DYSART DRAIN IMPROVEMENT PROJECT
160-Acre Detention Basin
Contract FCD 93-01

HYDRAULIC REPORT
30% Submittal

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REMARKS

WOOD/PATEL
ASSOCIATES
Civil Engineers
Hydrologists
Land Surveyors

DYSART DRAIN IMPROVEMENT PROJECT
160-Acre Detention Basin
Contract FCD 93-01

HYDRAULIC REPORT
30% Submittal

Submitted to:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
2801 West Durango Street
Phoenix, Arizona 85009
(602) 506-1501

Submitted by:

WOOD, PATEL & ASSOCIATES, INC.
1550 East Missouri Street, Suite 203
Phoenix, Arizona 85014
(602) 234-1344

On Behalf of:
NBS Lowry
2600 North 44th Street
Phoenix, Arizona 85008-1599
(602) 468-1688

WP# 93030

February 11, 1994

WOOD/PATEL ASSOCIATES
Civil Engineers
Hydrologists
Land Surveyors

Darrel E. Wood, P.E., R.L.S.
Ashok C. Patel, P.E., R.L.S.
James S. Campbell, P.E.
Jay N. Vaughn, R.L.S.
Gordon Wark, P.E.
Jeffrey J. Holzmeister, P.E.

February 11, 1994

Mr. Brian Fry, P.E.
NBS Lowry
2600 North 44th Street
Phoenix, AZ 85008-1599

Re: **Dysart Drain Improvement Project**
160-Acre Detention Basin
30% Submittal
WP #93030.00

Dear Mr. Fry:

In accordance with the referenced contract, we are herewith submitting two (2) copies of preliminary (30%) Hydraulic Report, cost analysis and design plans and a computer floppy. It is my understanding that one set will be submitted by your office directly to Randolph Air Force Base (HQ-AETC) for the review.

This submittal incorporates pertinent review comments from the District's memorandum, dated January 11, 1994. Please note, some comments were more applicable towards more detailed future submittals such as 60% or 90%. Those comments will be addressed appropriately at those submittal stages.

We believe our conceptual submittal for the detention basin concept plan 6-f was very beneficial in terms of the District's and Luke Air Force Base's input. Based on their input, we have prepared this submittal. We believe the data package submitted herewith represents over 50% completion of the design plans.

Please feel free to call us if you need any clarification regarding this submittal.

Sincerely,

WOOD, PATEL & ASSOCIATES, INC.

Ashok C. Patel, P.E., R.L.S.
Principal

ACP/ldg

cc: Don Rerick, FCDMC (with 6 sets, 1 floopy)
Zane Hoit, LAFB (with 5 sets, 1 floppy)

REPORT\93030.J26

PROJECT NO.: **93030**

PROJECT NAME: **Dysart Drain Improvement Project**
160-Acre Detention Basin Site

BASIN DESIGN 30% SUBMITTAL

Hydrology

For the purpose of design, Wood/Patel used the hydrology information provided by the District from the report titled "Addendum to Dysart Drain Improvement Project, Concept Design Study Selected Alternative", November, 1993, prepared by WLB Group, Inc. The HEC-1 computer model provided by the District was used to verify basin parameters and outflow requirements. Wood/Patel took the HEC-1 model and replaced the storage-outflow rating curves for the detention basin from the WLB report. The storage outflow rating curves are based upon the selected concept Option 6-f by Wood/Patel. All key drainage features for the selected option are depicted on Figure 1.

The hydrology peak flows have been checked all along the channel alignment. Per Figure 2, the comparison of flows between WLB's November, 1993 report and Wood/Patel's Option 6-f have been made. As can be seen from the figure, the flows are in general agreement with the WLB report.

Although not required, Wood/Patel also checked the basin hydrology based on the original WLB HEC-1 model from the August, 1993 report. This model utilized larger peak flows coming into the detention basin. As a check, Wood/Patel's storage-outflow rating curve was inserted in the HEC-1 model. The routed peak flows and the flows along the entire channel alignment have been checked and are also listed on Figure 2.

Basin Design Parameters

Wood/Patel has generally followed the design parameters shown below in the best possible way:

1. The maximum depth of water in the basin is to be approximately 10 feet.

2. The maximum berm and spoil area heights above the existing grade will be approximately 12 feet. Spoil material which cannot be accommodated within these height limits will be exported offsite. Our initial analysis suggests that we may have an earthwork balance within the project site. This was pursued in order to reduce the significant cost impact of exporting the dirt.

3. Basin and berm sideslopes will have a maximum slope of 6:1. For the outlet channel, the side slope is kept to about 5:1. For the inlet and outlet structure transition area, where the side slopes are steeper than 2:1, grouted riprap linings are provided to enhance the slope stability.

Design Inflows

Due to uncertainty in the spill flow conditions, a conservative approach was utilized for the design of the collector and transmission channels within the detention basin. The peak flow that is established by WLB's November, 1993 report is used for design purposes. The inflow points and volume of peaks have been depicted on the attached Figure 3.

Storage Requirements

1. Maximum storage capacity for the basin is 550-acre feet. This volume includes detention volume, sediment volume, freeboard, and other uncertainties in hydrology. These parameters have been established by the District.

2. The peak outflow of the detention basin will be 550 cfs and this will occur when the basin is completely full.

3. The subsidence values to be accounted for in the detention basin design are given by the District for all corners except the northeast corner. Wood/Patel has established an estimated value to be 12.4 feet of subsidence for the northeast corner. This value will be consistently used in the design purposes.

Operation & Maintenance Requirements

To reduce the amount of nuisance ponding, all major inflow areas will be directed into a nuisance flow swale, which runs along the south and east boundary of the detention basin. This channel, with a bottom width of 10 feet and an approximate depth of 2 feet, has the capacity to handle approximately a 100 cfs flow. Flows of 100 cfs can be anticipated from a storm in about a 1-year event. Any irrigation runoff which will end up in the detention basin, will also be handled by this swale. The swale will help reduce the sediment deposition problem, nuisance flow collection problem, growth introduced by nuisance flow, and bird population which may be attracted as a result of vegetation and ponding.

Operation and Maintenance Feature Design

1. A 14-foot stabilized maintenance access road will be provided around the basin with access to Reems Road and Northern Avenue.

2. An invert access ramp from the maintenance access road will be provided into the basin from the north side.

3. A four strand, plain wire fence will be placed around the basin. Gates will be located a minimum of 40 feet back from the public right-of-way at each maintenance access location.

4. A swale to handle onsite runoff will be provided on the top of fill areas along the lowest elevation near the edges. The flows from swales will be collected at the outfall point and discharged into the basin or outfall channel via lined spillways. These details will be included in the next submittal.

Farmer's Requirements

1. The existing irrigation ditch, located along the north property line, will not be disturbed. Therefore, the right-of-way has been established a minimum of 55 feet south of the mid-section line in accordance with District requirements.

2. The existing water line, which pumps tailwater from the ponding area near Northern Avenue, will be relocated along the east and north boundary of the project as addressed by the NBS Lowry plans.

3. All irrigation and other structures located within the property line and basin boundary will be removed. All channels within the MCDOT right-of-way along Northern Avenue will be filled to the natural grade. All drainage culverts within that right-of-way will be removed.

Collector Channels

1. **North Collector Channel:**
   Flows will be collected in the current design via spillover from Reems Road into a collector channel approximately 200 feet in length along Reems Road. This channel will feed into a conveyance channel along the northern boundary (North Collector Channel). The channel will outfall into the detention basin as shown on the design plan.

Per the District's input, the North Collector Channel is designed in such a way it can intercept design flow from the future box culvert across Reems Road. If for some reason the design flow value is increased from 1,000 cfs to 2,000 cfs, the proposed channel cross-section can be expanded. To account for this, we have provided flat ground area along the south side of the channel so the south bank sideslope can be removed and additional cross-section can be added.

The North Collector Channel is a trapezoidal channel with 1.5:1 side slopes and a 12-foot bottom width. The lining of the lower 300 feet of the channel is composed of exposed rock grouted riprap; the remainder of the channel is lined with gunite. At the basin inflow point, a grouted riprap apron is proposed.

The North Collector Channel was analyzed using a HEC-2 model. The first cross-section of the model is located within the basin. The starting water surface elevation was set equal to the peak basin water surface elevation. The remaining cross-sections are located within the collector channel itself. A flow of 1,000 cfs was used for the entire length of the collector channel. A Manning's "n" value of 0.035 was used for the exposed rock grouted riprap-lined portion of the channel, and 0.019 was used for the concrete-lined portion.

2. **East Collector Channel:**
A new collector channel is anticipated along the mid-section line between Olive Avenue and the north property line. This channel will be designed by NBS. Wood/Patel has been coordinating the hydraulic requirement for the channel as to flow line, depth of flow, flow regime, and physical location, etc. at the north right-of-way line at the detention basin. Any work north of the north right-of-way line will be done by the NBS design team. To make sure that Option 6-f is workable, Wood/Patel has looked into potential options for the inflow point at the northeast corner. This information is being coordinated with NBS staff.

As with the North Collector Channel, the East Collector Channel is an exposed rock grouted-riprap-lined channel with a grouted riprap apron at the basin inflow point. The proposed channel has 2:1 side slopes and a 16-foot bottom width.

The East Collector Channel south of the north right-of-way line was analyzed using a HEC-2 model. The first cross-section of the model is located within the basin. The starting water surface elevation was set equal to the peak basin water surface elevation. A flow of 840 cfs was used for the entire length of the collector channel. A manning's "n" value of 0.035 was used for the exposed rock grouted riprap lining of the channel.

3. **Reems Road Collector Channel:**
The Reems Road Collector Channel/swale system is located along the east side of Reems Road and extends from the southwest corner of the basin near Northern Avenue north for a distance of approximately 2,240 feet. The channel collects overflow from Reems Road and conveys it to the basin. The channel has a trapezoidal cross-section with a bottom width that varies from 20 feet near the basin inflow area to 10 feet further upstream as shown on the design plan. The channel lining consists of grouted riprap for the channel and soil cement for the side swale. As with the other collector channels, a grouted riprap apron is proposed at the basin inflow point.

This channel was also analyzed using a HEC-2 model. The first cross-section of the model is located within the basin. The starting water surface elevation was set equal to the peak basin water surface elevation. The remaining cross-sections are located within the collector channel itself. A flow of 1,000 cfs was used for the downstream 480 feet of channel; a flow of 600 cfs was used for the remainder of the side swale. The grouted riprap lining in this case is not an exposed rock lining as is the case with the other collector channels. Therefore, a lower Manning's "n" value of 0.030 is used for the grouted riprap lining of the Reems Road Collector Channel. A Manning's "n" value of 0.020 was used for the soil cement lining.

Basin Outflow System

To achieve a nonjurisdictional embankment size, according to the Arizona Department of Water Resources, the basin configuration has been modified from the WLB concept. With the selected Option 6-f, the entire storage volume in the detention basin has been provided below natural grade. To achieve this, the outflow structure is now located approximately 1,300 feet north of Northern Avenue along the east boundary line. At Northern Avenue a 2-barrel 6' x 6' box culvert is provided. A concrete bottom channel will be provided between Northern Avenue to the outflow box culvert. This will enhance nuisance flow conveyance for the drainage outflow. It will also reduce the potential of any ponding or added maintenance. This was essential because the gradient along this channel is extremely flat. This channel was also checked for a positive drainage condition in the case of future subsidence.

As discussed in the paragraph above, the entire storage volume is provided in the basin below the natural grade. In a case where the basin is completely full and all freeboard volume has been used, the spillover will occur over the natural grade at the southeast corner near Northern Avenue.

To ensure functioning of the outfall box culvert, a HEC-2 analysis was performed, beginning from the Northern Avenue Channel to the proposed 1-barrel 6' x 7' basin outlet box culvert through the outfall channel. The HEC-2 analysis was utilized to create an outflow rating curve for the outfall structure.

Starting conditions for the HEC-2 model were obtained by using a normal-depth rating curve for the Northern Avenue Channel. This rating curve was then used as a tailwater condition for the 2-barrel 6' X 6' box culvert at Northern Avenue. Culvert headwater calculations were then performed for several different flows in order to obtain staring water surface elevations for the basin outflow channel HEC-2 model.

The above methodology was repeated for the future condition, in which elevations were lowered to account for subsidence. For the outfall channel, the proposed channel grades are depicted on Figure 3 and the subsided channel grades are depicted on Figure 4.

SUMMARY OF CHANNEL SLOPES (FT/FT)

Drainage Feature	Design Condition	Subsided Condition	Remark
a North Collector Channel	.0025	.0022	OK
b East Collector Channel	.0095	.0095	OK
c Reems Road Collector Channel	.0057	.0057	OK
f Outfall Channel	.00137	.00031	Check For Conveyance
g Nuisance Flow Channel - East Nuisance Flow Channel - South	.0026 .0008	.00157 .00109	OK OK

As can be seen from the above summary, all major drainage features will have a minor impact for the subsided condition with the exception of the outfall channel. To address adequate functioning of the outfall channel, we have performed a detailed backwater analysis included in this report.

Detention Basin Design

A preliminary grading design was performed to ensure that the basin will have a positive slope in the bottom, as well as a storage relationship adequate to allow proper routing of the flood hydrograph.

Channel Velocities

All collector channels are lined with either gunite or grouted riprap lining to address erosion concern. The outfall channel is provided with a gunite bottom, where the velocity is about 5 fps. The 5:1 sideslope area, however, has a velocity less than 2 fps, therefore, no erosion protection is warranted.

Channel Flow Conditions

Froude numbers for subcritical channel flow are to be less than or equal to 0.86. Froude numbers for supercritical flow are to be greater than or equal to 1.13 but less than 2.0. A minimum channel velocity of 2.0 feet per second is required to prevent deposition of fine sediments in the collector channels.

Channel Geometry

Changes in horizontal channel alignment are made with curves having a minimum radius of 3.0 times the water surface topwidth. According to the Hydraulics Manual, a minimum freeboard of 0.25 times the sum of the flow depth and velocity head is required, or a minimum of 1 foot for subcritical flow and 2 feet for supercritical flow, whichever is greater.

Exceptions to the minimum freeboard requirement have been approved by the District during the bi-weekly meeting dated December 6, 1993. Accordingly, the collector channels have been provided with 1 foot of freeboard. The outfall channel, however, will be provided with a minimum freeboard of 0.25 times the sum of the flow depth and velocity head.

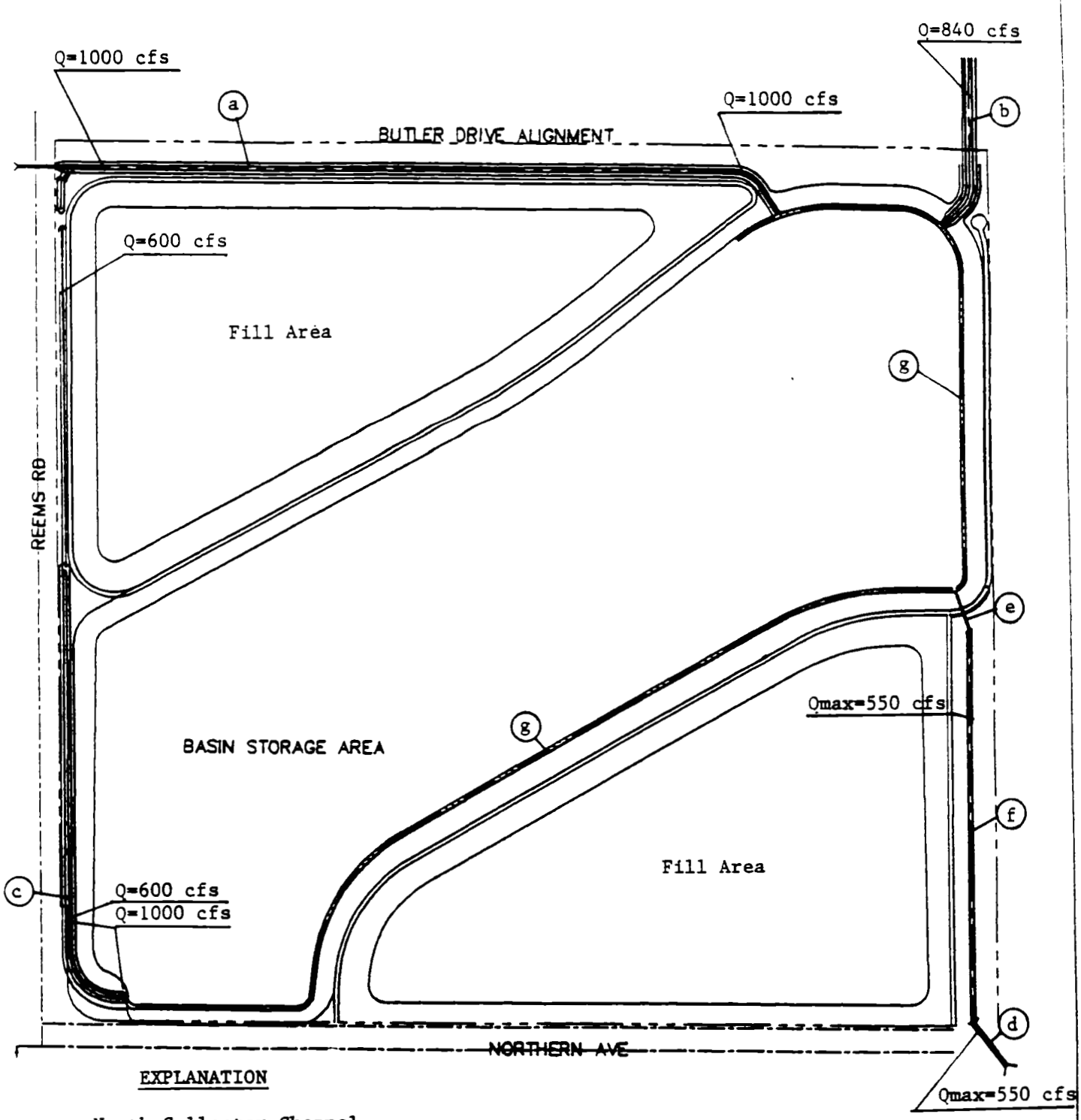
Trash Rack for Northern Avenue Box

The issue of the trash rack for the Northern Avenue box inlet has been discussed with the District and Luke Air Force Base. An alternative for a flood gate (collapsible fence) was presented to the District in December of 1993. Resolution for this issue is currently pending, therefore, it is not addressed in this submittal.

Cost Estimates

Table 1 depicts the cost estimate for the proposed basin design on the Preliminary Plans. To provide a guideline for the base cost, we have extracted pertinent basin related costs from the WLB Report as shown on Table 2.

REPORT\93030.J24



EXPLANATION

a North Collector Channel
b East Collector Channel
c Reems Road Collector Channel
d Northern Avenue Box Culvert
e Basin Outlet Box Culvert
f Outfall Channel
g Nuisance Flow Swale

DRAINAGE FEATURES & DESIGN FLOWS

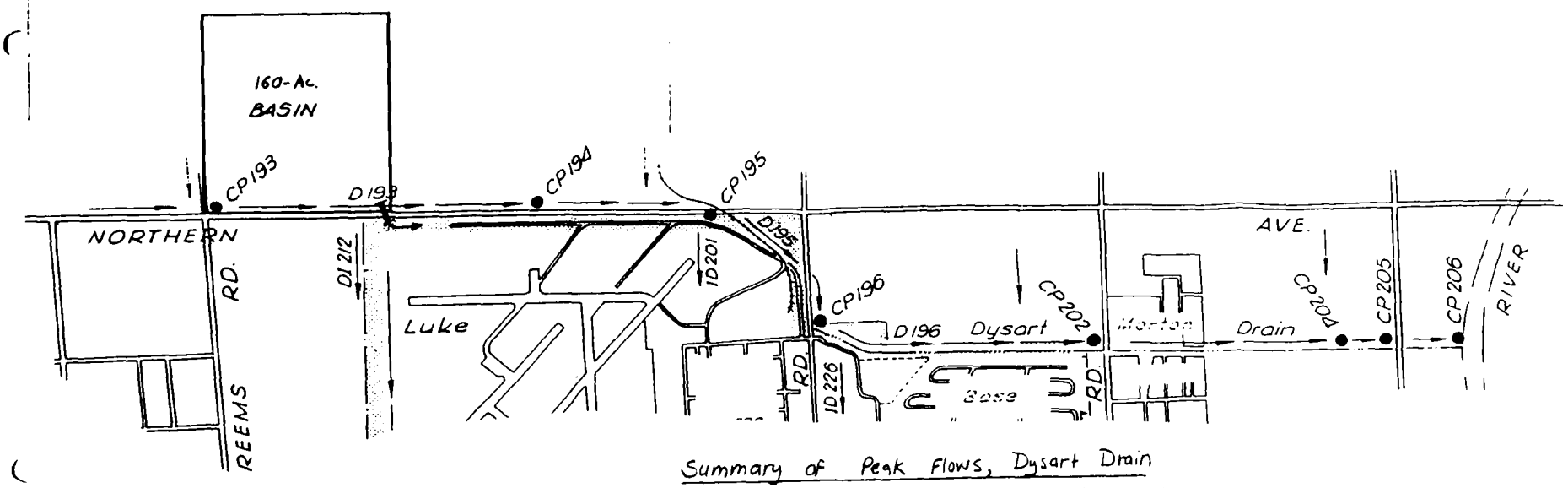
KEY MAP

Figure 1

WOOD/PATEL ASSOCIATES

Scale 1"=400'

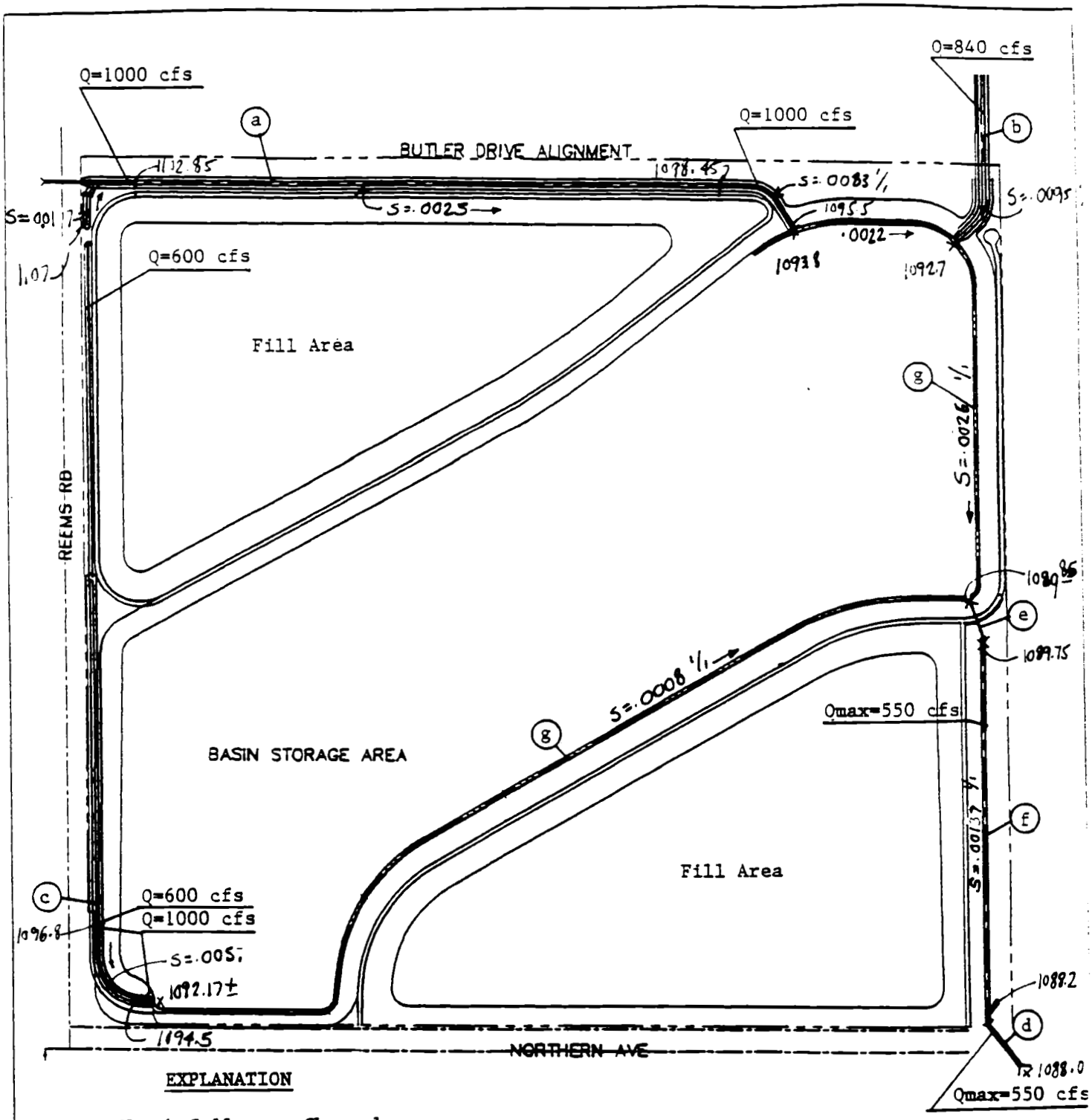
	Det. Vol. needed	Basin Highwater	Basin Outflow			I I193	D193	CP194	CP195	D195	CP196	D196	CP202	CP204	CP205	CP206
Concept by WLB, Aug 1993			550 cfs			596	550	655	2152	2152	2428	2428	2428	3520	3520	3520
Recommended Plan 6-F. Results produced by placing plan 6-F Basin into WLB, Aug 93 model	477 Ac-ft	1100.3	462 cfs			596	462	610	2062	2062	2338	2338	2327	3437	3437	3436
Revised Concept by WLB, NOV 1993	363 Ac-ft	1099.5	486 cfs			596	486	661	1812	1812	2338	2339	2325	4024	4019	4016
USE → Recommended Plan 6-P, Results produced by placing plan 6-F basin into WLB, NOV 93 model	396 Ac-ft	1099.3	431 cfs			596	431	642	1753	1753	2281	2281	2268	3967	3962	3962



Summary of Peak Flows, Dysart Drain

Flow Comparisions with WLB Concepts Vs Wood/Patel Prelim. Design

Figure 2



EXPLANATION

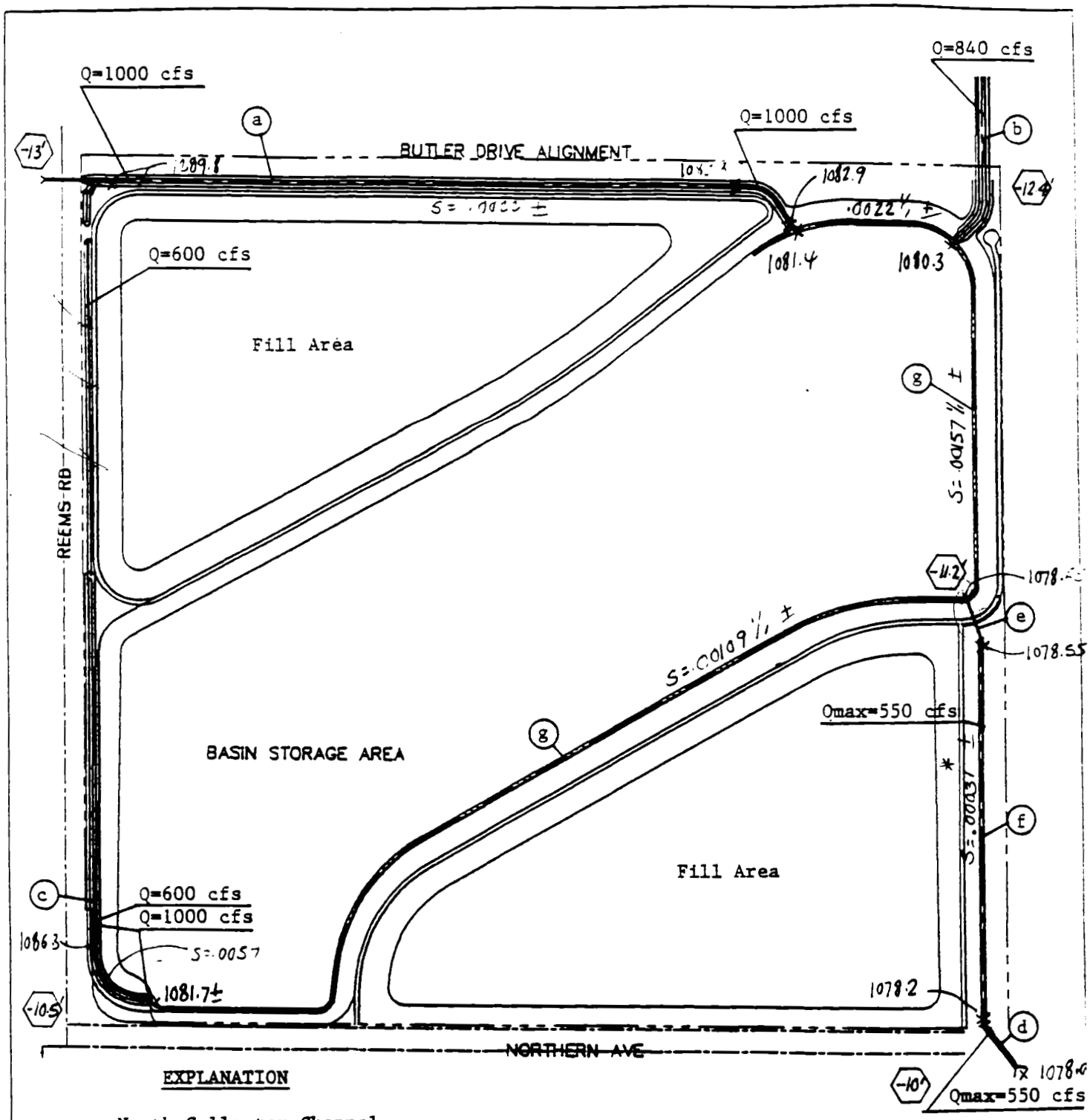
a North Collector Channel
b East Collector Channel
c Reems Road Collector Channel
d Northern Avenue Box Culvert
e Basin Outlet Box Culvert
f Outfall Channel
g Nuisance Flow Swale

PROPOSED CHANNEL GRADES DESIGN CONDITION

Figure 3

WOOD/PATEL ASSOCIATES

Scale 1"=400'



EXPLANATION

a North Collector Channel
b East Collector Channel
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g Nuisance Flow Swale

(-13) Projected Subsidence

* Critical Area for Channel Slope

PROPOSED CHANNEL GRADES SUBSIDENCE CONDITION

Figure 4

WOOD/PATEL ASSOCIATES

Scale 1"=400' ±

TABLE 1

01/28/94

ESTIMATES OF PROBABLE COSTS

160-ACRE DETENTION BASIN IMPROVEMENTS

DYSART DRAIN IMPROVEMENT PROJECT

WOOD/PATEL CONCEPT 6-1 , PRELIMINARY DESIGN

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST	AMOUNT
1	BOX CULVERT @ BASIN END	85.52	CY	$250.00	$21.380
2	BOX CULVERT @ NORTHERN AVENUE	234.2	CY	$250.00	$58.550
3	CHANNELS				
	NORTH COLLECTOR CHANNEL (2500x50)	125000	SF	$2.25	$281.250
	REEMS RD COLLECTOR CHNL (500x43)	21560	SF	$2.25	$48.510
	@ NE CORNER .TO E COLL CHNL(300x50)	15000	SF	$2.25	$33,750
4	CHANNEL GROUTED RIPRAP INLETS				
	FROM NORTH COLLECTOR CHANNEL	200	CY	$55.00	$11,000
	FROM REEMS RD COLLECTOR CHANNEL	200	CY	$55.00	$11,000
	FROM EAST COLLECTOR CHANNEL	200	CY	$55.00	$11,000
5	NUISANCE FLOW SWALE:				
	@ EAST BOUNDARY (1600x15)	24000	SF	$1.75	$42,000
	@ SOUTH BOUNDARY (3000x15)	45000	SF	$1.75	$78,750
	@ BASIN OUTFALL CHANNEL (1200x20)	24000	SF	$1.75	$42,000
6	EXCAVATION	1200000	CY	$1.00	$1,200,000
7	FENCING	10400	LF	$3.00	$31,200
	RIGHT-OF-WAY ACQUISITION	120	Ac	$5,000.00	$600,000
8	RIGHT-OF-WAY ACQUISITION,additional 40 ac.	40	Ac	$5,000.00	$200,000
	SUBTOTAL				$2,670,390
	ENGINEERING (FIXED AMOUNT)	5.62	%		$150,072
	CONSTRUCTION ADMINISTRATION	7	%		$186,927
	CONTINGENCIES	15	%		$400,559
	TOTAL				***$3,407,948***
	BUDGETED COST PER WLB REPORT DATED AUG '93, FROM TABLE 2				$3,336,600
	COST DIFFERENTIAL				$71,348

EXPLANATION:

This Table represents updated cost analysis for the selected basin concept.
All quantities and unit costs are preliminary and they are subject to change.
All major drainage elements have been included in the analysis and therefore the contengencies are now adjusted to 15%.

It should be noted that the basin area has increased from 120 acre in the concept phase to 160 acres in the design phase.
The acquisition cost of additional 40 acres is included in this Table.

Please note that some cost items are excluded associated with Reems Road Improvements, East Collector Channel, Irrigation Line Relocation and Northern Avenue improvements. These items are included in the estimates by NBS-LOWRY.

TABLE 2 01/28/94

BASIN IMPROVEMENT QUANTITIES & COSTS

DYSART DRAIN IMPROVEMENT PROJECT

WLB CONCEPT DESIGN

ITEM	*DESCRIPTION*	*QUANTITY*	*UNIT*	*UNIT COST*	*AMOUNT*
1	BOX CULVERT	200	LF	$245.00	$49,000
2	SPILLWAY	16400	SY	$22.00	$360,800
3	EXCAVATION	1480200	CY	$1.00	$1,480,200
4	INTERCEPTOR CHANNEL				$0
5	RIGHT-OF-WAY ACQUISITION	120	Ac	$5,000.00	$600,000
	SUBTOTAL				$2,490,000
	ENGINEERING	7	%		$174,300
	CONSTRUCTION ADMINISTRATION	7	%		$174,300
	CONTINGENCIES	20	%		$498,000
	TOTAL				***$3,336,600***

EXPLANATION:

It should be noted that, the cost in this table has been reproduced from the WLB's CONCEPT REPORT Dated Aug, 1993. Pertinent items from pages 29 & 30 of the report were extracted in conjunction with the basin construction. *This table would provide a base for the comparison purposes for the design* phase of this project.

TECHNICAL DATA

TABLE OF CONTENTS

1. **HYDROLOGY**

HEC-1 Input/Output,
WLB's HEC-1 model dated Nov. 1993 is updated
Wood/Patel's Design (Concept 6-f) is incorporated in the model

2. **HYDRAULICS AT BASIN OUTFALL (Design Condition)**

a. Tailwater calculations, channel along Northern Avenue at 2 - 6' X 6' box culvert outfall.

b. Culvert hydraulics to create inlet rating curve, 2 - 6' X 6' box culvert at Northern Avenue.

c. HEC-2 analysis, outfall channel including basin outlet box culvert (1 - 6' X 7' box).

3. **HYDRAULICS AT BASIN OUTFALL (Subsidence Condition)**

a. Tailwater calculations, channel along Northern Avenue at 2 - 6' X 6' box culvert outfall.

b. Culvert hydraulics to create inlet rating curve, 2 - 6' X 6' box culvert at Northern Avenue.

c. HEC-2 analysis, outfall channel including basin outlet box culvert (1 - 6' X 7' box).

4. **HYDRAULICS FOR BASIN COLLECTOR CHANNELS**

a. "North Collector Channel" at north property line.

b. "East Collector Channel", outfall from the NE corner designed by NBS.

c. "Reems Road Collector Channel" at west boundary.

HYDROLOGY

HEC-1 Input/Output based on WLB's model dated November, 1993:

- Portion of WLB's input data that was modified by Wood/Patel for the 160-acre detention basin storage routing.

- Partial runoff summary output table; only pertinent concentration points have been included.

1/24/94
OPTION 6F

```
RC  .075    .075    .075    3750   .0039
RX  1000    1001    1002    1360    2780    2998    2999    3000
RY  1109    1109    1109    1108    1108    1109    1109    1109
KK CP193
KM      ADD HYDROGRAPHS AT CP193
KO     1       1
HC     2   36.34
KK SR193
KM      STORAGE ROUTE THROUGH 74-ACRE DETENTION BASIN 1 AT CP193
KM      1-6'X7' BOX CULVERT-INLET ELEVATION = 1089.85
KM      CONVEY FLOWS SOUTH AROUND WEST EDGE OF LUKE AFB
KO     1       1
RS     1    STOR       0       0
SV     0       0   15.56   48.03   104.2   207.3   566.8
SQ     0      46     108     160     210     299     562
SE1089.9  1092.0  1093.5  1094.5  1095.5    1097    1102
KK  D193
KM      DIVERT TO CP212 FROM CP193
DT DI212
DI     0     500     520     580    1000    1500    2000    2500    3000    5000
DQ     0       0       0       0       0       0       0       0       0       0
```

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							
+		D179	1000.	13.75	634.	190.	183.	25.34
	ROUTED TO							
+		R179	996.	14.42	629.	189.	182.	25.34
	2 COMBINED AT							
+		2I193	1248.	14.17	722.	225.	217.	36.34
	HYDROGRAPH AT							
+		D179	841.	13.83	399.	100.	97.	25.34
	ROUTED TO							
+		R179	660.	15.08	369.	99.	95.	25.34
	2 COMBINED AT							
+		CP193	1624.	14.75	1058.	323.	311.	36.34
	ROUTED TO							
+		SR193	431.	19.50	416.	180.	174.	36.34
	DIVERSION TO							
+		DI212	0.	0.08	0.	0.	0.	36.34
	HYDROGRAPH AT							
+		D193	431.	19.50	416.	180.	174.	36.34
	ROUTED TO							
+		R193	431.	19.58	416.	179.	172.	36.34
	HYDROGRAPH AT							
+		194	535.	13.42	144.	36.	35.	0.99
	2 COMBINED AT							
+		CP194	638.	13.42	416.	213.	206.	37.33
	ROUTED TO							
+		R194	629.	13.50	415.	210.	204.	37.33
	HYDROGRAPH AT							
+		D180	1230.	16.25	725.	229.	221.	30.29
	ROUTED TO							
+		R180	1198.	17.58	707.	212.	205.	30.29
	HYDROGRAPH AT							
+		195	256.	13.50	72.	18.	17.	0.49
	2 COMBINED AT							
+		1I195	1192.	17.58	707.	229.	221.	35.64
	HYDROGRAPH AT							
+		D181	280.	12.92	158.	51.	49.	30.66
	ROUTED TO							
+		R181	258.	13.17	157.	51.	49.	30.66
	3 COMBINED AT							

+	CP195	1753.	17.67	1207.	485.	468.	43.14
DIVERSION TO							
+	1D201	0.	0.08	0.	0.	0.	43.14
HYDROGRAPH AT							
+	D195	1753.	17.67	1207.	485.	468.	43.14
ROUTED TO							
+	R195	1754.	17.67	1207.	483.	467.	43.14
HYDROGRAPH AT							
+	D182	589.	16.50	381.	136.	131.	38.46
ROUTED TO							
+	R182	579.	17.25	380.	131.	126.	38.46
HYDROGRAPH AT							
+	196	313.	13.00	68.	17.	17.	0.47
2 COMBINED AT							
+	1I196	579.	17.25	383.	148.	142.	38.93
2 COMBINED AT							
+	CP196	2280.	17.58	1561.	626.	604.	51.75
DIVERSION TO							
+	1D226	0.	0.08	0.	0.	0.	51.75
HYDROGRAPH AT							
+	D196	2280.	17.58	1561.	626.	604.	51.75
ROUTED TO							
+	R196	2268.	17.75	1559.	620.	598.	51.75
HYDROGRAPH AT							
+	202	258.	13.42	73.	18.	18.	0.48
2 COMBINED AT							
+	CP202	2267.	17.75	1560.	637.	615.	52.23
DIVERSION TO							
+	2D226	0.	0.08	0.	0.	0.	52.23
HYDROGRAPH AT							
+	D202	2267.	17.75	1560.	637.	615.	52.23
ROUTED TO							
+	R202	2262.	17.92	1559.	631.	610.	52.23
2 COMBINED AT							
+	CP204	3968.	18.75	2943.	1160.	1119.	58.13
ROUTED TO							
+	R204	3963.	18.75	2943.	1158.	1117.	58.13
HYDROGRAPH AT							
+	205	125.	12.08	8.	2.	2.	0.06
2 COMBINED AT							

+	CP205	3963.	18.75	2943.	1160.	1119.	58.19
ROUTED TO							
+	R205	3962.	18.83	2942.	1158.	1117.	58.19
HYDROGRAPH AT							
+	206	188.	12.17	14.	3.	3.	0.12
2 COMBINED AT							
+	CP206	3962.	18.83	2942.	1161.	1120.	58.31
2 COMBINED AT							
+	RCP206	3929.	18.83	2919.	1153.	1112.	68.69

HYDRAULICS AT BASIN OUTFALL (Design Condition)

a. Tailwater calculations, channel along Northern Avenue at 2 - 6′ X 6′ box culvert outfall.

b. Culvert hydraulics to create inlet rating curve, 2 - 6′ X 6′ box culvert at Northern Avenue.

c. HEC-2 analysis, outfall channel including basin outlet box culvert (1 - 6′ X 7′ box).

TRAPEZOIDAL CHANNEL ANALYSIS
RATING CURVE COMPUTATION

January 24, 1994
DYSART DRAIN IMPROVEMENT PROJECT
CHANNEL DOWNSTREAM OF NORTHERN AVENUE BOX CULVERT
NORMAL DEPTH TAILWATER CURVE

==========

PROGRAM INPUT DATA:

DESCRIPTION	VALUE
Channel Bottom Slope (feet per foot).....	0.0011
Manning's Roughness Coefficient (n-value).....	0.0130
Channel Side Slope - Left Side (horizontal/vertical)....	2.00
Channel Side Slope - Right Side (horizontal/vertical)....	2.00
Channel Bottom Width (feet).....	8.0

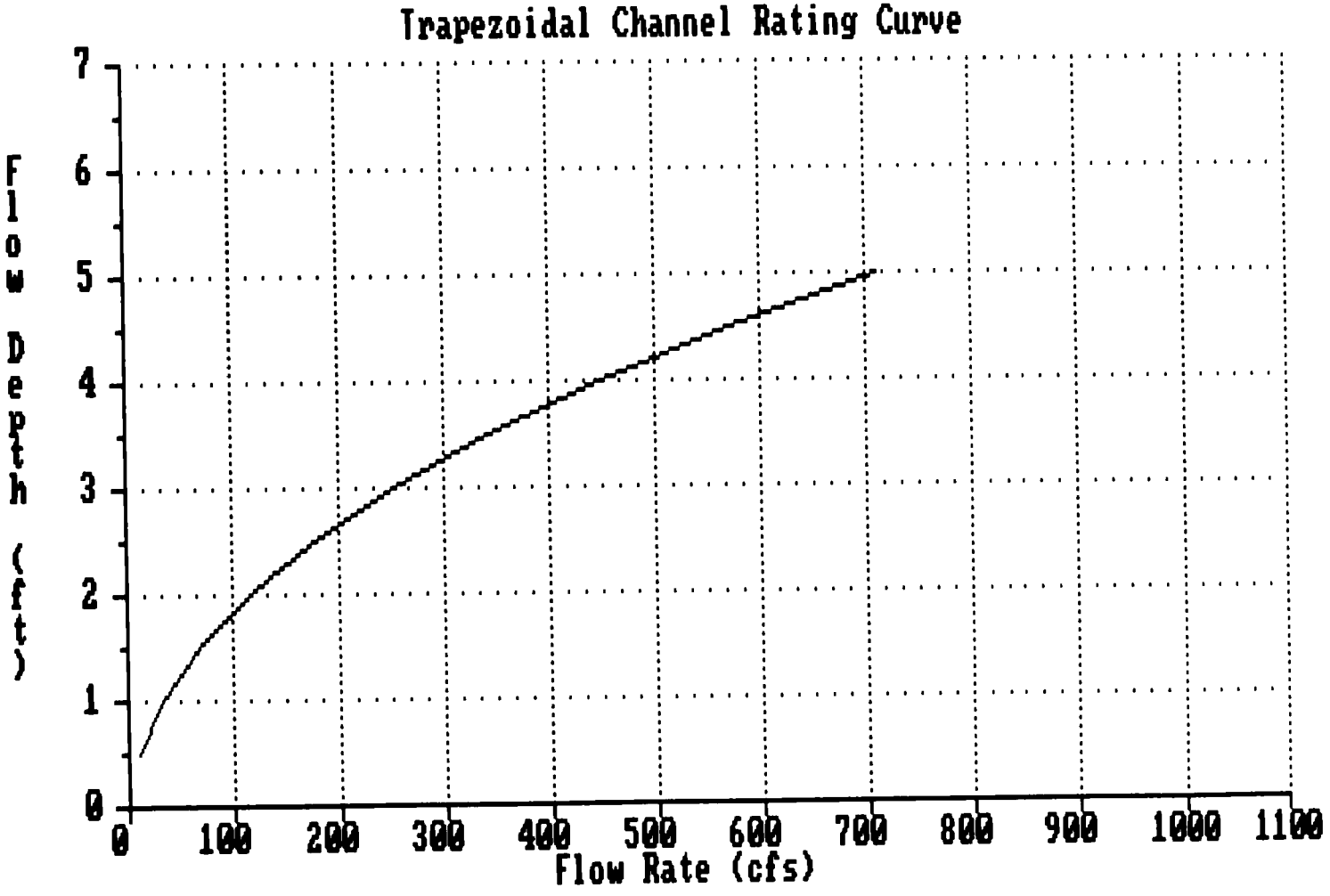
==========

PROGRAM RESULTS:

Depth (ft)	Flow Rate (cfs)	Velocity (fps)	Froude Number	Velocity Head(ft)	Energy Head(ft)	Flow Area (sq ft)	Top Width (ft)
0.5	10.0	2.21	0.581	0.076	0.576	4.5	10.0
1.0	33.0	3.30	0.637	0.169	1.169	10.0	12.0
1.5	68.1	4.13	0.670	0.265	1.765	16.5	14.0
2.0	115.8	4.82	0.694	0.361	2.361	24.0	16.0
2.5	176.7	5.44	0.713	0.459	2.959	32.5	18.0
3.0	251.7	5.99	0.729	0.558	3.558	42.0	20.0
3.5	341.7	6.51	0.743	0.658	4.158	52.5	22.0
4.0	447.6	6.99	0.755	0.760	4.760	64.0	24.0
4.5	570.2	7.45	0.766	0.863	5.363	76.5	26.0
5.0	710.5	7.89	0.776	0.968	5.968	90.0	28.0

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986
Dodson & Associates, Inc., 5629 FM 1960 W., #314, Houston, TX 77069
(713) 440-3787. A manual with equations & flow chart is available.


Trapezoidal Channel Rating Curve
Flow Depth (ft)
0
1
2
3
4
5
6
7
0
100
200
300
400
500
600
700
800
900
1000
1100
Flow Rate (cfs)

BOX CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

January 11, 1994
DYSART DRAIN IMPROVEMENT PROJECT
OPTION 6F REVISED FOR CULVERT LENGTH & D.S. CHANNEL SLOPE
2-BARREL 6' X 6' BOX CULVERT AT NORTHERN AVENUE

==========

PROGRAM INPUT DATA:

DESCRIPTION	VALUE
Culvert Span (Width of Opening) (feet).....	6.00
Culvert Rise (Height of Opening) (feet).....	6.00
FHWA Chart Number (8,9,10,11,12 or 13).....	8
Scale Number on Chart (Type of Culvert Entrance).....	1
Manning's Roughness Coefficient (n-value).....	0.0130
Entrance Loss Coefficient of Culvert Opening.....	0.30
Culvert Length (feet).....	155.0
Culvert Slope (feet per foot).....	0.0013

==========

PROGRAM RESULTS:

Flow Rate (cfs)	Tailwater Depth (ft)	Headwater (ft) Inlet Control	Headwater (ft) Outlet Control	Normal Depth (ft)	Critical Depth (ft)	Depth at Outlet (ft)	Outlet Velocity (fps)
10.0	0.70	0.68	3.02	0.63	0.44	0.70	2.38
20.0	1.10	1.09	3.16	0.99	0.70	1.10	3.03
30.0	1.40	1.43	3.28	1.30	0.92	1.40	3.57
40.0	1.70	1.74	3.39	1.58	1.11	1.70	3.92
50.0	1.90	2.03	3.50	1.85	1.29	1.90	4.39
100.0	2.70	3.25	4.03	3.07	2.05	2.70	6.17
150.0	3.30	4.30	4.61	4.19	2.69	3.30	7.58
200.0	3.80	5.24	5.26	5.27	3.26	3.80	8.77
250.0	4.25	6.11	5.99	6.00	3.78	6.00	6.94
300.0	4.60	6.93	6.81	6.00	4.27	6.00	8.33

==========

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==========
B O S S H E C - 2 (tm)
==========

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Version : 3.10
Serial Number : 0010276.250

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PROGRAM ORIGIN :

Boss Hec-2 (tm) is an enhanced version of the U.S. Army Corps of Engineers Hydrologic Engineering Center HEC-2 program for water-surface profile computations. Program based upon the September 1990 version, updated on August 1991.

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PROJECT DESCRIPTION :

PROJECT TITLE : DYSART DRAIN IMPROVEMENT PROJECT
PROJECT NUMBER : 93030.00
DESCRIPTION : DETENTION BASIN 193 OUTLET CHANNEL
ENGINEER : WOOD, PATEL & ASSOCIATES
DATE OF RUN : 1/24/1994
TIME OF RUN : 1:28 pm

PROJECT TITLE : DYSART DRAIN IMPROVEMENT PROJECT

PROJECT NUMBER : 93030.00 1/24/1994

T1 93030.00

T2 DYSART DRAIN IMPROVEMENT PROJECT

T3 DETENTION BASIN 193 OUTLET CHANNEL

T4 OPTION 6F REVISED 1/11/94

Subcritical flow

Known W.S.E.

JOB PARAMETERS :

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	0	2	0	0	[redacted]	0	0.0	20.0	1091.22	

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	1	1	0.0	0.0	0.0	0.0	0.0	-6.0	0.0	15

Flow Distribution for all X-sections

Create TAPE16 files

USER-DEFINED SUMMARY TABLES (J3) :

38	42	1	43	26	51	4	8	10	53
54	13	15		150					

REQUESTED CROSS-SECTION PRINTOUTS (J5) :

	-10	-10							
	LB	RB	MC	EC	EC				
NC	0.035	0.035	0.014	0.3	0.5				

UPSTREAM FACE OF BOX CULVERT

UPSTREAM FACE OF BOX CULVERT

			LB	RB						
X1	3	7	92.0	108.0	0.0	0.0	0.0	1.0	0.0	
GR	1099.2	52.0	1090.2	92.0	1088.2	94.0	1088.2	100.0	1088.2	106.0
GR	1090.2	108.0	1099.2	148.0						

Prev. X-sec is repeated

Slope = .0014 ft/ft

NC	0.0	0.0	0.0	0.1	0.3				
X1	4	0	0.0	0.0	200.0	200.0	200.0	1.0	0.284
X1	5	0	0.0	0.0	200.0	200.0	200.0	1.0	0.284
X1	6	0	0.0	0.0	200.0	200.0	200.0	1.0	0.284
X1	7	0	0.0	0.0	200.0	200.0	200.0	1.0	0.284
NC	0.0	0.0	0.0	0.3	0.5				
X1	8	0	0.0	0.0	200.0	200.0	200.0	1.0	0.284

DOWNSTREAM FACE OF 6' X 7' BOX

PROJECT TITLE : DYSART DRAIN IMPROVEMENT PROJECT

PROJECT NUMBER : 93030.00 1/24/1994

DOWNSTREAM FACE OF 6' X 7' BOX

X1	8.5	7	95.0	105.0	109.0	109.0	109.0	1.0	0.0	
X3	10	0.0	0.0	0.0	0.0	0.0	0.0	1102.0	1102.0	
GR	1099.7	55.0	1091.75	95.0	1089.75	97.0	1089.75	100.0	1089.75	103.0
GR	1091.7	105.0	1099.75	145.0						
SC	1.014	0.3	2.6	25.0	7.0	6.0	75.0	8.1	1089.85	1089.75

UPSTREAM FACE OF 6' X 7' BOX

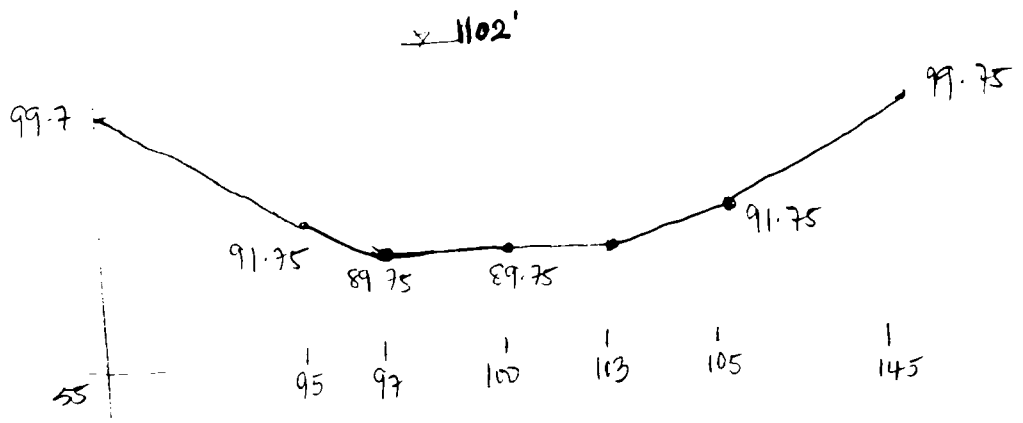
UPSTREAM FACE OF 6' X 7' BOX

X1	9	0	0.0	0.0	75.0	75.0	75.0	1.0	0.1
X2	0.0	0.0	2	0.0	1102.0	0.0	0	0.0	0.0
X3	10	0.0	0.0	0.0	0.0	0.0	0.0	1102.0	1102.0
NC	0.025	0.025	0.025	0.0	0.0				

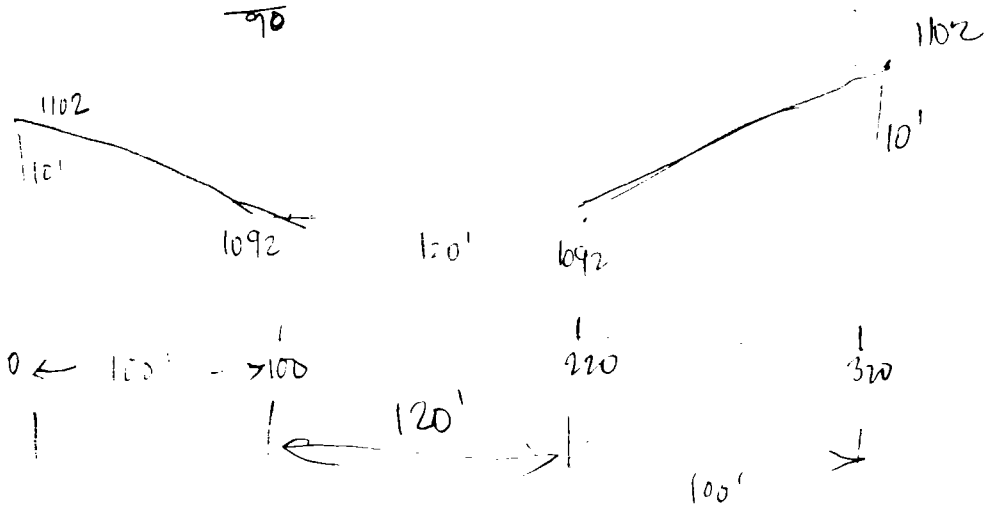
DETENTION BASIN 193

DETENTION BASIN 193

X1	10	4	0.0	320.0	100.0	100.0	100.0	1.0	0.0
GR	1102.0	0.0	1092.0	100.0	1092.0	220.0	1102.0	320.0	



145
-55
90



Station (ft) =	9.2	320.0
Flow (%) =		100.0
Area (sq ft) =		1913.9
Vel (ft/s) =		.26
Depth (ft) =		6.35

T1 93030.00
T2 DYSART DRAIN IMPROVEMENT PROJECT
T3 DETENTION BASIN 193 OUTLET CHANNEL

JOB PARAMETERS :

	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
J1	0	11	0	0	0.0	0	0.0	600.0	1095.01	

	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
J2	15	1	0.0	0.0	0.0	0.0	0.0	-6.0	0.0	15

FLOW DISTRIBUTION :

Cross-Section Number (SECNO)	3.000
Total Discharge (cfs, Q)	600
Computed Water Surface Elevation (ft MSL, CWSEL)	1095.01

Station (ft) =	70.6	92.0	108.0	129.4
Flow (%) =	8.7	82.6	8.7	
Area (sq ft) =	51.4	105.0	51.4	
Vel (ft/s) =	1.02	4.72	1.02	
Depth (ft) =	2.41	6.56	2.41	

FLOW DISTRIBUTION :

Cross-Section Number (SECNO)	4.000
Total Discharge (cfs, Q)	600
Computed Water Surface Elevation (ft MSL, CWSEL)	1095.02

Station (ft) =	71.8	92.0	108.0	128.2
Flow (%) =	8.1	83.8	8.1	
Area (sq ft) =	45.8	100.6	45.8	
Vel (ft/s) =	1.06	4.99	1.06	
Depth (ft) =	2.27	6.29	2.27	

FLOW DISTRIBUTION :

Cross-Section Number (SECNO) 5.000
Total Discharge (cfs, Q) 600
Computed Water Surface Elevation (ft MSL, CWSEL) 1095.04

Station (ft) =	73.0	92.0	108.0	127.0
Flow (%) =	7.5	84.9	7.5	
Area (sq ft) =	40.5	96.3	40.5	
Vel (ft/s) =	1.11	5.29	1.11	
Depth (ft) =	2.14	6.02	2.14	

FLOW DISTRIBUTION :

Cross-Section Number (SECNO) 6.000
Total Discharge (cfs, Q) 600
Computed Water Surface Elevation (ft MSL, CWSEL) 1095.06

Station (ft) =	74.2	92.0	108.0	125.8
Flow (%) =	6.9	86.1	6.9	
Area (sq ft) =	35.7	92.1	35.7	
Vel (ft/s) =	1.17	5.61	1.17	
Depth (ft) =	2.00	5.76	2.00	

FLOW DISTRIBUTION :

Cross-Section Number (SECNO) 7.000
Total Discharge (cfs, Q) 600
Computed Water Surface Elevation (ft MSL, CWSEL) 1095.08

Station (ft) =	75.3	92.0	108.0	124.7
Flow (%) =	6.4	87.3	6.4	
Area (sq ft) =	31.2	88.0	31.2	
Vel (ft/s) =	1.22	5.95	1.22	
Depth (ft) =	1.87	5.50	1.87	

FLOW DISTRIBUTION :

Cross-Section Number (SECNO) 8.000
Total Discharge (cfs, Q) 600
Computed Water Surface Elevation (ft MSL, CWSEL) 1095.13

Station (ft) =	76.3	92.0	108.0	123.7
Flow (%) =	5.8	88.3	5.8	
Area (sq ft) =	27.6	84.4	27.6	
Vel (ft/s) =	1.27	6.28	1.27	
Depth (ft) =	1.76	5.27	1.76	

FLOW DISTRIBUTION :

Cross-Section Number (SECNO) 8.500
Total Discharge (cfs, Q) 600
Computed Water Surface Elevation (ft MSL, CWSEL) 1094.94

Station (ft) =	95.0	105.0	
Flow (%) =	100.0		
Area (sq ft) =	48.0		
Vel (ft/s) =	12.51		
Depth (ft) =	4.80		

FLOW DISTRIBUTION :

Cross-Section Number (SECNO) 9.000
Total Discharge (cfs, Q) 600
Computed Water Surface Elevation (ft MSL, CWSEL) 1102.61

Station (ft) =	55.0	95.0	105.0	145.0
Flow (%) =	27.6	44.9	27.6	
Area (sq ft) =	271.5	123.7	271.5	
Vel (ft/s) =	.61	2.18	.61	
Depth (ft) =	6.79	12.37	6.79	

FLOW DISTRIBUTION :

Cross-Section Number (SECNO) 10.000
Total Discharge (cfs, Q) 600
Computed Water Surface Elevation (ft MSL, CWSEL) 1102.66

Station (ft) =	.0	320.0
Flow (%) =	100.0	
Area (sq ft) =	2410.9	
Vel (ft/s) =	.25	
Depth (ft) =	7.53	

SPECIAL NOTE :

An asterisk (*) to the left of the cross-section number indicates a special note is present in the SUMMARY OF WARNING AND STATUS MESSAGES section.

SUMMARY PRINTOUT : DYSART DRAIN IMPROVEMENT PROJECT
DETENTION BASIN 193 OUTLET CHANNEL
93030.00

Cross-Section Number SECNO	Minimum C. S. Elevation (ft MSL) ELMIN	Computed W. S. Elevation (ft MSL) CWSEL	Discharge Flow (cfs) Q	Channel Mean Flow Velocity (ft/s) VCH	W.S. Elev Diff per Section (ft) DIFWSX	Water Surface Top Width (ft) TOPWID	Flow Depth (ft) DEPTH	Mean Velocity Head (ft) HV	Left W. S. Station (ft) SSTA	Right W. S. Station (ft) ENDST	Left Overbank Flow (cfs) QLOB	Right Overbank Flow (cfs) QROB
3.000	1088.20	1091.22	20.00	.44	.00	25.07	3.02	.00	87.47	112.53	.14	.14
3.000	1088.20	1091.40	40.00	.83	.00	26.67	3.20	.01	86.67	113.33	.39	.39
3.000	1088.20	1091.48	60.00	1.21	.00	27.38	3.28	.02	86.31	113.69	.66	.66
3.000	1088.20	1091.59	80.00	1.55	.00	28.36	3.39	.04	85.82	114.18	1.02	1.02
3.000	1088.20	1091.70	100.00	1.87	.00	29.33	3.50	.05	85.33	114.67	1.48	1.48
3.000	1088.20	1092.23	200.00	3.14	.00	34.04	4.03	.15	82.98	117.02	5.03	5.03
3.000	1088.20	1092.81	300.00	3.98	.00	39.20	4.61	.23	80.40	119.60	11.32	11.32
3.000	1088.20	1093.46	400.00	4.47	.00	44.98	5.26	.28	77.51	122.49	20.97	20.97
3.000	1088.20	1094.31	500.00	4.57	.00	52.53	6.11	.28	73.73	126.27	35.83	35.83
3.000	1088.20	1095.01	600.00	4.72	.00	58.76	6.81	.29	70.62	129.38	52.24	52.24
4.000	1088.48	1091.22	20.00	.50	.00	22.55	2.74	.00	88.72	111.28	.07	.07
4.000	1088.48	1091.40	40.00	.93	.00	24.17	2.92	.01	87.91	112.09	.23	.23
4.000	1088.48	1091.48	60.00	1.34	.00	24.91	3.00	.03	87.54	112.46	.41	.41
4.000	1088.48	1091.60	80.00	1.72	.01	25.93	3.11	.04	87.04	112.96	.67	.67
4.000	1088.48	1091.71	100.00	2.05	.01	26.94	3.22	.06	86.53	113.47	1.01	1.01
4.000	1088.48	1092.25	200.00	3.41	.02	31.76	3.77	.17	84.12	115.88	3.98	3.98
4.000	1088.48	1092.83	300.00	4.28	.02	36.88	4.35	.27	81.56	118.44	9.59	9.59
4.000	1088.48	1093.48	400.00	4.78	.02	42.64	5.00	.32	78.68	121.32	18.58	18.58
4.000	1088.48	1094.33	500.00	4.86	.02	50.15	5.84	.32	74.93	125.07	32.81	32.81
4.000	1088.48	1095.02	600.00	4.99	.01	56.35	6.54	.33	71.83	128.17	48.70	48.70
5.000	1088.77	1091.22	20.00	.57	.00	20.03	2.45	.00	89.98	110.02	.02	.02
5.000	1088.77	1091.41	40.00	1.04	.00	21.67	2.64	.02	89.16	110.84	.10	.10
5.000	1088.77	1091.49	60.00	1.51	.01	22.44	2.72	.03	88.78	111.22	.20	.20
5.000	1088.77	1091.61	80.00	1.91	.01	23.48	2.84	.06	88.26	111.74	.38	.38
5.000	1088.77	1091.72	100.00	2.28	.01	24.52	2.95	.08	87.74	112.26	.62	.62
5.000	1088.77	1092.27	200.00	3.72	.03	29.45	3.51	.21	85.27	114.73	3.00	3.00
5.000	1088.77	1092.86	300.00	4.60	.03	34.72	4.10	.31	82.64	117.36	8.03	8.03
5.000	1088.77	1093.51	400.00	5.11	.03	40.37	4.74	.37	79.82	120.18	16.26	16.26
5.000	1088.77	1094.35	500.00	5.17	.02	47.80	5.58	.37	76.10	123.90	29.82	29.82

	Cross-Section Number SECNO	Minimum C. S. Elevation (ft MSL) ELMIN	Computed W. S. Elevation (ft MSL) CWSEL	Discharge Flow (cfs) Q	Channel Mean Flow Velocity (ft/s) VCH	W.S. Elev Diff per Section (ft) DIFWSX	Water Surface Top Width (ft) TOPWID	Flow Depth (ft) DEPTH	Mean Velocity Head (ft) HV	Left W. S. Station (ft) SSTA	Right W. S. Station (ft) ENDST	Left Overbank Flow (cfs) QLOB	Right Overbank Flow (cfs) QROB
	5.000	1088.77	1095.04	600.00	5.29	.02	53.96	6.27	.37	73.02	126.98	45.15	45.15
	6.000	1089.05	1091.22	20.00	.65	.00	17.52	2.17	.01	91.24	108.76	.00	.00
	6.000	1089.05	1091.41	40.00	1.18	.00	19.19	2.36	.02	90.41	109.59	.03	.03
	6.000	1089.05	1091.50	60.00	1.70	.01	20.00	2.45	.04	90.00	110.00	.07	.07
	6.000	1089.05	1091.62	80.00	2.15	.01	21.08	2.57	.07	89.46	110.54	.16	.16
	6.000	1089.05	1091.74	100.00	2.54	.02	22.16	2.69	.10	88.92	111.08	.31	.31
	6.000	1089.05	1092.31	200.00	4.05	.04	27.26	3.26	.25	86.37	113.63	2.15	2.15
	6.000	1089.05	1092.90	300.00	4.98	.04	32.47	3.85	.37	83.77	116.23	6.45	6.45
	6.000	1089.05	1093.55	400.00	5.48	.04	38.17	4.49	.43	80.91	119.09	14.06	14.06
	6.000	1089.05	1094.37	500.00	5.50	.03	45.50	5.32	.42	77.25	122.75	26.88	26.88
	6.000	1089.05	1095.06	600.00	5.61	.02	51.62	6.01	.42	74.19	125.81	41.61	41.61
	7.000	1089.34	1091.23	20.00	.76	.00	15.78	1.89	.01	92.11	107.89	.00	.00
	7.000	1089.34	1091.42	40.00	1.36	.01	16.73	2.08	.03	91.63	108.37	.00	.00
	7.000	1089.34	1091.52	60.00	1.94	.02	17.61	2.18	.06	91.20	108.80	.00	.00
	7.000	1089.34	1091.64	80.00	2.43	.02	18.75	2.31	.09	90.62	109.38	.04	.04
	7.000	1089.34	1091.77	100.00	2.85	.03	19.89	2.43	.13	90.05	109.95	.11	.11
	7.000	1089.34	1092.36	200.00	4.42	.05	25.21	3.03	.30	87.40	112.60	1.44	1.44
	7.000	1089.34	1092.96	300.00	5.36	.06	30.45	3.63	.43	84.77	115.23	5.13	5.13
	7.000	1089.34	1093.60	400.00	5.86	.05	36.10	4.26	.50	81.95	118.05	12.02	12.02
	7.000	1089.34	1094.40	500.00	5.86	.03	43.27	5.07	.48	78.36	121.64	24.03	24.03
	7.000	1089.34	1095.08	600.00	5.95	.03	49.32	5.75	.48	75.34	124.66	38.11	38.11
	8.000	1089.62	1091.23	20.00	.91	.01	15.22	1.61	.01	92.39	107.61	.00	.00
	8.000	1089.62	1091.43	40.00	1.60	.02	15.62	1.81	.04	92.19	107.81	.00	.00
	8.000	1089.62	1091.55	60.00	2.24	.03	15.84	1.92	.08	92.08	107.92	.00	.00
	8.000	1089.62	1091.69	80.00	2.76	.04	16.54	2.06	.12	91.73	108.27	.00	.00
	8.000	1089.62	1091.82	100.00	3.21	.05	17.76	2.20	.16	91.12	108.88	.00	.00
	8.000	1089.62	1092.45	200.00	4.80	.09	23.40	2.83	.35	88.30	111.70	.92	.92
	8.000	1089.62	1093.06	300.00	5.71	.10	28.85	3.44	.49	85.58	114.42	4.13	4.13
	8.000	1089.62	1093.68	400.00	6.21	.09	34.40	4.06	.57	82.80	117.20	10.39	10.39
	8.000	1089.62	1094.47	500.00	6.20	.06	41.37	4.85	.55	79.31	120.69	21.60	21.60
	8.000	1089.62	1095.13	600.00	6.28	.05	47.32	5.51	.54	76.34	123.66	35.05	35.05
*	8.500	1089.75	1091.22	20.00	1.80	-.01	9.00	1.47	.05	95.52	104.52	.00	.00
*	8.500	1089.75	1091.41	40.00	3.15	-.03	9.35	1.66	.15	95.34	104.70	.00	.00
*	8.500	1089.75	1091.48	60.00	4.46	-.06	9.51	1.73	.31	95.27	104.78	.00	.00
*	8.500	1089.75	1091.58	80.00	5.56	-.11	9.71	1.83	.48	95.17	104.88	.00	.00
*	8.500	1089.75	1091.66	100.00	6.55	-.16	9.89	1.91	.67	95.08	104.97	.00	.00
*	8.500	1089.75	1092.46	200.00	8.64	.01	10.00	2.71	1.16	95.00	105.00	.00	.00
*	8.500	1089.75	1093.16	300.00	9.93	.11	10.00	3.41	1.53	95.00	105.00	.00	.00
*	8.500	1089.75	1093.81	400.00	10.91	.13	10.00	4.06	1.85	95.00	105.00	.00	.00
*	8.500	1089.75	1094.41	500.00	11.72	-.06	10.00	4.66	2.13	95.00	105.00	.00	.00

	Cross-Section Number SECNO	Minimum C. S. Elevation (ft MSL) ELMIN	Computed W. S. Elevation (ft MSL) CWSEL	Discharge Flow (cfs) Q	Channel Mean Flow Velocity (ft/s) VCH	W.S. Elev Diff per Section (ft) DIFWSX	Water Surface Top Width (ft) TOPWID	Flow Depth (ft) DEPTH	Mean Velocity Head (ft) HV	Left W. S. Station (ft) SSTA	Right W. S. Station (ft) ENDST	Left Overbank Flow (cfs) QLOB	Right Overbank Flow (cfs) QROB
*	8.500	1089.75	1094.94	600.00	12.51	-.19	10.00	5.19	2.43	95.00	105.00	.00	.00
	9.000	1089.85	1091.32	20.00	1.82	.09	8.97	1.47	.05	95.53	104.50	.00	.00
	9.000	1089.85	1091.71	40.00	2.72	.31	9.78	1.86	.11	95.13	104.91	.00	.00
*	9.000	1089.85	1092.15	60.00	3.15	.67	10.00	2.30	.15	95.00	105.00	.00	.00
*	9.000	1089.85	1092.61	80.00	3.38	1.03	10.00	2.76	.18	95.00	105.00	.00	.00
*	9.000	1089.85	1093.06	100.00	3.55	1.40	10.00	3.21	.20	95.00	105.00	.00	.00
*	9.000	1089.85	1094.96	200.00	4.24	2.50	10.00	5.11	.28	95.00	105.00	.00	.00
*	9.000	1089.85	1096.55	300.00	4.76	3.38	10.00	6.70	.35	95.00	105.00	.00	.00
*	9.000	1089.85	1098.15	400.00	5.06	4.35	10.00	8.30	.40	95.00	105.00	.00	.00
*	9.000	1089.85	1100.61	500.00	4.82	6.20	10.00	10.76	.36	95.00	105.00	.00	.00
*	9.000	1089.85	1102.61	600.00	2.18	7.67	90.00	12.76	.04	55.00	145.00	165.37	165.45
*	10.000	1092.00	1092.10	20.00	1.73	.78	121.91	.10	.05	99.05	220.95	.00	.00
*	10.000	1092.00	1092.15	40.00	2.18	.44	123.02	.15	.07	98.49	221.51	.00	.00
*	10.000	1092.00	1092.39	60.00	1.23	.25	127.88	.39	.02	96.06	223.94	.00	.00
*	10.000	1092.00	1092.86	80.00	.72	.25	137.18	.86	.01	91.41	228.59	.00	.00
*	10.000	1092.00	1093.32	100.00	.57	.26	146.41	1.32	.01	86.79	233.21	.00	.00
*	10.000	1092.00	1095.32	200.00	.39	.36	186.42	3.32	.00	66.79	253.21	.00	.00
*	10.000	1092.00	1097.01	300.00	.35	.46	220.10	5.01	.00	49.95	270.05	.00	.00
*	10.000	1092.00	1098.67	400.00	.32	.52	253.40	6.67	.00	33.30	286.70	.00	.00
*	10.000	1092.00	1101.08	500.00	.26	.47	301.59	9.08	.00	9.21	310.79	.00	.00
*	10.000	1092.00	1102.66	600.00	.25	.05	320.00	10.66	.00	.00	320.00	.00	.00

SUMMARY PRINTOUT TABLE 150 : DYSART DRAIN IMPROVEMENT PROJECT
---------- DETENTION BASIN 193 OUTLET CHANNEL
93030.00

Cross-Section Number SECNO	Channel Reach Length (ft) XLCH	Top of Roadway Elevation (ft MSL) ELTRD	Max. Low Chord Elevation (ft MSL) ELLC	Minimum C. S. Elevation (ft MSL) ELMIN	Discharge Flow (cfs) Q	Computed W. S. Elevation (ft MSL) CWSEL	Critical W. S. Elevation (ft MSL) CRIWS	Energy Gradient Elevation (ft MSL) EG	Energy Gradient Slope * 10,000 10K*S	Channel Mean Flow Velocity (ft/s) VCH	Cross-Section Area (sq ft) AREA	Index Q (0.01 * Convey.) .01K
3.000	.00	.00	.00	1088.20	20.00	1091.22	.00	1091.22	.05	.44	48.94	88.12
3.000	.00	.00	.00	1088.20	40.00	1091.40	.00	1091.41	.17	.83	53.60	98.41
3.000	.00	.00	.00	1088.20	60.00	1091.48	.00	1091.50	.34	1.21	55.76	103.16
3.000	.00	.00	.00	1088.20	80.00	1091.59	.00	1091.63	.53	1.55	58.83	109.90
3.000	.00	.00	.00	1088.20	100.00	1091.70	.00	1091.75	.73	1.87	62.00	116.85
3.000	.00	.00	.00	1088.20	200.00	1092.23	.00	1092.38	1.70	3.14	78.80	153.60

Cross-Section Number SECNO	Channel Reach Length (ft) XLCH	Top of Roadway Elevation (ft MSL) ELTRD	Max. Low Chord Elevation (ft MSL) ELLC	Minimum C. S. Elevation (ft MSL) ELMIN	Discharge Flow (cfs) Q	Computed W. S. Elevation (ft MSL) CWSEL	Critical W. S. Elevation (ft MSL) CRIWS	Energy Gradient Elevation (ft MSL) EG	Energy Gradient Slope * 10,000 10K*S	Channel Mean Flow Velocity (ft/s) VCH	Cross-Section Area (sq ft) AREA	Index Q (0.01 * Convey.) .01K
3.000	.00	.00	.00	1088.20	300.00	1092.81	.00	1093.04	2.25	3.98	100.04	200.17
3.000	.00	.00	.00	1088.20	400.00	1093.46	.00	1093.74	2.36	4.47	127.39	260.62
3.000	.00	.00	.00	1088.20	500.00	1094.31	.00	1094.59	2.00	4.57	168.84	353.62
3.000	.00	.00	.00	1088.20	600.00	1095.01	.00	1095.30	1.84	4.72	207.79	442.70
4.000	200.00	.00	.00	1088.48	20.00	1091.22	.00	1091.22	.07	.50	42.20	73.12
4.000	200.00	.00	.00	1088.48	40.00	1091.40	.00	1091.42	.23	.93	46.47	82.62
4.000	200.00	.00	.00	1088.48	60.00	1091.48	.00	1091.51	.47	1.34	48.51	87.16
4.000	200.00	.00	.00	1088.48	80.00	1091.60	.00	1091.64	.73	1.72	51.41	93.56
4.000	200.00	.00	.00	1088.48	100.00	1091.71	.00	1091.77	1.00	2.05	54.42	100.21
4.000	200.00	.00	.00	1088.48	200.00	1092.25	.00	1092.42	2.19	3.41	70.33	135.09
4.000	200.00	.00	.00	1088.48	300.00	1092.83	.00	1093.10	2.83	4.28	90.09	178.34
4.000	200.00	.00	.00	1088.48	400.00	1093.48	.00	1093.80	2.90	4.78	115.88	235.09
4.000	200.00	.00	.00	1088.48	500.00	1094.33	.00	1094.65	2.40	4.86	155.05	322.48
4.000	200.00	.00	.00	1088.48	600.00	1095.02	.00	1095.35	2.18	4.99	192.18	406.80
5.000	200.00	.00	.00	1088.77	20.00	1091.22	.00	1091.23	.11	.57	36.18	59.50
5.000	200.00	.00	.00	1088.77	40.00	1091.41	.00	1091.42	.34	1.04	40.02	68.20
5.000	200.00	.00	.00	1088.77	60.00	1091.49	.00	1091.53	.69	1.51	41.92	72.47
5.000	200.00	.00	.00	1088.77	80.00	1091.61	.00	1091.66	1.04	1.91	44.60	78.47
5.000	200.00	.00	.00	1088.77	100.00	1091.72	.00	1091.80	1.39	2.28	47.41	84.71
5.000	200.00	.00	.00	1088.77	200.00	1092.27	.00	1092.48	2.89	3.72	62.39	117.72
5.000	200.00	.00	.00	1088.77	300.00	1092.86	.00	1093.18	3.54	4.60	81.42	159.35
5.000	200.00	.00	.00	1088.77	400.00	1093.51	.00	1093.88	3.57	5.11	105.26	211.66
5.000	200.00	.00	.00	1088.77	500.00	1094.35	.00	1094.71	2.90	5.17	142.11	293.43
5.000	200.00	.00	.00	1088.77	600.00	1095.04	.00	1095.41	2.59	5.29	177.40	373.06
6.000	200.00	.00	.00	1089.05	20.00	1091.22	.00	1091.23	.18	.65	30.87	47.23
6.000	200.00	.00	.00	1089.05	40.00	1091.41	.00	1091.43	.52	1.18	34.31	55.23
6.000	200.00	.00	.00	1089.05	60.00	1091.50	.00	1091.54	1.02	1.70	36.09	59.31
6.000	200.00	.00	.00	1089.05	80.00	1091.62	.00	1091.69	1.52	2.15	38.59	64.99
6.000	200.00	.00	.00	1089.05	100.00	1091.74	.00	1091.84	1.99	2.54	41.22	70.92
6.000	200.00	.00	.00	1089.05	200.00	1092.31	.00	1092.56	3.82	4.05	55.40	102.36
6.000	200.00	.00	.00	1089.05	300.00	1092.90	.00	1093.27	4.55	4.98	72.89	140.69
6.000	200.00	.00	.00	1089.05	400.00	1093.55	.00	1093.98	4.42	5.48	95.56	190.34
6.000	200.00	.00	.00	1089.05	500.00	1094.37	.00	1094.79	3.52	5.50	130.06	266.55
6.000	200.00	.00	.00	1089.05	600.00	1095.06	.00	1095.48	3.09	5.61	163.47	341.46
7.000	200.00	.00	.00	1089.34	20.00	1091.23	.00	1091.24	.30	.76	26.25	36.74
7.000	200.00	.00	.00	1089.34	40.00	1091.42	.00	1091.45	.84	1.36	29.35	43.64
7.000	200.00	.00	.00	1089.34	60.00	1091.52	.00	1091.57	1.59	1.94	31.04	47.61
7.000	200.00	.00	.00	1089.34	80.00	1091.64	.00	1091.73	2.27	2.43	33.38	53.08
7.000	200.00	.00	.00	1089.34	100.00	1091.77	.00	1091.90	2.89	2.85	35.86	58.77
7.000	200.00	.00	.00	1089.34	200.00	1092.36	.00	1092.66	5.05	4.42	49.34	88.99

	Cross-Section Number SECNO	Channel Reach Length (ft) XLCH	Top of Roadway Elevation (ft MSL) ELTRD	Max. Low Chord Elevation (ft MSL) ELLC	Minimum C. S. Elevation (ft MSL) ELMIN	Discharge Flow (cfs) Q	Computed W. S. Elevation (ft MSL) CWSEL	Critical W. S. Elevation (ft MSL) CRIWS	Energy Gradient Elevation (ft MSL) EG	Energy Gradient Slope * 10,000 10K*S	Channel Mean Flow Velocity (ft/s) VCH	Cross-Section Area (sq ft) AREA	Index Q (0.01 * Convey.) .01K
	7.000	200.00	.00	.00	1089.34	300.00	1092.96	.00	1093.39	5.75	5.36	65.77	125.11
	7.000	200.00	.00	.00	1089.34	400.00	1093.60	.00	1094.10	5.45	5.86	86.89	171.31
	7.000	200.00	.00	.00	1089.34	500.00	1094.40	.00	1094.89	4.27	5.86	118.93	241.84
	7.000	200.00	.00	.00	1089.34	600.00	1095.08	.00	1095.57	3.70	5.95	150.41	312.04
	8.000	200.00	.00	.00	1089.62	20.00	1091.23	.00	1091.24	.51	.91	21.92	28.06
	8.000	200.00	.00	.00	1089.62	40.00	1091.43	.00	1091.47	1.37	1.60	25.02	34.20
	8.000	200.00	.00	.00	1089.62	60.00	1091.55	.00	1091.62	2.52	2.24	26.75	37.76
	8.000	200.00	.00	.00	1089.62	80.00	1091.69	.00	1091.80	3.50	2.76	28.99	42.78
	8.000	200.00	.00	.00	1089.62	100.00	1091.82	.00	1091.98	4.28	3.21	31.35	48.33
	8.000	200.00	.00	.00	1089.62	200.00	1092.45	.00	1092.81	6.57	4.80	44.40	78.03
	8.000	200.00	.00	.00	1089.62	300.00	1093.06	.00	1093.55	7.00	5.71	60.40	113.35
	8.000	200.00	.00	.00	1089.62	400.00	1093.68	.00	1094.25	6.53	6.21	80.15	156.56
	8.000	200.00	.00	.00	1089.62	500.00	1094.47	.00	1095.01	5.08	6.20	109.88	221.83
	8.000	200.00	.00	.00	1089.62	600.00	1095.13	.00	1095.68	4.35	6.28	139.57	287.75
*	8.500	109.00	.00	.00	1089.75	20.00	1091.22	.00	1091.27	2.58	1.80	11.10	12.45
*	8.500	109.00	.00	.00	1089.75	40.00	1091.41	.00	1091.56	7.00	3.15	12.71	15.12
*	8.500	109.00	.00	.00	1089.75	60.00	1091.48	.00	1091.79	13.40	4.46	13.45	16.39
*	8.500	109.00	.00	.00	1089.75	80.00	1091.58	.00	1092.06	19.63	5.56	14.40	18.06
*	8.500	109.00	.00	.00	1089.75	100.00	1091.66	.00	1092.33	26.01	6.55	15.27	19.61
*	8.500	109.00	.00	.00	1089.75	200.00	1092.46	1092.46	1093.62	26.40	8.64	23.16	38.93
*	8.500	109.00	.00	.00	1089.75	300.00	1093.16	1093.16	1094.70	24.52	9.93	30.20	60.58
*	8.500	109.00	.00	.00	1089.75	400.00	1093.81	1093.81	1095.66	22.87	10.91	36.65	83.65
*	8.500	109.00	.00	.00	1089.75	500.00	1094.41	1094.41	1096.54	21.56	11.72	42.64	107.69
*	8.500	109.00	.00	.00	1089.75	600.00	1094.94	1094.94	1097.37	20.97	12.51	47.97	131.03
	9.000	75.00	1102.00	.00	1089.85	20.00	1091.32	.00	1091.37	2.67	1.82	10.97	12.24
	9.000	75.00	1102.00	.00	1089.85	40.00	1091.71	.00	1091.83	4.62	2.72	14.72	18.62
*	9.000	75.00	1102.00	.00	1089.85	60.00	1092.15	.00	1092.30	4.56	3.15	19.05	28.11
*	9.000	75.00	1102.00	.00	1089.85	80.00	1092.61	.00	1092.79	3.92	3.38	23.69	40.42
*	9.000	75.00	1102.00	.00	1089.85	100.00	1093.06	.00	1093.25	3.44	3.55	28.15	53.89
*	9.000	75.00	1102.00	.00	1089.85	200.00	1094.96	.00	1095.24	2.47	4.24	47.14	127.27
*	9.000	75.00	1102.00	.00	1089.85	300.00	1096.55	.00	1096.90	2.11	4.76	63.06	206.67
*	9.000	75.00	1102.00	.00	1089.85	400.00	1098.15	.00	1098.55	1.76	5.06	79.11	301.64
*	9.000	75.00	1102.00	.00	1089.85	500.00	1100.61	.00	1100.97	1.12	4.82	103.66	473.26
*	9.000	75.00	1102.00	.00	1089.85	600.00	1102.61	.00	1102.65	.18	2.18	666.71	1415.86
*	10.000	100.00	.00	.00	1092.00	20.00	1092.10	1092.10	1092.14	196.75	1.73	11.55	1.43
*	10.000	100.00	.00	.00	1092.00	40.00	1092.15	1092.15	1092.22	169.66	2.18	18.36	3.07
*	10.000	100.00	.00	.00	1092.00	60.00	1092.39	.00	1092.42	15.46	1.23	48.81	15.26
*	10.000	100.00	.00	.00	1092.00	80.00	1092.86	.00	1092.87	1.99	.72	110.43	56.78
*	10.000	100.00	.00	.00	1092.00	100.00	1093.32	.00	1093.33	.72	.57	175.91	118.10
*	10.000	100.00	.00	.00	1092.00	200.00	1095.32	.00	1095.32	.11	.39	508.84	590.04

	Cross-Section Number SECNO	Channel Reach Length (ft) XLCH	Top of Roadway Elevation (ft MSL) ELTRD	Max. Low Chord Elevation (ft MSL) ELLC	Minimum C. S. Elevation (ft MSL) ELMIN	Discharge Flow (cfs) Q	Computed W. S. Elevation (ft MSL) CWSEL	Critical W. S. Elevation (ft MSL) CRIWS	Energy Gradient Elevation (ft MSL) EG	Energy Gradient Slope * 10,000 10K*S	Channel Mean Flow Velocity (ft/s) VCH	Cross-Section Area (sq ft) AREA	Index Q (0.01 * Convey.) .01K
*	10.000	100.00	.00	.00	1092.00	300.00	1097.01	.00	1097.01	.06	.35	851.16	1244.62
*	10.000	100.00	.00	.00	1092.00	400.00	1098.67	.00	1098.67	.04	.32	1245.27	2135.89
*	10.000	100.00	.00	.00	1092.00	500.00	1101.08	.00	1101.08	.02	.26	1913.87	3891.78
*	10.000	100.00	.00	.00	1092.00	600.00	1102.66	.00	1102.66	.01	.25	2410.86	5481.18

SUMMARY PRINTOUT TABLE 150 : DYSART DRAIN IMPROVEMENT PROJECT
---------- DETENTION BASIN 193 OUTLET CHANNEL
93030.00

Cross-Section Number SECNO	Discharge Flow (cfs) Q	Computed W. S. Elevation (ft MSL) CWSEL	W.S. Elev Diff per Profile (ft) DIFWSP	W.S. Elev Diff per Section (ft) DIFWSX	W.S. Elev Diff per Know/Comp (ft) DIFKWS	Water Surface Top Width (ft) TOPWID	Channel Reach Length (ft) XLCH
3.000	20.00	1091.22	.00	.00	.00	25.07	.00
3.000	40.00	1091.40	.18	.00	.00	26.67	.00
3.000	60.00	1091.48	.08	.00	.00	27.38	.00
3.000	80.00	1091.59	.11	.00	.00	28.36	.00
3.000	100.00	1091.70	.11	.00	.00	29.33	.00
3.000	200.00	1092.23	.53	.00	.00	34.04	.00
3.000	300.00	1092.81	.58	.00	.00	39.20	.00
3.000	400.00	1093.46	.65	.00	.00	44.98	.00
3.000	500.00	1094.31	.85	.00	.00	52.53	.00
3.000	600.00	1095.01	.70	.00	.00	58.76	.00
4.000	20.00	1091.22	.00	.00	.00	22.55	200.00
4.000	40.00	1091.40	.18	.00	.00	24.17	200.00
4.000	60.00	1091.48	.08	.00	.00	24.91	200.00
4.000	80.00	1091.60	.11	.01	.00	25.93	200.00
4.000	100.00	1091.71	.11	.01	.00	26.94	200.00
4.000	200.00	1092.25	.54	.02	.00	31.76	200.00
4.000	300.00	1092.83	.58	.02	.00	36.88	200.00
4.000	400.00	1093.48	.65	.02	.00	42.64	200.00
4.000	500.00	1094.33	.84	.02	.00	50.15	200.00
4.000	600.00	1095.02	.70	.01	.00	56.35	200.00
5.000	20.00	1091.22	.00	.00	.00	20.03	200.00
5.000	40.00	1091.41	.18	.00	.00	21.67	200.00
5.000	60.00	1091.49	.09	.01	.00	22.44	200.00

	Cross-Section Number SECNO	Discharge Flow (cfs) Q	Computed W. S. Elevation (ft MSL) CWSEL	W.S. Elev Diff per Profile (ft) DIFWSP	W.S. Elev Diff per Section (ft) DIFWSX	W.S. Elev Diff per Know/Comp (ft) DIFKWS	Water Surface Top Width (ft) TOPWID	Channel Reach Length (ft) XLCH
	5.000	80.00	1091.61	.12	.01	.00	23.48	200.00
	5.000	100.00	1091.72	.12	.01	.00	24.52	200.00
	5.000	200.00	1092.27	.55	.03	.00	29.45	200.00
	5.000	300.00	1092.86	.59	.03	.00	34.72	200.00
	5.000	400.00	1093.51	.64	.03	.00	40.37	200.00
	5.000	500.00	1094.35	.84	.02	.00	47.80	200.00
	5.000	600.00	1095.04	.69	.02	.00	53.96	200.00
	6.000	20.00	1091.22	.00	.00	.00	17.52	200.00
	6.000	40.00	1091.41	.19	.00	.00	19.19	200.00
	6.000	60.00	1091.50	.09	.01	.00	20.00	200.00
	6.000	80.00	1091.62	.12	.01	.00	21.08	200.00
	6.000	100.00	1091.74	.12	.02	.00	22.16	200.00
	6.000	200.00	1092.31	.57	.04	.00	27.26	200.00
	6.000	300.00	1092.90	.59	.04	.00	32.47	200.00
	6.000	400.00	1093.55	.64	.04	.00	38.17	200.00
	6.000	500.00	1094.37	.82	.03	.00	45.50	200.00
	6.000	600.00	1095.06	.69	.02	.00	51.62	200.00
	7.000	20.00	1091.23	.00	.00	.00	15.78	200.00
	7.000	40.00	1091.42	.19	.01	.00	16.73	200.00
	7.000	60.00	1091.52	.10	.02	.00	17.61	200.00
	7.000	80.00	1091.64	.13	.02	.00	18.75	200.00
	7.000	100.00	1091.77	.13	.03	.00	19.89	200.00
	7.000	200.00	1092.36	.59	.05	.00	25.21	200.00
	7.000	300.00	1092.96	.60	.06	.00	30.45	200.00
	7.000	400.00	1093.60	.63	.05	.00	36.10	200.00
	7.000	500.00	1094.40	.81	.03	.00	43.27	200.00
	7.000	600.00	1095.08	.68	.03	.00	49.32	200.00
	8.000	20.00	1091.23	.00	.01	.00	15.22	200.00
	8.000	40.00	1091.43	.20	.02	.00	15.62	200.00
	8.000	60.00	1091.55	.11	.03	.00	15.84	200.00
	8.000	80.00	1091.69	.14	.04	.00	16.54	200.00
	8.000	100.00	1091.82	.14	.05	.00	17.76	200.00
	8.000	200.00	1092.45	.63	.09	.00	23.40	200.00
	8.000	300.00	1093.06	.61	.10	.00	28.85	200.00
	8.000	400.00	1093.68	.62	.09	.00	34.40	200.00
	8.000	500.00	1094.47	.78	.06	.00	41.37	200.00
	8.000	600.00	1095.13	.67	.05	.00	47.32	200.00
*	8.500	20.00	1091.22	.00	-.01	.00	9.00	109.00
*	8.500	40.00	1091.41	.18	-.03	.00	9.35	109.00
*	8.500	60.00	1091.48	.08	-.06	.00	9.51	109.00

	Cross-Section Number SECNO	Discharge Flow (cfs) Q	Computed W. S. Elevation (ft MSL) CWSEL	W.S. Elev Diff per Profile (ft) DIFWSP	W.S. Elev Diff per Section (ft) DIFWSX	W.S. Elev Diff per Know/Comp (ft) DIFKWS	Water Surface Top Width (ft) TOPWID	Channel Reach Length (ft) XLCH
*	8.500	80.00	1091.58	.10	-.11	.00	9.71	109.00
*	8.500	100.00	1091.66	.08	-.16	.00	9.89	109.00
*	8.500	200.00	1092.46	.80	.01	.00	10.00	109.00
*	8.500	300.00	1093.16	.70	.11	.00	10.00	109.00
*	8.500	400.00	1093.81	.64	.13	.00	10.00	109.00
*	8.500	500.00	1094.41	.60	-.06	.00	10.00	109.00
*	8.500	600.00	1094.94	.53	-.19	.00	10.00	109.00
	9.000	20.00	1091.32	.00	.09	.00	8.97	75.00
	9.000	40.00	1091.71	.40	.31	.00	9.78	75.00
*	9.000	60.00	1092.15	.43	.67	.00	10.00	75.00
*	9.000	80.00	1092.61	.46	1.03	.00	10.00	75.00
*	9.000	100.00	1093.06	.45	1.40	.00	10.00	75.00
*	9.000	200.00	1094.96	1.90	2.50	.00	10.00	75.00
*	9.000	300.00	1096.55	1.59	3.38	.00	10.00	75.00
*	9.000	400.00	1098.15	1.61	4.35	.00	10.00	75.00
*	9.000	500.00	1100.61	2.46	6.20	.00	10.00	75.00
*	9.000	600.00	1102.61	2.00	7.67	.00	90.00	75.00
*	10.000	20.00	1092.10	.00	.78	.00	121.91	100.00
*	10.000	40.00	1092.15	.06	.44	.00	123.02	100.00
*	10.000	60.00	1092.39	.24	.25	.00	127.88	100.00
*	10.000	80.00	1092.86	.46	.25	.00	137.18	100.00
*	10.000	100.00	1093.32	.46	.26	.00	146.41	100.00
*	10.000	200.00	1095.32	2.00	.36	.00	186.42	100.00
*	10.000	300.00	1097.01	1.68	.46	.00	220.10	100.00
*	10.000	400.00	1098.67	1.66	.52	.00	253.40	100.00
*	10.000	500.00	1101.08	2.41	.47	.00	301.59	100.00
*	10.000	600.00	1102.66	1.58	.05	.00	320.00	100.00

SUMMARY OF WARNING AND STATUS MESSAGES :

Section 8.5, profile 1, conveyance change outside acceptable range.

Section 8.5, profile 2, conveyance change outside acceptable range.

Section 8.5, profile 3, conveyance change outside acceptable range.

Section 8.5, profile 4, conveyance change outside acceptable range.

Section 8.5, profile 5, conveyance change outside acceptable range.

Section 8.5, profile 6, critical depth assumed.

Section 8.5, profile 6, probable minimum specific energy.

Section 8.5, profile 6, 20 trials attempted to balance water surface elevation.

Section 8.5, profile 7, critical depth assumed.

Section 8.5, profile 7, probable minimum specific energy.

Section 8.5, profile 7, 20 trials attempted to balance water surface elevation.

Section 8.5, profile 8, critical depth assumed.

Section 8.5, profile 8, probable minimum specific energy.

Section 8.5, profile 8, 20 trials attempted to balance water surface elevation.

Section 8.5, profile 9, critical depth assumed.

Section 8.5, profile 9, probable minimum specific energy.

Section 8.5, profile 9, 20 trials attempted to balance water surface elevation.

Section 8.5, profile 10, critical depth assumed.

Section 8.5, profile 10, probable minimum specific energy.

Section 8.5, profile 10, 20 trials attempted to balance water surface elevation.

Section 9, profile 3, conveyance change outside acceptable range.

Section 9, profile 4, conveyance change outside acceptable range.

Section 9, profile 5, conveyance change outside acceptable range.

Section 9, profile 6, conveyance change outside acceptable range.

Section 9, profile 7, conveyance change outside acceptable range.

Section 9, profile 8, conveyance change outside acceptable range.

Section 9, profile 9, conveyance change outside acceptable range.

Section 9, profile 10, conveyance change outside acceptable range.

Section 10, profile 1, critical depth assumed.

Section 10, profile 1, probable minimum specific energy.

Section 10, profile 1, 20 trials attempted to balance water surface elevation.

Section 10, profile 2, critical depth assumed.

Section 10, profile 2, probable minimum specific energy.

Section 10, profile 2, 20 trials attempted to balance water surface elevation.

Section 10, profile 3, conveyance change outside acceptable range.

Section 10, profile 4, conveyance change outside acceptable range.

Section 10, profile 5, conveyance change outside acceptable range.

Section 10, profile 6, conveyance change outside acceptable range.

Section 10, profile 7, conveyance change outside acceptable range.

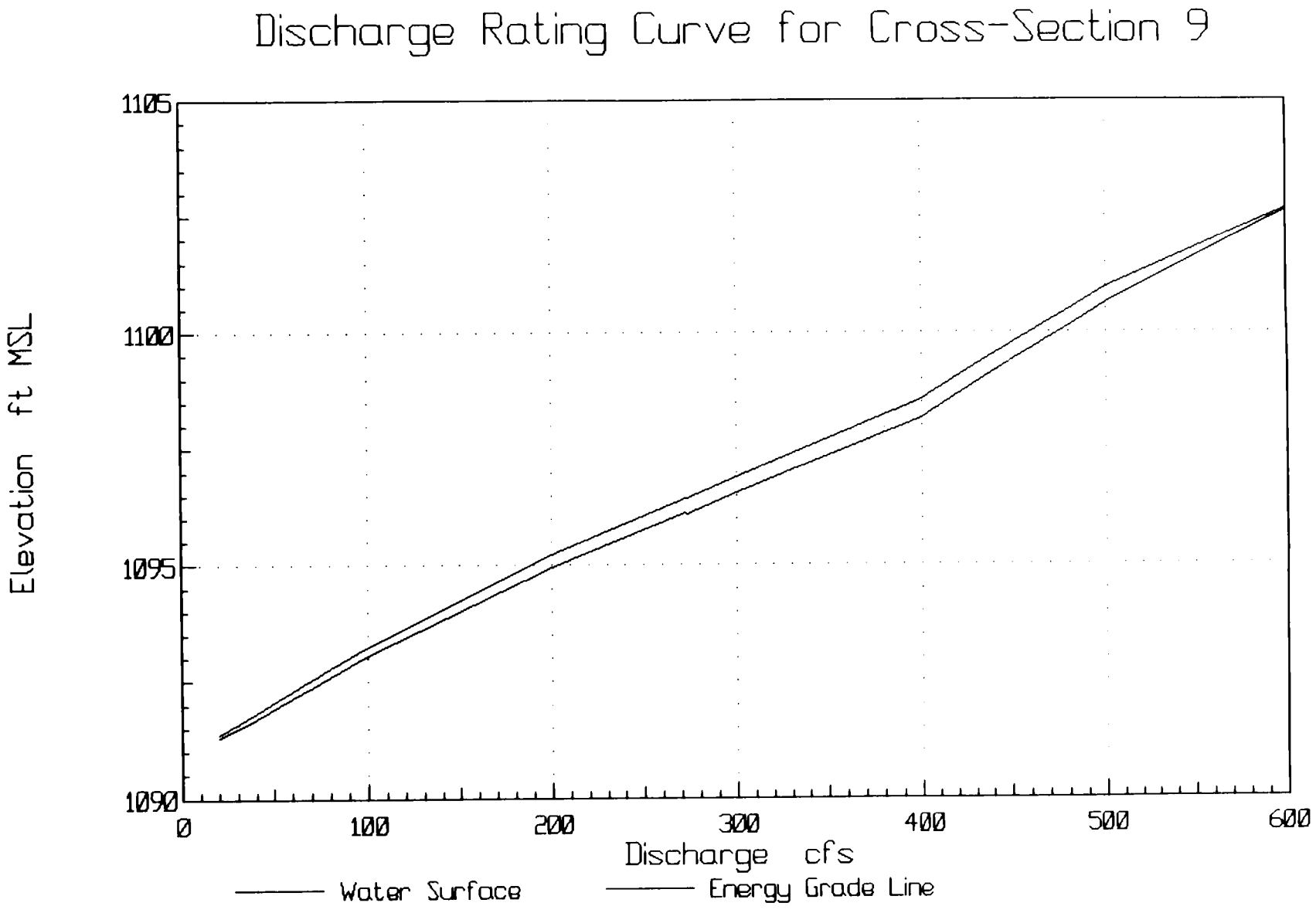
Section 10, profile 8, conveyance change outside acceptable range.

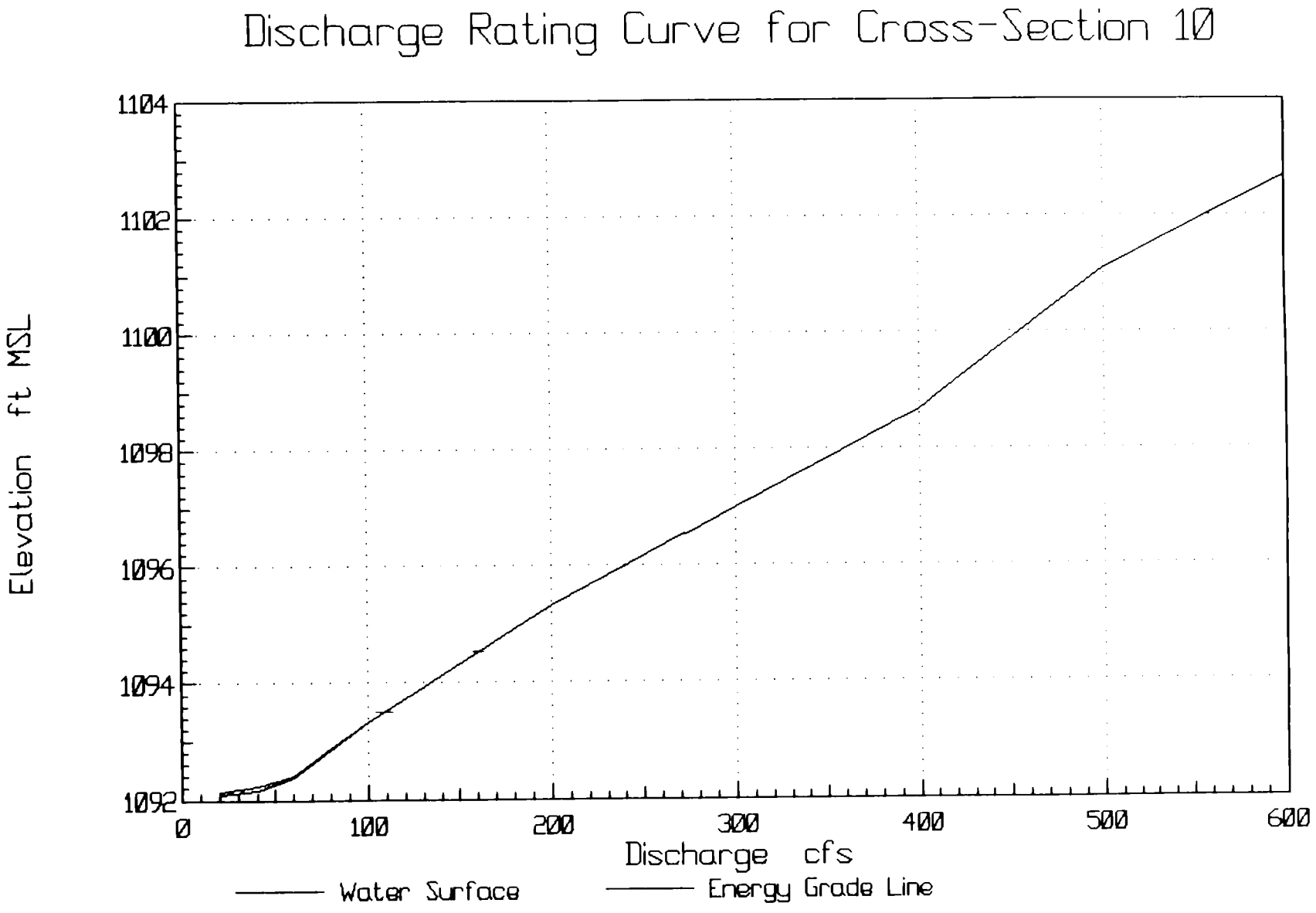
Section 10, profile 9, conveyance change outside acceptable range.

Section 10, profile 10, conveyance change outside acceptable range.

42 Warning and status message(s) generated

END OF OUTPUT


Discharge Rating Curve for Cross-Section 9
Elevation ft MSL
1105
1100
1095
1090
0
100
200
300
400
500
600
Discharge cfs
Water Surface
Energy Grade Line


Discharge Rating Curve for Cross-Section 10
1104
1102
1100
1098
1096
1094
1092
Elevation ft MSL
0
100
200
300
400
500
600
Discharge cfs
Water Surface
Energy Grade Line

HYDRAULICS AT BASIN OUTFALL (Subsidence Condition)

a. Tailwater calculations, channel along Northern Avenue at 2 - 6' X 6' box culvert outfall.

b. Culvert hydraulics to create inlet rating curve, 2 - 6' X 6' box culvert at Northern Avenue.

c. HEC-2 analysis, outfall channel including basin outlet box culvert (1 - 6' X 7' box).

TRAPEZOIDAL CHANNEL ANALYSIS
RATING CURVE COMPUTATION

January 24, 1994
DYSART DRAIN IMPROVEMENT PROJECT
CHANNEL DOWNSTREAM OF NORTHERN AVENUE BOX CULVERT
NORMAL DEPTH TAILWATER CURVE - SUBSIDENCE CONDITION

==========

PROGRAM INPUT DATA:

DESCRIPTION	VALUE
Channel Bottom Slope (feet per foot).....	0.0009
Manning's Roughness Coefficient (n-value).....	0.0130
Channel Side Slope - Left Side (horizontal/vertical)....	2.00
Channel Side Slope - Right Side (horizontal/vertical)...	2.00
Channel Bottom Width (feet).....	8.0

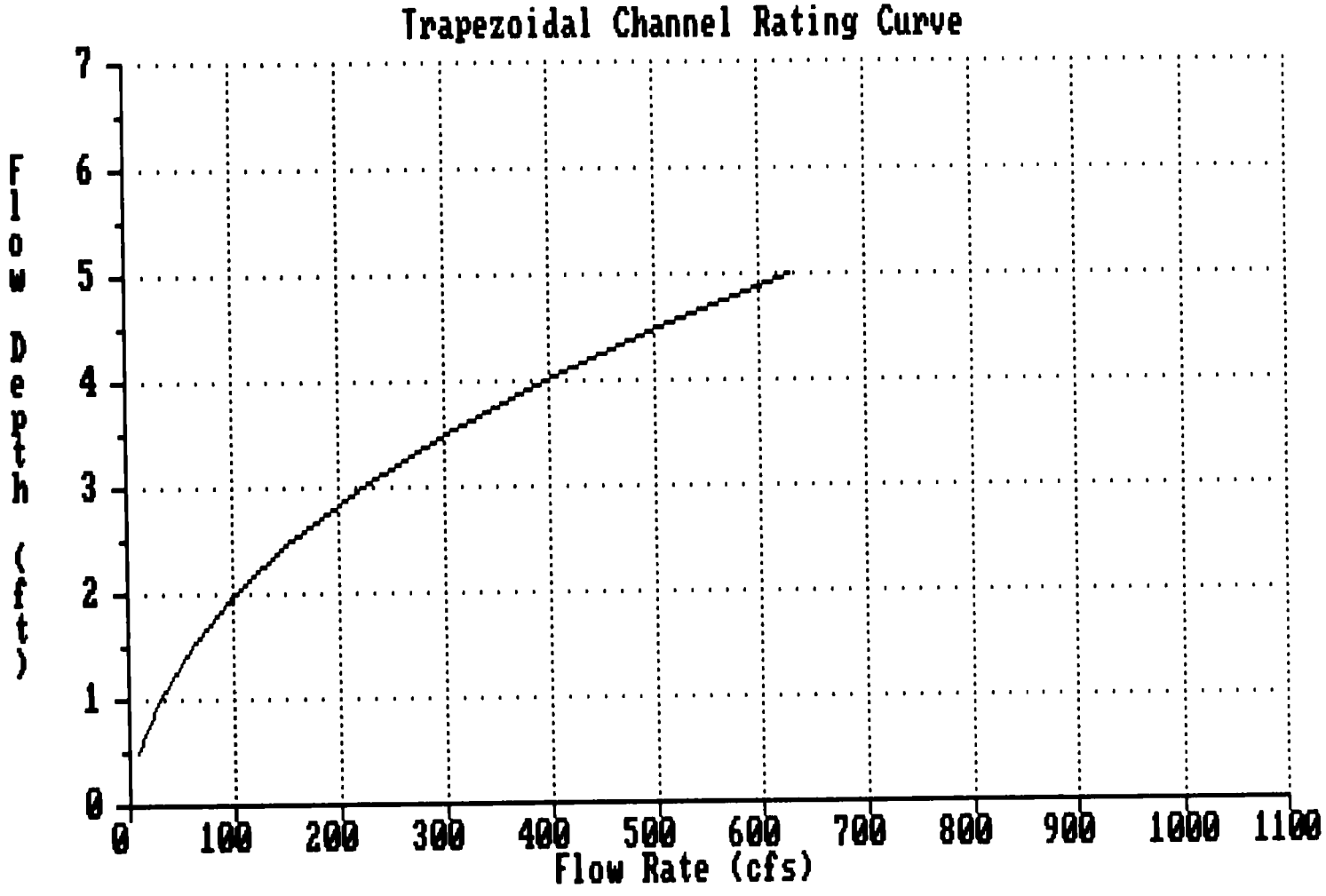
==========

PROGRAM RESULTS:

Depth (ft)	Flow Rate (cfs)	Velocity (fps)	Froude Number	Velocity Head(ft)	Energy Head(ft)	Flow Area (sq ft)	Top Width (ft)
0.5	8.8	1.96	0.514	0.059	0.559	4.5	10.0
1.0	29.2	2.92	0.564	0.132	1.132	10.0	12.0
1.5	60.3	3.65	0.593	0.207	1.707	16.5	14.0
2.0	102.4	4.27	0.614	0.283	2.283	24.0	16.0
2.5	156.2	4.81	0.630	0.359	2.859	32.5	18.0
3.0	222.6	5.30	0.644	0.436	3.436	42.0	20.0
3.5	302.1	5.76	0.657	0.514	4.014	52.5	22.0
4.0	395.8	6.18	0.667	0.594	4.594	64.0	24.0
4.5	504.2	6.59	0.677	0.674	5.174	76.5	26.0
5.0	628.2	6.98	0.686	0.756	5.756	90.0	28.0

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986
Dodson & Associates, Inc., 5629 FM 1960 W., #314, Houston, TX 77069
(713) 440-3787. A manual with equations & flow chart is available.


Trapezoidal Channel Rating Curve
Flow Depth (ft)
0
1
2
3
4
5
6
7
0
100
200
300
400
500
600
700
800
900
1000
1100
Flow Rate (cfs)

BOX CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

January 11, 1994
DYSART DRAIN IMPROVEMENT PROJECT
OPTION 6F WITH SUBSIDENCE
2-BARREL 6' X 6' BOX CULVERT AT NORTHERN AVENUE

==========

PROGRAM INPUT DATA:

DESCRIPTION	VALUE
Culvert Span (Width of Opening) (feet).....	6.00
Culvert Rise (Height of Opening) (feet).....	6.00
FHWA Chart Number (8,9,10,11,12 or 13).....	8
Scale Number on Chart (Type of Culvert Entrance).....	1
Manning's Roughness Coefficient (n-value).....	0.0130
Entrance Loss Coefficient of Culvert Opening.....	0.30
Culvert Length (feet).....	155.0
Culvert Slope (feet per foot).....	0.0013

==========

PROGRAM RESULTS:

Flow Rate (cfs)	Tailwater Depth (ft)	Headwater (ft) Inlet Control	Headwater (ft) Outlet Control	Normal Depth (ft)	Critical Depth (ft)	Depth at Outlet (ft)	Outlet Velocity (fps)
10.0	0.80	0.68	3.02	0.63	0.44	0.80	2.08
20.0	1.15	1.09	3.16	0.99	0.70	1.15	2.90
30.0	1.50	1.43	3.28	1.30	0.92	1.50	3.33
40.0	1.80	1.74	3.39	1.58	1.11	1.80	3.70
50.0	2.00	2.03	3.50	1.85	1.29	2.00	4.17
100.0	2.80	3.25	4.03	3.07	2.05	2.80	5.95
150.0	3.50	4.30	4.61	4.19	2.69	3.50	7.14
200.0	4.00	5.24	5.26	5.27	3.26	4.00	8.33
250.0	4.50	6.11	5.99	6.00	3.78	6.00	6.94
300.0	4.90	6.93	6.81	6.00	4.27	6.00	8.33

==========

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==========
B O S S H E C - 2 (tm)
==========

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Version : 3.10
Serial Number : 0010276.250

Licensed to Wood Patel Associates

PROGRAM ORIGIN :

Boss Hec-2 (tm) is an enhanced version of the U.S. Army Corps of Engineers Hydrologic Engineering Center HEC-2 program for water-surface profile computations. Program based upon the September 1990 version, updated on August 1991.

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PROJECT DESCRIPTION :

PROJECT TITLE : DYSART DRAIN IMPROVEMENT PROJECT
PROJECT NUMBER : 93030.00
DESCRIPTION : DETENTION BASIN 193 OUTLET CHANNEL
ENGINEER : WOOD, PATEL & ASSOCIATES
DATE OF RUN : 1/24/1994
TIME OF RUN : 1:36 pm

```
T1      93030.00
T2      DYSART DRAIN IMPROVEMENT PROJECT
T3      DETENTION BASIN 193 OUTLET CHANNEL
T4      * ELEVATIONS IN THIS MODEL ARE LOWERED FOR SUBSIDENCE (FUTURE
T4        CONDITION) COMPARED TO THE MODEL 6F DATED 12/20/93.
```

JOB PARAMETERS :

	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
J1	0	2	0	0	0.0	0	0.0	20.0	1081.2	

	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
J2	1	1	0.0	0.0	0.0	0.0	0.0	-6.0	0.0	15

USER-DEFINED SUMMARY TABLES (J3) :

```
     38      42       1      43      26      51       4       8      10      53
     54      13      15             150
```

REQUESTED CROSS-SECTION PRINTOUTS (J5) :

```
    -10     -10

NC    0.035     0.035     0.014       0.3       0.5
  UPSTREAM FACE OF BOX CULVERT
UPSTREAM FACE OF BOX CULVERT

X1        3         7      92.0     108.0       0.0       0.0       0.0       1.0       0.0
GR   1089.2      47.0    1080.2      92.0    1078.2      94.0    1078.2     100.0    1078.2     106.0
GR   1080.2     108.0    1089.2     153.0

NC      0.0       0.0       0.0       0.1       0.3
X1        4         0       0.0       0.0     200.0     200.0     200.0       1.0   0.06312

X1        5         0       0.0       0.0     200.0     200.0     200.0       1.0   0.06312

X1        6         0       0.0       0.0     200.0     200.0     200.0       1.0   0.06312

X1        7         0       0.0       0.0     200.0     200.0     200.0       1.0   0.06312

NC      0.0       0.0       0.0       0.3       0.5
X1        8         0       0.0       0.0     200.0     200.0     200.0       1.0   0.06312
  DOWNSTREAM FACE OF 6' X 7' BOX
```

DOWNSTREAM FACE OF 6' X 7' BOX

X1	8.5	7	97.0	103.0	109.0	109.0	109.0	1.0	0.0	
X3	10	0.0	0.0	0.0	0.0	0.0	0.0	1091.0	1091.0	
GR	1088.5	55.0	1080.55	95.0	1078.55	97.0	1078.55	100.0	1078.55	103.0
GR	1080.5	105.0	1088.55	145.0						
SC	1.014	0.3	2.6	25.0	7.0	6.0	75.0	8.1	1079.45	1078.55

UPSTREAM FACE OF 6' X 7' BOX

UPSTREAM FACE OF 6' X 7' BOX

X1	9	0	0.0	0.0	75.0	75.0	75.0	1.0	0.1
X2	0.0	0.0	2	0.0	1090.8	0.0	0	0.0	0.0
X3	10	0.0	0.0	0.0	0.0	0.0	0.0	1091.0	1091.0
NC	0.025	0.025	0.025	0.0	0.0				

DETENTION BASIN 193

DETENTION BASIN 193

X1	10	4	0.0	320.0	100.0	100.0	100.0	1.0	0.0
GR	1090.5	0.0	1080.8	100.0	1080.8	220.0	1090.5	320.0	

FLOW DISTRIBUTION :

Cross-Section Number (SECNO) 3.000
Total Discharge (cfs, Q) 20
Computed Water Surface Elevation (ft MSL, CWSEL) 1081.20

Station (ft) =	87.0	92.0	108.0	113.0
Flow (%) =	.8	98.5	.8	
Area (sq ft) =	2.5	44.0	2.5	
Vel (ft/s) =	.06	.45	.06	
Depth (ft) =	.50	2.75	.50	

FLOW DISTRIBUTION :

Cross-Section Number (SECNO) 4.000
Total Discharge (cfs, Q) 20
Computed Water Surface Elevation (ft MSL, CWSEL) 1081.20

Station (ft) =	87.3	92.0	108.0	112.7
Flow (%) =	.7	98.7	.7	
Area (sq ft) =	2.2	43.0	2.2	
Vel (ft/s) =	.06	.46	.06	
Depth (ft) =	.47	2.69	.47	

Station (ft) =	.0	320.0
Flow (%) =	100.0	
Area (sq ft) =	2230.3	
Vel (ft/s) =	.22	
Depth (ft) =	6.97	

T1 93030.00
T2 DYSART DRAIN IMPROVEMENT PROJECT
T3 DETENTION BASIN 193 OUTLET CHANNEL

JOB PARAMETERS :

	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
J1	0	11	0	0	0.0	0	0.0	600.0	1085.1	

	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
J2	15	1	0.0	0.0	0.0	0.0	0.0	-6.0	0.0	15

FLOW DISTRIBUTION :

Cross-Section Number (SECNO)	3.000
Total Discharge (cfs, Q)	600
Computed Water Surface Elevation (ft MSL, CWSEL)	1085.10

Station (ft) =	67.5	92.0	108.0	132.5
Flow (%) =	9.8	80.4	9.8	
Area (sq ft) =	60.0	106.4	60.0	
Vel (ft/s) =	.98	4.53	.98	
Depth (ft) =	2.45	6.65	2.45	

FLOW DISTRIBUTION :

Cross-Section Number (SECNO)	4.000
Total Discharge (cfs, Q)	600
Computed Water Surface Elevation (ft MSL, CWSEL)	1085.13

Station (ft) =	67.6	92.0	108.0	132.4
Flow (%) =	9.8	80.5	9.8	
Area (sq ft) =	59.3	105.9	59.3	
Vel (ft/s) =	.99	4.56	.99	
Depth (ft) =	2.44	6.62	2.44	

FLOW DISTRIBUTION :

Cross-Section Number (SECNO) 5.000
Total Discharge (cfs, Q) 600
Computed Water Surface Elevation (ft MSL, CWSEL) 1085.16

Station (ft) =	67.8	92.0	108.0	132.2
Flow (%) =	9.7	80.6	9.7	
Area (sq ft) =	58.5	105.4	58.5	
Vel (ft/s) =	.99	4.59	.99	
Depth (ft) =	2.42	6.59	2.42	

FLOW DISTRIBUTION :

Cross-Section Number (SECNO) 6.000
Total Discharge (cfs, Q) 600
Computed Water Surface Elevation (ft MSL, CWSEL) 1085.19

Station (ft) =	68.0	92.0	108.0	132.0
Flow (%) =	9.6	80.8	9.6	
Area (sq ft) =	57.8	104.9	57.8	
Vel (ft/s) =	1.00	4.62	1.00	
Depth (ft) =	2.40	6.56	2.40	

FLOW DISTRIBUTION :

Cross-Section Number (SECNO) 7.000
Total Discharge (cfs, Q) 600
Computed Water Surface Elevation (ft MSL, CWSEL) 1085.23

Station (ft) =	68.1	92.0	108.0	131.9
Flow (%) =	9.5	80.9	9.5	
Area (sq ft) =	57.0	104.4	57.0	
Vel (ft/s) =	1.00	4.65	1.00	
Depth (ft) =	2.39	6.53	2.39	

FLOW DISTRIBUTION :

Cross-Section Number (SECNO) 8.000
Total Discharge (cfs, Q) 600
Computed Water Surface Elevation (ft MSL, CWSEL) 1085.26

Station (ft) =	68.3	92.0	108.0	131.7
Flow (%) =	9.5	81.1	9.5	
Area (sq ft) =	56.3	104.0	56.3	
Vel (ft/s) =	1.01	4.68	1.01	
Depth (ft) =	2.37	6.50	2.37	

FLOW DISTRIBUTION :

Cross-Section Number (SECNO) 8.500
Total Discharge (cfs, Q) 600
Computed Water Surface Elevation (ft MSL, CWSEL) 1085.30

Station (ft) =	97.0	103.0
Flow (%) =	100.0	
Area (sq ft) =	40.5	
Vel (ft/s) =	14.81	
Depth (ft) =	6.75	

FLOW DISTRIBUTION :

Cross-Section Number (SECNO) 9.000
Total Discharge (cfs, Q) 600
Computed Water Surface Elevation (ft MSL, CWSEL) 1091.65

Station (ft) =	55.0	95.0	97.0	103.0	105.0	145.0
Flow (%) =	30.1	3.1	33.5	3.1	30.1	
Area (sq ft) =	281.1	24.0	78.0	24.1	281.1	
Vel (ft/s) =	.64	.78	2.58	.78	.64	
Depth (ft) =	7.03	12.00	13.00	12.03	7.03	

FLOW DISTRIBUTION :

Cross-Section Number (SECNO) 10.000
Total Discharge (cfs, Q) 600
Computed Water Surface Elevation (ft MSL, CWSEL) 1091.70

Station (ft) =	.0	320.0
Flow (%) =	100.0	
Area (sq ft) =	2518.8	
Vel (ft/s) =	.24	
Depth (ft) =	7.87	

SPECIAL NOTE :

An asterisk (*) to the left of the cross-section number indicates a special note is present in the SUMMARY OF WARNING AND STATUS MESSAGES section.

SUMMARY PRINTOUT : DYSART DRAIN IMPROVEMENT PROJECT
DETENTION BASIN 193 OUTLET CHANNEL
93030.00

Cross-Section Number SECNO	Minimum C. S. Elevation (ft MSL) ELMIN	Computed W. S. Elevation (ft MSL) CWSEL	Discharge Flow (cfs) Q	Channel Mean Flow Velocity (ft/s) VCH	W.S. Elev Diff per Section (ft) DIFWSX	Water Surface Top Width (ft) TOPWID	Flow Depth (ft) DEPTH	Mean Velocity Head (ft) HV	Left W. S. Station (ft) SSTA	Right W. S. Station (ft) ENDST	Left Overbank Flow (cfs) QLOB	Right Overbank Flow (cfs) QROB
3.000	1078.20	1081.20	20.00	.45	.00	26.00	3.00	.00	87.00	113.00	.15	.15
3.000	1078.20	1081.40	40.00	.83	.00	28.00	3.20	.01	86.00	114.00	.44	.44
3.000	1078.20	1081.50	60.00	1.20	.00	29.00	3.30	.02	85.50	114.50	.76	.76
3.000	1078.20	1081.60	80.00	1.54	.00	30.00	3.40	.04	85.00	115.00	1.17	1.17
3.000	1078.20	1081.70	100.00	1.86	.00	31.00	3.50	.05	84.50	115.50	1.66	1.66
3.000	1078.20	1082.20	200.00	3.15	.00	36.00	4.00	.15	82.00	118.00	5.50	5.50
3.000	1078.20	1082.80	300.00	3.95	.00	42.00	4.60	.22	79.00	121.00	12.58	12.58
3.000	1078.20	1083.50	400.00	4.36	.00	49.00	5.30	.26	75.50	124.50	23.75	23.75
3.000	1078.20	1084.30	500.00	4.50	.00	57.00	6.10	.27	71.50	128.50	39.59	39.59
3.000	1078.20	1085.10	600.00	4.53	.00	65.00	6.90	.26	67.50	132.50	58.93	58.93
4.000	1078.26	1081.20	20.00	.46	.00	25.38	2.94	.00	87.31	112.69	.13	.13
4.000	1078.26	1081.40	40.00	.85	.00	27.40	3.14	.01	86.30	113.70	.39	.39
4.000	1078.26	1081.51	60.00	1.22	.01	28.44	3.24	.02	85.78	114.22	.70	.70
4.000	1078.26	1081.61	80.00	1.57	.01	29.47	3.35	.04	85.26	114.74	1.09	1.09
4.000	1078.26	1081.71	100.00	1.89	.01	30.51	3.45	.05	84.74	115.26	1.56	1.56
4.000	1078.26	1082.23	200.00	3.18	.03	35.71	3.97	.15	82.14	117.86	5.37	5.37
4.000	1078.26	1082.84	300.00	3.97	.04	41.81	4.58	.23	79.09	120.91	12.44	12.44
4.000	1078.26	1083.54	400.00	4.38	.04	48.81	5.28	.26	75.59	124.41	23.57	23.57
4.000	1078.26	1084.34	500.00	4.52	.04	56.76	6.07	.27	71.62	128.38	39.30	39.30
4.000	1078.26	1085.13	600.00	4.56	.03	64.70	6.87	.26	67.65	132.35	58.52	58.52
5.000	1078.33	1081.20	20.00	.47	.00	24.76	2.88	.00	87.62	112.38	.12	.12
5.000	1078.33	1081.41	40.00	.87	.00	26.80	3.08	.01	86.60	113.40	.35	.35
5.000	1078.33	1081.51	60.00	1.25	.01	27.87	3.19	.02	86.07	113.93	.64	.64
5.000	1078.33	1081.62	80.00	1.60	.01	28.94	3.29	.04	85.53	114.47	1.01	1.01
5.000	1078.33	1081.73	100.00	1.92	.01	30.02	3.40	.06	84.99	115.01	1.46	1.46
5.000	1078.33	1082.27	200.00	3.21	.03	35.42	3.94	.15	82.29	117.71	5.23	5.23
5.000	1078.33	1082.89	300.00	3.99	.04	41.62	4.56	.23	79.19	120.81	12.29	12.29
5.000	1078.33	1083.59	400.00	4.41	.04	48.61	5.26	.27	75.69	124.31	23.37	23.37
5.000	1078.33	1084.37	500.00	4.55	.04	56.50	6.05	.27	71.75	128.25	38.98	38.98

	Cross-Section Number SECNO	Minimum C. S. Elevation (ft MSL) ELMIN	Computed W. S. Elevation (ft MSL) CWSEL	Discharge Flow (cfs) Q	Channel Mean Flow Velocity (ft/s) VCH	W.S. Elev Diff per Section (ft) DIFWSX	Water Surface Top Width (ft) TOPWID	Flow Depth (ft) DEPTH	Mean Velocity Head (ft) HV	Left W. S. Station (ft) SSTA	Right W. S. Station (ft) ENDST	Left Overbank Flow (cfs) QLOB	Right Overbank Flow (cfs) QROB
	5.000	1078.33	1085.16	600.00	4.59	.03	64.38	6.84	.27	67.81	132.19	58.07	58.07
	6.000	1078.39	1081.20	20.00	.48	.00	24.14	2.81	.00	87.93	112.07	.10	.10
	6.000	1078.39	1081.41	40.00	.89	.00	26.21	3.02	.01	86.90	113.10	.32	.32
	6.000	1078.39	1081.52	60.00	1.28	.01	27.31	3.13	.02	86.35	113.65	.58	.58
	6.000	1078.39	1081.63	80.00	1.63	.01	28.42	3.24	.04	85.79	114.21	.93	.93
	6.000	1078.39	1081.74	100.00	1.96	.02	29.54	3.35	.06	85.23	114.77	1.37	1.37
	6.000	1078.39	1082.30	200.00	3.24	.03	35.13	3.91	.15	82.43	117.57	5.11	5.11
	6.000	1078.39	1082.93	300.00	4.01	.04	41.43	4.54	.23	79.29	120.71	12.15	12.15
	6.000	1078.39	1083.63	400.00	4.43	.04	48.42	5.24	.27	75.79	124.21	23.18	23.18
	6.000	1078.39	1084.41	500.00	4.57	.04	56.25	6.02	.28	71.88	128.12	38.67	38.67
	6.000	1078.39	1085.19	600.00	4.62	.03	64.07	6.81	.27	67.96	132.04	57.64	57.64
	7.000	1078.45	1081.20	20.00	.50	.00	23.52	2.75	.00	88.24	111.76	.08	.08
	7.000	1078.45	1081.41	40.00	.91	.00	25.61	2.96	.01	87.19	112.81	.28	.28
	7.000	1078.45	1081.53	60.00	1.30	.01	26.75	3.07	.03	86.62	113.38	.53	.53
	7.000	1078.45	1081.64	80.00	1.66	.01	27.91	3.19	.04	86.05	113.95	.86	.86
	7.000	1078.45	1081.76	100.00	1.99	.02	29.07	3.31	.06	85.46	114.54	1.28	1.28
	7.000	1078.45	1082.34	200.00	3.27	.04	34.86	3.89	.16	82.57	117.43	4.98	4.98
	7.000	1078.45	1082.98	300.00	4.03	.05	41.25	4.52	.23	79.37	120.63	12.02	12.02
	7.000	1078.45	1083.68	400.00	4.45	.04	48.24	5.22	.27	75.88	124.12	22.99	22.99
	7.000	1078.45	1084.45	500.00	4.60	.04	56.00	6.00	.28	72.00	128.00	38.38	38.38
	7.000	1078.45	1085.23	600.00	4.65	.03	63.77	6.77	.27	68.12	131.88	57.21	57.21
	8.000	1078.52	1081.21	20.00	.51	.00	22.90	2.69	.00	88.55	111.45	.07	.07
	8.000	1078.52	1081.42	40.00	.93	.00	25.02	2.90	.01	87.49	112.51	.25	.25
	8.000	1078.52	1081.54	60.00	1.33	.01	26.20	3.02	.03	86.90	113.10	.47	.47
	8.000	1078.52	1081.66	80.00	1.70	.01	27.40	3.14	.04	86.30	113.70	.79	.79
	8.000	1078.52	1081.78	100.00	2.03	.02	28.61	3.26	.06	85.69	114.31	1.20	1.20
	8.000	1078.52	1082.38	200.00	3.29	.04	34.60	3.86	.16	82.70	117.30	4.86	4.86
	8.000	1078.52	1083.02	300.00	4.05	.05	41.08	4.51	.24	79.46	120.54	11.90	11.90
	8.000	1078.52	1083.72	400.00	4.47	.05	48.07	5.21	.28	75.97	124.03	22.82	22.82
	8.000	1078.52	1084.49	500.00	4.63	.04	55.77	5.98	.28	72.12	127.88	38.09	38.09
	8.000	1078.52	1085.26	600.00	4.68	.03	63.47	6.75	.28	68.26	131.74	56.80	56.80
*	8.500	1078.55	1081.20	20.00	1.25	-.01	6.00	2.65	.02	97.00	103.00	.00	.00
*	8.500	1078.55	1081.39	40.00	2.35	-.03	6.00	2.84	.09	97.00	103.00	.00	.00
*	8.500	1078.55	1081.47	60.00	3.43	-.07	6.00	2.92	.18	97.00	103.00	.00	.00
*	8.500	1078.55	1081.54	80.00	4.46	-.12	6.00	2.99	.31	97.00	103.00	.00	.00
*	8.500	1078.55	1081.60	100.00	5.47	-.18	6.00	3.05	.46	97.00	103.00	.00	.00
*	8.500	1078.55	1081.80	200.00	10.24	-.57	6.00	3.25	1.63	97.00	103.00	.00	.00
*	8.500	1078.55	1082.82	300.00	11.72	-.21	6.00	4.27	2.13	97.00	103.00	.00	.00
*	8.500	1078.55	1083.69	400.00	12.96	-.03	6.00	5.14	2.61	97.00	103.00	.00	.00
*	8.500	1078.55	1084.53	500.00	13.93	.04	6.00	5.98	3.01	97.00	103.00	.00	.00

	Cross-Section Number SECNO	Minimum C. S. Elevation (ft MSL) ELMIN	Computed W. S. Elevation (ft MSL) CWSEL	Discharge Flow (cfs) Q	Channel Mean Flow Velocity (ft/s) VCH	W.S. Elev Diff per Section (ft) DIFWSX	Water Surface Top Width (ft) TOPWID	Flow Depth (ft) DEPTH	Mean Velocity Head (ft) HV	Left W. S. Station (ft) SSTA	Right W. S. Station (ft) ENDST	Left Overbank Flow (cfs) QLOB	Right Overbank Flow (cfs) QROB
*	8.500	1078.55	1085.30	600.00	14.81	.04	6.00	6.75	3.40	97.00	103.00	.00	.00
	9.000	1078.65	1081.19	20.00	1.31	.00	6.00	2.54	.03	97.00	103.00	.00	.00
	9.000	1078.65	1081.57	40.00	2.28	.19	6.00	2.92	.08	97.00	103.00	.00	.00
	9.000	1078.65	1081.91	60.00	3.06	.45	6.00	3.26	.15	97.00	103.00	.00	.00
	9.000	1078.65	1082.25	80.00	3.70	.71	6.00	3.60	.21	97.00	103.00	.00	.00
*	9.000	1078.65	1082.58	100.00	4.24	.99	6.00	3.93	.28	97.00	103.00	.00	.00
*	9.000	1078.65	1084.28	200.00	5.91	2.47	6.00	5.63	.54	97.00	103.00	.00	.00
*	9.000	1078.65	1085.71	300.00	7.08	2.89	6.00	7.06	.78	97.00	103.00	.00	.00
*	9.000	1078.65	1087.16	400.00	7.83	3.47	6.00	8.51	.95	97.00	103.00	.00	.00
*	9.000	1078.65	1089.64	500.00	7.57	5.11	6.00	10.99	.89	97.00	103.00	.00	.00
*	9.000	1078.65	1091.65	600.00	2.58	6.35	90.00	13.00	.04	55.00	145.00	199.38	199.69
*	10.000	1080.80	1081.23	20.00	.37	.04	128.95	.43	.00	95.53	224.47	.00	.00
*	10.000	1080.80	1081.68	40.00	.35	.11	138.21	.88	.00	90.89	229.11	.00	.00
*	10.000	1080.80	1082.11	60.00	.34	.19	146.94	1.31	.00	86.53	233.47	.00	.00
*	10.000	1080.80	1082.53	80.00	.34	.28	155.63	1.73	.00	82.18	237.82	.00	.00
*	10.000	1080.80	1082.95	100.00	.33	.36	164.27	2.15	.00	77.87	242.13	.00	.00
*	10.000	1080.80	1084.98	200.00	.29	.71	206.28	4.18	.00	56.86	263.14	.00	.00
*	10.000	1080.80	1086.72	300.00	.28	1.01	242.10	5.92	.00	38.95	281.05	.00	.00
*	10.000	1080.80	1088.40	400.00	.27	1.24	276.69	7.60	.00	21.65	298.35	.00	.00
*	10.000	1080.80	1090.80	500.00	.22	1.16	320.00	10.00	.00	.00	320.00	.00	.00
*	10.000	1080.80	1091.70	600.00	.24	.05	320.00	10.90	.00	.00	320.00	.00	.00

SUMMARY PRINTOUT TABLE 150 : DYSART DRAIN IMPROVEMENT PROJECT
---------- DETENTION BASIN 193 OUTLET CHANNEL
93030.00

Cross-Section Number SECNO	Channel Reach Length (ft) XLCH	Top of Roadway Elevation (ft MSL) ELTRD	Max. Low Chord Elevation (ft MSL) ELLC	Minimum C. S. Elevation (ft MSL) ELMIN	Discharge Flow (cfs) Q	Computed W. S. Elevation (ft MSL) CWSEL	Critical W. S. Elevation (ft MSL) CRIWS	Energy Gradient Elevation (ft MSL) EG	Energy Gradient Slope * 10,000 10K*S	Channel Mean Flow Velocity (ft/s) VCH	Cross-Section Area (sq ft) AREA	Index Q (0.01 * Convey.) .01K
3.000	.00	.00	.00	1078.20	20.00	1081.20	.00	1081.20	.05	.45	49.00	87.17
3.000	.00	.00	.00	1078.20	40.00	1081.40	.00	1081.41	.16	.83	54.40	98.65
3.000	.00	.00	.00	1078.20	60.00	1081.50	.00	1081.52	.33	1.20	57.25	104.67
3.000	.00	.00	.00	1078.20	80.00	1081.60	.00	1081.64	.52	1.54	60.20	110.89
3.000	.00	.00	.00	1078.20	100.00	1081.70	.00	1081.75	.73	1.86	63.25	117.30
3.000	.00	.00	.00	1078.20	200.00	1082.20	.00	1082.35	1.72	3.15	80.00	152.33

Cross-Section Number SECNO	Channel Reach Length (ft) XLCH	Top of Roadway Elevation (ft MSL) ELTRD	Max. Low Chord Elevation (ft MSL) ELLC	Minimum C. S. Elevation (ft MSL) ELMIN	Discharge Flow (cfs) Q	Computed W. S. Elevation (ft MSL) CWSEL	Critical W. S. Elevation (ft MSL) CRIWS	Energy Gradient Elevation (ft MSL) EG	Energy Gradient Slope * 10,000 10K*S	Channel Mean Flow Velocity (ft/s) VCH	Cross-Section Area (sq ft) AREA	Index Q (0.01 * Convey.) .01K
3.000	.00	.00	.00	1078.20	300.00	1082.80	.00	1083.02	2.22	3.95	103.40	201.23
3.000	.00	.00	.00	1078.20	400.00	1083.50	.00	1083.76	2.22	4.36	135.25	268.27
3.000	.00	.00	.00	1078.20	500.00	1084.30	.00	1084.57	1.94	4.50	177.66	358.92
3.000	.00	.00	.00	1078.20	600.00	1085.10	.00	1085.36	1.66	4.53	226.45	465.44
4.000	200.00	.00	.00	1078.26	20.00	1081.20	.00	1081.20	.06	.46	47.41	83.76
4.000	200.00	.00	.00	1078.26	40.00	1081.40	.00	1081.41	.18	.85	52.75	95.14
4.000	200.00	.00	.00	1078.26	60.00	1081.51	.00	1081.53	.35	1.22	55.63	101.25
4.000	200.00	.00	.00	1078.26	80.00	1081.61	.00	1081.65	.55	1.57	58.63	107.59
4.000	200.00	.00	.00	1078.26	100.00	1081.71	.00	1081.77	.77	1.89	61.76	114.16
4.000	200.00	.00	.00	1078.26	200.00	1082.23	.00	1082.38	1.77	3.18	78.97	150.19
4.000	200.00	.00	.00	1078.26	300.00	1082.84	.00	1083.07	2.26	3.97	102.62	199.59
4.000	200.00	.00	.00	1078.26	400.00	1083.54	.00	1083.81	2.26	4.38	134.34	266.34
4.000	200.00	.00	.00	1078.26	500.00	1084.34	.00	1084.61	1.97	4.52	176.27	355.94
4.000	200.00	.00	.00	1078.26	600.00	1085.13	.00	1085.39	1.69	4.56	224.51	461.16
5.000	200.00	.00	.00	1078.33	20.00	1081.20	.00	1081.21	.06	.47	45.85	80.41
5.000	200.00	.00	.00	1078.33	40.00	1081.41	.00	1081.42	.19	.87	51.12	91.69
5.000	200.00	.00	.00	1078.33	60.00	1081.51	.00	1081.54	.38	1.25	54.03	97.86
5.000	200.00	.00	.00	1078.33	80.00	1081.62	.00	1081.66	.59	1.60	57.08	104.32
5.000	200.00	.00	.00	1078.33	100.00	1081.73	.00	1081.78	.81	1.92	60.27	111.04
5.000	200.00	.00	.00	1078.33	200.00	1082.27	.00	1082.42	1.83	3.21	77.92	147.98
5.000	200.00	.00	.00	1078.33	300.00	1082.89	.00	1083.11	2.30	3.99	101.80	197.87
5.000	200.00	.00	.00	1078.33	400.00	1083.59	.00	1083.85	2.29	4.41	133.37	264.29
5.000	200.00	.00	.00	1078.33	500.00	1084.37	.00	1084.65	2.01	4.55	174.81	352.78
5.000	200.00	.00	.00	1078.33	600.00	1085.16	.00	1085.43	1.73	4.59	222.46	456.64
6.000	200.00	.00	.00	1078.39	20.00	1081.20	.00	1081.21	.07	.48	44.33	77.14
6.000	200.00	.00	.00	1078.39	40.00	1081.41	.00	1081.42	.21	.89	49.54	88.32
6.000	200.00	.00	.00	1078.39	60.00	1081.52	.00	1081.54	.40	1.28	52.48	94.58
6.000	200.00	.00	.00	1078.39	80.00	1081.63	.00	1081.67	.63	1.63	55.58	101.15
6.000	200.00	.00	.00	1078.39	100.00	1081.74	.00	1081.80	.86	1.96	58.84	108.03
6.000	200.00	.00	.00	1078.39	200.00	1082.30	.00	1082.46	1.88	3.24	76.92	145.91
6.000	200.00	.00	.00	1078.39	300.00	1082.93	.00	1083.16	2.34	4.01	101.02	196.23
6.000	200.00	.00	.00	1078.39	400.00	1083.63	.00	1083.90	2.32	4.43	132.45	262.33
6.000	200.00	.00	.00	1078.39	500.00	1084.41	.00	1084.69	2.04	4.57	173.38	349.71
6.000	200.00	.00	.00	1078.39	600.00	1085.19	.00	1085.47	1.76	4.62	220.47	452.26
7.000	200.00	.00	.00	1078.45	20.00	1081.20	.00	1081.21	.07	.50	42.86	73.96
7.000	200.00	.00	.00	1078.45	40.00	1081.41	.00	1081.43	.22	.91	48.00	85.04
7.000	200.00	.00	.00	1078.45	60.00	1081.53	.00	1081.55	.43	1.30	50.98	91.39
7.000	200.00	.00	.00	1078.45	80.00	1081.64	.00	1081.68	.67	1.66	54.14	98.09
7.000	200.00	.00	.00	1078.45	100.00	1081.76	.00	1081.82	.90	1.99	57.47	105.13
7.000	200.00	.00	.00	1078.45	200.00	1082.34	.00	1082.50	1.93	3.27	75.97	143.93

	Cross-Section Number SECNO	Channel Reach Length (ft) XLCH	Top of Roadway Elevation (ft MSL) ELTRD	Max. Low Chord Elevation (ft MSL) ELLC	Minimum C. S. Elevation (ft MSL) ELMIN	Discharge Flow (cfs) Q	Computed W. S. Elevation (ft MSL) CWSEL	Critical W. S. Elevation (ft MSL) CRIWS	Energy Gradient Elevation (ft MSL) EG	Energy Gradient Slope * 10,000 10K*S	Channel Mean Flow Velocity (ft/s) VCH	Cross-Section Area (sq ft) AREA	Index Q (0.01 * Convey.) .01K
	7.000	200.00	.00	.00	1078.45	300.00	1082.98	.00	1083.21	2.37	4.03	100.28	194.69
	7.000	200.00	.00	.00	1078.45	400.00	1083.68	.00	1083.95	2.36	4.45	131.56	260.46
	7.000	200.00	.00	.00	1078.45	500.00	1084.45	.00	1084.73	2.08	4.60	172.02	346.77
	7.000	200.00	.00	.00	1078.45	600.00	1085.23	.00	1085.50	1.79	4.65	218.53	447.98
	8.000	200.00	.00	.00	1078.52	20.00	1081.21	.00	1081.21	.08	.51	41.42	70.83
	8.000	200.00	.00	.00	1078.52	40.00	1081.42	.00	1081.43	.24	.93	46.51	81.83
	8.000	200.00	.00	.00	1078.52	60.00	1081.54	.00	1081.56	.46	1.33	49.52	88.27
	8.000	200.00	.00	.00	1078.52	80.00	1081.66	.00	1081.70	.71	1.70	52.74	95.13
	8.000	200.00	.00	.00	1078.52	100.00	1081.78	.00	1081.84	.96	2.03	56.14	102.32
	8.000	200.00	.00	.00	1078.52	200.00	1082.38	.00	1082.54	1.98	3.29	75.07	142.04
	8.000	200.00	.00	.00	1078.52	300.00	1083.02	.00	1083.26	2.41	4.05	99.58	193.22
	8.000	200.00	.00	.00	1078.52	400.00	1083.72	.00	1084.00	2.39	4.47	130.72	258.68
	8.000	200.00	.00	.00	1078.52	500.00	1084.49	.00	1084.78	2.11	4.63	170.70	343.92
	8.000	200.00	.00	.00	1078.52	600.00	1085.26	.00	1085.54	1.83	4.68	216.64	443.83
*	8.500	109.00	.00	.00	1078.55	20.00	1081.20	.00	1081.22	.38	1.25	15.94	32.45
*	8.500	109.00	.00	.00	1078.55	40.00	1081.39	.00	1081.47	1.22	2.35	17.02	36.20
*	8.500	109.00	.00	.00	1078.55	60.00	1081.47	.00	1081.65	2.50	3.43	17.51	37.94
*	8.500	109.00	.00	.00	1078.55	80.00	1081.54	.00	1081.85	4.10	4.46	17.93	39.49
*	8.500	109.00	.00	.00	1078.55	100.00	1081.60	.00	1082.06	6.00	5.47	18.29	40.82
*	8.500	109.00	.00	.00	1078.55	200.00	1081.80	1081.80	1083.43	19.32	10.24	19.52	45.50
*	8.500	109.00	.00	.00	1078.55	300.00	1082.82	1082.82	1084.95	17.61	11.72	25.60	71.50
*	8.500	109.00	.00	.00	1078.55	400.00	1083.69	1083.69	1086.30	16.79	12.96	30.86	97.62
*	8.500	109.00	.00	.00	1078.55	500.00	1084.53	1084.53	1087.55	15.87	13.93	35.88	125.50
*	8.500	109.00	.00	.00	1078.55	600.00	1085.30	1085.30	1088.71	15.24	14.81	40.52	153.68
	9.000	75.00	1090.80	.00	1078.65	20.00	1081.19	.00	1081.22	.44	1.31	15.25	30.13
	9.000	75.00	1090.80	.00	1078.65	40.00	1081.57	.00	1081.66	1.10	2.28	17.55	38.09
	9.000	75.00	1090.80	.00	1078.65	60.00	1081.91	.00	1082.06	1.72	3.06	19.59	45.75
	9.000	75.00	1090.80	.00	1078.65	80.00	1082.25	.00	1082.46	2.20	3.70	21.60	53.88
*	9.000	75.00	1090.80	.00	1078.65	100.00	1082.58	.00	1082.86	2.56	4.24	23.61	62.48
*	9.000	75.00	1090.80	.00	1078.65	200.00	1084.28	.00	1084.82	3.10	5.91	33.81	113.66
*	9.000	75.00	1090.80	.00	1078.65	300.00	1085.71	.00	1086.49	3.29	7.08	42.36	165.49
*	9.000	75.00	1090.80	.00	1078.65	400.00	1087.16	.00	1088.11	3.13	7.83	51.08	226.03
*	9.000	75.00	1090.80	.00	1078.65	500.00	1089.64	.00	1090.53	2.08	7.57	66.01	346.61
*	9.000	75.00	1090.80	.00	1078.65	600.00	1091.65	.00	1091.69	.19	2.58	688.30	1367.46
*	10.000	100.00	.00	.00	1080.80	20.00	1081.23	.00	1081.24	1.24	.37	54.00	17.96
*	10.000	100.00	.00	.00	1080.80	40.00	1081.68	.00	1081.69	.45	.35	114.04	59.61
*	10.000	100.00	.00	.00	1080.80	60.00	1082.11	.00	1082.11	.27	.34	174.38	116.12
*	10.000	100.00	.00	.00	1080.80	80.00	1082.53	.00	1082.53	.18	.34	238.19	187.89
*	10.000	100.00	.00	.00	1080.80	100.00	1082.95	.00	1082.95	.13	.33	305.14	273.85
*	10.000	100.00	.00	.00	1080.80	200.00	1084.98	.00	1084.99	.05	.29	682.65	899.95

	Cross-Section Number SECNO	Channel Reach Length (ft) XLCH	Top of Roadway Elevation (ft MSL) ELTRD	Max. Low Chord Elevation (ft MSL) ELLC	Minimum C. S. Elevation (ft MSL) ELMIN	Discharge Flow (cfs) Q	Computed W. S. Elevation (ft MSL) CWSEL	Critical W. S. Elevation (ft MSL) CRIWS	Energy Gradient Elevation (ft MSL) EG	Energy Gradient Slope * 10,000 10K*S	Channel Mean Flow Velocity (ft/s) VCH	Cross-Section Area (sq ft) AREA	Index Q (0.01 * Convey.) .01K
*	10.000	100.00	.00	.00	1080.80	300.00	1086.72	.00	1086.72	.03	.28	1072.13	1715.93
*	10.000	100.00	.00	.00	1080.80	400.00	1088.40	.00	1088.40	.02	.27	1507.33	2769.17
*	10.000	100.00	.00	.00	1080.80	500.00	1090.80	.00	1090.80	.01	.22	2230.32	4822.00
*	10.000	100.00	.00	.00	1080.80	600.00	1091.70	.00	1091.70	.01	.24	2518.83	5883.89

SUMMARY PRINTOUT TABLE 150 : DYSART DRAIN IMPROVEMENT PROJECT
---------- DETENTION BASIN 193 OUTLET CHANNEL
93030.00

Cross-Section Number SECNO	Discharge Flow (cfs) Q	Computed W. S. Elevation (ft MSL) CWSEL	W.S. Elev Diff per Profile (ft) DIFWSP	W.S. Elev Diff per Section (ft) DIFWSX	W.S. Elev Diff per Know/Comp (ft) DIFKWS	Water Surface Top Width (ft) TOPWID	Channel Reach Length (ft) XLCH
3.000	20.00	1081.20	.00	.00	.00	26.00	.00
3.000	40.00	1081.40	.20	.00	.00	28.00	.00
3.000	60.00	1081.50	.10	.00	.00	29.00	.00
3.000	80.00	1081.60	.10	.00	.00	30.00	.00
3.000	100.00	1081.70	.10	.00	.00	31.00	.00
3.000	200.00	1082.20	.50	.00	.00	36.00	.00
3.000	300.00	1082.80	.60	.00	.00	42.00	.00
3.000	400.00	1083.50	.70	.00	.00	49.00	.00
3.000	500.00	1084.30	.80	.00	.00	57.00	.00
3.000	600.00	1085.10	.80	.00	.00	65.00	.00
4.000	20.00	1081.20	.00	.00	.00	25.38	200.00
4.000	40.00	1081.40	.20	.00	.00	27.40	200.00
4.000	60.00	1081.51	.10	.01	.00	28.44	200.00
4.000	80.00	1081.61	.10	.01	.00	29.47	200.00
4.000	100.00	1081.71	.10	.01	.00	30.51	200.00
4.000	200.00	1082.23	.52	.03	.00	35.71	200.00
4.000	300.00	1082.84	.61	.04	.00	41.81	200.00
4.000	400.00	1083.54	.70	.04	.00	48.81	200.00
4.000	500.00	1084.34	.79	.04	.00	56.76	200.00
4.000	600.00	1085.13	.79	.03	.00	64.70	200.00
5.000	20.00	1081.20	.00	.00	.00	24.76	200.00
5.000	40.00	1081.41	.20	.00	.00	26.80	200.00
5.000	60.00	1081.51	.11	.01	.00	27.87	200.00

	Cross-Section Number SECNO	Discharge Flow (cfs) Q	Computed W. S. Elevation (ft MSL) CWSEL	W.S. Elev Diff per Profile (ft) DIFWSP	W.S. Elev Diff per Section (ft) DIFWSX	W.S. Elev Diff per Know/Comp (ft) DIFKWS	Water Surface Top Width (ft) TOPWID	Channel Reach Length (ft) XLCH
	5.000	80.00	1081.62	.11	.01	.00	28.94	200.00
	5.000	100.00	1081.73	.11	.01	.00	30.02	200.00
	5.000	200.00	1082.27	.54	.03	.00	35.42	200.00
	5.000	300.00	1082.89	.62	.04	.00	41.62	200.00
	5.000	400.00	1083.59	.70	.04	.00	48.61	200.00
	5.000	500.00	1084.37	.79	.04	.00	56.50	200.00
	5.000	600.00	1085.16	.79	.03	.00	64.38	200.00
	6.000	20.00	1081.20	.00	.00	.00	24.14	200.00
	6.000	40.00	1081.41	.21	.00	.00	26.21	200.00
	6.000	60.00	1081.52	.11	.01	.00	27.31	200.00
	6.000	80.00	1081.63	.11	.01	.00	28.42	200.00
	6.000	100.00	1081.74	.11	.02	.00	29.54	200.00
	6.000	200.00	1082.30	.56	.03	.00	35.13	200.00
	6.000	300.00	1082.93	.63	.04	.00	41.43	200.00
	6.000	400.00	1083.63	.70	.04	.00	48.42	200.00
	6.000	500.00	1084.41	.78	.04	.00	56.25	200.00
	6.000	600.00	1085.19	.78	.03	.00	64.07	200.00
	7.000	20.00	1081.20	.00	.00	.00	23.52	200.00
	7.000	40.00	1081.41	.21	.00	.00	25.61	200.00
	7.000	60.00	1081.53	.11	.01	.00	26.75	200.00
	7.000	80.00	1081.64	.12	.01	.00	27.91	200.00
	7.000	100.00	1081.76	.12	.02	.00	29.07	200.00
	7.000	200.00	1082.34	.58	.04	.00	34.86	200.00
	7.000	300.00	1082.98	.64	.05	.00	41.25	200.00
	7.000	400.00	1083.68	.70	.04	.00	48.24	200.00
	7.000	500.00	1084.45	.78	.04	.00	56.00	200.00
	7.000	600.00	1085.23	.78	.03	.00	63.77	200.00
	8.000	20.00	1081.21	.00	.00	.00	22.90	200.00
	8.000	40.00	1081.42	.21	.00	.00	25.02	200.00
	8.000	60.00	1081.54	.12	.01	.00	26.20	200.00
	8.000	80.00	1081.66	.12	.01	.00	27.40	200.00
	8.000	100.00	1081.78	.12	.02	.00	28.61	200.00
	8.000	200.00	1082.38	.60	.04	.00	34.60	200.00
	8.000	300.00	1083.02	.65	.05	.00	41.08	200.00
	8.000	400.00	1083.72	.70	.05	.00	48.07	200.00
	8.000	500.00	1084.49	.77	.04	.00	55.77	200.00
	8.000	600.00	1085.26	.77	.03	.00	63.47	200.00
*	8.500	20.00	1081.20	.00	-.01	.00	6.00	109.00
*	8.500	40.00	1081.39	.19	-.03	.00	6.00	109.00
*	8.500	60.00	1081.47	.08	-.07	.00	6.00	109.00

PROJECT TITLE : DYSART DRAIN IMPROVEMENT PROJECT

PROJECT NUMBER : 93030.00 1/24/1994

	Cross-Section Number SECNO	Discharge Flow (cfs) Q	Computed W. S. Elevation (ft MSL) CWSEL	W.S. Elev Diff per Profile (ft) DIFWSP	W.S. Elev Diff per Section (ft) DIFWSX	W.S. Elev Diff per Know/Comp (ft) DIFKWS	Water Surface Top Width (ft) TOPWID	Channel Reach Length (ft) XLCH
*	8.500	80.00	1081.54	.07	-.12	.00	6.00	109.00
*	8.500	100.00	1081.60	.06	-.18	.00	6.00	109.00
*	8.500	200.00	1081.80	.21	-.57	.00	6.00	109.00
*	8.500	300.00	1082.82	1.01	-.21	.00	6.00	109.00
*	8.500	400.00	1083.69	.88	-.03	.00	6.00	109.00
*	8.500	500.00	1084.53	.84	.04	.00	6.00	109.00
*	8.500	600.00	1085.30	.77	.04	.00	6.00	109.00
	9.000	20.00	1081.19	.00	.00	.00	6.00	75.00
	9.000	40.00	1081.57	.38	.19	.00	6.00	75.00
	9.000	60.00	1081.91	.34	.45	.00	6.00	75.00
	9.000	80.00	1082.25	.34	.71	.00	6.00	75.00
*	9.000	100.00	1082.58	.33	.99	.00	6.00	75.00
*	9.000	200.00	1084.28	1.70	2.47	.00	6.00	75.00
*	9.000	300.00	1085.71	1.43	2.89	.00	6.00	75.00
*	9.000	400.00	1087.16	1.45	3.47	.00	6.00	75.00
*	9.000	500.00	1089.64	2.48	5.11	.00	6.00	75.00
*	9.000	600.00	1091.65	2.01	6.35	.00	90.00	75.00
*	10.000	20.00	1081.23	.00	.04	.00	128.95	100.00
*	10.000	40.00	1081.68	.45	.11	.00	138.21	100.00
*	10.000	60.00	1082.11	.42	.19	.00	146.94	100.00
*	10.000	80.00	1082.53	.42	.28	.00	155.63	100.00
*	10.000	100.00	1082.95	.42	.36	.00	164.27	100.00
*	10.000	200.00	1084.98	2.04	.71	.00	206.28	100.00
*	10.000	300.00	1086.72	1.74	1.01	.00	242.10	100.00
*	10.000	400.00	1088.40	1.68	1.24	.00	276.69	100.00
*	10.000	500.00	1090.80	2.40	1.16	.00	320.00	100.00
*	10.000	600.00	1091.70	.90	.05	.00	320.00	100.00

SUMMARY OF WARNING AND STATUS MESSAGES :

Section 8.5, profile 1, conveyance change outside acceptable range.

Section 8.5, profile 2, conveyance change outside acceptable range.

Section 8.5, profile 3, conveyance change outside acceptable range.

Section 8.5, profile 4, conveyance change outside acceptable range.

Section 8.5, profile 5, conveyance change outside acceptable range.

Section 8.5, profile 6, critical depth assumed.

Section 8.5, profile 6, minimum specific energy.

Section 8.5, profile 7, critical depth assumed.

Section 8.5, profile 7, probable minimum specific energy.

Section 8.5, profile 7, 20 trials attempted to balance water surface elevation.

Section 8.5, profile 8, critical depth assumed.

Section 8.5, profile 8, probable minimum specific energy.

Section 8.5, profile 8, 20 trials attempted to balance water surface elevation.

Section 8.5, profile 9, critical depth assumed.

Section 8.5, profile 9, probable minimum specific energy.

Section 8.5, profile 9, 20 trials attempted to balance water surface elevation.

Section 8.5, profile 10, critical depth assumed.

Section 8.5, profile 10, probable minimum specific energy.

Section 8.5, profile 10, 20 trials attempted to balance water surface elevation.

Section 9, profile 5, conveyance change outside acceptable range.

Section 9, profile 6, conveyance change outside acceptable range.

Section 9, profile 7, conveyance change outside acceptable range.

Section 9, profile 8, conveyance change outside acceptable range.

Section 9, profile 9, conveyance change outside acceptable range.

Section 9, profile 10, conveyance change outside acceptable range.

Section 10, profile 1, conveyance change outside acceptable range.

Section 10, profile 2, conveyance change outside acceptable range.

Section 10, profile 3, conveyance change outside acceptable range.

Section 10, profile 4, conveyance change outside acceptable range.

Section 10, profile 5, conveyance change outside acceptable range.

Section 10, profile 6, conveyance change outside acceptable range.

Section 10, profile 7, conveyance change outside acceptable range.

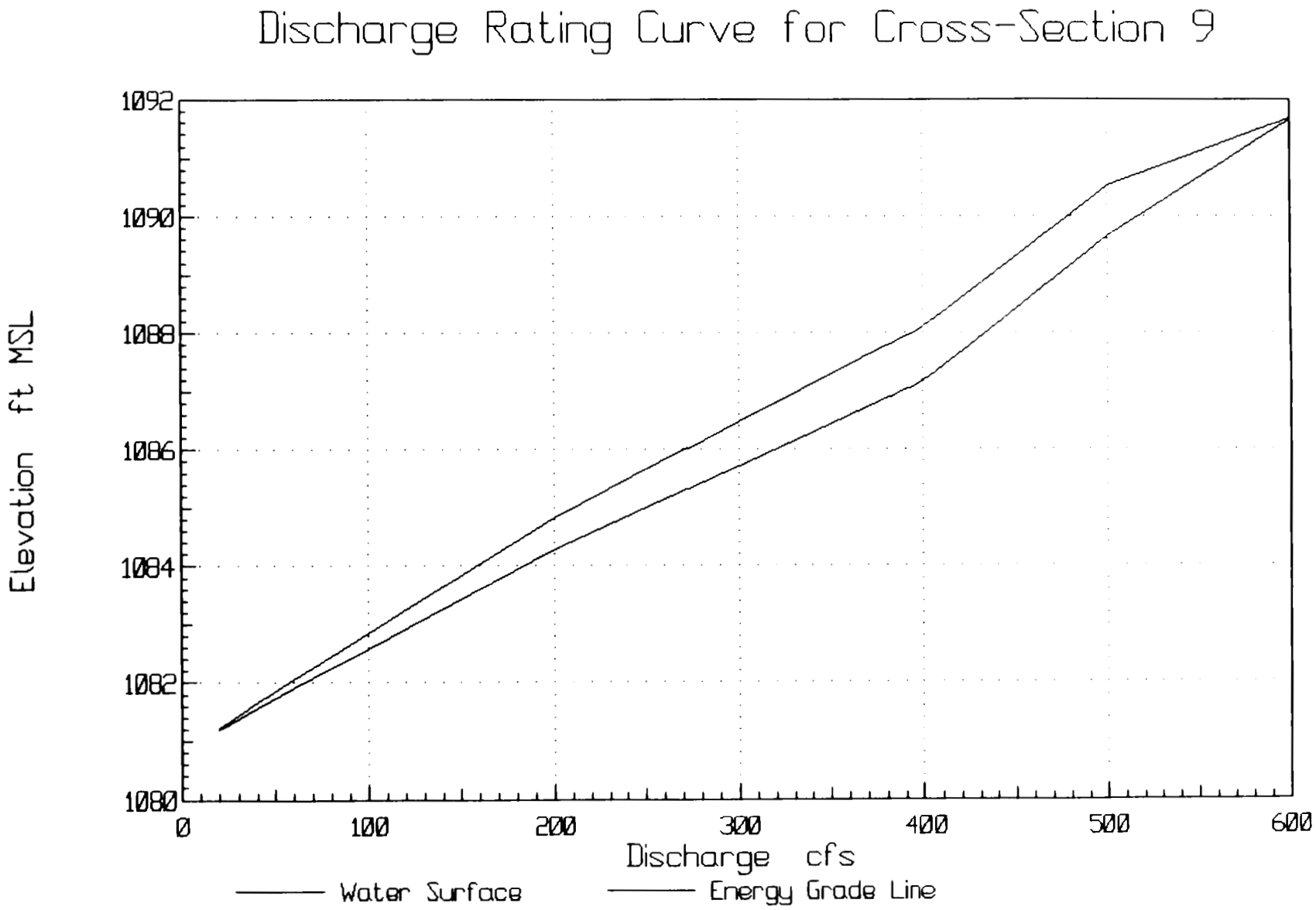
Section 10, profile 8, conveyance change outside acceptable range.

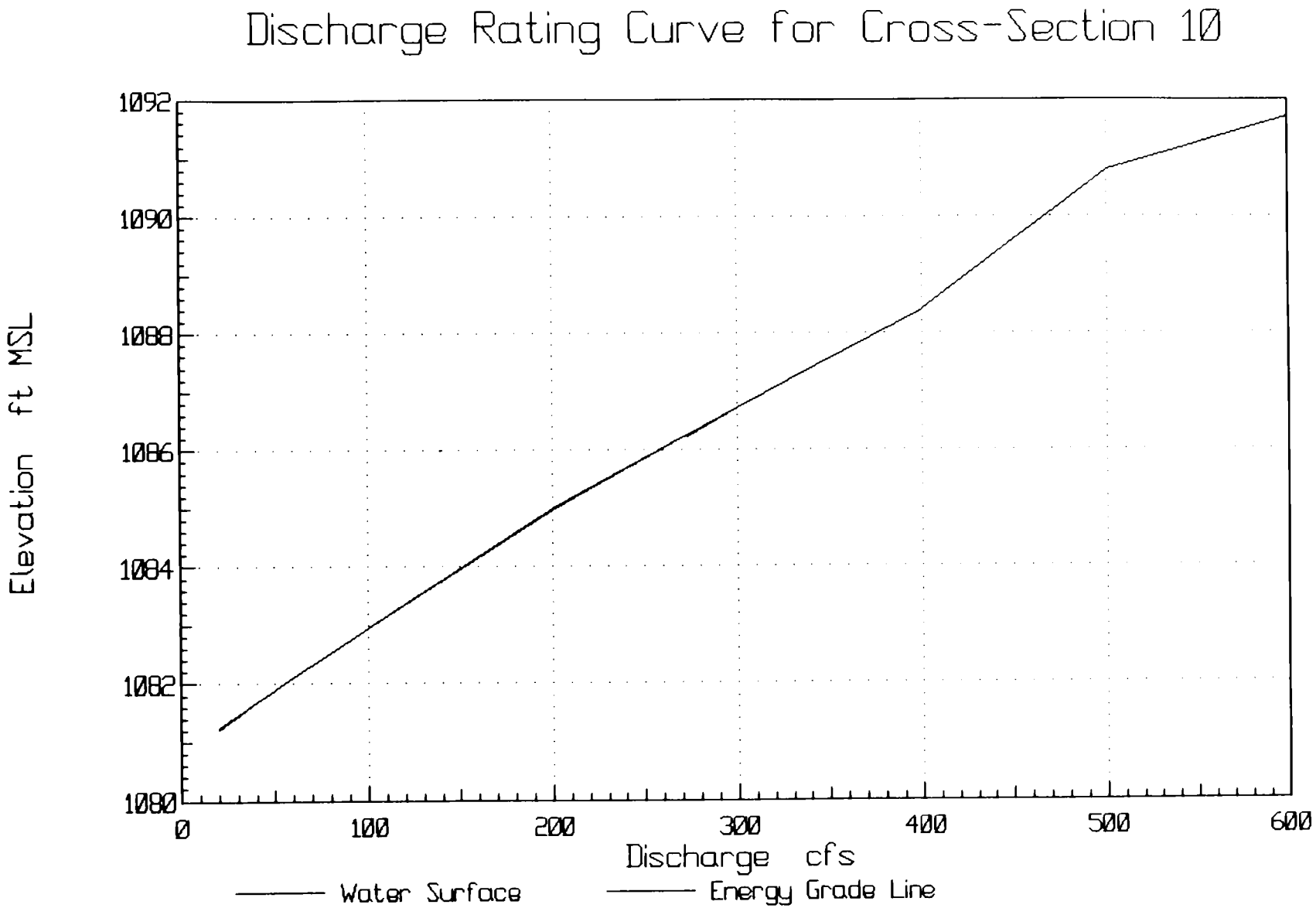
Section 10, profile 9, conveyance change outside acceptable range.

Section 10, profile 10, conveyance change outside acceptable range.

35 Warning and status message(s) generated

END OF OUTPUT


Discharge Rating Curve for Cross-Section 9
Elevation ft MSL
1092
1090
1088
1086
1084
1082
1080
0
100
200
300
400
500
600
Discharge cfs
Water Surface
Energy Grade Line


Discharge Rating Curve for Cross-Section 10
Elevation ft MSL
1092
1090
1088
1086
1084
1082
1080
0
100
200
300
400
500
600
Discharge cfs
Water Surface
Energy Grade Line

HYDRAULICS FOR BASIN COLLECTOR CHANNELS

a. "North Collector Channel" at north property line.

b. "East Collector Channel", outfall from the NE corner designed by NBS.

c. "Reems Road Collector Channel" at west boundary.

```
*****************************************
*  HEC-2 WATER SURFACE PROFILES         *
*                                       *
*  Version   4.6.2;  May 1991           *
*                                       *
*  RUN DATE    09FEB94    TIME   14:47:08 *
*****************************************
```

```
*************************************
*  U.S. ARMY CORPS OF ENGINEERS     *
*  HYDROLOGIC ENGINEERING CENTER    *
*  609 SECOND STREET, SUITE D       *
*  DAVIS, CALIFORNIA 95616-4687     *
*          (916) 756-1104           *
*************************************
```

```
X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                        X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                  X
X     X  X        X     X            X
X     X  XXXXXXX   XXXXX             XXXXXXX
```

THIS RUN EXECUTED 09FEB94 14:47:08

****

HEC-2 WATER SURFACE PROFILES

Version 4.6.2, May 1991

****

subcritical

known WSE

T2 DYSART DRAIN IMPROVEMENT PROJECT

T3 NORTH COLLECTOR CHANNEL - PROPOSED CONDITION

T4 THIS MODEL WAS STARTED USING THE PEAK STAGE IN DETENTION BASIN SR193

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	0	2	0	0	0	0	0.0	1000.	1099.5	

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	-1	0	-1	0.0	0.0	0.0	0.0	-6.0	0.0	

J3 VARIABLE CODES FOR SUMMARY PRINTOUT

38	42	1	43	26	51	4	8	10	53
54	13	15		150					

J5 LPRNT NUMSEC ********REQUESTED SECTION NUMBERS********

-10 -10

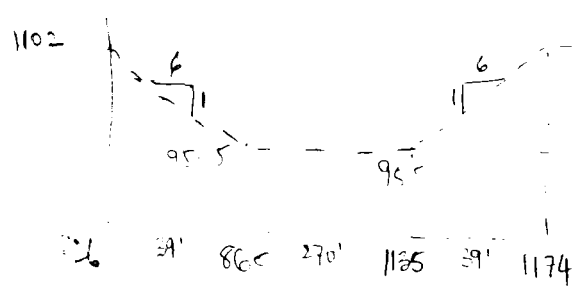
Computed Rip-Rap

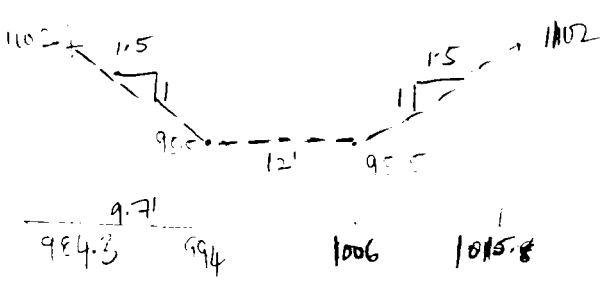
NC	0.035	0.035	0.035	0.1	0.3					
X1	0	4	826	1174	0.0	0.0	0.0	1.0	0.0	0
GR	1102.0	826	1095.5	865	1095.5	1135	1102.0	1174		
X1	1	4	991	10009	90.0	90.0	90.0	1.0	0.0	0
GR	1102.0	984.3	1095.5	994	1095.5	1006	1102.0	1015.8		

IN DETENTION BASIN @ NORTH COLLECTOR CHANNEL OUTLET

X1	2	0	0	0	50.0	50.0	50.0	1.0	0.125	0
X1	3	0	0	0	50.0	50.0	50.0	1.0	0.125	0
X1	4	0	0	0	50.0	50.0	50.0	1.0	0.125	0
X1	5	0	0	0	50.0	50.0	50.0	1.0	0.125	0
X1	6	0	0	0	50.0	50.0	50.0	1.0	0.125	0

.0025 1/ft





X1	7	0	0	0	50.0	50.0	50.0	1.0	0.125	0
NC	0.019	0.019	.019							
X1	8	0	0	0	50.0	50.0	50.0	1.0	0.125	0
X1	9	0	0	0	100.0	100.0	100.0	1.0	0.25	0
X1	10	0	0	0	100.0	100.0	100.0	1.0	0.25	0
X1	11	0	0	0	200.0	200.0	200.0	1.0	0.5	0
X1	12	0	0	0	200.0	200.0	200.0	1.0	0.5	0
X1	13	0	0	0	200.0	200.0	200.0	1.0	0.5	0
X1	14	0	0	0	200.0	200.0	200.0	1.0	0.5	0
X1	15	0	0	0	200.0	200.0	200.0	1.0	0.5	0
X1	16	0	0	0	200.0	200.0	200.0	1.0	0.5	0
X1	17	0	0	0	200.0	200.0	200.0	1.0	0.5	0
X1	18	0	0	0	100.0	100.0	100.0	1.0	0.25	0

$S = -.0025 \frac{1}{ft}$

THIS RUN EXECUTED 09FEB94 14:47:09

****
HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991
****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

NORTH COLLECTOR CHANNEL

SUMMARY PRINTOUT

	SECNO	ELMIN	CWSEL	Q	VCH	DIFWSX	TOPWID	DEPTH	HV	SSTA	ENDST	QLOB	QROB
	.000	1095.50	1099.50	1000.00	.85	.00	318.00	4.00	.01	841.00	1159.00	.00	.00
*	1.000	1095.50	1100.34	1000.00	10.72	.84	26.52	4.84	1.79	986.78	1013.30	.00	.00
*	2.000	1095.63	1101.68	1000.00	7.84	1.34	30.15	6.06	.96	984.97	1015.12	.00	.00
	3.000	1095.75	1102.07	1000.00	7.36	.39	30.97	6.32	.84	984.56	1015.53	.00	.00
	4.000	1095.88	1102.38	1000.00	7.07	.30	31.50	6.50	.78	984.30	1015.80	.00	.00
	5.000	1096.00	1102.63	1000.00	6.87	.26	31.50	6.63	.73	984.30	1015.80	.00	.00
	6.000	1096.13	1102.86	1000.00	6.73	.23	31.50	6.73	.70	984.30	1015.80	.00	.00
	7.000	1096.25	1103.07	1000.00	6.61	.21	31.50	6.82	.68	984.30	1015.80	.00	.00
*	8.000	1096.38	1103.15	1000.00	6.66	.08	31.50	6.78	.69	984.30	1015.80	.00	.00
	9.000	1096.63	1103.23	1000.00	6.91	.08	31.50	6.61	.74	984.30	1015.80	.00	.00
	10.000	1096.88	1103.32	1000.00	7.16	.09	31.34	6.45	.80	984.38	1015.72	.00	.00
	11.000	1097.38	1103.53	1000.00	7.64	.21	30.48	6.16	.91	984.81	1015.29	.00	.00
	12.000	1097.88	1103.80	1000.00	8.07	.27	29.79	5.93	1.01	985.15	1014.94	.00	.00
	13.000	1098.38	1104.14	1000.00	8.39	.33	29.31	5.76	1.09	985.39	1014.70	.00	.00
	14.000	1098.88	1104.52	1000.00	8.63	.38	28.96	5.65	1.16	985.56	1014.52	.00	.00
	15.000	1099.38	1104.95	1000.00	8.81	.43	28.73	5.57	1.20	985.68	1014.41	.00	.00
	16.000	1099.88	1105.41	1000.00	8.91	.46	28.59	5.53	1.23	985.75	1014.34	.00	.00

SECNO	ELMIN	CWSEL	Q	VCH	DIFWSX	TOPWID	DEPTH	HV	SSTA	ENDST	QLOB	QROB
17.000	1100.38	1105.89	1000.00	8.96	.48	28.53	5.51	1.25	985.78	1014.31	.00	.00
18.000	1100.63	1106.13	1000.00	8.97	.25	28.52	5.51	1.25	985.78	1014.30	.00	.00

NORTH COLLECTOR CHANNEL

SUMMARY PRINTOUT TABLE 150

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	01K
	.000	.00	.00	.00	1095.50	1000.00	1099.50	.00	1099.51	.70	.85	1176.00	1192.42
*	1.000	90.00	.00	.00	1095.50	1000.00	1100.34	1100.34	1102.13	137.24	10.72	93.25	85.36
*	2.000	50.00	.00	.00	1095.63	1000.00	1101.68	.00	1102.64	58.14	7.84	127.50	131.15
	3.000	50.00	.00	.00	1095.75	1000.00	1102.07	.00	1102.91	48.87	7.36	135.87	143.04
	4.000	50.00	.00	.00	1095.88	1000.00	1102.38	.00	1103.15	43.85	7.07	141.39	151.01
	5.000	50.00	.00	.00	1096.00	1000.00	1102.63	.00	1103.37	40.18	6.87	145.57	157.75
	6.000	50.00	.00	.00	1096.13	1000.00	1102.86	.00	1103.56	37.88	6.73	148.48	162.48
	7.000	50.00	.00	.00	1096.25	1000.00	1103.07	.00	1103.75	35.88	6.61	151.21	166.95
*	8.000	50.00	.00	.00	1096.38	1000.00	1103.15	.00	1103.84	10.82	6.66	150.06	304.05
	9.000	100.00	.00	.00	1096.63	1000.00	1103.23	.00	1103.97	12.03	6.91	144.79	288.27
	10.000	100.00	.00	.00	1096.88	1000.00	1103.32	.00	1104.12	13.36	7.16	139.66	273.57
	11.000	200.00	.00	.00	1097.38	1000.00	1103.53	.00	1104.44	15.97	7.64	130.82	250.22
	12.000	200.00	.00	.00	1097.88	1000.00	1103.80	.00	1104.82	18.53	8.07	123.91	232.33
	13.000	200.00	.00	.00	1098.38	1000.00	1104.14	.00	1105.23	20.61	8.39	119.17	220.26
	14.000	200.00	.00	.00	1098.88	1000.00	1104.52	.00	1105.68	22.29	8.63	115.81	211.80
	15.000	200.00	.00	.00	1099.38	1000.00	1104.95	.00	1106.15	23.54	8.81	113.53	206.13
	16.000	200.00	.00	.00	1099.88	1000.00	1105.41	.00	1106.64	24.29	8.91	112.23	202.88
	17.000	200.00	.00	.00	1100.38	1000.00	1105.89	.00	1107.13	24.66	8.96	111.62	201.37
	18.000	100.00	.00	.00	1100.63	1000.00	1106.13	.00	1107.38	24.72	8.97	111.52	201.12

NORTH COLLECTOR CHANNEL

SUMMARY PRINTOUT TABLE 150

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
	.000	1000.00	1099.50	.00	.00	.00	318.00	.00
*	1.000	1000.00	1100.34	.00	.84	.00	26.52	90.00
*	2.000	1000.00	1101.68	.00	1.34	.00	30.15	50.00
	3.000	1000.00	1102.07	.00	.39	.00	30.97	50.00
	4.000	1000.00	1102.38	.00	.30	.00	31.50	50.00
	5.000	1000.00	1102.63	.00	.26	.00	31.50	50.00
	6.000	1000.00	1102.86	.00	.23	.00	31.50	50.00
	7.000	1000.00	1103.07	.00	.21	.00	31.50	50.00
*	8.000	1000.00	1103.15	.00	.08	.00	31.50	50.00
	9.000	1000.00	1103.23	.00	.08	.00	31.50	100.00
	10.000	1000.00	1103.32	.00	.09	.00	31.34	100.00
	11.000	1000.00	1103.53	.00	.21	.00	30.48	200.00
	12.000	1000.00	1103.80	.00	.27	.00	29.79	200.00
	13.000	1000.00	1104.14	.00	.33	.00	29.31	200.00
	14.000	1000.00	1104.52	.00	.38	.00	28.96	200.00
	15.000	1000.00	1104.95	.00	.43	.00	28.73	200.00
	16.000	1000.00	1105.41	.00	.46	.00	28.59	200.00
	17.000	1000.00	1105.89	.00	.48	.00	28.53	200.00
	18.000	1000.00	1106.13	.00	.25	.00	28.52	100.00

SUMMARY OF ERRORS AND SPECIAL NOTES

CAUTION SECNO=	1.000	PROFILE=	1	CRITICAL DEPTH ASSUMED
CAUTION SECNO=	1.000	PROFILE=	1	PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=	1.000	PROFILE=	1	20 TRIALS ATTEMPTED TO BALANCE WSEL
WARNING SECNO=	2.000	PROFILE=	1	CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=	8.000	PROFILE=	1	CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

```
*****************************************
*  HEC-2 WATER SURFACE PROFILES          *
*                                        *
*  Version   4.6.2;  May 1991            *
*                                        *
*  RUN DATE    09FEB94    TIME   14:46:39 *
*****************************************
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```
*************************************
*  U.S. ARMY CORPS OF ENGINEERS     *
*  HYDROLOGIC ENGINEERING CENTER    *
*  609 SECOND STREET, SUITE D       *
*  DAVIS, CALIFORNIA 95616-4687     *
*          (916) 756-1104           *
*************************************
```

```
X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                        X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                  X
X     X  X        X     X            X
X     X  XXXXXXX   XXXXX             XXXXXXX
```

THIS RUN EXECUTED 09FEB94 14:46:39

****
HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991
****

Discharge

Peak stage in D basin

T2 DYSART DRAIN IMPROVEMENT PROJECT
T3 EAST COLLECTOR CHANNEL - PROPOSED CONDITION
T4 THIS MODEL WAS STARTED USING THE PEAK STAGE IN DETENTION BASIN SR193

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	0	2	0	0	0	0	0.0	840	1099.5	

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	-1	0	-1	0.0	0.0	0.0	0.0	-6.0	0.0	

J3 VARIABLE CODES FOR SUMMARY PRINTOUT

38	42	1	43	26	51	4	8	10	53
54	13	15		150					

J5 LPRNT NUMSEC ********REQUESTED SECTION NUMBERS********

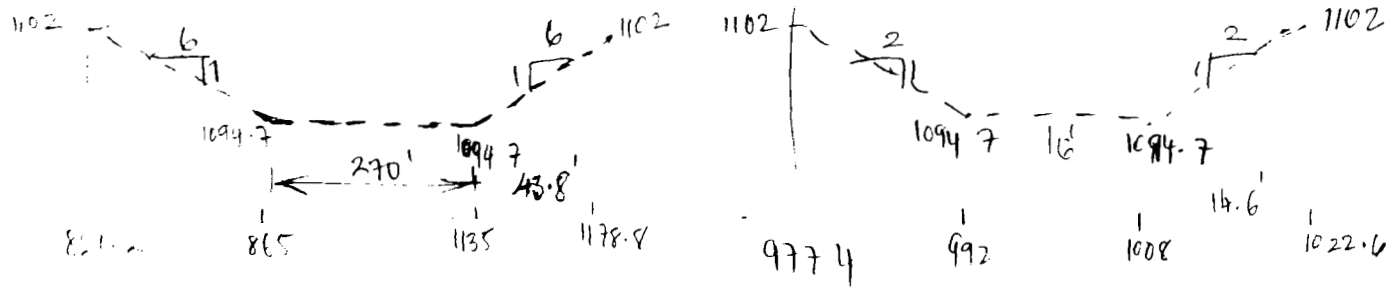
-10 -10

NC	0.035	0.035	0.035	0.1	0.3					
X1	0	4	821.2	1178.8	0.0	0.0	0.0	1.0	0.0	0
GR	1102.0	821.2	1094.7	865	1094.7	1135	1102.0	1178.8		
X1	1	4	991	10009	90.0	90.0	90.0	1.0	0.0	0
GR	1102.0	977.4	1094.7	992	1094.7	1008	1102.0	1022.6		

IN DETENTION BASIN @ NORTH COLLECTOR CHANNEL OUTLET

X1	2	0	0	0	50.0	50.0	50.0	1.0	0.475	0
X1	3	0	0	0	50.0	50.0	50.0	1.0	0.475	0
X1	4	0	0	0	50.0	50.0	50.0	1.0	0.475	0
X1	5	0	0	0	50.0	50.0	50.0	1.0	0.475	0
X1	6	0	0	0	50.0	50.0	50.0	1.0	0.475	0

S = .0095 1/ft



THIS RUN EXECUTED 09FEB94 14:46:39

****
HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991
****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

EAST COLLECTOR CHANNEL -

SUMMARY PRINTOUT

	SECNO	ELMIN	CWSEL	Q	VCH	DIFWSX	TOPWID	DEPTH	HV	SSTA	ENDST	QLOB	QROB
	.000	1094.70	1099.50	840.00	.59	.00	327.60	4.80	.01	836.20	1163.80	.00	.00
*	1.000	1094.70	1098.66	840.00	8.88	-.84	31.82	3.96	1.22	984.09	1015.91	.00	.00
	2.000	1095.17	1099.31	840.00	8.37	.66	32.54	4.14	1.09	983.73	1016.27	.00	.00
	3.000	1095.65	1099.78	840.00	8.39	.47	32.51	4.13	1.09	983.75	1016.25	.00	.00
	4.000	1096.12	1100.25	840.00	8.40	.47	32.49	4.12	1.10	983.75	1016.25	.00	.00
	5.000	1096.60	1100.72	840.00	8.41	.47	32.48	4.12	1.10	983.76	1016.24	.00	.00
	6.000	1097.07	1101.19	840.00	8.41	.47	32.48	4.12	1.10	983.76	1016.24	.00	.00

EAST COLLECTOR CHANNEL -

SUMMARY PRINTOUT TABLE 150

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
	.000	.00	.00	.00	1094.70	840.00	1099.50	.00	1099.51	.27	.59	1434.26	1627.12
*	1.000	90.00	.00	.00	1094.70	840.00	1098.66	.00	1099.88	110.41	8.88	94.60	79.94
	2.000	50.00	.00	.00	1095.17	840.00	1099.31	.00	1100.40	93.58	8.37	100.35	86.83
	3.000	50.00	.00	.00	1095.65	840.00	1099.78	.00	1100.87	94.29	8.39	100.08	86.51
	4.000	50.00	.00	.00	1096.12	840.00	1100.25	.00	1101.35	94.59	8.40	99.97	86.37
	5.000	50.00	.00	.00	1096.60	840.00	1100.72	.00	1101.82	94.75	8.41	99.90	86.29
	6.000	50.00	.00	.00	1097.07	840.00	1101.19	.00	1102.29	94.89	8.41	99.85	86.23

EAST COLLECTOR CHANNEL -

SUMMARY PRINTOUT TABLE 150

SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
.000	840.00	1099.50	.00	.00	.00	327.60	.00
* 1.000	840.00	1098.66	.00	-.84	.00	31.82	90.00
2.000	840.00	1099.31	.00	.66	.00	32.54	50.00
3.000	840.00	1099.78	.00	.47	.00	32.51	50.00
4.000	840.00	1100.25	.00	.47	.00	32.49	50.00
5.000	840.00	1100.72	.00	.47	.00	32.48	50.00
6.000	840.00	1101.19	.00	.47	.00	32.48	50.00

SUMMARY OF ERRORS AND SPECIAL NOTES

WARNING SECNO= 1.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

```
*****************************************
*  HEC-2 WATER SURFACE PROFILES         *
*                                       *
*  Version   4.6.2;  May 1991           *
*                                       *
*  RUN DATE    09FEB94    TIME   14:45:21 *
*****************************************
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*************************************
*  U.S. ARMY CORPS OF ENGINEERS     *
*  HYDROLOGIC ENGINEERING CENTER    *
*  609 SECOND STREET, SUITE D       *
*  DAVIS, CALIFORNIA 95616-4687     *
*          (916) 756-1104           *
*************************************
```

```
X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                        X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                  X
X     X  X        X     X            X
X     X  XXXXXXX   XXXXX             XXXXXXX
```

Subcritical flow

Start from known WSE

Peak stage in basin

THIS RUN EXECUTED 09FEB94 14:45:21

****

HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991

****

T2 DYSART DRAIN IMPROVEMENT PROJECT

T3 REEMS COLLECTOR CHANNEL @ SW CORNER OF BASIN

T4 THIS MODEL WAS STARTED USING THE PEAK STAGE IN DETENTION BASIN SR193

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	0	2	0	0	0	0	0.0	1000.	1099.5	

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	-1	0	-1	0.0	0.0	0.0	0.0	-6.0	0.0	

J3 VARIABLE CODES FOR SUMMARY PRINTOUT

38	42	1	43	26	51	4	8	10	53
54	13	15		150					

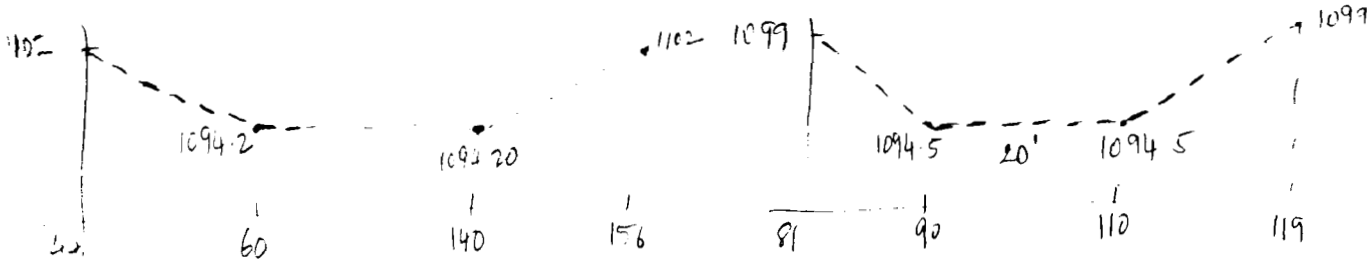
J5 LPRNT NUMSEC ********REQUESTED SECTION NUMBERS********

-10 -10

NC	0.030	0.030	0.030	0.1	0.3					
X1	0	4	44.0	156.0	0.0	0.0	0.0	1.0	0.0	0
GR	1102.0	44.0	1094.20	60.0	1094.20	140.0	1102.00	156.0		
X1	1	4	81	119	40.0	40.0	40.0	1.0	0.0	0
GR	1099.0	81	1094.5	90.0	1094.5	110.0	1099.0	119		

IN DETENTION BASIN @ REEMS COLLECTOR CHANNEL OUTLET

X1	2	0	0	0	50.0	50.0	50.0	1.0	0.285	0
X1	3	0	0	0	50.0	50.0	50.0	1.0	0.285	0
X1	4	0	0	0	50.0	50.0	50.0	1.0	0.285	0
X1	5	0	0	0	50.0	50.0	50.0	1.0	0.285	0
X1	6	0	0	0	50.0	50.0	50.0	1.0	0.285	0



X1	7	0	0	0	50.0	50.0	50.0	1.0	0.285	0
X1	8	0	0	0	50.0	50.0	50.0	1.0	0.285	0
QT	1	600	Change in "Q"							
X1	9	0	0	0	45.0	45.0	45.0	1.0	0.2565	0
NC	.020	.020	.020	Gunite						
X1	10	4	60	115.4	80.0	80.0	80.0	1.0	0.0	0
GR	1103.4	60.0	1100.8	95.0	1100.8	105.0	1103.4	115.4		
X1	11	0	0	0	50.0	50.0	50.0	1.0	0.2145	0
X1	12	0	0	0	50.0	50.0	50.0	1.0	0.2145	0
X1	13	0	0	0	50.0	50.0	50.0	1.0	0.2145	0
X1	14	0	0	0	50.0	50.0	50.0	1.0	0.2145	0
X1	15	0	0	0	50.0	50.0	50.0	1.0	0.2145	0
X1	16	0	0	0	100	100	100	1.0	0.429	0
X1	17	0	0	0	200	200	200	1.0	0.858	0
X1	18	0	0	0	200	200	200	1.0	0.858	0
X1	19	0	0	0	200	200	200	1.0	0.858	0
X1	20	0	0	0	200	200	200	1.0	0.858	0
X1	21	0	0	0	200	200	200	1.0	0.858	0
X1	22	0	0	0	200	200	200	1.0	0.858	0
X1	23	0	0	0	210	210	210	1.0	0.901	0

S = .0043 ft/ft

THIS RUN EXECUTED 09FEB94 14:45:22

****
HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991
****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

REEMS COLLECTOR CHANNEL

SUMMARY PRINTOUT

	SECNO	ELMIN	CWSEL	Q	VCH	DIFWSX	TOPWID	DEPTH	HV	SSTA	ENDST	QLOB	QROB
	.000	1094.20	1099.50	1000.00	2.08	.00	101.74	5.30	.07	49.13	150.87	.00	.00
*	1.000	1094.50	1098.89	1000.00	7.90	-.61	37.58	4.39	.97	81.21	118.79	.00	.00
	2.000	1094.79	1099.16	1000.00	7.95	.26	37.50	4.37	.98	81.25	118.75	.00	.00
	3.000	1095.07	1099.43	1000.00	7.98	.27	37.44	4.36	.99	81.28	118.72	.00	.00
	4.000	1095.36	1099.71	1000.00	8.01	.28	37.41	4.35	1.00	81.30	118.70	.00	.00
	5.000	1095.64	1099.98	1000.00	8.02	.28	37.38	4.34	1.00	81.31	118.69	.00	.00
	6.000	1095.93	1100.27	1000.00	8.03	.28	37.37	4.34	1.00	81.32	118.68	.00	.00
	7.000	1096.21	1100.55	1000.00	8.04	.28	37.35	4.34	1.00	81.32	118.68	.00	.00
	8.000	1096.50	1100.83	1000.00	8.04	.28	37.35	4.34	1.00	81.33	118.67	.00	.00
	9.000	1096.75	1101.79	600.00	3.98	.95	38.00	5.03	.25	81.00	119.00	.00	.00
*	10.000	1100.80	1103.39	600.00	7.11	1.60	55.20	2.59	.79	60.16	115.35	.00	.00
	11.000	1101.01	1103.77	600.00	6.42	.38	55.40	2.75	.64	60.00	115.40	.00	.00
	12.000	1101.23	1103.95	600.00	6.56	.18	55.40	2.72	.67	60.00	115.40	.00	.00
	13.000	1101.44	1104.14	600.00	6.63	.20	55.40	2.70	.68	60.00	115.40	.00	.00
	14.000	1101.66	1104.35	600.00	6.66	.21	55.40	2.69	.69	60.00	115.40	.00	.00
	15.000	1101.87	1104.56	600.00	6.67	.21	55.40	2.69	.69	60.00	115.40	.00	.00
	16.000	1102.30	1104.99	600.00	6.67	.43	55.40	2.69	.69	60.00	115.40	.00	.00

SECNO	ELMIN	CWSEL	Q	VCH	DIFWSX	TOPWID	DEPTH	HV	SSTA	ENDST	QLOB	QROB
17.000	1103.16	1105.85	600.00	6.67	.86	55.40	2.69	.69	60.00	115.40	.00	.00
18.000	1104.02	1106.71	600.00	6.68	.86	55.40	2.69	.69	60.00	115.40	.00	.00
19.000	1104.88	1107.56	600.00	6.67	.86	55.40	2.69	.69	60.00	115.40	.00	.00
20.000	1105.73	1108.42	600.00	6.67	.86	55.40	2.69	.69	60.00	115.40	.00	.00
21.000	1106.59	1109.28	600.00	6.67	.86	55.40	2.69	.69	60.00	115.40	.00	.00
22.000	1107.45	1110.14	600.00	6.68	.86	55.40	2.69	.69	60.00	115.40	.00	.00
23.000	1108.35	1111.04	600.00	6.67	.91	55.40	2.69	.69	60.00	115.40	.00	.00

REEMS COLLECTOR CHANNEL

SUMMARY PRINTOUT TABLE 150

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
	.000	.00	.00	.00	1094.20	1000.00	1099.50	.00	1099.57	2.28	2.08	481.63	562.04
*	1.000	40.00	.00	.00	1094.50	1000.00	1098.89	.00	1099.86	54.15	7.90	126.56	135.99
	2.000	50.00	.00	.00	1094.79	1000.00	1099.16	.00	1100.14	55.12	7.95	125.77	134.53
	3.000	50.00	.00	.00	1095.07	1000.00	1099.43	.00	1100.42	55.76	7.98	125.26	133.92
	4.000	50.00	.00	.00	1095.36	1000.00	1099.71	.00	1100.70	56.20	8.01	124.91	133.39
	5.000	50.00	.00	.00	1095.64	1000.00	1099.98	.00	1100.98	56.51	8.02	124.67	133.03
	6.000	50.00	.00	.00	1095.93	1000.00	1100.27	.00	1101.27	56.70	8.03	124.52	132.80
	7.000	50.00	.00	.00	1096.21	1000.00	1100.55	.00	1101.55	56.82	8.04	124.42	132.66
	8.000	50.00	.00	.00	1096.50	1000.00	1100.83	.00	1101.84	56.89	8.04	124.37	132.58
	9.000	45.00	.00	.00	1096.75	600.00	1101.79	.00	1102.03	11.44	3.98	150.79	177.42
*	10.000	80.00	.00	.00	1100.80	600.00	1103.39	1103.39	1104.17	52.53	7.11	84.38	82.78
	11.000	50.00	.00	.00	1101.01	600.00	1103.77	.00	1104.41	37.83	6.42	93.45	97.55
	12.000	50.00	.00	.00	1101.23	600.00	1103.95	.00	1104.61	40.58	6.56	91.46	94.19
	13.000	50.00	.00	.00	1101.44	600.00	1104.14	.00	1104.82	42.06	6.63	90.46	92.51
	14.000	50.00	.00	.00	1101.66	600.00	1104.35	.00	1105.04	42.72	6.66	90.02	91.79
	15.000	50.00	.00	.00	1101.87	600.00	1104.56	.00	1105.25	42.87	6.67	89.93	91.64
	16.000	100.00	.00	.00	1102.30	600.00	1104.99	.00	1105.68	42.85	6.67	89.94	91.66
	17.000	200.00	.00	.00	1103.16	600.00	1105.85	.00	1106.54	42.86	6.67	89.94	91.65
	18.000	200.00	.00	.00	1104.02	600.00	1106.71	.00	1107.40	42.96	6.68	89.87	91.55
	19.000	200.00	.00	.00	1104.88	600.00	1107.56	.00	1108.26	42.91	6.67	89.90	91.59
	20.000	200.00	.00	.00	1105.73	600.00	1108.42	.00	1109.11	42.77	6.67	90.00	91.75
	21.000	200.00	.00	.00	1106.59	600.00	1109.28	.00	1109.97	42.90	6.67	89.91	91.60
	22.000	200.00	.00	.00	1107.45	600.00	1110.14	.00	1110.83	43.11	6.68	89.77	91.38
	23.000	210.00	.00	.00	1108.35	600.00	1111.04	.00	1111.73	42.75	6.67	90.01	91.77

REEMS COLLECTOR CHANNEL

SUMMARY PRINTOUT TABLE 150

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
	.000	1000.00	1099.50	.00	.00	.00	101.74	.00
*	1.000	1000.00	1098.89	.00	-.61	.00	37.58	40.00
	2.000	1000.00	1099.16	.00	.26	.00	37.50	50.00
	3.000	1000.00	1099.43	.00	.27	.00	37.44	50.00
	4.000	1000.00	1099.71	.00	.28	.00	37.41	50.00
	5.000	1000.00	1099.98	.00	.28	.00	37.38	50.00
	6.000	1000.00	1100.27	.00	.28	.00	37.37	50.00
	7.000	1000.00	1100.55	.00	.28	.00	37.35	50.00
	8.000	1000.00	1100.83	.00	.28	.00	37.35	50.00
	9.000	600.00	1101.79	.00	.95	.00	38.00	45.00
*	10.000	600.00	1103.39	.00	1.60	.00	55.20	80.00
	11.000	600.00	1103.77	.00	.38	.00	55.40	50.00
	12.000	600.00	1103.95	.00	.18	.00	55.40	50.00
	13.000	600.00	1104.14	.00	.20	.00	55.40	50.00
	14.000	600.00	1104.35	.00	.21	.00	55.40	50.00
	15.000	600.00	1104.56	.00	.21	.00	55.40	50.00
	16.000	600.00	1104.99	.00	.43	.00	55.40	100.00
	17.000	600.00	1105.85	.00	.86	.00	55.40	200.00
	18.000	600.00	1106.71	.00	.86	.00	55.40	200.00
	19.000	600.00	1107.56	.00	.86	.00	55.40	200.00
	20.000	600.00	1108.42	.00	.86	.00	55.40	200.00
	21.000	600.00	1109.28	.00	.86	.00	55.40	200.00
	22.000	600.00	1110.14	.00	.86	.00	55.40	200.00
	23.000	600.00	1111.04	.00	.91	.00	55.40	210.00

SUMMARY OF ERRORS AND SPECIAL NOTES

```
WARNING SECNO=      1.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     10.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     10.000  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     10.000  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
```