

$Q_{100} = 22$

Dble (29"x18"/28"x20" csp

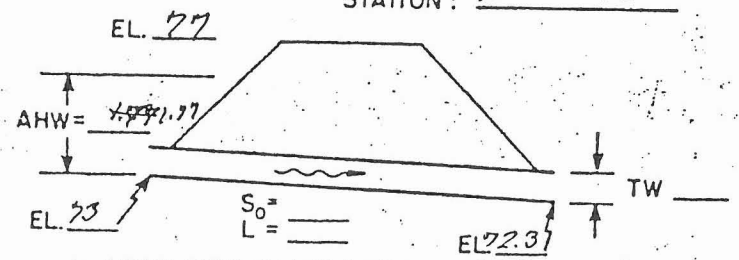
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 282+90



MEAN STREAM VELOCITY = 1.7

MAX. STREAM VELOCITY = 2.55

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				
HDWL's	2x11		1.0	1.5	0.4	1.25	0.95	1.22	0.8	1.22	0.7	1.77	1.77	6.8		

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY PHASE I.

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} - 1200

4-10/4 CBC

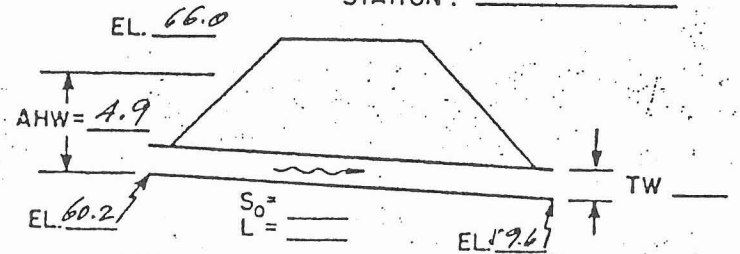
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 304+13



MEAN STREAM VELOCITY = 3.50

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				
HDWL'S	1200		1.22	4.9	0.4	1.50	3.1	3.55	2.8	3.55	0.6	4.45	4.9	9.6		

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY PHASE I

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

30 cfs

Table (29"+18") 28"x20" CSP

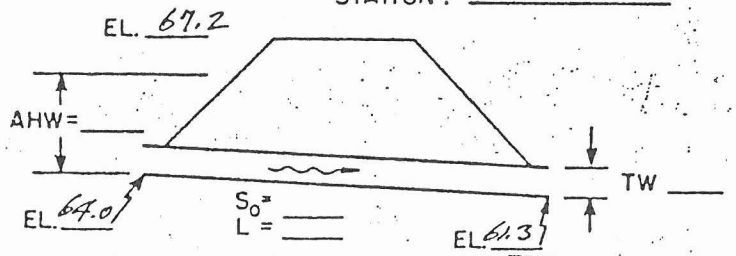
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 307+7850



MEAN STREAM VELOCITY = 2.70

MAX. STREAM VELOCITY = 4.05

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				
HEADWL'S	2x15		1.33	2.0	0.4	2.07	1.08	1.79	1.0	1.79	2.7	1.16	2.0	7.5		Max HW 2'

SUMMARY & RECOMMENDATIONS:

PROJECT: SON VALLEY PRWY PHASE I.

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

$Q_{100} = 34$

Dble (29"x18") 28"x20" CSP

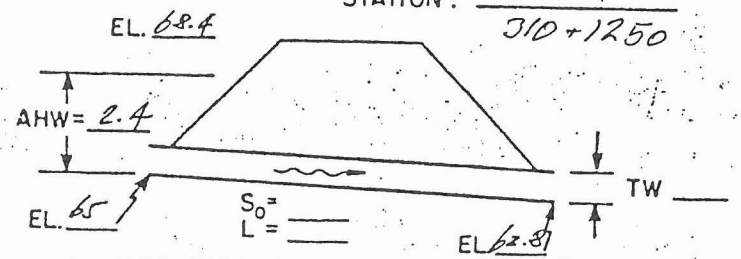
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: ~~[illegible]~~ + ~~[illegible]~~ 310+1250



MEAN STREAM VELOCITY = 2.40

MAX. STREAM VELOCITY = 3.60

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	2x14		1.6	2.4	0.4	2.63	1.15	1.82	1.0	1.82	2.2	2.25	2.4	8.5		MAX AVAIL HW = 2.4

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY PHASE I

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 28 cfs

Dble (29"x18") 28"x20" CSP

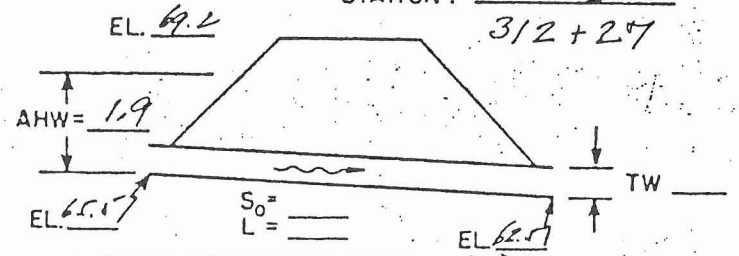
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: ~~[illegible]~~ 312+27



MEAN STREAM VELOCITY = 4.80

MAX. STREAM VELOCITY = 7.20

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				
HDWL's	2x14		1.26	1.9	0.4	1.82	1.03	1.76	0.95	1.76	3.0	0.58	1.9	7.0		AVAIL MAX HW 1.9

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY. PHASE I.

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 15 cfs

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

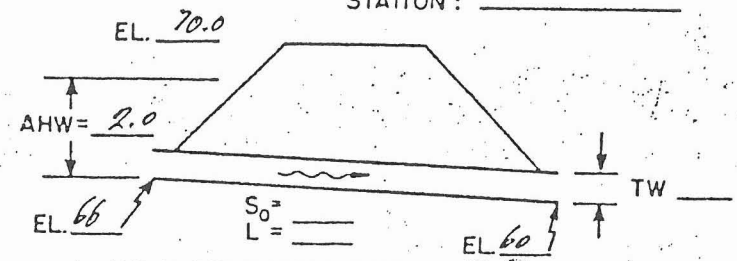
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 315+02.50



MEAN STREAM VELOCITY = 2.90

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
END SECT	15		1.33	2.0	0.5	2.17	1.06	1.28	1.0	1.28	6.0	–	2.0	7.5		MAX AVAIL. HW = 2'

SUMMARY & RECOMMENDATIONS:

PROJECT: SOD VALLEY PKWY PHASE I.

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 420

10/8 CBC

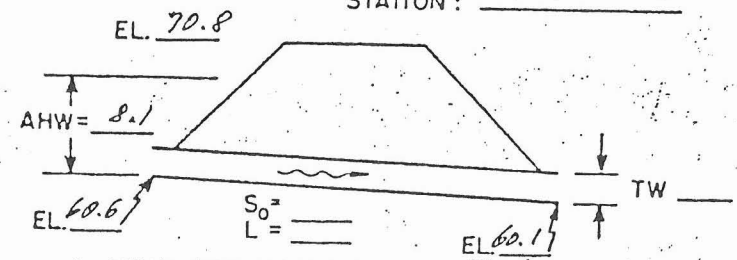
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 316+3650



MEAN STREAM VELOCITY = 5.60

MAX. STREAM VELOCITY = 8.40

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	420		1.01	8.10	0.4	0.67	3.7	5.85	3.2	5.85	0.5	6.02	8.10	11.3		MAX HW 8.10

SUMMARY & RECOMMENDATIONS:

CATTLE CROSSING – SHOWN MAX CAPACITY OF 10/8 (CULVERT NOT FOR DRAINAGE)

PROJECT: SUN VALLEY PKWY PHASE I

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

$Q_{100} = 12$

(29" + 18") 28" + 20° CSP

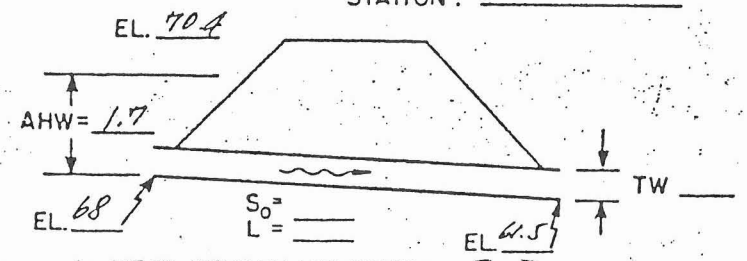
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 318+88



MEAN STREAM VELOCITY = 2.0

MAX. STREAM VELOCITY = 3.0

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.	12		1.13	1.7	0.5	1.36	0.95	1.22	0.8	1.22	6.5	–	1.7	7.5		MAX AVAIL HW = 1.70'

SUMMARY & RECOMMENDATIONS:

PROJECT: SON VALLEY PKWY PHASE I

DESIGNER: CT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

$Q_{100} = 65$

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

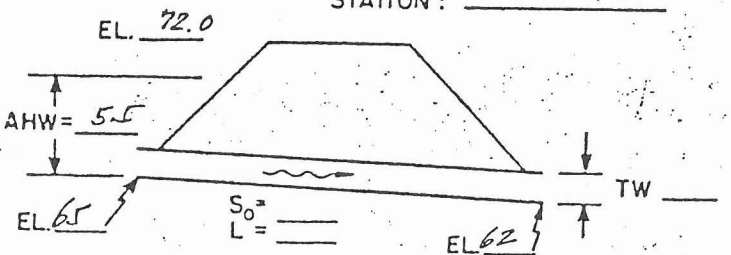
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 320+57.50



MEAN STREAM VELOCITY = 3.80

MAX. STREAM VELOCITY = 5.70

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.	65		2.4	5.5	0.5	6.02	2.01	2.13	1.90	2.13	3.0	5.15	5.5	11.8		MAX AVAIL HW = 5.5'

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY. PHASE I.

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

$Q_{100} = 45$

(42" x 27") 42" x 29" CSP

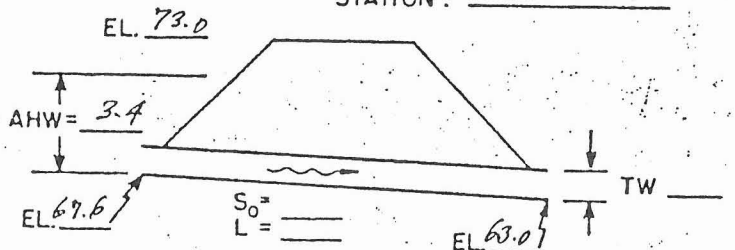
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 322+99



MEAN STREAM VELOCITY = 4.90

MAX. STREAM VELOCITY = 7.35

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.	45		1.51	3.4	0.5	2.69	1.7	1.97	1.6	1.97	4.6	–	3.4	7.9		MAX AVAIL. HW = 3.4

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY. PHASE I

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 8 cfs

(24" x 18") 28" x 20" CSP

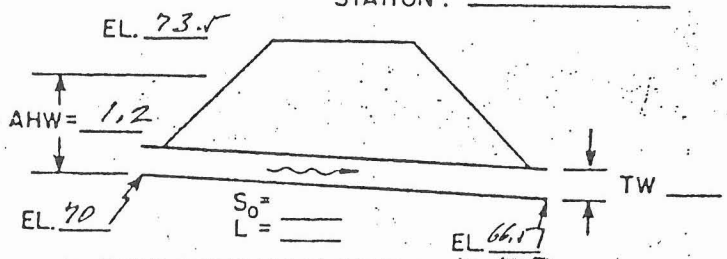
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 324+95.5



MEAN STREAM VELOCITY = 3.50

MAX. STREAM VELOCITY = 5.25

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.	8		0.8	1.2	0.5	0.58	0.74	1.12	0.6	1.12	3.5	–	1.2	10.0		MAX AVAIL. HW = 1.8'

SUMMARY & RECOMMENDATIONS:

PROJECT: SON VALLEY PRWY PHASE I

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 90

(43"+27") 42" x 29" CSP

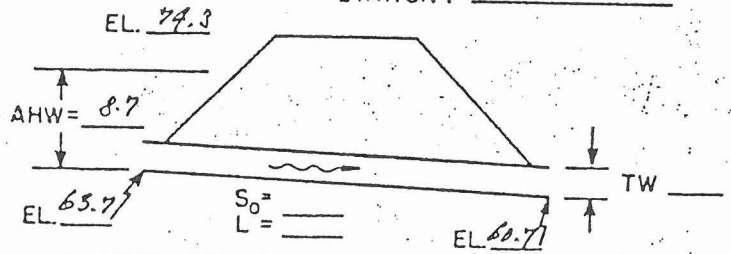
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 327+30



MEAN STREAM VELOCITY = 4.90

MAX. STREAM VELOCITY = 7.35

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.	90		3.86	8.7	0.5	12.59	2.3	2.62	22	2.62	3.0	12.21	10.6	13.8		MAX AVAIL HW 8.7

SUMMARY & RECOMMENDATIONS: CALCULATED MAXIMUM WILL OVERFLOW VIA DITCHES TO WEST

PROJECT: SUN VALLEY PKWY PHASE I.

DESIGNER: GT

DATE: 6-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 75

(43"x27") 42"x29" CSP

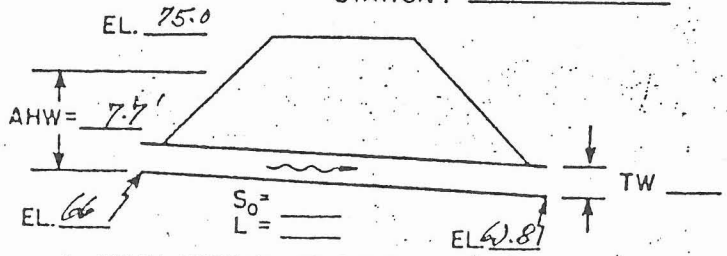
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 328+91



MEAN STREAM VELOCITY = 4.0

MAX. STREAM VELOCITY = 6.0

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 SECTION.	75		3.1	7'	0.5	8.35	2.1	2.19	2.0	2.17	2.8	7.72	7.7	12.5		MAX AVAIL HW=7'

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY. PHASE I

DESIGNER: GT

DATE: 3.87

HYDROLOGIC AND CHANNEL INFORMATION

$Q_{100} = 51$

(50"x31") 49"x33" CSP

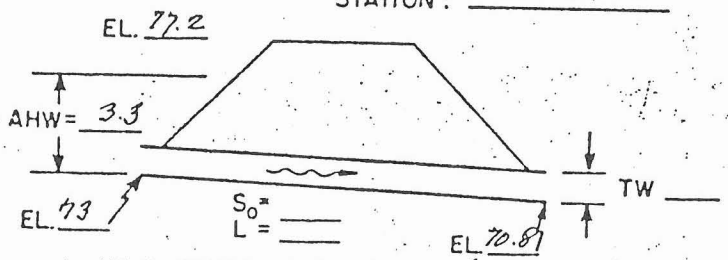
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 336+5850



MEAN STREAM VELOCITY = 4.20

MAX. STREAM VELOCITY = 6.30

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.	51		1.2	3.3	0.5	1.61	1.7	2.22	1.5	2.22	2.2	1.62	3.3	7.3		MAX AVAIL. HW=33'

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY. PHASE I

DESIGNER: GT

DATE: 2-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 1280

Dble 10/8 CBC

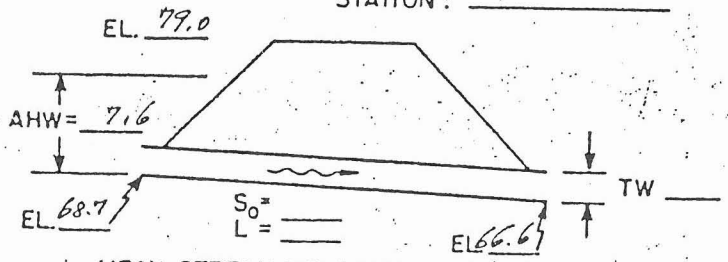
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 341+7650



MEAN STREAM VELOCITY = 11.20

MAX. STREAM VELOCITY = 16.80

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				
HEADW.	1280		0.9	7.6	0.4	1.67	5.0	6.5	4.5	6.5	2.1	6.09	7.6	12.8		

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY PHASE I

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

$Q_{100} = 600$

3-10/3 CBC

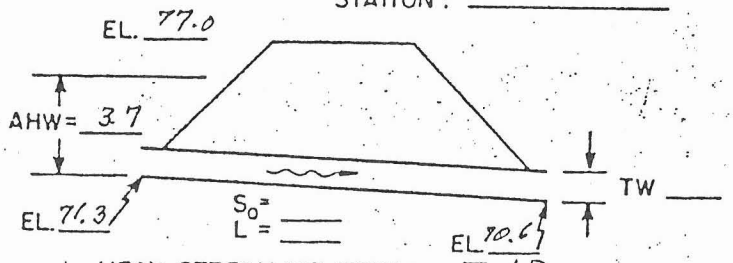
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 347+26



MEAN STREAM VELOCITY = 5.10

MAX. STREAM VELOCITY = 7.65

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	600		1.23	3.7	0.4	1.35	2.35	2.67	2.1	2.67	0.7	3.3	3.7	8.5		

SUMMARY & RECOMMENDATIONS:

PROJECT: SOU VALLEY PKWY PHASE I.

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

$Q_{100} = 76$

Tele (43"x27") 42" x 29" CSP

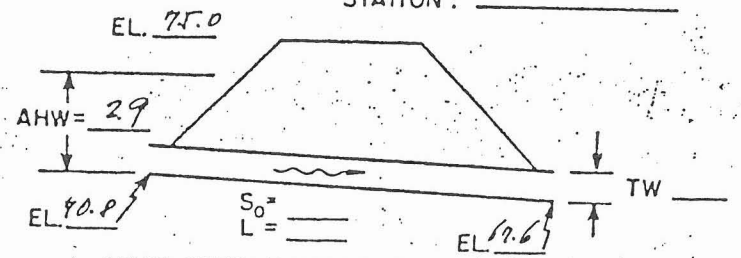
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 349+18



MEAN STREAM VELOCITY = 4.30

MAX. STREAM VELOCITY = 6.45

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	2x38		1.26	2.90	0.4	1.89	1.53	1.96	1.3	1.96	3.2	0.65	2.9	12.8		

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY. PHASE I.

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

$Q_{100} = 134$

Dble (50" + 31") 49" + 33" CSP

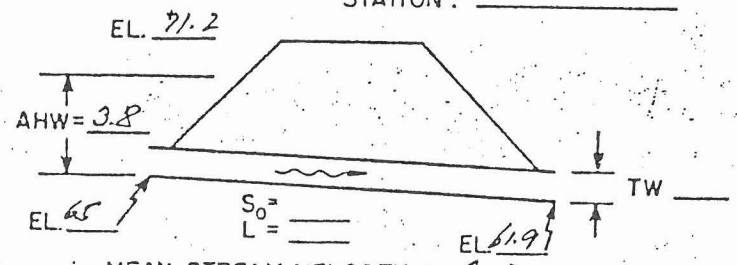
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 352+92



MEAN STREAM VELOCITY = 4.0

MAX. STREAM VELOCITY = 6.0

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				
HEADWL	2x62		1.47	3.80	0.4	2.54	1.91	2.24	1.7	2.24	3.1	1.62	3.80	8.8		

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY. PHASE I.

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

$Q_{100} = 140$

48" CSP

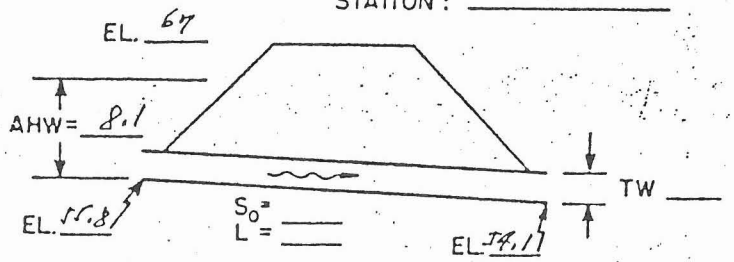
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 357+26



MEAN STREAM VELOCITY = 3.20

MAX. STREAM VELOCITY = 4.80

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.	140		1.9	7.6	0.5	6.08	3.6	3.8	3.1	3.8	1.7	8.1	8.1	14.0		

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY PHASE I

DESIGNER: CT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 290

72" CSP

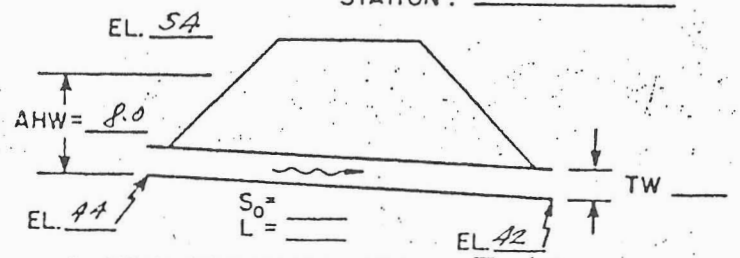
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 369+17.50



MEAN STREAM VELOCITY = 5.40

MAX. STREAM VELOCITY = 8.10

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
HEADWALL	290		1.35	8.0	0.4	4.04	4.7	5.35	4.2	5.35	2.0	7.39	8.0	12.0		

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY PHASE I.

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

$Q_{100} = 165$

60" CSP

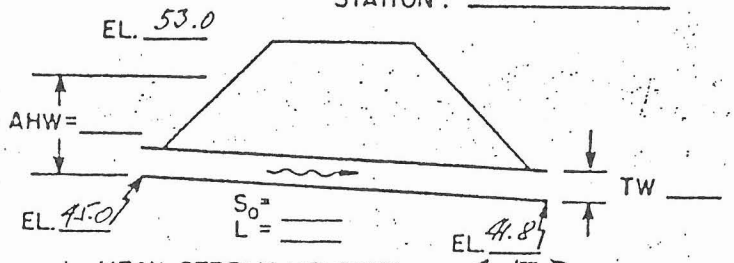
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 370 + 82



MEAN STREAM VELOCITY = 4.50

MAX. STREAM VELOCITY = 6.75

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
END SEC	165		1.28	6.4	0.5	2.95	3.7	4.35	3.6	4.35	3.2	4.10	6.4	10.3		

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY. PHASE I.

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 14 CFS.

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

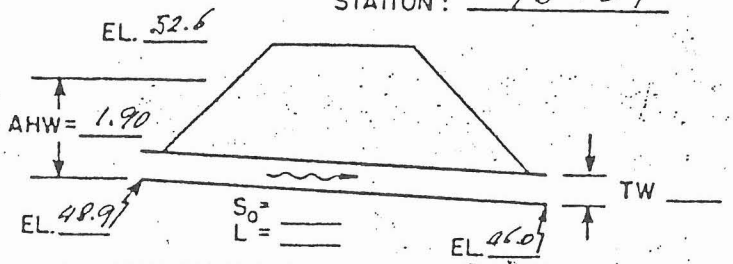
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 373+07



MEAN STREAM VELOCITY = 2.80

MAX. STREAM VELOCITY = 4.20

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	14		1.26	1.90	0.5	1.86	1.09	1.29	0.9	1.29	2.9	0.25	1.90	4.8		

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY PHASE I.

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

$Q_{100} = 9$

$(29^{4} \times 18'') = 28^{9} \times 20'$ CSP

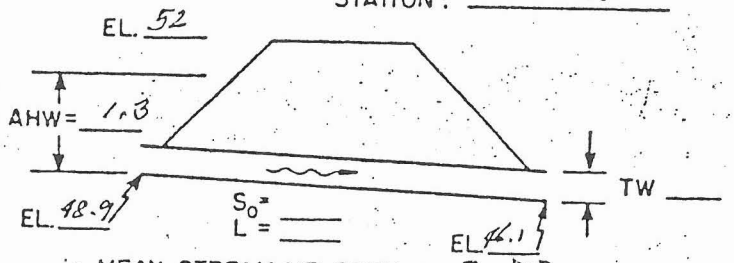
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 374+90



MEAN STREAM VELOCITY = 2.80

MAX. STREAM VELOCITY = 4.20

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 SECT.~~	~~35~~		~~[illegible]~~	~~6.9~~	~~0.5~~						~~2.8~~					
END SECT.	9		0.86	1.30	0.5	0.76	0.85	1.17	0.8	1.17	2.8	–	1.30	3.1		

SUMMARY & RECOMMENDATIONS:

OR 379+00

PROJECT: SUN VALLEY PKWY PHASE I

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

Q_{100} = 78

36" CSP

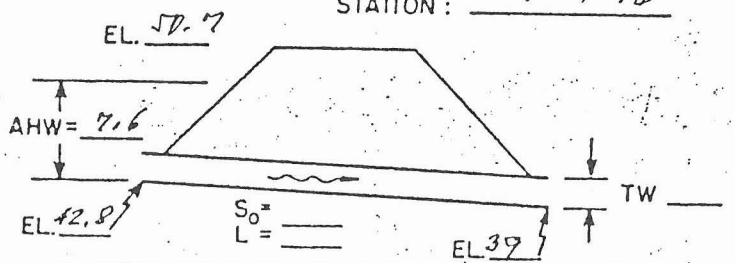
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 378+96



MEAN STREAM VELOCITY = 4.55

MAX. STREAM VELOCITY = 6.8

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.	78		2.3	6.9	0.5	8.58	2.75	2.85	2.6	2.85	3.8	7.6	7.6	11.0		

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY PHASE I

DESIGNER: CT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

$Q_{100} = 30$

24" CPP

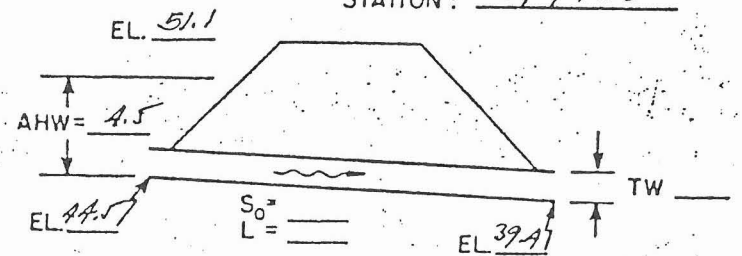
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 379+85



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
END SECT.	30		2.25	4.5	0.5	1.04	1.85	1.95	1.6	1.95	5.1	-	4.5	4.5		

SUMMARY & RECOMMENDATIONS:

PROJECT: JON VALLEY PKWY PHASE I

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

$Q_{100} = 21$

(43" + 27") 42" x 29" CSP

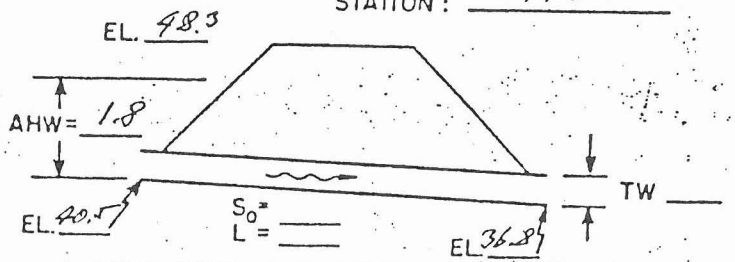
Q_1 = ____ TW_1 = ____

Q_2 = ____ TW_2 = ____

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

SKETCH

STATION: 384+06



MEAN STREAM VELOCITY = 4.8-5

MAX. STREAM VELOCITY = 7.2 ft

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.	21		0.8	1.80	.05	0.65	1.1	1.67	1.0	1.67	5.7	–	1.8	5.2		

SUMMARY & RECOMMENDATIONS:

PROJECT: SUN VALLEY PKWY PHASE I

DESIGNER: GT

DATE: 3-87

HYDROLOGIC AND CHANNEL INFORMATION

2 - 10/10 CBC

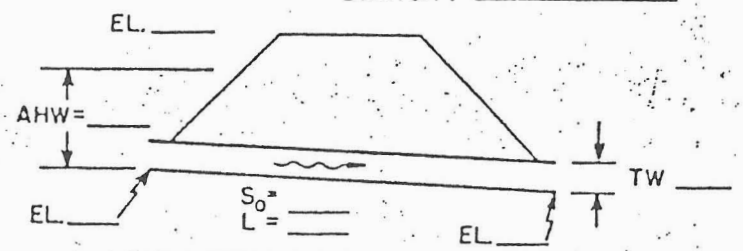
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

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

SKETCH

STATION: 473+08



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: LEVELING STRUCTURE BETWEEN SUBDIVIDED PORTION OF THE DAM

ROADSIDE DITCHES

```
**********DESCRIPTION OF RESULTS*****************************************
* MAXIMUM SLOPE TRAPEZOIDAL DITCH                                       *
* 4:1 SIDE SLOPES 5 FT BOTTOM .5 FT DEPTH                               *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =     .50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .037000
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     17.61
    FLOW TOP- WIDTH(FEET) =          9.00
    FLOW AREA(SQUARE FEET) =           3.50
    HYDRAULIC DEPTH(FEET) =       .39
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.03
    UNIFORM FROUDE NUMBER =    1.422
    PRESSURE + MOMENTUM(POUNDS) =          221.04
    AVERAGED VELOCITY HEAD(FEET) =        .393
    SPECIFIC ENERGY(FEET) =        .893
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =          9.91
    CRITICAL FLOW AREA(SQUARE FEET) =           4.58
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =       .46
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     3.85
    CRITICAL DEPTH(FEET) =       .61
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          209.30
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =        .230
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =        .844


**********DESCRIPTION OF RESULTS*****************************************
* MAXIMUM SLOPE FOR TRAPEZOIDAL DITCH                                   *
* 4:1 SIDE SLOPES 5 FT BOTTOM WIDTH 1 FT DEPTH                          *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .017100
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     45.05
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =       .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.01
    UNIFORM FROUDE NUMBER =    1.060
    PRESSURE + MOMENTUM(POUNDS) =          676.28
    AVERAGED VELOCITY HEAD(FEET) =        .389
    SPECIFIC ENERGY(FEET) =      1.389
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        13.25
    CRITICAL FLOW AREA(SQUARE FEET) =           9.41
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =       .71
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.79
    CRITICAL DEPTH(FEET) =     1.03
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          675.18
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =        .356
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.387
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*********DESCRIPTION OF RESULTS*********************************************
* MAXIMUM SLOPE TRAPEZOIDAL DITCH                                          *
* 4:1 SIDE SLOPES 5 FT BOTTOM WIDTH 1.5 FT DEPTH                           *
*                                                                          *
****************************************************************************

****************************************************************************
))))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*********************************************
* MAXIMUM SLOPE TRAPEZOIDAL DITCH                                          *
* 4:1 SIDE SLOPES 5 FT BOTTOM WIDTH 2 FT DEPTH                             *
*                                                                          *
****************************************************************************

****************************************************************************
))))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*****************************************
* MAXIMUM SLOPE TRAPEZOIDAL DITCH                                       *
* 4:1 SIDE SLOPES 5 FT BOTTOM WIDTH 2.5 FT DEPTH                        *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .006200
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    188.57
    FLOW TOP- WIDTH(FEET) =        25.00
    FLOW AREA(SQUARE FEET) =          37.50
    HYDRAULIC DEPTH(FEET) =     1.50
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.03
    UNIFORM FROUDE NUMBER =     .724
    PRESSURE + MOMENTUM(POUNDS) =         4112.60
    AVERAGED VELOCITY HEAD(FEET) =       .393
    SPECIFIC ENERGY(FEET) =      2.893
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        22.12
    CRITICAL FLOW AREA(SQUARE FEET) =          29.01
    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) =         3904.51
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .656
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.796


**********DESCRIPTION OF RESULTS*****************************************
* MAXIMUM SLOPE TRAPEZOIDAL DITCH                                       *
* 4;1 SIDE SLOPES 5 FT BOTTOM WIDTH 3 FT DEPTH                          *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   3.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .004960
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    254.90
    FLOW TOP- WIDTH(FEET) =        29.00
    FLOW AREA(SQUARE FEET) =          51.00
    HYDRAULIC DEPTH(FEET) =     1.76
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.00
    UNIFORM FROUDE NUMBER =     .664
    PRESSURE + MOMENTUM(POUNDS) =         6119.33
    AVERAGED VELOCITY HEAD(FEET) =       .388
    SPECIFIC ENERGY(FEET) =      3.388
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        24.79
    CRITICAL FLOW AREA(SQUARE FEET) =          36.84
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.49
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.92
    CRITICAL DEPTH(FEET) =     2.47
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         5631.41
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .743
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.217
=========================================================================
```

```
**********DESCRIPTION OF RESULTS**********************************************
* MAXIMUM SLOPE FOR TRAPEZOIDAL DITCH                                        *
* 4:1 SIDE SLOPES 10 FT BOTTOM .5 FT DEPTH                                    *
*                                                                             *
*******************************************************************************

*******************************************************************************
>>>>CHANNEL INPUT INFORMATION<<<<
-------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =    .50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    10.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .032000
    MANNINGS FRICTION FACTOR =  .0300
===============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------------
    >>>>> NORMAL DEPTH FLOW(CFS) =     30.04
    FLOW TOP- WIDTH(FEET) =        14.00
    FLOW AREA(SQUARE FEET) =           6.00
    HYDRAULIC DEPTH(FEET) =       .43
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.01
    UNIFORM FROUDE NUMBER =    1.348
    PRESSURE + MOMENTUM(POUNDS) =          379.95
    AVERAGED VELOCITY HEAD(FEET) =       .389
    SPECIFIC ENERGY(FEET) =       .889
===============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        14.82
    CRITICAL FLOW AREA(SQUARE FEET) =           7.47
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =       .50
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.02
    CRITICAL DEPTH(FEET) =       .60
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          365.41
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .251
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =       .853


**********DESCRIPTION OF RESULTS**********************************************
* MAXIMUM SLOPE FOR TRAPEZOIDAL DITCH                                        *
* 4:1 SIDE SLOPES 10 FT BOTTOM 1 FT DEPTH                                     *
*                                                                             *
*******************************************************************************

*******************************************************************************
>>>>CHANNEL INPUT INFORMATION<<<<
-------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    10.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .014500
    MANNINGS FRICTION FACTOR =  .0300
===============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------------
    >>>>> NORMAL DEPTH FLOW(CFS) =     69.99
    FLOW TOP- WIDTH(FEET) =        10.00
    FLOW AREA(SQUARE FEET) =          14.00
    HYDRAULIC DEPTH(FEET) =       .78
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.00
    UNIFORM FROUDE NUMBER =      .999
    PRESSURE + MOMENTUM(POUNDS) =         1073.19
    AVERAGED VELOCITY HEAD(FEET) =       .300
    SPECIFIC ENERGY(FEET) =      1.300
===============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        10.00
    CRITICAL FLOW AREA(SQUARE FEET) =          14.00
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =       .78
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.00
    CRITICAL DEPTH(FEET) =     1.00
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         1073.19
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .300
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.300
```

```
**********DESCRIPTION OF RESULTS**********************************************
* MAXIMUM SLOPE TRAPEZOIDAL DITCH                                            *
* 4:1 SIDE SLOPES 10 FT BOTTOM 1.5 FT DEPTH                                  *
*                                                                             *
*******************************************************************************

*******************************************************************************
>>>>CHANNEL INPUT INFORMATION<<<<
-------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    10.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .009300
    MANNINGS FRICTION FACTOR =  .0500
===============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------------
    >>>>> NORMAL DEPTH FLOW(CFS) =    120.15
    FLOW TOP- WIDTH(FEET) =        22.00
    FLOW AREA(SQUARE FEET) =          24.00
    HYDRAULIC DEPTH(FEET) =     1.09
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.01
    UNIFORM FROUDE NUMBER =     .845
    PRESSURE + MOMENTUM(POUNDS) =          2148.44
    AVERAGED VELOCITY HEAD(FEET) =        .389
    SPECIFIC ENERGY(FEET) =      1.889
===============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        20.92
    CRITICAL FLOW AREA(SQUARE FEET) =          21.10
    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) =         2118.59
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .503
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.868


**********DESCRIPTION OF RESULTS**********************************************
* MAXIMUM SLOPE TRAPEZOIDAL DITCH                                            *
* 4:1 SIDE SLOPES 10 FT BOTTOM 2 FT DEPTH                                    *
*                                                                             *
*******************************************************************************

*******************************************************************************
>>>>CHANNEL INPUT INFORMATION<<<<
-------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    10.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .006800
    MANNINGS FRICTION FACTOR =  .0500
===============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------------
    >>>>> NORMAL DEPTH FLOW(CFS) =    180.40
    FLOW TOP- WIDTH(FEET) =        26.00
    FLOW AREA(SQUARE FEET) =          36.00
    HYDRAULIC DEPTH(FEET) =     1.38
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.01
    UNIFORM FROUDE NUMBER =     .750
    PRESSURE + MOMENTUM(POUNDS) =          3665.50
    AVERAGED VELOCITY HEAD(FEET) =        .390
    SPECIFIC ENERGY(FEET) =      2.390
===============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        23.69
    CRITICAL FLOW AREA(SQUARE FEET) =          28.81
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.22
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.26
    CRITICAL DEPTH(FEET) =     1.71
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         3518.49
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .609
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.319
```

```
**********DESCRIPTION OF RESULTS*****************************************
* MAXIMUM SLOPE TRAPEZOIDAL DITCH                                       *
* 4:1 SIDE SLOPES 10 FT BOTTOM 2.5 FT DEPTH                             *
*                                                                        *
**************************************************************************

**************************************************************************
>>>>CHANNEL INPUT INFORMATION<<<<
--------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    10.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .005300
    MANNINGS FRICTION FACTOR =  .0300
==========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
--------------------------------------------------------------------------
    >>>>> NORMAL DEPTH FLOW(CFS) =    250.05
    FLOW TOP- WIDTH(FEET) =        30.00
    FLOW AREA(SQUARE FEET) =          50.00
    HYDRAULIC DEPTH(FEET) =     1.67
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.00
    UNIFORM FROUDE NUMBER =     .683
    PRESSURE + MOMENTUM(POUNDS) =         5673.31
    AVERAGED VELOCITY HEAD(FEET) =       .388
    SPECIFIC ENERGY(FEET) =      2.888
==========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
--------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        26.34
    CRITICAL FLOW AREA(SQUARE FEET) =          37.10
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.41
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.74
    CRITICAL DEPTH(FEET) =     2.04
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         5275.30
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .705
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.747


**********DESCRIPTION OF RESULTS*****************************************
* MAXIMUM SLOPE TRAPEZOIDAL DITCH                                       *
* 4:1 SIDE SLOPES 10 FT BOTTOM 3 FT DEPTH                               *
*                                                                        *
**************************************************************************

**************************************************************************
>>>>CHANNEL INPUT INFORMATION<<<<
--------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   3.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    10.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .004400
    MANNINGS FRICTION FACTOR =  .0300
==========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
--------------------------------------------------------------------------
    >>>>> NORMAL DEPTH FLOW(CFS) =    332.65
    FLOW TOP- WIDTH(FEET) =        34.00
    FLOW AREA(SQUARE FEET) =          66.00
    HYDRAULIC DEPTH(FEET) =     1.94
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.04
    UNIFORM FROUDE NUMBER =     .638
    PRESSURE + MOMENTUM(POUNDS) =         8303.51
    AVERAGED VELOCITY HEAD(FEET) =       .394
    SPECIFIC ENERGY(FEET) =      3.394
==========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
--------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        29.03
    CRITICAL FLOW AREA(SQUARE FEET) =          46.41
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.60
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.17
    CRITICAL DEPTH(FEET) =     2.38
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         7504.76
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .790
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.176
```

```
**********DESCRIPTION OF RESULTS**********************************************
* MAXIMUM SLOPE TRAPEZOIDAL DITCH                                            *
* 4:1 SIDE SLOPES 15 FT BOTTOM .5 FT DEPTH                                    *
*                                                                             *
*******************************************************************************

*******************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =     .50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    15.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .030000
    MANNINGS FRICTION FACTOR =  .0300
===============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     42.47
    FLOW TOP- WIDTH(FEET) =        19.00
    FLOW AREA(SQUARE FEET) =          8.50
    HYDRAULIC DEPTH(FEET) =       .45
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.00
    UNIFORM FROUDE NUMBER =    1.317
    PRESSURE + MOMENTUM(POUNDS) =          538.68
    AVERAGED VELOCITY HEAD(FEET) =       .388
    SPECIFIC ENERGY(FEET) =       .888
===============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        19.76
    CRITICAL FLOW AREA(SQUARE FEET) =          10.34
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .52
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.11
    CRITICAL DEPTH(FEET) =      .59
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          521.27
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .262
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =       .857


**********DESCRIPTION OF RESULTS**********************************************
* MAXIMUM SLOPE TRAPEZOIDAL DITCH                                            *
* 4:1 SIDE SLOPES 15 FT BOTTOM 1 FT DEPTH                                     *
*                                                                             *
*******************************************************************************

*******************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    15.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .013400
    MANNINGS FRICTION FACTOR =  .0300
===============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     95.24
    FLOW TOP- WIDTH(FEET) =        23.00
    FLOW AREA(SQUARE FEET) =          19.00
    HYDRAULIC DEPTH(FEET) =       .83
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.01
    UNIFORM FROUDE NUMBER =      .972
    PRESSURE + MOMENTUM(POUNDS) =         1476.29
    AVERAGED VELOCITY HEAD(FEET) =       .390
    SPECIFIC ENERGY(FEET) =      1.390
===============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        22.07
    CRITICAL FLOW AREA(SQUARE FEET) =          18.62
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .81
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.11
    CRITICAL DEPTH(FEET) =      .98
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         1475.72
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .406
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.390
```

```
**********DESCRIPTION OF RESULTS*****************************************
* MAXIMUM SLOPE TRAPEZOIDAL DITCH                                       *
* 4:1 SIDE SLOPES 15 FT BOTTOM 1.5 FT DEPTH                             *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    15.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .008500
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    157.98
    FLOW TOP- WIDTH(FEET) =        27.00
    FLOW AREA(SQUARE FEET) =          31.50
    HYDRAULIC DEPTH(FEET) =     1.17
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.02
    UNIFORM FROUDE NUMBER =     .818
    PRESSURE + MOMENTUM(POUNDS) =         2869.30
    AVERAGED VELOCITY HEAD(FEET) =       .391
    SPECIFIC ENERGY(FEET) =      1.891
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        25.65
    CRITICAL FLOW AREA(SQUARE FEET) =          27.07
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.06
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.84
    CRITICAL DEPTH(FEET) =     1.33
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         2813.29
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .529
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.861


**********DESCRIPTION OF RESULTS*****************************************
* MAXIMUM SLOPE TRAPEZOIDAL DITCH                                       *
* 4:1 SIDE SLOPES 15 FT BOTTOM 2 FT DEPTH                               *
*                                                                       *
*************************************************************************

*************************************************************************
))))CHANNEL INPUT INFORMATION((((
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =    15.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .006200
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    230.97
    FLOW TOP- WIDTH(FEET) =        31.00
    FLOW AREA(SQUARE FEET) =          46.00
    HYDRAULIC DEPTH(FEET) =     1.48
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.02
    UNIFORM FROUDE NUMBER =     .726
    PRESSURE + MOMENTUM(POUNDS) =         4784.98
    AVERAGED VELOCITY HEAD(FEET) =       .391
    SPECIFIC ENERGY(FEET) =      2.391
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        28.32
    CRITICAL FLOW AREA(SQUARE FEET) =          36.07
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.27
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.40
    CRITICAL DEPTH(FEET) =     1.67
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         4548.00
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .637
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.302
```

```
**********DESCRIPTION OF RESULTS*****************************************************
* MAXIMUM SLOPE TRAPEZOIDAL DITCH                                                   *
* 4:1 SIDE SLOPES 15 FT BOTTOM 2.5 FT DEPTH                                         *
*                                                                                   *
*************************************************************************************

*************************************************************************************
>>>>CHANNEL INPUT INFORMATION<<<<
-------------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =    2.50
    CHANNEL Z(HORIZONTAL/VERTICAL) =     4.00
    BASEWIDTH(FEET) =    15.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .004800
    MANNINGS FRICTION FACTOR =  .0300
=====================================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------------------
    >>>>> NORMAL DEPTH FLOW(CFS) =     312.05
    FLOW TOP- WIDTH(FEET) =          35.00
    FLOW AREA(SQUARE FEET) =              62.50
    HYDRAULIC DEPTH(FEET) =      1.79
    FLOW AVERAGE VELOCITY(FEET/SEC.) =      4.99
    UNIFORM FROUDE NUMBER =      .658
    PRESSURE + MOMENTUM(POUNDS) =          7244.26
    AVERAGED VELOCITY HEAD(FEET) =        .387
    SPECIFIC ENERGY(FEET) =      2.887
=====================================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =          30.82
    CRITICAL FLOW AREA(SQUARE FEET) =             45.31
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      1.47
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =      6.89
    CRITICAL DEPTH(FEET) =      1.98
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =           6638.74
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =         .737
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =       2.714


**********DESCRIPTION OF RESULTS*****************************************************
* MAXIMUM SLOPE TRAPEZOIDAL DITCH                                                   *
* 4:1 SIDE SLOPES 15 FT BOTTOM 3 FT DEPTH                                           *
*                                                                                   *
*************************************************************************************

*************************************************************************************
>>>>CHANNEL INPUT INFORMATION<<<<
-------------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =    3.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =     4.00
    BASEWIDTH(FEET) =    15.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .004000
    MANNINGS FRICTION FACTOR =  .0300
=====================================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------------------
    >>>>> NORMAL DEPTH FLOW(CFS) =     407.94
    FLOW TOP- WIDTH(FEET) =          39.00
    FLOW AREA(SQUARE FEET) =              81.00
    HYDRAULIC DEPTH(FEET) =      2.08
    FLOW AVERAGE VELOCITY(FEET/SEC.) =      5.04
    UNIFORM FROUDE NUMBER =      .616
    PRESSURE + MOMENTUM(POUNDS) =          10439.78
    AVERAGED VELOCITY HEAD(FEET) =        .394
    SPECIFIC ENERGY(FEET) =      3.394
=====================================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =          33.40
    CRITICAL FLOW AREA(SQUARE FEET) =             55.64
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      1.67
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =      7.33
    CRITICAL DEPTH(FEET) =      2.30
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =           9281.98
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =         .835
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =       3.134
=====================================================================================
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 5+00                                                                  *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
>>>>CHANNEL INPUT INFORMATION<<<<
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =    3.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .013400
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    >>>>> NORMAL DEPTH FLOW(CFS) =    559.03
    FLOW TOP- WIDTH(FEET) =        32.00
    FLOW AREA(SQUARE FEET) =          63.24
    HYDRAULIC DEPTH(FEET) =     1.96
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     8.84
    UNIFORM FROUDE NUMBER =    1.112
    PRESSURE + MOMENTUM(POUNDS) =        14649.99
    AVERAGED VELOCITY HEAD(FEET) =      1.213
    SPECIFIC ENERGY(FEET) =      4.613
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        33.54
    CRITICAL FLOW AREA(SQUARE FEET) =          68.76
    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) =        14572.58
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =      1.026
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      4.594


**********DESCRIPTION OF RESULTS*****************************************
* 16+20                                                                 *
*                                                                       *
*                                                                       *
*************************************************************************

*************************************************************************
>>>>CHANNEL INPUT INFORMATION<<<<
-------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =    2.90
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .085900
    MANNINGS FRICTION FACTOR =  .0300
=========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    >>>>> NORMAL DEPTH FLOW(CFS) =    981.75
    FLOW TOP- WIDTH(FEET) =        28.20
    FLOW ARCA(SQUARE FEET) =          48.14
    HYDRAULIC DEPTH(FEET) =     1.71
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    20.39
    UNIFORM FROUDE NUMBER =    2.751
    PRESSURE + MOMENTUM(POUNDS) =        42140.22
    AVERAGED VELOCITY HEAD(FEET) =      6.458
    SPECIFIC ENERGY(FEET) =      9.358
=========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        41.82
    CRITICAL FLOW AREA(SQUARE FEET) =         107.75
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     2.58
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     9.11
    CRITICAL DEPTH(FEET) =     4.30
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        28751.46
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =      1.289
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      5.872
```

```
**********DESCRIPTION OF RESULTS**********************************************
* 25+50                                                                      *
*                                                                            *
*                                                                            *
******************************************************************************

******************************************************************************
))))CHANNEL INPUT INFORMATION((((
------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.70
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .022600
    MANNINGS FRICTION FACTOR =  .0300
==============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    154.78
    FLOW TOP- WIDTH(FEET) =        18.60
    FLOW AREA(SQUARE FEET) =          20.06
    HYDRAULIC DEPTH(FEET) =     1.08
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.72
    UNIFORM FROUDE NUMBER =    1.309
    PRESSURE + MOMENTUM(POUNDS) =         3173.98
    AVERAGED VELOCITY HEAD(FEET) =        .924
    SPECIFIC ENERGY(FEET) =      2.624
==============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        20.54
    CRITICAL FLOW AREA(SQUARE FEET) =          24.79
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.21
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.24
    CRITICAL DEPTH(FEET) =     1.94
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         3070.07
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =        .605
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.547


**********DESCRIPTION OF RESULTS**********************************************
* 45+20                                                                      *
*                                                                            *
*                                                                            *
******************************************************************************

******************************************************************************
))))CHANNEL INPUT INFORMATION((((
------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.80
    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) =    141.58
    FLOW TOP- WIDTH(FEET) =        19.40
    FLOW AREA(SQUARE FEET) =          21.96
    HYDRAULIC DEPTH(FEET) =     1.13
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.45
    UNIFORM FROUDE NUMBER =    1.068
    PRESSURE + MOMENTUM(POUNDS) =         2759.60
    AVERAGED VELOCITY HEAD(FEET) =        .645
    SPECIFIC ENERGY(FEET) =      2.445
==============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        19.87
    CRITICAL FLOW AREA(SQUARE FEET) =          23.11
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.16
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.13
    CRITICAL DEPTH(FEET) =     1.86
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         2753.93
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =        .583
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.111
```

```
**********DESCRIPTION OF RESULTS**********************************************
* 49+65                                                                      *
*                                                                            *
*                                                                            *
******************************************************************************

******************************************************************************
))))CHANNEL INPUT INFORMATION((((
------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.90
    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) =    124.40
    FLOW TOP- WIDTH(FEET) =        14.60
    FLOW AREA(SQUARE FEET) =        11.76
    HYDRAULIC DEPTH(FEET) =       .81
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    10.58
    UNIFORM FROUDE NUMBER =    2.077
    PRESSURE + MOMENTUM(POUNDS) =          2910.46
    AVERAGED VELOCITY HEAD(FEET) =      1.738
    SPECIFIC ENERGY(FEET) =      2.938
==============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        18.95
    CRITICAL FLOW AREA(SQUARE FEET) =          20.89
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.10
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.96
    CRITICAL DEPTH(FEET) =     1.74
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         2351.62
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .551
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.295


**********DESCRIPTION OF RESULTS**********************************************
* 49+50                                                                      *
*                                                                            *
*                                                                            *
******************************************************************************

******************************************************************************
))))CHANNEL INPUT INFORMATION((((
------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.90
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .010700
    MANNINGS FRICTION FACTOR =  .0300
==============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    135.29
    FLOW TOP- WIDTH(FEET) =        20.20
    FLOW AREA(SQUARE FEET) =          23.94
    HYDRAULIC DEPTH(FEET) =     1.19
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.65
    UNIFORM FROUDE NUMBER =     .915
    PRESSURE + MOMENTUM(POUNDS) =          2615.45
    AVERAGED VELOCITY HEAD(FEET) =       .496
    SPECIFIC ENERGY(FEET) =      2.396
==============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        19.54
    CRITICAL FLOW AREA(SQUARE FEET) =          22.31
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.14
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.06
    CRITICAL DEPTH(FEET) =     1.82
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         2605.36
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .571
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.309
```

```
**********DESCRIPTION OF RESULTS*************************************************
* 51+50                                                                         *
*                                                                               *
*                                                                               *
*********************************************************************************

*********************************************************************************
>>>>CHANNEL INPUT INFORMATION<<<<
---------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.20
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .043800
    MANNINGS FRICTION FACTOR =  .0300
=================================================================================
    NORMAL-DEPTH FLOW INFORMATION:
---------------------------------------------------------------------------------
    >>>>> NORMAL DEPTH FLOW(CFS) =    377.17
    FLOW TOP- WIDTH(FEET) =        22.60
    FLOW AREA(SQUARE FEET) =           30.36
    HYDRAULIC DEPTH(FEET) =     1.34
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    12.42
    UNIFORM FROUDE NUMBER =    1.889
    PRESSURE + MOMENTUM(POUNDS) =        10721.46
    AVERAGED VELOCITY HEAD(FEET) =      2.397
    SPECIFIC ENERGY(FEET) =      4.597
=================================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
---------------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        28.81
    CRITICAL FLOW AREA(SQUARE FEET) =          50.33
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.75
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.49
    CRITICAL DEPTH(FEET) =      2.98
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          9054.66
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =        .872
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.849


**********DESCRIPTION OF RESULTS*************************************************
* 112+00                                                                        *
*                                                                               *
*                                                                               *
*********************************************************************************

*********************************************************************************
>>>>CHANNEL INPUT INFORMATION<<<<
---------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =     .60
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .037100
    MANNINGS FRICTION FACTOR =  .0300
=================================================================================
    NORMAL-DEPTH FLOW INFORMATION:
---------------------------------------------------------------------------------
    >>>>> NORMAL DEPTH FLOW(CFS) =     21.74
    FLOW TOP- WIDTH(FEET) =         9.80
    FLOW AREA(SQUARE FEET) =            4.44
    HYDRAULIC DEPTH(FEET) =       .45
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.57
    UNIFORM FROUDE NUMBER =    1.459
    PRESSURE + MOMENTUM(POUNDS) =        341.28
    AVERAGED VELOCITY HEAD(FEET) =        .482
    SPECIFIC ENERGY(FEET) =      1.082
=================================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
---------------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        10.94
    CRITICAL FLOW AREA(SQUARE FEET) =          5.92
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     .54
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.18
    CRITICAL DEPTH(FEET) =      .74
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          320.50
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =        .271
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.014
```

```
**********DESCRIPTION OF RESULTS*****************************************
* 121+00                                                                 *
*                                                                        *
*                                                                        *
**************************************************************************

**************************************************************************
))))CHANNEL INPUT INFORMATION((((
--------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.90
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .015600
    MANNINGS FRICTION FACTOR =  .0300
==========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
--------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    163.36
    FLOW TOP- WIDTH(FEET) =        20.20
    FLOW AREA(SQUARE FEET) =          23.94
    HYDRAULIC DEPTH(FEET) =     1.19
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.82
    UNIFORM FROUDE NUMBER =    1.105
    PRESSURE + MOMENTUM(POUNDS) =         3293.96
    AVERAGED VELOCITY HEAD(FEET) =       .723
    SPECIFIC ENERGY(FEET) =      2.623
==========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
--------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        20.95
    CRITICAL FLOW AREA(SQUARE FEET) =          25.88
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.24
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.31
    CRITICAL DEPTH(FEET) =     1.99
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         3278.54
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .619
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.613


**********DESCRIPTION OF RESULTS*****************************************
* 124+00                                                                 *
*                                                                        *
*                                                                        *
**************************************************************************

**************************************************************************
))))CHANNEL INPUT INFORMATION((((
--------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .016700
    MANNINGS FRICTION FACTOR =  .0300
==========================================================================
    NORMAL-DEPTH FLOW INFORMATION:
--------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    188.95
    FLOW TOP- WIDTH(FEET) =        21.00
    FLOW AREA(SQUARE FEET) =          26.00
    HYDRAULIC DEPTH(FEET) =     1.24
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.27
    UNIFORM FROUDE NUMBER =    1.151
    PRESSURE + MOMENTUM(POUNDS) =         3950.72
    AVERAGED VELOCITY HEAD(FEET) =       .820
    SPECIFIC ENERGY(FEET) =      2.820
==========================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
--------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        22.14
    CRITICAL FLOW AREA(SQUARE FEET) =          29.07
    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) =         3914.12
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .656
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.798
```

```
**********DESCRIPTION OF RESULTS**********************************************
* 131+00                                                                     *
*                                                                            *
*                                                                            *
******************************************************************************

******************************************************************************
))))CHANNEL INPUT INFORMATION((((
------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.90
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .020000
    MANNINGS FRICTION FACTOR =  .0300
==============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    187.72
    FLOW TOP- WIDTH(FEET) =        20.20
    FLOW AREA(SQUARE FEET) =          23.94
    HYDRAULIC DEPTH(FEET) =     1.19
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.84
    UNIFORM FROUDE NUMBER =    1.269
    PRESSURE + MOMENTUM(POUNDS) =         3986.30
    AVERAGED VELOCITY HEAD(FEET) =        .955
    SPECIFIC ENERGY(FEET) =      2.855
==============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        22.08
    CRITICAL FLOW AREA(SQUARE FEET) =          28.91
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.31
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.49
    CRITICAL DEPTH(FEET) =     2.14
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         3883.04
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .655
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.790


**********DESCRIPTION OF RESULTS**********************************************
* 133+50                                                                     *
*                                                                            *
*                                                                            *
******************************************************************************

******************************************************************************
))))CHANNEL INPUT INFORMATION((((
------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.50
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .007100
    MANNINGS FRICTION FACTOR =  .0300
==============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    201.80
    FLOW TOP- WIDTH(FEET) =        25.00
    FLOW AREA(SQUARE FEET) =          37.50
    HYDRAULIC DEPTH(FEET) =     1.50
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.38
    UNIFORM FROUDE NUMBER =     .774
    PRESSURE + MOMENTUM(POUNDS) =         4379.35
    AVERAGED VELOCITY HEAD(FEET) =        .450
    SPECIFIC ENERGY(FEET) =      2.950
==============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        22.09
    CRITICAL FLOW AREA(SQUARE FEET) =          30.62
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.35
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.59
    CRITICAL DEPTH(FEET) =     2.21
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         4239.98
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .675
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.886
```

```
**********DESCRIPTION OF RESULTS**********************************************
* 135+30                                                                     *
*                                                                            *
*                                                                            *
******************************************************************************

******************************************************************************
))))CHANNEL INPUT INFORMATION((((
------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.30
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .012200
    MANNINGS FRICTION FACTOR =  .0300
==============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    219.64
    FLOW TOP- WIDTH(FEET) =        23.40
    FLOW AREA(SQUARE FEET) =          32.66
    HYDRAULIC DEPTH(FEET) =     1.40
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.72
    UNIFORM FROUDE NUMBER =    1.003
    PRESSURE + MOMENTUM(POUNDS) =         4699.88
    AVERAGED VELOCITY HEAD(FEET) =        .702
    SPECIFIC ENERGY(FEET) =      3.002
==============================================================================
    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.) =     6.70
    CRITICAL DEPTH(FEET) =     2.30
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         4699.85
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =        .698
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.002


**********DESCRIPTION OF RESULTS**********************************************
* 141+00                                                                     *
*                                                                            *
*                                                                            *
******************************************************************************

******************************************************************************
))))CHANNEL INPUT INFORMATION((((
------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.90
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .018500
    MANNINGS FRICTION FACTOR =  .0300
==============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    177.89
    FLOW TOP- WIDTH(FEET) =        20.20
    FLOW AREA(SQUARE FEET) =          23.94
    HYDRAULIC DEPTH(FEET) =     1.19
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.43
    UNIFORM FROUDE NUMBER =    1.203
    PRESSURE + MOMENTUM(POUNDS) =         3695.52
    AVERAGED VELOCITY HEAD(FEET) =        .857
    SPECIFIC ENERGY(FEET) =      2.757
==============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        21.64
    CRITICAL FLOW AREA(SQUARE FEET) =          27.71
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.28
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.42
    CRITICAL DEPTH(FEET) =     2.00
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         3637.15
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =        .640
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.720
```

```
**********DESCRIPTION OF RESULTS**********************************************
* 142+00                                                                     *
*                                                                            *
*                                                                            *
******************************************************************************

******************************************************************************
))))CHANNLL INPUT INFORMATION((((
------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.10
    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) =    154.34
    FLOW TOP- WIDTH(FEET) =        21.80
    FLOW AREA(SQUARE FEET) =          28.14
    HYDRAULIC DEPTH(FEET) =     1.29
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.48
    UNIFORM FROUDE NUMBER =     .851
    PRESSURE + MOMENTUM(POUNDS) =         3098.84
    AVERAGED VELOCITY HEAD(FEET) =       .467
    SPECIFIC ENERGY(FEET) =      2.567
==============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        20.52
    CRITICAL FLOW AREA(SQUARE FEET) =          24.74
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.21
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.24
    CRITICAL DEPTH(FEET) =     1.94
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         3059.31
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .604
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.544


**********DESCRIPTION OF RESULTS**********************************************
* 148+50                                                                     *
*                                                                            *
*                                                                            *
******************************************************************************

******************************************************************************
))))CHANNEL INPUT INFORMATION((((
------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =     .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) =     34.21
    FLOW TOP- WIDTH(FEET) =        11.40
    FLOW AREA(SQUARE FEET) =           6.56
    HYDRAULIC DEPTH(FEET) =       .58
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.22
    UNIFORM FROUDE NUMBER =    1.212
    PRESSURE + MOMENTUM(POUNDS) =          408.26
    AVERAGED VELOCITY HEAD(FEET) =       .422
    SPECIFIC ENERGY(FEET) =      1.222
==============================================================================
    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.) =     4.50
    CRITICAL DEPTH(FEET) =       .89
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          480.00
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .315
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.203
```

```
**********DESCRIPTION OF RESULTS*********************************************
* 149+00                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.60
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .043400
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    188.54
    FLOW TOP- WIDTH(FEET) =        17.80
    FLOW AREA(SQUARE FEET) =          18.24
    HYDRAULIC DEPTH(FEET) =     1.02
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    10.34
    UNIFORM FROUDE NUMBER =    1.799
    PRESSURE + MOMENTUM(POUNDS) =          4516.76
    AVERAGED VELOCITY HEAD(FEET) =      1.659
    SPECIFIC ENERGY(FEET) =      3.259
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        22.12
    CRITICAL FLOW AREA(SQUARE FEET) =          29.01
    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) =         3903.66
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .658
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.795


**********DESCRIPTION OF RESULTS*********************************************
* 162+20                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
))))CHANNEL INPUT INFORMATION((((
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.20
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .015000
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     60.94
    FLOW TOP- WIDTH(FEET) =        14.60
    FLOW AREA(SQUARE FEET) =          11.76
    HYDRAULIC DEPTH(FEET) =       .81
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.18
    UNIFORM FROUDE NUMBER =    1.018
    PRESSURE + MOMENTUM(POUNDS) =          980.42
    AVERAGED VELOCITY HEAD(FEET) =       .417
    SPECIFIC ENERGY(FEET) =      1.617
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        14.60
    CRITICAL FLOW AREA(SQUARE FEET) =          11.91
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =       .81
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.12
    CRITICAL DEPTH(FEET) =      1.21
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          980.28
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .407
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.617
```

```
**********DESCRIPTION OF RESULTS*********************************************
* 168+00                                                                    *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
>>>>CHANNEL INPUT INFORMATION<<<<
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .016000
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    >>>>> NORMAL DEPTH FLOW(CFS) =    104.95
    FLOW TOP- WIDTH(FEET) =        21.00
    FLOW AREA(SQUARE FEET) =          26.00
    HYDRAULIC DEPTH(FEET) =     1.24
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.11
    UNIFORM FROUDE NUMBER =    1.127
    PRESSURE + MOMENTUM(POUNDS) =         3839.10
    AVERAGED VELOCITY HEAD(FEET) =       .786
    SPECIFIC ENERGY(FEET) =      2.786
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        21.97
    CRITICAL FLOW AREA(SQUARE FEET) =          28.59
    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) =         3813.40
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .650
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.770
=============================================================================


**********DESCRIPTION OF RESULTS*********************************************
* STA 329+80                                                                *
*                                                                           *
*                                                                           *
*****************************************************************************

*****************************************************************************
>>>>CHANNEL INPUT INFORMATION<<<<
-----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .082000
    MANNINGS FRICTION FACTOR =  .0300
=============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    >>>>> NORMAL DEPTH FLOW(CFS) =     98.66
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =       .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    10.96
    UNIFORM FROUDE NUMBER =    2.322
    PRESSURE + MOMENTUM(POUNDS) =          2335.15
    AVERAGED VELOCITY HEAD(FEET) =      1.866
    SPECIFIC ENERGY(FEET) =      2.866
=============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
-----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        17.43
    CRITICAL FLOW AREA(SQUARE FEET) =          17.42
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.00
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.66
    CRITICAL DEPTH(FEET) =      1.55
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          1771.22
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .498
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      2.052
```

```
**********DESCRIPTION OF RESULTS*********************************************
* STA 341+00                                                                 *
*                                                                            *
*                                                                            *
******************************************************************************

******************************************************************************
))))CHANNEL INPUT INFORMATION((((
------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   3.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .012600
    MANNINGS FRICTION FACTOR =  .0300
==============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    406.27
    FLOW TOP- WIDTH(FEET) =        29.00
    FLOW AREA(SQUARE FEET) =          51.00
    HYDRAULIC DEPTH(FEET) =     1.76
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.97
    UNIFORM FROUDE NUMBER =    1.059
    PRESSURE + MOMENTUM(POUNDS) =         9922.29
    AVERAGED VELOCITY HEAD(FEET) =        .985
    SPECIFIC ENERGY(FEET) =      3.985
==============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        29.65
    CRITICAL FLOW AREA(SQUARE FEET) =          53.39
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.80
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.61
    CRITICAL DEPTH(FEET) =     3.08
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         9906.94
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .899
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.981


**********DESCRIPTION OF RESULTS*********************************************
* STA 352+10                                                                 *
*                                                                            *
*                                                                            *
******************************************************************************

******************************************************************************
))))CHANNEL INPUT INFORMATION((((
------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   2.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .045450
    MANNINGS FRICTION FACTOR =  .0300
==============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    311.72
    FLOW TOP- WIDTH(FEET) =        21.00
    FLOW AREA(SQUARE FEET) =          26.00
    HYDRAULIC DEPTH(FEET) =     1.24
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    11.99
    UNIFORM FROUDE NUMBER =    1.899
    PRESSURE + MOMENTUM(POUNDS) =         8532.00
    AVERAGED VELOCITY HEAD(FEET) =      2.232
    SPECIFIC ENERGY(FEET) =      4.232
==============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        26.77
    CRITICAL FLOW AREA(SQUARE FEET) =          43.24
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.61
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     7.21
    CRITICAL DEPTH(FEET) =     2.73
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         7187.93
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .807
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      3.529
==============================================================================
```

```
**********DESCRIPTION OF RESULTS*********************************************
* STA 369+00                                                                 *
*                                                                            *
*                                                                            *
******************************************************************************

******************************************************************************
))))CHANNEL INPUT INFORMATION((((
------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   1.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .047000
    MANNINGS FRICTION FACTOR =  .0300
==============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =     74.69
    FLOW TOP- WIDTH(FEET) =        13.00
    FLOW AREA(SQUARE FEET) =           9.00
    HYDRAULIC DEPTH(FEET) =      .69
    FLOW AVERAGE VELOCITY(FEET/SEC.) =     8.30
    UNIFORM FROUDE NUMBER =    1.758
    PRESSURE + MOMENTUM(POUNDS) =         1440.54
    AVERAGED VELOCITY HEAD(FEET) =      1.070
    SPECIFIC ENERGY(FEET) =      2.070
==============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        15.77
    CRITICAL FLOW AREA(SQUARE FEET) =          13.97
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      .89
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     5.34
    CRITICAL DEPTH(FEET) =     1.35
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         1259.08
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       .444
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      1.789


**********DESCRIPTION OF RESULTS*********************************************
* STA 390+60                                                                 *
*                                                                            *
*                                                                            *
******************************************************************************

******************************************************************************
))))CHANNEL INPUT INFORMATION((((
------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   3.00
    CHANNEL Z(HORIZONTAL/VERTICAL) =    4.00
    BASEWIDTH(FEET) =     5.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .022670
    MANNINGS FRICTION FACTOR =  .0300
==============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    ))))) NORMAL DEPTH FLOW(CFS) =    544.95
    FLOW TOP- WIDTH(FEET) =        29.00
    FLOW AREA(SQUARE FEET) =          51.00
    HYDRAULIC DEPTH(FEET) =     1.76
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    10.69
    UNIFORM FROUDE NUMBER =    1.420
    PRESSURE + MOMENTUM(POUNDS) =        14934.82
    AVERAGED VELOCITY HEAD(FEET) =      1.773
    SPECIFIC ENERGY(FEET) =      4.773
==============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =        33.22
    CRITICAL FLOW AREA(SQUARE FEET) =          67.41
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     2.03
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     8.08
    CRITICAL DEPTH(FEET) =     3.53
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        14130.42
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =      1.015
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      4.542
```

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 396

DISCHARGE IS = 377 CFS
BOTTOM WIDTH IS = 43 FT
SLOPE IS = .0142 FT/FT
SIDE SLOPE (Z1) = 4
SIDE SLOPE (Z2) = 62
MANNING'S N = .035
TOP WIDTH IS = 116.73 FT
AREA IS = 89.21 SQ FT
WETTED PERIMETER IS = 116.87 FT
HYDRAULIC RADIUS IS = .76 FT
NORMAL DEPTH IS = 1.12 FT
VELOCITY IS = 4.23 FPS
FROUDE NUMBER IS = .85

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 400+00 To 413+00

DISCHARGE IS = 377 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .0142 FT/FT
SIDE SLOPE (Z1) = 4
SIDE SLOPE (Z2) = 60
MANNING'S N = .03
TOP WIDTH IS = 98.68 FT
AREA IS = 76.07 SQ FT
WETTED PERIMETER IS = 98.88 FT
HYDRAULIC RADIUS IS = .77 FT
NORMAL DEPTH IS = 1.54 FT
VELOCITY IS = 4.96 FPS
FROUDE NUMBER IS = .99

NATURAL CHANNELS

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 4+30

DISCHARGE IS = 154 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .012 FT/FT
SIDE SLOPE (Z1) = 24.4
SIDE SLOPE (Z2) = 22.1
MANNING'S N = .035
TOP WIDTH IS = 66.5 FT
AREA IS = 43.78 SQ FT
WETTED PERIMETER IS = 66.55 FT
HYDRAULIC RADIUS IS = .66 FT
NORMAL DEPTH IS = 1.32 FT
VELOCITY IS = 3.52 FPS
FROUDE NUMBER IS = .76

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 16+19

DISCHARGE IS = 189 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .013 FT/FT
SIDE SLOPE (Z1) = 31.25
SIDE SLOPE (Z2) = 31.25
MANNING'S N = .05
TOP WIDTH IS = 92.37 FT
AREA IS = 68.26 SQ FT
WETTED PERIMETER IS = 92.42 FT
HYDRAULIC RADIUS IS = .74 FT
NORMAL DEPTH IS = 1.48 FT
VELOCITY IS = 2.77 FPS
FROUDE NUMBER IS = .57

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 26+06

DISCHARGE IS = 260 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .01 FT/FT
SIDE SLOPE (Z1) = 5
SIDE SLOPE (Z2) = 10
MANNING'S N = .035
TOP WIDTH IS = 39.3 FT
AREA IS = 51.48 SQ FT
WETTED PERIMETER IS = 39.69 FT
HYDRAULIC RADIUS IS = 1.3 FT
NORMAL DEPTH IS = 2.62 FT
VELOCITY IS = 5.05 FPS
FROUDE NUMBER IS = .78

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 30+35

DISCHARGE IS = 28 CFS
BOTTOM WIDTH IS = 23 FT
SLOPE IS = .014 FT/FT
SIDE SLOPE (Z1) = 8.75
SIDE SLOPE (Z2) = 5.83
MANNING'S N = .035
TOP WIDTH IS = 29.05 FT
AREA IS = 10.9 SQ FT
WETTED PERIMETER IS = 29.11 FT
HYDRAULIC RADIUS IS = .37 FT
NORMAL DEPTH IS = .41 FT
VELOCITY IS = 2.59 FPS
FROUDE NUMBER IS = .75

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS

CHANNEL 35+07

DISCHARGE IS = 20 CFS
BOTTOM WIDTH IS = 20 FT
SLOPE IS = .009 FT/FT
SIDE SLOPE (Z1) = 29.2
SIDE SLOPE (Z2) = 18.3
MANNING'S N = .035
TOP WIDTH IS = 33.34 FT
AREA IS = 7.49 SQ FT
WETTED PERIMETER IS = 33.35 FT
HYDRAULIC RADIUS IS = .22 FT
NORMAL DEPTH IS = .20 FT
VELOCITY IS = 2.67 FPS
FROUDE NUMBER IS = .99

CHANNEL SLOPE .013

MANNINGS 'N' .035

CROSS SECTION ID NUMBER IS 1

36+92

NUMBER OF CROSS SECTION COORDINATE POINTS IS 9

COORDINATE ID NO.	STATION X(I)	ELEVATION Y(I)
1	0.00	60.00
2	11.00	59.00
3	22.00	58.60
4	35.00	59.00
5	41.00	58.00
6	47.00	57.00
7	55.00	58.00
8	66.00	59.00
9	100.00	60.00

WATER SURFACE ELEV FT	AREA SQ FT	WETTED PERIMETER FT	TOP WIDTH FT	HYD RADIUS FT	HYD DEPTH FT	NORMAL VELOCITY FPS	NORMAL FLOW CFS
60.00	115.8	100.3	100.0	1.1	1.1	5.1	586.0

CHANNEL SLOPE .015

MANNINGS 'N' .035

CROSS SECTION ID NUMBER IS 1

38+84

NUMBER OF CROSS SECTION COORDINATE POINTS IS 9

COORDINATE ID NO.	STATION X(I)	ELEVATION Y(I)
1	0.00	60.00
2	14.00	59.00
3	21.00	57.40
4	30.00	59.00
5	36.00	59.30
6	45.00	59.00
7	55.00	56.90
8	62.00	59.00
9	100.00	60.00

WATER SURFACE ELEV FT	AREA SQ FT	WETTED PERIMETER FT	TOP WIDTH FT	HYD RADIUS FT	HYD DEPTH FT	NORMAL VELOCITY FPS	NORMAL FLOW CFS
59.50	58.9	74.9	74.0	0.8	0.8	4.4	261.0
59.70	74.7	80.3	84.4	0.9	0.9	4.8	355.9
59.60	66.6	80.1	79.2	0.8	0.8	4.6	305.9
59.57	64.2	78.5	77.6	0.8	0.8	4.5	291.9

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 49+00

DISCHARGE IS = 30 CFS
BOTTOM WIDTH IS = 4 FT
SLOPE IS = .021 FT/FT
SIDE SLOPE (Z1) = 10
SIDE SLOPE (Z2) = 4.8
MANNING'S N = .035
TOP WIDTH IS = 15.72 FT
AREA IS = 7.81 SQ FT
WETTED PERIMETER IS = 15.05 FT
HYDRAULIC RADIUS IS = .49 FT
NORMAL DEPTH IS = .79 FT
VELOCITY IS = 3.84 FPS
FROUDE NUMBER IS = .96

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 49+39

DISCHARGE IS = 29 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .021 FT/FT
SIDE SLOPE (Z1) = 13.8
SIDE SLOPE (Z2) = 5.4
MANNING'S N = .035
TOP WIDTH IS = 17.52 FT
AREA IS = 7.99 SQ FT
WETTED PERIMETER IS = 17.63 FT
HYDRAULIC RADIUS IS = .45 FT
NORMAL DEPTH IS = .91 FT
VELOCITY IS = 3.63 FPS
FROUDE NUMBER IS = .95

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 51+76

DISCHARGE IS = 34 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .024 FT/FT
SIDE SLOPE (Z1) = 35.7
SIDE SLOPE (Z2) = 11.4
MANNING'S N = .035
TOP WIDTH IS = 31.73 FT
AREA IS = 10.69 SQ FT
WETTED PERIMETER IS = 31.77 FT
HYDRAULIC RADIUS IS = .34 FT
NORMAL DEPTH IS = .67 FT
VELOCITY IS = 3.18 FPS
FROUDE NUMBER IS = .97

CHANNEL SLOPE .014

MANNINGS 'N' .035

CROSS SECTION ID NUMBER IS 1

64+87

NUMBER OF CROSS SECTION COORDINATE POINTS IS 8

COORDINATE ID NO.	STATION X(I)	ELEVATION Y(I)
1	0.00	39.50
2	72.00	39.00
3	107.00	38.00
4	114.00	37.00
5	124.00	38.10
6	143.00	38.00
7	155.00	38.70
8	203.00	39.50

WATER SURFACE ELEV FT	AREA SQ FT	WETTED PERIMETER FT	TOP WIDTH FT	HYD RADIUS FT	HYD DEPTH FT	NORMAL VELOCITY FPS	NORMAL FLOW CFS
38.70	45.0	72.7	72.5	0.6	0.6	3.7	164.4
39.00	71.1	101.2	101.0	0.7	0.7	4.0	282.0
39.50	117.1	203.2	203.0	0.7	0.7	4.0	585.5

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS

CHANNEL 67+33

DISCHARGE IS = 1110 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .01 FT/FT
SIDE SLOPE (Z1) = 61.5
SIDE SLOPE (Z2) = 12.7
MANNING'S N = .035
TOP WIDTH IS = 134.13 FT
AREA IS = 293.51 SQ FT
WETTED PERIMETER IS = 134.2[illegible] FT
HYDRAULIC RADIUS IS = 1.52 FT
NORMAL DEPTH IS = 3.05 FT
VELOCITY IS = 3.6 FPS
FROUDE NUMBER IS = .8

CHANNEL SLOPE .02

MANNINGS 'N' .035

CROSS SECTION ID NUMBER IS 1

74+15

NUMBER OF CROSS SECTION COORDINATE POINTS IS 8

COORDINATE ID NO.	STATION X(I)	ELEVATION Y(I)
1	0.00	32.00
2	12.00	31.00
3	16.00	30.00
4	21.00	30.00
5	28.00	29.70
6	32.00	30.00
7	34.00	31.00
8	74.00	32.00

WATER SURFACE ELEV FT	AREA SQ FT	WETTED PERIMETER FT	TOP WIDTH FT	HYD RADIUS FT	HYD DEPTH FT	NORMAL VELOCITY FPS	NORMAL FLOW CFS
31.00	21.2	24.3	21.0	0.9	0.9	5.5	116.3
32.00	70.2	74.3	74.0	0.9	0.9	5.8	405.8

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS

CHANNEL 79+21

DISCHARGE IS = 160 CFS
BOTTOM WIDTH IS = 28 FT
SLOPE IS = .013 FT/FT
SIDE SLOPE (Z1) = 25.5
SIDE SLOPE (Z2) = 66.6
MANNING'S N = .035
TOP WIDTH IS = 101.62 FT
AREA IS = 51.8 SQ FT
WETTED PERIMETER IS = 101.6[illegible] FT
HYDRAULIC RADIUS IS = .51 FT
NORMAL DEPTH IS = .8 FT
VELOCITY IS = 3.09 FPS
FROUDE NUMBER IS = .36

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 84+07

DISCHARGE IS = 800 CFS
BOTTOM WIDTH IS = 45 FT
SLOPE IS = .014 FT/FT
SIDE SLOPE (Z1) = 41
SIDE SLOPE (Z2) = 33.3
MANNING'S N = .035
TOP WIDTH IS = 160.52 FT
AREA IS = 159.77 SQ FT
WETTED PERIMETER IS = 160.56 FT
HYDRAULIC RADIUS IS = 1 FT
NORMAL DEPTH IS = 1.55 FT
VELOCITY IS = 5.01 FPS
FROUDE NUMBER IS = .88

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 99+10

DISCHARGE IS = 150 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .011 FT/FT
SIDE SLOPE (Z1) = 13.3
SIDE SLOPE (Z2) = 15
MANNING'S N = .035
TOP WIDTH IS = 46.62 FT
AREA IS = 38.4 SQ FT
WETTED PERIMETER IS = 46.74 FT
HYDRAULIC RADIUS IS = .82 FT
NORMAL DEPTH IS = 1.65 FT
VELOCITY IS = 3.91 FPS
FROUDE NUMBER IS = .76

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 102+11

DISCHARGE IS = 1520 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .012 FT/FT
SIDE SLOPE (Z1) = 68.3
SIDE SLOPE (Z2) = 13.3
MANNING'S N = .035
TOP WIDTH IS = 200.86 FT
AREA IS = 247.22 SQ FT
WETTED PERIMETER IS = 200.97 FT
HYDRAULIC RADIUS IS = 1.23 FT
NORMAL DEPTH IS = 2.46 FT
VELOCITY IS = 5.34 FPS
FROUDE NUMBER IS = .85

CHANNEL SLOPE .01

MANNINGS 'N' .035

CROSS SECTION ID NUMBER IS 1

106+89

NUMBER OF CROSS SECTION COORDINATE POINTS IS 8

COORDINATE ID NO.	STATION X(I)	ELEVATION Y(I)
1	0.00	12.00
2	58.00	11.70
3	88.00	11.00
4	92.00	10.80
5	90.00	11.00
6	110.00	11.70
7	144.00	11.00
8	174.00	12.00

WATER SURFACE ELEV FT	AREA SQ FT	WETTED PERIMETER FT	TOP WIDTH FT	HYD RADIUS FT	HYD DEPTH FT	NORMAL VELOCITY FPS	NORMAL FLOW CFS
11.70	42.9	107.1	107.0	0.4	0.4	2.3	99.2
12.00	85.1	174.1	174.0	0.5	0.5	2.6	224.2

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 110+99

DISCHARGE IS = 2220 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .001 FT/FT
SIDE SLOPE (Z1) = 12.6
SIDE SLOPE (Z2) = 7.4
MANNING'S N = .035
TOP WIDTH IS = 91.30 FT
AREA IS = 208.75 SQ FT
WETTED PERIMETER IS = 91.87 FT
HYDRAULIC RADIUS IS = 2.27 FT
NORMAL DEPTH IS = 4.57 FT
VELOCITY IS = 10.63 FPS
FROUDE NUMBER IS = 1.24

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 114+09

DISCHARGE IS = 30 CFS
BOTTOM WIDTH IS = 11 FT
SLOPE IS = .022 FT/FT
SIDE SLOPE (Z1) = 8.3
SIDE SLOPE (Z2) = 16.7
MANNING'S N = .035
TOP WIDTH IS = 24 FT
AREA IS = 9.1 SQ FT
WETTED PERIMETER IS = 24.05 FT
HYDRAULIC RADIUS IS = .38 FT
NORMAL DEPTH IS = .52 FT
VELOCITY IS = 3.3 FPS
FROUDE NUMBER IS = .94

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 116+05

DISCHARGE IS = 60 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .011 FT/FT
SIDE SLOPE (Z1) = 5.3
SIDE SLOPE (Z2) = 20
MANNING'S N = .035
TOP WIDTH IS = 30.84 FT
AREA IS = 18.8 SQ FT
WETTED PERIMETER IS = 30.99 FT
HYDRAULIC RADIUS IS = .61 FT
NORMAL DEPTH IS = 1.22 FT
VELOCITY IS = 3.19 FPS
FROUDE NUMBER IS = .72

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 124+23

DISCHARGE IS = 94 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .015 FT/FT
SIDE SLOPE (Z1) = 8
SIDE SLOPE (Z2) = 9.6
MANNING'S N = .035
TOP WIDTH IS = 27.46 FT
AREA IS = 21.42 SQ FT
WETTED PERIMETER IS = 27.64 FT
HYDRAULIC RADIUS IS = .78 FT
NORMAL DEPTH IS = 1.56 FT
VELOCITY IS = 4.39 FPS
FROUDE NUMBER IS = .88

CHANNEL SLOPE .012

MANNINGS 'N' .035

CROSS SECTION ID NUMBER IS 1

127+67

NUMBER OF CROSS SECTION COORDINATE POINTS IS 5

COORDINATE ID NO.	STATION X(I)	ELEVATION Y(I)
1	0.00	98.00
2	12.00	97.20
3	20.00	97.50
4	34.00	97.00
5	42.00	98.00

WATER SURFACE ELEV FT	AREA SQ FT	WETTED PERIMETER FT	TOP WIDTH FT	HYD RADIUS FT	HYD DEPTH FT	NORMAL VELOCITY FPS	NORMAL FLOW CFS
97.50	6.4	30.6	30.5	0.2	0.2	1.6	10.4
97.70	12.9	35.2	35.1	0.4	0.4	2.4	30.9
97.65	11.2	34.0	34.0	0.3	0.3	2.2	24.9

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS

CHANNEL 136+16

DISCHARGE IS = 71 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .010 FT/FT
SIDE SLOPE (Z1) = 26.7
SIDE SLOPE (Z2) = 39
MANNING'S N = .035
TOP WIDTH IS = 54.33 FT
AREA IS = 22.47 SQ FT
WETTED PERIMETER IS = 54.36 FT
HYDRAULIC RADIUS IS = .41 FT
NORMAL DEPTH IS = .83 FT
VELOCITY IS = 3.16 FPS
FROUDE NUMBER IS = .87

CHANNEL SLOPE .02

MANNINGS 'N' .035

CROSS SECTION ID NUMBER IS 1

146+50

NUMBER OF CROSS SECTION COORDINATE POINTS IS 12

COORDINATE ID NO.	STATION X(I)	ELEVATION Y(I)
1	0.00	82.00
2	14.00	81.00
3	32.00	80.10
4	57.00	80.00
5	61.00	79.20
6	65.00	80.00
7	69.00	81.00
8	77.00	81.20
9	85.00	81.00
10	93.00	80.50
11	100.00	81.00
12	154.00	82.00

WATER SURFACE ELEV FT	AREA SQ FT	WETTED PERIMETER FT	TOP WIDTH FT	HYD RADIUS FT	HYD DEPTH FT	NORMAL VELOCITY FPS	NORMAL FLOW CFS
81.00	48.8	70.3	70.0	0.7	0.7	4.7	229.6
81.50	90.7	120.4	120.0	0.8	0.8	5.7	519.2
81.30	76.1	106.9	106.4	0.7	0.7	4.8	364.3
81.40	87.0	113.6	113.2	0.8	0.8	5.0	437.7
81.45	92.8	117.0	116.6	0.8	0.8	5.1	477.4

CHANNEL SLOPE .01

MANNINGS 'N' .035

CROSS SECTION ID NUMBER IS 1

194+43

NUMBER OF CROSS SECTION COORDINATE POINTS IS 5

COORDINATE ID NO.	STATION X(I)	ELEVATION Y(I)
1	0.00	74.00
2	56.00	73.00
3	64.00	72.10
4	70.00	73.00
5	108.00	74.00

WATER SURFACE ELEV FT	AREA SQ FT	WETTED PERIMETER FT	TOP WIDTH FT	HYD RADIUS FT	HYD DEPTH FT	NORMAL VELOCITY FPS	NORMAL FLOW CFS
73.50	25.0	61.1	61.0	0.4	0.4	2.3	58.7
73.70	39.1	79.9	79.8	0.5	0.5	2.6	103.2
73.60	31.6	70.5	70.4	0.4	0.4	2.5	78.6
73.65	35.3	75.2	75.1	0.5	0.5	2.6	90.3

CHANNEL SLOPE .017

MANNINGS 'N' .035

CROSS SECTION ID NUMBER IS 1

197+74

NUMBER OF CROSS SECTION COORDINATE POINTS IS 11

COORDINATE ID NO.	STATION X(I)	ELEVATION Y(I)
1	0.00	34.00
2	34.00	33.00
3	48.00	32.00
4	64.00	28.50
5	80.00	32.00
6	87.00	32.20
7	91.00	32.00
8	110.00	30.10
9	122.00	32.00
10	135.00	33.00
11	148.00	34.00

WATER SURFACE ELEV FT	AREA SQ FT	WETTED PERIMETER FT	TOP WIDTH FT	HYD RADIUS FT	HYD DEPTH FT	NORMAL VELOCITY FPS	NORMAL FLOW CFS
32.00	171.9	102.1	101.0	1.7	1.7	7.8	1346.2
33.50	220.2	125.6	124.5	1.8	1.8	8.2	1801.2
33.70	254.1	135.0	133.9	1.9	1.9	8.4	2143.6
33.80	267.7	139.7	138.6	1.9	1.9	8.5	2285.9

CHANNEL SLOPE 0.00

MANNINGS 'N' .035

CROSS SECTION ID NUMBER IS 1

207+57

NUMBER OF CROSS SECTION COORDINATE POINTS IS 8

COORDINATE ID NO.	STATION X(I)	ELEVATION Y(I)
1	0.00	23.00
2	22.00	22.00
3	72.00	21.00
4	120.00	20.00
5	138.00	21.00
6	190.00	20.70
7	216.00	21.00
8	250.00	23.00

WATER SURFACE ELEV FT	AREA SQ FT	WETTED PERIMETER FT	TOP WIDTH FT	HYD RADIUS FT	HYD DEPTH FT	NORMAL VELOCITY FPS	NORMAL FLOW CFS
21.50	165.0	197.6	197.5	0.8	0.8	3.4	555.5
22.00	267.1	211.1	211.0	1.3	1.3	4.4	1186.6
23.00	497.6	250.2	250.0	2.0	2.0	6.0	2988.7

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 210+68

DISCHARGE IS = 46 CFS
BOTTOM WIDTH IS = 6 FT
SLOPE IS = .014 FT/FT
SIDE SLOPE (Z1) = 70
SIDE SLOPE (Z2) = 20
MANNING'S N = .035
TOP WIDTH IS = 50.3 FT
AREA IS = 19.33 SQ FT
WETTED PERIMETER IS = 59.31 FT
HYDRAULIC RADIUS IS = .33 FT
NORMAL DEPTH IS = .59 FT
VELOCITY IS = 2.38 FPS
FROUDE NUMBER IS = .73

CHANNEL SLOPE .01

MANNINGS 'N' .035

CROSS SECTION ID NUMBER IS 1

236+72

NUMBER OF CROSS SECTION COORDINATE POINTS IS 7

COORDINATE ID NO.	STATION X(I)	ELEVATION Y(I)
1	0.00	99.40
2	64.00	97.00
3	72.00	96.00
4	77.00	95.80
5	82.00	96.00
6	87.00	98.00
7	96.00	98.40

WATER SURFACE ELEV FT	AREA SQ FT	WETTED PERIMETER FT	TOP WIDTH FT	HYD RADIUS FT	HYD DEPTH FT	NORMAL VELOCITY FPS	NORMAL FLOW CFS
97.50	32.5	45.0	44.6	0.7	0.7	3.4	111.3
98.00	69.9	69.2	68.7	0.9	0.9	3.9	237.2
98.40	93.0	96.5	96.0	1.0	1.0	4.2	390.0

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS

CHANNEL 254+82

DISCHARGE IS = 720 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .012 FT/FT
SIDE SLOPE (Z1) = 20
SIDE SLOPE (Z2) = 24.5
MANNING'S N = .035
TOP WIDTH IS = 109.56 FT
AREA IS = 134.07 SQ FT
WETTED PERIMETER IS = 109.67 FT
HYDRAULIC RADIUS IS = 1.23 FT
NORMAL DEPTH IS = 2.46 FT
VELOCITY IS = 5.34 FPS
FROUDE NUMBER IS = .85

CHANNEL SLOPE .015

MANNINGS 'N' .035

CROSS SECTION ID NUMBER IS 1

260+98

NUMBER OF CROSS SECTION COORDINATE POINTS IS 19

COORDINATE ID NO.	STATION X(I)	ELEVATION Y(I)
1	0.00	80.00
2	6.00	79.00
3	13.00	79.00
4	54.00	79.70
5	92.00	79.00
6	96.00	78.50
7	100.00	79.00
8	112.00	79.70
9	128.00	79.00
10	132.00	79.00
11	140.00	79.30
12	149.00	79.00
13	156.00	79.00
14	160.00	79.00
15	168.00	79.30
16	174.00	79.00
17	180.00	79.00
18	188.00	79.00
19	205.00	80.00

WATER SURFACE ELEV FT	AREA SQ FT	WETTED PERIMETER FT	TOP WIDTH FT	HYD RADIUS FT	HYD DEPTH FT	NORMAL VELOCITY FPS	NORMAL FLOW CFS
79.50	69.3	163.4	162.9	0.4	0.4	2.9	203.5
79.80	125.4	201.0	200.4	0.6	0.6	3.8	475.9
80.00	165.9	205.6	205.0	0.8	0.8	4.5	747.7

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS

CHANNEL 264+99

DISCHARGE IS = 80 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .015 FT/FT
SIDE SLOPE (Z1) = 9
SIDE SLOPE (Z2) = 9
MANNING'S N = .035
TOP WIDTH IS = 26.21 FT
AREA IS = 19.09 SQ FT
WETTED PERIMETER IS = 26.37 FT
HYDRAULIC RADIUS IS = .72 FT
NORMAL DEPTH IS = 1.46 FT
VELOCITY IS = 4.19 FPS
FROUDE NUMBER IS = .87

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS

CHANNEL 279+1

DISCHARGE IS = 512 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .013 FT/FT
SIDE SLOPE (Z1) = 50.7
SIDE SLOPE (Z2) = 34.7
MANNING'S N = .035
TOP WIDTH IS = 142.72 FT
AREA IS = 119.25 SQ FT
WETTED PERIMETER IS = 142.76 FT
HYDRAULIC RADIUS IS = .84 FT
NORMAL DEPTH IS = 1.67 FT
VELOCITY IS = 4.29 FPS
FROUDE NUMBER IS = .83

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS

CHANNEL 282+90

DISCHARGE IS = 18 CFS
BOTTOM WIDTH IS = 16 FT
SLOPE IS = .015 FT/FT
SIDE SLOPE (Z1) = 37
SIDE SLOPE (Z2) = 88
MANNING'S N = .035
TOP WIDTH IS = 53.29 FT
AREA IS = 10.33 SQ FT
WETTED PERIMETER IS = 53.29 FT
HYDRAULIC RADIUS IS = .19 FT
NORMAL DEPTH IS = .3 FT
VELOCITY IS = 1.74 FPS
FROUDE NUMBER IS = .7

CHANNEL SLOPE .011

MANNINGS 'N' .035

CROSS SECTION ID NUMBER IS 1

304+13

NUMBER OF CROSS SECTION COORDINATE POINTS IS 7

COORDINATE ID NO.	STATION X(I)	ELEVATION Y(I)
1	0.00	80.00
2	13.00	79.00
3	20.00	78.90
4	26.00	77.00
5	57.00	79.60
6	80.00	78.80
7	130.00	80.00

WATER SURFACE ELEV FT	AREA SQ FT	WETTED PERIMETER FT	TOP WIDTH FT	HYD RADIUS FT	HYD DEPTH FT	NORMAL VELOCITY FPS	NORMAL FLOW CFS
80.00	90.2	130.1	130.0	0.7	0.7	3.5	315.0

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS

CHANNEL 307+78

DISCHARGE IS = 28 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .017 FT/FT
SIDE SLOPE (Z1) = 27
SIDE SLOPE (Z2) = 18
MANNING'S N = .035
TOP WIDTH IS = 30.50 FT
AREA IS = 10.39 SQ FT
WETTED PERIMETER IS = 30.62 FT
HYDRAULIC RADIUS IS = .34 FT
NORMAL DEPTH IS = .60 FT
VELOCITY IS = 2.69 FPS
FROUDE NUMBER IS = .81

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 310+12

DISCHARGE IS = 34 CFS
BOTTOM WIDTH IS = 10 FT
SLOPE IS = .015 FT/FT
SIDE SLOPE (Z1) = 13.3
SIDE SLOPE (Z2) = 32.8
MANNING'S N = .035
TOP WIDTH IS = 40.34 FT
AREA IS = 14.14 SQ FT
WETTED PERIMETER IS = 40.37 FT
HYDRAULIC RADIUS IS = .35 FT
NORMAL DEPTH IS = .40 FT
VELOCITY IS = 2.41 FPS
FROUDE NUMBER IS = .72

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 312+27

DISCHARGE IS = 36 CFS
BOTTOM WIDTH IS = 4 FT
SLOPE IS = .02 FT/FT
SIDE SLOPE (Z1) = 3
SIDE SLOPE (Z2) = 3
MANNING'S N = .035
TOP WIDTH IS = 10.32 FT
AREA IS = 7.55 SQ FT
WETTED PERIMETER IS = 10.67 FT
HYDRAULIC RADIUS IS = .71 FT
NORMAL DEPTH IS = 1.05 FT
VELOCITY IS = 4.77 FPS
FROUDE NUMBER IS = .98

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 315+02

DISCHARGE IS = 19 CFS
BOTTOM WIDTH IS = 8 FT
SLOPE IS = .027 FT/FT
SIDE SLOPE (Z1) = 10
SIDE SLOPE (Z2) = 29.3
MANNING'S N = .035
TOP WIDTH IS = 23.99 FT
AREA IS = 6.5 SQ FT
WETTED PERIMETER IS = 24.01 FT
HYDRAULIC RADIUS IS = .27 FT
NORMAL DEPTH IS = .41 FT
VELOCITY IS = 2.92 FPS
FROUDE NUMBER IS = .99

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 316+36

DISCHARGE IS = 700 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .012 FT/FT
SIDE SLOPE (Z1) = 36
SIDE SLOPE (Z2) = 4
MANNING'S N = .035
TOP WIDTH IS = 105.68 FT
AREA IS = 179.61 SQ FT
WETTED PERIMETER IS = 106.04 FT
HYDRAULIC RADIUS IS = 1.32 FT
NORMAL DEPTH IS = 2.64 FT
VELOCITY IS = 5.59 FPS
FROUDE NUMBER IS = .86

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 318+00

DISCHARGE IS = 11 CFS
BOTTOM WIDTH IS = 30 FT
SLOPE IS = .029 FT/FT
SIDE SLOPE (Z1) = 15
SIDE SLOPE (Z2) = 23
MANNING'S N = .035
TOP WIDTH IS = 38.21 FT
AREA IS = 5.41 SQ FT
WETTED PERIMETER IS = 38.22 FT
HYDRAULIC RADIUS IS = .15 FT
NORMAL DEPTH IS = .16 FT
VELOCITY IS = 2.03 FPS
FROUDE NUMBER IS = .93

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 320+57

DISCHARGE IS = 70 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .015 FT/FT
SIDE SLOPE (Z1) = 7.5
SIDE SLOPE (Z2) = 15
MANNING'S N = .035
TOP WIDTH IS = 20.65 FT
AREA IS = 18.24 SQ FT
WETTED PERIMETER IS = 20.78 FT
HYDRAULIC RADIUS IS = .63 FT
NORMAL DEPTH IS = 1.27 FT
VELOCITY IS = 3.84 FPS
FROUDE NUMBER IS = .85

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 322+99

DISCHARGE IS = 54 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .025 FT/FT
SIDE SLOPE (Z1) = 9.5
SIDE SLOPE (Z2) = 4
MANNING'S N = .035
TOP WIDTH IS = 17.2 FT
AREA IS = 10.96 SQ FT
WETTED PERIMETER IS = 17.42 FT
HYDRAULIC RADIUS IS = .63 FT
NORMAL DEPTH IS = 1.27 FT
VELOCITY IS = 4.93 FPS
FROUDE NUMBER IS = 1.09

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 324+95

DISCHARGE IS = 17 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .027 FT/FT
SIDE SLOPE (Z1) = 6.4
SIDE SLOPE (Z2) = 12.8
MANNING'S N = .035
TOP WIDTH IS = 13.68 FT
AREA IS = 4.87 SQ FT
WETTED PERIMETER IS = 13.76 FT
HYDRAULIC RADIUS IS = .35 FT
NORMAL DEPTH IS = .71 FT
VELOCITY IS = 3.49 FPS
FROUDE NUMBER IS = 1.03

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 327+39

DISCHARGE IS = 90 CFS
BOTTOM WIDTH IS = 6 FT
SLOPE IS = .016 FT/FT
SIDE SLOPE (Z1) = 7.5
SIDE SLOPE (Z2) = 4
MANNING'S N = .035
TOP WIDTH IS = 22.18 FT
AREA IS = 19.82 SQ FT
WETTED PERIMETER IS = 22.45 FT
HYDRAULIC RADIUS IS = .88 FT
NORMAL DEPTH IS = 1.41 FT
VELOCITY IS = 4.94 FPS
FROUDE NUMBER IS = .92

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 328+91

DISCHARGE IS = 70 CFS
BOTTOM WIDTH IS = 13 FT
SLOPE IS = .014 FT/FT
SIDE SLOPE (Z1) = 0.7
SIDE SLOPE (Z2) = 6
MANNING'S N = .035
TOP WIDTH IS = 27.23 FT
AREA IS = 19.48 SQ FT
WETTED PERIMETER IS = 27.37 FT
HYDRAULIC RADIUS IS = .71 FT
NORMAL DEPTH IS = .97 FT
VELOCITY IS = 4 FPS
FROUDE NUMBER IS = .83

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 336+58

DISCHARGE IS = 55 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .016 FT/FT
SIDE SLOPE (Z1) = 5
SIDE SLOPE (Z2) = 9
MANNING'S N = .035
TOP WIDTH IS = 19.25 FT
AREA IS = 13.24 SQ FT
WETTED PERIMETER IS = 19.47 FT
HYDRAULIC RADIUS IS = .68 FT
NORMAL DEPTH IS = 1.30 FT
VELOCITY IS = 4.15 FPS
FROUDE NUMBER IS = .88

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 341+76

DISCHARGE IS = 1600 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .017 FT/FT
SIDE SLOPE (Z1) = 5.1
SIDE SLOPE (Z2) = 2.8
MANNING'S N = .035
TOP WIDTH IS = 48.16 FT
AREA IS = 142.74 SQ FT
WETTED PERIMETER IS = 49.53 FT
HYDRAULIC RADIUS IS = 2.88 FT
NORMAL DEPTH IS = 5.08 FT
VELOCITY IS = 11.21 FPS
FROUDE NUMBER IS = 1.15

CHANNEL SLOPE ...10

MANNINGS 'N' .035

CROSS SECTION ID NUMBER IS 1

347+26

NUMBER OF CROSS SECTION COORDINATE POINTS IS 7

COORDINATE ID No.	STATION X(I)	ELEVATION Y(I)
1	0.00	73.00
2	36.00	72.00
3	40.00	71.00
4	66.00	70.20
5	120.00	71.00
6	129.00	72.00
7	145.00	73.00

WATER SURFACE ELEV FT	AREA SQ FT	WETTED PERIMETER FT	TOP WIDTH FT	HYD RADIUS FT	HYD DEPTH FT	NORMAL VELOCITY FPS	NORMAL FLOW CFS
71.00	28.8	72.0	72.0	0.4	0.4	2.4	69.6
72.00	111.3	93.1	93.0	1.2	1.2	5.0	558.2
72.30	141.5	108.7	108.6	1.3	1.3	5.3	751.4
72.10	120.9	98.3	98.2	1.2	1.2	5.1	617.6

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 349+18

DISCHARGE IS = 96 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .010 FT/FT
SIDE SLOPE (Z1) = 14.5
SIDE SLOPE (Z2) = 12.5
MANNING'S N = .035
TOP WIDTH IS = 34.76 FT
AREA IS = 22.54 SQ FT
WETTED PERIMETER IS = 34.05 FT
HYDRAULIC RADIUS IS = .65 FT
NORMAL DEPTH IS = 1.3 FT
VELOCITY IS = 4.26 FPS
FROUDE NUMBER IS = .93

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 352+92

DISCHARGE IS = 120 CFS
BOTTOM WIDTH IS = 25 FT
SLOPE IS = .014 FT/FT
SIDE SLOPE (Z1) = 9.5
SIDE SLOPE (Z2) = 11.5
MANNING'S N = .035
TOP WIDTH IS = 43.62 FT
AREA IS = 30.41 SQ FT
WETTED PERIMETER IS = 43.7 FT
HYDRAULIC RADIUS IS = .7 FT
NORMAL DEPTH IS = .89 FT
VELOCITY IS = 3.95 FPS
FROUDE NUMBER IS = .83

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 357+26

DISCHARGE IS = 140 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .009 FT/FT
SIDE SLOPE (Z1) = 16.3
SIDE SLOPE (Z2) = 26.3
MANNING'S N = .035
TOP WIDTH IS = 60.09 FT
AREA IS = 43.51 SQ FT
WETTED PERIMETER IS = 60.96 FT
HYDRAULIC RADIUS IS = .71 FT
NORMAL DEPTH IS = 1.43 FT
VELOCITY IS = 3.22 FPS
FROUDE NUMBER IS = .67

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 369+15

DISCHARGE IS = 200 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .019 FT/FT
SIDE SLOPE (Z1) = 17.8
SIDE SLOPE (Z2) = 11.9
MANNING'S N = .035
TOP WIDTH IS = 55.36 FT
AREA IS = 51.6 SQ FT
WETTED PERIMETER IS = 55.49 FT
HYDRAULIC RADIUS IS = .93 FT
NORMAL DEPTH IS = 1.86 FT
VELOCITY IS = 5.43 FPS
FROUDE NUMBER IS = .99

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 370+80

DISCHARGE IS = 165 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .014 FT/FT
SIDE SLOPE (Z1) = 15
SIDE SLOPE (Z2) = 10.7
MANNING'S N = .035
TOP WIDTH IS = 43.49 FT
AREA IS = 36.79 SQ FT
WETTED PERIMETER IS = 43.62 FT
HYDRAULIC RADIUS IS = .84 FT
NORMAL DEPTH IS = 1.69 FT
VELOCITY IS = 4.48 FPS
FROUDE NUMBER IS = .86

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 373+10

DISCHARGE IS = 14 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .019 FT/FT
SIDE SLOPE (Z1) = 9.6
SIDE SLOPE (Z2) = 12.3
MANNING'S N = .035
TOP WIDTH IS = 14.74 FT
AREA IS = 4.96 SQ FT
WETTED PERIMETER IS = 14.8 FT
HYDRAULIC RADIUS IS = .34 FT
NORMAL DEPTH IS = .67 FT
VELOCITY IS = 2.82 FPS
FROUDE NUMBER IS = .86

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 374+90

DISCHARGE IS = 9 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .022 FT/FT
SIDE SLOPE (Z1) = 9.4
SIDE SLOPE (Z2) = 9.4
MANNING'S N = .035
TOP WIDTH IS = 11.05 FT
AREA IS = 3.25 SQ FT
WETTED PERIMETER IS = 11.11 FT
HYDRAULIC RADIUS IS = .29 FT
NORMAL DEPTH IS = .59 FT
VELOCITY IS = 2.77 FPS
FROUDE NUMBER IS = .9

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 379+00

DISCHARGE IS = 78 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .015 FT/FT
SIDE SLOPE (Z1) = 7.7
SIDE SLOPE (Z2) = 4.8
MANNING'S N = .035
TOP WIDTH IS = 20.71 FT
AREA IS = 17.16 SQ FT
WETTED PERIMETER IS = 20.99 FT
HYDRAULIC RADIUS IS = .82 FT
NORMAL DEPTH IS = 1.66 FT
VELOCITY IS = 4.55 FPS
FROUDE NUMBER IS = .88

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 379+80

DISCHARGE IS = 30 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .033 FT/FT
SIDE SLOPE (Z1) = 11.3
SIDE SLOPE (Z2) = 7.4
MANNING'S N = .035
TOP WIDTH IS = 16.03 FT
AREA IS = 6.87 SQ FT
WETTED PERIMETER IS = 16.12 FT
HYDRAULIC RADIUS IS = .43 FT
NORMAL DEPTH IS = .86 FT
VELOCITY IS = 4.37 FPS
FROUDE NUMBER IS = 1.18

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 379+80

DISCHARGE IS = 30 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .033 FT/FT
SIDE SLOPE (Z1) = 11.3
SIDE SLOPE (Z2) = 7.4
MANNING'S N = .035
TOP WIDTH IS = 16.03 FT
AREA IS = 6.87 SQ FT
WETTED PERIMETER IS = 16.12 FT
HYDRAULIC RADIUS IS = .43 FT
NORMAL DEPTH IS = .86 FT
VELOCITY IS = 4.37 FPS
FROUDE NUMBER IS = 1.18

NORMAL DEPTH FOR TRAPEZOIDAL CHANNELS
CHANNEL 384+05

DISCHARGE IS = 21 CFS
BOTTOM WIDTH IS = 0 FT
SLOPE IS = .054 FT/FT
SIDE SLOPE (Z1) = 10.4
SIDE SLOPE (Z2) = 7.6
MANNING'S N = .035
TOP WIDTH IS = 12.49 FT
AREA IS = 4.33 SQ FT
WETTED PERIMETER IS = 12.56 FT
HYDRAULIC RADIUS IS = .34 FT
NORMAL DEPTH IS = .69 FT
VELOCITY IS = 4.85 FPS
FROUDE NUMBER IS = 1.45

HEC-1 RUNOFF SUMMARY

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*            FEBRUARY 1981              *
*           REVISED 14 JUN 85           *
*                                       *
*  RUN DATE APR 02, 1986  TIME 01:55 PM *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*  THE HYDROLOGIC ENGINEERING CE[illegible]
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*  (916) 440-3295 OR (FTS) 448-3[illegible]
*                                       *
*****************************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THE VERSION RELEASED 31JAN85 CONTAINS NEW OPTIONS ON RL AND BA RECORDS, AND ADDS THE HL RECORD. SEE JANUARY 1985 INPUT DESCRIPTION FOR NEW DEFINITIONS.

1 HEC-1 INPUT PAGE 1

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
   1          ED
   2          ID                          WHITE TANK
   3          ID                          GW BLVD 1ST
   4          ID                           850840-6
   5          IE                             100 Y
              *DIAGRAM
   6          IT       3 02APR86    1200      60
   7          ID       3

   8          KK      1A
   9          BA    1.13
  10          PH                    0.74    1.45    2.55
  11          LS              92
  12          UD    0.23

  13          KK
  14          RK   11000    0.03    0.03            TRAP      20       2

  15          KK      1B
  16          BA    0.39
  17          LS              83
  18          UD    0.39

  19          KK    COMB
  20          HC       2
  21          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW
   9          1A
              V
              V
  13
              .
              .
  15          .          1B
              .           .
              .           .
  19       COMB...........
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

WHITE TANK
GW BLVD 1ST
850840-6
100 Y

3

II HYDROGRAPH TIME DATA

NMIN	3	MINUTES IN COMPUTATION INTERVAL
IDATE	2APR86	STARTING DATE
ITIME	1200	STARTING TIME
NQ	60	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	2APR86	ENDING DATE
NDTIME	1457	ENDING TIME

COMPUTATION INTERVAL 0.05 HOURS
TOTAL TIME BASE 2.95 HOURS

ENGLISH UNITS

DRAINAGE AREA	SQUARE MILES
PRECIPITATION DEPTH	INCHES
LENGTH, ELEVATION	FEET
FLOW	CUBIC FEET PER SECOND
STORAGE VOLUME	ACRE-FEET
SURFACE AREA	ACRES
TEMPERATURE	DEGREES FAHRENHEIT

```
**************
*            *
*        1A  *
*            *
**************
```

SUBBASIN RUNOFF DATA

9 BA SUBBASIN CHARACTERISTICS
TAREA 1.13 SUBBASIN AREA

PRECIPITATION DATA

10 PH DEPTHS FOR 0-PERCENT HYPOTHETICAL STORM

HYDRO-35			TP-40					TP-49			
5-MIN	15-MIN	60-MIN	2-HR	3-HR	6-HR	12-HR	24-HR	2-DAY	4-DAY	7-DAY	10-DAY
0.74	1.45	2.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

STORM AREA = 1.13

11 LS SCS LOSS RATE
STRTL 0.17 INITIAL ABSTRACTION
CRVNBR 92.00 CURVE NUMBER
RTIMP 0.00 PERCENT IMPERVIOUS AREA

12 UD SCS DIMENSIONLESS UNITGRAPH
TLAG 0.23 LAG

***

UNIT HYDROGRAPH
25 END-OF-PERIOD ORDINATES

206.	644.	1366.	1955.	2130.	2022.	1710.	1280.	888.	642.
473.	316.	211.	137.	192.	96.	[illegible]	51.	37.	27.
21.	15.	11.	6.	2.					

HYDROGRAPH AT STATION 1A

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
2	APR	1200	1	0.00	0.00	0.00	0.	2	APR	1330	31	0.00	0.00	0.00	119.
2	APR	1203	2	0.05	0.05	0.00	0.	2	APR	1333	32	0.00	0.00	0.00	87.
2	APR	1206	3	0.05	0.05	0.00	0.	2	APR	1336	33	0.00	0.00	0.00	63.
2	APR	1209	4	0.05	0.05	0.00	0.	2	APR	1339	34	0.00	0.00	0.00	45.
2	APR	1212	5	0.06	0.06	0.00	0.	2	APR	1342	35	0.00	0.00	0.00	31.
2	APR	1215	6	0.07	0.06	0.01	3.	2	APR	1345	36	0.00	0.00	0.00	21.
2	APR	1218	7	0.09	0.07	0.02	13.	2	APR	1348	37	0.00	0.00	0.00	14.
2	APR	1221	8	0.11	0.06	0.04	40.	2	APR	1351	38	0.00	0.00	0.00	9.
2	APR	1224	9	0.12	0.06	0.06	94.	2	APR	1354	39	0.00	0.00	0.00	6.
2	APR	1227	10	0.20	0.08	0.12	192.	2	APR	1357	40	0.00	0.00	0.00	4.
2	APR	1230	11	0.37	0.10	0.28	375.	2	APR	1400	41	0.00	0.00	0.00	3.
2	APR	1233	12	0.44	0.08	0.36	698.	2	APR	1403	42	0.00	0.00	0.00	2.
2	APR	1236	13	0.25	0.03	0.22	1170.	2	APR	1406	43	0.00	0.00	0.00	1.
2	APR	1239	14	0.17	0.02	0.15	1711.	2	APR	1409	44	0.00	0.00	0.00	0.
2	APR	1242	15	0.11	0.01	0.10	2156.	2	APR	1412	45	0.00	0.00	0.00	0.
2	APR	1245	16	0.10	0.01	0.09	2401.	2	APR	1415	46	0.00	0.00	0.00	0.
2	APR	1248	17	0.07	0.01	0.06	2434.	2	APR	1418	47	0.00	0.00	0.00	0.
2	APR	1251	18	0.06	0.01	0.06	2294.	2	APR	1421	48	0.00	0.00	0.00	0.
2	APR	1254	19	0.06	0.00	0.05	2046.	2	APR	1424	49	0.00	0.00	0.00	0.
2	APR	1257	20	0.05	0.00	0.05	1775.	2	APR	1427	50	0.00	0.00	0.00	0.
2	APR	1300	21	0.05	0.00	0.04	1534.	2	APR	1430	51	0.00	0.00	0.00	0.
2	APR	1303	22	0.00	0.00	0.00	1322.	2	APR	1433	52	0.00	0.00	0.00	0.
2	APR	1306	23	0.00	0.00	0.00	1126.	2	APR	1436	53	0.00	0.00	0.00	0.
2	APR	1309	24	0.00	0.00	0.00	933.	2	APR	1439	54	0.00	0.00	0.00	0.
2	APR	1312	25	0.00	0.00	0.00	745.	2	APR	1442	55	0.00	0.00	0.00	0.
2	APR	1315	26	0.00	0.00	0.00	574.	2	APR	1445	56	0.00	0.00	0.00	0.
2	APR	1318	27	0.00	0.00	0.00	428.	2	APR	1448	57	0.00	0.00	0.00	0.
2	APR	1321	28	0.00	0.00	0.00	311.	2	APR	1451	58	0.00	0.00	0.00	0.
2	APR	1324	29	0.00	0.00	0.00	224.	2	APR	1454	59	0.00	0.00	0.00	0.
2	APR	1327	30	0.00	0.00	0.00	163.	2	APR	1457	60	0.00	0.00	0.00	0.

TOTAL RAINFALL = 2.53, TOTAL LOSS = 0.81, TOTAL EXCESS = 1.73

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.95-HR
2434.	0.80	(CFS)	427.	427.	427.	427.
		(INCHES)	1.726	1.726	1.726	1.726
		(AC-FT)	104.	104.	104.	104.

CUMULATIVE AREA = 1.13 SQ MI

13 KK

HYDROGRAPH ROUTING DATA

14 RK KINEMATIC WAVE STREAM ROUTING

L	11000.	CHANNEL LENGTH
S	0.0300	SLOPE
N	0.050	CHANNEL ROUGHNESS COEFFICIENT
CA	0.00	CONTRIBUTING AREA
SHAPE	TRAP	CHANNEL SHAPE
WB	20.00	BOTTOM WIDTH OR DIAMETER
Z	2.00	SIDE SLOPE

***

KINEMATIC STREAM ROUTING USED FOR THIS REACH

COMPUTED KINEMATIC PARAMETERS

ALPHA	M	DT (MIN)	DX (FT)
1.5907	1.505	1.50	5500.00

HYDROGRAPH AT STATION

DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW
2 APR 1200	1	0.	2 APR 1245	16	1466.	2 APR 1330	31	379.	2 APR 1415	46	29.
2 APR 1203	2	0.	2 APR 1248	17	1963.	2 APR 1333	32	310.	2 APR 1418	47	25.
2 APR 1206	3	0.	2 APR 1251	18	2228.	2 APR 1336	33	254.	2 APR 1421	48	22.
2 APR 1209	4	0.	2 APR 1254	19	2265.	2 APR 1339	34	209.	2 APR 1424	49	19.
2 APR 1212	5	0.	2 APR 1257	20	2145.	2 APR 1342	35	175.	2 APR 1427	50	17.
2 APR 1215	6	0.	2 APR 1300	21	1951.	2 APR 1345	36	144.	2 APR 1430	51	15.
2 APR 1218	7	0.	2 APR 1303	22	1739.	2 APR 1348	37	120.	2 APR 1433	52	14.
2 APR 1221	8	0.	2 APR 1306	23	1536.	2 APR 1351	38	100.	2 APR 1436	53	12.
2 APR 1224	9	0.	2 APR 1309	24	1346.	2 APR 1354	39	84.	2 APR 1439	54	11.
2 APR 1227	10	1.	2 APR 1312	25	1166.	2 APR 1357	40	71.	2 APR 1442	55	10.
2 APR 1230	11	7.	2 APR 1315	26	995.	2 APR 1400	41	61.	2 APR 1445	56	9.
2 APR 1233	12	35.	2 APR 1318	27	836.	2 APR 1403	42	52.	2 APR 1448	57	8.
2 APR 1236	13	132.	2 APR 1321	28	694.	2 APR 1406	43	44.	2 APR 1451	58	7.
2 APR 1239	14	389.	2 APR 1324	29	570.	2 APR 1409	44	38.	2 APR 1454	59	7.
2 APR 1242	15	868.	2 APR 1327	30	465.	2 APR 1412	45	33.	2 APR 1457	60	6.

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.95-HR
2265.	0.90	(CFS)	425.	425.	425.	425.
		(INCHES)	1.720	1.720	1.720	1.720
		(AC-FT)	104.	104.	104.	104.

CUMULATIVE AREA = 1.13 SQ MI

15 KK 1B

SUBBASIN RUNOFF DATA

16 BA SUBBASIN CHARACTERISTICS
TAREA 0.39 SUBBASIN AREA

PRECIPITATION DATA

10 PH DEPTHS FOR 0-PERCENT HYPOTHETICAL STORM

HYDRO-35 5-MIN	15-MIN	60-MIN	TP-40 2-HR	3-HR	6-HR	12-HR	24-HR	TP-49 2-DAY	4-DAY	7-DAY	10-DAY
0.74	1.45	2.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

STORM AREA = 0.39

17 LS SCS LOSS RATE
STRTL 0.41 INITIAL ABSTRACTION
CRVNBR 83.00 CURVE NUMBER
RTIMP 0.00 PERCENT IMPERVIOUS AREA

19 UD SCS DIMENSIONLESS UNITGRAPH
TLAG 0.31 LAG

***

UNIT HYDROGRAPH
41 END-OF-PERIOD ORDINATES

29.	62.	120.	200.	301.	384.	434.	452.	450.	421.
381.	333.	273.	215.	175.	144.	119.	99.	82.	66.
55.	45.	37.	30.	25.	20.	17.	14.	11.	9.
8.	6.	5.	4.	4.	3.	3.	2.	1.	1.
0.									

HYDROGRAPH AT STATION 18

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
2	APR	1200	1	0.00	0.00	0.00	0.	2	APR	1330	31	0.00	0.00	0.00	128.
2	APR	1203	2	0.05	0.05	0.00	0.	2	APR	1333	32	0.00	0.00	0.00	105.
2	APR	1206	3	0.05	0.05	0.00	0.	2	APR	1336	33	0.00	0.00	0.00	86.
2	APR	1209	4	0.05	0.05	0.00	0.	2	APR	1339	34	0.00	0.00	0.00	70.
2	APR	1212	5	0.06	0.06	0.00	0.	2	APR	1342	35	0.00	0.00	0.00	58.
2	APR	1215	6	0.07	0.07	0.00	0.	2	APR	1345	36	0.00	0.00	0.00	48.
2	APR	1218	7	0.09	0.09	0.00	0.	2	APR	1348	37	0.00	0.00	0.00	39.
2	APR	1221	8	0.11	0.10	0.00	0.	2	APR	1351	38	0.00	0.00	0.00	32.
2	APR	1224	9	0.13	0.11	0.01	0.	2	APR	1354	39	0.00	0.00	0.00	26.
2	APR	1227	10	0.20	0.15	0.05	2.	2	APR	1357	40	0.00	0.00	0.00	22.
2	APR	1230	11	0.39	0.24	0.15	8.	2	APR	1400	41	0.00	0.00	0.00	18.
2	APR	1233	12	0.44	0.20	0.24	23.	2	APR	1403	42	0.00	0.00	0.00	15.
2	APR	1236	13	0.25	0.09	0.16	50.	2	APR	1406	43	0.00	0.00	0.00	12.
2	APR	1239	14	0.17	0.05	0.11	91.	2	APR	1409	44	0.00	0.00	0.00	10.
2	APR	1242	15	0.11	0.03	0.08	146.	2	APR	1412	45	0.00	0.00	0.00	8.
2	APR	1245	16	0.10	0.03	0.07	209.	2	APR	1415	46	0.00	0.00	0.00	7.
2	APR	1248	17	0.07	0.02	0.05	271.	2	APR	1418	47	0.00	0.00	0.00	6.
2	APR	1251	18	0.06	0.02	0.05	324.	2	APR	1421	48	0.00	0.00	0.00	5.
2	APR	1254	19	0.06	0.01	0.04	363.	2	APR	1424	49	0.00	0.00	0.00	4.
2	APR	1257	20	0.05	0.01	0.04	387.	2	APR	1427	50	0.00	0.00	0.00	3.
2	APR	1300	21	0.05	0.01	0.04	396.	2	APR	1430	51	0.00	0.00	0.00	2.
2	APR	1303	22	0.00	0.00	0.00	391.	2	APR	1433	52	0.00	0.00	0.00	2.
2	APR	1306	23	0.00	0.00	0.00	374.	2	APR	1436	53	0.00	0.00	0.00	1.
2	APR	1309	24	0.00	0.00	0.00	348.	2	APR	1439	54	0.00	0.00	0.00	1.
2	APR	1312	25	0.00	0.00	0.00	315.	2	APR	1442	55	0.00	0.00	0.00	1.
2	APR	1315	26	0.00	0.00	0.00	281.	2	APR	1445	56	0.00	0.00	0.00	0.
2	APR	1318	27	0.00	0.00	0.00	247.	2	APR	1448	57	0.00	0.00	0.00	0.
2	APR	1321	28	0.00	0.00	0.00	213.	2	APR	1451	58	0.00	0.00	0.00	0.
2	APR	1324	29	0.00	0.00	0.00	182.	2	APR	1454	59	0.00	0.00	0.00	0.
2	APR	1327	30	0.00	0.00	0.00	153.	2	APR	1457	60	0.00	0.00	0.00	0.

TOTAL RAINFALL = 2.54, TOTAL LOSS = 1.46, TOTAL EXCESS = 1.09

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.95-HR
+ 396.	1.00	(CFS)	93.	93.	93.	93.
		(INCHES)	1.090	1.090	1.090	1.090
		(AC-FT)	23.	23.	23.	23.

CUMULATIVE AREA = 0.39 SQ MI

19 KK COMB

20 HC HYDROGRAPH COMBINATION
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

HYDROGRAPH AT STATION COMB
SUM OF 2 HYDROGRAPHS

DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FL
2 APR 1200	1	0.	2 APR 1245	16	1675.	2 APR 1330	31	507.	2 APR 1415	46	3
2 APR 1203	2	0.	2 APR 1248	17	2234.	2 APR 1333	32	415.	2 APR 1418	47	3
2 APR 1206	3	0.	2 APR 1251	18	2552.	2 APR 1336	33	340.	2 APR 1421	48	2
2 APR 1209	4	0.	2 APR 1254	19	2627.	2 APR 1339	34	280.	2 APR 1424	49	2
2 APR 1212	5	0.	2 APR 1257	20	2532.	2 APR 1342	35	231.	2 APR 1427	50	2
2 APR 1215	6	0.	2 APR 1300	21	2396.	2 APR 1345	36	191.	2 APR 1430	51	1
2 APR 1218	7	0.	2 APR 1303	22	2131.	2 APR 1348	37	159.	2 APR 1433	52	1
2 APR 1221	8	0.	2 APR 1306	23	1911.	2 APR 1351	38	133.	2 APR 1436	53	1
2 APR 1224	9	1.	2 APR 1309	24	1693.	2 APR 1354	39	111.	2 APR 1439	54	1
2 APR 1227	10	3.	2 APR 1312	25	1491.	2 APR 1357	40	93.	2 APR 1442	55	1
2 APR 1230	11	15.	2 APR 1315	26	1276.	2 APR 1400	41	78.	2 APR 1445	56	
2 APR 1233	12	58.	2 APR 1318	27	1083.	2 APR 1403	42	66.	2 APR 1448	57	
2 APR 1236	13	182.	2 APR 1321	28	907.	2 APR 1406	43	56.	2 APR 1451	58	
2 APR 1239	14	480.	2 APR 1324	29	752.	2 APR 1409	44	48.	2 APR 1454	59	
2 APR 1242	15	1014.	2 APR 1327	30	618.	2 APR 1412	45	41.	2 APR 1457	60	

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.95-HR
		(CFS)				
2627.	0.90		510.	518.	518.	518.
		(INCHES)	1.558	1.558	1.558	1.558
		(AC-FT)	126.	126.	126.	126.

CUMULATIVE AREA = 1.52 SQ MI

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	1A	2434.	0.80	427.	427.	427.	1.13		
ROUTED TO		2265.	0.90	425.	425.	425.	1.13		
HYDROGRAPH AT	1B	396.	1.00	93.	93.	93.	0.39		
2 COMBINED AT	COMB	2627.	0.90	518.	518.	518.	1.52		

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
  1           ID                                WHITE TANK
  2           ID                                 GW BLVD 1ST
  3           ID                                 850840-6
  4           ID                                   100 Y
              *DIAGRAM
  5           IT       3 02APR86    1200      60
  6           ID       3

  7           KK      2A
  8           BA    0.26
  9           PH                    0.74    1.45    2.55
 10           LS              92
 11           UD    0.23

 12           KK
 13           RK    7000   0.021    0.03            TRAP      20       3

 14           KK      2B
 15           BA    0.67
 16           LS              83
 17           UD    0.53

 18           KK    COMB
 19           HC       2
 20           ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW
   7           2A
                Y
                V
  12
                .
                .
  14            .          2B
                .           .
                .           .
  18        COMB............
            --------------
            **************
            *            *
   7 KK     *       2A   *
            *            *
            **************
```

SUBBASIN RUNOFF DATA

8 BA SUBBASIN CHARACTERISTICS

TAREA 0.26 SUBBASIN AREA

PRECIPITATION DATA

9 PH

DEPTHS FOR 0-PERCENT HYPOTHETICAL STORM

HYDRO-35			TP-40					TP-42			
5-MIN	15-MIN	60-MIN	2-HR	3-HR	6-HR	12-HR	24-HR	2-DAY	4-DAY	7-DAY	10-DAY
0.74	1.45	2.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

STORM AREA = 0.26

10 LS SCS LOSS RATE

STRTL 0.17 INITIAL ABSTRACTION
CRVNBR 92.00 CURVE NUMBER
RTIMP 0.00 PERCENT IMPERVIOUS AREA

11 UD SCS DIMENSIONLESS UNITGRAPH

TLAG 0.23 LAG

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UNIT HYDROGRAPH
25 END-OF-PERIOD ORDINATES

48.	148.	314.	450.	492.	465.	395.	295.	204.	148.
110.	79.	58.	42.	30.	22.	16.	12.	8.	6.
5.	4.	2.	1.	0.					

HYDROGRAPH AT STATION 2A

DA MON HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	DA MON HRMN	ORD	RAIN	LOSS	EXCESS	COMP
2 APR 1200	1	0.00	0.00	0.00	0.	2 APR 1330	31	0.00	0.00	0.00	28.
2 APR 1203	2	0.05	0.05	0.00	0.	2 APR 1333	32	0.00	0.00	0.00	20.
2 APR 1206	3	0.05	0.05	0.00	0.	2 APR 1336	33	0.00	0.00	0.00	15.
2 APR 1209	4	0.05	0.05	0.00	0.	2 APR 1339	34	0.00	0.00	0.00	10.
2 APR 1212	5	0.06	0.06	0.00	0.	2 APR 1342	35	0.00	0.00	0.00	7.
2 APR 1215	6	0.07	0.06	0.01	1.	2 APR 1345	36	0.00	0.00	0.00	5.
2 APR 1218	7	0.09	0.07	0.02	3.	2 APR 1348	37	0.00	0.00	0.00	3.
2 APR 1221	8	0.11	0.06	0.04	9.	2 APR 1351	38	0.00	0.00	0.00	2.
2 APR 1224	9	0.13	0.06	0.06	22.	2 APR 1354	39	0.00	0.00	0.00	1.
2 APR 1227	10	0.20	0.08	0.12	44.	2 APR 1357	40	0.00	0.00	0.00	1.
2 APR 1230	11	0.39	0.10	0.28	87.	2 APR 1400	41	0.00	0.00	0.00	1.
2 APR 1233	12	0.44	0.08	0.37	162.	2 APR 1403	42	0.00	0.00	0.00	0.
2 APR 1236	13	0.25	0.03	0.22	271.	2 APR 1406	43	0.00	0.00	0.00	0.
2 APR 1239	14	0.17	0.02	0.15	397.	2 APR 1409	44	0.00	0.00	0.00	0.
2 APR 1242	15	0.11	0.01	0.10	500.	2 APR 1412	45	0.00	0.00	0.00	0.
2 APR 1245	16	0.10	0.01	0.09	557.	2 APR 1415	46	0.00	0.00	0.00	0.
2 APR 1248	17	0.07	0.01	0.06	564.	2 APR 1418	47	0.00	0.00	0.00	0.
2 APR 1251	18	0.06	0.01	0.06	532.	2 APR 1421	48	0.00	0.00	0.00	0.
2 APR 1254	19	0.06	0.00	0.05	474.	2 APR 1424	49	0.00	0.00	0.00	0.
2 APR 1257	20	0.05	0.00	0.05	411.	2 APR 1427	50	0.00	0.00	0.00	0.
2 APR 1300	21	0.05	0.00	0.04	355.	2 APR 1430	51	0.00	0.00	0.00	0.
2 APR 1303	22	0.00	0.00	0.00	306.	2 APR 1433	52	0.00	0.00	0.00	0.
2 APR 1306	23	0.00	0.00	0.00	260.	2 APR 1436	53	0.00	0.00	0.00	0.
2 APR 1309	24	0.00	0.00	0.00	215.	2 APR 1439	54	0.00	0.00	0.00	0.
2 APR 1312	25	0.00	0.00	0.00	172.	2 APR 1442	55	0.00	0.00	0.00	0.
2 APR 1315	26	0.00	0.00	0.00	132.	2 APR 1445	56	0.00	0.00	0.00	0.
2 APR 1318	27	0.00	0.00	0.00	99.	2 APR 1448	57	0.00	0.00	0.00	0.
2 APR 1321	28	0.00	0.00	0.00	72.	2 APR 1451	58	0.00	0.00	0.00	0.
2 APR 1324	29	0.00	0.00	0.00	52.	2 APR 1454	59	0.00	0.00	0.00	0.
2 APR 1327	30	0.00	0.00	0.00	38.	2 APR 1457	60	0.00	0.00	0.00	0.

TOTAL RAINFALL = 2.55, TOTAL LOSS = 0.81, TOTAL EXCESS = 1.74

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.95-HR
564.	0.80	(CFS)	99.	99.	99.	99.
		(INCHES)	1.736	1.736	1.736	1.736
		(AC-FT)	24.	24.	24.	24.

CUMULATIVE AREA = 0.26 SQ MI

*** ***

12 KK

HYDROGRAPH ROUTING DATA

13 RK KINEMATIC WAVE STREAM ROUTING

L	7000.	CHANNEL LENGTH
S	0.0210	SLOPE
N	0.030	CHANNEL ROUGHNESS COEFFICIENT
DA	0.00	CONTRIBUTING AREA
SHAPE	TRAP	CHANNEL SHAPE
WB	20.00	BOTTOM WIDTH OR DIAMETER
Z	3.00	SIDE SLOPE

***

KINEMATIC STREAM ROUTING USED FOR THIS REACH

COMPUTED KINEMATIC PARAMETERS

ALPHA	M	DT (MIN)	DX (FT)
1.3959	1.475	1.50	3500.00

HYDROGRAPH AT STATION

DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FL
2 APR 1200	1	0.	2 APR 1245	16	252.	2 APR 1330	31	106.	2 APR 1415	46	
2 APR 1203	2	0.	2 APR 1248	17	370.	2 APR 1333	32	88.	2 APR 1418	47	
2 APR 1206	3	0.	2 APR 1251	18	457.	2 APR 1336	33	73.	2 APR 1421	48	
2 APR 1209	4	0.	2 APR 1254	19	496.	2 APR 1339	34	61.	2 APR 1424	49	
2 APR 1212	5	0.	2 APR 1257	20	493.	2 APR 1342	35	51.	2 APR 1427	50	
2 APR 1215	6	0.	2 APR 1300	21	464.	2 APR 1345	36	43.	2 APR 1430	51	
2 APR 1218	7	0.	2 APR 1303	22	423.	2 APR 1348	37	36.	2 APR 1433	52	
2 APR 1221	8	0.	2 APR 1306	23	380.	2 APR 1351	38	30.	2 APR 1436	53	
2 APR 1224	9	0.	2 APR 1309	24	336.	2 APR 1354	39	26.	2 APR 1439	54	
2 APR 1227	10	0.	2 APR 1312	25	295.	2 APR 1357	40	22.	2 APR 1442	55	
2 APR 1230	11	1.	2 APR 1315	26	255.	2 APR 1400	41	19.	2 APR 1445	56	
2 APR 1233	12	5.	2 APR 1318	27	218.	2 APR 1403	42	16.	2 APR 1448	57	
2 APR 1236	13	19.	2 APR 1321	28	184.	2 APR 1406	43	14.	2 APR 1451	58	
2 APR 1239	14	57.	2 APR 1324	29	153.	2 APR 1409	44	12.	2 APR 1454	59	
2 APR 1242	15	137.	2 APR 1327	30	127.	2 APR 1412	45	11.	2 APR 1457	60	

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.95-HR
496.	0.90	(CFS)	98.	98.	98.	98.
		(INCHES)	1.727	1.727	1.727	1.727
		(AC-FT)	24.	24.	24.	24.

CUMULATIVE AREA = 0.26 SQ MI

14 KK 2B

SUBBASIN RUNOFF DATA

15 BA SUBBASIN CHARACTERISTICS
TAREA 0.67 SUBBASIN AREA

PRECIPITATION DATA

9 PH DEPTHS FOR 0-PERCENT HYPOTHETICAL STORM

HYDRO-35 5-MIN	15-MIN	60-MIN	TP-40 2-HR	3-HR	6-HR	12-HR	24-HR	TP-49 2-DAY	4-DAY	7-DAY	10-DAY
0.74	1.45	2.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

STORM AREA = 0.67

16 LS SCS LOSS RATE
STRTL 0.41 INITIAL ABSTRACTION
CRVNBR 83.00 CURVE NUMBER
RTIMP 0.00 PERCENT IMPERVIOUS AREA

17 UD SCS DIMENSIONLESS UNITGRAPH
TLAG 0.53 LAG

UNIT HYDROGRAPH
55 END-OF-PERIOD ORDINATES

16.	50.	95.	153.	228.	319.	413.	491.	546.	577.
583.	578.	552.	517.	478.	431.	374.	314.	263.	227.
195.	169.	148.	129.	113.	96.	82.	71.	61.	53.
46.	40.	34.	29.	25.	22.	19.	16.	14.	12.
11.	9.	8.	7.	6.	5.	5.	4.	4.	3.
2.	2.	1.	1.	0.					

HYDROGRAPH AT STATION 26

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
2	APR	1200	1	0.00	0.00	0.00	0.	2	APR	1330	31	0.00	0.00	0.00	346.
2	APR	1203	2	0.05	0.05	0.00	0.	2	APR	1333	32	0.00	0.00	0.00	306.
2	APR	1206	3	0.05	0.05	0.00	0.	2	APR	1336	33	0.00	0.00	0.00	269.
2	APR	1209	4	0.05	0.05	0.00	0.	2	APR	1339	34	0.00	0.00	0.00	235.
2	APR	1212	5	0.06	0.06	0.00	0.	2	APR	1342	35	0.00	0.00	0.00	205.
2	APR	1215	6	0.07	0.07	0.00	0.	2	APR	1345	36	0.00	0.00	0.00	177.
2	APR	1218	7	0.09	0.09	0.00	0.	2	APR	1348	37	0.00	0.00	0.00	153.
2	APR	1221	8	0.11	0.10	0.00	0.	2	APR	1351	38	0.00	0.00	0.00	131.
2	APR	1224	9	0.13	0.11	0.01	0.	2	APR	1354	39	0.00	0.00	0.00	113.
2	APR	1227	10	0.20	0.15	0.05	2.	2	APR	1357	40	0.00	0.00	0.00	98.
2	APR	1230	11	0.39	0.24	0.15	6.	2	APR	1400	41	0.00	0.00	0.00	84.
2	APR	1233	12	0.44	0.20	0.24	18.	2	APR	1403	42	0.00	0.00	0.00	73.
2	APR	1236	13	0.25	0.09	0.16	40.	2	APR	1406	43	0.00	0.00	0.00	63.
2	APR	1239	14	0.17	0.05	0.11	71.	2	APR	1409	44	0.00	0.00	0.00	54.
2	APR	1242	15	0.11	0.03	0.08	114.	2	APR	1412	45	0.00	0.00	0.00	47.
2	APR	1245	16	0.10	0.03	0.07	170.	2	APR	1415	46	0.00	0.00	0.00	41.
2	APR	1248	17	0.07	0.02	0.05	235.	2	APR	1418	47	0.00	0.00	0.00	35.
2	APR	1251	18	0.06	0.02	0.05	306.	2	APR	1421	48	0.00	0.00	0.00	30.
2	APR	1254	19	0.06	0.01	0.04	374.	2	APR	1424	49	0.00	0.00	0.00	26.
2	APR	1257	20	0.05	0.01	0.04	435.	2	APR	1427	50	0.00	0.00	0.00	23.
2	APR	1300	21	0.05	0.01	0.04	484.	2	APR	1430	51	0.00	0.00	0.00	19.
2	APR	1303	22	0.00	0.00	0.00	520.	2	APR	1433	52	0.00	0.00	0.00	17.
2	APR	1306	23	0.00	0.00	0.00	543.	2	APR	1436	53	0.00	0.00	0.00	15.
2	APR	1309	24	0.00	0.00	0.00	552.	2	APR	1439	54	0.00	0.00	0.00	13.
2	APR	1312	25	0.00	0.00	0.00	549.	2	APR	1442	55	0.00	0.00	0.00	11.
2	APR	1315	26	0.00	0.00	0.00	535.	2	APR	1445	56	0.00	0.00	0.00	9.
2	APR	1318	27	0.00	0.00	0.00	510.	2	APR	1448	57	0.00	0.00	0.00	8.
2	APR	1321	28	0.00	0.00	0.00	474.	2	APR	1451	58	0.00	0.00	0.00	7.
2	APR	1324	29	0.00	0.00	0.00	432.	2	APR	1454	59	0.00	0.00	0.00	6.
2	APR	1327	30	0.00	0.00	0.00	388.	2	APR	1457	60	0.00	0.00	0.00	5.

TOTAL RAINFALL = 2.54, TOTAL LOSS = 1.45, TOTAL EXCESS = 1.09

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.95-HR
552.	1.15	(CFS)	159.	159.	159.	159.
		(INCHES)	1.084	1.084	1.084	1.084
		(AC-FT)	39.	39.	39.	39.

CUMULATIVE AREA = 0.67 SQ MI

18 KK COMB

19 HC HYDROGRAPH COMBINATION
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

***

HYDROGRAPH AT STATION COMB
SUM OF 2 HYDROGRAPHS

DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW
2 APR 1200	1	0.	2 APR 1245	16	421.	2 APR 1330	31	451.	2 APR 1415	46	50.
2 APR 1203	2	0.	2 APR 1248	17	606.	2 APR 1333	32	393.	2 APR 1418	47	43.
2 APR 1206	3	0.	2 APR 1251	18	763.	2 APR 1336	33	342.	2 APR 1421	48	37.
2 APR 1209	4	0.	2 APR 1254	19	870.	2 APR 1339	34	296.	2 APR 1424	49	32.
2 APR 1212	5	0.	2 APR 1257	20	927.	2 APR 1342	35	256.	2 APR 1427	50	28.
2 APR 1215	6	0.	2 APR 1300	21	948.	2 APR 1345	36	220.	2 APR 1430	51	25.
2 APR 1218	7	0.	2 APR 1303	22	943.	2 APR 1348	37	188.	2 APR 1433	52	21.
2 APR 1221	8	0.	2 APR 1306	23	923.	2 APR 1351	38	161.	2 APR 1436	53	19.
2 APR 1224	9	0.	2 APR 1309	24	889.	2 APR 1354	39	139.	2 APR 1439	54	16.
2 APR 1227	10	2.	2 APR 1312	25	844.	2 APR 1357	40	120.	2 APR 1442	55	14.
2 APR 1230	11	7.	2 APR 1315	26	790.	2 APR 1400	41	103.	2 APR 1445	56	12.
2 APR 1233	12	23.	2 APR 1318	27	727.	2 APR 1403	42	89.	2 APR 1448	57	11.
2 APR 1236	13	58.	2 APR 1321	28	658.	2 APR 1406	43	77.	2 APR 1451	58	10.
2 APR 1239	14	129.	2 APR 1324	29	585.	2 APR 1409	44	67.	2 APR 1454	59	9.
2 APR 1242	15	251.	2 APR 1327	30	515.	2 APR 1412	45	58.	2 APR 1457	60	8.

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.95-HR
948.	1.00	(CFS)	257.	257.	257.	257.
		(INCHES)	1.264	1.264	1.264	1.264
		(AC-FT)	63.	63.	63.	63.

CUMULATIVE AREA = 0.93 SQ MI

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	2A	564.	0.80	99.	99.	99.	0.26		
ROUTED TO		496.	0.90	99.	98.	98.	0.26		
HYDROGRAPH AT	2S	552.	1.15	159.	159.	159.	0.67		
2 COMBINED AT	COMB	948.	1.00	257.	257.	257.	0.93		

1. HEC-1 INPUT PAGE 1

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
   1          ID                          WHITE TANK
   2          ID                            GW BLVD
   3          ID                           850840-6
   4          ID                             100 Y
              *DIAGRAM
   5          IT       3  4DEC86    1200      60
   6          IO       3

   7          KK      3A
   8          BA    2.14
   9          PB                   0.74    1.45    2.55
  10          LS              92
  11          UD    0.25

  12          KK
  13          RS   13000   0.021    0.03            TRAP      20       3

  14          KK      3B
  15          BA    0.02
  16          LS              83
  17          UD    0.55

  18          KK    COMB
  19          HC       2
  20          ZZ
```

*** ***

```
            **************
            *            *
  7 KK      *     3A     *
            *            *
            **************
```

SUBBASIN RUNOFF DATA

8 BA SUBBASIN CHARACTERISTICS

TAREA	2.14	SUBBASIN AREA

PRECIPITATION DATA

9 PH DEPTHS FOR 0-PERCENT HYPOTHETICAL STORM

HYDRO-35			TP-40						TP-49		
5-MIN	15-MIN	60-MIN	2-HR	3-HR	6-HR	12-HR	24-HR	2-DAY	4-DAY	7-DAY	10-DAY
0.74	1.45	2.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

STORM AREA = 2.14

10 LS SCS LOSS RATE

STRTL	0.17	INITIAL ABSTRACTION
CRVNBR	92.00	CURVE NUMBER
RTIMP	0.00	PERCENT IMPERVIOUS AREA

11 UD SCS DIMENSIONLESS UNITGRAPH

TLAG	0.24	LAG

***

UNIT HYDROGRAPH
26 END-OF-PERIOD ORDINATES

359.	1104.	2325.	3436.	3882.	3790.	3293.	2611.	1803.	1319.
986.	733.	533.	393.	288.	209.	155.	114.	84.	62.
46.	36.	27.	18.	11.	4.				

*** *** *** *** ***

HYDROGRAPH AT STATION 3A

TOTAL RAINFALL = 2.52, TOTAL LOSS = 0.81, TOTAL EXCESS = 1.71

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	2.95-HR
(CFS)	(HR)				
4489.	8.00	(CFS) 892.	892.	892.	892.
		(INCHES) 1.713	1.713	1.713	1.713
		(AC-FT) 196.	196.	196.	196.

CUMULATIVE AREA = 2.14 SQ MI

*** ***

```
            **************
            *            *
  12 KK     *            *
            *            *
            **************
```

HYDROGRAPH ROUTING DATA

13 RK KINEMATIC WAVE STREAM ROUTING

L	13000.	CHANNEL LENGTH
S	0.0210	SLOPE
N	0.030	CHANNEL ROUGHNESS COEFFICIENT
CA	0.00	CONTRIBUTING AREA
SHAPE	TRAP	CHANNEL SHAPE
WB	20.00	BOTTOM WIDTH OR DIAMETER
Z	3.00	SIDE SLOPE

***

KINEMATIC STREAM ROUTING USED FOR THIS REACH

COMPUTED KINEMATIC PARAMETERS

ALPHA	M	DT (MIN)	DX (FT)
1.3959	1.475	1.50	6500.00

*** *** *** *** ***

HYDROGRAPH AT STATION

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.95-HR
+		(CFS)				
+ 4003.	0.90		798.	798.	798.	798.
		(INCHES)	1.705	1.705	1.705	1.705
		(AC-FT)	195.	195.	195.	195.

CUMULATIVE AREA = 2.14 SQ MI

*** ***

```
**************
*            *
*        3B  *
*            *
**************
```

14 KK

SUBBASIN RUNOFF DATA

15 BA

SUBBASIN CHARACTERISTICS

TAREA 0.82 SUBBASIN AREA

PRECIPITATION DATA

9 PH

DEPTHS FOR 0-PERCENT HYPOTHETICAL STORM

HYDRO-35 5-MIN	15-MIN	60-MIN	TP-40 2-HR	3-HR	6-HR	12-HR	24-HR	TP-49 2-DAY	4-DAY	7-DAY	10-DAY
0.74	1.45	2.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

STORM AREA = 0.82

16 LS

SCS LOSS RATE

STRTL 0.41 INITIAL ABSTRACTION

CRVNBR 83.00 CURVE NUMBER

RTIMP 0.00 PERCENT IMPERVIOUS AREA

17 UD

SCS DIMENSIONLESS UNITGRAPH

TLAG 0.55 LAG

***

UNIT HYDROGRAPH

57 END-OF-PERIOD ORDINATES

18.	56.	107.	170.	252.	352.	464.	560.	627.	669.
686.	686.	669.	632.	590.	542.	483.	414.	350.	298.
250.	227.	193.	171.	149.	130.	112.	96.	81.	77.
64.	55.	48.	41.	36.	31.	27.	24.	20.	18.
15.	13.	12.	10.	9.	8.	7.	6.	5.	5.
4.	3.	3.	2.	1.	1.	0.			

*** *** *** *** ***

HYDROGRAPH AT STATION 3B

TOTAL RAINFALL = 2.54, TOTAL LOSS = 1.45, TOTAL EXCESS = 1.09

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.95-HR
+		(CFS)				
+ 657.	1.20		194.	194.	194.	194.
		(INCHES)	1.082	1.082	1.082	1.082
		(AC-FT)	47.	47.	47.	47.

CUMULATIVE AREA = 0.82 SQ MI

```
18 KK      *      COMB   *
           *             *
           **************

19 HC          HYDROGRAPH COMBINATION
                    ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

     ***            ***            ***            ***            ***
                          HYDROGRAPH AT STATION     COMB

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR      2.95-HR
+   (CFS)       (HR)
                                  (CFS)
+   4492.       0.95                992.        992.        992.        992.
                              (INCHES)      1.533       1.533       1.533       1.533
                              (AC-FT)        242.        242.        242.        242.

                          CUMULATIVE AREA =    2.96 SQ MI
1
                                                   RUNOFF SUMMARY
                                              FLOW IN CUBIC FEET PER SECOND
                                            TIME IN HOURS,  AREA IN SQUARE MILES

                                     PEAK   TIME OF     AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN     MAXIMU
        OPERATION        STATION     FLOW    PEAK                                          AREA      STAGE
+                                                        6-HOUR     24-HOUR     72-HOUR

        HYDROGRAPH AT
+                            3A      4489.   0.80         802.        802.        802.      2.14
        ROUTED TO
+                                    4003.   0.90         798.        798.        798.      2.14
        HYDROGRAPH AT
+                            3B       657.   1.20         194.        194.        194.      0.82
        2 COMBINED AT
+                          COMB      4492.   0.95         992.        992.        992.      2.96
1                                                   HEC-1 INPUT                                          PAGE

     LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
       1           ID                          WHITE TANK
       2           ID                           GW PKWY
       3           ID                            850840-6
       4           ID                              100 Y
                   *DIAGRAM
       5           IT       3  4DEC86    1200      60
       6           IO       3

       7           KK      4A
       8           BA    1.97
       9           PH                   0.74    1.45    2.55
      10           LS              92
      11           UD    0.23

      12           KK
      13           RK    9500   0.015    0.03            TRAP      20       2

      14           KK      4B
      15           BA    0.75
      16           LS              83
      17           UD    0.67

      18           KK    COMB
      19           HC       2
      20           ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW
   7           4A
               V
               V
  12
               .
               .
  14           .          4B
               .           .
               .           .
  18        COMB.............
```

```
7 KK        *          *
            *    4A    *
            *          *
            ************
```

SUBBASIN RUNOFF DATA

8 BA SUBBASIN CHARACTERISTICS
TAREA 1.97 SUBBASIN AREA

PRECIPITATION DATA

9 PH DEPTHS FOR 0-PERCENT HYPOTHETICAL STORM

HYDRO-35			TP-40					TP-49			
5-MIN	15-MIN	60-MIN	2-HR	3-HR	6-HR	12-HR	24-HR	2-DAY	4-DAY	7-DAY	10-DAY
0.74	1.45	2.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

STORM AREA = 1.97

10 LS SCS LOSS RATE
STRTL 0.17 INITIAL ABSTRACTION
CRVNBR 92.00 CURVE NUMBER
RTIMP 0.00 PERCENT IMPERVIOUS AREA

11 UD SCS DIMENSIONLESS UNITGRAPH
TLAG 0.23 LAG

***

UNIT HYDROGRAPH
25 END-OF-PERIOD ORDINATES

363.	1123.	2381.	3409.	3727.	3526.	2995.	2232.	1549.	1119.
832.	602.	439.	318.	230.	167.	122.	89.	64.	47.
36.	27.	18.	11.	4.					

*** *** *** *** ***
HYDROGRAPH AT STATION 4A

TOTAL RAINFALL = 2.52, TOTAL LOSS = 0.81, TOTAL EXCESS = 1.72

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.95-HR
		(CFS)				
4213.	0.80		739.	739.	739.	739.
		(INCHES)	1.715	1.715	1.715	1.715
		(AC-FT)	180.	180.	180.	180.

CUMULATIVE AREA = 1.97 SQ MI

HYDROGRAPH ROUTING DATA

13 RK KINEMATIC WAVE STREAM ROUTING
L 9500. CHANNEL LENGTH
S 0.0150 SLOPE
N 0.030 CHANNEL ROUGHNESS COEFFICIENT
CA 0.00 CONTRIBUTING AREA
SHAPE TRAP CHANNEL SHAPE
WD 20.00 BOTTOM WIDTH OR DIAMETER
Z 2.00 SIDE SLOPE

***

KINEMATIC STREAM ROUTING USED FOR THIS REACH

COMPUTED KINEMATIC PARAMETERS

ALPHA	M	DT (MIN)	DX (FT)
1.1240	1.505	1.50	4750.00

*** *** *** *** ***
HYDROGRAPH AT STATION

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.95-HR
		(CFS)				
3981.	0.95		737.	737.	737.	737.
		(INCHES)	1.711	1.711	1.711	1.711
		(AC-FT)	180.	180.	180.	180.

CUMULATIVE AREA = 1.97 SQ MI

```
              **************
              *            *
14 KK         *     4B     *
              *            *
              **************

          SUBBASIN RUNOFF DATA

15 BA          SUBBASIN CHARACTERISTICS
                    TAREA        0.75  SUBBASIN AREA

               PRECIPITATION DATA

 9 PH                                 DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM -
                 ..... HYDRO-35 .....  ............... TP-40 ...............  ........... TP-49 ...........
                 5-MIN  15-MIN  60-MIN   2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
                  0.74   1.45   2.55    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00

                                                        STORM AREA =    0.75

16 LS          SCS LOSS RATE
                    STRTL        0.41  INITIAL ABSTRACTION
                   CRVNBR       83.00  CURVE NUMBER
                    RTIMP        0.00  PERCENT IMPERVIOUS AREA

17 UD          SCS DIMENSIONLESS UNITGRAPH
                    TLAG        0.67  LAG

                                                   ***

                                              UNIT HYDROGRAPH
                                          69 END-OF-PERIOD ORDINATES
                 11.     32.     60.     93.    136.    188.    249.    320.    384.    439.
                480.    505.    518.    521.    517.    500.    478.    450.    420.    386.
                348.    303.    263.    230.    204.    181.    161.    143.    130.    116.
                103.     92.     81.     72.     64.     57.     51.     45.     40.     36.
                 32.     28.     25.     22.     20.     18.     16.     14.     13.     11.
                 10.      9.      8.      7.      6.      6.      5.      5.      4.      4.
                  3.      3.      2.      2.      2.      1.      1.      1.      0.

      ***            ***            ***            ***            ***
                     HYDROGRAPH AT STATION      4B

   TOTAL RAINFALL =    2.54, TOTAL LOSS =    1.45, TOTAL EXCESS =    1.09

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR      2.95-HR
+   (CFS)       (HR)
                                  (CFS)
+    518.       1.30                 176.        176.        176.        176.
                                (INCHES)       1.071       1.071       1.071       1.071
                                (AC-FT)         43.         43.         43.         43.

                          CUMULATIVE AREA =    0.75 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
18 KK         *    COMB    *
              *            *
              **************

19 HC          HYDROGRAPH COMBINATION
                    ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                   ***

      ***            ***            ***            ***            ***
                     HYDROGRAPH AT STATION     COMB

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR      2.95-HR
+   (CFS)       (HR)
                                  (CFS)
+   4198.       0.90                 913.        913.        913.        913.
                                (INCHES)       1.535       1.535       1.535       1.535
                                (AC-FT)        223.        223.        223.        223.

                          CUMULATIVE AREA =    2.72 SQ MI
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME MAX S
+	HYDROGRAPH AT	4A	4213.	0.80	739.	739.	739.	1.97		
+	ROUTED TO		3981.	0.85	737.	737.	737.	1.97		
+	HYDROGRAPH AT	4B	518.	1.30	176.	176.	176.	0.75		
+	2 COMBINED AT	COMB	4198.	0.90	913.	913.	913.	2.72		

1 HEC-1 INPUT PAGE 1

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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
  1           ID                                WHITE TANK
  2           ID                                GW BLVD 1 SECT
  3           ID                                850840-6
  4           ID                                 100 Y
              *DIAGRAM
  5           IT       3 03APR86    1200      60
  6           IO       3

  7           KK      5A
  8           BA    0.38
  9           PH                    0.74    1.45    2.55
 10           LS              92
 11           UD    0.16

 12           KK
 13           RK    4500   0.017    0.03            TRAP      20       2

 14           KK      5B
 15           BA    0.22
 16           LS              83
 17           UD    0.52

 18           KK    COMB
 19           HC       2
 20           ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (---)) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW
   7           5A
               V
               V
  12
               .
               .
  14           .          5B
               .           .
               .           .
  18        COMB............
```

```
                 *            *
  7 KK           *     5A     *
                 *            *
                 **************

              SUBBASIN RUNOFF DATA

  8 BA          SUBBASIN CHARACTERISTICS
                      TAREA        0.38  SUBBASIN AREA

                PRECIPITATION DATA

  9 PH                                  DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                ..... HYDRO-35 .....   ............... TP-40 ...............   ........... TP-49 ...........
                5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
                 0.74    1.45    2.55    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00

                                                   STORM AREA =    0.38

 10 LS          SCS LOSS RATE
                      STRTL        0.17  INITIAL ABSTRACTION
                     CRVNBR       92.00  CURVE NUMBER
                      RTIMP        0.00  PERCENT IMPERVIOUS AREA

 11 UD          SCS DIMENSIONLESS UNITGRAPH
                       TLAG        0.16  LAG

                                                          ***

WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG

                                                   UNIT HYDROGRAPH
                                              18 END-OF-PERIOD ORDINATES
            162.     543.     929.     984.     813.     534.     332.     219.     139.      91.
             58.      37.      24.      15.      10.       7.       4.       1.

     ***            ***            ***            ***            ***
                        HYDROGRAPH AT STATION       5A

   TOTAL RAINFALL =    2.54, TOTAL LOSS =    0.01, TOTAL EXCESS =    1.73

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR      2.95-HR
+   (CFS)       (HR)
                            (CFS)
+    990.       0.70                144.        144.        144.        144.
                          (INCHES)  1.733       1.733       1.733       1.733
                           (AC-FT)    35.         35.         35.         35.

                        CUMULATIVE AREA =    0.38 SQ MI

              HYDROGRAPH ROUTING DATA

 13 RK          KINEMATIC WAVE STREAM ROUTING
                            L       4500.  CHANNEL LENGTH
                            S      0.0170  SLOPE
                            N       0.030  CHANNEL ROUGHNESS COEFFICIENT
                           CA        0.00  CONTRIBUTING AREA
                        SHAPE        TRAP  CHANNEL SHAPE
                           WD       20.00  BOTTOM WIDTH OR DIAMETER
                            Z        2.00  SIDE SLOPE

                                                          ***

          KINEMATIC STREAM ROUTING USED FOR THIS REACH

          COMPUTED KINEMATIC PARAMETERS
              ALPHA        M      DT (MIN)   DX (FT)
             1.1974    1.505        1.50     2250.00

     ***            ***            ***            ***            ***
                        HYDROGRAPH AT STATION

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR      2.95-HR
+   (CFS)       (HR)
                            (CFS)
+    952.       0.75                144.        144.        144.        144.
                          (INCHES)  1.733       1.733       1.733       1.733
                           (AC-FT)    35.         35.         35.         35.

                        CUMULATIVE AREA =    0.38 SQ MI
```

```
              **************
              *            *
   14 KK      *     5B     *
              *            *
              **************

                 SUBBASIN RUNOFF DATA

   15 BA           SUBBASIN CHARACTERISTICS
                        TAREA        0.22  SUBBASIN AREA

                   PRECIPITATION DATA

    9 PH                                 DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                  ..... HYDRO-35 .....   ............... TP-40 ...............   ........... TP-49 ...........
                  5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
                   0.74    1.45    2.55    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00

                                                        STORM AREA =    0.22

   16 LS           SCS LOSS RATE
                        STRTL        0.41  INITIAL ABSTRACTION
                       CRVNBR       83.00  CURVE NUMBER
                        RTIMP        0.00  PERCENT IMPERVIOUS AREA

   17 UD           SCS DIMENSIONLESS UNITGRAPH
                        TLAG        0.52  LAG

                                                          ***

                                                   UNIT HYDROGRAPH
                                             54 END-OF-PERIOD ORDINATES
                   5.      17.      33.      53.      79.     110.     142.     167.     184.     193.
                 195.     193.     182.     170.     156.     139.     119.      99.      84.      72.
                  62.      53.      47.      40.      35.      30.      26.      22.      19.      16.
                  14.      12.      10.       9.       8.       7.       6.       5.       4.       4.
                   3.       3.       2.       2.       2.       2.       1.       1.       1.       1.
                   1.       0.       0.       0.

        ***            ***            ***            ***            ***
                        HYDROGRAPH AT STATION      5B

      TOTAL RAINFALL =    2.55, TOTAL LOSS =    1.46, TOTAL EXCESS =    1.09

    PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR      24-HR      72-HR     2.95-HR
  +   (CFS)       (HR)
                          (CFS)
  +    185.       1.15                  52.        52.        52.        52.
                        (INCHES)      1.089      1.089      1.089      1.089
                         (AC-FT)        13.        13.        13.        13.

                        CUMULATIVE AREA =    0.22 SQ MI


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
   18 KK      *    COMB    *
              *            *
              **************

   19 HC           HYDROGRAPH COMBINATION
                       ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                          ***

        ***            ***            ***            ***            ***
                        HYDROGRAPH AT STATION     COMB

    PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR      24-HR      72-HR     2.95-HR
  +   (CFS)       (HR)
                          (CFS)
  +   1010.       0.75                 196.       196.       196.       196.
                        (INCHES)      1.497      1.497      1.497      1.497
                         (AC-FT)        48.        48.        48.        48.

                        CUMULATIVE AREA =    0.60 SQ MI
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	5A	990.	0.70	144.	144.	144.	0.38		
+	ROUTED TO		952.	0.75	144.	144.	144.	0.38		
+	HYDROGRAPH AT	5B	185.	1.15	52.	52.	52.	0.22		
+	2 COMBINED AT	COMB	1010.	0.75	196.	196.	196.	0.60		

1 HEC-1 INPUT PAGE 1

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
  1           ID                                WHITE TANK
  2           ID                              GW BLVD 1 SECT
  3           ID                                850840-6
  4           ID                                  100 Y
              *DIAGRAM
  5           IT       3 09APR86
  6           IO       3

  7           KK      6A
  8           BA    0.94
  9           PH                    0.74    1.45    2.55
 10           LS              92
 11           UD    0.19

 12           KK
 13           RK    4600   0.024    0.03            TRAP      15       2

 14           KK      6B
 15           BA    0.15
 16           LS              83
 17           UD    0.38

 18           KK    COMB
 19           HC       2
 20           ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW
   7           6A
               V
               V
  12
               .
               .
  14           .          6B
               .           .
               .           .
  18        COMB............
```

```
              **************
              *            *
   7 KK       *     6A     *
              *            *
              **************

                 SUBBASIN RUNOFF DATA

   8 BA            SUBBASIN CHARACTERISTICS
                        TAREA        0.94  SUBBASIN AREA

                   PRECIPITATION DATA

   9 PH                                 DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                 ..... HYDRO-35 .....  ............... TP-40 ...............  ........... TP-49 ...........
                 5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
                  0.74    1.45    2.55    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00

                                                   STORM AREA =    0.94

  10 LS            SCS LOSS RATE
                       STRTL        0.17  INITIAL ABSTRACTION
                      CRVNBR       92.00  CURVE NUMBER
                       RTIMP        0.00  PERCENT IMPERVIOUS AREA

  11 UD            SCS DIMENSIONLESS UNITGRAPH
                        TLAG        0.19  LAG

                                                        ***

                                                   UNIT HYDROGRAPH
                                             21 END-OF-PERIOD ORDINATES
                 273.     874.    1723.    2096.    2010.    1654.    1123.     747.     519.     357.
                 244.     165.     112.      78.      54.      37.      25.      19.      13.       7.
                   2.

      ***          ***          ***          ***          ***
                          HYDROGRAPH AT STATION      6A

     TOTAL RAINFALL =    2.54, TOTAL LOSS =    0.81, TOTAL EXCESS =    1.73

   PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR      5.00-HR
 +   (CFS)       (HR)
                              (CFS)
 +    2258.      0.75                 210.        210.        210.        210.
                            (INCHES)   1.728       1.728       1.728       1.728
                            (AC-FT)     87.         87.         87.         87.

                            CUMULATIVE AREA =    0.94 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *

              **************
              *            *
  12 KK       *            *
              *            *
              **************

                 HYDROGRAPH ROUTING DATA

  13 RK            KINEMATIC WAVE STREAM ROUTING
                            L       4600.  CHANNEL LENGTH
                            S      0.0240  SLOPE
                            N       0.030  CHANNEL ROUGHNESS COEFFICIENT
                           CA        0.00  CONTRIBUTING AREA
                        SHAPE        TRAP  CHANNEL SHAPE
                           WD       15.00  BOTTOM WIDTH OR DIAMETER
                            Z        2.00  SIDE SLOPE

                                                        ***
```

KINEMATIC STREAM ROUTING USED FOR THIS REACH

COMPUTED KINEMATIC PARAMETERS

ALPHA	M	DT (MIN)	DX (FT)
1.7034	1.479	0.75	2300.00

*** *** *** *** ***

HYDROGRAPH AT STATION

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	5.00-HR
+ 2173.	0.80	(CFS)	210.	210.	210.	210.
		(INCHES)	1.728	1.728	1.728	1.728
		(AC-FT)	87.	87.	87.	87.

CUMULATIVE AREA = 0.94 SQ MI

*** ***

```
**************
*            *
*        6B  *
*            *
**************
```

14 KK

SUBBASIN RUNOFF DATA

15 BA

SUBBASIN CHARACTERISTICS

TAREA 0.15 SUBBASIN AREA

PRECIPITATION DATA

9 PH

DEPTHS FOR 0-PERCENT HYPOTHETICAL STORM

HYDRO-35 5-MIN	15-MIN	60-MIN	TP-40 2-HR	3-HR	6-HR	12-HR	24-HR	TP-49 2-DAY	4-DAY	7-DAY	10-DAY
0.74	1.45	2.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

STORM AREA = 0.15

16 LS

SCS LOSS RATE

STRTL 0.41 INITIAL ABSTRACTION
CRVNBR 83.00 CURVE NUMBER
RTIMP 0.00 PERCENT IMPERVIOUS AREA

17 UD

SCS DIMENSIONLESS UNITGRAPH

TLAG 0.38 LAG

***

UNIT HYDROGRAPH
40 END-OF-PERIOD ORDINATES

8.	25.	49.	82.	123.	155.	173.	179.	176.	162.
146.	125.	99.	79.	64.	52.	44.	36.	29.	24.
19.	16.	13.	11.	9.	7.	6.	5.	4.	3.
3.	2.	2.	2.	1.	1.	1.	1.	0.	0.

*** *** *** *** ***

HYDROGRAPH AT STATION- 6B

TOTAL RAINFALL = 2.55, TOTAL LOSS = 1.46, TOTAL EXCESS = 1.09

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	5.00-HR
+ 155.	1.00	(CFS)	21.	21.	21.	21.
		(INCHES)	1.092	1.092	1.092	1.092
		(AC-FT)	9.	9.	9.	9.

CUMULATIVE AREA = 0.15 SQ MI

```
18 KK        *        COMB        *
             *                    *
             ********************

19 HC          HYDROGRAPH COMBINATION
                    ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                          ***

     ***            ***            ***            ***            ***
                        HYDROGRAPH AT STATION     COMB

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR      5.00-HR
+   (CFS)       (HR)
                                   (CFS)
+   2283.       0.80                231.        231.        231.        231.
                              (INCHES)  1.640       1.640       1.640       1.640
                              (AC-FT)    95.         95.         95.         95.

                        CUMULATIVE AREA =    1.09 SQ MI
1
                                                  RUNOFF SUMMARY
                                              FLOW IN CUBIC FEET PER SECOND
                                            TIME IN HOURS,  AREA IN SQUARE MILES

                                   PEAK   TIME OF    AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN    MAXIMUM    TIME
+       OPERATION      STATION     FLOW    PEAK                                          AREA     STAGE     MAX S
                                                      6-HOUR     24-HOUR     72-HOUR

        HYDROGRAPH AT
+                         6A      2238.    0.75        210.        210.        210.      0.94
        ROUTED TO
+                                 2173.    0.80        210.        210.        210.      0.94
        HYDROGRAPH AT
+                         6B       155.    1.00         21.         21.         21.      0.15
        2 COMBINED AT
+                        COMB     2283.    0.80        231.        231.        231.      1.09
1                                                   HEC-1 INPUT                                          PAGE  1

         LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
           1           ID                                WHITE TANK
           2           ID                                GW BLVD 1 SECT
           3           ID                                850840-6
           4           ID                                  100 Y
                       *DIAGRAM
           5           IT       3 10APR86    1200      60
           6           IO       3

           7           KK      7A
           8           BA    0.38
           9           PH                   0.74    1.45    2.55
          10           LS          92
          11           UD    0.12

          12           KK
          13           RK    4700   0.024    0.03            TRAP      20       2

          14           KK      7B
          15           BA    0.61
          16           LS          83
          17           UD    0.50

          18           KK    COMB
          19           HC       2
          20           ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW
    7           7A
                V
                V
   12
                .
                .
   14           .          7B
                .           .
   18        COMB
```

```
7 KK      *          7A  *
          *              *
          **************

            SUBBASIN RUNOFF DATA

8 BA          SUBBASIN CHARACTERISTICS
                  TAREA        0.38  SUBBASIN AREA

              PRECIPITATION DATA

9 PH                                DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
              ..... HYDRO-35 ......  ............... TP-40 ...............  ........... TP-49 ...........
              5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
               0.74    1.45    2.55    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00

                                                   STORM AREA =    0.38

10 LS         SCS LOSS RATE
                  STRTL        0.17  INITIAL ABSTRACTION
                 CRVNBR       92.00  CURVE NUMBER
                  RTIMP        0.00  PERCENT IMPERVIOUS AREA

11 UD         SCS DIMENSIONLESS UNITGRAPH
                  TLAG   -     0.12  LAG

                                                   UNIT HYDROGRAPH
                                              14 END-OF-PERIOD ORDINATES
            309.    1018.    1262.    1009.     561.     323.     183.     105.      60.      34.
             19.      12.       7.       2.

     ***          ***          ***          ***          ***
                    HYDROGRAPH AT STATION      7A

   TOTAL RAINFALL =    2.54, TOTAL LOSS =    0.81, TOTAL EXCESS =    1.73

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR      2.95-HR
+   (CFS)       (HR)
                          (CFS)
+   1115.       0.65                144.        144.        144.        144.
                        (INCHES)    1.735       1.735       1.735       1.735
                        (AC-FT)      35.         35.         35.         35.

                       CUMULATIVE AREA =    0.38 SQ MI
          *           *
12 KK     *           *
          *           *
          **************

            HYDROGRAPH ROUTING DATA

13 RK         KINEMATIC WAVE STREAM ROUTING
                      L       4700.  CHANNEL LENGTH
                      S      0.0240  SLOPE
                      N       0.030  CHANNEL ROUGHNESS COEFFICIENT
                     CA        0.00  CONTRIBUTING AREA
                  SHAPE        TRAP  CHANNEL SHAPE
                     WD       20.00  BOTTOM WIDTH OR DIAMETER
                      Z        2.00  SIDE SLOPE

                                                          ***

        KINEMATIC STREAM ROUTING USED FOR THIS REACH

         COMPUTED KINEMATIC PARAMETERS
            ALPHA        M       DT (MIN)   DX (FT)
           1.4228    1.505        1.00     2350.00

     ***          ***          ***          ***          ***
                    HYDROGRAPH AT STATION

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR      2.95-HR
+   (CFS)       (HR)
                          (CFS)
+   1042.       0.70                144.        144.        144.        144.
                        (INCHES)    1.733       1.733       1.733       1.733
                        (AC-FT)      35.         35.         35.         35.

                       CUMULATIVE AREA =    0.38 SQ MI
```

```
              **************
              *            *
  14 KK       *     7B     *
              *            *
              **************

                SUBBASIN RUNOFF DATA

  15 BA           SUBBASIN CHARACTERISTICS
                       TAREA        0.61  SUBBASIN AREA

                  PRECIPITATION DATA

   9 PH                                  DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                  ..... HYDRO-35 .....   ............... TP-40 ...............  ........... TP-49 ...........
                  5-MIN  15-MIN  60-MIN   2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
                   0.74   1.45   2.55    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00

                                                   STORM AREA =    0.61

  16 LS           SCS LOSS RATE
                       STRTL        0.41  INITIAL ABSTRACTION
                      CRVNBR       83.00  CURVE NUMBER
                       RTIMP        0.00  PERCENT IMPERVIOUS AREA

  17 UD           SCS DIMENSIONLESS UNITGRAPH
                       TLAG        0.50  LAG

                                                        ***

                                                   UNIT HYDROGRAPH
                                              52 END-OF-PERIOD ORDINATES
                   16.     52.    100.    161.    243.    340.    431.    499.    542.    559.
                  559.    542.    500.    468.    422.    366.    304.    253.    216.    184.
                  157.    138.    118.    102.     86.     74.     63.     55.     46.     40.
                   34.     29.     25.     21.     18.     16.     14.     11.     10.      8.
                    7.      6.      6.      5.      4.      4.      3.      2.      2.      1.
                    1.      0.

      ***            ***            ***            ***            ***
                        HYDROGRAPH AT STATION      7B

     TOTAL RAINFALL =    2.54, TOTAL LOSS =    1.45, TOTAL EXCESS =    1.09

   PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR      2.95-HR
+   (CFS)        (HR)
                          (CFS)
+    524.        1.15                145.        145.        145.        145.
                        (INCHES)     1.086       1.086       1.086       1.086
                        (AC-FT)       35.         35.         35.         35.

                        CUMULATIVE AREA =    0.61 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
  18 KK       *    COMB    *
              *            *
              **************

  19 HC           HYDROGRAPH COMBINATION
                      ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                        ***

      ***            ***            ***            ***            ***
                        HYDROGRAPH AT STATION     COMB

   PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR      2.95-HR
+   (CFS)        (HR)
                          (CFS)
+   1185.        0.75                289.        289.        289.        289.
                        (INCHES)     1.334       1.334       1.334       1.334
                        (AC-FT)       70.         70.         70.         70.

                        CUMULATIVE AREA =    0.99 SQ MI
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX ST.
+	HYDROGRAPH AT	7A	1115.	0.65	144.	144.	144.	0.38		
+	ROUTED TO		1042.	0.70	144.	144.	144.	0.38		
+	HYDROGRAPH AT	7B	524.	1.15	145.	145.	145.	0.61		
+	2 COMBINED AT	COMB	1185.	0.75	289.	289.	289.	0.99		

1 HEC-1 INPUT PAGE 1

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
  1           ID                              WHITE TANK
  2           ID                              850810-6
  3           ID                               PKWY
  4           ID                                100 Y
              *DIAGRAM
  5           IT       3 30DEC80    1200      60
  6           IO       3

  7           KK       8
  8           BA    1.23
  9           PH                    0.74    1.45    2.55
 10           LS              92
 11           UD    0.25
 12           ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE NO. 7

(V) ROUTING (---)) DIVERSION OR PUMP FLOW

(.) CONNECTOR ((---) RETURN OF DIVERTED OR PUMPED FLOW

00

```
            ***************
            *             *
  7 KK      *      0      *
            *             *
            ***************

          SUBBASIN RUNOFF DATA

  8 BA        SUBBASIN CHARACTERISTICS
                TAREA        1.23  SUBBASIN AREA

              PRECIPITATION DATA

  9 PH                                DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
              ..... HYDRO-35 ......  ............... TP-40 ...............  ........... TP-19 ...........
              5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
               0.74   1.45   2.55    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00

                                                  STORM AREA =    1.23

 10 LS        SCS LOSS RATE
                STRTL        0.17  INITIAL ABSTRACTION
               CRVNBR       92.00  CURVE NUMBER
                RTIMP        0.00  PERCENT IMPERVIOUS AREA

 11 UD        SCS DIMENSIONLESS UNITGRAPH
                TLAG        0.25  LAG

                                                  ***

                                              UNIT HYDROGRAPH
                                         27 END-OF-PERIOD ORDINATES
            188.     575.    1201.    1835.    2140.    2140.    1898.    1567.    1131.     819.
            605.     461.     341.     255.     190.     140.     104.      78.      58.      43.
             32.      24.      19.      14.      10.       6.       2.

     ***          ***          ***          ***          ***
                HYDROGRAPH AT STATION      88

   TOTAL RAINFALL =    2.53, TOTAL LOSS =    0.81, TOTAL EXCESS =    1.72

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR      2.95-HR
+  (CFS)       (HR)
                          (CFS)
+   2545.      0.80                464.        464.        464.        464.
                         (INCHES)  1.724       1.724       1.724       1.724
                         (AC-FT)    113.        113.        113.        113.

                         CUMULATIVE AREA =    1.23 SQ MI
1
                                              RUNOFF SUMMARY
                                        FLOW IN CUBIC FEET PER SECOND
                                      TIME IN HOURS,  AREA IN SQUARE MILES

                                    PEAK   TIME OF     AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN     MAXIMUM     TIME
        OPERATION        STATION    FLOW    PEAK                                          AREA      STAGE     MAX ST
+                                                       6-HOUR     24-HOUR     72-HOUR

        HYDROGRAPH AT
+                          88      2545.   0.80         464.        464.        464.      1.23
```

```
         LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

           1           ID                    WHITE TANKS
           2           ID              SW PARKWAY  PHASE I
           3           ID                 850840-6     100YR
*** FREE ***
           4           IT       3 05APR07    1200      60
           5           IO       3

           6           KK    396A
           7           BA   .1625
           8           PH       0       0    0.74    1.45    2.55
           9           LS       0     92.
          10           UD     .10

          11           KK   396AR ROUTE TO PARKWAY
          12           RK    7330   .0017     .03            TRAP      20       2

          13           KK    396B
          14           BA   .1625
          15           LS       0      83
          16           UD     .35

          17           KK    396C COMBINE A+B
          18           HC       2
          19           ZZ
```

```
          **************
          *            *
   6 KK   *     396A   *
          *(Area 46)   *
          **************
```

SUBBASIN RUNOFF DATA

7 BA SUBBASIN CHARACTERISTICS
TAREA .16 SUBBASIN AREA

PRECIPITATION DATA

8 PH DEPTHS FOR 0-PERCENT HYPOTHETICAL STORM

HYDRO-35			TP-40					TP-49			
5-MIN	15-MIN	60-MIN	2-HR	3-HR	6-HR	12-HR	24-HR	2-DAY	4-DAY	7-DAY	10-DAY
.74	1.45	2.55	.00	.00	.00	.00	.00	.00	.00	.00	.00

STORM AREA = .16

9 LS SCS LOSS RATE
STRTL .17 INITIAL ABSTRACTION
CRVNBR 92.00 CURVE NUMBER
RTIMP .00 PERCENT IMPERVIOUS AREA

10 UD SCS DIMENSIONLESS UNITGRAPH
TLAG .10 LAG

***

VALUE EXCEEDS TABLE IN LOGLOG 1.00000 .01667 1.00000

WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG

UNIT HYDROGRAPH
12 END-OF-PERIOD ORDINATES

196.	589.	589.	354.	177.	93.	49.	25.	13.	7.
4.	1.								

*** *** *** *** ***

HYDROGRAPH AT STATION 396A

TOTAL RAINFALL = 2.55, TOTAL LOSS = .81, TOTAL EXCESS = 1.74

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	2.95-HR
+ (CFS)	(HR)					
		(CFS)				
+ 504.	.65		62.	62.	62.	62.
		(INCHES)	1.737	1.737	1.737	1.737
		(AC-FT)	15.	15.	15.	15.

CUMULATIVE AREA = .16 SQ MI

```
*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *

              **************
              *            *
   11 KK      *    396AR   *        ROUTE TO PARKWAY
              *            *
              **************

                HYDROGRAPH ROUTING DATA

   12 RK          KINEMATIC WAVE STREAM ROUTING
                          L       7330.  CHANNEL LENGTH
                          S       .0017  SLOPE
                          N        .030  CHANNEL ROUGHNESS COEFFICIENT
                         CA         .00  CONTRIBUTING AREA
                      SHAPE        TRAP  CHANNEL SHAPE
                         WD       20.00  BOTTOM WIDTH OR DIAMETER
                          Z        2.00  SIDE SLOPE

                                                                ***

          KINEMATIC STREAM ROUTING USED FOR THIS REACH


           COMPUTED KINEMATIC PARAMETERS
               ALPHA         M      DT (MIN)   DX (FT)
               .3787    1.505         3.00     3665.00

       ***            ***             ***              ***              ***

                           HYDROGRAPH AT STATION    396AR

    PEAK FLOW     TIME                            MAXIMUM AVERAGE FLOW
                                       6-HR        24-HR        72-HR       2.95-HR
 +   (CFS)        (HR)
                               (CFS)
 +     203.       1.00                   58.          58.          58.          58.
                           (INCHES)   1.626        1.626        1.626        1.626
                            (AC-FT)      14.          14.          14.          14.

                          CUMULATIVE AREA =      .16 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *

              **************
              *            *
   13 KK      *    396B    *
              *            *
              **************

                SUBBASIN RUNOFF DATA

   14 BA          SUBBASIN CHARACTERISTICS
                      TAREA         .16  SUBBASIN AREA

                  PRECIPITATION DATA

    8 PH                                 DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                  ..... HYDRO-35 ......   ................ TP-40 ................   ........... TP-49 ...........
                  5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
                    .74    1.45    2.55     .00     .00     .00     .00     .00     .00     .00     .00     .00

                                              STORM AREA =      .16

   15 LS          SCS LOSS RATE
                      STRTL         .41  INITIAL ABSTRACTION
                     CRVNBR       83.00  CURVE NUMBER
                      RTIMP         .00  PERCENT IMPERVIOUS AREA

   16 UD          SCS DIMENSIONLESS UNITGRAPH
                       TLAG         .35  LAG
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***

VALUE EXCEEDS TABLE IN LOGLOG 1.00000 .01667 1.00000

UNIT HYDROGRAPH
37 END-OF-PERIOD ORDINATES

11.	34.	65.	112.	161.	195.	200.	208.	195.	175.
149.	117.	91.	73.	59.	48.	39.	31.	25.	20.
16.	13.	10.	8.	7.	6.	4.	4.	3.	2.
2.	2.	1.	1.	1.	0.	0.			

*** *** *** *** ***

HYDROGRAPH AT STATION 396B

TOTAL RAINFALL = 2.55, TOTAL LOSS = 1.46, TOTAL EXCESS = 1.09

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.95-HR
+	(CFS)	(HR)					
+	176.	.95	(CFS)	39.	39.	39.	39.
			(INCHES)	1.092	1.092	1.092	1.092
			(AC-FT)	9.	9.	9.	9.

CUMULATIVE AREA = .16 SQ MI

*** ***

17 KK

```
**************
*            *
*     396C   *
*            *
**************
```

(Area 46)
COMBINE A+B

18 HC HYDROGRAPH COMBINATION
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

***

*** *** *** *** ***

HYDROGRAPH AT STATION 396C

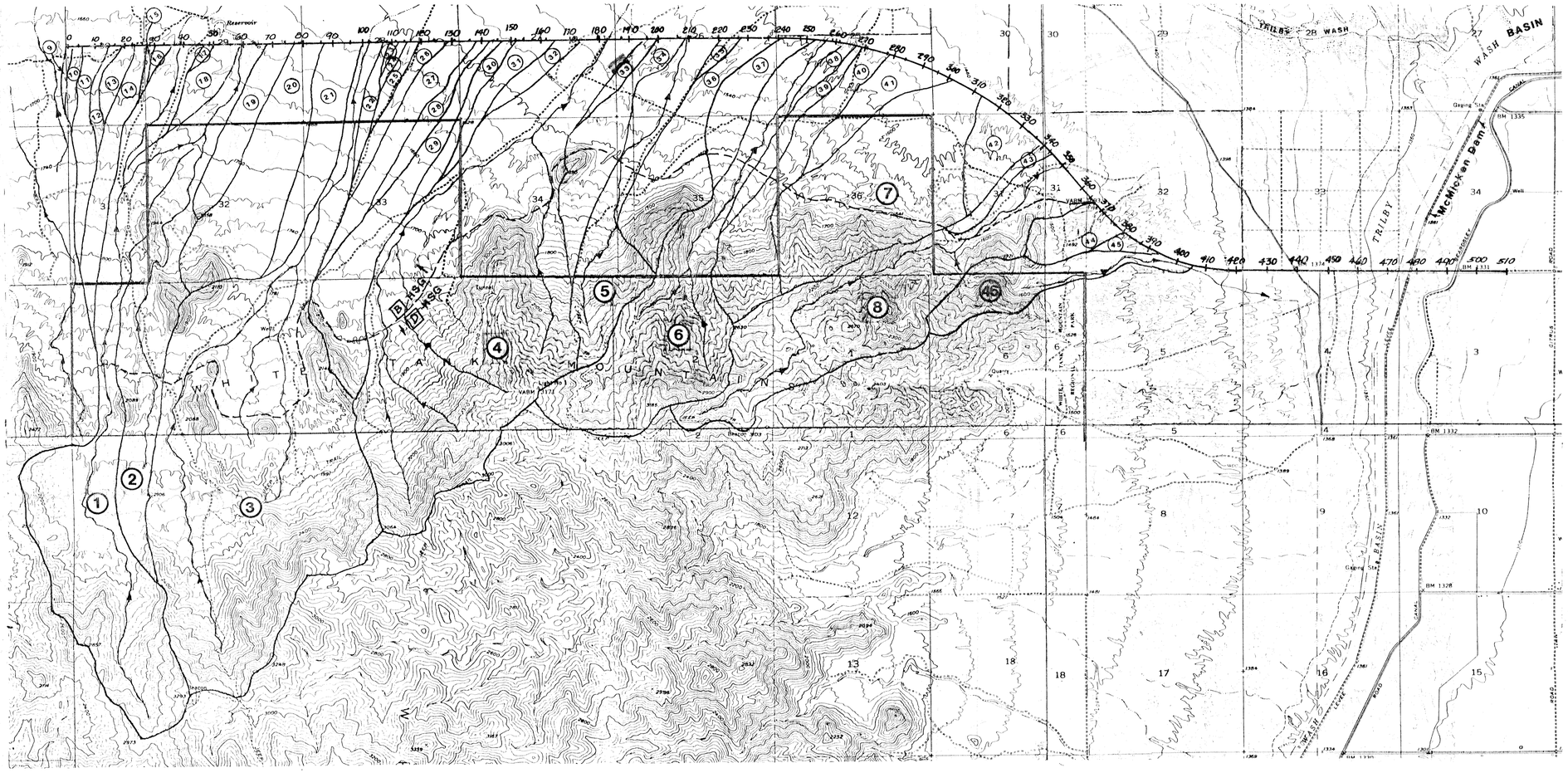
	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.95-HR
+	(CFS)	(HR)					
+	377.	1.00	(CFS)	97.	97.	97.	97.
			(INCHES)	1.359	1.359	1.359	1.359
			(AC-FT)	24.	24.	24.	24.

CUMULATIVE AREA = .32 SQ MI

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME MAX
+	HYDROGRAPH AT	396A	504.	.65	62.	62.	62.	.16		
+	ROUTED TO	396AR	203.	1.03	58.	58.	58.	.16		
+	HYDROGRAPH AT	396B	176.	.95	39.	39.	39.	.16		
+	2 COMBINED AT	396C	377.	1.00	97.	97.	97.	.32		



SCALE: 1" - 2,000'

SUN VALLEY PARKWAY
DRAINAGE AREA MAP
PHASE I

(1) DRAINAGE AREA
MAJOR WASH

EXHIBIT C

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