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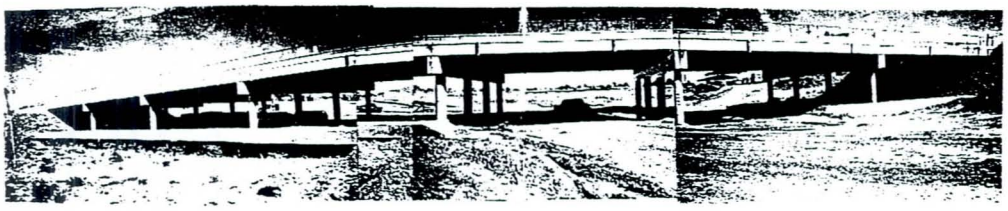
ALMA SCHOOL ROAD-SOUTH BRIDGE OVER THE SALT RIVER

-PRELIMINARY DRAINAGE REPORT-



PREPARED FOR:

MARICOPA COUNTY

DEPARTMENT OF TRANSPORTATION

Prepared By:

DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

-ALMA SCHOOL ROAD-
-SOUTH BRIDGE OVER THE SALT RIVER-

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
WORK ORDER NO. 1 68931

PRELIMINARY DRAINAGE REPORT

PREPARED BY:

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2633 E. INDIAN SCHOOL ROAD, SUITE 401
PHOENIX, ARIZONA 85016-6763.

May 20, 1997

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U.S. ARMY CORPS OF ENGINEERS

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

ARIZONA DEPARTMENT OF TRANSPORTATION

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION

SALT RIVER PROJECT

ALMA SCHOOL ROAD-SOUTH BRIDGE

PRELIMINARY DRAINAGE REPORT

1-INTRODUCTION

The Alma School Road South Bridge Project, included in this Preliminary Drainage Report consists of widening and overlaying Alma School Road from the south side of the South Bridge, where the ADOT Red Mountain Interchange project ends, to the south end of the North Bridge. The present four-lane paved median road will be widened to an ultimate six lanes, including widening of the South Bridge to accommodate the new section which includes a bike path on the west side and sidewalk on the east side.

This Preliminary Drainage Report has been prepared in accordance with guidelines and criteria established by the Arizona Department of Transportation, Maricopa County Department of Transportation, and the Maricopa County Flood Control District.

Included in this report are the roadway drainage system, stream analysis, bridge hydraulics, scour calculations, scour remedial measures, and bank evaluation and stabilization method. The FHWA Technical Circulars HEC-18 and HEC-20 establish the criteria used in the stream stability scour analysis and scour remedial measures.

The river and bridge hydraulics have been performed using the U.S. Army Corps of Engineers HEC-RAS Model.

Engineering calculations, tables, drawings, and other supporting graphics (whenever feasible) are presented in SI units.

2-DRAINAGE SYSTEM- ROADWAY

A-SYSTEM DESCRIPTION

The drainage system includes drainage of the south bridge deck from Sta.____ to Sta.____ and of the roadway from the south end of the bridge to Sta.____ and from the north end of the bridge to the high point on the north bridge deck at Sta._____ where the runoff from the deck splits north and south respectively. See Plan and Profile drawings in Section 4-F.

Drainage of the bridge deck is achieved by intercepting the runoff from the deck through slots set at the flow line elevation in the barrier wall, and conveying the runoff via the bike path and sidewalk to inlets at each of the four corners of the bridge. Runoff from the south roadway section, including runoff from the south half of the bridge and any extraneous runoff discharging into the ROW, is discharged into the ADOT drainage system. Runoff from the north half of the

bridge and north section of the road is intercepted at a low point ___ feet south of the north bridge from where it is conveyed to a Preliminary Runoff Treatment Basin that provides 90 seconds detention time to a volume of runoff equal to the first three inches of runoff generated by the additional pavement. An overflow pipe from the pre-treatment basin discharges the treated runoff into the river.

where is it?

Table I shows systems total area, pavement and pervious area and detention volume provided.

B-SITE INSPECTION

The existing low point on the north side of the south bridge is approximately ___ ft. south of the North Bridge. There are no existing drainage facilities in this section of the road. The south half of the North Bridge drains south, therefore, runoff from that section of the road will be collected and disposed of by the north drainage system of the South Bridge.

There are several driveways on the east and west side of the road near the South Bridge. These driveways are used by the rock mining company operating in the river, on the west side of the road. These driveways will require cross-gutters to avoid discharge of the runoff outside the ROW at points other than the system outfall.

C-HYDROLOGY

The methodology presented in the Maricopa County Drainage Design Manual Volumes I and II has been implemented in the design of the drainage system. The Rational Method is used to determine the peak discharge during the design event. Ten minutes inlet time is the initial time of concentration used in the calculations. The 10 year storm is the selected design event for the storm sewer system. See Section 4-_____.

D-HYDRAULICS

Manning's equation and the Manning's n values from Volume II of MC Drainage Design Manual are used in the storm sewer calculations. Inlet hydraulics and losses through manholes and inlets are in accordance with MC Drainage Manual II.

The 10 year event is the criteria for spread calculations of the roadway section and bridge deck. The control elevation for the north side storm sewer system is the weir crest elevation in the pollution retardant structure. The ADOT system hydraulic grade at the point of connection, is the control elevation for the south system hydraulics.

reference property (sketch of as-builts etc)

-See hydraulic calculations in Section 5-C.

E-CONSTRUCTION COSTS

To be included in later submittal.

3-BRIDGE HYDRAULICS AND SCOUR CALCULATIONS

A-GENERAL.

Scour evaluation and remedial measures presented herein are based on guidelines and requirements set forth by FHWA publications HEC-18 and HEC-20. Information presented in Letter of Map Revision (LOMR) for the Salt River Floodplain Delineation by Wood-Patel and Associates Inc., dated September 13, 1995 provides information on stream characteristics, 100 year storm flow and stages. Information from the LOMR Report has been used to obtain a detailed bridge hydraulics analysis using the HEC-RAS model. See Section 5-B.

The existing ground elevations within the reach of the South River covered in this report do not match the cross sections in the Wood-Patel report. Since topographic discrepancies are considerably large, two different sets of hydraulic analyses and calculations are presented herein. One set of calculations is performed using data from a recent survey reflecting present site conditions. Another set of calculations is based on the cross sections from the Wood-Patel LOMR.

B-SITE CHARACTERISTICS

The South River Bridge is located approximately 2900 feet west of a diversion side weir where part of excessive flows from the main channel are diverted to the south branch during extreme events.

The elevation of the earth dam is set to allow diversion to commence when flow in the main channel is approximately 97,000 cfs. The earth dam is designed to allow its obliteration when flows exceed the overtopping rate. ↳ discuss split flow → how much flows thru S. Bridge

There is a pronounced bend in the channel approximately 600 feet upstream from the structure. Alignment of the piers is approximately 12 degrees off the channel flow direction at the crossing locations Fig.___.

There is a permanent barbed wire fence across the channel attached to the existing grade control structure. This fence is susceptible to debris blockage when flows occur and not likely to remain.

C-STREAM STABILITY

An inspection of the site revealed an armored bed in areas of the river away from the bridge. Under and in the vicinity of the bridge, the armored bed is covered by sand to an elevation, in

some areas, of several feet above the stream bed elevation. There is a compacted vehicular dirt road swinging across and along the river bed. There are also several sandy material stockpiles within the floodway. The existing bridge has a cobble mat extending ___ feet from the toe of the sloped cobble abutment protection. See pictures in Section 4-B.

There is a grade control structure on the downstream side of the bridge. The protection provided by this structure is limited to the bed material under it, at its immediate downstream side. Local scour may occur at the upstream side of the structure during extreme flows. (at piers, abutment)

The south branch of the Salt River is an ephemeral stream at this location. The occurrence of flows depends on extreme events exceeding the rate where overtopping of the side weir begins.

D-HEC-RAS MODEL

The River Analysis System HEC-RAS Model was used to perform the bridge and stream hydraulics. Input from the LOMR Report prepared by Wood/Patel and Associates provides the stage and flow data used in the analyses presented in this report. The topography reflected in the HEC-RAS using Wood-Patel cross sections information is in disagreement with the actual elevations in areas of the waterway as a result of the existing stockpiling and vehicular trails, and for that reason another analysis using actual elevations is included and a comparison of the results is presented in Section 4.

The 500 year and 100 year events are modeled. Determination of pressure flow producing event and resulting stage are included in the analysis. See HEC-RAS input/output printout in section 5.

E-SCOUR ANALYSIS

Analyses of the scour in the structural elements produced by the 500 year and 100 year flows for two sets of cross sections are presented in this report.

The methodology of FHWA HEC- 18 and HEC-20 is employed to determine the magnitude of the scour preventive and remedial measures required. For Scour calculations see Section 5-C. Scour prevention and remedial measures are presented in section 3-F.

The contraction scour calculations have been performed assuming clear water conditions. The presence of a well armored bed in the vicinity of the project supports this approach.

Local scour at piers has been determined using the highest velocity in the channel as a conservative approach. The scour at each pier will be reflected in the final submittal of this report. Although there is cobble slope protection on each abutment, we have determined the magnitude of the local scour at the toe of the slope. The existing cobble mat must be upgraded to meet the requirements of the scour preventive measures presented in this report.

It is important to consider the elevation of the hydraulic gradient in the upstream section of the river during the 100 year and 500 year event. An elevation of approximately 1209.0 and 1210.0 for the 100 and 500 year events, using the existing topography, indicates that flows through the bridge will not reach the values shown in the HEC-RAS output since the surrounding ground elevation in that area of the reach is lower than the hydraulic profile elevation. Flooding of the area adjacent to the upstream section of the South River is likely to occur under the aforementioned flows.

F-SCOUR PREVENTION AND REMEDIAL MEASURES.

The scour prevention and remedial measures presented in this Preliminary Drainage Report are subject to modifications upon final design of the structure.

Evaluation of each of the two HEC-RAS models, using the two sets of topographic data, indicate that the flow allowed into the South River, during an event of equal or higher intensity than the 100 year recurrence results in scour producing velocities and depths. ??

Several options of scour prevention and remedial measures are presented in this section. New scour calculations may be necessary depending on the selected option.

SCOUR PREVENTION
Existing Structure:

Option 1: Re-design the earth dam to divert a smaller flow to the South River during an extreme event. New scour calculations and remedial measures may be required depending on flow limitation.

Option 2: Seal invert.

A: Provide a riprap mat across and to the full length of the existing structure. (In accordance wit HE'S 18 and 20 guidelines).
HEC 18 & 20

B: Provide a concrete slab extending beyond the scour susceptible area. This option may always be required within the vehicular pathway since a riprap or gabion mat alone will not support the heavy truck traffic.

C: Provide a gabion mat across and to the full length of the existing structure. This option will require consideration to the drag and rolling effect on cobbles produced by high velocities and flow depth.

New Structure:

Pier columns, pier caps and piles shall be designed considering the scour reflected in the calculations included in this report unless a new weir and flow diversion rate are

selected. In this case piers shall be designed according to the scour resulting from the selected diversion flow. Riprap protection to the abutments is required in the new structure unless a considerable slower flow rate, from a new weir, allows protection of the structural element to be included in the design.

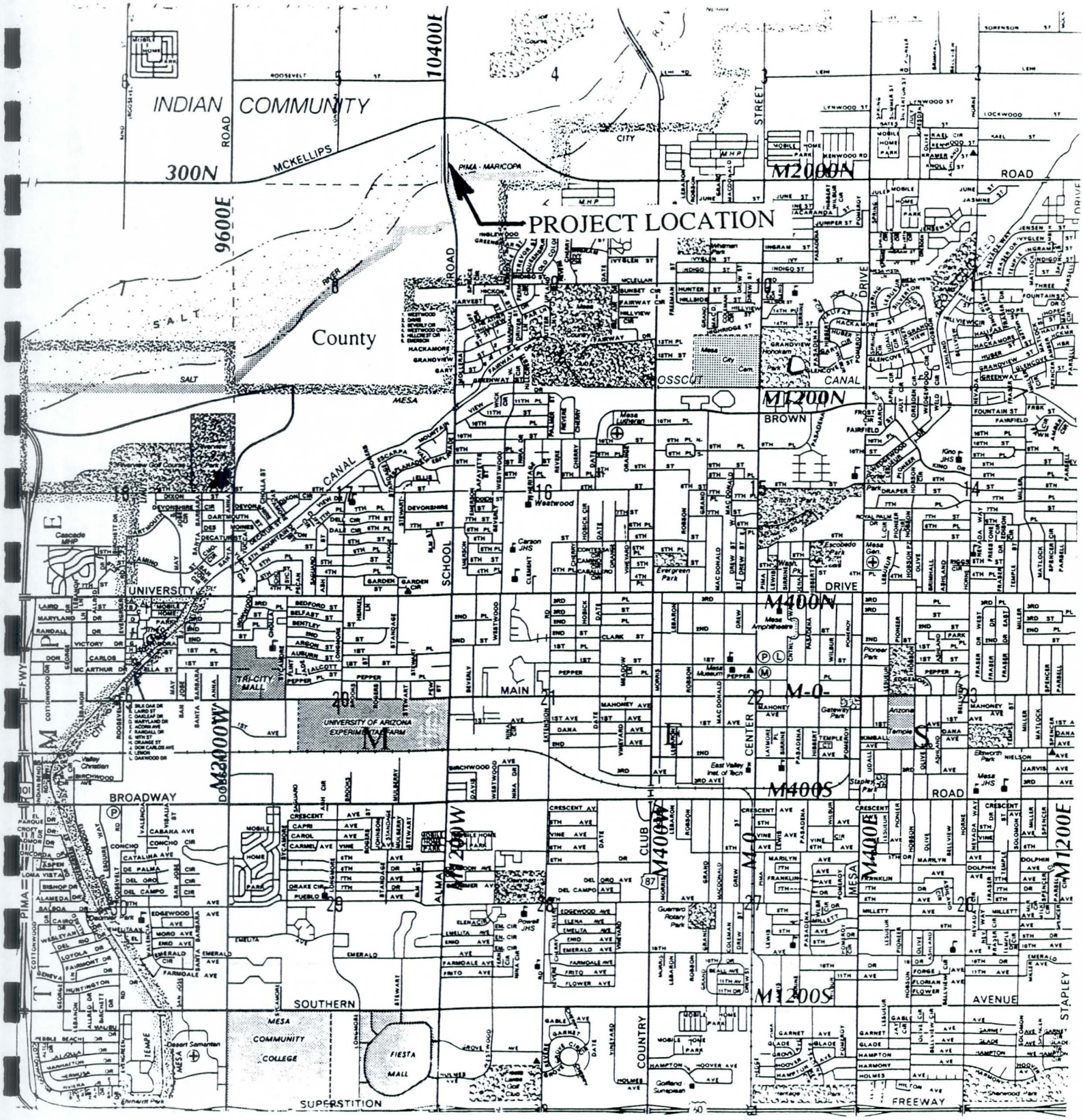
Indentations on the south bank downstream from the bridge are produced by the combined of high velocities and the sharp bend in that location. Rip rap protection should be provided in that area if restoration of the banks in the vicinity of the bridge is made a part of the scope of work in this project.

See rip rap design in Section 5-D.

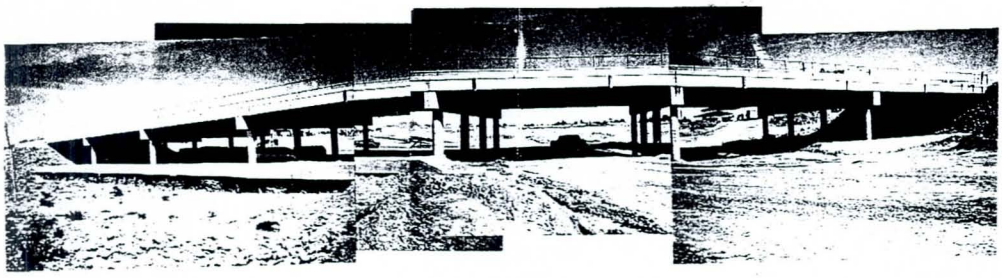
At the present time there are no empirical or theoretical formulas to determine the scour that the concrete cap on the gabion may produce. It is recommended to eliminate the concrete cap and cover the existing gabion across its full width with the rubble mat. Calculations of local scour at the downstream side of the grade structure are presented in Section 5. The local scour formula used may not accurately reflect the scour hole depth along the transverse gabion.

G-CONSTRUCTION COSTS
(To be included later)

4-GRAPHICS



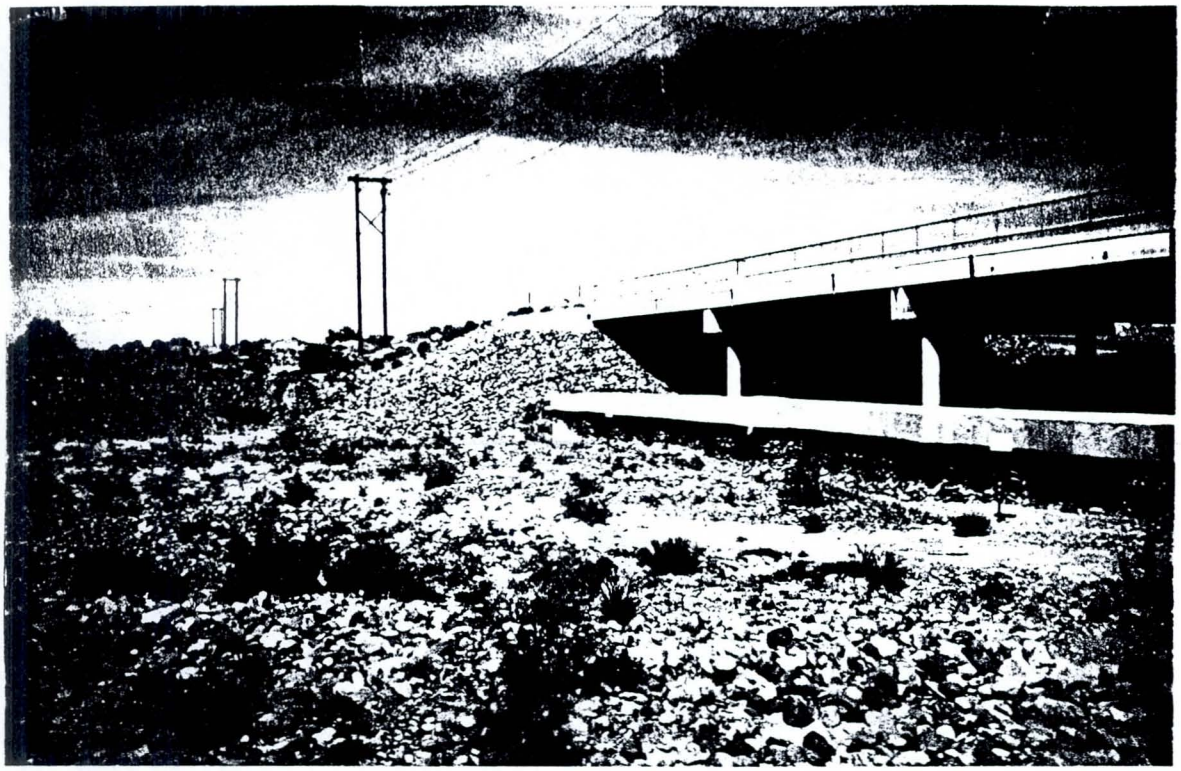
LOCATION MAP



ALMA SCHOOL RD. BRIDGE

OVER THE SALT RIVER

DOWNSTREAM SIDE



RIVER BED AND GRADE CONTROL STRUCTURE

DOWNSTREAM SIDE

ARMORED BED AND SAND STOCKPILE

DOWNSTREAM SIDE

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CHKD _____ DATE _____ SHT 1 OF 9

TITLE ALMA SCHOOL RD. SOUTH BRIDGE
– EXISTING TOPOGRAPHY –

SCOUR CALCULATIONS

CONTRACTION SCOUR

100 YR

– LAURSEN'S MODIFIED EQUATION – (LIVE BED)

$$y_2/y_1 = (Q_2/Q_1)^{0.857}(W_1/W_2)^{k_1}$$

$$y_3 = y_2 - y_1$$

WHERE:

y_1 = AVER. DEPTH UPSTREAM IN CHANNEL

y_2 = AVER. DEPTH IN BRIDGE SECTION

$Q_1 = Q_2$ IN THIS BRIDGE

W_1 = BOTTOM WIDTH IN MAIN CHANNEL (UPSTREAM)

W_2 = BOTTOM WIDTH IN CONTRACTED SECTION

k_1 = exponent in table below:

V_*/ω	k_1	Mode of Bed Material Transport
<0.5	0.59	mostly contact bed material discharge
0.5 to 2.0	0.64	some suspended bed material discharge
>2.0	0.69	mostly suspended bed material discharge

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TITLE ALMA SCHOOL ROAD - SOUTH BRIDGE
- EXISTING TOPOGRAPHY -

CONTRACTION SCOUR (100 YR)

$y_2/y_1 = (350.0/345)^{0.64} = 1.01$

$y_2 = 1.01 \times 13.23 = 13.36'$

→ $y_{s_{100}} = 13.36' - 13.23 = 0.13'$

500 YR

$y_2/y_1 = (350.0/345.0)^{0.64} = 1.01$

$y_2 = 1.01 \times 26.86 = 27.13'$

$y_s = 27.13 - 26.86 = 0.27'$

- SEE CLEAR WATER SCOUR CALCS ON SHT. 3

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TITLE ALMA SCHOOL RD - SOUTH BRIDGE
-EXISTING TOPOGRAPHY-

CLEAR WATER SCOUR CALCS.

- IT IS POSSIBLE TO HAVE CLEAR WATER SCOUR IN THIS STREAM IF A LARGE EVENT FOLLOWS AN EVENT OF A LESSER MAGNITUDE THAT HAD WASHED AWAY THE BED FINE MTL. —

100 YR

$$y_2 = \left(72500^2 / \left(120(D_m)^{0.66} \times 345^2\right)\right)^{0.429} = 39.33'$$

100YR FLOW

OPENING WIDTH

$D_m = D_{50} \times 1.23 = 5.63mm = 0.018'$
($D_{50} = 4.5mm$)
SEE SECTION 5E

$$y_s = 39.13 - 13.23 = 26.10'$$

(y_2, y_1)

500 YR

(FOR 500 YR (PARTIAL PRESS. FLOW) WE USE Q_{500} IN BRIDGE = 123,250 CFS)

$$y_2 = \left(98,370^2 / \left(120(0.018)^{0.66} \times (345^2)\right)\right)^{0.429} = 51.10'$$

$$y_s = 51.10 - 26.86 = 24.25'$$

- SEE LOCAL SCOUR CALCS. ON SHT. 4 -

$Q = (0.02831685) \times 72500 = 205.3\ m^3/s$

$D_m = 5.63mm = 0.00563\ m$

$W = 345\ ft \times 0.3048 = 105.16$

$$y_2 = \left[\frac{(0.025 \times 205.3^2)}{0.00563^{0.67} \times 105.16^2}\right]^{0.429} = 11.6\ m = 38.2\ ft$$

$y_s = y_2 - y_0 = 38.2 - 13.2 =$

* Check Q = main channel flow only
* Check if clear water case

$V_c = 6.19\, y^{1/6} D_{50}^{1/3}$ $y = 4.02m$ $D_{50} = 0.00563 \Rightarrow V_c = 1.41\ m/s$ $V = 17.3ft$ (5.2m)
$V > V_c \Rightarrow$ Live bed scour, not clear water

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TITLE ALMA SCHOOL ROAD - SOUTH BRIDGE
- EXISTING TOPOGRAPHY -

SCOUR CALCULATIONS

LOCAL SCOUR

PIER SCOUR

CSU Equation (Richard's)

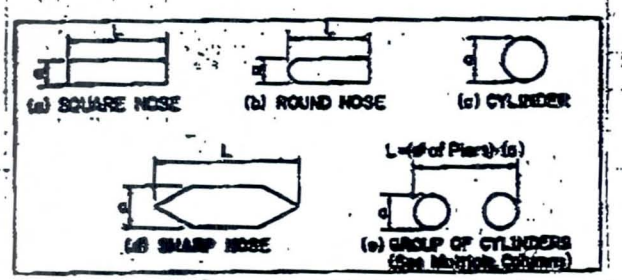
$$y_s/y_1 = 2.0 K_1 K_2 K_3 \left(\frac{a}{y_1}\right)^{0.65} Fr_1^{0.43}$$

WHERE: y_s = SCOUR DEPTH
y_1 = DEPTH OF FLOW UPSTREAM OF PIER
a = PIER WIDTH
Fr_1 = Froude No.
K_1, K_2, K_3 CORRECTIONS ACCORDING TO TABLE BELOW:

100 yr event

Q_{100} = 72500 cfs

Correction Factor, K_1, for Pier Type		Correction Factor, K_2, for Angle of Attack of Flow			
Types of Pier	K_1	Angle	L/a = 4	L/a = 8	L/a = 12
(a) Square nose	1.1	0	1.0	1.0	1.0
(b) Round nose	1.0	15	1.5	2.0	2.5
(c) Circular cylinder	1.0	30	2.0	2.75	3.5
(d) Sharp nose	0.9	45	2.3	3.3	4.3
(e) Group of cylinders	1.0	90	2.5	3.9	5.0
		Angle = skew angle of flow L = length of pier			



COMMON PIER SHAPES

Bed Condition	Dune Height H ft	K_3
Large Dunes	H > 30	1.3
Medium Dunes	30 > H > 10	1.1 to 1.2
Small Dunes	10 > H > 2	1.1
Plane bed and antidune flow	NA	1.1
Clear-water Scour	NA	1.1

PERCENT INCREASE (K_3) IN EQUILIBRIUM PIER SCOUR DEPTHS FOR BED CONDITION

FOR Q_{100} = 72500 y_1 = 13.23* $Fr_1 = \frac{V_1}{(gy_1)^{0.5}} = \frac{17.34(1.2)}{(32.2 \times 17.19)^{0.5}}$ (AVG. P. FACTOR)

$Fr_1 = 0.88$

$$y_s/y_1 = 2.0(1.0)(1.0)(1.1)\left(\frac{2.5}{17.2}\right)^{0.65}(0.88)^{0.43} = 0.61$$

→ y_s = 17.30 × 0.61 = 10.49 FT.

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TITLE ALMA SCHOOL RD. - SOUTH BRIDGE -
- EXISTING TOPOGRAPHY -

SCOUR CALCULATIONS

PIER SCOUR

500 YR PRESSURE FLOW.

$y_1 = 17.5'$ $A = 17.5 \times 369 = 6457.5\ ft^2$

$V_{aver} = 98{,}376 / 6458 = 15.23\ fps$ (98,376 ← FLOW IN BRIDGE)

$15.23 \times 1.2 = 18.3\ fps$ (1.2 ← P. FACTOR)

$Fr_1 = 18.3 / (32.2 \times 17.5)^{.5} = 0.77$

$y_s / y_1 = 2.0(1.0)(1.0)(1.1)\left(\frac{2.5}{17.5}\right)^{.65}(0.77)^{.43} = 0.55$

$y_s = 17.5 \times 0.55 = 9.63'$

PRESSURE FLOW CORRECTED PIER SCOUR

NOTE: AT HG REQUIRED ON 500 YR (AT BRIDGE ENTRANCE) ACTUAL WS UNKNOWN SINCE FLOW EXTENDS OUTSIDE 100 YR FLOODPLAIN - BRIDGE LOW MEMBER EL. TAKEN FOR y_1 = E.H - CHAN BOTTOM.

- FOR PRESSURE FLOW A MULTIPLIER OF 1.6 IS APPROPIATE ACCORDING TO P10-14 SECT. VIII OF FHWA PUBLICATION No HI-91-011

- SINCE THE SCOUR CALCULATED IS FOR EXISTING TOPOGRAPHY, IT IS PRUDENT TO APPLY THE "PRESURE FLOW FACTOR". THEN:

→ $y_{s(500\ PRESSURE)} = 9.63 \times 1.6 = \underline{15.41'}$

→ SCOUR HOLE WIDTH = 15.41 × 2.8 = 43.1' (ALL AROUND PIER

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TITLE ALMA SCHOOL RD. — SOUTH BRIDGE
— EXISTING TOPOGRAPHY —

SCOUR CALCULATIONS

ABUTMENT SCOUR

100 YR. $Q = 72{,}500$ cfs

$$y_s/y_a = 2.27\left(K_1 K_2 \left(\frac{a'}{y_a}\right)\right) F_r^{0.61} + 1$$

WHERE:

K_1, K_2 (COEFFICIENTS) = SEE TABLE BELOW.

a' = LENGTH OF ABUTMENT PROJECTED 90° TO FLOW.

y_a = average depth of flow in floodplain.

F_{r_1} = Froude No. = 0.93 $K_1 = 0.55$ $K_2 = (12/90)^{.13} = 0.77$
Σ cons. value

Then: $y_s/y_a = 2.27(0.55)(0.77)\left(\frac{17}{10.83}\right)^{.43}(0.93)^{.61} + 1 = 2.12$

$y_{s_{100}} = 10.83 \times 2.12 = \underline{22.96'}$

WIDTH = $y_s \times \cot\theta = 22.96 \times 1.73 = \underline{39.72'}$

→ SEE 500 CALCS. NEXT SHT.

Description	K_1
Vertical Abutment	1.0
Vertical Abutment with Wing Walls	0.82
Spill-Through Abutment	0.55

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TITLE ALMA SCHOOL ROAD - SOUTH BRIDGE
- EXISTING TOPOGRAPHY -

SCOUR CALCULATIONS

ABUTMENT SCOUR

500 YR. $Q = 98{,}376$ CFS (IN BRIDGE) $F_r = 0.64$

$y_a = 12.5$ (TO LOWEST EL. IN CHANNEL) $V = 15.23$ FPS (CONTRACTION VEL. OVER IN CHANNEL)

then: $y_s/y_a = 2.27\left(K_1 K_2 \left(\frac{a'}{y_a}\right) F_r^{0.61}\right) + 1$

$= 2.27\left((0.55)(0.77)\left(17/17.5\right)^{.43}(0.64)^{.61}\right) + 1 = 1.72$

→ $y_{s_{500}} = 1.72 \times 17.5 = \underline{\underline{30.15'}}$

WIDTH $= 30.15 \times 1.73 = \underline{\underline{52.16'}}$

- SEE REMEDIAL MEASURES NEXT SHT. -

TOTAL SCOUR CALCULATIONS

		CONTRACTION		LOCAL		TOTAL	
		500 YR	100 YR	500 YR	100 YR	500 YR	100 YR
LIVE BED	PIER	0.27'	0.13'	15.41'	10.49'	15.68'	10.6
	ABUTMENT	0.27	0.13	30.15'	22.96'	30.42'	23.0
CLEAR WATER	PIER	24.25	26.10	15.41	10.49'	39.66'	36.5
	ABUTMENT	24.25	26.10	30.15'	22.96'	54.4	49.1

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CALC JAL DATE 5-16-97 JOB 9632
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TITLE ALMA SCHOOL RD.– SOUTH BRIDGE
– EXISTING TOPOGRAPHY –

– REMEDIAL MEASURES –
EXISTING STRUCTURE

– BY FHWA-HEC20.
RIPRAP AROUND EXIST. PIERS
– THIS APPROACH REQUIRES REGULAR INSPECTIONS –

STONE SIZE

$$D_{50} = 0.69(KV)^2/(s-1)(2g)$$

WHERE = K = COEFF. FOR PIER SHAPE. = 1.5 ROUND
V = VELOCITY ON PIER. S = SPECIFIC GRAVITY OF STONE = (USE 2.65)
V = 1.2 $V_{MAX.}$ 500 yr. = 18.3 FPS.

THEN $D_{50} = 0.69(1.5 \times 18.3)^2/(2.65-1)(64.4) = 4.89'$ FT.

– SINCE $D_{50} = 4.89'$ IS UNFEASIBLE AND UNREALISTIC A RIP-RAP MAT OF THE LARGEST FEASIBLE AND WORKABLE SIZE SHOULD BE PROVIDED – INSPECTION DURING EXTREME EVENTS IS REQUIRED.

– PIERS ON NEW BRIDGE SHOULD BE DESIGNED ACCORDING TO THE SCOUR VALUES PRESENTED IN THIS REPORT. (NO RIP RAP ON NEW PIERS)

DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

CALC JAL DATE 5-16-95 JOB 9632
CHKD _____ DATE _____ SHT 9 OF 9

TITLE ALMA SCHOOL ROAD SOUTH BRIDGE
-EXISTING TOPOGRAPHY-

-REMEDIAL MEASURES-
RIP RAP AT ABUTMENTS
(HIGH FROUDE No.)

500 YR

$$D_{50}/y = K/(S_s - 1) \times \left(\frac{V^2}{gy}\right)^{0.14}$$

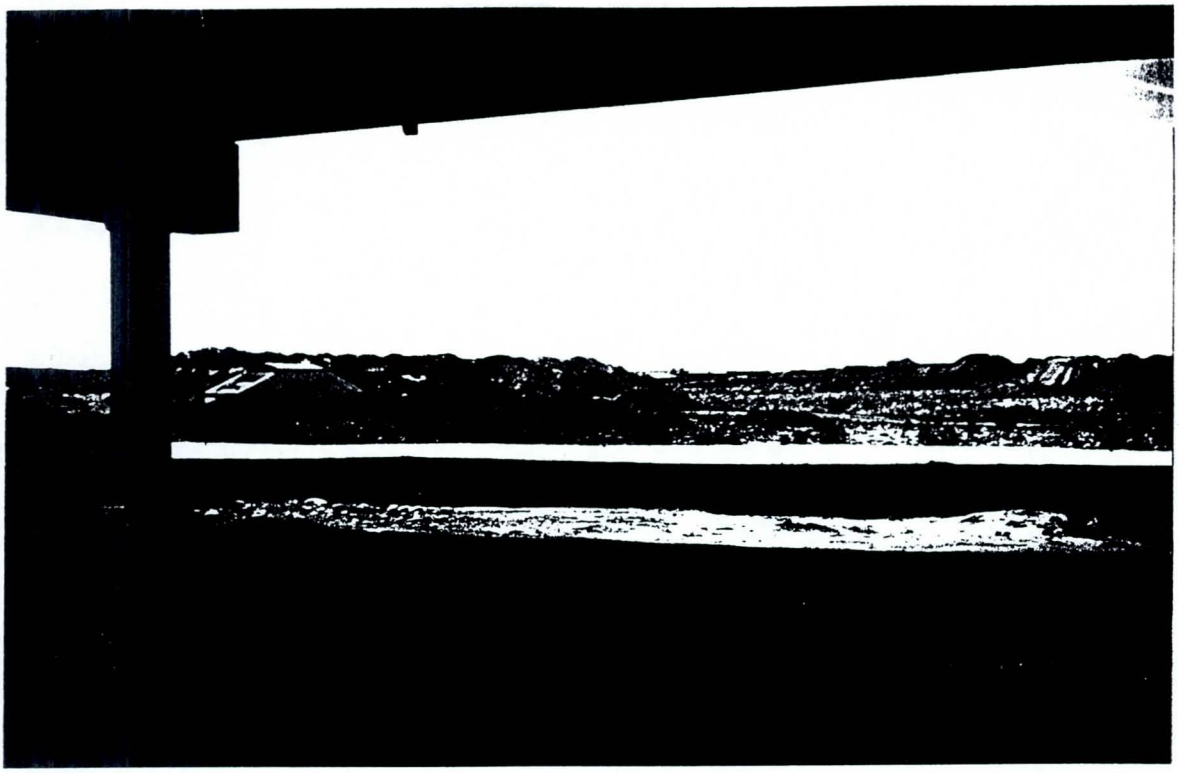
$V = 18.3/1.2 = 15.23$ $K = 0.61$ $y = 17.5'$

THEN $D_{50}/y = (0.69/1.65)\left(\frac{15.23^2}{32.2 \times 17.5}\right)^{.14} = 0.37$

$D_{50_{500}} = 17.5 \times .37 = \underline{6.48'}$

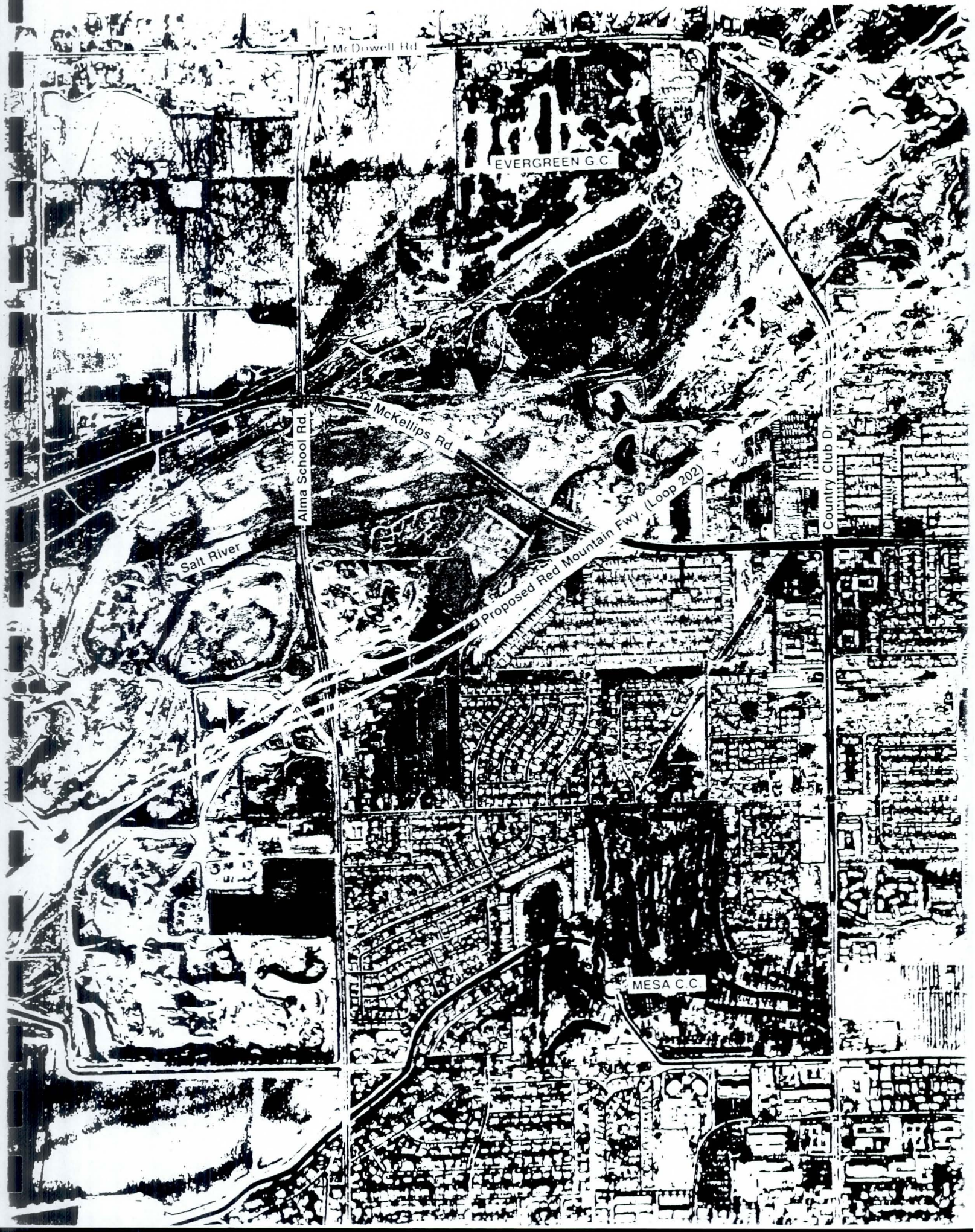
-STONE SIZE TOO LARGE - RIP RAP MAT ACCROSS AND TO THE FULL LENGTH OF BRIDGE RECOMMENDED. FOR EXIST. BRIDGE.

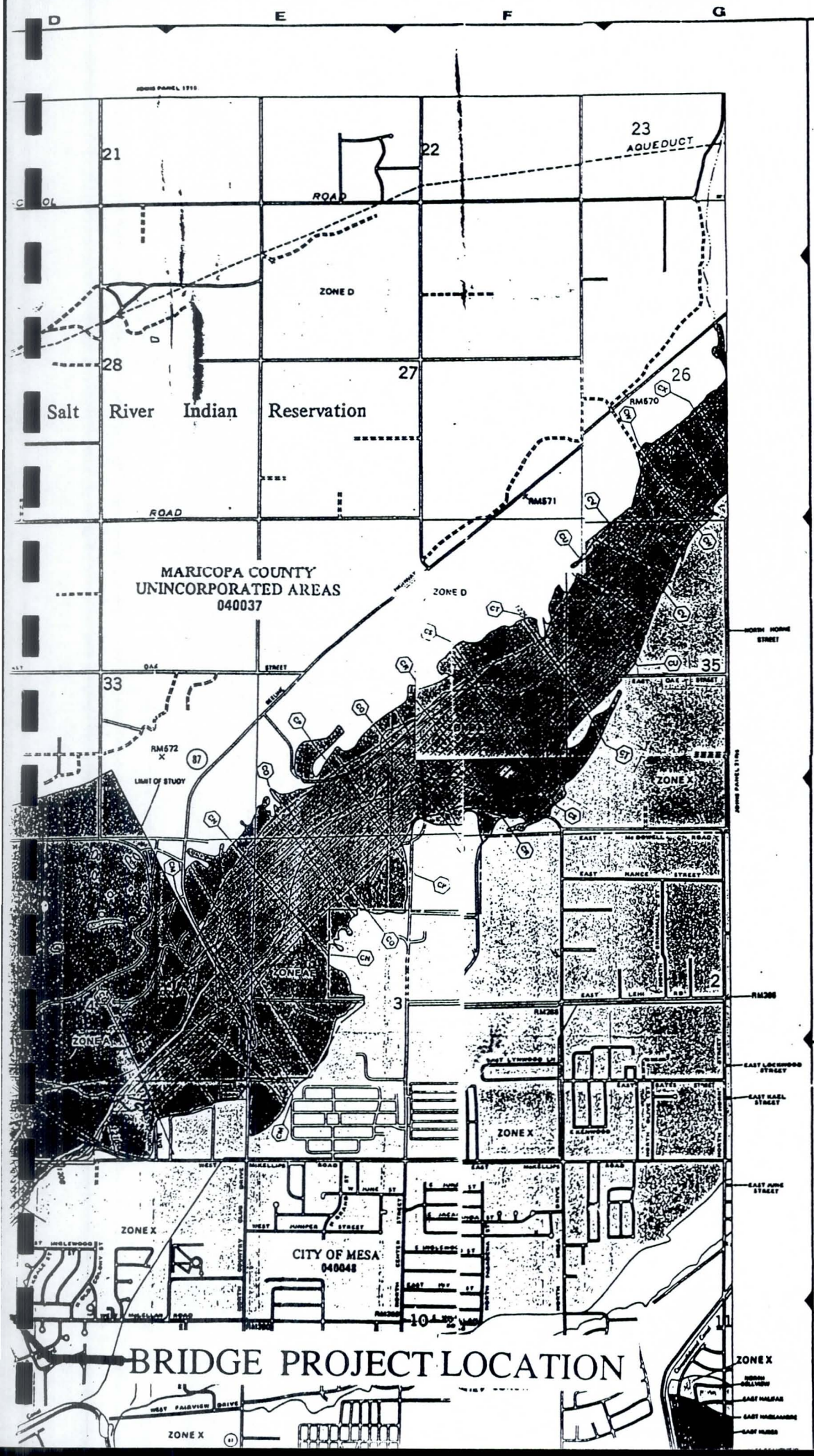
-DESIGN OF ABUTMENT FOR EXPECTED SCOUR MAY NOT BE PRACTICAL. IN SUCH CASE PROPOSED RIPRAP MAT SHOULD EXTEND TO NEW BRIDGE.



SAND STOCKPILES DOWNSTREAM SIDE

SAND STOCKPILES UPSTREAM SIDE


McDowell Rd.
EVERGREEN G.C.
McKellips Rd.
Alma School Rd.
Salt River
Proposed Red Mountain Fwy. (Loop 202)
Country Club Dr.
MESA C.C.



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

- **ZONE A** No base flood elevations determined.
- **ZONE AE** Base flood elevations determined.
- **ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
- **ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- **ZONE AR** To be protected from 100-year flood by Federal flood protection system under construction; no base elevations determined.
- **ZONE V** Coastal flood with velocity hazard (wave action); no base flood elevations determined.
- **ZONE VE** Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

- **ZONE X** Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

- **ZONE X** Areas determined to be outside 500-year flood plain.
- **ZONE D** Areas in which flood hazards are undetermined.

Flood Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.

513 — Base Flood Elevation Line; Elevation in Feet*

D — D — Cross Section Line

(EL 987) — Base Flood Elevation in Feet Where Uniform Within Zone*

RM7X — Elevation Reference Mark

*Referenced to the National Geodetic Vertical Datum of 1929

NOTES

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features outside Special Flood Hazard Areas.

Areas of special flood hazard (100-year flood) include Zones A, A1-30, AE, AH, AO, AR, V, V1-30 AND VE.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

Coastal base flood elevations apply only landward of the shoreline.

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of the map.

For community map revision history prior to countywide mapping, see Section 5.0 of the Flood Insurance Study Report.

For adjoining map panels, see separately printed Map Index.

MAP REPOSITORY

Refer to Repository Listing on Index Map

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP

APRIL 15, 1980

EFFECTIVE DATE (S) OF REVISION (S) TO THIS PANEL

Map revised September 4, 1981 to update corporate boundaries, to change base flood elevations, to add base flood elevations, to add special flood hazard areas, to change special flood hazard areas, to change zone designations, to update map format, to add roads and road names and to incorporate previously issued letter of map revision.

To determine if flood insurance is available, contact an insurance agent or call the National Flood Insurance Program at (800) 638-6620.

APPROXIMATE SCALE IN FEET

1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

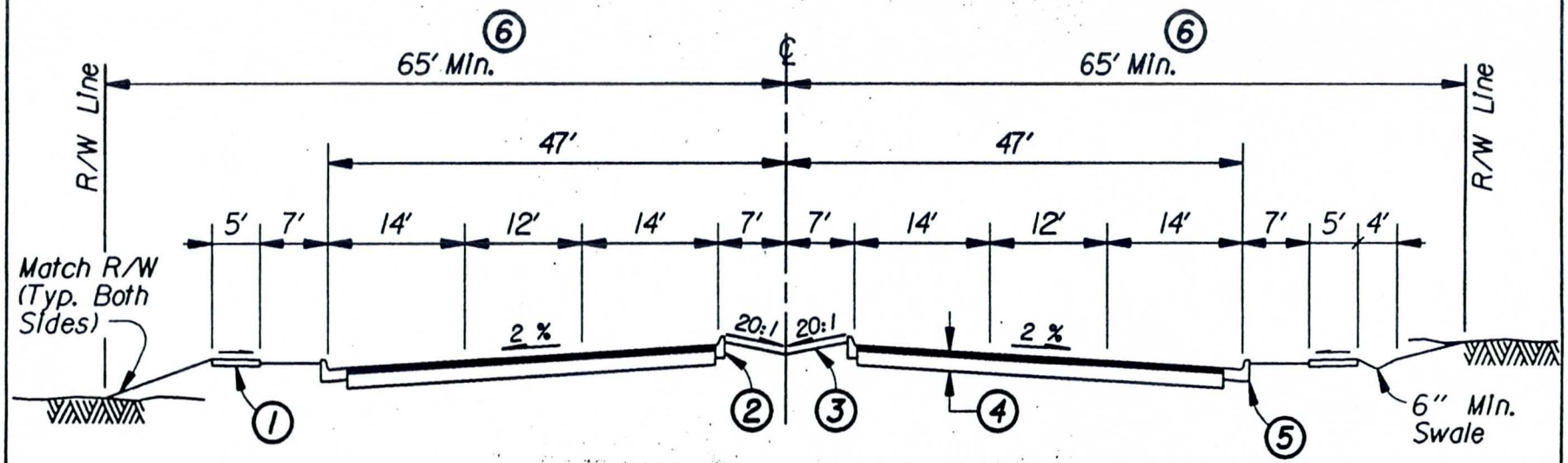
PANEL 2180 OF 4350

CONTAINS

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY, UNINCORPORATED AREAS	040037	2180	E
MESA, CITY OF	040048	2180	E

MAP NUMBER

04013C2180E

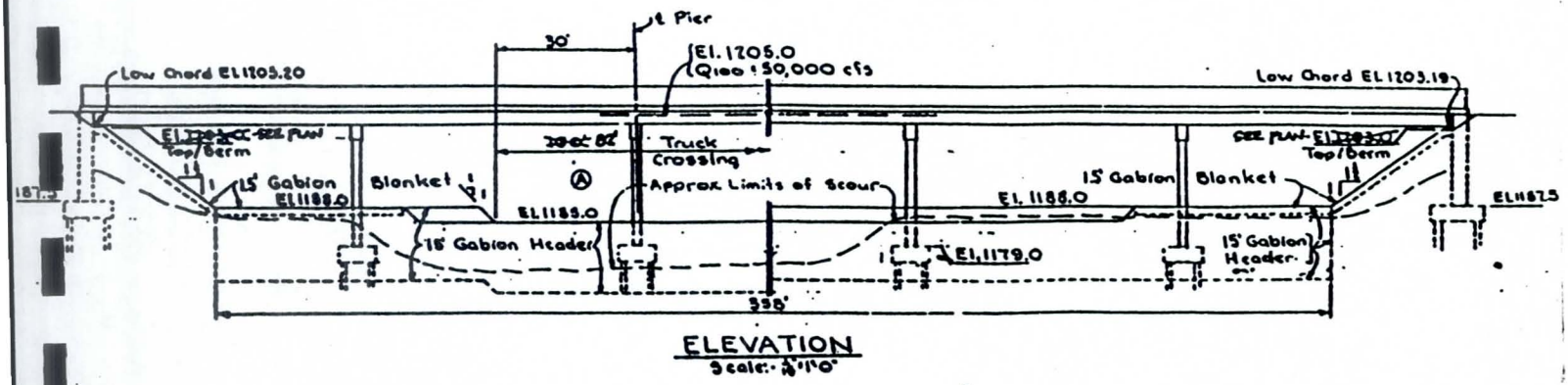


N.T.S.

1. Designer Shall Offset S/W Except at Street Intersections (Typ. Both Sides).
2. MCDOT Std. Detail 2030, Single Curb (Typ. Both Sides).
3. Under Certain Conditions, the Construction of Median Curb may be Waived by the Department.
4. 4" Min. A.C. Over 10" Min. A.B. or Approved Equivalent.
5. MAG Std. Detail 220, Type A or MCDOT Std. Detail 2030, Curb & Gutter (Typ. Both Sides).
6. Road of Regional Significance Alignment - 70' Typical Half-Width Min.

NOTE: Cross Section may be Flared at Intersections to Provide Dual Left Turn Lanes and/or Right Turn Lanes.

Maricopa Co. Dept. of Transportation Standard Typical Section	URBAN PRINCIPAL ARTERIAL ROAD	FIG. 5.6



EXISTING BRIDGE
AS BUILT-PROFILE AND
DETECTED SCOUR-

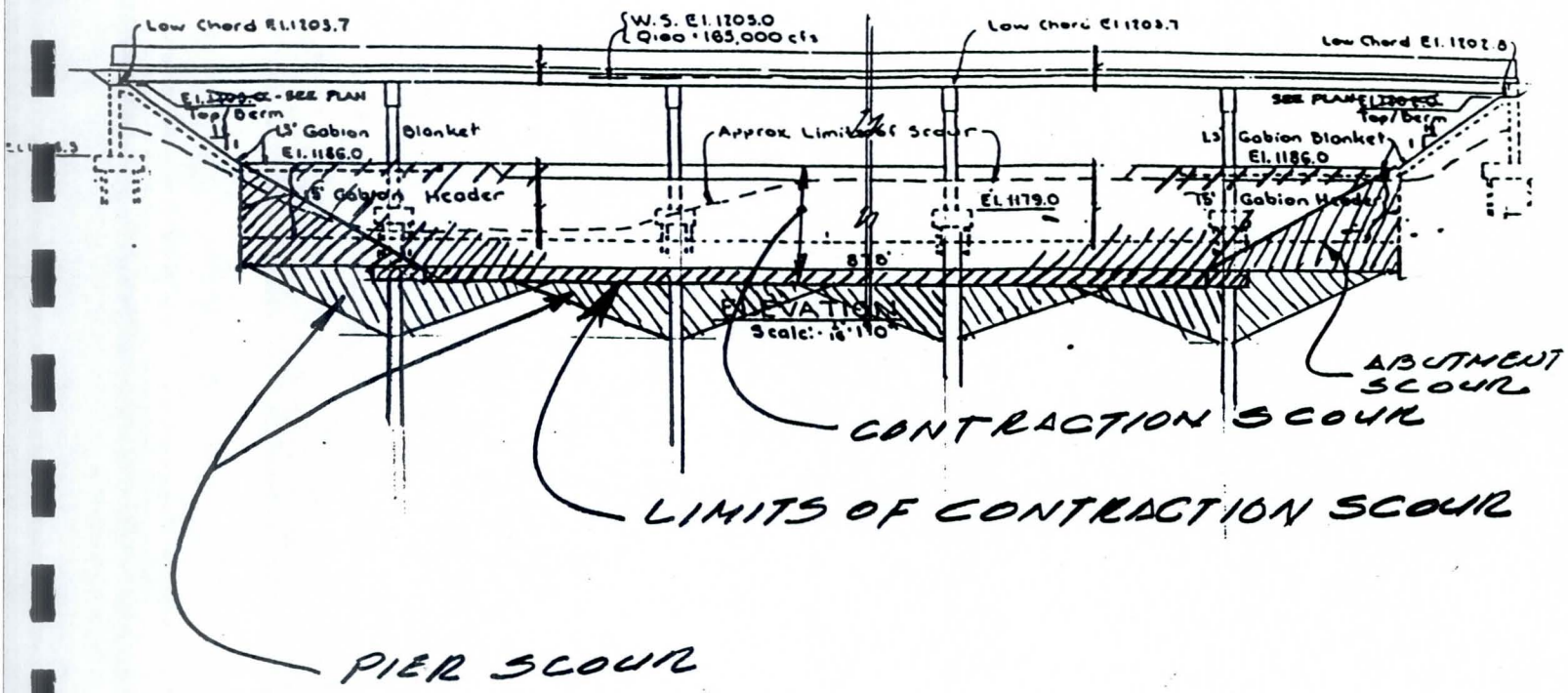
TABLE I

SUMMARY OF SCOUR

	CONTRACTION	PIER	TOTAL AT PIER	ABUTMENT	TOTAL AT ABUTMENT
USING CROSS SECTION FROM WOOD-PATEL REPORT					
100 YEAR	23.75 **(1161.25)**	11.33	35.08 **(1149.92)**	22.45	46.20 **(1141.60)**
500 YEAR*	15.72 **(1169.28)**	10.87	36.59 **(1148.41)**	33.18	48.90 **(1138. 90)**
USING CROSS SECTION FROM RECENT SURVEY BY DIBBLE AND ASSOCIATES.					
100 YEAR*	26.10 **(1158.9)**	10.49	36.59 **(1148.40)**	22.96	49.06 **(1135.94)**
500 YEAR*	24.25 **(1160.75)**	15.41	39.66 **(1145.34)**	30.15	54.40 **(1130.60)**

*PRESSURE FLOW--- INACCURATE RESULTS.

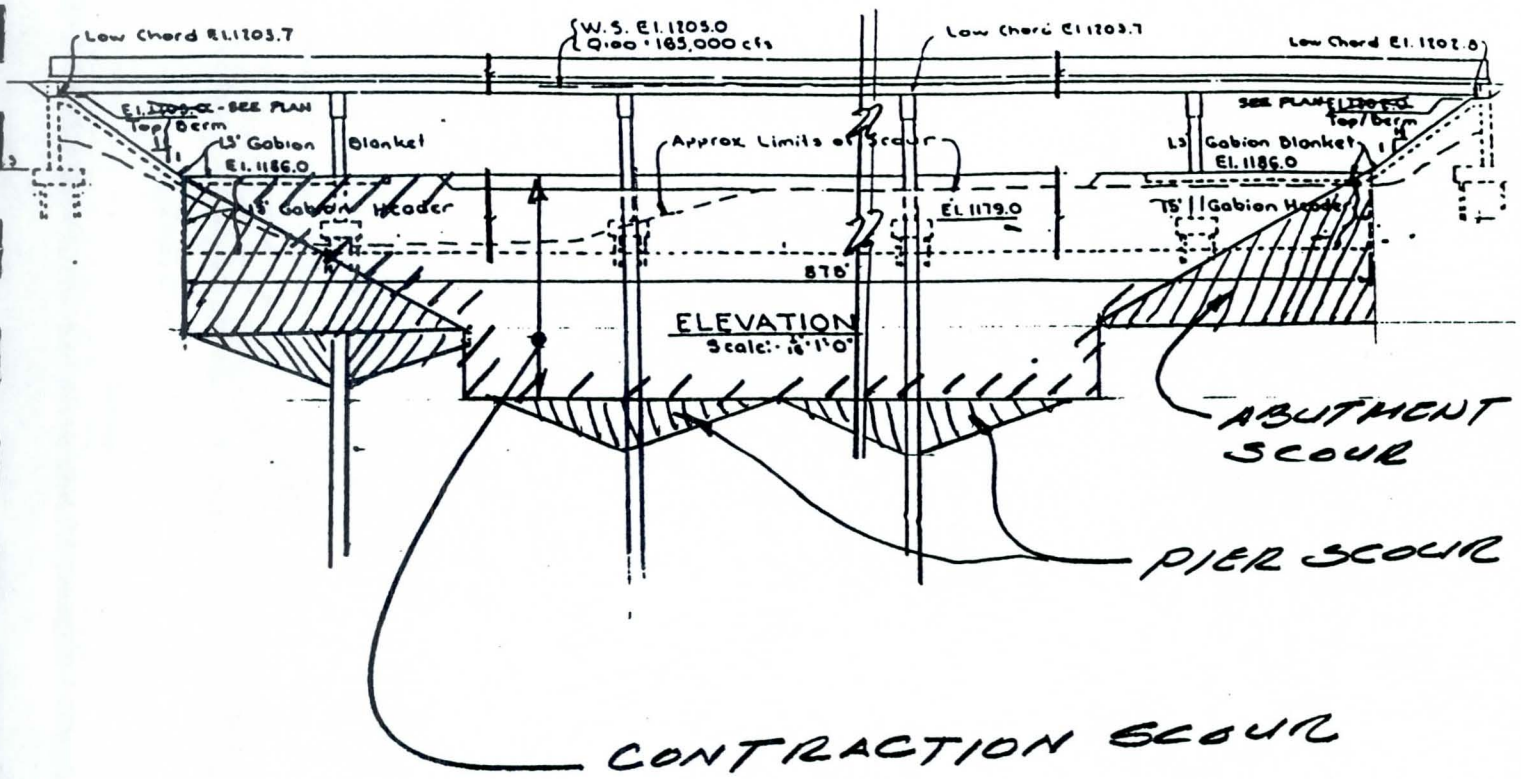
Number in parenthesis indicates elevation of scour.



100 YR. SCOUR PROFILE

(CLEAR WATER)

(LOMR TOPO)



500 YR. - SCOUR PROFILE

(CLEAR WATER)

(LOMR TOPO)

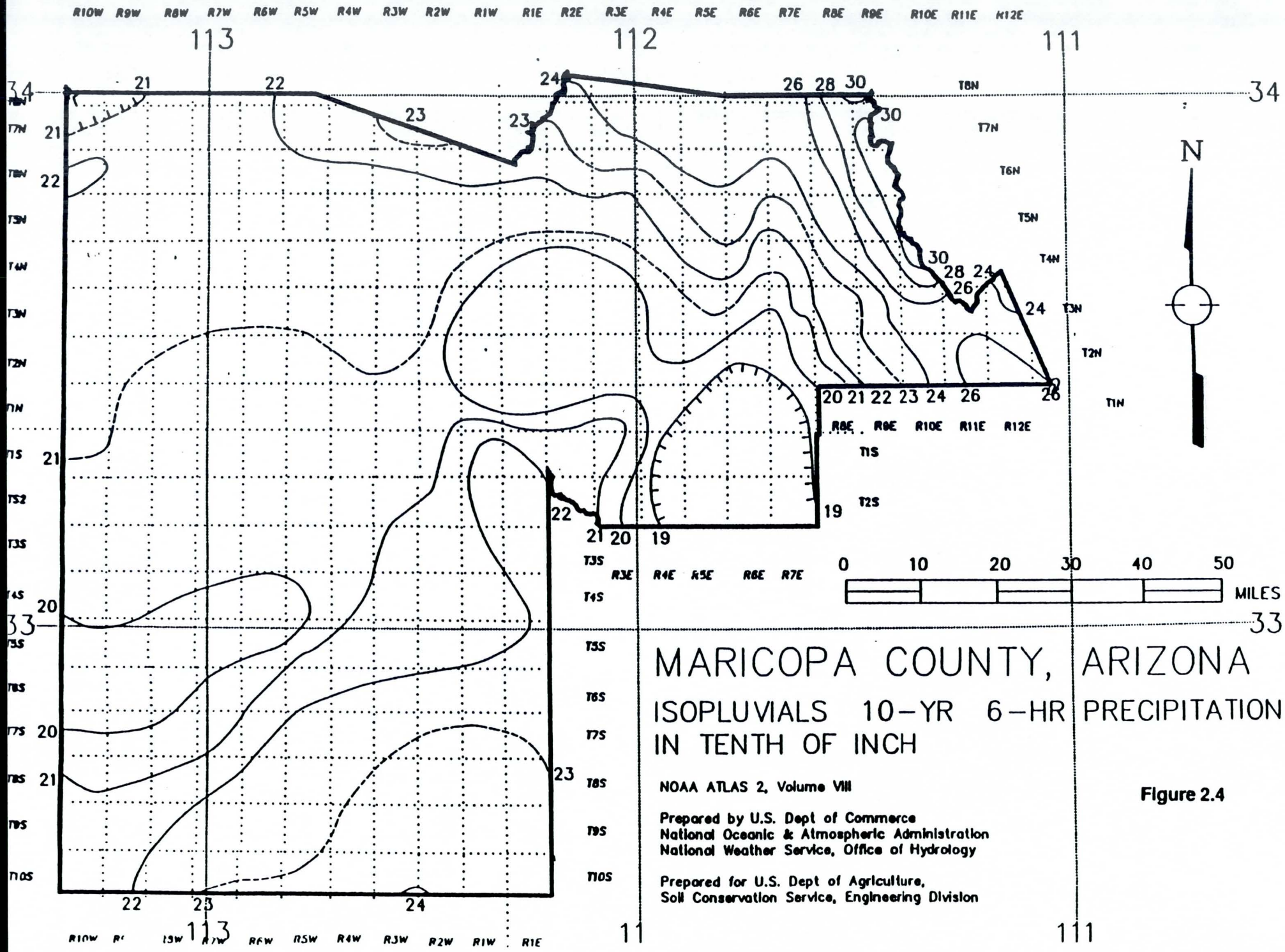
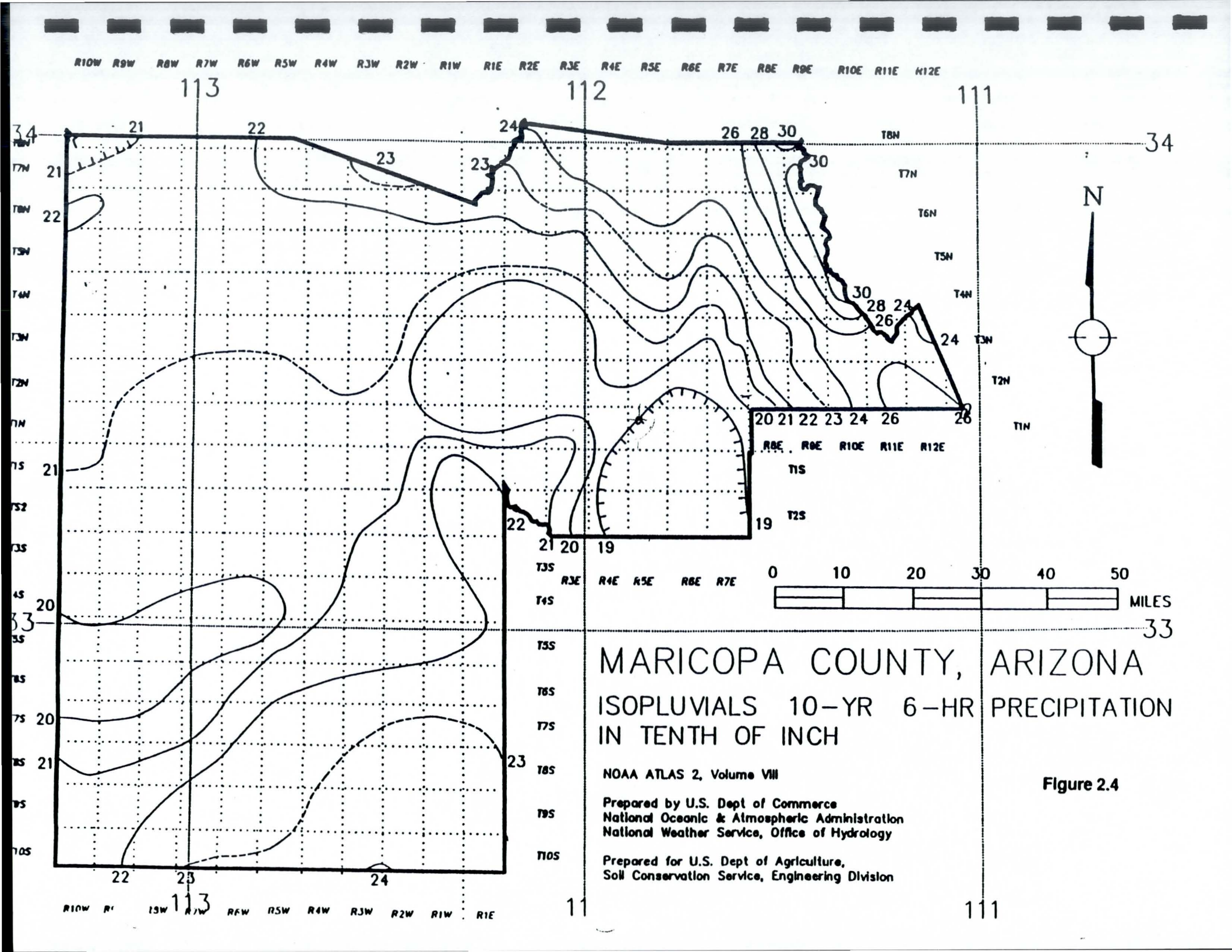

MARICOPA COUNTY, ARIZONA
ISOPLUVIALS 10-YR 6-HR PRECIPITATION
IN TENTH OF INCH
NOAA ATLAS 2, Volume VIII
Prepared by U.S. Dept of Commerce
National Oceanic & Atmospheric Administration
National Weather Service, Office of Hydrology
Prepared for U.S. Dept of Agriculture,
Soil Conservation Service, Engineering Division
N
0 10 20 30 40 50
MILES
113
112
111
34
33

Figure 2.4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Soil Conservation Service, Engineering Division
N
0 10 20 30 40 50
MILES
113
112
111
34
33

Figure 2.4

5-SUPPORTING DOCUMENTATION

ADOT - HIGHWAY DRAINAGE DESIGN MANUAL - HYDROLOGY
RAINFALL DEPTH-DURATION-FREQUENCY (D-D-F) WORKSHEET

Project No. 9632 TRACS N N/A
Project: Alma School Road Bridge Date: 14-Apr-97
Location/Sta:CITY OF PHOENIX, AZ.
Designer: Brian Fry Checker:

PART A

Rainfall Depths from Isopluvials:

2-year, 6-hour =	1.16 in.
2-year, 24-hour =	1.60 in.
100-year, 6-hour =	3.10 in.
100-year, 24-hour=	3.90 in.

PART B

2-year, 1-hour =	0.78 in.
100-year, 1-hour =	2.35 in.
2-year, 2-hour =	0.91 in.
2-year, 3-hour =	1.00 in.
2-year, 12-hour =	1.38 in.
100-year, 2-hour =	2.61 in.
100-year, 3-hour =	2.78 in.
100-year, 12-hour=	3.50 in.

PART C

Zone = 8 (6 or 8)

2-year, 5-min =	0.27 in.
2-year, 10-min =	0.40 in.
2-year, 15-min =	0.48 in.
2-year, 30-min =	0.64 in.
100-year, 5-min =	0.71 in.
100-year, 10-min =	1.08 in.
100-year, 15-min =	1.39 in.
100-year, 30-min =	1.88 in.

Duration (Min)	Ratio 2-yr	Ratio 100-yr
5	0.34	0.30
10	0.51	0.46
15	0.62	0.59
30	0.82	0.80

PART D & E

	Rainfall Depth, (in) Frequency (yrs)					
Duration	2-yr	5-yr	10-yr	25-yr	50-yr	500-yr
5-min =	0.27	0.38	0.45	0.55	0.63	0.89
10-min =	0.40	0.57	0.68	0.84	0.96	1.36
15-min =	0.48	0.71	0.86	1.07	1.23	1.76
30-min =	0.64	0.96	1.16	1.45	1.67	2.39

1-hour	=	0.78	1.18	1.44	1.80	2.08	2.99
2-hour	=	0.91	1.34	1.62	2.01	2.31	3.30
3-hour	=	1.00	1.44	1.74	2.15	2.47	3.50
6-hour	=	1.16	1.64	1.97	2.41	2.76	3.89
12-hour	=	1.38	1.90	2.26	2.75	3.12	4.37
24-hour	=	1.60	2.16	2.54	3.08	3.49	4.85

DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

CALC _____ DATE 3-5-97 JOB _____
CHKD _____ DATE _____ SHT 1 OF 1

TITLE ALMA SCHOOL ROAD - BRIDGE OVER SALT RIVER
PRELIMINARY DRAINAGE CALCS.

① AREA 1/4 WIDENING = 204.75' x 42'/43560 = 0.1974 AC.

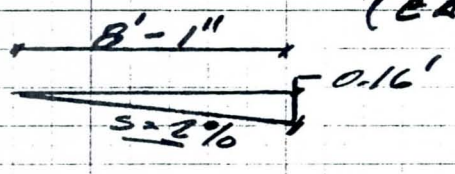
② C = 0.95

③ t_c = 10 m.

④ i = 4.5" (FROM FIG. 3.2 MC DRAINAGE DESIGN MANUAL)

⑤ Q = 0.1974 x 0.95 x 4.5 = 0.84 CFS (FOR 1/4 OF NEW BRIDGE WIDENING)

CONVEYANCE CAPACITY OF BIKE PATH (EAST SIDE)



A = 8.08 x 0.16/2 = 0.65 ft²

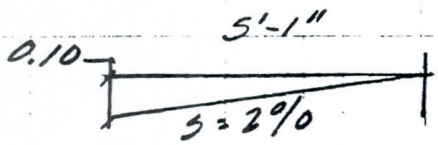
S = 0.3% (LONGITUDINAL)

WP = 8.16' R = 0.65/8.16 = 0.08

$V = \frac{1.49}{0.012} \times 0.08^{.67} \times 0.003^{.5} = 1.23$ fps

Q = 1.23 x 0.65 = 0.80 CFS ∴ BIKE PATH OK FOR PEAK RUNOFF FROM 1/4 OF BRIDGE EXPANSION

CONVEYANCE CAPACITY OF CATWALK (WEST SIDE)



A = 5.08 x 0.10 = 0.58 ft²

S = 0.3% (LONGITUDINAL)

WP = 5.10' R = 0.58/5.10 = 0.11

$V = \frac{1.49}{0.012} \times 0.11^{.67} \times 0.003^{.5} = 1.48$ fps

Q = 1.48 x 0.58 = 0.86 CFS
∴ CATWALK O.K. FOR CONVEYANCE

DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

CALC VAC DATE 4/18/97 JOB
CHKD DATE SHT 1 OF 2

TITLE

ALMA SCHOOL RD
-PRELIMINARY STORM SEWER DESIGN-

SOUTH SYSTEM

1- ROADWAY AREA = 246.88 TOTAL LENGTH
204.5 1/2 BRIDGE L.

2- ROAD AREA = 42.38 x 130 = 0.1265 AC
BRIDGE AREA 204.5 x 88 = 0.4130 AC
0.5395 AC

C = 0.95

3- Q_{10} = 0.5395 x 0.95 x 4.13* = 2.12 CFS

* = 4.5 (P^6_{10}) / 2.07

FROM FIG. 2.4 MCDR. MANUAL VOL I.

FROM FIG 3.2
MCDOT DR. MANUAL
NO. 1

SEE NORTH SECTION
ON NEXT SHT.

-ALMA SCHOOL RD.-
-PRELIMINARY STORM
-SEWER DESIGN-

NORTH SYSTEM.

1- ROADWAY AREA = 1360' x 130' = 4.059 Ac.
↑ TOTAL R/W WIDTH

2- BRIDGE AREA = 640 x 88' = 1.293 Ac.

3- CA BRIDGE = 1.293 x 0.95 = 1.293

CA ROAD = 4.059 x 0.95 = 3.856

TOTAL CA 5.149

- USE 15 MIN T_c*. i = 3.75" (FIG 3.2 MCDM Vol I)

$i = 3.75 \frac{(P_{10}^{6})}{2.07} = 3.75(1.9)/2.07 = 3.44''$

Q_{10} = 5.149 x 3.44 = 17.72 CFS
↑ TOTAL CA

4- 3" VOL. TO POLLUTION RETARDANT BASIN.

= AREA OF WIDENING = 2000 x 24/43560 = 1.10 Ac.

3" = 0.25' (TREATMENT RUNOFF)

VOL. = 1.10 x 43560 x 0.25 = 11,979 C.F.

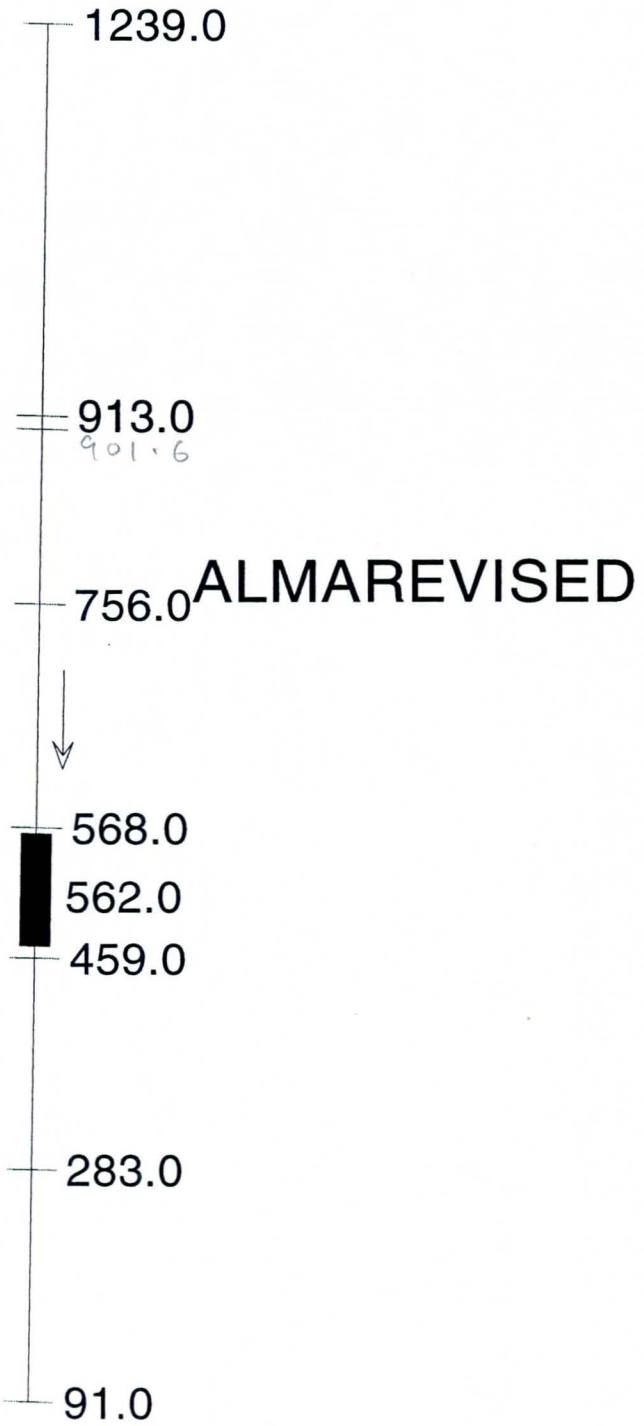
ASSUME 3" VOL. AT T = T_{PEAK} (CONSERVATIVE VALUE)

THEN V_{TOTAL} = 11,979 x (17.72 x 90) = 13574 C.F. OF DETENTION VOL. REQUIRED.

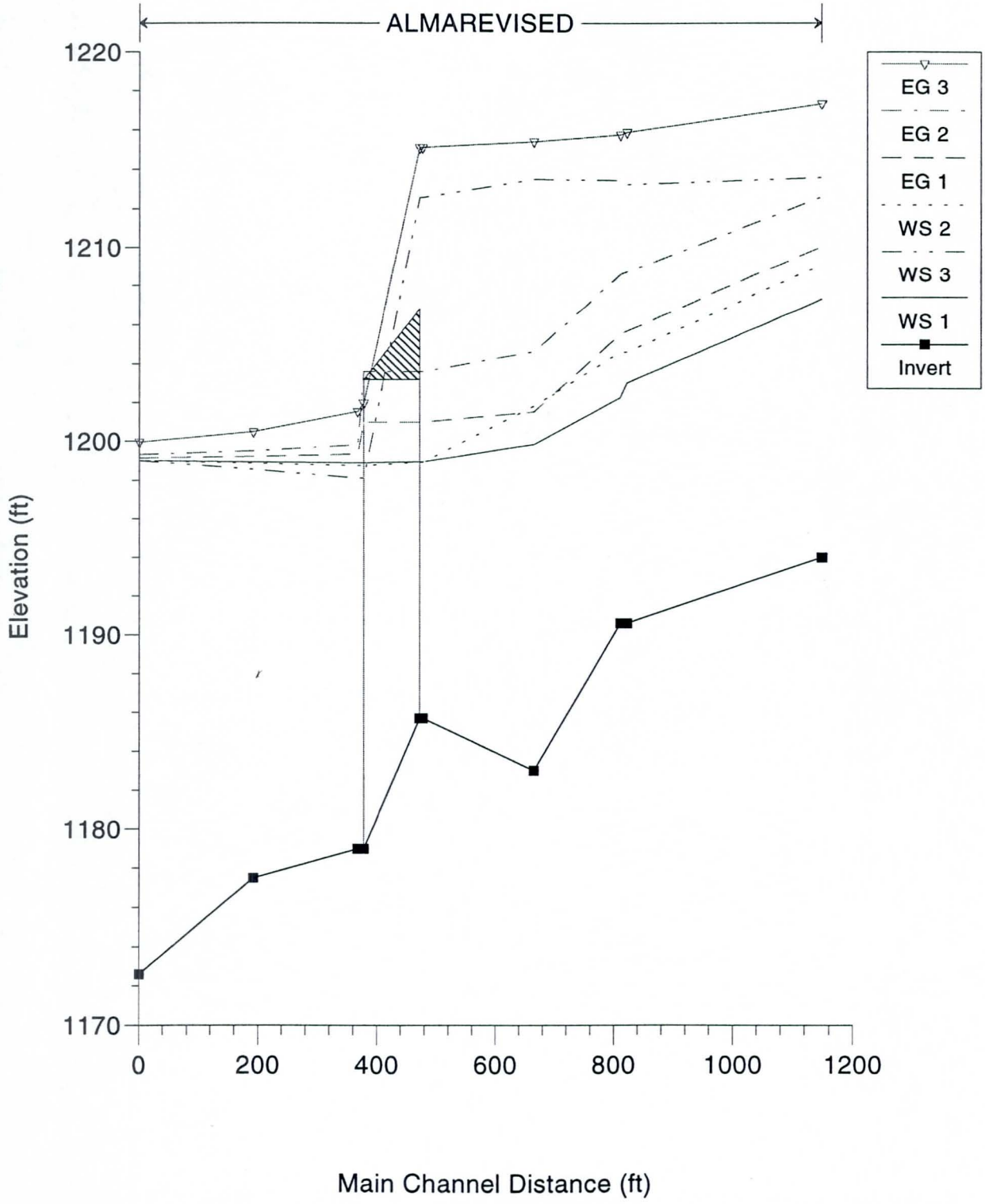
HEC-RAS PRINTOUT

EXISTING TOPOGRAPHY

NOTE: A HYDRAULIC ANALYSIS OF AN EVENT OF INTENSITY APPROXIMATELY EQUAL TO 10 YEAR RECURRENCE IS INCLUDED FOR ILLUSTRATIVE PURPOSES ONLY.


1239.0
913.0
901.6
756.0
ALMAREVISED
568.0
562.0
459.0
283.0
91.0

ALMAREVISED Plan: ALMAREVISED 5/16/97



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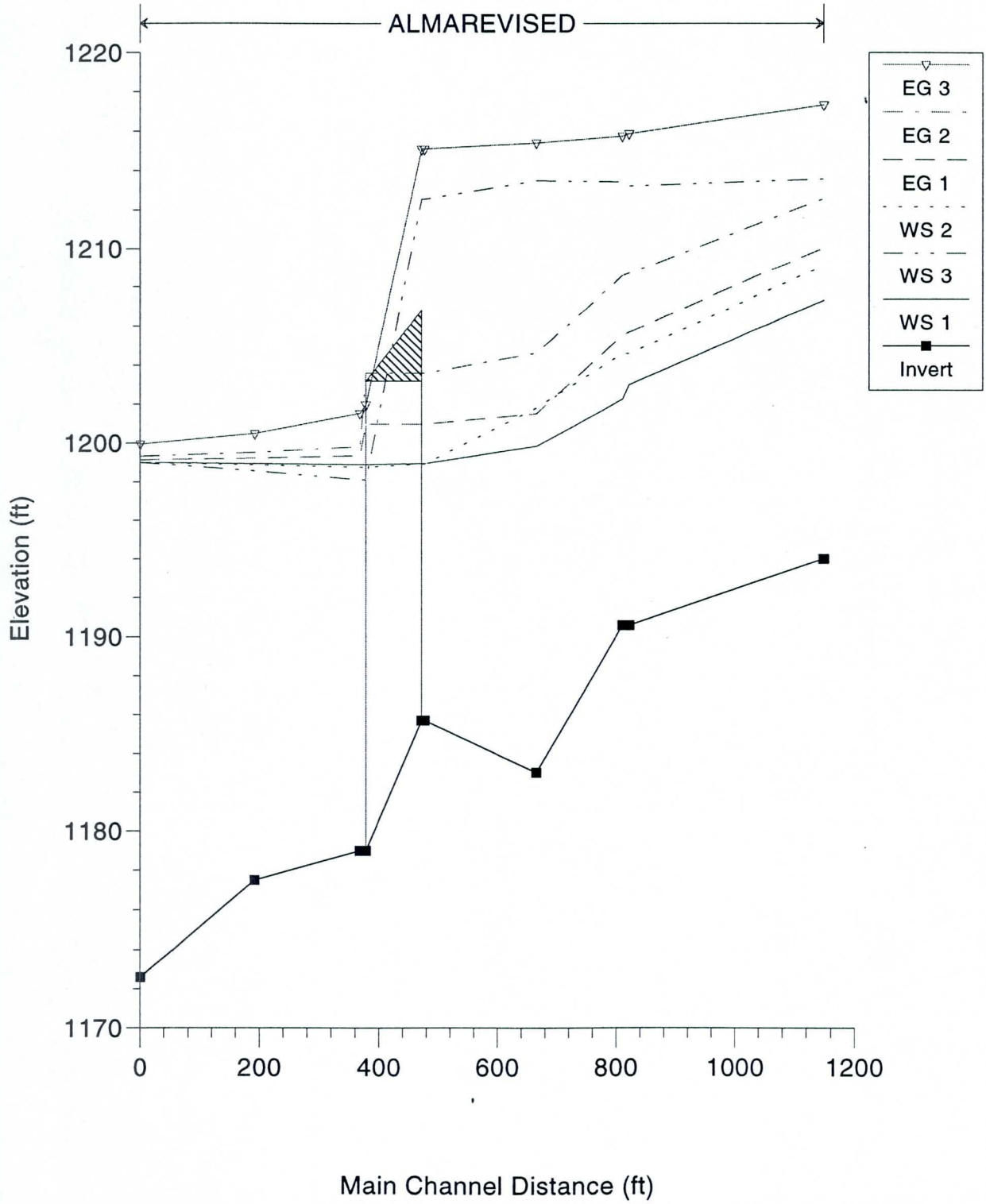
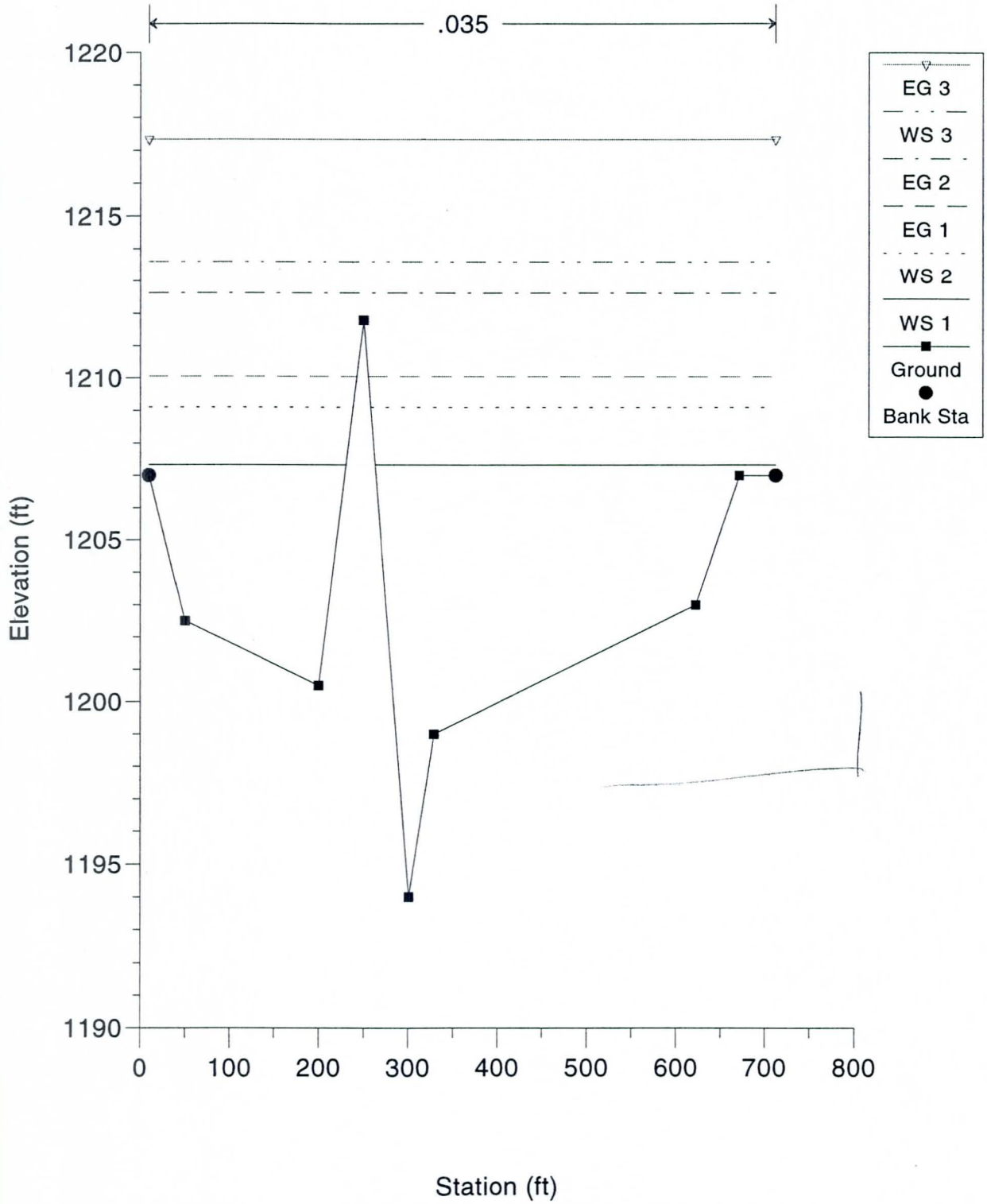


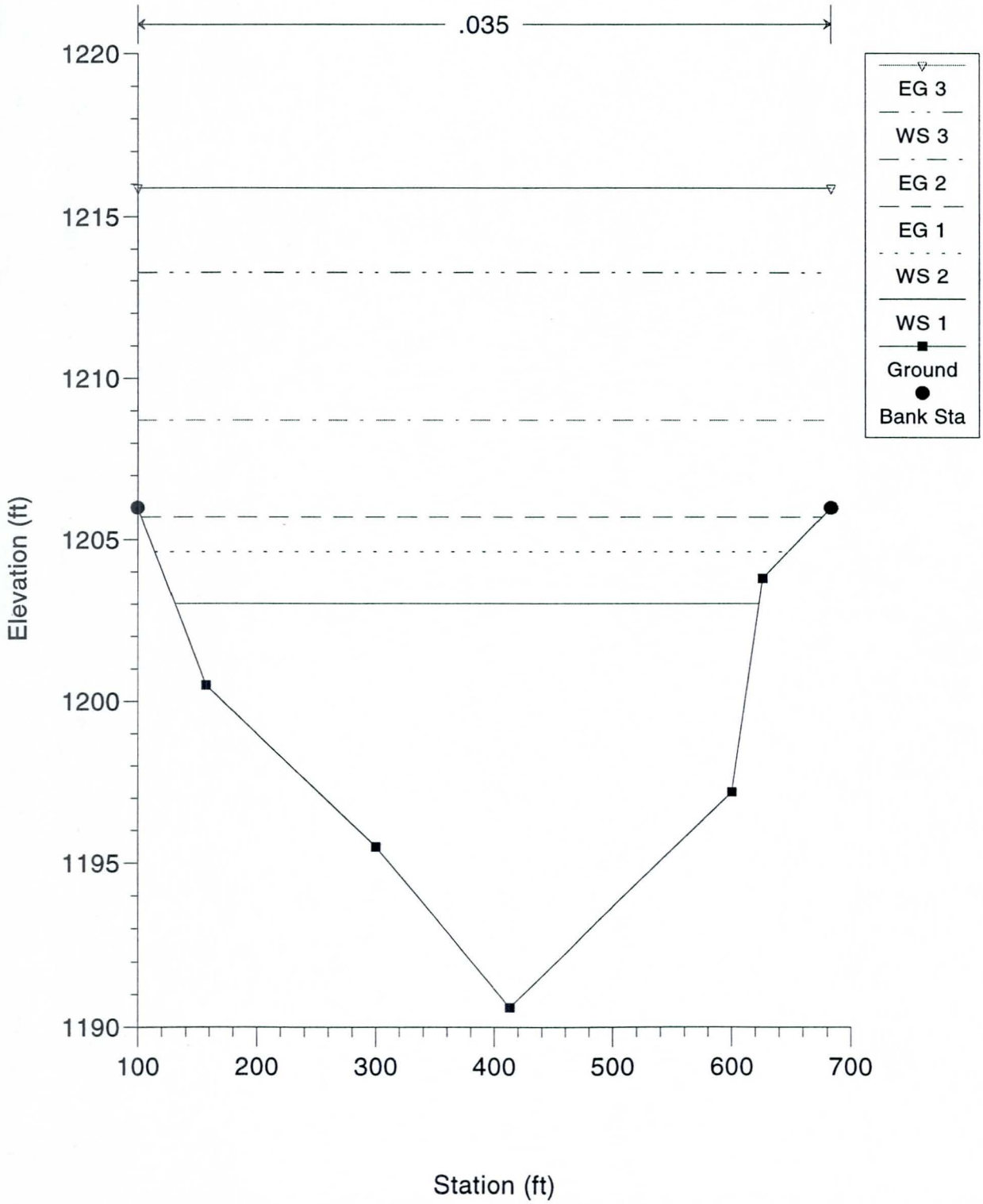
ALMAREVISED Plan: ALMAREVISED 5/15/97
UPSTREAM SECTION

1239

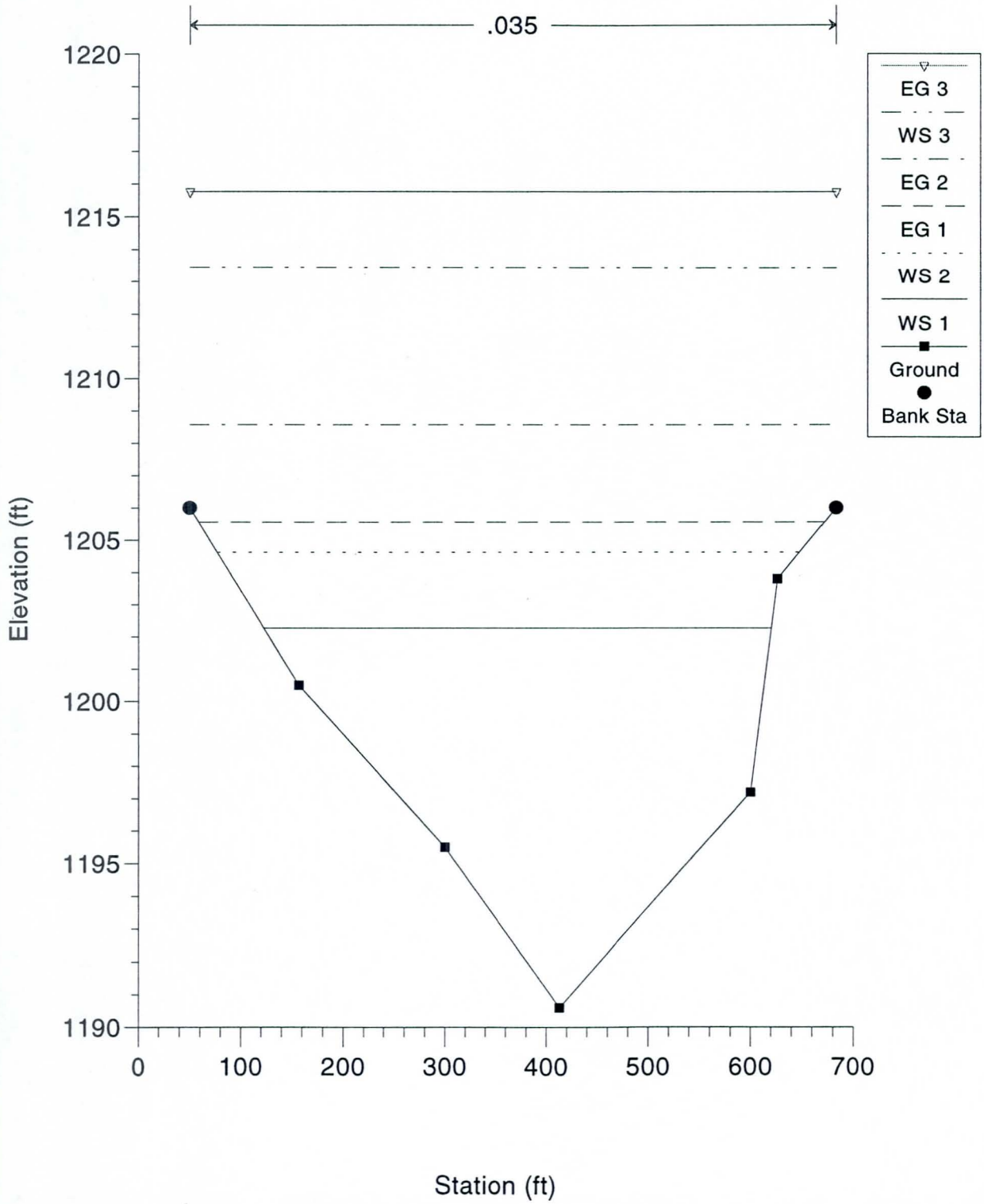


ALMAREVISED Plan: ALMAREVISED 5/15/97
UPSTREAM EARTH DIKE

913.0

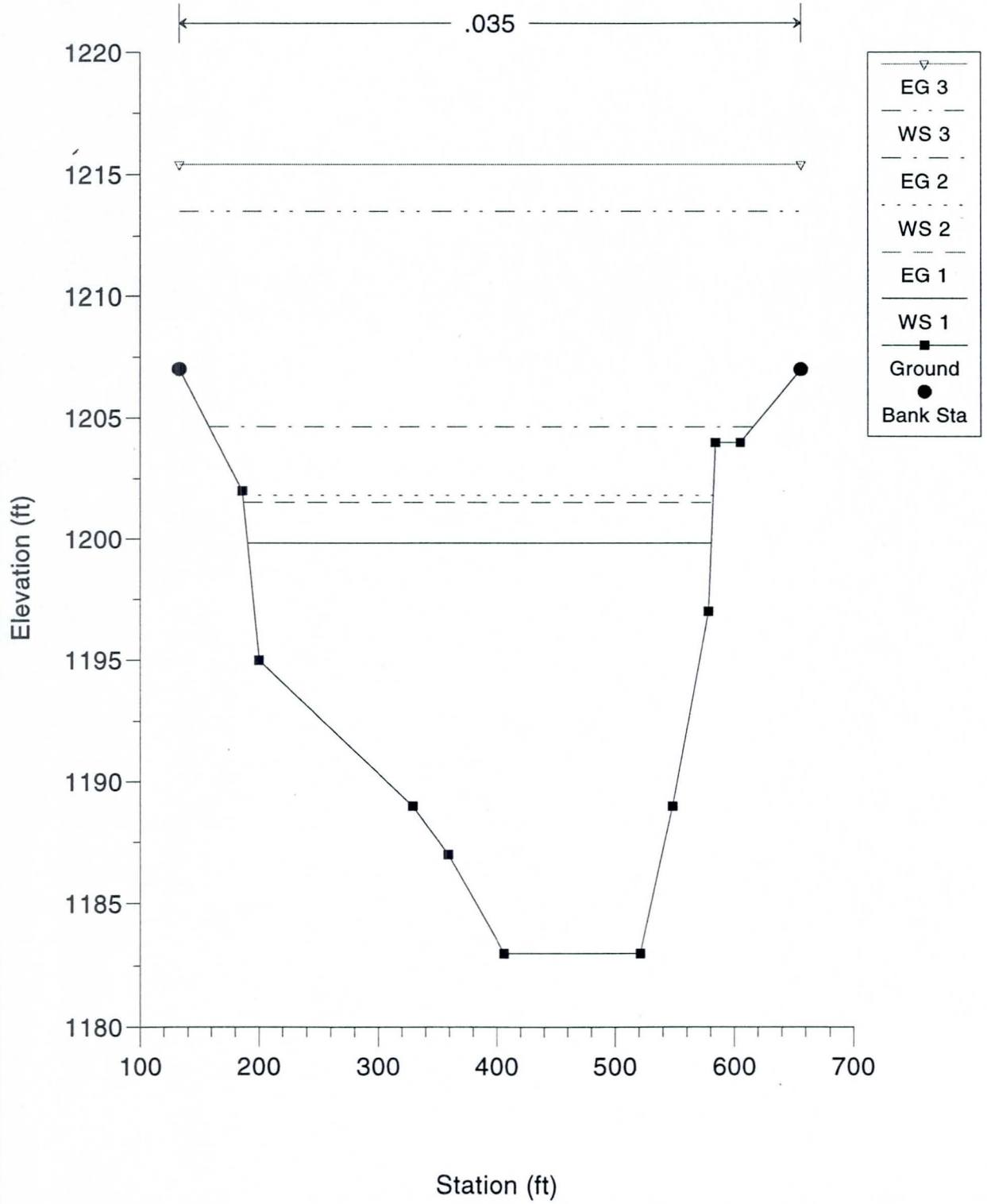


ALMAREVISED Plan: ALMAREVISED 5/15/97
DOWNSTR. EARTH DIKE
901.6



ALMAREVISED Plan: ALMAREVISED 5/15/97
UPSTREAM OF BRIDGE

756



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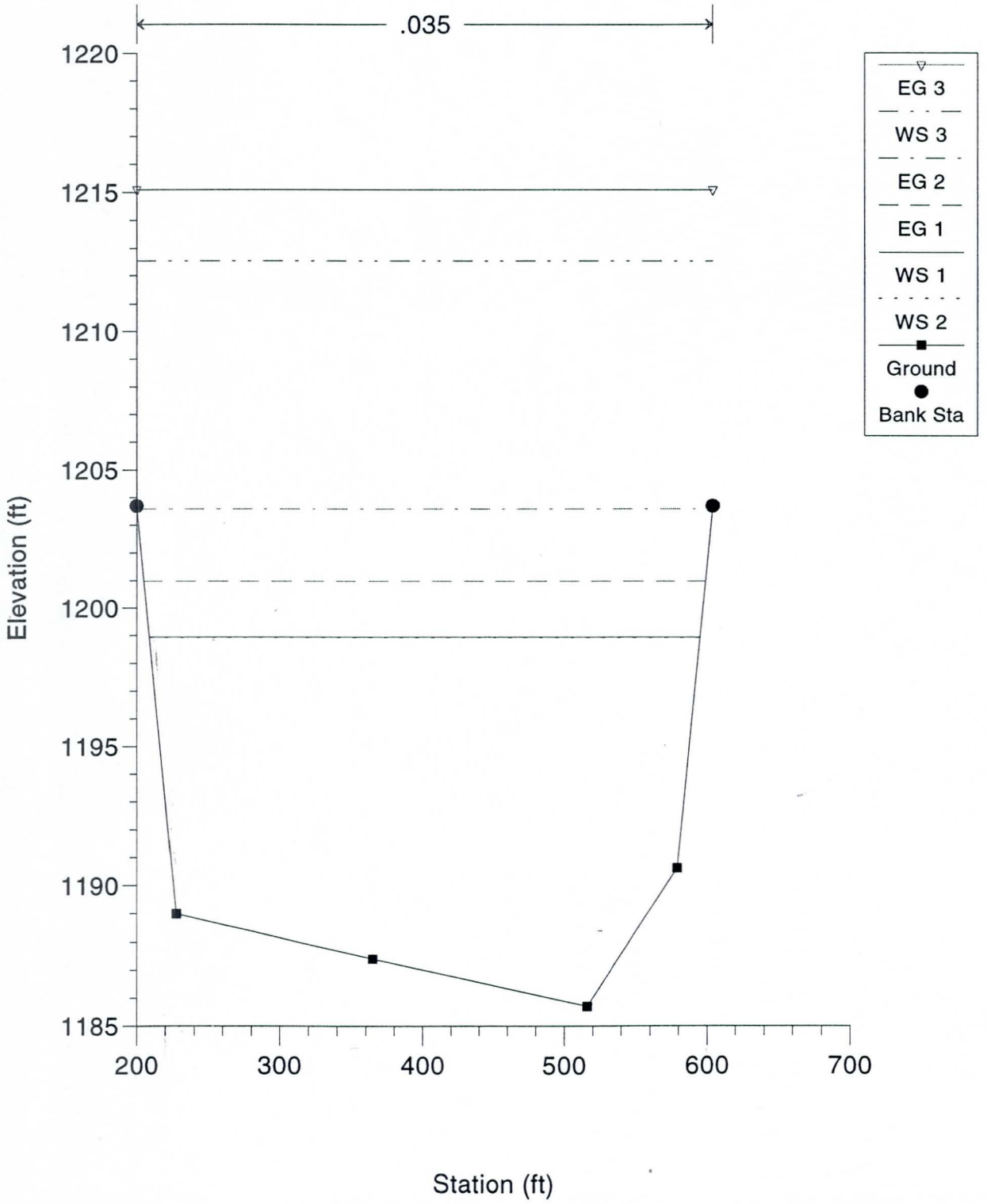
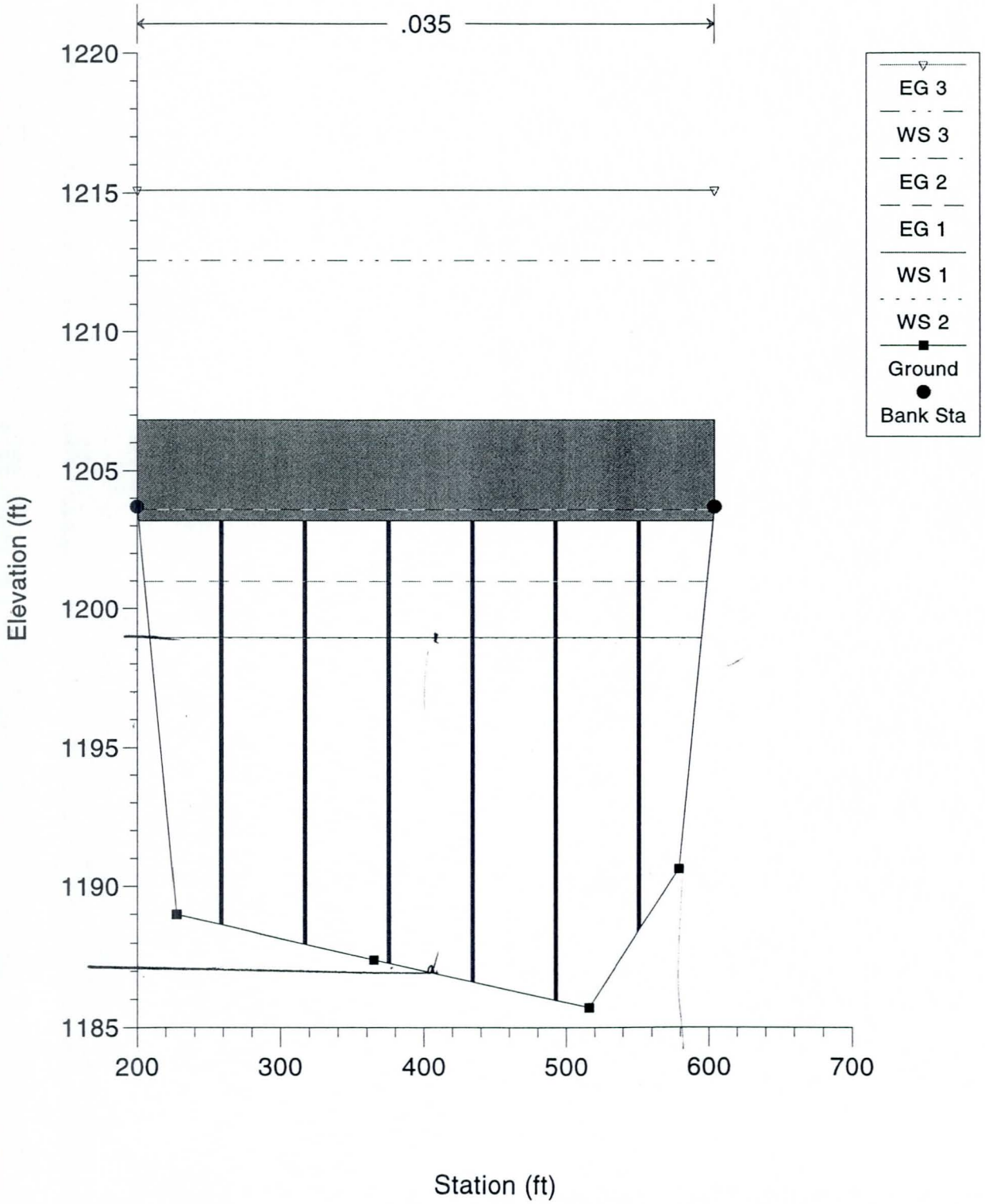
SECTION UPSTREAM SIDE BR.

568.0



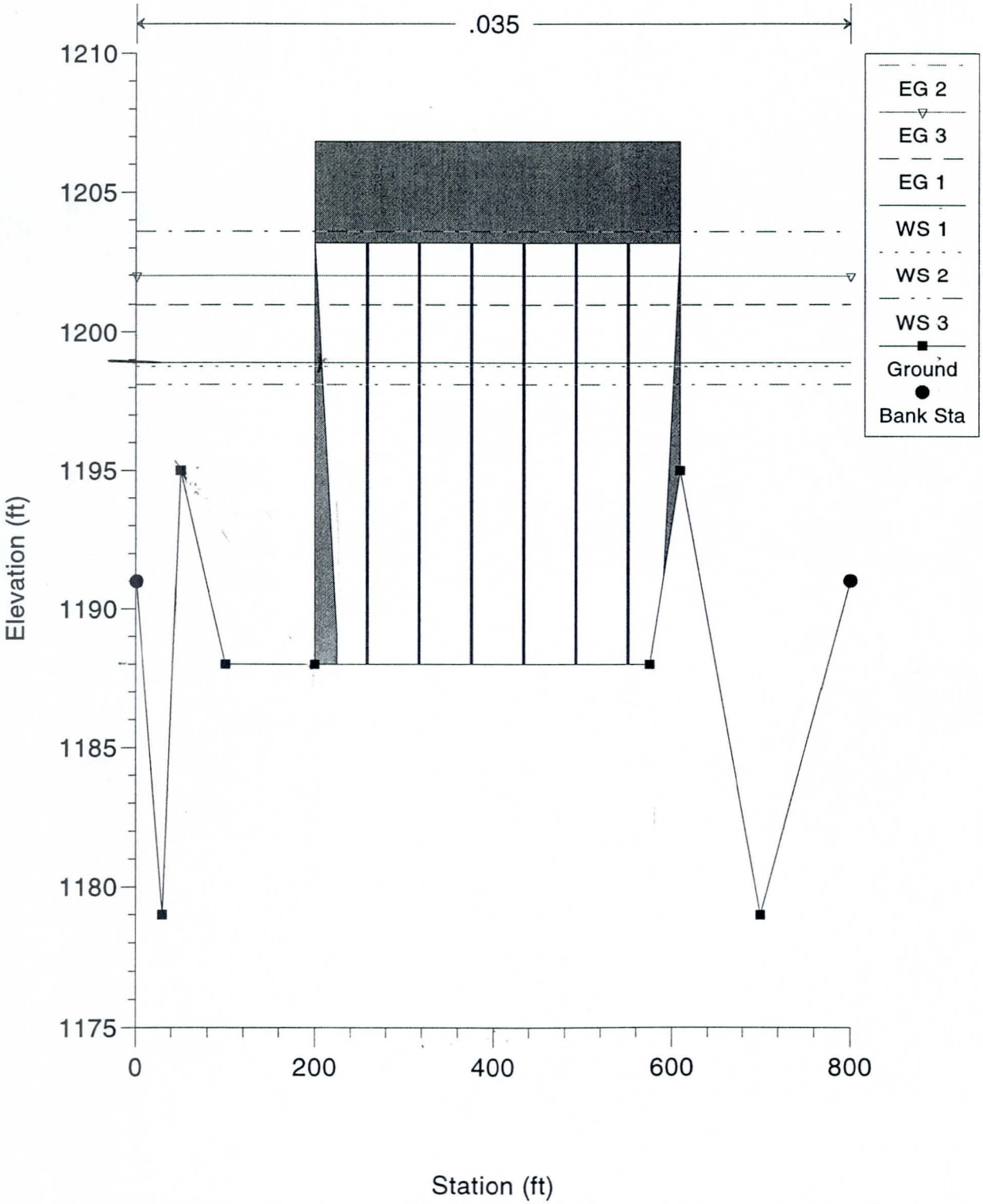
ALMAREVISED Plan: ALMAREVISED 5/15/97
Upstream Inside SOUTH BRIDGE

562.0 BR U



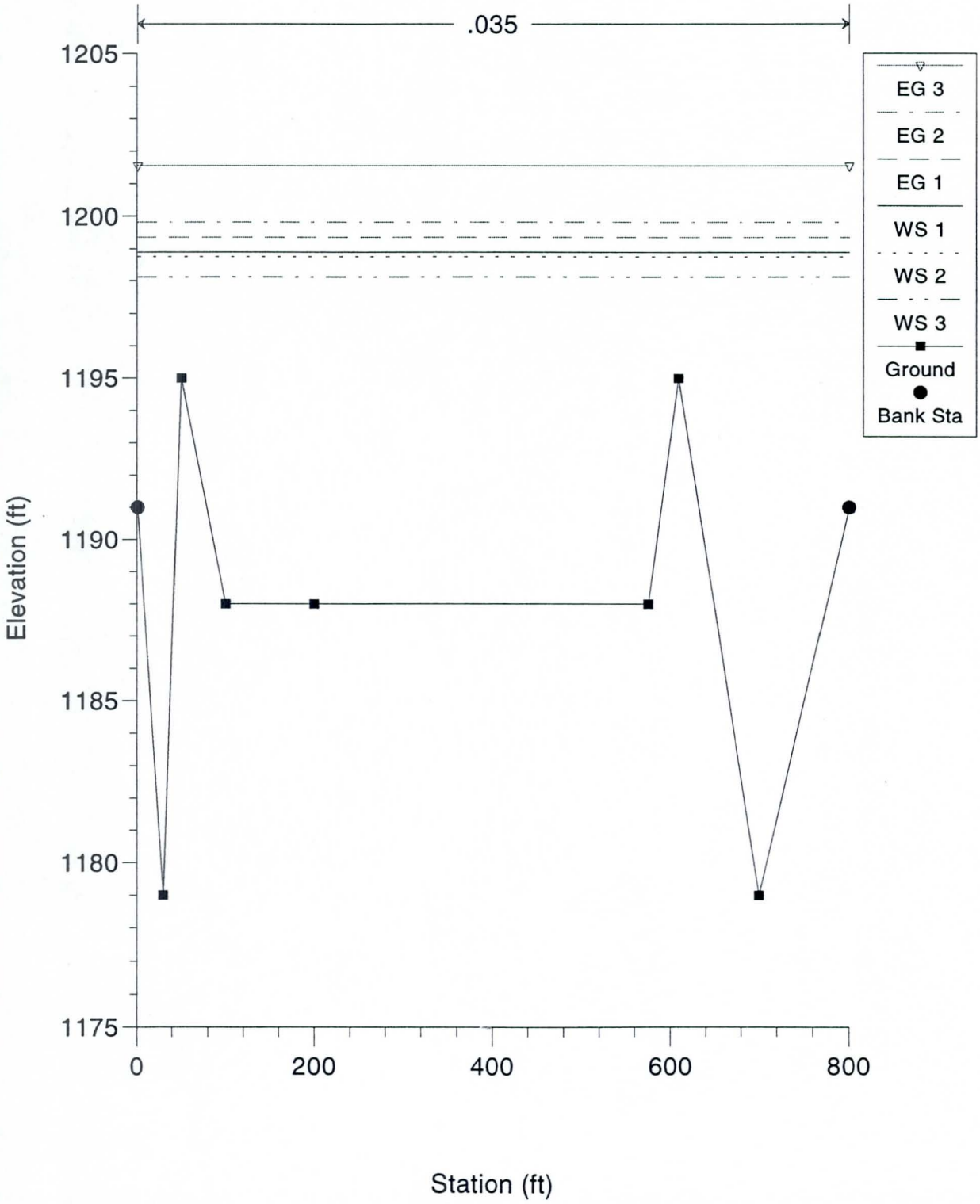
ALMAREVISED Plan: ALMAREVISED 5/15/97
Downstream Inside SOUTH BRIDGE

562 BR D



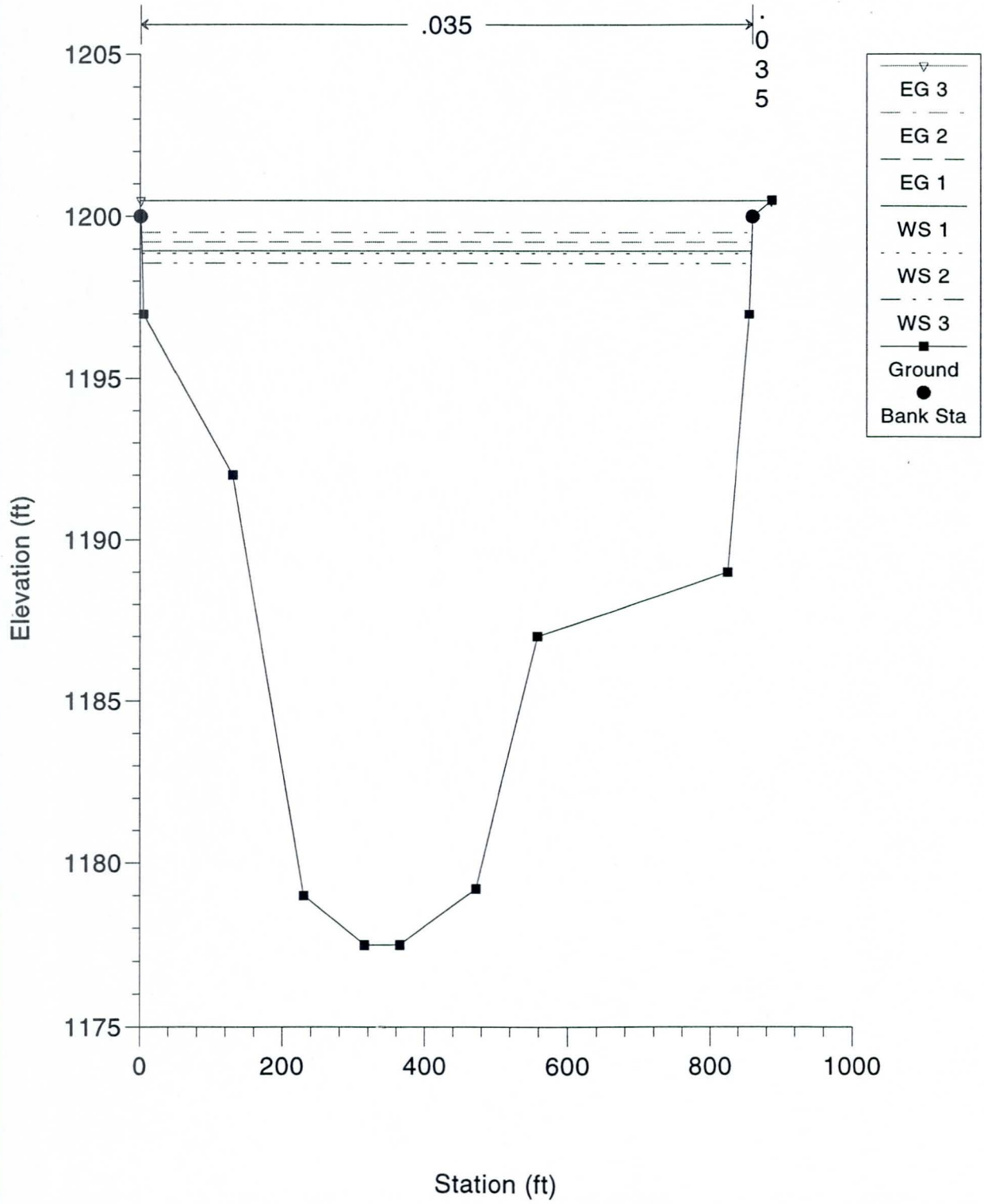
ALMAREVISED Plan: ALMAREVISED 5/15/97
CONC. WALL

459.0



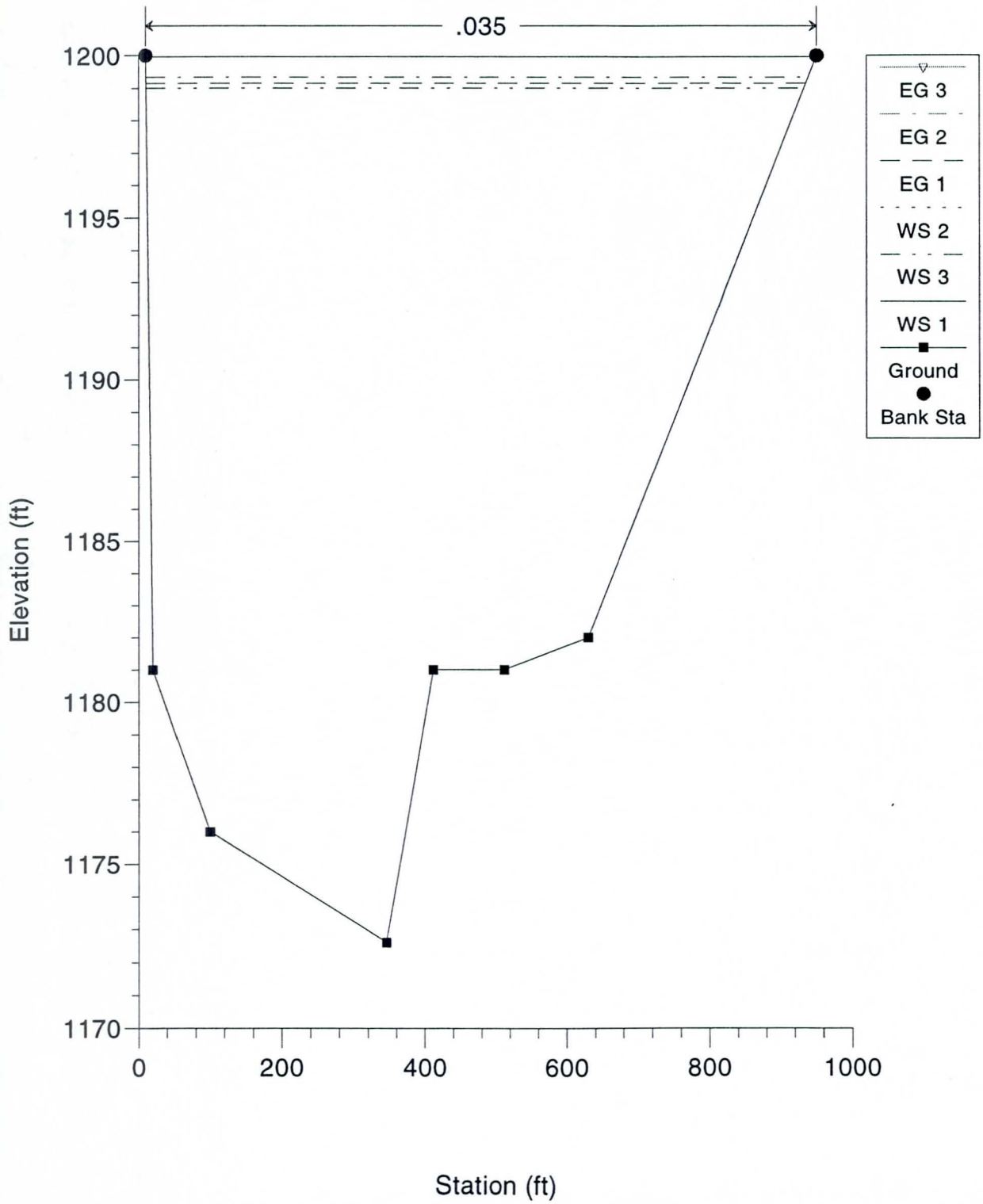
ALMAREVISED Plan: ALMAREVISED 5/15/97
FIRST SECT. DOWNSTREAM BRID.

283.0



ALMAREVISED Plan: ALMAREVISED 5/15/97
LAST DOWNSTREAM SECTION

91.0



HEC-RAS Version 1.2 April 1996
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street, Suite D
Davis, California 95616-4687
(916) 756-1104

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

****

PROJECT DATA
Project Title: ALMAREVISED
Project File : ev.prj
Run Date and Time: 5/16/97 8:01:50 AM

Project in English units

****

PLAN DATA

Plan Title: ALMAREVISED
Plan File : c:\hec\ras\ev.p01

Geometry Title: ALMAREVISED
Geometry File : c:\hec\ras\ev.p01

Flow Title : ALMAREVISED
Flow File : c:\hec\ras\ev.p01

Plan Summary Information:

Number of:	Cross Sections =	8	Mulitple Openings =	0
	Culverts =	0	Inline Weirs =	0
	Bridges =	1		

Computational Information

Water surface calculation tolerance	=	.01
Critical depth calculaton tolerance	=	.01
Maximum number of interations	=	20
Maximum difference tolerance	=	.3
Flow tolerance factor	=	.001

Computational Flow Regime: Mixed Flow

Encroachment Data: None

Flow Distribution Locations: None

****

FLOW DATA

HEC-RAS Version 1.2 April 1996
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street, Suite D
Davis, California 95616-4687
(916) 756-1104

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

****

PROJECT DATA
Project Title: ALMAREVISED
Project File : ev.prj
Run Date and Time: 5/16/97 8:01:50 AM

Project in English units

****

PLAN DATA

Plan Title: ALMAREVISED
Plan File : c:\hec\ras\ev.p01

Geometry Title: ALMAREVISED
Geometry File : c:\hec\ras\ev.p01

Flow Title : ALMAREVISED
Flow File : c:\hec\ras\ev.p01

Plan Summary Information:

Number of:	Cross Sections =	8	Mulitple Openings =	0
	Culverts =	0	Inline Weirs =	0
	Bridges =	1		

Computational Information

Water surface calculation tolerance	=	.01
Critical depth calculaton tolerance	=	.01
Maximum number of interations	=	20
Maximum difference tolerance	=	.3
Flow tolerance factor	=	.001

Computational Flow Regime: Mixed Flow

Encroachment Data: None

Flow Distribution Locations: None

****

FLOW DATA

Dibble & Assoc. Alma Sch. S. Bridge

Comments

(1) It is not clear if both survey reports (MDOT, 6/94) and Dibble are on same Vert. Datum

(2) Check 100 yr & 500 yr Q's for the Post-Roosevelt hydrologs. ~~Then Q's~~ the Q's were determined was not given (split flow

(3) Contraction Scour by Dibble appear to be excessive ~~(eg~~ and higher than local scour. Thats unusual.

(4) Page 2, Table I for system total area, .. not in report

Provide a sketch of the north side Storm Sewer & weir crest elevation, hydraulic gradeline

(5) Cobble mat at Abutment → must be upgraded? How?

(6) HEC-RAS model

Warnings of inadequate GR points that do not contain flows @ Secs 568.0 and 459.0

(7) Check contraction & expansion coeffs at Bridge location. Also check reach lengths (all segments equal but is there a curve?

```
Flow Title: ALMAREVISED
Flow File : c:\hec\ras\ev.f01

Flow Data (cfs)
***********************************************
* Reach        Riv Sta *    PF#1    PF#2    PF#3 *
***********************************************
* ALMAREVISED 1239.0  *   48000   72500  123250 *
***********************************************
Boundary Conditions
*************************************************************************
* Reach         Profile *            Upstream                Downstream    *
*************************************************************************
* ALMAREVISED         1 *       Known WS =  1201.5         Known WS =  1199 *
* ALMAREVISED         2 *         Known WS =  1202         Known WS =  1199 *
* ALMAREVISED         3 *       Known WS =  1203.5         Known WS =  1199 *
*************************************************************************

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

GEOMETRY DATA

Geometry Title: ALMAREVISED
Geometry File : c:\hec\ras\ev.g01

CROSS SECTION INPUT    Reach: ALMAREVISED    River Station: 1239.0
Description: UPSTREAM SECTION

Station Elevation Data,  num = 9
    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.
     10    1207      50  1202.5     200  1200.5     250  1211.8     301    1194
    329    1199     622    1203     671    1207     712    1207

Manning's n Values,  num = 3
    Sta.   Value    Sta.   Value    Sta.   Value
     10    .035      10    .035     712    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right    Coeff Contr.   Expan.
           10     712               326     326     326             .1       .3

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 1239.0    Profile # 1
*******************************************************************************
* W.S. Elev (ft)     *  1201.50 * Element           *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *   149.49 * Wt. n-Val.        *          *    0.035 *          *
* E.G. Elev (ft)     *  1350.99 * Reach Len. (ft)   *   326.00 *   326.00 *   326.00 *
* E.G. Slope (ft/ft)* 2.955987 * Flow Area (sq ft) *          *   489.20 *          *
* Q Total (cfs)      * 48000.00 * Flow (cfs)        *          * 48000.00 *          *
* Top Width (ft)     *   312.04 * Top Width (ft)    *          *   312.04 *          *
* Vel Total (ft/s)   *    98.12 * Avg. Vel. (ft/s)  *          *    98.12 *          *
* Max Chl Dpth (ft)  *     7.50 * Hydr. Depth (ft)  *          *     1.57 *          *
* Crit W.S. (ft)     *  1207.34 * Wetted Per. (ft)  *          *   313.89 *          *
* Conv. Total (cfs)  *  27918.4 * Conv. (cfs)       *          *  27918.4 *          *
*******************************************************************************

Warning - Divided flow computed for this cross-section.

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 1239.0    Profile # 2
*******************************************************************************
* W.S. Elev (ft)     *  1202.00 * Element           *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *   184.75 * Wt. n-Val.        *          *    0.035 *          *
```

```
Flow Title: ALMAREVISED
Flow File : c:\hec\ras\ev.f01

Flow Data (cfs)
***********************************************
* Reach        Riv Sta *    PF#1    PF#2    PF#3 *
***********************************************
* ALMAREVISED 1239.0  *   48000   72500  123250 *
***********************************************
Boundary Conditions
*************************************************************************
* Reach         Profile *            Upstream                Downstream    *
*************************************************************************
* ALMAREVISED         1 *       Known WS =  1201.5         Known WS =  1199 *
* ALMAREVISED         2 *         Known WS =  1202         Known WS =  1199 *
* ALMAREVISED         3 *       Known WS =  1203.5         Known WS =  1199 *
*************************************************************************

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

GEOMETRY DATA

Geometry Title: ALMAREVISED
Geometry File : c:\hec\ras\ev.g01

CROSS SECTION INPUT    Reach: ALMAREVISED    River Station: 1239.0
Description: UPSTREAM SECTION

Station Elevation Data,  num = 9
    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.
      10    1207      50  1202.5     200  1200.5     250  1211.8     301    1194
     329    1199     622    1203     671    1207     712    1207

Manning's n Values,  num = 3
    Sta.   Value    Sta.   Value    Sta.   Value
      10    .035      10    .035     712    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right    Coeff Contr.   Expan.
           10     712              326     326     326             .1       .3

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 1239.0    Profile # 1
*****************************************************************************
* W.S. Elev (ft)     *  1201.50 * Element           *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *   149.49 * Wt. n-Val.        *          *    0.035 *          *
* E.G. Elev (ft)     *  1350.99 * Reach Len. (ft)   *   326.00 *   326.00 *   326.00 *
* E.G. Slope (ft/ft)* 2.955987 * Flow Area (sq ft) *          *   489.20 *          *
* Q Total (cfs)      * 48000.00 * Flow (cfs)        *          * 48000.00 *          *
* Top Width (ft)     *   312.04 * Top Width (ft)    *          *   312.04 *          *
* Vel Total (ft/s)   *    98.12 * Avg. Vel. (ft/s)  *          *    98.12 *          *
* Max Chl Dpth (ft)  *     7.50 * Hydr. Depth (ft)  *          *     1.57 *          *
* Crit W.S. (ft)     *  1207.34 * Wetted Per. (ft)  *          *   313.89 *          *
* Conv. Total (cfs)  *  27918.4 * Conv. (cfs)       *          *  27918.4 *          *
*****************************************************************************

Warning - Divided flow computed for this cross-section.

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 1239.0    Profile # 2
*****************************************************************************
* W.S. Elev (ft)     *  1202.00 * Element           *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *   184.75 * Wt. n-Val.        *          *    0.035 *          *
```

```
* E.G. Elev (ft)     *  1386.75 * Reach Len. (ft)    *   326.00 *   326.00 *   326.00 *
* E.G. Slope (ft/ft)* 3.262699 * Flow Area (sq ft) *          *   664.66 *          *
* Q Total (cfs)      * 72500.00 * Flow (cfs)         *          * 72500.00 *          *
* Top Width (ft)     *   389.81 * Top Width (ft)     *          *   389.81 *          *
* Vel Total (ft/s)   *   109.08 * Avg. Vel. (ft/s)   *          *   109.08 *          *
* Max Chl Dpth (ft)  *     8.00 * Hydr. Depth (ft)   *          *     1.71 *          *
* Crit W.S. (ft)     *  1209.10 * Wetted Per. (ft)   *          *   391.81 *          *
* Conv. Total (cfs)  *  40137.4 * Conv. (cfs)        *          *  40137.4 *          *
*******************************************************************************

Warning - Divided flow computed for this cross-section.

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 1239.0    Profile # 3
*******************************************************************************
* W.S. Elev (ft)     *  1203.50 * Element            *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *   123.20 * Wt. n-Val.         *          *    0.035 *          *
* E.G. Elev (ft)     *  1326.70 * Reach Len. (ft)    *   326.00 *   326.00 *   326.00 *
* E.G. Slope (ft/ft)* 1.221493 * Flow Area (sq ft) *          *  1383.68 *          *
* Q Total (cfs)      *123250.00 * Flow (cfs)         *          *123250.00 *          *
* Top Width (ft)     *   526.51 * Top Width (ft)     *          *   526.51 *          *
* Vel Total (ft/s)   *    89.07 * Avg. Vel. (ft/s)   *          *    89.07 *          *
* Max Chl Dpth (ft)  *     9.50 * Hydr. Depth (ft)   *          *     2.63 *          *
* Crit W.S. (ft)     *  1212.15 * Wetted Per. (ft)   *          *   529.01 *          *
* Conv. Total (cfs)  * 111517.1 * Conv. (cfs)        *          * 111517.1 *          *
*******************************************************************************

Warning - Divided flow computed for this cross-section.
Warning - The parabolic search method failed to converge on critical depth.  The
                program will try the cross section slice/secant method to find critical
                depth.

CROSS SECTION INPUT    Reach: ALMAREVISED    River Station: 913.0
Description: UPSTREAM EARTH DIKE

Station Elevation Data,  num = 7
    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.
     100    1206     157  1200.5     300  1195.5     413  1190.6     600  1197.2
     626  1203.8     683    1206

Manning's n Values,  num = 3
    Sta.   Value    Sta.   Value    Sta.   Value
     100    .035     100    .035     683    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right    Coeff Contr.   Expan.
           100     683             11.4    11.4    11.4             .1       .3

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 913.0     Profile # 1
*******************************************************************************
* W.S. Elev (ft)     *  1198.05 * Element            *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *    17.33 * Wt. n-Val.         *          *    0.035 *          *
* E.G. Elev (ft)     *  1215.39 * Reach Len. (ft)    *    11.40 *    11.40 *    11.40 *
* E.G. Slope (ft/ft)* 0.103964 * Flow Area (sq ft) *          *  1436.63 *          *
* Q Total (cfs)      * 48000.00 * Flow (cfs)         *          * 48000.00 *          *
* Top Width (ft)     *   376.38 * Top Width (ft)     *          *   376.38 *          *
* Vel Total (ft/s)   *    33.41 * Avg. Vel. (ft/s)   *          *    33.41 *          *
* Max Chl Dpth (ft)  *     7.45 * Hydr. Depth (ft)   *          *     3.82 *          *
* Crit W.S. (ft)     *  1202.22 * Wetted Per. (ft)   *          *   376.75 *          *
* Conv. Total (cfs)  * 148867.3 * Conv. (cfs)        *          * 148867.3 *          *
*******************************************************************************

Warning - The velocity head has changed by more than 0.5 ft (0.15 m).  This may
```

```
* E.G. Elev (ft)     *  1386.75 * Reach Len. (ft)    *   326.00 *   326.00 *   326.00 *
* E.G. Slope (ft/ft)* 3.262699 * Flow Area (sq ft) *          *   664.66 *          *
* Q Total (cfs)      * 72500.00 * Flow (cfs)        *          * 72500.00 *          *
* Top Width (ft)     *   389.81 * Top Width (ft)    *          *   389.81 *          *
* Vel Total (ft/s)   *   109.08 * Avg. Vel. (ft/s)  *          *   109.08 *          *
* Max Chl Dpth (ft)  *     8.00 * Hydr. Depth (ft)  *          *     1.71 *          *
* Crit W.S. (ft)     *  1209.10 * Wetted Per. (ft)  *          *   391.81 *          *
* Conv. Total (cfs)  *  40137.4 * Conv. (cfs)       *          *  40137.4 *          *
*******************************************************************************************

Warning - Divided flow computed for this cross-section.

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 1239.0    Profile # 3
*******************************************************************************************
* W.S. Elev (ft)     *  1203.50 * Element            *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *   123.20 * Wt. n-Val.         *          *    0.035 *          *
* E.G. Elev (ft)     *  1326.70 * Reach Len. (ft)    *   326.00 *   326.00 *   326.00 *
* E.G. Slope (ft/ft)* 1.221493 * Flow Area (sq ft) *          *  1383.68 *          *
* Q Total (cfs)      *123250.00 * Flow (cfs)        *          *123250.00 *          *
* Top Width (ft)     *   526.51 * Top Width (ft)    *          *   526.51 *          *
* Vel Total (ft/s)   *    89.07 * Avg. Vel. (ft/s)  *          *    89.07 *          *
* Max Chl Dpth (ft)  *     9.50 * Hydr. Depth (ft)  *          *     2.63 *          *
* Crit W.S. (ft)     *  1212.15 * Wetted Per. (ft)  *          *   529.01 *          *
* Conv. Total (cfs)  * 111517.1 * Conv. (cfs)       *          * 111517.1 *          *
*******************************************************************************************

Warning - Divided flow computed for this cross-section.
Warning - The parabolic search method failed to converge on critical depth.  The
          program will try the cross section slice/secant method to find critical
          depth.

CROSS SECTION INPUT    Reach: ALMAREVISED    River Station: 913.0
Description: UPSTREAM EARTH DIKE

Station Elevation Data,  num = 7
    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.
     100    1206     157  1200.5     300  1195.5     413  1190.6     600  1197.2
     626  1203.8     683    1206

Manning's n Values,  num = 3
    Sta.   Value    Sta.   Value    Sta.   Value
     100    .035     100    .035     683    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right    Coeff Contr.   Expan.
           100     683             11.4    11.4    11.4             .1       .3

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 913.0     Profile # 1
*******************************************************************************************
* W.S. Elev (ft)     *  1198.05 * Element            *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *    17.33 * Wt. n-Val.         *          *    0.035 *          *
* E.G. Elev (ft)     *  1215.39 * Reach Len. (ft)    *    11.40 *    11.40 *    11.40 *
* E.G. Slope (ft/ft)* 0.103964 * Flow Area (sq ft) *          *  1436.63 *          *
* Q Total (cfs)      * 48000.00 * Flow (cfs)        *          * 48000.00 *          *
* Top Width (ft)     *   376.38 * Top Width (ft)    *          *   376.38 *          *
* Vel Total (ft/s)   *    33.41 * Avg. Vel. (ft/s)  *          *    33.41 *          *
* Max Chl Dpth (ft)  *     7.45 * Hydr. Depth (ft)  *          *     3.82 *          *
* Crit W.S. (ft)     *  1202.22 * Wetted Per. (ft)  *          *   376.75 *          *
* Conv. Total (cfs)  * 148867.3 * Conv. (cfs)       *          * 148867.3 *          *
*******************************************************************************************

Warning - The velocity head has changed by more than 0.5 ft (0.15 m).  This may
```

indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning - The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION OUTPUT Reach: ALMAREVISED Riv Sta: 913.0 Profile # 2

W.S. Elev (ft)	1198.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	25.35	Wt. n-Val.		0.035	
E.G. Elev (ft)	1224.32	Reach Len. (ft)	11.40	11.40	11.40
E.G. Slope (ft/ft)	0.125149	Flow Area (sq ft)		1794.31	
Q Total (cfs)	72500.00	Flow (cfs)		72500.00	
Top Width (ft)	406.13	Top Width (ft)		406.13	
Vel Total (ft/s)	40.41	Avg. Vel. (ft/s)		40.41	
Max Chl Dpth (ft)	8.37	Hydr. Depth (ft)		4.42	
Crit W.S. (ft)	1204.56	Wetted Per. (ft)		406.63	
Conv. Total (cfs)	204938.5	Conv. (cfs)		204938.5	

Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Reach: ALMAREVISED Riv Sta: 913.0 Profile # 3

W.S. Elev (ft)	1201.56	Element	Left OB	Channel	Right OB
Vel Head (ft)	27.19	Wt. n-Val.		0.035	
E.G. Elev (ft)	1228.75	Reach Len. (ft)	11.40	11.40	11.40
E.G. Slope (ft/ft)	0.084558	Flow Area (sq ft)		2945.51	
Q Total (cfs)	123250.00	Flow (cfs)		123250.00	
Top Width (ft)	471.13	Top Width (ft)		471.13	
Vel Total (ft/s)	41.84	Avg. Vel. (ft/s)		41.84	
Max Chl Dpth (ft)	10.96	Hydr. Depth (ft)		6.25	
Crit W.S. (ft)	1208.19	Wetted Per. (ft)		472.04	
Conv. Total (cfs)	423847.2	Conv. (cfs)		423847.2	

Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning - The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION INPUT Reach: ALMAREVISED River Station: 901.6

indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning - The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION OUTPUT Reach: ALMAREVISED Riv Sta: 913.0 Profile # 2

W.S. Elev (ft)	1198.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	25.35	Wt. n-Val.		0.035	
E.G. Elev (ft)	1224.32	Reach Len. (ft)	11.40	11.40	11.40
E.G. Slope (ft/ft)	0.125149	Flow Area (sq ft)		1794.31	
Q Total (cfs)	72500.00	Flow (cfs)		72500.00	
Top Width (ft)	406.13	Top Width (ft)		406.13	
Vel Total (ft/s)	40.41	Avg. Vel. (ft/s)		40.41	
Max Chl Dpth (ft)	8.37	Hydr. Depth (ft)		4.42	
Crit W.S. (ft)	1204.56	Wetted Per. (ft)		406.63	
Conv. Total (cfs)	204938.5	Conv. (cfs)		204938.5	

Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Reach: ALMAREVISED Riv Sta: 913.0 Profile # 3

W.S. Elev (ft)	1201.56	Element	Left OB	Channel	Right OB
Vel Head (ft)	27.19	Wt. n-Val.		0.035	
E.G. Elev (ft)	1228.75	Reach Len. (ft)	11.40	11.40	11.40
E.G. Slope (ft/ft)	0.084558	Flow Area (sq ft)		2945.51	
Q Total (cfs)	123250.00	Flow (cfs)		123250.00	
Top Width (ft)	471.13	Top Width (ft)		471.13	
Vel Total (ft/s)	41.84	Avg. Vel. (ft/s)		41.84	
Max Chl Dpth (ft)	10.96	Hydr. Depth (ft)		6.25	
Crit W.S. (ft)	1208.19	Wetted Per. (ft)		472.04	
Conv. Total (cfs)	423847.2	Conv. (cfs)		423847.2	

Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning - The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION INPUT Reach: ALMAREVISED River Station: 901.6

Description: DOWNSTR. EARTH DIKE

Station Elevation Data, num = 7

Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
50	1206	157	1200.5	300	1195.5	413	1190.6	600	1197.2
626.1	1203.8	683	1206						

Manning's n Values, num = 3

Sta.	Value	Sta.	Value	Sta.	Value
50	.035	50	.035	683	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
50	683	145.6	145.6	145.6	.1	.3

CROSS SECTION OUTPUT Reach: ALMAREVISED Riv Sta: 901.6 Profile # 1

W.S. Elev (ft)	1198.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	15.46	Wt. n-Val.		0.035	
E.G. Elev (ft)	1213.74	Reach Len. (ft)	145.60	145.60	145.60
E.G. Slope (ft/ft)	0.088164	Flow Area (sq ft)		1521.07	
Q Total (cfs)	48000.00	Flow (cfs)		48000.00	
Top Width (ft)	383.63	Top Width (ft)		383.63	
Vel Total (ft/s)	31.56	Avg. Vel. (ft/s)		31.56	
Max Chl Dpth (ft)	7.68	Hydr. Depth (ft)		3.96	
Crit W.S. (ft)	1202.27	Wetted Per. (ft)		384.03	
Conv. Total (cfs)	161657.8	Conv. (cfs)		161657.8	

Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Reach: ALMAREVISED Riv Sta: 901.6 Profile # 2

W.S. Elev (ft)	1199.17	Element	Left OB	Channel	Right OB
Vel Head (ft)	23.16	Wt. n-Val.		0.035	
E.G. Elev (ft)	1222.33	Reach Len. (ft)	145.60	145.60	145.60
E.G. Slope (ft/ft)	0.109985	Flow Area (sq ft)		1877.36	
Q Total (cfs)	72500.00	Flow (cfs)		72500.00	
Top Width (ft)	412.75	Top Width (ft)		412.75	
Vel Total (ft/s)	38.62	Avg. Vel. (ft/s)		38.62	
Max Chl Dpth (ft)	8.57	Hydr. Depth (ft)		4.55	
Crit W.S. (ft)	1204.62	Wetted Per. (ft)		413.29	
Conv. Total (cfs)	218610.4	Conv. (cfs)		218610.4	

Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Reach: ALMAREVISED Riv Sta: 901.6 Profile # 3

W.S. Elev (ft)	1201.73	Element	Left OB	Channel	Right OB
Vel Head (ft)	25.65	Wt. n-Val.		0.035	
E.G. Elev (ft)	1227.38	Reach Len. (ft)	145.60	145.60	145.60
E.G. Slope (ft/ft)	0.079714	Flow Area (sq ft)		3032.49	
Q Total (cfs)	123250.00	Flow (cfs)		123250.00	

Description: DOWNSTR. EARTH DIKE

Station Elevation Data, num = 7

Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
50	1206	157	1200.5	300	1195.5	413	1190.6	600	1197.2
626.1	1203.8	683	1206						

Manning's n Values, num = 3

Sta.	Value	Sta.	Value	Sta.	Value
50	.035	50	.035	683	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
50	683	145.6	145.6	145.6	.1	.3

CROSS SECTION OUTPUT Reach: ALMAREVISED Riv Sta: 901.6 Profile # 1

W.S. Elev (ft)	1198.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	15.46	Wt. n-Val.		0.035	
E.G. Elev (ft)	1213.74	Reach Len. (ft)	145.60	145.60	145.60
E.G. Slope (ft/ft)	0.088164	Flow Area (sq ft)		1521.07	
Q Total (cfs)	48000.00	Flow (cfs)		48000.00	
Top Width (ft)	383.63	Top Width (ft)		383.63	
Vel Total (ft/s)	31.56	Avg. Vel. (ft/s)		31.56	
Max Chl Dpth (ft)	7.68	Hydr. Depth (ft)		3.96	
Crit W.S. (ft)	1202.27	Wetted Per. (ft)		384.03	
Conv. Total (cfs)	161657.8	Conv. (cfs)		161657.8	

Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Reach: ALMAREVISED Riv Sta: 901.6 Profile # 2

W.S. Elev (ft)	1199.17	Element	Left OB	Channel	Right OB
Vel Head (ft)	23.16	Wt. n-Val.		0.035	
E.G. Elev (ft)	1222.33	Reach Len. (ft)	145.60	145.60	145.60
E.G. Slope (ft/ft)	0.109985	Flow Area (sq ft)		1877.36	
Q Total (cfs)	72500.00	Flow (cfs)		72500.00	
Top Width (ft)	412.75	Top Width (ft)		412.75	
Vel Total (ft/s)	38.62	Avg. Vel. (ft/s)		38.62	
Max Chl Dpth (ft)	8.57	Hydr. Depth (ft)		4.55	
Crit W.S. (ft)	1204.62	Wetted Per. (ft)		413.29	
Conv. Total (cfs)	218610.4	Conv. (cfs)		218610.4	

Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Reach: ALMAREVISED Riv Sta: 901.6 Profile # 3

W.S. Elev (ft)	1201.73	Element	Left OB	Channel	Right OB
Vel Head (ft)	25.65	Wt. n-Val.		0.035	
E.G. Elev (ft)	1227.38	Reach Len. (ft)	145.60	145.60	145.60
E.G. Slope (ft/ft)	0.079714	Flow Area (sq ft)		3032.49	
Q Total (cfs)	123250.00	Flow (cfs)		123250.00	

```
* Top Width (ft)     *   484.78 * Top Width (ft)     *          *   484.78 *          *
* Vel Total (ft/s)   *    40.64 * Avg. Vel. (ft/s)   *          *    40.64 *          *
* Max Chl Dpth (ft)  *    11.13 * Hydr. Depth (ft)   *          *     6.26 *          *
* Crit W.S. (ft)     *  1208.08 * Wetted Per. (ft)   *          *   485.69 *          *
* Conv. Total (cfs)  * 436536.8 * Conv. (cfs)        *          * 436536.8 *          *
*******************************************************************************

Warning - The velocity head has changed by more than 0.5 ft (0.15 m).  This may
                indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and
                previous cross section.  This may indicate the need for additional cross
                sections.
Warning - The parabolic search method failed to converge on critical depth.  The
                program will try the cross section slice/secant method to find critical
                depth.

CROSS SECTION INPUT    Reach: ALMAREVISED    River Station: 756.0
Description: 207 FT. UPSTREAM OF BRIDGE

Station Elevation Data,  num = 12
    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.
     133    1207     186    1202     200    1195     329    1189     359    1187
     406    1183     521    1183     548    1189     578    1197     584    1204
     605    1204     656    1207

Manning's n Values,  num = 3
    Sta.   Value    Sta.   Value    Sta.   Value
     133    .035     133    .035     656    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right    Coeff Contr.   Expan.
           133     656              188     188     188             .1       .3

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 756.0     Profile # 1
*******************************************************************************
* W.S. Elev (ft)     *  1191.77 * Element           *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *    12.49 * Wt. n-Val.        *          *    0.035 *          *
* E.G. Elev (ft)     *  1204.26 * Reach Len. (ft)   *   188.00 *   188.00 *   188.00 *
* E.G. Slope (ft/ft)* 0.042536 * Flow Area (sq ft) *          *  1692.26 *          *
* Q Total (cfs)      * 48000.00 * Flow (cfs)        *          * 48000.00 *          *
* Top Width (ft)     *   288.92 * Top Width (ft)    *          *   288.92 *          *
* Vel Total (ft/s)   *    28.36 * Avg. Vel. (ft/s)  *          *    28.36 *          *
* Max Chl Dpth (ft)  *     8.77 * Hydr. Depth (ft)  *          *     5.86 *          *
* Crit W.S. (ft)     *  1195.60 * Wetted Per. (ft)  *          *   290.24 *          *
* Conv. Total (cfs)  * 232735.8 * Conv. (cfs)       *          * 232735.8 *          *
*******************************************************************************

Warning - The velocity head has changed by more than 0.5 ft (0.15 m).  This may
                indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream
                conveyance) is less than 0.7 or greater than 1.4.  This may indicate the
                need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and
                previous cross section.  This may indicate the need for additional cross
                sections.

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 756.0     Profile # 2
*******************************************************************************
* W.S. Elev (ft)     *  1193.41 * Element           *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *    16.85 * Wt. n-Val.        *          *    0.035 *          *
* E.G. Elev (ft)     *  1210.26 * Reach Len. (ft)   *   188.00 *   188.00 *   188.00 *
* E.G. Slope (ft/ft)* 0.048331 * Flow Area (sq ft) *          *  2201.02 *          *
```

```
* Top Width (ft)     *   484.78 * Top Width (ft)     *           *   484.78 *           *
* Vel Total (ft/s)   *    40.64 * Avg. Vel. (ft/s)   *           *    40.64 *           *
* Max Chl Dpth (ft)  *    11.13 * Hydr. Depth (ft)   *           *     6.26 *           *
* Crit W.S. (ft)     *  1208.08 * Wetted Per. (ft)   *           *   485.69 *           *
* Conv. Total (cfs)  * 436536.8 * Conv. (cfs)         *           * 436536.8 *           *
*******************************************************************************

Warning - The velocity head has changed by more than 0.5 ft (0.15 m).  This may
                indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and
                previous cross section.  This may indicate the need for additional cross
                sections.
Warning - The parabolic search method failed to converge on critical depth.  The
                program will try the cross section slice/secant method to find critical
                depth.

CROSS SECTION INPUT    Reach: ALMAREVISED    River Station: 756.0
Description: 207 FT. UPSTREAM OF BRIDGE

Station Elevation Data,  num = 12
    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.
     133    1207     186    1202     200    1195     329    1189     359    1187
     406    1183     521    1183     548    1189     578    1197     584    1204
     605    1204     656    1207

Manning's n Values,  num = 3
    Sta.   Value    Sta.   Value    Sta.   Value
     133    .035     133    .035     656    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right    Coeff Contr.   Expan.
           133     656              188     188     188             .1       .3

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 756.0     Profile # 1
*******************************************************************************
* W.S. Elev (ft)     *  1191.77 * Element           *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *    12.49 * Wt. n-Val.        *          *    0.035 *          *
* E.G. Elev (ft)     *  1204.26 * Reach Len. (ft)   *   188.00 *   188.00 *   188.00 *
* E.G. Slope (ft/ft)* 0.042536 * Flow Area (sq ft) *          *  1692.26 *          *
* Q Total (cfs)      * 48000.00 * Flow (cfs)        *          * 48000.00 *          *
* Top Width (ft)     *   288.92 * Top Width (ft)    *          *   288.92 *          *
* Vel Total (ft/s)   *    28.36 * Avg. Vel. (ft/s)  *          *    28.36 *          *
* Max Chl Dpth (ft)  *     8.77 * Hydr. Depth (ft)  *          *     5.86 *          *
* Crit W.S. (ft)     *  1195.60 * Wetted Per. (ft)  *          *   290.24 *          *
* Conv. Total (cfs)  * 232735.8 * Conv. (cfs)        *          * 232735.8 *          *
*******************************************************************************

Warning - The velocity head has changed by more than 0.5 ft (0.15 m).  This may
                indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream
                conveyance) is less than 0.7 or greater than 1.4.  This may indicate the
                need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and
                previous cross section.  This may indicate the need for additional cross
                sections.

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 756.0     Profile # 2
*******************************************************************************
* W.S. Elev (ft)     *  1193.41 * Element           *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *    16.85 * Wt. n-Val.        *          *    0.035 *          *
* E.G. Elev (ft)     *  1210.26 * Reach Len. (ft)   *   188.00 *   188.00 *   188.00 *
* E.G. Slope (ft/ft)* 0.048331 * Flow Area (sq ft) *          *  2201.02 *          *
```

```
* Q Total (cfs)      * 72500.00 * Flow (cfs)         *          * 72500.00 *          *
* Top Width (ft)     *   330.41 * Top Width (ft)     *          *   330.41 *          *
* Vel Total (ft/s)   *    32.94 * Avg. Vel. (ft/s)   *          *    32.94 *          *
* Max Chl Dpth (ft)  *    10.41 * Hydr. Depth (ft)   *          *     6.66 *          *
* Crit W.S. (ft)     *  1198.20 * Wetted Per. (ft)   *          *   331.98 *          *
* Conv. Total (cfs)  * 329779.8 * Conv. (cfs)        *          * 329779.8 *          *
********************************************************************************

Warning - The velocity head has changed by more than 0.5 ft (0.15 m).  This may
                indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream
                conveyance) is less than 0.7 or greater than 1.4.  This may indicate the
                need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and
                previous cross section.  This may indicate the need for additional cross
                sections.

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 756.0     Profile # 3
********************************************************************************
* W.S. Elev (ft)     *  1213.50 * Element           *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *     1.91 * Wt. n-Val.        *          *    0.035 *          *
* E.G. Elev (ft)     *  1215.41 * Reach Len. (ft)   *   188.00 *   188.00 *   188.00 *
* E.G. Slope (ft/ft)* 0.001219 * Flow Area (sq ft) *          * 11114.61 *          *
* Q Total (cfs)      *123250.00 * Flow (cfs)        *          *123250.00 *          *
* Top Width (ft)     *   523.00 * Top Width (ft)    *          *   523.00 *          *
* Vel Total (ft/s)   *    11.09 * Avg. Vel. (ft/s)  *          *    11.09 *          *
* Max Chl Dpth (ft)  *    30.50 * Hydr. Depth (ft)  *          *    21.25 *          *
* Crit W.S. (ft)     *          * Wetted Per. (ft)  *          *   543.28 *          *
* Conv. Total (cfs) *3529698.0 * Conv. (cfs)       *          *3529698.0 *          *
********************************************************************************

Warning - The cross-section end points had to be extended vertically for the
                computed water surface.
Warning - The velocity head has changed by more than 0.5 ft (0.15 m).  This may
                indicate the need for additional cross sections.

CROSS SECTION INPUT    Reach: ALMAREVISED    River Station: 568.0
Description: SECTION UPSTREAM SIDE BR.

Station Elevation Data,  num = 6
    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.
     200  1203.7   227.5    1189     365  1187.4     516  1185.7     579 1190.64
     604  1203.7

Manning's n Values,  num = 3
    Sta.   Value    Sta.   Value    Sta.   Value
     200    .035     200    .035     604    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right    Coeff Contr.   Expan.
           200     604              109     109     109             .1       .3

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 568.0     Profile # 1
********************************************************************************
* W.S. Elev (ft)     *  1198.95 * Element           *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *     2.04 * Wt. n-Val.        *          *    0.035 *          *
* E.G. Elev (ft)     *  1200.99 * Reach Len. (ft)   *     5.00 *     5.00 *     5.00 *
* E.G. Slope (ft/ft)* 0.003085 * Flow Area (sq ft) *          *  4187.83 *          *
* Q Total (cfs)      * 48000.00 * Flow (cfs)        *          * 48000.00 *          *
* Top Width (ft)     *   386.02 * Top Width (ft)    *          *   386.02 *          *
* Vel Total (ft/s)   *    11.46 * Avg. Vel. (ft/s)  *          *    11.46 *          *
* Max Chl Dpth (ft)  *    13.25 * Hydr. Depth (ft)  *          *    10.85 *          *
```

```
* Q Total (cfs)      * 72500.00 * Flow (cfs)         *          * 72500.00 *          *
* Top Width (ft)     *   330.41 * Top Width (ft)     *          *   330.41 *          *
* Vel Total (ft/s)   *    32.94 * Avg. Vel. (ft/s)   *          *    32.94 *          *
* Max Chl Dpth (ft)  *    10.41 * Hydr. Depth (ft)   *          *     6.66 *          *
* Crit W.S. (ft)     *  1198.20 * Wetted Per. (ft)   *          *   331.98 *          *
* Conv. Total (cfs)  * 329779.8 * Conv. (cfs)        *          * 329779.8 *          *
********************************************************************************

Warning - The velocity head has changed by more than 0.5 ft (0.15 m).  This may
                indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream
                conveyance) is less than 0.7 or greater than 1.4.  This may indicate the
                need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and
                previous cross section.  This may indicate the need for additional cross
                sections.

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 756.0     Profile # 3
********************************************************************************
* W.S. Elev (ft)     *  1213.50 * Element           *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *     1.91 * Wt. n-Val.        *          *    0.035 *          *
* E.G. Elev (ft)     *  1215.41 * Reach Len. (ft)   *   188.00 *   188.00 *   188.00 *
* E.G. Slope (ft/ft)* 0.001219 * Flow Area (sq ft) *          * 11114.61 *          *
* Q Total (cfs)      *123250.00 * Flow (cfs)        *          *123250.00 *          *
* Top Width (ft)     *   523.00 * Top Width (ft)    *          *   523.00 *          *
* Vel Total (ft/s)   *    11.09 * Avg. Vel. (ft/s)  *          *    11.09 *          *
* Max Chl Dpth (ft)  *    30.50 * Hydr. Depth (ft)  *          *    21.25 *          *
* Crit W.S. (ft)     *          * Wetted Per. (ft)  *          *   543.28 *          *
* Conv. Total (cfs) *3529698.0 * Conv. (cfs)        *          *3529698.0 *          *
********************************************************************************

Warning - The cross-section end points had to be extended vertically for the
                computed water surface.
Warning - The velocity head has changed by more than 0.5 ft (0.15 m).  This may
                indicate the need for additional cross sections.

CROSS SECTION INPUT    Reach: ALMAREVISED    River Station: 568.0
Description: SECTION UPSTREAM SIDE BR.

Station Elevation Data,  num = 6
    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.
     200  1203.7   227.5    1189     365  1187.4     516  1185.7     579 1190.64
     604  1203.7

Manning's n Values,  num = 3
    Sta.   Value    Sta.   Value    Sta.   Value
     200    .035     200    .035     604    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right    Coeff Contr.   Expan.
           200     604              109     109     109             .1       .3

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 568.0     Profile # 1
********************************************************************************
* W.S. Elev (ft)     *  1198.95 * Element           *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *     2.04 * Wt. n-Val.        *          *    0.035 *          *
* E.G. Elev (ft)     *  1200.99 * Reach Len. (ft)   *     5.00 *     5.00 *     5.00 *
* E.G. Slope (ft/ft)* 0.003085 * Flow Area (sq ft) *          *  4187.83 *          *
* Q Total (cfs)      * 48000.00 * Flow (cfs)        *          * 48000.00 *          *
* Top Width (ft)     *   386.02 * Top Width (ft)    *          *   386.02 *          *
* Vel Total (ft/s)   *    11.46 * Avg. Vel. (ft/s)  *          *    11.46 *          *
* Max Chl Dpth (ft)  *    13.25 * Hydr. Depth (ft)  *          *    10.85 *          *
```

```
* Crit W.S. (ft)     *  1195.80 * Wetted Per. (ft)  *          *   390.76 *          *
* Conv. Total (cfs) * 864241.8 * Conv. (cfs)       *          * 864241.8 *          *
*****************************************************************************************

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 568.0     Profile # 2
*****************************************************************************************
* W.S. Elev (ft)     *  1198.93 * Element           *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *     4.67 * Wt. n-Val.        *          *    0.035 *          *
* E.G. Elev (ft)     *  1203.60 * Reach Len. (ft)   *     5.00 *     5.00 *     5.00 *
* E.G. Slope (ft/ft)* 0.007071 * Flow Area (sq ft) *          *  4181.52 *          *
* Q Total (cfs)      * 72500.00 * Flow (cfs)        *          * 72500.00 *          *
* Top Width (ft)     *   385.95 * Top Width (ft)    *          *   385.95 *          *
* Vel Total (ft/s)   *    17.34 * Avg. Vel. (ft/s)  *          *    17.34 *          *
* Max Chl Dpth (ft)  *    13.23 * Hydr. Depth (ft)  *          *    10.83 *          *
* Crit W.S. (ft)     *  1198.36 * Wetted Per. (ft)  *          *   390.69 *          *
* Conv. Total (cfs) * 862174.3 * Conv. (cfs)       *          * 862174.3 *          *
*****************************************************************************************

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 568.0     Profile # 3
*****************************************************************************************
* W.S. Elev (ft)     *  1212.56 * Element           *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *     2.54 * Wt. n-Val.        *          *    0.035 *          *
* E.G. Elev (ft)     *  1215.10 * Reach Len. (ft)   *     5.00 *     5.00 *     5.00 *
* E.G. Slope (ft/ft)* 0.001427 * Flow Area (sq ft) *          *  9644.92 *          *
* Q Total (cfs)      *123250.00 * Flow (cfs)        *          *123250.00 *          *
* Top Width (ft)     *   404.00 * Top Width (ft)    *          *   404.00 *          *
* Vel Total (ft/s)   *    12.78 * Avg. Vel. (ft/s)  *          *    12.78 *          *
* Max Chl Dpth (ft)  *    26.86 * Hydr. Depth (ft)  *          *    23.87 *          *
* Crit W.S. (ft)     *  1202.88 * Wetted Per. (ft)  *          *   428.82 *          *
* Conv. Total (cfs) *3262660.0 * Conv. (cfs)       *          *3262660.0 *          *
*****************************************************************************************

BRIDGE INPUT           Reach: ALMAREVISED    River Station: 562.0
Description: SOUTH BRIDGE
Distance from Upstream XS =        5
Deck/Roadway Width        =       94
Weir Coefficient          =      2.6
Bridge Deck/Roadway Skew  =
Upstream Deck/Roadway Coordinates,  num = 2
    Sta. Hi Cord Lo Cord    Sta. Hi Cord Lo Cord
*********************************************
     200 1206.83 1203.19     609 1206.83 1203.19
Downstream Deck/Roadway Coordinates,  num = 2
    Sta. Hi Cord Lo Cord    Sta. Hi Cord Lo Cord
*********************************************
     200 1206.83 1203.19     609 1206.83 1203.19
Elevation at which weir flow begins         =
Maximum allowable submergence for weir flow =      .95
Submergence criteria :Broad Crested

Number of Abutments =  2

Upstream Abutment Data,  num = 2
    Sta.   Elev.    Sta.   Elev.
*******************************
     200 1203.19     225    1189
Downstream Abutment Data,  num = 2
    Sta.   Elev.    Sta.   Elev.
*******************************
     200 1203.19     225    1189
```

15.33

```
* Crit W.S. (ft)     *  1195.80 * Wetted Per. (ft)  *          *   390.76 *          *
* Conv. Total (cfs) * 864241.8 * Conv. (cfs)       *          * 864241.8 *          *
*******************************************************************************************

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 568.0     Profile # 2
*******************************************************************************************
* W.S. Elev (ft)     *  1198.93 * Element           *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *     4.67 * Wt. n-Val.        *          *    0.035 *          *
* E.G. Elev (ft)     *  1203.60 * Reach Len. (ft)   *     5.00 *     5.00 *     5.00 *
* E.G. Slope (ft/ft)* 0.007071 * Flow Area (sq ft) *          *  4181.52 *          *
* Q Total (cfs)      * 72500.00 * Flow (cfs)        *          * 72500.00 *          *
* Top Width (ft)     *   385.95 * Top Width (ft)    *          *   385.95 *          *
* Vel Total (ft/s)   *    17.34 * Avg. Vel. (ft/s)  *          *    17.34 *          *
* Max Chl Dpth (ft)  *    13.23 * Hydr. Depth (ft)  *          *    10.83 *          *
* Crit W.S. (ft)     *  1198.36 * Wetted Per. (ft)  *          *   390.69 *          *
* Conv. Total (cfs) * 862174.3 * Conv. (cfs)       *          * 862174.3 *          *
*******************************************************************************************

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 568.0     Profile # 3
*******************************************************************************************
* W.S. Elev (ft)     *  1212.56 * Element           *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *     2.54 * Wt. n-Val.        *          *    0.035 *          *
* E.G. Elev (ft)     *  1215.10 * Reach Len. (ft)   *     5.00 *     5.00 *     5.00 *
* E.G. Slope (ft/ft)* 0.001427 * Flow Area (sq ft) *          *  9644.92 *          *
* Q Total (cfs)      *123250.00 * Flow (cfs)        *          *123250.00 *          *
* Top Width (ft)     *   404.00 * Top Width (ft)    *          *   404.00 *          *
* Vel Total (ft/s)   *    12.78 * Avg. Vel. (ft/s)  *          *    12.78 *          *
* Max Chl Dpth (ft)  *    26.86 * Hydr. Depth (ft)  *          *    23.87 *          *
* Crit W.S. (ft)     *  1202.88 * Wetted Per. (ft)  *          *   428.82 *          *
* Conv. Total (cfs) *3262660.0 * Conv. (cfs)       *          *3262660.0 *          *
*******************************************************************************************

BRIDGE INPUT           Reach: ALMAREVISED    River Station: 562.0
Description: SOUTH BRIDGE
Distance from Upstream XS =       5
Deck/Roadway Width        =      94
Weir Coefficient          =     2.6
Bridge Deck/Roadway Skew  =
Upstream Deck/Roadway Coordinates,  num = 2
    Sta. Hi Cord Lo Cord    Sta. Hi Cord Lo Cord
*********************************************
     200 1206.83 1203.19     609 1206.83 1203.19
Downstream Deck/Roadway Coordinates,  num = 2
    Sta. Hi Cord Lo Cord    Sta. Hi Cord Lo Cord
*********************************************
     200 1206.83 1203.19     609 1206.83 1203.19
Elevation at which weir flow begins         =
Maximum allowable submergence for weir flow =     .95
Submergence criteria :Broad Crested

Number of Abutments =  2

Upstream Abutment Data,  num = 2
    Sta.   Elev.    Sta.   Elev.
*******************************
     200 1203.19     225    1189
Downstream Abutment Data,  num = 2
    Sta.   Elev.    Sta.   Elev.
*******************************
     200 1203.19     225    1189
```

15.33

```
Upstream Abutment Data,  num = 2
    Sta.   Elev.    Sta.   Elev.
*********************************
     584    1187     609 1203.19
Downstream Abutment Data,  num = 2
    Sta.   Elev.    Sta.   Elev.
*********************************
     584    1187     609 1203.19

Number of Piers =  6

Pier Station     Upstream=   258.5    Downstream=   258.5
Upstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*********************************
    1189     2.5 1203.19     2.5
Downstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*********************************
    1189     2.5 1203.19     2.5

Pier Station     Upstream=     317    Downstream=     317
Upstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*********************************
  1188.5     2.5 1203.19     2.5
Downstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*********************************
  1188.5     2.5 1203.19     2.5

Pier Station     Upstream=   375.5    Downstream=   375.5
Upstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*********************************
    1188     2.5 1203.19     2.5
Downstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*********************************
    1188     2.5 1203.19     2.5

Pier Station     Upstream=     434    Downstream=     434
Upstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*********************************
    1188     2.5 1203.19     2.5
Downstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*********************************
    1188     2.5 1203.19     2.5

Pier Station     Upstream=   492.5    Downstream=   492.5
Upstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*********************************
  1187.5     2.5 1203.19     2.5
Downstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*********************************
  1187.5     2.5 1203.19     2.5
```

```
Upstream Abutment Data,  num = 2
    Sta.   Elev.    Sta.   Elev.
*********************************
     584    1187     609 1203.19
Downstream Abutment Data,  num = 2
    Sta.   Elev.    Sta.   Elev.
*********************************
     584    1187     609 1203.19

Number of Piers =  6

Pier Station     Upstream=   258.5    Downstream=   258.5
Upstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*********************************
    1189     2.5 1203.19     2.5
Downstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*********************************
    1189     2.5 1203.19     2.5

Pier Station     Upstream=     317    Downstream=     317
Upstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*********************************
  1188.5     2.5 1203.19     2.5
Downstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*********************************
  1188.5     2.5 1203.19     2.5

Pier Station     Upstream=   375.5    Downstream=   375.5
Upstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*********************************
    1188     2.5 1203.19     2.5
Downstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*********************************
    1188     2.5 1203.19     2.5

Pier Station     Upstream=     434    Downstream=     434
Upstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*********************************
    1188     2.5 1203.19     2.5
Downstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*********************************
    1188     2.5 1203.19     2.5

Pier Station     Upstream=   492.5    Downstream=   492.5
Upstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*********************************
  1187.5     2.5 1203.19     2.5
Downstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*********************************
  1187.5     2.5 1203.19     2.5
```

```
Pier Station     Upstream=     551    Downstream=     551
Upstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*******************************
    1187     2.5 1203.19     2.5
Downstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*******************************
    1187     2.5 1203.19     2.5

Number of Bridge Coefficient Sets =  1

Low Flow Methods
       Energy
       Momentum                Cd   =       0
       Yarnell                 KVal =    1.25
       W.S. Pro Method         CVal =
Selected Low Flow Methods = Yarnell

High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd           =
           Submerged Inlet + Outlet Cd =       .8
           Max Low Cord                 =

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the downstream end
       Criteria to check for pressure flow = Upstream water surface

BRIDGE OUTPUT  Reach: ALMAREVISED   Riv Sta: 562.0     Profile # 1
Opening : Bridge #1
*******************************************************************************
* E.G. US. (ft)       *     1200.99 * Element              *Inside BR US *Inside BR DS *
* W.S. US. (ft)       *     1198.95 * E.G. Elev (ft)       *     1200.99 *     1200.99 *
* Q Total (cfs)       *    48000.00 * W.S. Elev (ft)       *     1198.95 *     1198.90 *
* Q Bridge (cfs)      *    48000.00 * Crit W.S. (ft)       *     1196.02 *     1192.80 *
* Q Weir (cfs)        *             * Max Chl Dpth (ft)    *             *             *
* Weir Sta Lft (ft)   *             * Vel Total (ft/s)     *             *             *
* Weir Sta Rgt (ft)   *             * Flow Area (sq ft)    *             *             *
* Weir Submerg        *             * Froude # Chl         *             *             *
* Weir Max Depth (ft) *             * Specif Force (cu ft)*             *             *
* Min Top Rd (ft)     *     1206.83 * Hydr Depth (ft)      *             *             *
* Min El Prs (ft)     *     1203.19 * W.P. Total (ft)      *             *             *
* Delta EG (ft)       *        1.64 * Conv. Total (cfs)    *             *             *
* Delta WS (ft)       *        0.05 * Top Width (ft)       *             *             *
*******************************************************************************

BRIDGE OUTPUT  Reach: ALMAREVISED   Riv Sta: 562.0     Profile # 2
Opening : Bridge #1
*******************************************************************************
* E.G. US. (ft)       *     1203.60 * Element              *Inside BR US *Inside BR DS *
* W.S. US. (ft)       *     1198.93 * E.G. Elev (ft)       *     1203.60 *     1203.60 *
* Q Total (cfs)       *    72500.00 * W.S. Elev (ft)       *     1198.93 *     1198.76 *
* Q Bridge (cfs)      *    72500.00 * Crit W.S. (ft)       *     1198.67 *     1194.46 *
* Q Weir (cfs)        *             * Max Chl Dpth (ft)    *             *             *
* Weir Sta Lft (ft)   *             * Vel Total (ft/s)     *             *             *
* Weir Sta Rgt (ft)   *             * Flow Area (sq ft)    *             *             *
* Weir Submerg        *             * Froude # Chl         *             *             *
```

```
Pier Station     Upstream=     551    Downstream=     551
Upstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*******************************
    1187     2.5 1203.19     2.5
Downstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*******************************
    1187     2.5 1203.19     2.5

Number of Bridge Coefficient Sets =  1

Low Flow Methods
       Energy
       Momentum                Cd   =       0
       Yarnell                 KVal =    1.25
       W.S. Pro Method         CVal =
Selected Low Flow Methods = Yarnell

High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd          =
           Submerged Inlet + Outlet Cd =       .8
           Max Low Cord                =

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the downstream end
       Criteria to check for pressure flow = Upstream water surface

BRIDGE OUTPUT  Reach: ALMAREVISED   Riv Sta: 562.0     Profile # 1
Opening : Bridge #1
*******************************************************************************
* E.G. US. (ft)        *     1200.99 * Element              *Inside BR US *Inside BR DS *
* W.S. US. (ft)        *     1198.95 * E.G. Elev (ft)       *     1200.99 *     1200.99 *
* Q Total (cfs)        *    48000.00 * W.S. Elev (ft)       *     1198.95 *     1198.90 *
* Q Bridge (cfs)       *    48000.00 * Crit W.S. (ft)       *     1196.02 *     1192.80 *
* Q Weir (cfs)         *             * Max Chl Dpth (ft)    *             *             *
* Weir Sta Lft (ft)    *             * Vel Total (ft/s)     *             *             *
* Weir Sta Rgt (ft)    *             * Flow Area (sq ft)    *             *             *
* Weir Submerg         *             * Froude # Chl         *             *             *
* Weir Max Depth (ft)  *             * Specif Force (cu ft)*             *             *
* Min Top Rd (ft)      *     1206.83 * Hydr Depth (ft)      *             *             *
* Min El Prs (ft)      *     1203.19 * W.P. Total (ft)      *             *             *
* Delta EG (ft)        *        1.64 * Conv. Total (cfs)    *             *             *
* Delta WS (ft)        *        0.05 * Top Width (ft)       *             *             *
*******************************************************************************

BRIDGE OUTPUT  Reach: ALMAREVISED   Riv Sta: 562.0     Profile # 2
Opening : Bridge #1
*******************************************************************************
* E.G. US. (ft)        *     1203.60 * Element              *Inside BR US *Inside BR DS *
* W.S. US. (ft)        *     1198.93 * E.G. Elev (ft)       *     1203.60 *     1203.60 *
* Q Total (cfs)        *    72500.00 * W.S. Elev (ft)       *     1198.93 *     1198.76 *
* Q Bridge (cfs)       *    72500.00 * Crit W.S. (ft)       *     1198.67 *     1194.46 *
* Q Weir (cfs)         *             * Max Chl Dpth (ft)    *             *             *
* Weir Sta Lft (ft)    *             * Vel Total (ft/s)     *             *             *
* Weir Sta Rgt (ft)    *             * Flow Area (sq ft)    *             *             *
* Weir Submerg         *             * Froude # Chl         *             *             *
```

```
* Weir Max Depth (ft) *             * Specif Force (cu ft)*             *             *
* Min Top Rd (ft)     *     1206.83 * Hydr Depth (ft)     *             *             *
* Min El Prs (ft)     *     1203.19 * W.P. Total (ft)     *             *             *
* Delta EG (ft)       *        3.79 * Conv. Total (cfs)   *             *             *
* Delta WS (ft)       *        0.17 * Top Width (ft)      *             *             *
*******************************************************************************************

BRIDGE OUTPUT  Reach: ALMAREVISED   Riv Sta: 562.0     Profile # 3
Opening : Bridge #1
*******************************************************************************************
* E.G. US. (ft)       *     1215.10 * Element             *Inside BR US *Inside BR DS *
* W.S. US. (ft)       *     1212.56 * E.G. Elev (ft)      *     1215.10 *     1201.98 *
* Q Total (cfs)       *   123250.00 * W.S. Elev (ft)      *     1212.56 *     1198.10 *
* Q Bridge (cfs)      *    98375.69 * Crit W.S. (ft)      *     1203.18 *     1197.24 *
* Q Weir (cfs)        *    24970.76 * Max Chl Dpth (ft)   *             *             *
* Weir Sta Lft (ft)   *      200.00 * Vel Total (ft/s)    *             *             *
* Weir Sta Rgt (ft)   *      604.00 * Flow Area (sq ft)   *             *             *
* Weir Submerg        *        0.00 * Froude # Chl        *             *             *
* Weir Max Depth (ft) *        8.27 * Specif Force (cu ft)*             *             *
* Min Top Rd (ft)     *     1206.83 * Hydr Depth (ft)     *             *             *
* Min El Prs (ft)     *     1203.19 * W.P. Total (ft)     *             *             *
* Delta EG (ft)       *       13.55 * Conv. Total (cfs)   *             *             *
* Delta WS (ft)       *       14.46 * Top Width (ft)      *             *             *
*******************************************************************************************

CROSS SECTION INPUT    Reach: ALMAREVISED    River Station: 459.0
Description: CONC. WALL

Station Elevation Data,  num = 9
    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.
      1    1191      30    1179      50    1195     100    1188     200    1188
    575    1188     609    1195     700    1179     800    1191

Manning's n Values,  num = 3
    Sta.   Value    Sta.   Value    Sta.   Value
      1    .035       1    .035     800    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right    Coeff Contr.   Expan.
            1     800              176     176     176             .1       .3

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 459.0     Profile # 1
*******************************************************************************************
* W.S. Elev (ft)     *  1198.90 * Element            *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *     0.45 * Wt. n-Val.         *          *    0.035 *          *
* E.G. Elev (ft)     *  1199.35 * Reach Len. (ft)    *   176.00 *   176.00 *   176.00 *
* E.G. Slope (ft/ft)* 0.000675 * Flow Area (sq ft) *          *  8912.92 *          *
* Q Total (cfs)      * 48000.00 * Flow (cfs)         *          * 48000.00 *          *
* Top Width (ft)     *   799.00 * Top Width (ft)     *          *   799.00 *          *
* Vel Total (ft/s)   *     5.39 * Avg. Vel. (ft/s)   *          *     5.39 *          *
* Max Chl Dpth (ft)  *    19.90 * Hydr. Depth (ft)   *          *    11.16 *          *
* Crit W.S. (ft)     *          * Wetted Per. (ft)   *          *   826.11 *          *
* Conv. Total (cfs) *1847574.0 * Conv. (cfs)        *          *1847574.0 *          *
*******************************************************************************************

Warning - The cross-section end points had to be extended vertically for the
          computed water surface.
Warning - The conveyance ratio (upstream conveyance divided by downstream
          conveyance) is less than 0.7 or greater than 1.4.  This may indicate the
          need for additional cross sections.

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 459.0     Profile # 2
```

```
* Weir Max Depth (ft) *             * Specif Force (cu ft)*             *             *
* Min Top Rd (ft)     *     1206.83 * Hydr Depth (ft)     *             *             *
* Min El Prs (ft)     *     1203.19 * W.P. Total (ft)     *             *             *
* Delta EG (ft)       *        3.79 * Conv. Total (cfs)   *             *             *
* Delta WS (ft)       *        0.17 * Top Width (ft)      *             *             *
*******************************************************************************************

BRIDGE OUTPUT  Reach: ALMAREVISED   Riv Sta: 562.0     Profile # 3
Opening : Bridge #1
*******************************************************************************************
* E.G. US. (ft)       *     1215.10 * Element             *Inside BR US *Inside BR DS *
* W.S. US. (ft)       *     1212.56 * E.G. Elev (ft)      *     1215.10 *     1201.98 *
* Q Total (cfs)       *   123250.00 * W.S. Elev (ft)      *     1212.56 *     1198.10 *
* Q Bridge (cfs)      *    98375.69 * Crit W.S. (ft)      *     1203.18 *     1197.24 *
* Q Weir (cfs)        *    24970.76 * Max Chl Dpth (ft)   *             *             *
* Weir Sta Lft (ft)   *      200.00 * Vel Total (ft/s)    *             *             *
* Weir Sta Rgt (ft)   *      604.00 * Flow Area (sq ft)   *             *             *
* Weir Submerg        *        0.00 * Froude # Chl        *             *             *
* Weir Max Depth (ft) *        8.27 * Specif Force (cu ft)*             *             *
* Min Top Rd (ft)     *     1206.83 * Hydr Depth (ft)     *             *             *
* Min El Prs (ft)     *     1203.19 * W.P. Total (ft)     *             *             *
* Delta EG (ft)       *       13.55 * Conv. Total (cfs)   *             *             *
* Delta WS (ft)       *       14.46 * Top Width (ft)      *             *             *
*******************************************************************************************

CROSS SECTION INPUT    Reach: ALMAREVISED    River Station: 459.0
Description: CONC. WALL

Station Elevation Data,  num = 9
    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.
       1    1191      30    1179      50    1195     100    1188     200    1188
     575    1188     609    1195     700    1179     800    1191

Manning's n Values,  num = 3
    Sta.   Value    Sta.   Value    Sta.   Value
       1    .035       1    .035     800    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right    Coeff Contr.   Expan.
             1     800              176     176     176             .1       .3

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 459.0     Profile # 1
*******************************************************************************************
* W.S. Elev (ft)     *  1198.90 * Element            *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *     0.45 * Wt. n-Val.         *          *    0.035 *          *
* E.G. Elev (ft)     *  1199.35 * Reach Len. (ft)    *   176.00 *   176.00 *   176.00 *
* E.G. Slope (ft/ft)* 0.000675 * Flow Area (sq ft) *          *  8912.92 *          *
* Q Total (cfs)      * 48000.00 * Flow (cfs)         *          * 48000.00 *          *
* Top Width (ft)     *   799.00 * Top Width (ft)     *          *   799.00 *          *
* Vel Total (ft/s)   *     5.39 * Avg. Vel. (ft/s)   *          *     5.39 *          *
* Max Chl Dpth (ft)  *    19.90 * Hydr. Depth (ft)   *          *    11.16 *          *
* Crit W.S. (ft)     *          * Wetted Per. (ft)   *          *   826.11 *          *
* Conv. Total (cfs) *1847574.0 * Conv. (cfs)        *          *1847574.0 *          *
*******************************************************************************************

Warning - The cross-section end points had to be extended vertically for the
          computed water surface.
Warning - The conveyance ratio (upstream conveyance divided by downstream
          conveyance) is less than 0.7 or greater than 1.4.  This may indicate the
          need for additional cross sections.

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 459.0     Profile # 2
```

```
*******************************************************************************
* W.S. Elev (ft)     *  1198.76 * Element           *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *     1.05 * Wt. n-Val.        *          *    0.035 *          *
* E.G. Elev (ft)     *  1199.81 * Reach Len. (ft)   *   176.00 *   176.00 *   176.00 *
* E.G. Slope (ft/ft)* 0.001606 * Flow Area (sq ft) *          *  8799.69 *          *
* Q Total (cfs)      * 72500.00 * Flow (cfs)        *          * 72500.00 *          *
* Top Width (ft)     *   799.00 * Top Width (ft)    *          *   799.00 *          *
* Vel Total (ft/s)   *     8.24 * Avg. Vel. (ft/s)  *          *     8.24 *          *
* Max Chl Dpth (ft)  *    19.76 * Hydr. Depth (ft)  *          *    11.01 *          *
* Crit W.S. (ft)     *          * Wetted Per. (ft)  *          *   825.83 *          *
* Conv. Total (cfs) *1809032.0 * Conv. (cfs)       *          *1809032.0 *          *
*******************************************************************************

Warning - The cross-section end points had to be extended vertically for the
               computed water surface.
Warning - The conveyance ratio (upstream conveyance divided by downstream
               conveyance) is less than 0.7 or greater than 1.4.  This may indicate the
               need for additional cross sections.

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 459.0     Profile # 3
*******************************************************************************
* W.S. Elev (ft)     *  1198.10 * Element           *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *     3.44 * Wt. n-Val.        *          *    0.035 *          *
* E.G. Elev (ft)     *  1201.55 * Reach Len. (ft)   *   176.00 *   176.00 *   176.00 *
* E.G. Slope (ft/ft)* 0.005682 * Flow Area (sq ft) *          *  8276.32 *          *
* Q Total (cfs)      *123250.00 * Flow (cfs)        *          *123250.00 *          *
* Top Width (ft)     *   799.00 * Top Width (ft)    *          *   799.00 *          *
* Vel Total (ft/s)   *    14.89 * Avg. Vel. (ft/s)  *          *    14.89 *          *
* Max Chl Dpth (ft)  *    19.10 * Hydr. Depth (ft)  *          *    10.36 *          *
* Crit W.S. (ft)     *          * Wetted Per. (ft)  *          *   824.52 *          *
* Conv. Total (cfs) *1635018.0 * Conv. (cfs)       *          *1635018.0 *          *
*******************************************************************************

Warning - The cross-section end points had to be extended vertically for the
               computed water surface.
Warning - The velocity head has changed by more than 0.5 ft (0.15 m).  This may
               indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream
               conveyance) is less than 0.7 or greater than 1.4.  This may indicate the
               need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and
               previous cross section.  This may indicate the need for additional cross
               sections.

CROSS SECTION INPUT    Reach: ALMAREVISED    River Station: 283.0
Description: FIRST SECT. DOWNSTREAM BRID.

Station Elevation Data,  num = 12
    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.
      1    1200       5    1197     130    1192     230    1179     315  1177.5
    365  1177.5     472  1179.2     558    1187     824    1189     855    1197
    860    1200     887  1200.5

Manning's n Values,  num = 3
    Sta.   Value    Sta.   Value    Sta.   Value
      1    .035       1    .035     860    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right    Coeff Contr.   Expan.
             1     860              192     192     192             .1       .3

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 283.0     Profile # 1
```

```
*******************************************************************************
* W.S. Elev (ft)     *  1198.76 * Element            *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *     1.05 * Wt. n-Val.         *          *    0.035 *          *
* E.G. Elev (ft)     *  1199.81 * Reach Len. (ft)    *   176.00 *   176.00 *   176.00 *
* E.G. Slope (ft/ft)* 0.001606 * Flow Area (sq ft) *          *  8799.69 *          *
* Q Total (cfs)      * 72500.00 * Flow (cfs)         *          * 72500.00 *          *
* Top Width (ft)     *   799.00 * Top Width (ft)     *          *   799.00 *          *
* Vel Total (ft/s)   *     8.24 * Avg. Vel. (ft/s)   *          *     8.24 *          *
* Max Chl Dpth (ft)  *    19.76 * Hydr. Depth (ft)   *          *    11.01 *          *
* Crit W.S. (ft)     *          * Wetted Per. (ft)   *          *   825.83 *          *
* Conv. Total (cfs) *1809032.0 * Conv. (cfs)        *          *1809032.0 *          *
*******************************************************************************

Warning - The cross-section end points had to be extended vertically for the
                computed water surface.
Warning - The conveyance ratio (upstream conveyance divided by downstream
                conveyance) is less than 0.7 or greater than 1.4.  This may indicate the
                need for additional cross sections.

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 459.0     Profile # 3
*******************************************************************************
* W.S. Elev (ft)     *  1198.10 * Element            *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *     3.44 * Wt. n-Val.         *          *    0.035 *          *
* E.G. Elev (ft)     *  1201.55 * Reach Len. (ft)    *   176.00 *   176.00 *   176.00 *
* E.G. Slope (ft/ft)* 0.005682 * Flow Area (sq ft) *          *  8276.32 *          *
* Q Total (cfs)      *123250.00 * Flow (cfs)         *          *123250.00 *          *
* Top Width (ft)     *   799.00 * Top Width (ft)     *          *   799.00 *          *
* Vel Total (ft/s)   *    14.89 * Avg. Vel. (ft/s)   *          *    14.89 *          *
* Max Chl Dpth (ft)  *    19.10 * Hydr. Depth (ft)   *          *    10.36 *          *
* Crit W.S. (ft)     *          * Wetted Per. (ft)   *          *   824.52 *          *
* Conv. Total (cfs) *1635018.0 * Conv. (cfs)        *          *1635018.0 *          *
*******************************************************************************

Warning - The cross-section end points had to be extended vertically for the
                computed water surface.
Warning - The velocity head has changed by more than 0.5 ft (0.15 m).  This may
                indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream
                conveyance) is less than 0.7 or greater than 1.4.  This may indicate the
                need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and
                previous cross section.  This may indicate the need for additional cross
                sections.

CROSS SECTION INPUT    Reach: ALMAREVISED    River Station: 283.0
Description: FIRST SECT. DOWNSTREAM BRID.

Station Elevation Data,  num = 12
    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.
      1    1200       5    1197     130    1192     230    1179     315  1177.5
    365  1177.5     472  1179.2     558    1187     824    1189     855    1197
    860    1200     887  1200.5

Manning's n Values,  num = 3
    Sta.   Value    Sta.   Value    Sta.   Value
      1    .035       1    .035     860    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right    Coeff Contr.   Expan.
             1     860              192     192     192             .1       .3

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 283.0     Profile # 1
```

```
*******************************************************************************
* W.S. Elev (ft)     *  1198.94 * Element            *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *     0.28 * Wt. n-Val.         *          *    0.035 *          *
* E.G. Elev (ft)     *  1199.22 * Reach Len. (ft)    *   192.00 *   192.00 *   192.00 *
* E.G. Slope (ft/ft)* 0.000313 * Flow Area (sq ft) *          * 11398.35 *          *
* Q Total (cfs)      * 48000.00 * Flow (cfs)         *          * 48000.00 *          *
* Top Width (ft)     *   855.83 * Top Width (ft)     *          *   855.83 *          *
* Vel Total (ft/s)   *     4.21 * Avg. Vel. (ft/s)   *          *     4.21 *          *
* Max Chl Dpth (ft)  *    21.44 * Hydr. Depth (ft)   *          *    13.32 *          *
* Crit W.S. (ft)     *          * Wetted Per. (ft)   *          *   859.36 *          *
* Conv. Total (cfs) *2711520.0 * Conv. (cfs)        *          *2711520.0 *          *
*******************************************************************************
```

Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Reach: ALMAREVISED Riv Sta: 283.0 Profile # 2

```
*******************************************************************************
* W.S. Elev (ft)     *  1198.87 * Element            *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *     0.64 * Wt. n-Val.         *          *    0.035 *          *
* E.G. Elev (ft)     *  1199.50 * Reach Len. (ft)    *   192.00 *   192.00 *   192.00 *
* E.G. Slope (ft/ft)* 0.000728 * Flow Area (sq ft) *          * 11333.17 *          *
* Q Total (cfs)      * 72500.00 * Flow (cfs)         *          * 72500.00 *          *
* Top Width (ft)     *   855.60 * Top Width (ft)     *          *   855.60 *          *
* Vel Total (ft/s)   *     6.40 * Avg. Vel. (ft/s)   *          *     6.40 *          *
* Max Chl Dpth (ft)  *    21.37 * Hydr. Depth (ft)   *          *    13.25 *          *
* Crit W.S. (ft)     *          * Wetted Per. (ft)   *          *   859.09 *          *
* Conv. Total (cfs) *2686299.0 * Conv. (cfs)        *          *2686299.0 *          *
*******************************************************************************
```

Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Reach: ALMAREVISED Riv Sta: 283.0 Profile # 3

```
*******************************************************************************
* W.S. Elev (ft)     *  1198.57 * Element            *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *     1.92 * Wt. n-Val.         *          *    0.035 *          *
* E.G. Elev (ft)     *  1200.49 * Reach Len. (ft)    *   192.00 *   192.00 *   192.00 *
* E.G. Slope (ft/ft)* 0.002270 * Flow Area (sq ft) *          * 11074.18 *          *
* Q Total (cfs)      *123250.00 * Flow (cfs)         *          *123250.00 *          *
* Top Width (ft)     *   854.70 * Top Width (ft)     *          *   854.70 *          *
* Vel Total (ft/s)   *    11.13 * Avg. Vel. (ft/s)   *          *    11.13 *          *
* Max Chl Dpth (ft)  *    21.07 * Hydr. Depth (ft)   *          *    12.96 *          *
* Crit W.S. (ft)     *          * Wetted Per. (ft)   *          *   857.99 *          *
* Conv. Total (cfs) *2586963.0 * Conv. (cfs)        *          *2586963.0 *          *
*******************************************************************************
```

Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION INPUT Reach: ALMAREVISED River Station: 91.0
Description: LAST DOWNSTREAM SECTION

Station Elevation Data, num = 8

Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
10	1200	20	1181	100	1176	346	1172.6	412	1181

```
*****************************************************************************************
* W.S. Elev (ft)     *  1198.94 * Element            *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *     0.28 * Wt. n-Val.         *          *    0.035 *          *
* E.G. Elev (ft)     *  1199.22 * Reach Len. (ft)    *   192.00 *   192.00 *   192.00 *
* E.G. Slope (ft/ft)* 0.000313 * Flow Area (sq ft) *          * 11398.35 *          *
* Q Total (cfs)      * 48000.00 * Flow (cfs)         *          * 48000.00 *          *
* Top Width (ft)     *   855.83 * Top Width (ft)     *          *   855.83 *          *
* Vel Total (ft/s)   *     4.21 * Avg. Vel. (ft/s)   *          *     4.21 *          *
* Max Chl Dpth (ft)  *    21.44 * Hydr. Depth (ft)   *          *    13.32 *          *
* Crit W.S. (ft)     *          * Wetted Per. (ft)   *          *   859.36 *          *
* Conv. Total (cfs) *2711520.0 * Conv. (cfs)        *          *2711520.0 *          *
*****************************************************************************************
```

Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Reach: ALMAREVISED Riv Sta: 283.0 Profile # 2

```
*****************************************************************************************
* W.S. Elev (ft)     *  1198.87 * Element            *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *     0.64 * Wt. n-Val.         *          *    0.035 *          *
* E.G. Elev (ft)     *  1199.50 * Reach Len. (ft)    *   192.00 *   192.00 *   192.00 *
* E.G. Slope (ft/ft)* 0.000728 * Flow Area (sq ft) *          * 11333.17 *          *
* Q Total (cfs)      * 72500.00 * Flow (cfs)         *          * 72500.00 *          *
* Top Width (ft)     *   855.60 * Top Width (ft)     *          *   855.60 *          *
* Vel Total (ft/s)   *     6.40 * Avg. Vel. (ft/s)   *          *     6.40 *          *
* Max Chl Dpth (ft)  *    21.37 * Hydr. Depth (ft)   *          *    13.25 *          *
* Crit W.S. (ft)     *          * Wetted Per. (ft)   *          *   859.09 *          *
* Conv. Total (cfs) *2686299.0 * Conv. (cfs)        *          *2686299.0 *          *
*****************************************************************************************
```

Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Reach: ALMAREVISED Riv Sta: 283.0 Profile # 3

```
*****************************************************************************************
* W.S. Elev (ft)     *  1198.57 * Element            *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *     1.92 * Wt. n-Val.         *          *    0.035 *          *
* E.G. Elev (ft)     *  1200.49 * Reach Len. (ft)    *   192.00 *   192.00 *   192.00 *
* E.G. Slope (ft/ft)* 0.002270 * Flow Area (sq ft) *          * 11074.18 *          *
* Q Total (cfs)      *123250.00 * Flow (cfs)         *          *123250.00 *          *
* Top Width (ft)     *   854.70 * Top Width (ft)     *          *   854.70 *          *
* Vel Total (ft/s)   *    11.13 * Avg. Vel. (ft/s)   *          *    11.13 *          *
* Max Chl Dpth (ft)  *    21.07 * Hydr. Depth (ft)   *          *    12.96 *          *
* Crit W.S. (ft)     *          * Wetted Per. (ft)   *          *   857.99 *          *
* Conv. Total (cfs) *2586963.0 * Conv. (cfs)        *          *2586963.0 *          *
*****************************************************************************************
```

Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION INPUT Reach: ALMAREVISED River Station: 91.0
Description: LAST DOWNSTREAM SECTION

Station Elevation Data, num = 8

Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
10	1200	20	1181	100	1176	346	1172.6	412	1181

```
     512     1181      630     1182      950     1200

Manning's n Values,  num = 3
    Sta.   Value    Sta.   Value    Sta.   Value
      10    .035      10    .035     950    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right    Coeff Contr.   Expan.
            10     950                 0       0       0             .1       .3

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 91.0      Profile # 1
*******************************************************************************
* W.S. Elev (ft)     *  1199.00 * Element           *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *     0.15 * Wt. n-Val.        *          *    0.035 *          *
* E.G. Elev (ft)     *  1199.15 * Reach Len. (ft)   *          *          *          *
* E.G. Slope (ft/ft)* 0.000120 * Flow Area (sq ft) *          * 15700.56 *          *
* Q Total (cfs)      * 48000.00 * Flow (cfs)        *          * 48000.00 *          *
* Top Width (ft)     *   921.70 * Top Width (ft)    *          *   921.70 *          *
* Vel Total (ft/s)   *     3.06 * Avg. Vel. (ft/s)  *          *     3.06 *          *
* Max Chl Dpth (ft)  *    26.40 * Hydr. Depth (ft)  *          *    17.03 *          *
* Crit W.S. (ft)     *  1183.46 * Wetted Per. (ft)  *          *   933.76 *          *
* Conv. Total (cfs) *4374847.0 * Conv. (cfs)       *          *4374847.0 *          *
*******************************************************************************

Warning - The parabolic search method failed to converge on critical depth.  The
          program will try the cross section slice/secant method to find critical
          depth.

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 91.0      Profile # 2
*******************************************************************************
* W.S. Elev (ft)     *  1199.00 * Element           *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *     0.33 * Wt. n-Val.        *          *    0.035 *          *
* E.G. Elev (ft)     *  1199.33 * Reach Len. (ft)   *          *          *          *
* E.G. Slope (ft/ft)* 0.000275 * Flow Area (sq ft) *          * 15700.56 *          *
* Q Total (cfs)      * 72500.00 * Flow (cfs)        *          * 72500.00 *          *
* Top Width (ft)     *   921.70 * Top Width (ft)    *          *   921.70 *          *
* Vel Total (ft/s)   *     4.62 * Avg. Vel. (ft/s)  *          *     4.62 *          *
* Max Chl Dpth (ft)  *    26.40 * Hydr. Depth (ft)  *          *    17.03 *          *
* Crit W.S. (ft)     *  1185.26 * Wetted Per. (ft)  *          *   933.76 *          *
* Conv. Total (cfs) *4374847.0 * Conv. (cfs)       *          *4374847.0 *          *
*******************************************************************************

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 91.0      Profile # 3
*******************************************************************************
* W.S. Elev (ft)     *  1199.00 * Element           *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *     0.96 * Wt. n-Val.        *          *    0.035 *          *
* E.G. Elev (ft)     *  1199.96 * Reach Len. (ft)   *          *          *          *
* E.G. Slope (ft/ft)* 0.000794 * Flow Area (sq ft) *          * 15700.56 *          *
* Q Total (cfs)      *123250.00 * Flow (cfs)        *          *123250.00 *          *
* Top Width (ft)     *   921.70 * Top Width (ft)    *          *   921.70 *          *
* Vel Total (ft/s)   *     7.85 * Avg. Vel. (ft/s)  *          *     7.85 *          *
* Max Chl Dpth (ft)  *    26.40 * Hydr. Depth (ft)  *          *    17.03 *          *
* Crit W.S. (ft)     *  1188.45 * Wetted Per. (ft)  *          *   933.76 *          *
* Conv. Total (cfs) *4374847.0 * Conv. (cfs)       *          *4374847.0 *          *
*******************************************************************************

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

SUMMARY OF MANNING'S N VALUES

*****************************************************
*    Reach    * River Sta. *   n1    *   n2    *   n3    *
```

```
     512     1181      630     1182      950     1200

Manning's n Values,  num = 3
    Sta.   Value    Sta.   Value    Sta.   Value
      10    .035      10    .035     950    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right    Coeff Contr.   Expan.
            10     950                 0       0       0             .1       .3

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 91.0      Profile # 1
*******************************************************************************
* W.S. Elev (ft)     *  1199.00 * Element           *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *     0.15 * Wt. n-Val.        *          *    0.035 *          *
* E.G. Elev (ft)     *  1199.15 * Reach Len. (ft)   *          *          *          *
* E.G. Slope (ft/ft)* 0.000120 * Flow Area (sq ft) *          * 15700.56 *          *
* Q Total (cfs)      * 48000.00 * Flow (cfs)        *          * 48000.00 *          *
* Top Width (ft)     *   921.70 * Top Width (ft)    *          *   921.70 *          *
* Vel Total (ft/s)   *     3.06 * Avg. Vel. (ft/s)  *          *     3.06 *          *
* Max Chl Dpth (ft)  *    26.40 * Hydr. Depth (ft)  *          *    17.03 *          *
* Crit W.S. (ft)     *  1183.46 * Wetted Per. (ft)  *          *   933.76 *          *
* Conv. Total (cfs) *4374847.0 * Conv. (cfs)       *          *4374847.0 *          *
*******************************************************************************

Warning - The parabolic search method failed to converge on critical depth.  The
          program will try the cross section slice/secant method to find critical
          depth.

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 91.0      Profile # 2
*******************************************************************************
* W.S. Elev (ft)     *  1199.00 * Element           *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *     0.33 * Wt. n-Val.        *          *    0.035 *          *
* E.G. Elev (ft)     *  1199.33 * Reach Len. (ft)   *          *          *          *
* E.G. Slope (ft/ft)* 0.000275 * Flow Area (sq ft) *          * 15700.56 *          *
* Q Total (cfs)      * 72500.00 * Flow (cfs)        *          * 72500.00 *          *
* Top Width (ft)     *   921.70 * Top Width (ft)    *          *   921.70 *          *
* Vel Total (ft/s)   *     4.62 * Avg. Vel. (ft/s)  *          *     4.62 *          *
* Max Chl Dpth (ft)  *    26.40 * Hydr. Depth (ft)  *          *    17.03 *          *
* Crit W.S. (ft)     *  1185.26 * Wetted Per. (ft)  *          *   933.76 *          *
* Conv. Total (cfs) *4374847.0 * Conv. (cfs)       *          *4374847.0 *          *
*******************************************************************************

CROSS SECTION OUTPUT  Reach: ALMAREVISED   Riv Sta: 91.0      Profile # 3
*******************************************************************************
* W.S. Elev (ft)     *  1199.00 * Element           *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *     0.96 * Wt. n-Val.        *          *    0.035 *          *
* E.G. Elev (ft)     *  1199.96 * Reach Len. (ft)   *          *          *          *
* E.G. Slope (ft/ft)* 0.000794 * Flow Area (sq ft) *          * 15700.56 *          *
* Q Total (cfs)      *123250.00 * Flow (cfs)        *          *123250.00 *          *
* Top Width (ft)     *   921.70 * Top Width (ft)    *          *   921.70 *          *
* Vel Total (ft/s)   *     7.85 * Avg. Vel. (ft/s)  *          *     7.85 *          *
* Max Chl Dpth (ft)  *    26.40 * Hydr. Depth (ft)  *          *    17.03 *          *
* Crit W.S. (ft)     *  1188.45 * Wetted Per. (ft)  *          *   933.76 *          *
* Conv. Total (cfs) *4374847.0 * Conv. (cfs)       *          *4374847.0 *          *
*******************************************************************************

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

SUMMARY OF MANNING'S N VALUES

*****************************************************
*    Reach    * River Sta. *    n1    *    n2    *    n3    *
```

*ALMAREVISED *	1239.0 *	.035*	.035*	.035*
*ALMAREVISED *	913.0 *	.035*	.035*	.035*
*ALMAREVISED *	901.6 *	.035*	.035*	.035*
*ALMAREVISED *	756.0 *	.035*	.035*	.035*
*ALMAREVISED *	568.0 *	.035*	.035*	.035*
*ALMAREVISED *	562.0 *	Bridge*	*	*
*ALMAREVISED *	459.0 *	.035*	.035*	.035*
*ALMAREVISED *	283.0 *	.035*	.035*	.035*
*ALMAREVISED *	91.0 *	.035*	.035*	.035*

Mannings n - equal?

SUMMARY OF REACH LENGTHS

Reach	River Sta.	Left	Channel	Right
*ALMAREVISED *	1239.0 *	326*	326*	326*
*ALMAREVISED *	913.0 *	11.4*	11.4*	11.4*
*ALMAREVISED *	901.6 *	145.6*	145.6*	145.6*
*ALMAREVISED *	756.0 *	188*	188*	188*
*ALMAREVISED *	568.0 *	109*	109*	109*
*ALMAREVISED *	562.0 *	Bridge*	*	*
*ALMAREVISED *	459.0 *	176*	176*	176*
*ALMAREVISED *	283.0 *	192*	192*	192*
*ALMAREVISED *	91.0 *	0*	0*	0*

no curves in channel alignment?

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS

Reach	River Sta.	Contr.	Expan.
*ALMAREVISED *	1239.0 *	.1*	.3*
*ALMAREVISED *	913.0 *	.1*	.3*
*ALMAREVISED *	901.6 *	.1*	.3*
*ALMAREVISED *	756.0 *	.1*	.3*
*ALMAREVISED *	568.0 *	.1*	.3*
*ALMAREVISED *	562.0 *	Bridge*	*
*ALMAREVISED *	459.0 *	.1*	.3*
*ALMAREVISED *	283.0 *	.1*	.3*
*ALMAREVISED *	91.0 *	.1*	.3*

equal?

Profile Output Table - Standard Table 1

River Sta.	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1239.0	48000.00	1194.00	1201.50	1207.34	1350.99	2.955987	98.12	489.20	312.04	13.81
1239.0	72500.00	1194.00	1202.00	1209.10	1386.75	3.262699	109.08	664.66	389.81	14.72
1239.0	123250.00	1194.00	1203.50	1212.15	1326.70	1.221493	89.07			

*ALMAREVISED *	1239.0 *	.035*	.035*	.035*
*ALMAREVISED *	913.0 *	.035*	.035*	.035*
*ALMAREVISED *	901.6 *	.035*	.035*	.035*
*ALMAREVISED *	756.0 *	.035*	.035*	.035*
*ALMAREVISED *	568.0 *	.035*	.035*	.035*
*ALMAREVISED *	562.0 *	Bridge*	*	*
*ALMAREVISED *	459.0 *	.035*	.035*	.035*
*ALMAREVISED *	283.0 *	.035*	.035*	.035*
*ALMAREVISED *	91.0 *	.035*	.035*	.035*

SUMMARY OF REACH LENGTHS

* Reach	* River Sta. *	Left *	Channel*	Right *
*ALMAREVISED *	1239.0 *	326*	326*	326*
*ALMAREVISED *	913.0 *	11.4*	11.4*	11.4*
*ALMAREVISED *	901.6 *	145.6*	145.6*	145.6*
*ALMAREVISED *	756.0 *	188*	188*	188*
*ALMAREVISED *	568.0 *	109*	109*	109*
*ALMAREVISED *	562.0 *	Bridge*	*	*
*ALMAREVISED *	459.0 *	176*	176*	176*
*ALMAREVISED *	283.0 *	192*	192*	192*
*ALMAREVISED *	91.0 *	0*	0*	0*

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS

* Reach	* River Sta. *	Contr.*	Expan. *
*ALMAREVISED *	1239.0 *	.1*	.3*
*ALMAREVISED *	913.0 *	.1*	.3*
*ALMAREVISED *	901.6 *	.1*	.3*
*ALMAREVISED *	756.0 *	.1*	.3*
*ALMAREVISED *	568.0 *	.1*	.3*
*ALMAREVISED *	562.0 *	Bridge*	*
*ALMAREVISED *	459.0 *	.1*	.3*
*ALMAREVISED *	283.0 *	.1*	.3*
*ALMAREVISED *	91.0 *	.1*	.3*

} check X-Secs and bridge

Profile Output Table - Standard Table 1

* River Sta. *	Q Total *	Min Ch El *	W.S. Elev *	Crit W.S. *	E.G. Elev *	E.G. Slope *	Vel Chnl *	Flow Area *	Top Width *	Froude # Chl *
*	(cfs) *	(ft) *	(ft) *	(ft) *	(ft) *	(ft/ft) *	(ft/s) *	(sq ft) *	(ft) *	
* 1239.0 *	48000.00 *	1194.00 *	1201.50 *	1207.34 *	1350.99 *	2.955987 *	98.12 *	489.20 *	312.04 *	13.81 *
* 1239.0 *	72500.00 *	1194.00 *	1202.00 *	1209.10 *	1386.75 *	3.262699 *	109.08 *	664.66 *	389.81 *	14.72 *
* 1239.0 *	123250.00 *	1194.00 *	1203.50 *	1212.15 *	1326.70 *	1.221493 *	89.07			

```
*  1383.68 *    526.51 *         9.68 *
*            *           *            *            *            *            *
*           *           *
* 913.0      * 48000.00 *  1190.60 *  1198.05 *  1202.22 *  1215.39 *  0.103964 *     33.41
*  1436.63 *    376.38 *         3.01 *
* 913.0      * 72500.00 *  1190.60 *  1198.97 *  1204.56 *  1224.32 *  0.125149 *     40.41
*  1794.31 *    406.13 *         3.39 *
* 913.0      *123250.00 *  1190.60 *  1201.56 *  1208.19 *  1228.75 *  0.084558 *     41.84
*  2945.51 *    471.13 *         2.95 *
*            *           *            *            *            *            *
*           *           *
* 901.6      * 48000.00 *  1190.60 *  1198.28 *  1202.27 *  1213.74 *  0.088164 *     31.56
*  1521.07 *    383.63 *         2.79 *
* 901.6      * 72500.00 *  1190.60 *  1199.17 *  1204.62 *  1222.33 *  0.109985 *     38.62
*  1877.36 *    412.75 *         3.19 *
* 901.6      *123250.00 *  1190.60 *  1201.73 *  1208.08 *  1227.38 *  0.079714 *     40.64
*  3032.49 *    484.78 *         2.86 *
*            *           *            *            *            *            *
*           *           *
* 756.0      * 48000.00 *  1183.00 *  1191.77 *  1195.60 *  1204.26 *  0.042536 *     28.36
*  1692.26 *    288.92 *         2.07 *
* 756.0      * 72500.00 *  1183.00 *  1193.41 *  1198.20 *  1210.26 *  0.048331 *     32.94
*  2201.02 *    330.41 *         2.25 *
* 756.0      *123250.00 *  1183.00 *  1213.50 *            *  1215.41 *  0.001219 *     11.09
* 11114.61 *    523.00 *         0.42 *
*            *           *            *            *            *            *
*           *           *
* 568.0      * 48000.00 *  1185.70 *  1198.95 *  1195.80 *  1200.99 *  0.003085 *     11.46
*  4187.83 *    386.02 *         0.61 *
* 568.0      * 72500.00 *  1185.70 *  1198.93 *  1198.36 *  1203.60 *  0.007071 *     17.34
*  4181.52 *    385.95 *         0.93 *
* 568.0      *123250.00 *  1185.70 *  1212.56 *  1202.88 *  1215.10 *  0.001427 *     12.78
*  9644.92 *    404.00 *         0.46 *
*            *           *            *            *            *            *
*           *           *
* 562.0      *    Bridge *            *            *            *            *
*           *           *
*            *           *            *            *            *            *
*           *           *
* 459.0      * 48000.00 *  1179.00 *  1198.90 *            *  1199.35 *  0.000675 *      5.39
*  8912.92 *    799.00 *         0.28 *
* 459.0      * 72500.00 *  1179.00 *  1198.76 *            *  1199.81 *  0.001606 *      8.24
*  8799.69 *    799.00 *         0.44 *
* 459.0      *123250.00 *  1179.00 *  1198.10 *            *  1201.55 *  0.005682 *     14.89
*  8276.32 *    799.00 *         0.82 *
*            *           *            *            *            *            *
*           *           *
* 283.0      * 48000.00 *  1177.50 *  1198.94 *            *  1199.22 *  0.000313 *      4.21
* 11398.35 *    855.83 *         0.20 *
* 283.0      * 72500.00 *  1177.50 *  1198.87 *            *  1199.50 *  0.000728 *      6.40
* 11333.17 *    855.60 *         0.31 *
* 283.0      *123250.00 *  1177.50 *  1198.57 *            *  1200.49 *  0.002270 *     11.13
* 11074.18 *    854.70 *         0.54 *
*            *           *            *            *            *            *
*           *           *
* 91.0       * 48000.00 *  1172.60 *  1199.00 *  1183.46 *  1199.15 *  0.000120 *      3.06
* 15700.56 *    921.70 *         0.13 *
* 91.0       * 72500.00 *  1172.60 *  1199.00 *  1185.26 *  1199.33 *  0.000275 *      4.62
* 15700.56 *    921.70 *         0.20 *
* 91.0       *123250.00 *  1172.60 *  1199.00 *  1188.45 *  1199.96 *  0.000794 *      7.85
* 15700.56 *    921.70 *         0.34 *
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```
*  1383.68 *   526.51 *        9.68 *
*          *         *          *          *          *          *          *
*          *         *          *
* 913.0      * 48000.00 *  1190.60 *  1198.05 *  1202.22 *  1215.39 *  0.103964 *    33.41
*  1436.63 *   376.38 *        3.01 *
* 913.0      * 72500.00 *  1190.60 *  1198.97 *  1204.56 *  1224.32 *  0.125149 *    40.41
*  1794.31 *   406.13 *        3.39 *
* 913.0      *123250.00 *  1190.60 *  1201.56 *  1208.19 *  1228.75 *  0.084558 *    41.84
*  2945.51 *   471.13 *        2.95 *
*          *         *          *          *          *          *          *
*          *         *          *
* 901.6      * 48000.00 *  1190.60 *  1198.28 *  1202.27 *  1213.74 *  0.088164 *    31.56
*  1521.07 *   383.63 *        2.79 *
* 901.6      * 72500.00 *  1190.60 *  1199.17 *  1204.62 *  1222.33 *  0.109985 *    38.62
*  1877.36 *   412.75 *        3.19 *
* 901.6      *123250.00 *  1190.60 *  1201.73 *  1208.08 *  1227.38 *  0.079714 *    40.64
*  3032.49 *   484.78 *        2.86 *
*          *         *          *          *          *          *          *
*          *         *          *
* 756.0      * 48000.00 *  1183.00 *  1191.77 *  1195.60 *  1204.26 *  0.042536 *    28.36
*  1692.26 *   288.92 *        2.07 *
* 756.0      * 72500.00 *  1183.00 *  1193.41 *  1198.20 *  1210.26 *  0.048331 *    32.94
*  2201.02 *   330.41 *        2.25 *
* 756.0      *123250.00 *  1183.00 *  1213.50 *          *  1215.41 *  0.001219 *    11.09
* 11114.61 *   523.00 *        0.42 *
*          *         *          *          *          *          *          *
*          *         *          *
* 568.0      * 48000.00 *  1185.70 *  1198.95 *  1195.80 *  1200.99 *  0.003085 *    11.46
*  4187.83 *   386.02 *        0.61 *
* 568.0      * 72500.00 *  1185.70 *  1198.93 *  1198.36 *  1203.60 *  0.007071 *    17.34
*  4181.52 *   385.95 *        0.93 *
* 568.0      *123250.00 *  1185.70 *  1212.56 *  1202.88 *  1215.10 *  0.001427 *    12.78
*  9644.92 *   404.00 *        0.46 *
*          *         *          *          *          *          *          *
*          *         *          *
* 562.0      *   Bridge *          *          *          *          *          *
*          *         *          *
*          *         *          *          *          *          *          *
*          *         *          *
* 459.0      * 48000.00 *  1179.00 *  1198.90 *          *  1199.35 *  0.000675 *     5.39
*  8912.92 *   799.00 *        0.28 *
* 459.0      * 72500.00 *  1179.00 *  1198.76 *          *  1199.81 *  0.001606 *     8.24
*  8799.69 *   799.00 *        0.44 *
* 459.0      *123250.00 *  1179.00 *  1198.10 *          *  1201.55 *  0.005682 *    14.89
*  8276.32 *   799.00 *        0.82 *
*          *         *          *          *          *          *          *
*          *         *          *
* 283.0      * 48000.00 *  1177.50 *  1198.94 *          *  1199.22 *  0.000313 *     4.21
* 11398.35 *   855.83 *        0.20 *
* 283.0      * 72500.00 *  1177.50 *  1198.87 *          *  1199.50 *  0.000728 *     6.40
* 11333.17 *   855.60 *        0.31 *
* 283.0      *123250.00 *  1177.50 *  1198.57 *          *  1200.49 *  0.002270 *    11.13
* 11074.18 *   854.70 *        0.54 *
*          *         *          *          *          *          *          *
*          *         *          *
* 91.0       * 48000.00 *  1172.60 *  1199.00 *  1183.46 *  1199.15 *  0.000120 *     3.06
* 15700.56 *   921.70 *        0.13 *
* 91.0       * 72500.00 *  1172.60 *  1199.00 *  1185.26 *  1199.33 *  0.000275 *     4.62
* 15700.56 *   921.70 *        0.20 *
* 91.0       *123250.00 *  1172.60 *  1199.00 *  1188.45 *  1199.96 *  0.000794 *     7.85
* 15700.56 *   921.70 *        0.34 *
```

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*****************************************************************************************
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Profile Output Table - Standard Table 2
*****************************************************************************************
*************************
* River Sta. *E.G. Elev *W.S. Elev * Vel Head *Frctn Loss *C & E Loss *   Q Left *Q
Channel *  Q Right *Top Width *
*          *     (ft) *     (ft) *     (ft) *      (ft) *      (ft) *    (cfs) *
(cfs) *    (cfs) *     (ft) *
*****************************************************************************************
*************************
* 1239.0     * 1350.99 *  1201.50 *   149.49 *      0.00 *      0.00 *          *
48000.00 *          *   312.04 *
* 1239.0     * 1386.75 *  1202.00 *   184.75 *      0.00 *      0.00 *          *
72500.00 *          *   389.81 *
* 1239.0     * 1326.70 *  1203.50 *   123.20 *      0.00 *      0.00 *
*123250.00 *          *   526.51 *
*          *          *          *          *          *          *          *
*          *          *
* 913.0      * 1215.39 *  1198.05 *    17.33 *     95.97 *     39.65 *          *
48000.00 *          *   376.38 *
* 913.0      * 1224.32 *  1198.97 *    25.35 *    114.56 *     47.80 *          *
72500.00 *          *   406.13 *
* 913.0      * 1228.75 *  1201.56 *    27.19 *     69.14 *     28.80 *
*123250.00 *          *   471.13 *
*          *          *          *          *          *          *          *
*          *          *
* 901.6      * 1213.74 *  1198.28 *    15.46 *      1.09 *      0.56 *          *
48000.00 *          *   383.63 *
* 901.6      * 1222.33 *  1199.17 *    23.16 *      1.34 *      0.66 *          *
72500.00 *          *   412.75 *
* 901.6      * 1227.38 *  1201.73 *    25.65 *      0.93 *      0.47 *
*123250.00 *          *   484.78 *
*          *          *          *          *          *          *          *
*          *          *
* 756.0      * 1204.26 *  1191.77 *    12.49 *      8.61 *      0.90 *          *
48000.00 *          *   288.92 *
* 756.0      * 1210.26 *  1193.41 *    16.85 *     10.18 *      1.89 *          *
72500.00 *          *   330.41 *
* 756.0      * 1215.41 *  1213.50 *     1.91 *      0.25 *      0.06 *
*123250.00 *          *   523.00 *
*          *          *          *          *          *          *          *
*          *          *
* 568.0      * 1200.99 *  1198.95 *     2.04 *           *           *          *
48000.00 *          *   386.02 *
* 568.0      * 1203.60 *  1198.93 *     4.67 *           *           *          *
72500.00 *          *   385.95 *
* 568.0      * 1215.10 *  1212.56 *     2.54 *           *           *
*123250.00 *          *   404.00 *
*          *          *          *          *          *          *          *
*          *          *
* 562.0      *   Bridge *          *          *          *          *          *
*          *          *
*          *          *          *          *          *          *          *
*          *          *
* 459.0      * 1199.35 *  1198.90 *     0.45 *      0.08 *      0.05 *          *
48000.00 *          *   799.00 *
* 459.0      * 1199.81 *  1198.76 *     1.05 *      0.18 *      0.13 *          *
72500.00 *          *   799.00 *
* 459.0      * 1201.55 *  1198.10 *     3.44 *      0.60 *      0.45 *
```

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

Profile Output Table - Standard Table 2
*****************************************************************************************
************************
* River Sta. *E.G. Elev *W.S. Elev * Vel Head *Frctn Loss *C & E Loss *   Q Left *Q
Channel *  Q Right *Top Width *
*            *     (ft) *     (ft) *     (ft) *      (ft) *      (ft) *    (cfs) *
(cfs) *    (cfs) *     (ft) *
*****************************************************************************************
************************
* 1239.0     *  1350.99 *  1201.50 *   149.49 *      0.00 *      0.00 *          *
48000.00 *          *   312.04 *
* 1239.0     *  1386.75 *  1202.00 *   184.75 *      0.00 *      0.00 *          *
72500.00 *          *   389.81 *
* 1239.0     *  1326.70 *  1203.50 *   123.20 *      0.00 *      0.00 *
*123250.00 *          *   526.51 *
*            *          *          *          *           *           *          *
*          *          *
* 913.0      *  1215.39 *  1198.05 *    17.33 *     95.97 *     39.65 *          *
48000.00 *          *   376.38 *
* 913.0      *  1224.32 *  1198.97 *    25.35 *    114.56 *     47.80 *          *
72500.00 *          *   406.13 *
* 913.0      *  1228.75 *  1201.56 *    27.19 *     69.14 *     28.80 *
*123250.00 *          *   471.13 *
*            *          *          *          *           *           *          *
*          *          *
* 901.6      *  1213.74 *  1198.28 *    15.46 *      1.09 *      0.56 *          *
48000.00 *          *   383.63 *
* 901.6      *  1222.33 *  1199.17 *    23.16 *      1.34 *      0.66 *          *
72500.00 *          *   412.75 *
* 901.6      *  1227.38 *  1201.73 *    25.65 *      0.93 *      0.47 *
*123250.00 *          *   484.78 *
*            *          *          *          *           *           *          *
*          *          *
* 756.0      *  1204.26 *  1191.77 *    12.49 *      8.61 *      0.90 *          *
48000.00 *          *   288.92 *
* 756.0      *  1210.26 *  1193.41 *    16.85 *     10.18 *      1.89 *          *
72500.00 *          *   330.41 *
* 756.0      *  1215.41 *  1213.50 *     1.91 *      0.25 *      0.06 *
*123250.00 *          *   523.00 *
*            *          *          *          *           *           *          *
*          *          *
* 568.0      *  1200.99 *  1198.95 *     2.04 *           *           *          *
48000.00 *          *   386.02 *
* 568.0      *  1203.60 *  1198.93 *     4.67 *           *           *          *
72500.00 *          *   385.95 *
* 568.0      *  1215.10 *  1212.56 *     2.54 *           *           *
*123250.00 *          *   404.00 *
*            *          *          *          *           *           *          *
*          *          *
* 562.0      *   Bridge *          *          *           *           *          *
*          *          *
*            *          *          *          *           *           *          *
*          *          *
* 459.0      *  1199.35 *  1198.90 *     0.45 *      0.08 *      0.05 *          *
48000.00 *          *   799.00 *
* 459.0      *  1199.81 *  1198.76 *     1.05 *      0.18 *      0.13 *          *
72500.00 *          *   799.00 *
* 459.0      *  1201.55 *  1198.10 *     3.44 *      0.60 *      0.45 *
```

```
*123250.00 *          *   799.00 *
*          *          *          *          *          *          *          *
*          *          *
* 283.0     *  1199.22 *  1198.94 *     0.28 *     0.04 *     0.04 *          *
48000.00 *          *   855.83 *
* 283.0     *  1199.50 *  1198.87 *     0.64 *     0.08 *     0.09 *          *
72500.00 *          *   855.60 *
* 283.0     *  1200.49 *  1198.57 *     1.92 *     0.24 *     0.29 *
*123250.00 *          *   854.70 *
*          *          *          *          *          *          *          *
*          *          *
* 91.0      *  1199.15 *  1199.00 *     0.15 *     0.00 *     0.00 *          *
48000.00 *          *   921.70 *
* 91.0      *  1199.33 *  1199.00 *     0.33 *     0.00 *     0.00 *          *
72500.00 *          *   921.70 *
* 91.0      *  1199.96 *  1199.00 *     0.96 *     0.00 *     0.00 *
*123250.00 *          *   921.70 *
*************************************************************************************
*************************

Profile Output Table - Six XS Bridge
*************************************************************************************
***********************************
* River Sta. *E.G. Elev *W.S. Elev *Crit W.S. *Frctn Loss *C & E Loss *Top Width *   Q
Left *Q Channel *  Q Right * Vel Chnl *
*          *     (ft) *     (ft) *     (ft) *     (ft) *     (ft) *     (ft) *
(cfs) *    (cfs) *    (cfs) *   (ft/s) *
*************************************************************************************
***********************************
* 756.0     *  1204.26 *  1191.77 *  1195.60 *     8.61 *     0.90 *   288.92 *
* 48000.00 *          *    28.36 *
* 756.0     *  1210.26 *  1193.41 *  1198.20 *    10.18 *     1.89 *   330.41 *
* 72500.00 *          *    32.94 *
* 756.0     *  1215.41 *  1213.50 *          *     0.25 *     0.06 *   523.00 *
*123250.00 *          *    11.09 *
*          *          *          *          *          *          *          *
*          *          *          *
* 568.0     *  1200.99 *  1198.95 *  1195.80 *          *          *   386.02 *
* 48000.00 *          *    11.46 *
* 568.0     *  1203.60 *  1198.93 *  1198.36 *          *          *   385.95 *
* 72500.00 *          *    17.34 *
* 568.0     *  1215.10 *  1212.56 *  1202.88 *          *          *   404.00 *
*123250.00 *          *    12.78 *
*          *          *          *          *          *          *          *
*          *          *          *
* 562.0    BU*  1200.99 *  1198.95 *  1196.02 *          *          *          *
* 48000.00 *          *          *
* 562.0    BU*  1203.60 *  1198.93 *  1198.67 *          *          *          *
* 72500.00 *          *          *
* 562.0    BU*  1215.10 *  1212.56 *  1203.18 *          *          *          *
*          *          *          *
*          *          *          *          *          *          *          *
*          *          *          *
* 562.0    BD*  1200.99 *  1198.90 *  1192.80 *          *          *          *
* 48000.00 *          *          *
* 562.0    BD*  1203.60 *  1198.76 *  1194.46 *          *          *          *
* 72500.00 *          *          *
* 562.0    BD*  1201.98 *  1198.10 *  1197.24 *          *          *          *
*          *          *          *
*          *          *          *          *          *          *          *
*          *          *          *
```

```
*123250.00 *          *   799.00 *
*          *          *          *          *          *          *          *
*          *          *
* 283.0     *  1199.22 *  1198.94 *     0.28 *      0.04 *      0.04 *          *
48000.00 *          *   855.83 *
* 283.0     *  1199.50 *  1198.87 *     0.64 *      0.08 *      0.09 *          *
72500.00 *          *   855.60 *
* 283.0     *  1200.49 *  1198.57 *     1.92 *      0.24 *      0.29 *
*123250.00 *          *   854.70 *
*          *          *          *          *          *          *          *
*          *          *
* 91.0      *  1199.15 *  1199.00 *     0.15 *      0.00 *      0.00 *          *
48000.00 *          *   921.70 *
* 91.0      *  1199.33 *  1199.00 *     0.33 *      0.00 *      0.00 *          *
72500.00 *          *   921.70 *
* 91.0      *  1199.96 *  1199.00 *     0.96 *      0.00 *      0.00 *
*123250.00 *          *   921.70 *
*************************************************************************************
*************************
```

Profile Output Table - Six XS Bridge

```
*************************************************************************************
***********************************
* River Sta. *E.G. Elev *W.S. Elev *Crit W.S. *Frctn Loss *C & E Loss *Top Width *   Q
Left *Q Channel *  Q Right * Vel Chnl *
*          *     (ft) *     (ft) *     (ft) *      (ft) *      (ft) *     (ft) *
(cfs) *    (cfs) *    (cfs) *   (ft/s) *
*************************************************************************************
***********************************
* 756.0     *  1204.26 *  1191.77 *  1195.60 *      8.61 *      0.90 *   288.92 *
* 48000.00 *          *    28.36 *
* 756.0     *  1210.26 *  1193.41 *  1198.20 *     10.18 *      1.89 *   330.41 *
* 72500.00 *          *    32.94 *
* 756.0     *  1215.41 *  1213.50 *          *      0.25 *      0.06 *   523.00 *
*123250.00 *          *    11.09 *
*          *          *          *          *          *          *          *
*          *          *          *
* 568.0     *  1200.99 *  1198.95 *  1195.80 *          *          *   386.02 *
* 48000.00 *          *    11.46 *
* 568.0     *  1203.60 *  1198.93 *  1198.36 *          *          *   385.95 *
* 72500.00 *          *    17.34 *
* 568.0     *  1215.10 *  1212.56 *  1202.88 *          *          *   404.00 *
*123250.00 *          *    12.78 *
*          *          *          *          *          *          *          *
*          *          *          *
* 562.0    BU*  1200.99 *  1198.95 *  1196.02 *          *          *          *
* 48000.00 *          *          *
* 562.0    BU*  1203.60 *  1198.93 *  1198.67 *          *          *          *
* 72500.00 *          *          *
* 562.0    BU*  1215.10 *  1212.56 *  1203.18 *          *          *          *
*          *          *          *
*          *          *          *          *          *          *          *
*          *          *          *
* 562.0    BD*  1200.99 *  1198.90 *  1192.80 *          *          *          *
* 48000.00 *          *          *
* 562.0    BD*  1203.60 *  1198.76 *  1194.46 *          *          *          *
* 72500.00 *          *          *
* 562.0    BD*  1201.98 *  1198.10 *  1197.24 *          *          *          *
*          *          *          *
*          *          *          *          *          *          *          *
*          *          *          *
```

```
* 459.0       *  1199.35 *  1198.90 *           *       0.08 *       0.05 *   799.00 *
* 48000.00 *           *     5.39 *
* 459.0       *  1199.81 *  1198.76 *           *       0.18 *       0.13 *   799.00 *
* 72500.00 *           *     8.24 *
* 459.0       *  1201.55 *  1198.10 *           *       0.60 *       0.45 *   799.00 *
*123250.00 *           *    14.89 *
*            *          *          *           *            *            *           *
*          *          *          *
* 283.0       *  1199.22 *  1198.94 *           *       0.04 *       0.04 *   855.83 *
* 48000.00 *           *     4.21 *
* 283.0       *  1199.50 *  1198.87 *           *       0.08 *       0.09 *   855.60 *
* 72500.00 *           *     6.40 *
* 283.0       *  1200.49 *  1198.57 *           *       0.24 *       0.29 *   854.70 *
*123250.00 *           *    11.13 *
*****************************************************************************************
************************************
```

Profile Output Table - Bridge Comparison

```
*****************************************************************************************
*************
* River Sta. *E.G. Elev *W.S. Elev *Energy EG *Momen. EG *Yarnell EG * WSPRO EG * Prs O EG
*Prs/Wr EG *
*            *     (ft) *     (ft) *     (ft) *     (ft) *      (ft) *     (ft) *     (ft)
*     (ft) *
*****************************************************************************************
*************
* 562.0       *  1200.99 *  1198.95 *  1200.45 *           *   1200.99 *           *
*          *
* 562.0       *  1203.60 *  1198.93 *  1204.23 *           *   1203.60 *           *
*          *
* 562.0       *  1215.10 *  1212.56 *  1210.96 *           *   1211.66 *           *  1225.78
*  1215.10 *
*****************************************************************************************
*************
```

Profile Output Table - HEC-FDA

```
**********************************************
* River Sta. *  Q Total *Min Ch El *W.S. Elev *
*            *    (cfs) *     (ft) *     (ft) *
**********************************************
* 1239.0      * 48000.00 *  1194.00 *  1201.50 *
* 1239.0      * 72500.00 *  1194.00 *  1202.00 *
* 1239.0      *123250.00 *  1194.00 *  1203.50 *
*             *          *          *          *
* 913.0       * 48000.00 *  1190.60 *  1198.05 *
* 913.0       * 72500.00 *  1190.60 *  1198.97 *
* 913.0       *123250.00 *  1190.60 *  1201.56 *
*             *          *          *          *
* 901.6       * 48000.00 *  1190.60 *  1198.28 *
* 901.6       * 72500.00 *  1190.60 *  1199.17 *
* 901.6       *123250.00 *  1190.60 *  1201.73 *
*             *          *          *          *
* 756.0       * 48000.00 *  1183.00 *  1191.77 *
* 756.0       * 72500.00 *  1183.00 *  1193.41 *
* 756.0       *123250.00 *  1183.00 *  1213.50 *
*             *          *          *          *
* 568.0       * 48000.00 *  1185.70 *  1198.95 *
* 568.0       * 72500.00 *  1185.70 *  1198.93 *
* 568.0       *123250.00 *  1185.70 *  1212.56 *
*             *          *          *          *
* 562.0       *   Bridge *          *          *
```

```
* 459.0      * 1199.35 * 1198.90 *          *      0.08 *      0.05 *   799.00 *
* 48000.00 *          *    5.39 *
* 459.0      * 1199.81 * 1198.76 *          *      0.18 *      0.13 *   799.00 *
* 72500.00 *          *    8.24 *
* 459.0      * 1201.55 * 1198.10 *          *      0.60 *      0.45 *   799.00 *
*123250.00 *          *   14.89 *
*           *          *         *          *           *           *          *
*          *          *         *
* 283.0      * 1199.22 * 1198.94 *          *      0.04 *      0.04 *   855.83 *
* 48000.00 *          *    4.21 *
* 283.0      * 1199.50 * 1198.87 *          *      0.08 *      0.09 *   855.60 *
* 72500.00 *          *    6.40 *
* 283.0      * 1200.49 * 1198.57 *          *      0.24 *      0.29 *   854.70 *
*123250.00 *          *   11.13 *
*************************************************************************************
***********************************
```

Profile Output Table - Bridge Comparison

```
*************************************************************************************
*************
* River Sta. *E.G. Elev *W.S. Elev *Energy EG *Momen. EG *Yarnell EG * WSPRO EG * Prs O EG
*Prs/Wr EG *
*           *     (ft) *     (ft) *     (ft) *     (ft) *      (ft) *     (ft) *     (ft)
*     (ft) *
*************************************************************************************
*************
* 562.0      * 1200.99 * 1198.95 * 1200.45 *          *   1200.99 *          *
*          *
* 562.0      * 1203.60 * 1198.93 * 1204.23 *          *   1203.60 *          *
*          *
* 562.0      * 1215.10 * 1212.56 * 1210.96 *          *   1211.66 *          *  1225.78
*  1215.10 *
*************************************************************************************
*************
```

Profile Output Table - HEC-FDA

```
*********************************************
* River Sta. *  Q Total *Min Ch El *W.S. Elev *
*           *    (cfs) *     (ft) *     (ft) *
*********************************************
* 1239.0     * 48000.00 * 1194.00 * 1201.50 *
* 1239.0     * 72500.00 * 1194.00 * 1202.00 *
* 1239.0     *123250.00 * 1194.00 * 1203.50 *
*           *          *         *         *
* 913.0      * 48000.00 * 1190.60 * 1198.05 *
* 913.0      * 72500.00 * 1190.60 * 1198.97 *
* 913.0      *123250.00 * 1190.60 * 1201.56 *
*           *          *         *         *
* 901.6      * 48000.00 * 1190.60 * 1198.28 *
* 901.6      * 72500.00 * 1190.60 * 1199.17 *
* 901.6      *123250.00 * 1190.60 * 1201.73 *
*           *          *         *         *
* 756.0      * 48000.00 * 1183.00 * 1191.77 *
* 756.0      * 72500.00 * 1183.00 * 1193.41 *
* 756.0      *123250.00 * 1183.00 * 1213.50 *
*           *          *         *         *
* 568.0      * 48000.00 * 1185.70 * 1198.95 *
* 568.0      * 72500.00 * 1185.70 * 1198.93 *
* 568.0      *123250.00 * 1185.70 * 1212.56 *
*           *          *         *         *
* 562.0      *   Bridge *         *         *
```

```
*            *          *          *          *
* 459.0      * 48000.00 *  1179.00 *  1198.90 *
* 459.0      * 72500.00 *  1179.00 *  1198.76 *
* 459.0      *123250.00 *  1179.00 *  1198.10 *
*            *          *          *          *
* 283.0      * 48000.00 *  1177.50 *  1198.94 *
* 283.0      * 72500.00 *  1177.50 *  1198.87 *
* 283.0      *123250.00 *  1177.50 *  1198.57 *
*            *          *          *          *
* 91.0       * 48000.00 *  1172.60 *  1199.00 *
* 91.0       * 72500.00 *  1172.60 *  1199.00 *
* 91.0       *123250.00 *  1172.60 *  1199.00 *
**********************************************
```

Profile Output Table - Bridge Only

```
*****************************************************************************************
*****************
* River Sta. *E.G. Elev *Min El Prs *Opening Area * Prs O WS *  Q Total *Min Top Rd *   Q
Weir * Delta EG *
*          *     (ft) *      (ft) *     (sq ft) *     (ft) *    (cfs) *      (ft) *
(cfs) *     (ft) *
*****************************************************************************************
*****************
* 562.0      *  1200.99 *   1203.19 *     5623.53 *          * 48000.00 *   1206.83 *
*     1.64 *
* 562.0      *  1203.60 *   1203.19 *     5623.53 *          * 72500.00 *   1206.83 *
*     3.79 *
* 562.0      *  1215.10 *   1203.19 *     5623.53 *  1224.66 *123250.00 *   1206.83 *
24970.76 *    13.55 *
*****************************************************************************************
*****************
```

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

1203.19
1186.00
17.19

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Plan 01

Summary for Profiles:1,2,3

Reach: ALMAREVISED Riv Sta: 91.0 Profile: 1
Warning - The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.
Reach: ALMAREVISED Riv Sta: 283.0 Profile: 1
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Reach: ALMAREVISED Riv Sta: 283.0 Profile: 2
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Reach: ALMAREVISED Riv Sta: 283.0 Profile: 3
Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Reach: ALMAREVISED Riv Sta: 459.0 Profile: 1
Warning - The cross-section end points had to be extended vertically for the computed water surface.

```
*            *          *          *          *
* 459.0      * 48000.00 *  1179.00 *  1198.90 *
* 459.0      * 72500.00 *  1179.00 *  1198.76 *
* 459.0      *123250.00 *  1179.00 *  1198.10 *
*            *          *          *          *
* 283.0      * 48000.00 *  1177.50 *  1198.94 *
* 283.0      * 72500.00 *  1177.50 *  1198.87 *
* 283.0      *123250.00 *  1177.50 *  1198.57 *
*            *          *          *          *
* 91.0       * 48000.00 *  1172.60 *  1199.00 *
* 91.0       * 72500.00 *  1172.60 *  1199.00 *
* 91.0       *123250.00 *  1172.60 *  1199.00 *
**********************************************
```

Profile Output Table - Bridge Only

```
*****************************************************************************************
*****************
* River Sta. *E.G. Elev *Min El Prs *Opening Area * Prs O WS *  Q Total *Min Top Rd *   Q
Weir * Delta EG *
*          *     (ft) *      (ft) *     (sq ft) *     (ft) *    (cfs) *      (ft) *
(cfs) *     (ft) *
*****************************************************************************************
*****************
* 562.0      *  1200.99 *   1203.19 *     5623.53 *          * 48000.00 *   1206.83 *
*     1.64 *
* 562.0      *  1203.60 *   1203.19 *     5623.53 *          * 72500.00 *   1206.83 *
*     3.79 *
* 562.0      *  1215.10 *   1203.19 *     5623.53 *  1224.66 *123250.00 *   1206.83 *
24970.76 *    13.55 *
*****************************************************************************************
*****************

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

1203.19
1186.00
17.19

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Plan 01

Summary for Profiles:1,2,3

Reach: ALMAREVISED Riv Sta: 91.0 Profile: 1
Warning - The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.
Reach: ALMAREVISED Riv Sta: 283.0 Profile: 1
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Reach: ALMAREVISED Riv Sta: 283.0 Profile: 2
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Reach: ALMAREVISED Riv Sta: 283.0 Profile: 3
Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Reach: ALMAREVISED Riv Sta: 459.0 Profile: 1
Warning - The cross-section end points had to be extended vertically for the computed water surface.

Reach: ALMAREVISED Riv Sta: 901.6 Profile: 3
Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning - The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.
Reach: ALMAREVISED Riv Sta: 913.0 Profile: 1
Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning - The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.
Reach: ALMAREVISED Riv Sta: 913.0 Profile: 2
Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Reach: ALMAREVISED Riv Sta: 913.0 Profile: 3
Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning - The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.
Reach: ALMAREVISED Riv Sta: 1239.0 Profile: 1
Warning - Divided flow computed for this cross-section.
Reach: ALMAREVISED Riv Sta: 1239.0 Profile: 2
Warning - Divided flow computed for this cross-section.
Reach: ALMAREVISED Riv Sta: 1239.0 Profile: 3
Warning - Divided flow computed for this cross-section.
Warning - The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

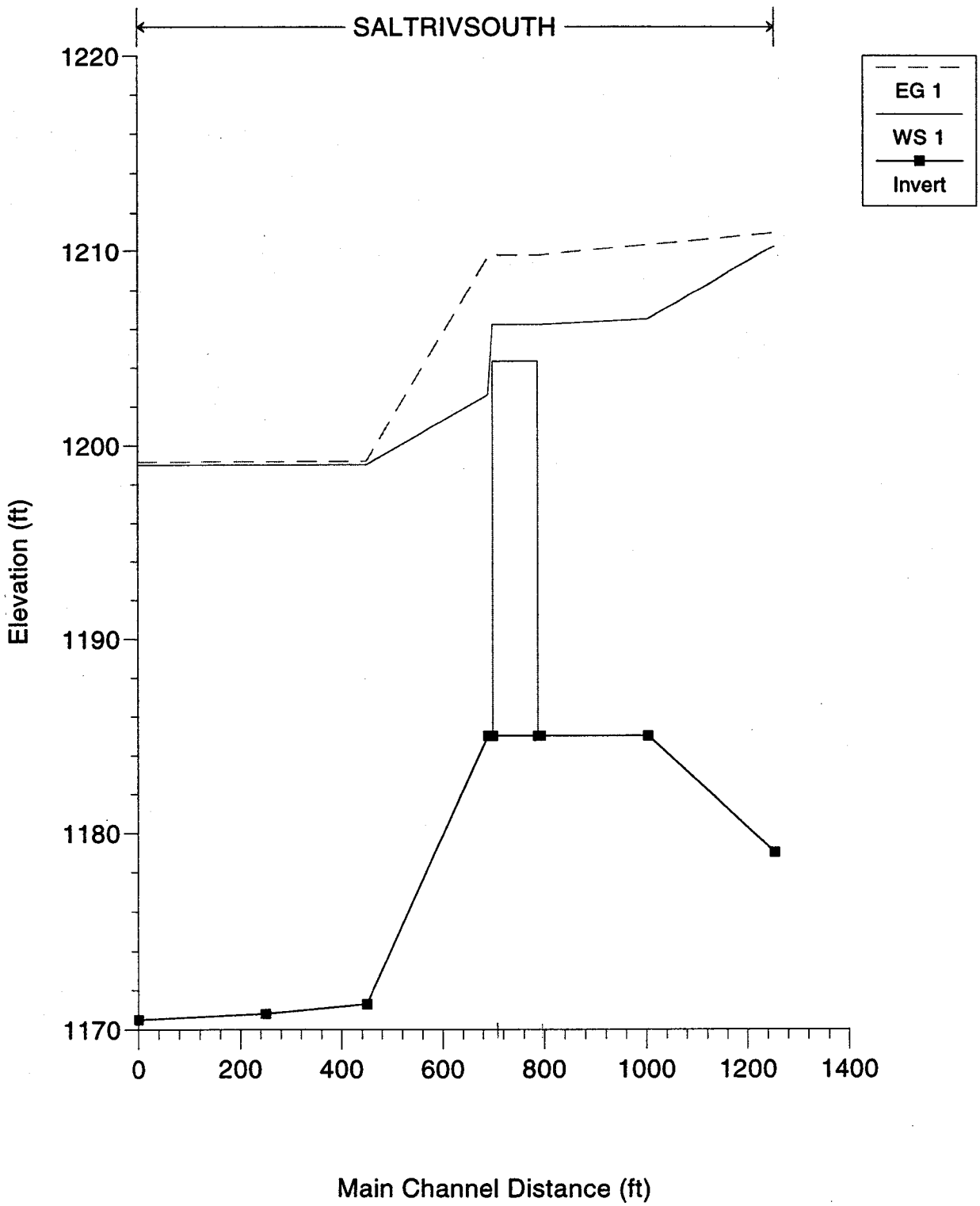
Reach: ALMAREVISED Riv Sta: 901.6 Profile: 3
Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning - The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.
Reach: ALMAREVISED Riv Sta: 913.0 Profile: 1
Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning - The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.
Reach: ALMAREVISED Riv Sta: 913.0 Profile: 2
Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Reach: ALMAREVISED Riv Sta: 913.0 Profile: 3
Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning - The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.
Reach: ALMAREVISED Riv Sta: 1239.0 Profile: 1
Warning - Divided flow computed for this cross-section.
Reach: ALMAREVISED Riv Sta: 1239.0 Profile: 2
Warning - Divided flow computed for this cross-section.
Reach: ALMAREVISED Riv Sta: 1239.0 Profile: 3
Warning - Divided flow computed for this cross-section.
Warning - The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

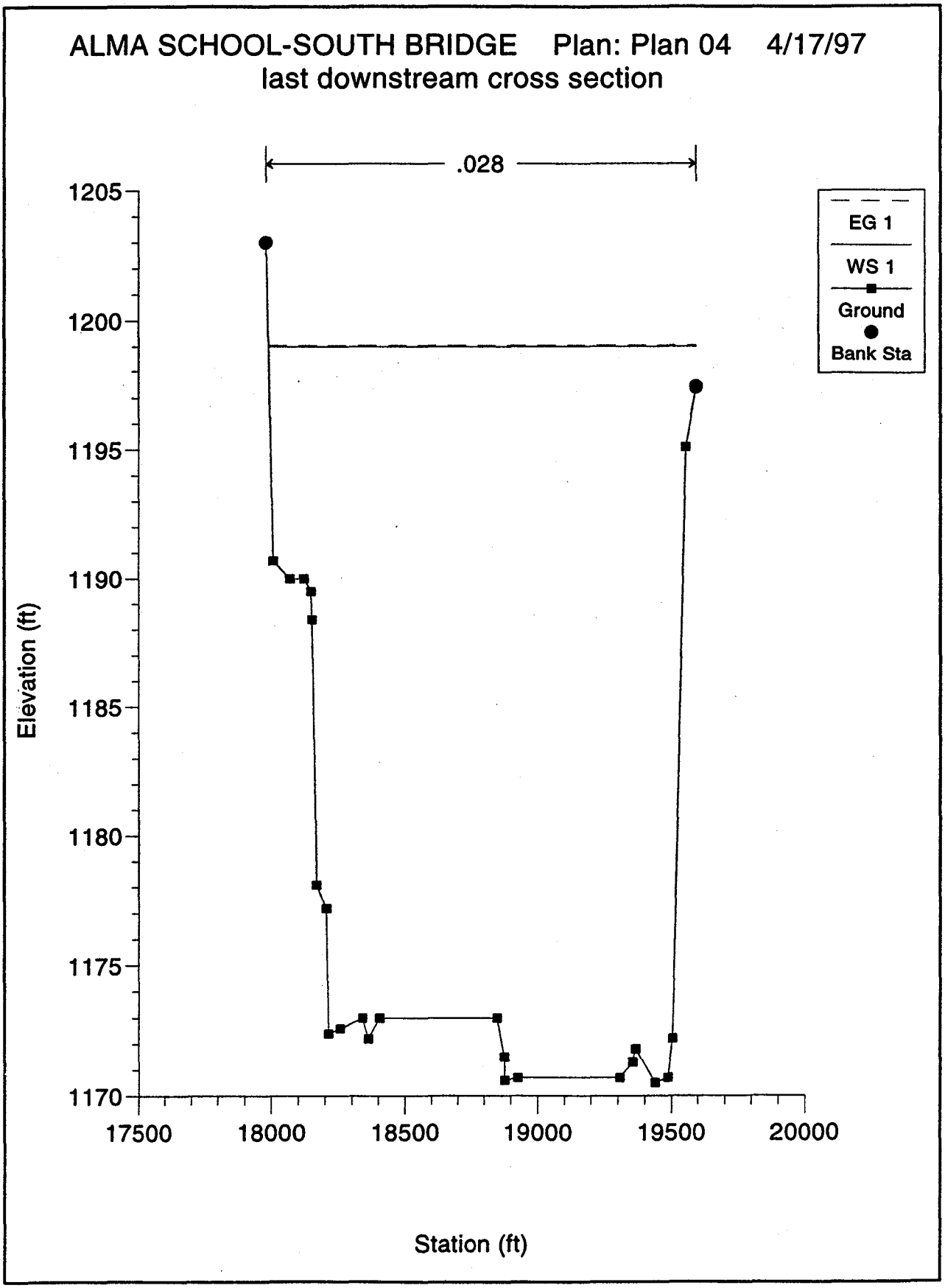
HEC-RAS PRINTOUT

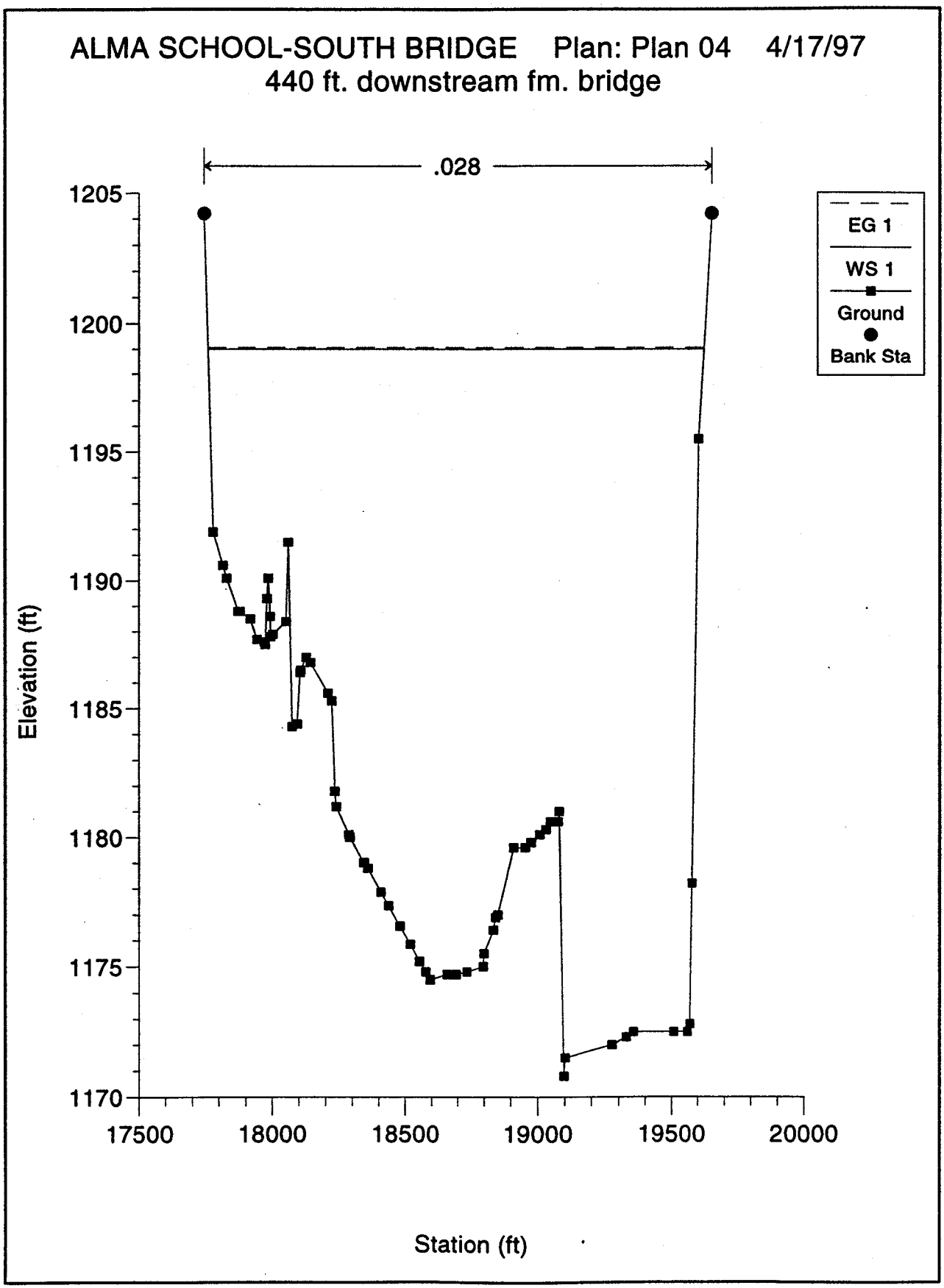
LOMR CROSS SECTIONS

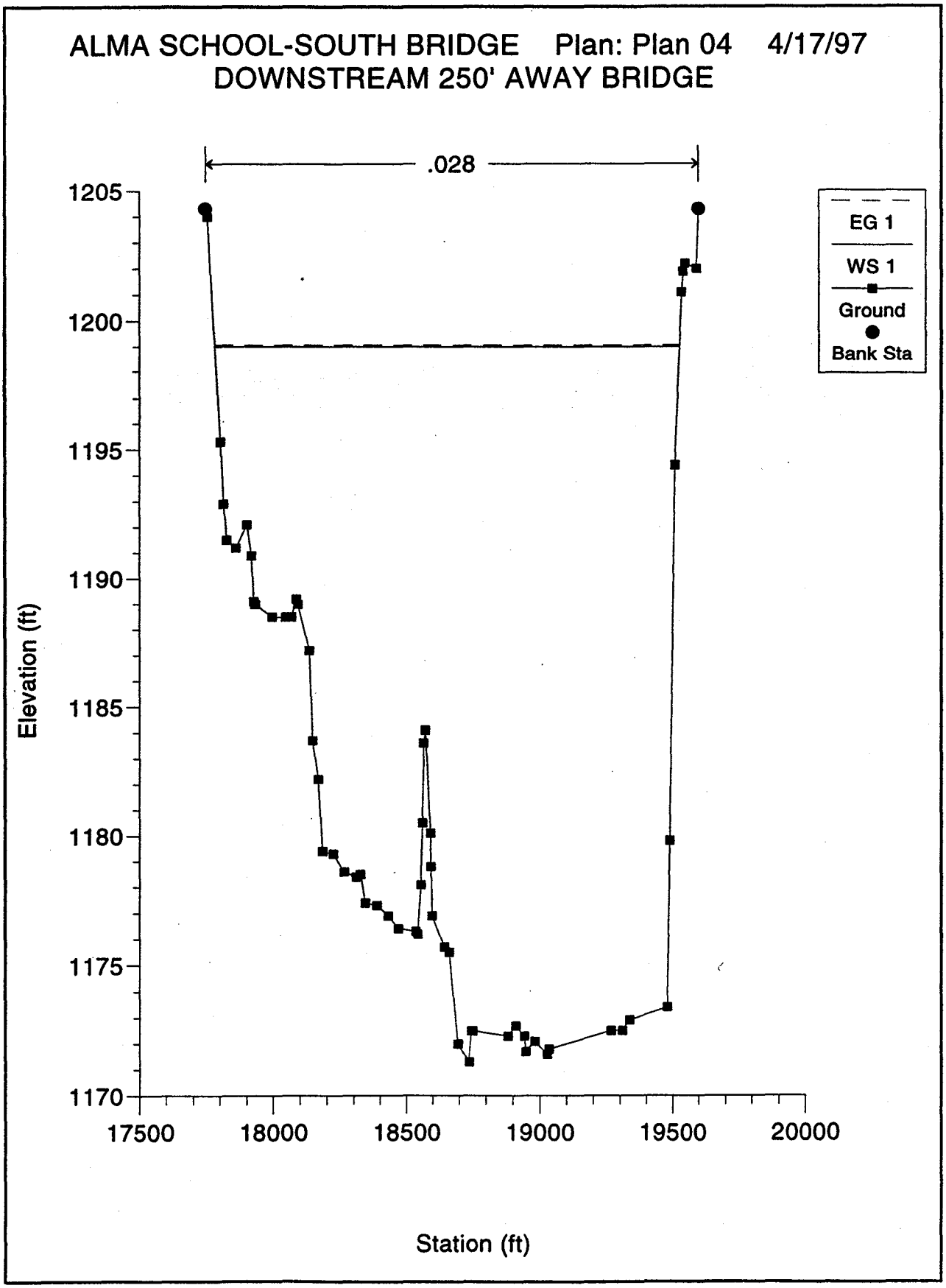
SALTRIVSOUTH

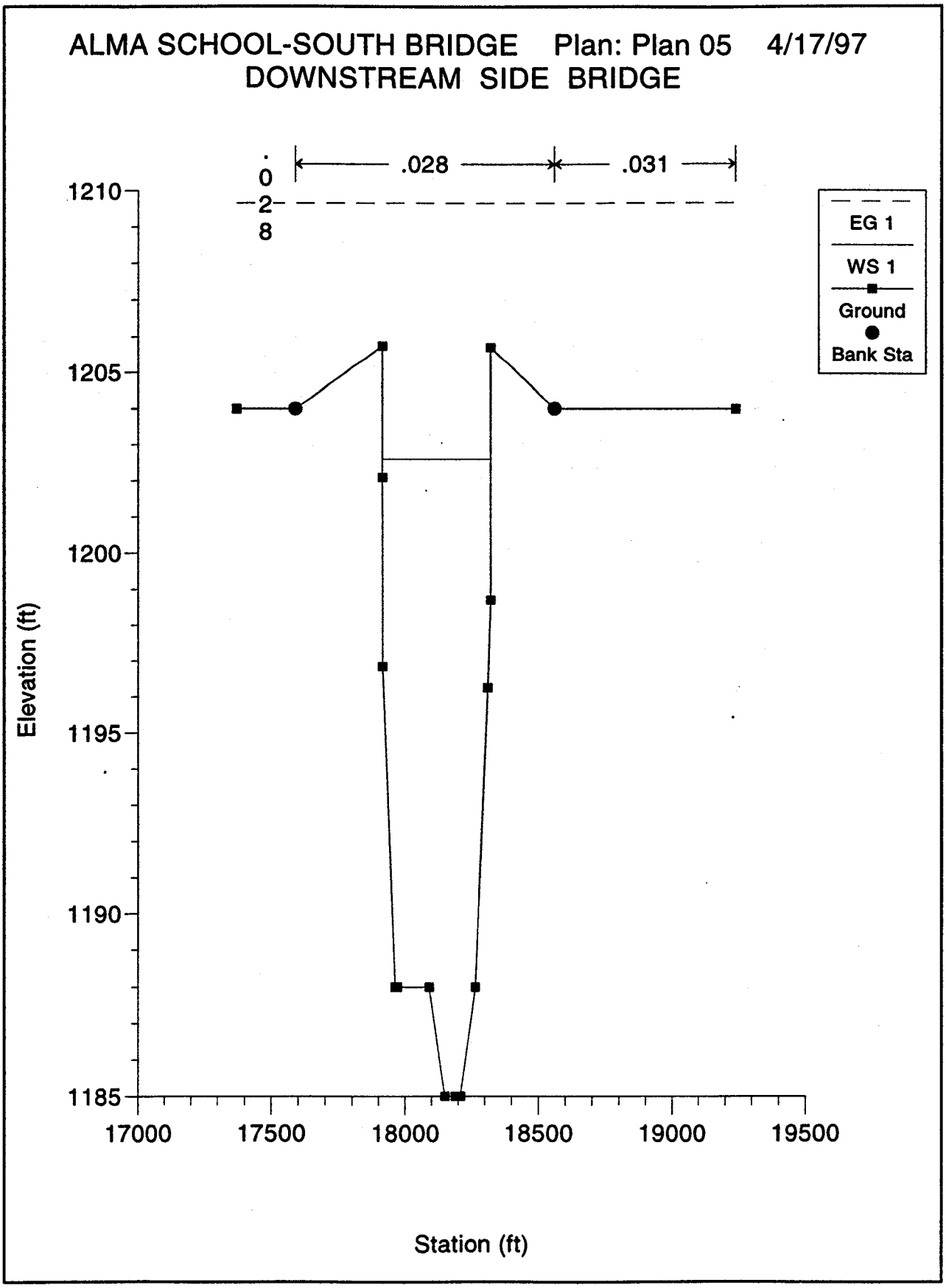
ALMA SCHOOL-SOUTH BRIDGE Plan: Plan 05 4/18/97



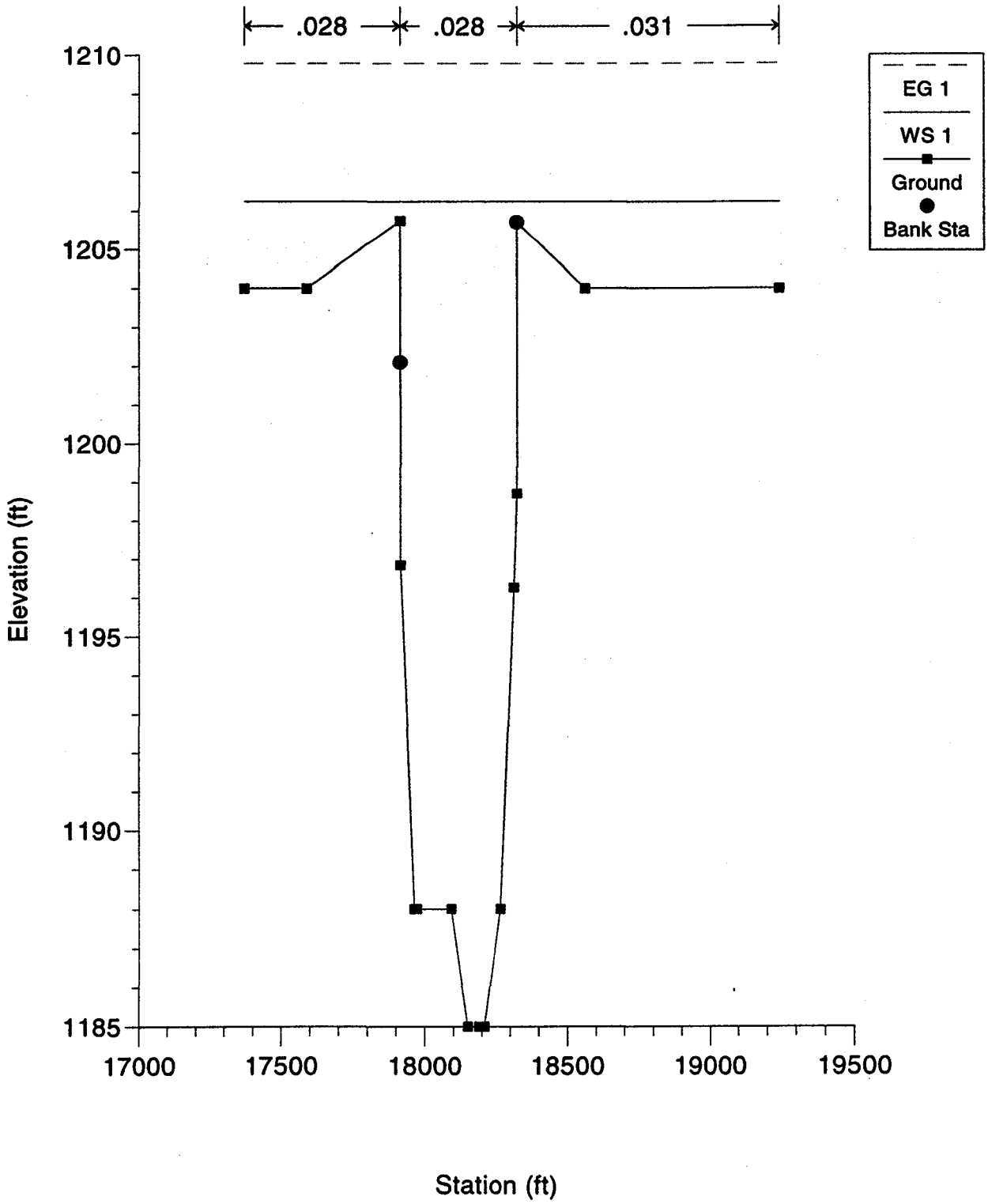

ALMA SCHOOL-SOUTH BRIDGE Plan: Plan 04 4/17/97
last downstream cross section
.028
EG 1
WS 1
Ground
Bank Sta
1205
1200
1195
1190
1185
1180
1175
1170
Elevation (ft)
17500
18000
18500
19000
19500
20000
Station (ft)


ALMA SCHOOL-SOUTH BRIDGE Plan: Plan 04 4/17/97
440 ft. downstream fm. bridge
.028
EG 1
WS 1
Ground
Bank Sta
Elevation (ft)
1205
1200
1195
1190
1185
1180
1175
1170
17500
18000
18500
19000
19500
20000
Station (ft)

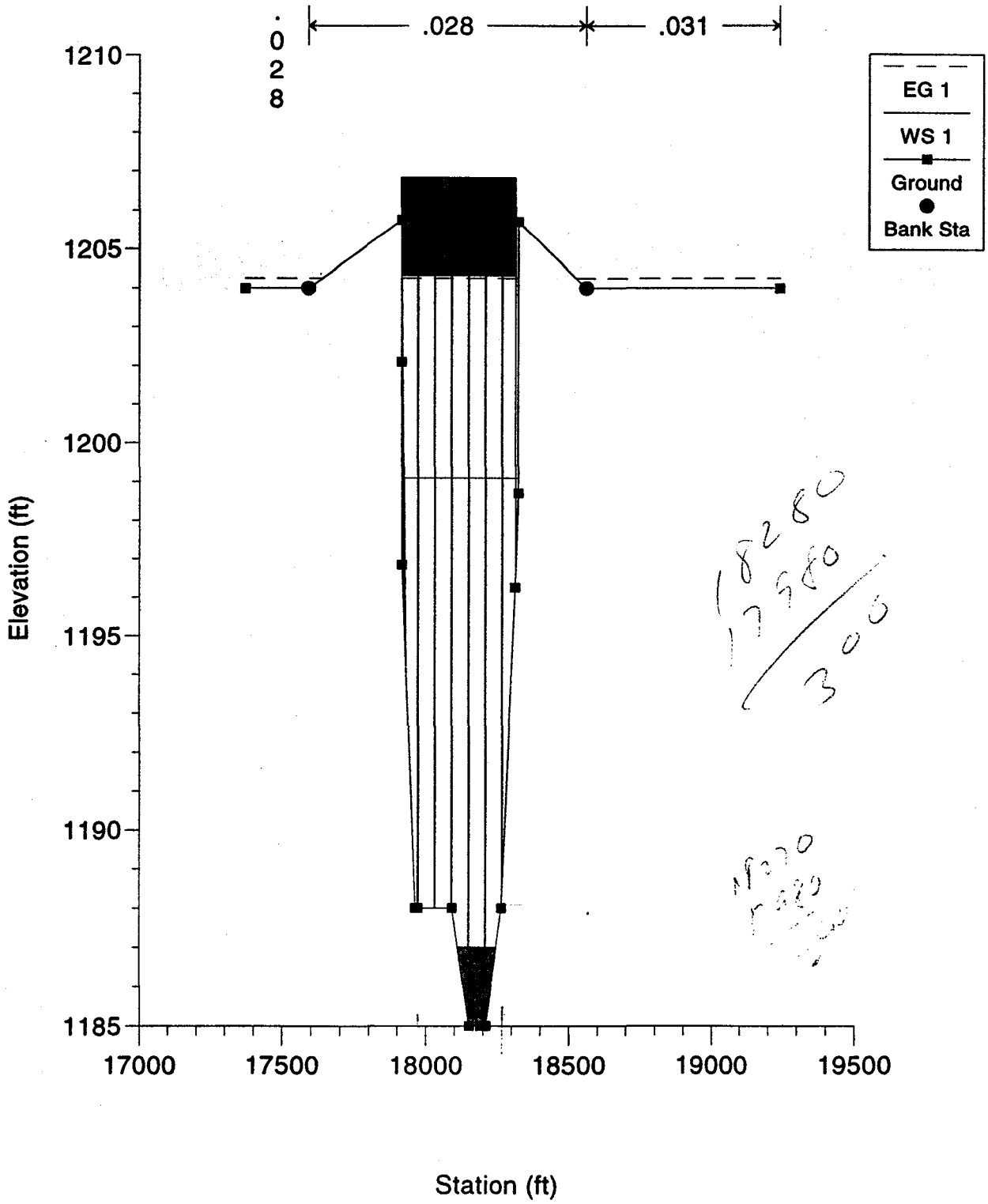

ALMA SCHOOL-SOUTH BRIDGE Plan: Plan 04 4/17/97
DOWNSTREAM 250' AWAY BRIDGE
.028
EG 1
WS 1
Ground
Bank Sta
Elevation (ft)
1205
1200
1195
1190
1185
1180
1175
1170
17500
18000
18500
19000
19500
20000
Station (ft)


ALMA SCHOOL-SOUTH BRIDGE Plan: Plan 05 4/17/97
DOWNSTREAM SIDE BRIDGE
.028
.031
0.28
EG 1
WS 1
Ground
Bank Sta
1210
1205
1200
1195
1190
1185
Elevation (ft)
17000
17500
18000
18500
19000
19500
Station (ft)

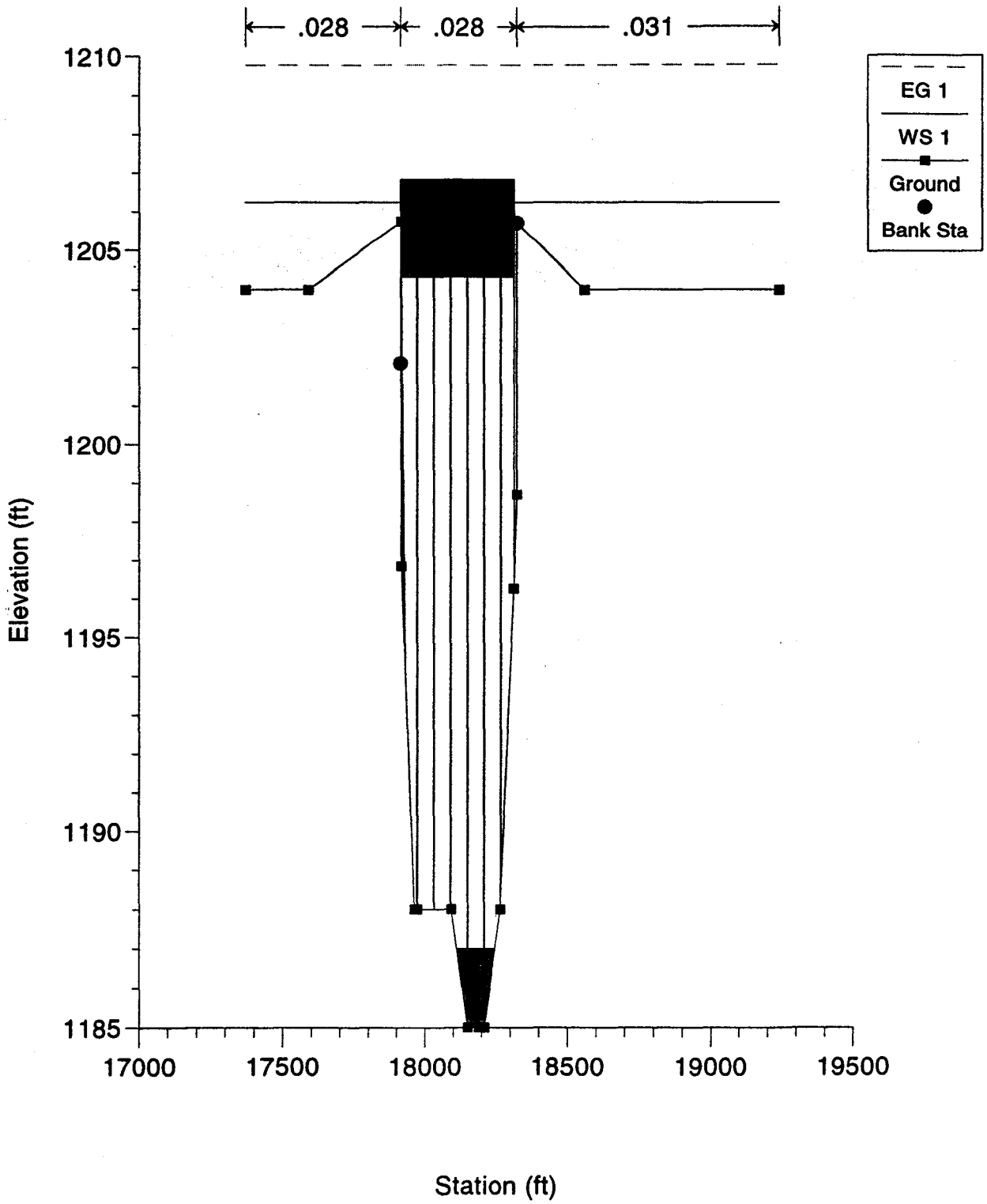
ALMA SCHOOL-SOUTH BRIDGE Plan: Plan 05 4/17/97
UPSTREAM SIDE BRIDGE



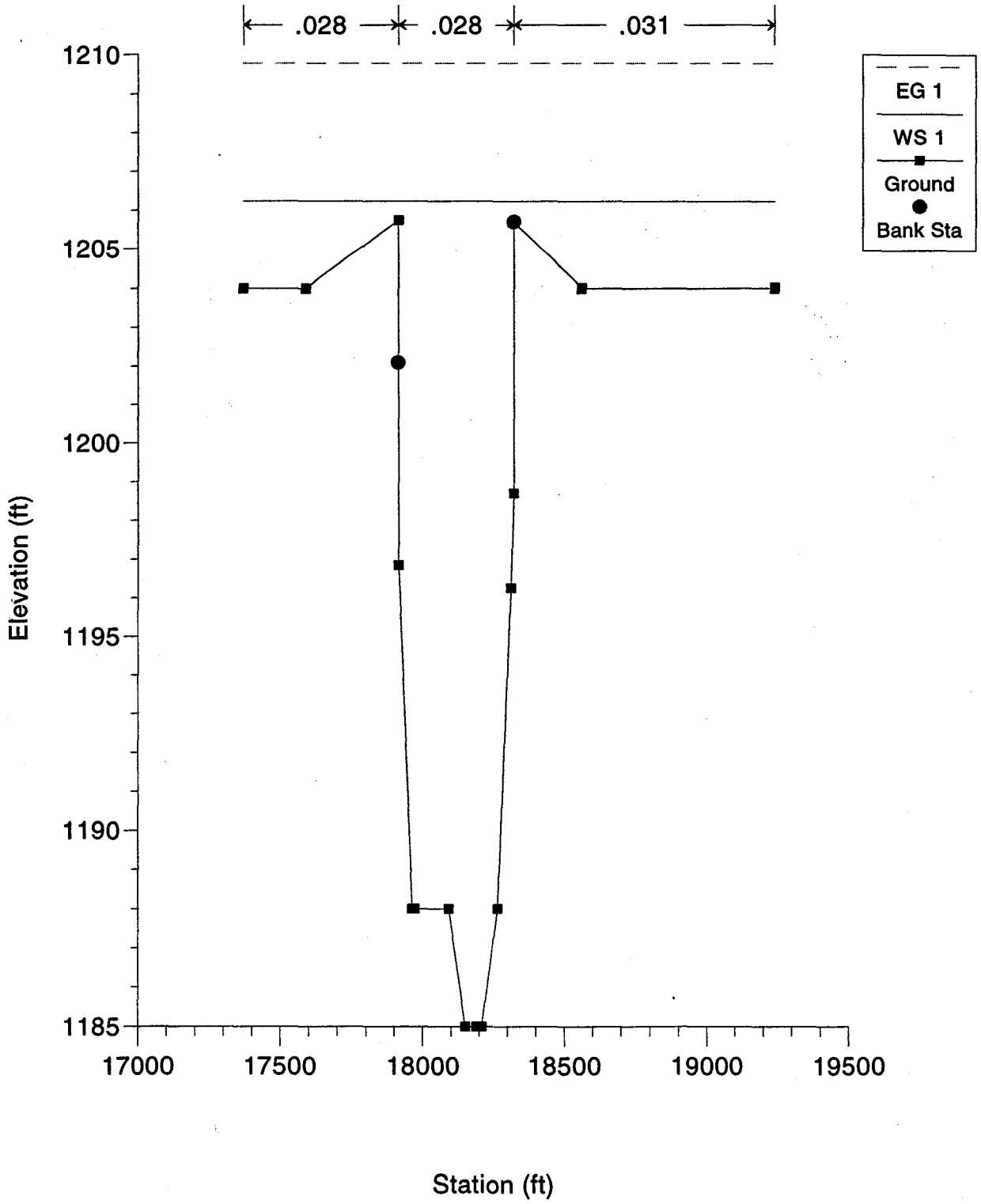
ALMA SCHOOL-SOUTH BRIDGE Plan: Plan 04 4/17/97
Downstream Inside SOUTH BRIDGE

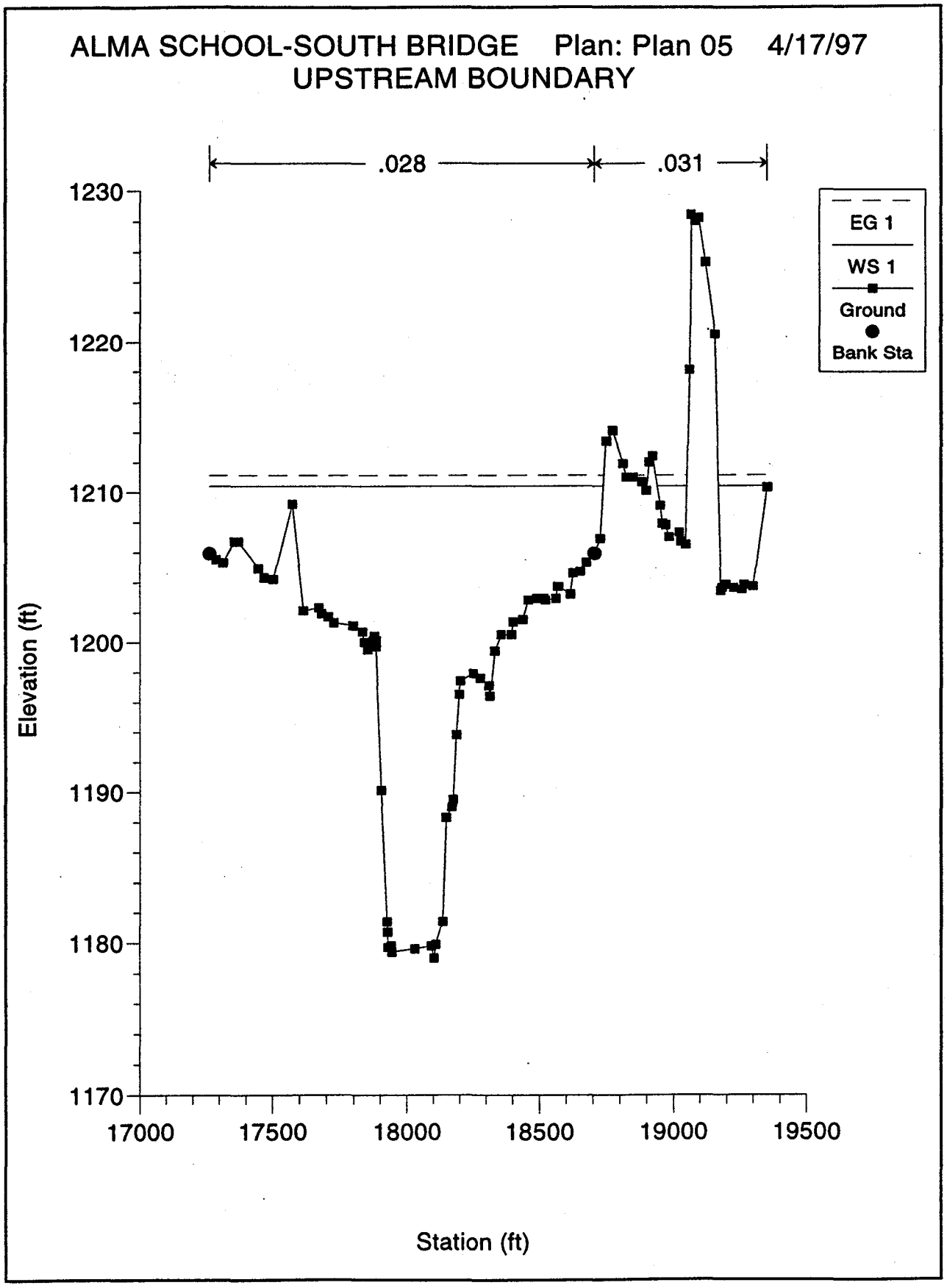


ALMA SCHOOL-SOUTH BRIDGE Plan: Plan 05 4/17/97
Upstream Inside SOUTH BRIDGE

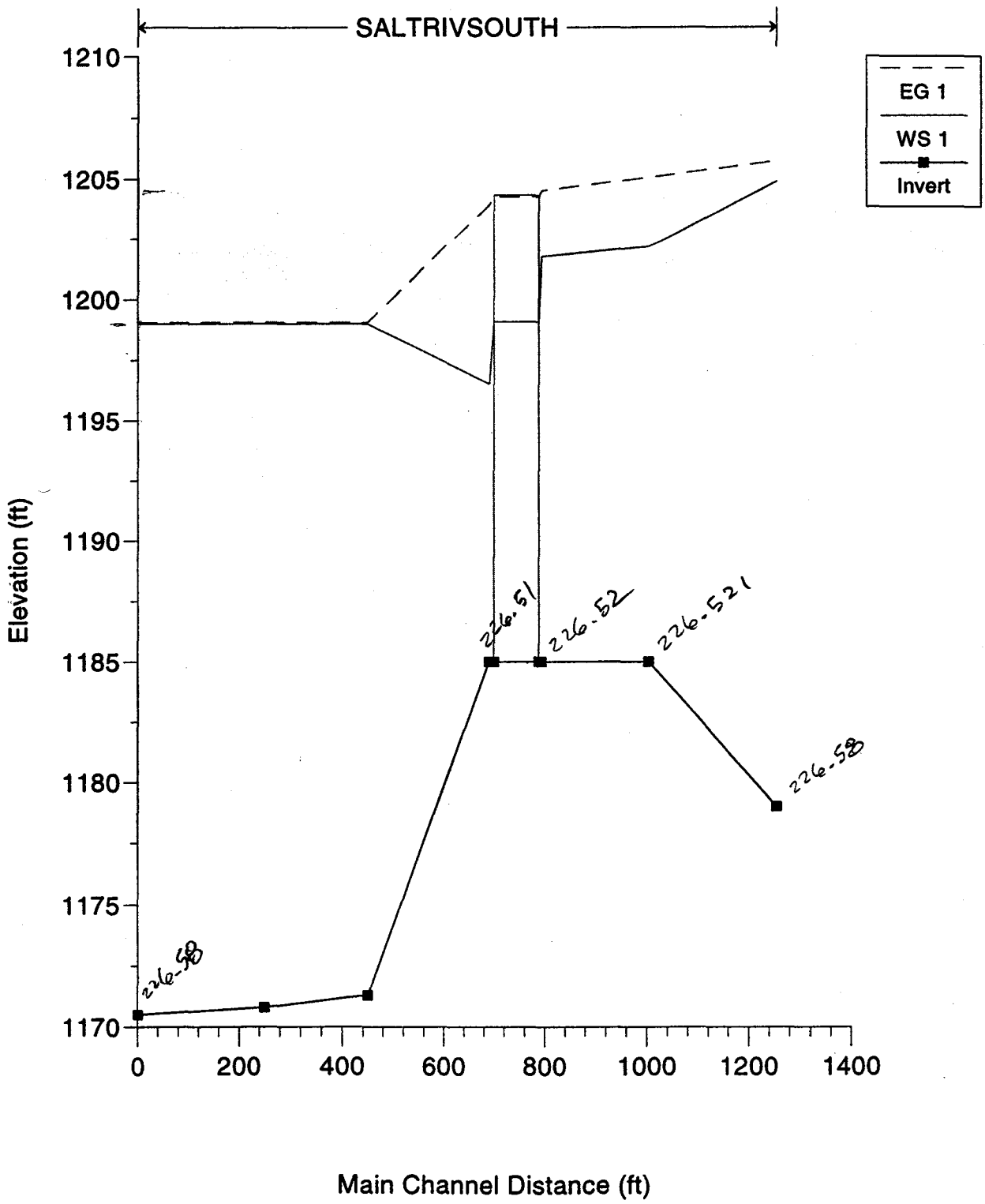


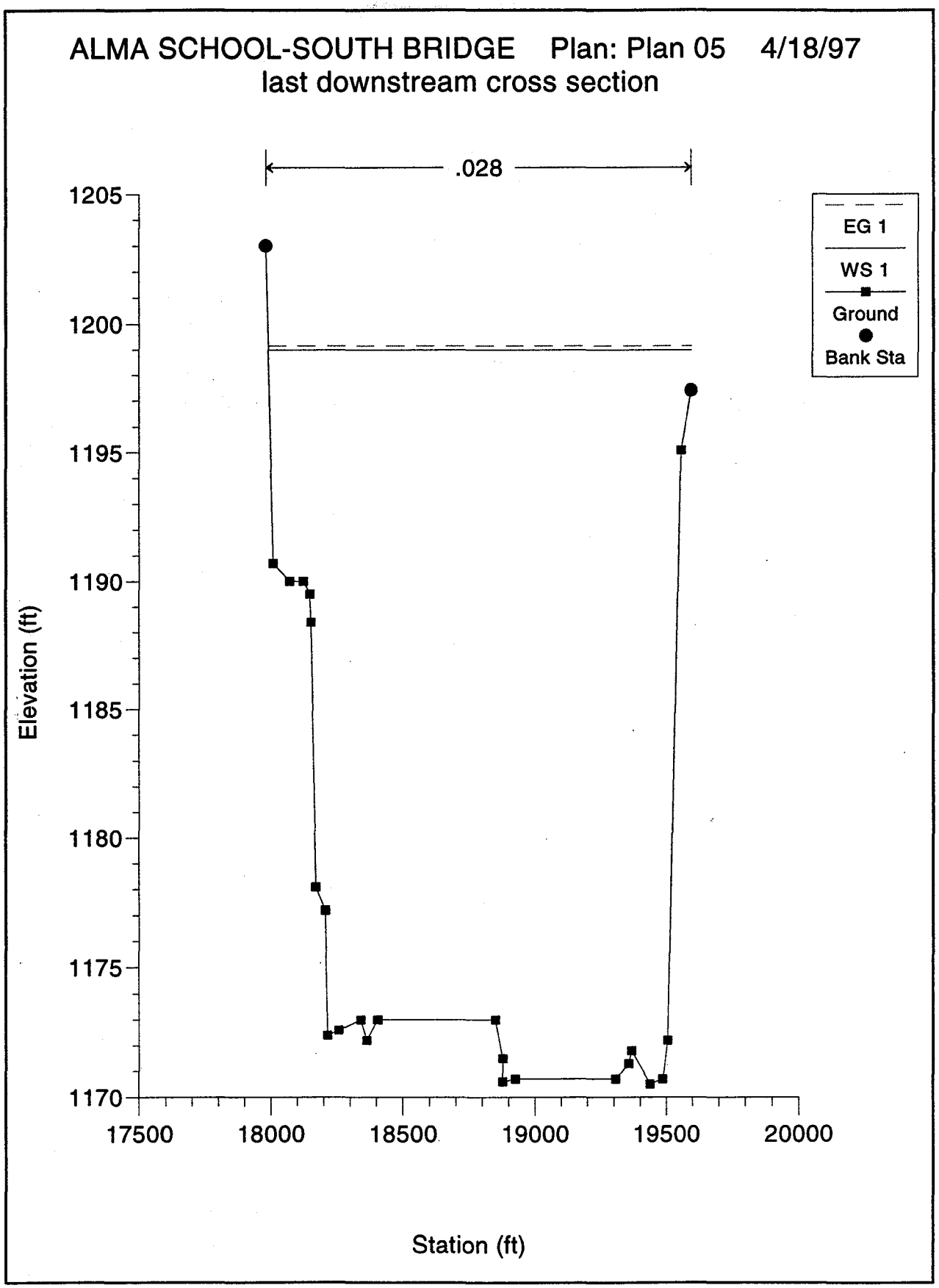
ALMA SCHOOL-SOUTH BRIDGE Plan: Plan 05 4/18/97
UPSTREAM SIDE BRIDGE

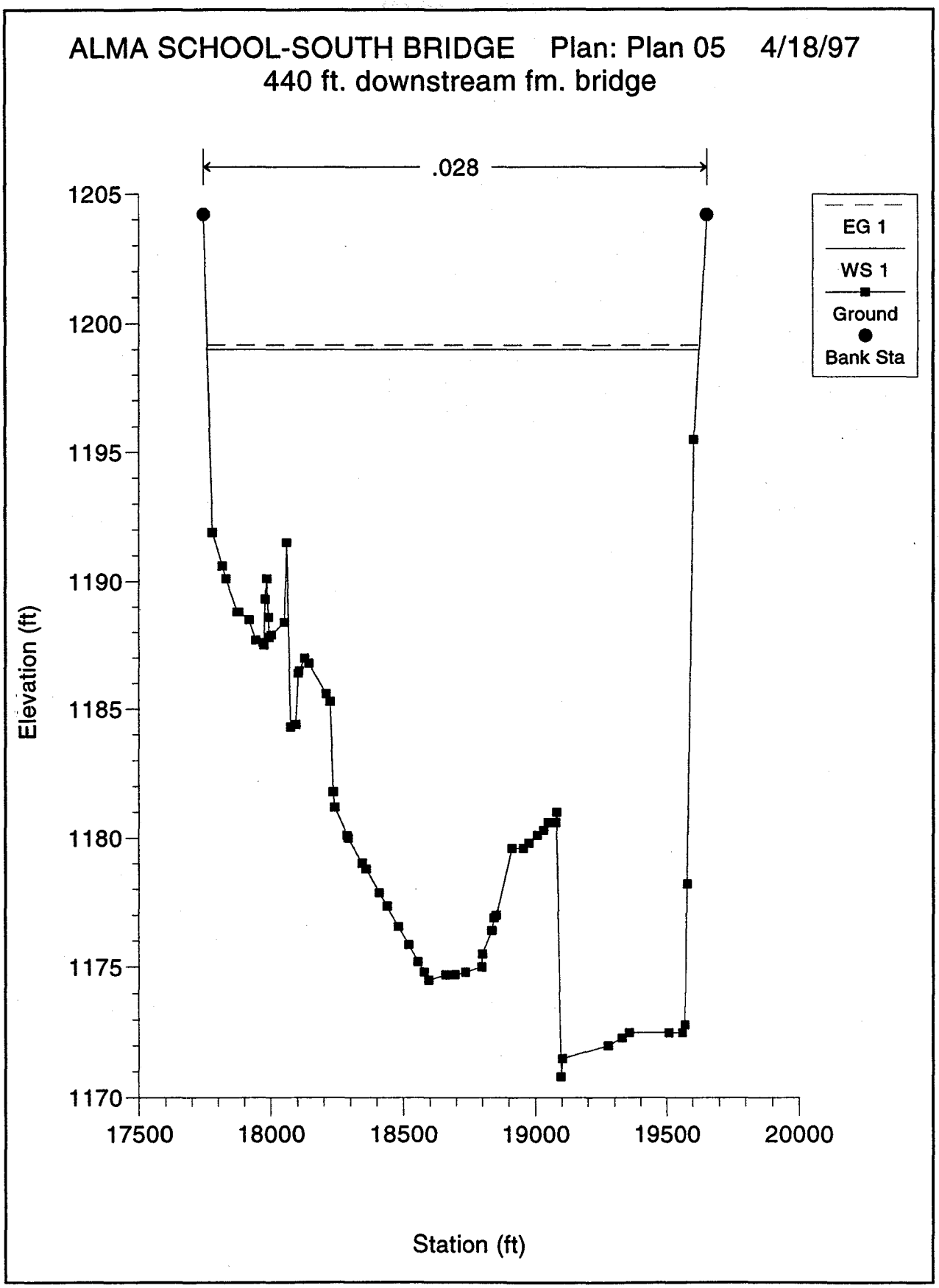


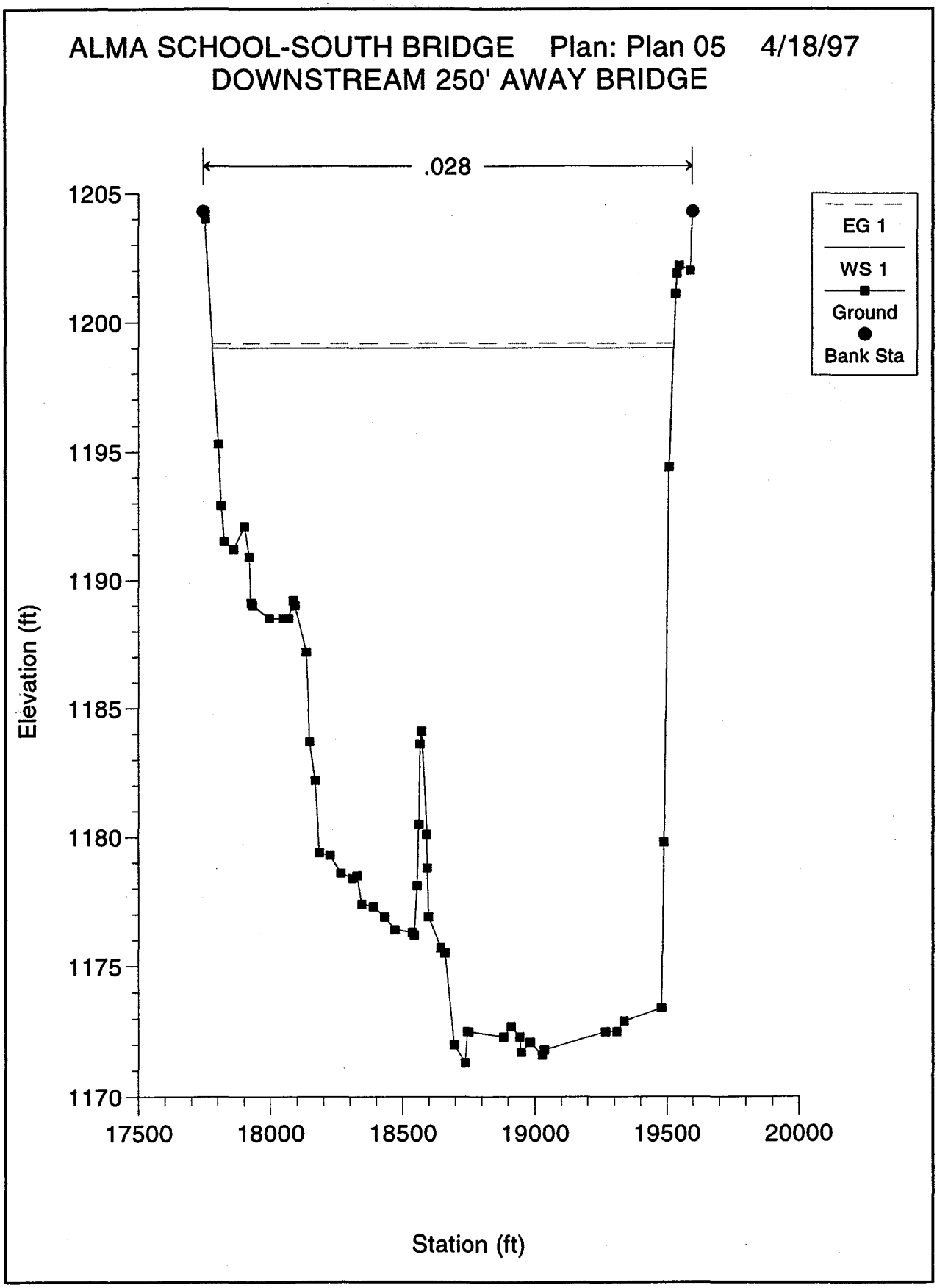

ALMA SCHOOL-SOUTH BRIDGE Plan: Plan 05 4/17/97
UPSTREAM BOUNDARY
.028
.031
EG 1
WS 1
Ground
Bank Sta
Elevation (ft)
1230
1220
1210
1200
1190
1180
1170
17000
17500
18000
18500
19000
19500
Station (ft)

ALMA SCHOOL-SOUTH BRIDGE Plan: Plan 04 4/17/97

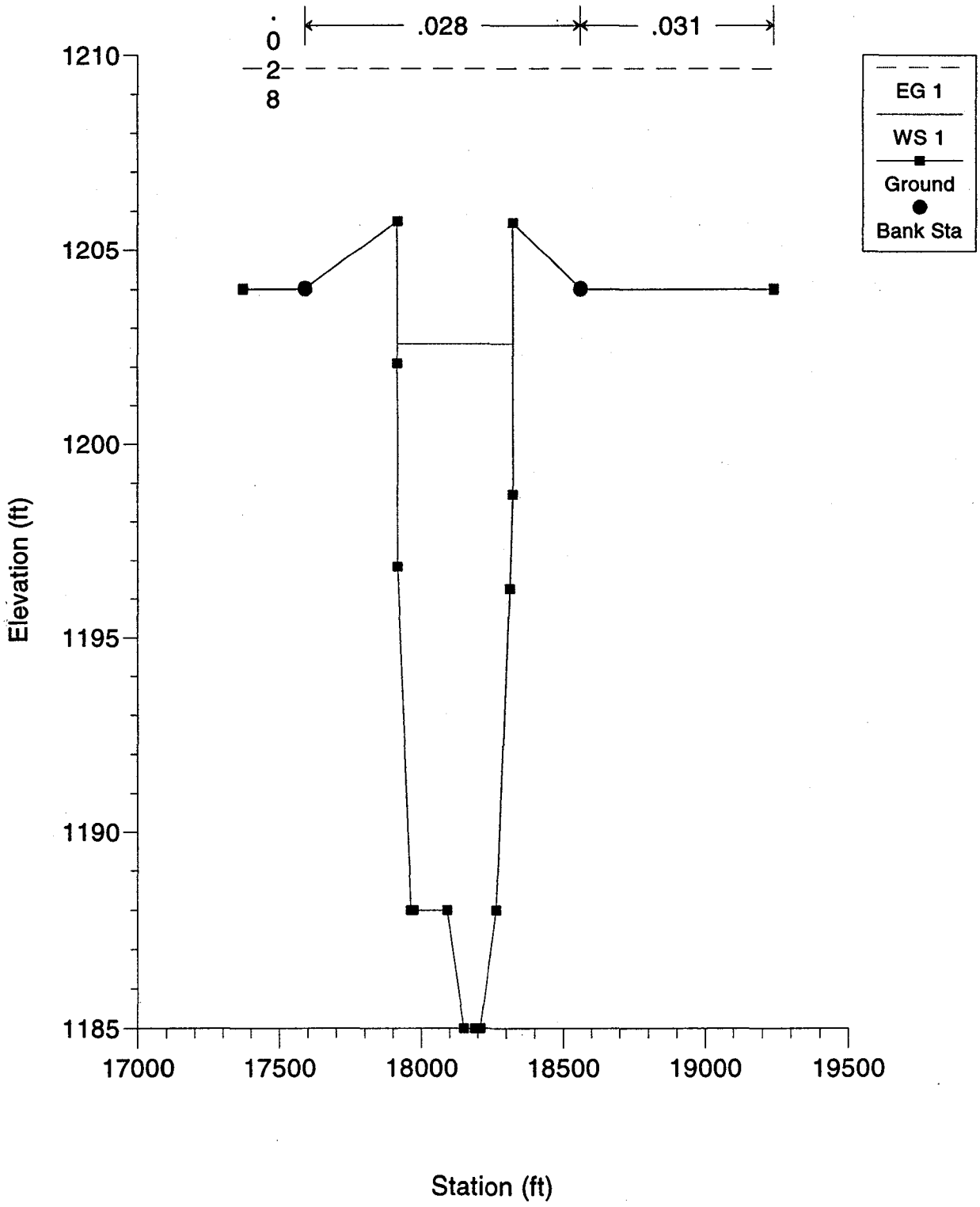



ALMA SCHOOL-SOUTH BRIDGE Plan: Plan 05 4/18/97
last downstream cross section
.028
EG 1
WS 1
Ground
Bank Sta
1205
1200
1195
1190
1185
1180
1175
1170
Elevation (ft)
17500
18000
18500
19000
19500
20000
Station (ft)

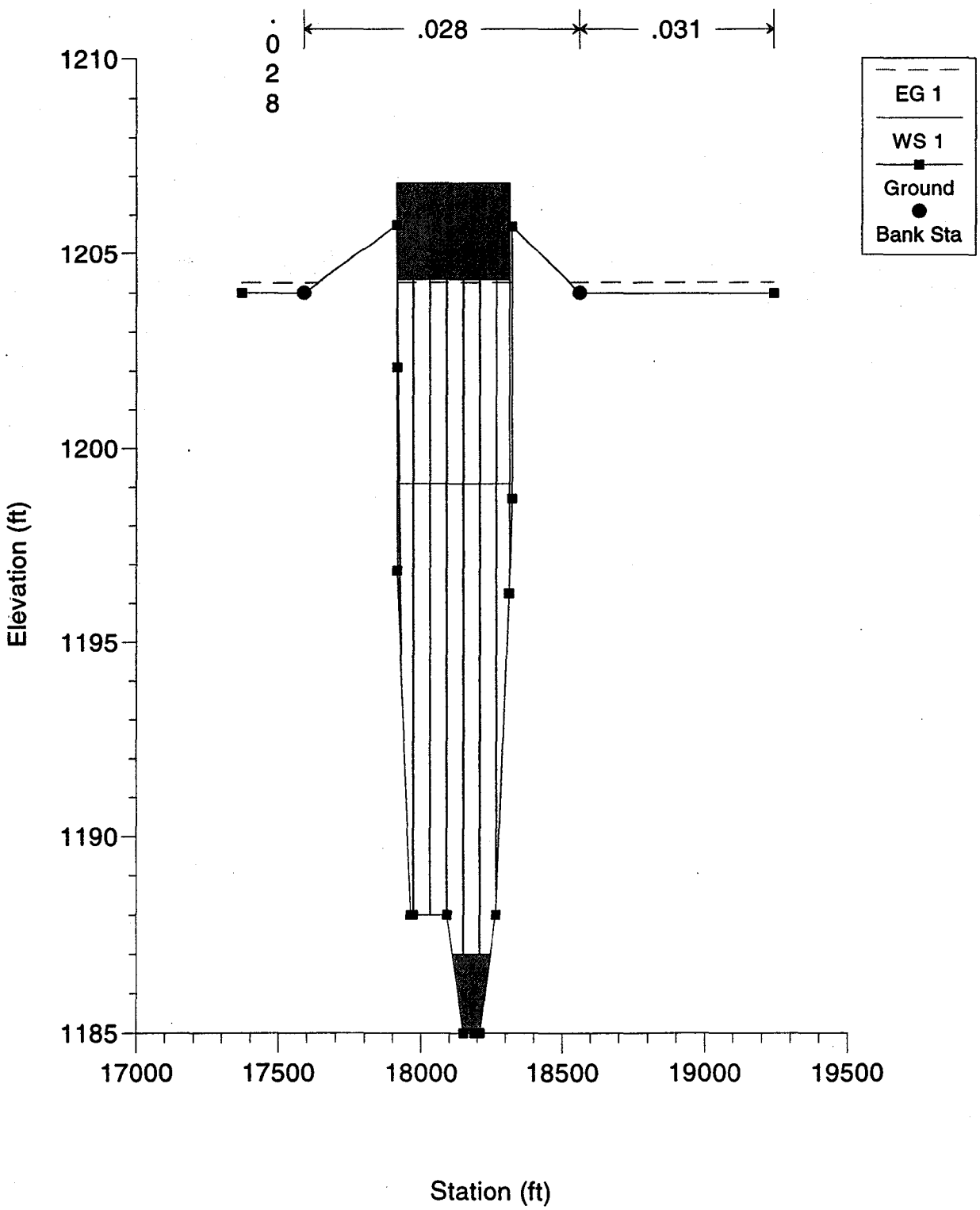

ALMA SCHOOL-SOUTH BRIDGE Plan: Plan 05 4/18/97
440 ft. downstream fm. bridge
.028
EG 1
WS 1
Ground
Bank Sta
Elevation (ft)
1205
1200
1195
1190
1185
1180
1175
1170
17500
18000
18500
19000
19500
20000
Station (ft)

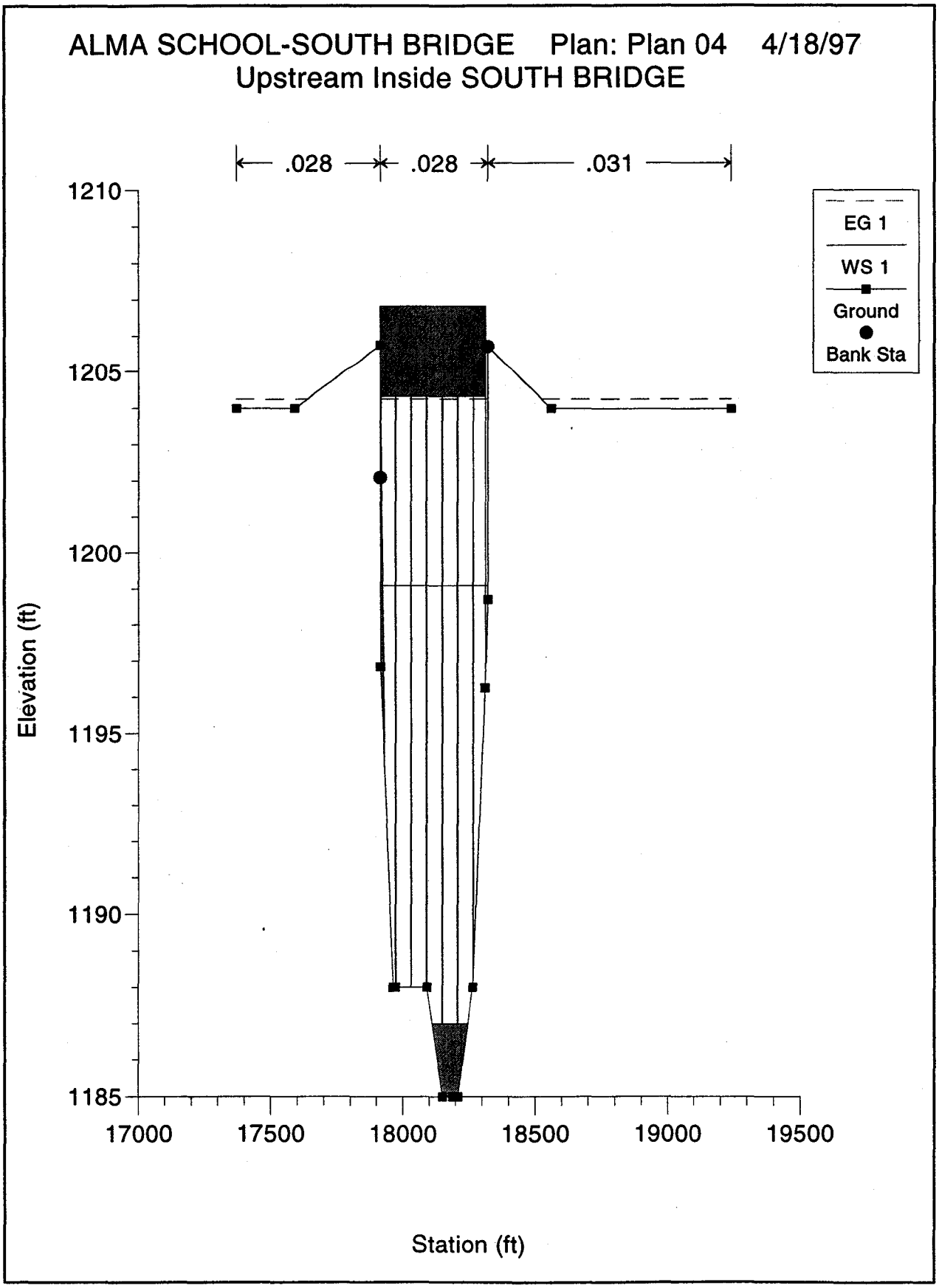

ALMA SCHOOL-SOUTH BRIDGE Plan: Plan 05 4/18/97
DOWNSTREAM 250' AWAY BRIDGE
.028
EG 1
WS 1
Ground
Bank Sta
Elevation (ft)
1205
1200
1195
1190
1185
1180
1175
1170
17500
18000
18500
19000
19500
20000
Station (ft)

ALMA SCHOOL-SOUTH BRIDGE Plan: Plan 05 4/18/97
DOWNSTREAM SIDE BRIDGE

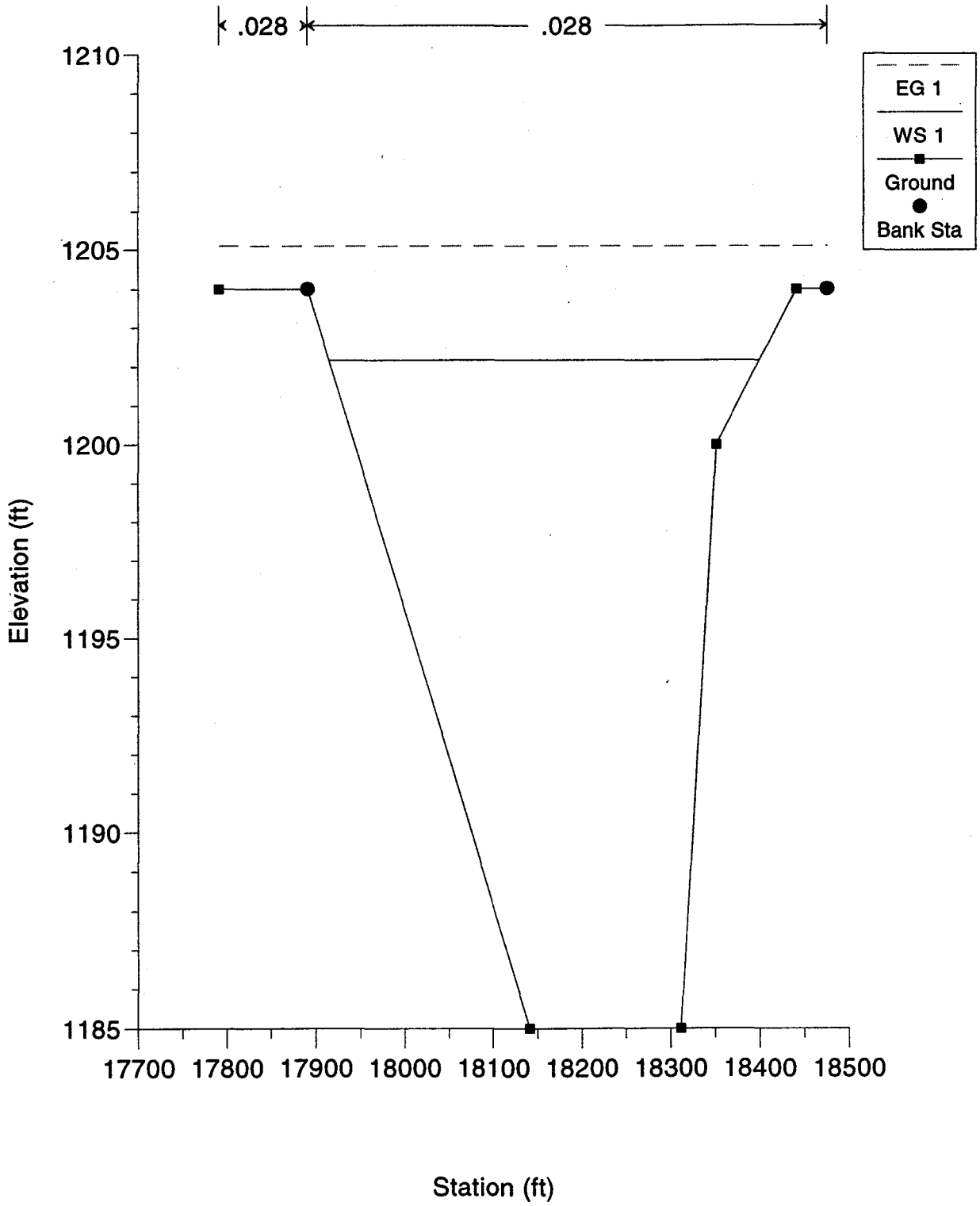


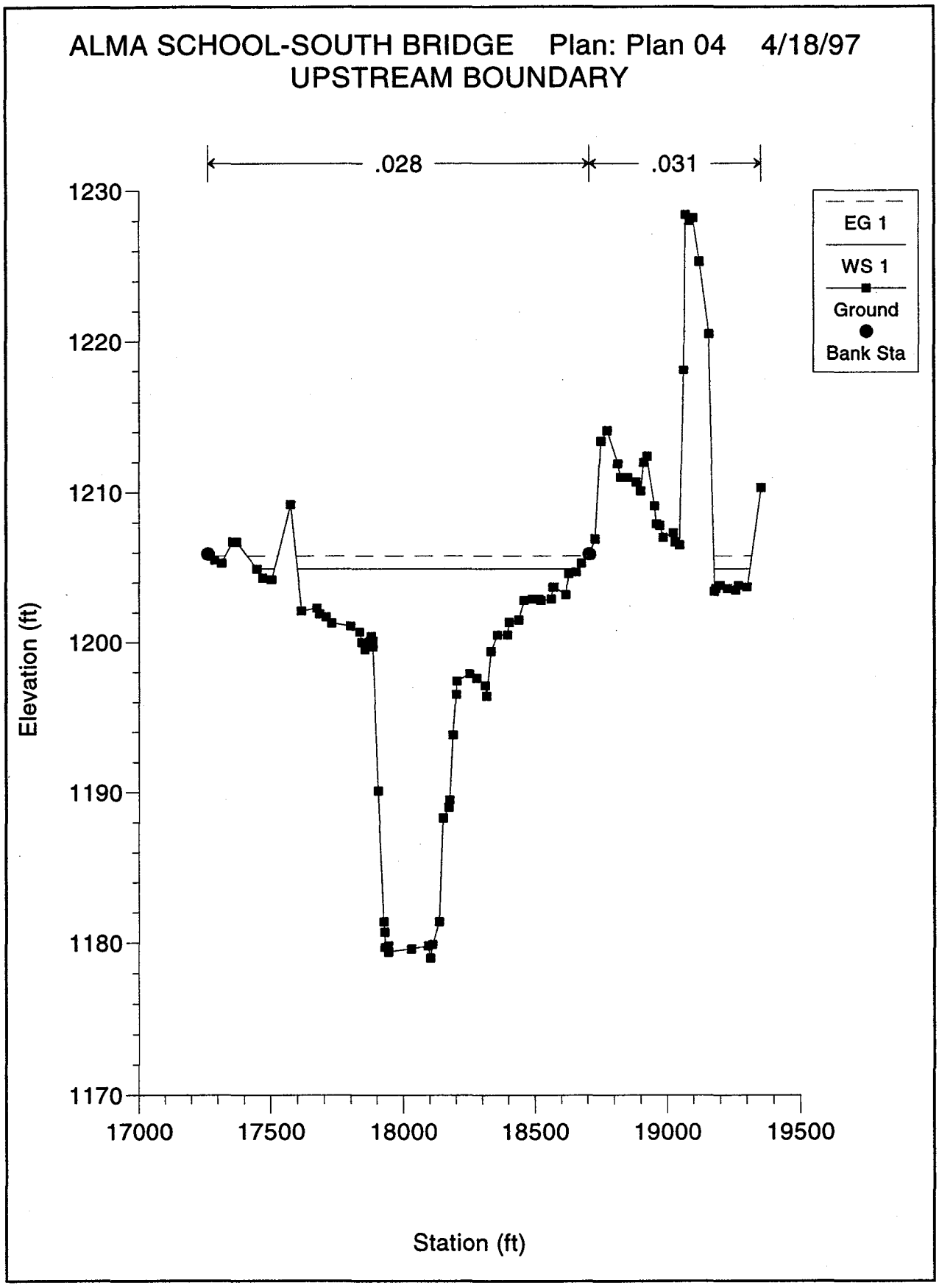
ALMA SCHOOL-SOUTH BRIDGE Plan: Plan 04 4/18/97
Downstream Inside SOUTH BRIDGE




ALMA SCHOOL-SOUTH BRIDGE Plan: Plan 04 4/18/97
Upstream Inside SOUTH BRIDGE
.028
.028
.031
EG 1
WS 1
Ground
Bank Sta
1210
1205
1200
1195
1190
1185
Elevation (ft)
17000
17500
18000
18500
19000
19500
Station (ft)

ALMA SCHOOL-SOUTH BRIDGE Plan: Plan 04 4/18/97
NARROWER SECT. BEFORE BR.




ALMA SCHOOL-SOUTH BRIDGE Plan: Plan 04 4/18/97
UPSTREAM BOUNDARY
.028
.031
EG 1
WS 1
Ground
Bank Sta
Elevation (ft)
1230
1220
1210
1200
1190
1180
1170
17000
17500
18000
18500
19000
19500
Station (ft)

HEC-RAS Version 1.2 April 1996
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street, Suite D
Davis, California 95616-4687
(916) 756-1104

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X    X    X   X
XXXXXXX  XXXX     X       XXX XXXX     XXXXXX    XXXX
X     X  X        X           X  X     X    X       X
X     X  X        X    X      X   X    X    X       X
X     X  XXXXXX    XXXX       X    X   X    X   XXXXX
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****

PROJECT DATA
Project Title: ALMA SCHOOL-SOUTH BRIDGE
Project File : alma.prj
Run Date and Time: 4/17/97 3:02:24 PM

Project in English units

****

PLAN DATA

Plan Title: Plan 05
Plan File : c:\hec\ras\alma.p05

Geometry Title: Plan 05
Geometry File : c:\hec\ras\alma.p05

Flow Title : Plan 05
Flow File : c:\hec\ras\alma.p05

Plan Summary Information:

Number of:	Cross Sections =	7	Mulitple Openings =	0
	Culverts =	0	Inline Weirs =	0
	Bridges =	1		

Computational Information

Water surface calculation tolerance =	.01
Critical depth calculaton tolerance =	.01
Maximum number of interations =	20
Maximum difference tolerance =	.3
Flow tolerance factor =	.001

Computational Flow Regime: Mixed Flow

Encroachment Data: None

Flow Distribution Locations

Reach	RS Start	RS End	LOB	Channel	ROB
SALTRIVSOUTH	226.58	226.13	5	20	5

****

FLOW DATA

Flow Title: AL500.DAT
Flow File : c:\hec\ras\alma.f05

Flow Data (cfs)

Reach	Riv Sta	PF#1
SALTRIVSOUTH	226.58	123250

Boundary Conditions

Reach	Profile	Upstream	Downstream
SALTRIVSOUTH	1	Known WS = 1203.5	Known WS = 1199

GEOMETRY DATA

Geometry Title: ALMA SCOOL-SOUTH BRIDGE
Geometry File : c:\hec\ras\alma.g01

CROSS SECTION INPUT Reach: SALTRIVSOUTH River Station: 226.58
Description: UPSTREAM BOUNDARY

Station Elevation Data, num = 92

Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
17263.7	1205.9	17287.8	1205.5	17314.2	1205.3	17356.2	1206.7	17370.8	1206.7
17448.3	1204.9	17469.9	1204.3	17504	1204.2	17575.1	1209.2	17616	1202.1
17674.1	1202.3	17684.3	1201.9	17708.4	1201.7	17729.6	1201.3	17799.9	1201.1
17835.5	1200.7	17842.6	1200	17855.1	1199.5	17874.99	1200.04	17877.2	1200.1
17880	1200.4	17885.1	1200.1	17885.4	1199.7	17904.6	1190.1	17925.1	1181.4
17928.5	1180.7	17930.2	1179.7	17942.1	1179.8	17943.9	1179.4	18030.2	1179.6
18093.5	1179.8	18103.1	1179	18110.1	1179.9	18135.1	1181.4	18150.1	1188.3
18171.5	1189	18174.4	1189.5	18188.6	1193.8	18199.7	1196.5	18202.3	1197.4
18251.8	1197.9	18278.2	1197.6	18311	1197.1	18315.6	1196.4	18333.3	1199.4
18357.8	1200.5	18396.07	1200.5	18402.8	1201.35	18438.4	1201.5	18459	1202.8
18490.5	1202.9	18515.6	1202.9	18523.4	1202.8	18562.2	1202.9	18568.8	1203.7
18571.7	1203.7	18617.2	1203.2	18626.8	1204.6	18654.2	1204.7	18675.4	1205.3
18706.9	1205.9	18727.2	1206.9	18750.2	1213.4	18773.8	1214.1	18813.2	1211.9
18825.2	1211	18850.7	1211	18882.4	1210.7	18899.2	1210.1	18910.9	1212
18923.2	1212.4	18950.7	1209.1	18958.6	1207.9	18970.4	1207.8	18983.5	1207
19021.8	1207.3	19028.8	1206.7	19045.4	1206.5	19062.3	1218.1	19069	1228.4
19083.1	1228	19097.8	1228.2	19122	1225.3	19157.3	1220.5	19177.8	1203.4
19184	1203.6	19198.3	1203.8	19227.4	1203.6	19258.4	1203.5	19267.3	1203.8
19300.5	1203.7	19353.4	1210.3						

Manning's n Values, num = 3

Sta.	Value	Sta.	Value	Sta.	Value
17263.7	.028	17263.7	.028	18706.9	.031

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
17263.7	18706.9	250	250	250	.1	.3

CROSS SECTION OUTPUT Reach: SALTRIVSOUTH Riv Sta: 226.58 Profile # 1

W.S. Elev (ft)	1210.41	Element	Left OB	Channel	Right OB

Vel Head (ft)	0.71	Wt. n-Val.			0.028	0.031
E.G. Elev (ft)	1211.12	Reach Len. (ft)	250.00		250.00	250.00
E.G. Slope (ft/ft)	0.000621	Flow Area (sq ft)			17239.74	1456.31
Q Total (cfs)	123250.00	Flow (cfs)			123250.00	
Top Width (ft)	1781.63	Top Width (ft)			1443.20	338.43
Vel Total (ft/s)	6.59	Avg. Vel. (ft/s)			6.87	3.36
Max Chl Dpth (ft)	31.41	Hydr. Depth (ft)			11.95	4.30
Crit W.S. (ft)	1202.65	Wetted Per. (ft)			1456.68	343.47
Conv. Total (cfs)	4947429.0	Conv. (cfs)			4751293.0	196136.2

Warning - Divided flow computed for this cross-section.
Warning - The cross-section end points had to be extended vertically for the computed water surface.
Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Reach: SALTRIVSOUTH Riv Sta: 226.58 Profile # 1

Left Sta (ft)	Right Sta (ft)	%Q	Area (sq ft)	W.P. (ft)	Conv. (cfs)	Hydr D. (ft)	Velocity (ft/s)
17552.34	17624.50	0.01	5.39	11.70	170.7	0.46	1.52
17624.50	17696.66	0.05	36.92	72.17	1253.4	0.51	1.63
17696.66	17768.82	0.22	89.91	72.16	5524.8	1.25	2.95
17768.82	17840.98	0.35	121.08	72.19	9071.3	1.68	3.59
17840.98	17913.14	2.45	394.46	75.41	63078.4	5.47	7.67
17913.14	17985.30	26.01	1609.79	73.58	668258.5	22.31	19.91
17985.30	18057.46	27.85	1664.23	72.16	715592.5	23.06	20.63
18057.46	18129.62	27.25	1643.63	72.29	700069.9	22.78	20.43
18129.62	18201.78	11.14	974.13	74.82	286109.8	13.50	14.09
18201.78	18273.94	2.15	358.04	72.19	55257.9	4.96	7.40
18273.94	18346.10	2.01	344.21	72.48	51607.7	4.77	7.19
18346.10	18418.26	0.46	141.53	72.23	11761.5	1.96	3.99
18418.26	18490.42	0.07	34.40	38.36	1697.4	0.90	2.37

Warning - Divided flow computed for this cross-section.
Warning - The cross-section end points had to be extended vertically for the computed water surface.
Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION INPUT Reach: SALTRIVSOUTH River Station: 226.521
Description: NARROWER SECT. BEFORE BR.

Station Elevation Data, num = 7

Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
17791	1204	17891	1204	18141	1185	18311	1185	18351	1200
18441	1204	18475	1204						

Manning's n Values, num = 3

Sta.	Value	Sta.	Value	Sta.	Value
17791	.028	17891	.028	18475	.028

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
17891	18475	240	210	190	.1	.3

CROSS SECTION OUTPUT Reach: SALTRIVSOUTH Riv Sta: 226.521 Profile # 1

W.S. Elev (ft)	1206.54	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.83	Wt. n-Val.	0.028	0.028	
E.G. Elev (ft)	1210.37	Reach Len. (ft)	240.00	210.00	190.00
E.G. Slope (ft/ft)	0.002861	Flow Area (sq ft)	254.27	7729.95	
Q Total (cfs)	123250.00	Flow (cfs)	1322.23	121927.80	
Top Width (ft)	684.00	Top Width (ft)	100.00	584.00	
Vel Total (ft/s)	15.44	Avg. Vel. (ft/s)	5.20	15.77	
Max Chl Dpth (ft)	21.54	Hydr. Depth (ft)	2.54	13.24	
Crit W.S. (ft)	1204.66	Wetted Per. (ft)	102.54	590.07	
Conv. Total (cfs)	2304336.0	Conv. (cfs)	24721.0	2279615.0	

Warning - The cross-section end points had to be extended vertically for the computed water surface.
Warning - The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

FLOW DISTRIBUTION OUTPUT Reach: SALTRIVSOUTH Riv Sta: 226.521 Profile # 1

Left Sta (ft)	Right Sta (ft)	%Q	Area (sq ft)	W.P. (ft)	Conv. (cfs)	Hydr D. (ft)	Velocity (ft/s)
17791.00	17811.00	0.20	50.85	22.54	4642.1	2.54	4.88
17811.00	17831.00	0.22	50.85	20.00	5027.7	2.54	5.28
17831.00	17851.00	0.22	50.85	20.00	5027.7	2.54	5.28
17851.00	17871.00	0.22	50.85	20.00	5027.7	2.54	5.28
17871.00	17891.00	0.22	50.85	20.00	5027.7	2.54	5.28
17891.00	17920.20	0.49	106.64	29.28	13396.2	3.65	5.72
17920.20	17949.40	1.09	171.46	29.29	29556.6	5.87	7.85
17949.40	17978.60	1.86	236.24	29.28	50430.1	8.09	9.72

17978.60	18007.80	2.79	301.06	29.29	75537.7	10.31	11.42
18007.80	18037.00	3.86	365.84	29.28	104530.2	12.53	13.01
18037.00	18066.20	5.07	430.64	29.28	137175.8	14.75	14.50
18066.20	18095.40	6.40	495.47	29.29	173287.8	16.97	15.92
18095.40	18124.60	7.85	560.24	29.28	212671.2	19.19	17.28
18124.60	18153.80	9.28	618.85	29.25	251234.5	21.19	18.48
18153.80	18183.00	9.54	629.03	29.20	258449.7	21.54	18.70
18183.00	18212.20	9.54	629.03	29.20	258449.7	21.54	18.70
18212.20	18241.40	9.55	629.07	29.20	258467.0	21.54	18.70
18241.40	18270.60	9.54	629.03	29.20	258449.7	21.54	18.70
18270.60	18299.80	9.55	629.07	29.20	258467.0	21.54	18.70
18299.80	18329.00	7.84	568.28	30.42	212310.7	19.46	17.01
18329.00	18358.20	2.40	280.64	30.70	65109.0	9.61	10.56
18358.20	18387.40	1.00	162.76	29.23	27135.9	5.57	7.59
18387.40	18416.60	0.64	124.86	29.23	17444.7	4.28	6.36
18416.60	18445.80	0.36	87.48	29.23	9642.5	3.00	5.02
18445.80	18475.00	0.26	74.25	31.74	6942.8	2.54	4.26

Warning - The cross-section end points had to be extended vertically for the computed water surface.
Warning - The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION INPUT Reach: SALTRIVSOUTH River Station: 226.52
Description: UPSTREAM SIDE BRIDGE

Station Elevation Data, num = 20

Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
17370	1204	17590	1204	17915.5	1205.74	17915.6	1202.09	17915.7	1196.84
17962.5	1188	17971.2	1188	18091.2	1188	18091.2	1188	18149.7	1185
18149.7	1185	18188.7	1185	18208.2	1185	18208.2	1185	18264.2	1188
18311.5	1196.26	18322.5	1198.7	18322.7	1205.7	18560	1204	19240	1204

Manning's n Values, num = 3

Sta.	Value	Sta.	Value	Sta.	Value
17370	.028	17915.6	.028	18322.7	.031

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
17915.6	18322.7	103	103	103	.1	.3

CROSS SECTION OUTPUT Reach: SALTRIVSOUTH Riv Sta: 226.52 Profile # 1

W.S. Elev (ft)	1206.24	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.54	Wt. n-Val.	0.028	0.028	0.031
E.G. Elev (ft)	1209.78	Reach Len. (ft)	5.00	5.00	5.00
E.G. Slope (ft/ft)	0.001960	Flow Area (sq ft)	936.44	7260.40	1848.78
Q Total (cfs)	123250.00	Flow (cfs)	3132.04	113867.70	6250.23
Top Width (ft)	1870.00	Top Width (ft)	545.60	407.10	917.30
Vel Total (ft/s)	12.27	Avg. Vel. (ft/s)	3.34	15.68	3.38
Max Chl Dpth (ft)	21.24	Hydr. Depth (ft)	1.72	17.83	2.02
Crit W.S. (ft)	1202.59	Wetted Per. (ft)	551.39	421.02	919.54
Conv. Total (cfs)	2783686.0	Conv. (cfs)	70739.3	2571781.0	141165.8

Warning - The cross-section end points had to be extended vertically for the computed water surface.

Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Reach: SALTRIVSOUTH Riv Sta: 226.52 Profile # 1

Left Sta (ft)	Right Sta (ft)	%Q	Area (sq ft)	W.P. (ft)	Conv. (cfs)	Hydr D. (ft)	Velocity (ft/s)
17370.00	17479.12	0.74	243.92	111.35	21832.8	2.24	3.73
17479.12	17588.24	0.75	243.92	109.12	22130.4	2.24	3.78
17588.24	17697.36	0.60	213.12	109.12	17670.8	1.95	3.45
17697.36	17806.48	0.33	149.48	109.12	9783.9	1.37	2.73
17806.48	17915.60	0.13	86.00	112.67	3811.8	0.79	1.85
17915.60	17935.96	1.82	229.74	25.86	52289.0	11.29	9.76
17935.96	17956.31	3.44	308.23	20.71	98958.7	15.14	13.77
17956.31	17976.66	4.66	367.57	20.46	133781.1	18.06	15.61
17976.66	17997.02	4.75	371.19	20.36	136471.4	18.24	15.77
17997.02	18017.38	4.75	371.19	20.36	136471.4	18.24	15.77
18017.38	18037.73	4.75	371.19	20.36	136471.4	18.24	15.77
18037.73	18058.08	4.75	371.15	20.35	136458.3	18.24	15.77
18058.08	18078.44	4.75	371.19	20.36	136471.4	18.24	15.77
18078.44	18098.79	4.78	372.67	20.37	137334.3	18.31	15.81
18098.79	18119.15	5.15	389.70	20.38	147884.6	19.15	16.28
18119.15	18139.50	5.62	410.99	20.38	161579.8	20.19	16.86

* 18139.50	* 18159.86	* 6.06	* 429.59	* 20.37	* 174027.0	* 21.10	* 17.38	*
* 18159.86	* 18180.21	* 6.12	* 432.26	* 20.36	* 175907.3	* 21.24	* 17.46	*
* 18180.21	* 18200.57	* 6.12	* 432.26	* 20.36	* 175907.3	* 21.24	* 17.46	*
* 18200.57	* 18220.92	* 6.02	* 427.88	* 20.37	* 172855.6	* 21.02	* 17.33	*
* 18220.92	* 18241.28	* 5.54	* 407.28	* 20.38	* 159145.3	* 20.01	* 16.76	*
* 18241.28	* 18261.63	* 5.04	* 385.08	* 20.38	* 144953.1	* 18.92	* 16.15	*
* 18261.63	* 18281.99	* 4.14	* 343.70	* 20.63	* 118992.4	* 16.89	* 14.85	*
* 18281.99	* 18302.34	* 2.80	* 271.78	* 20.66	* 80363.0	* 13.35	* 12.68	*
* 18302.34	* 18322.70	* 1.34	* 195.77	* 27.56	* 38386.1	* 9.62	* 8.41	*
* 18322.70	* 18506.16	* 0.41	* 218.78	* 183.47	* 11792.4	* 1.19	* 2.33	*
* 18506.16	* 18689.62	* 1.13	* 399.71	* 183.46	* 32199.5	* 2.18	* 3.48	*
* 18689.62	* 18873.08	* 1.18	* 410.10	* 183.46	* 33606.3	* 2.24	* 3.54	*
* 18873.08	* 19056.54	* 1.18	* 410.10	* 183.46	* 33605.9	* 2.24	* 3.54	*
* 19056.54	* 19240.00	* 1.17	* 410.10	* 185.70	* 33336.0	* 2.24	* 3.52	*

****
*

Warning - The cross-section end points had to be extended vertically for the computed water surface.
Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

BRIDGE INPUT Reach: SALTRIVSOUTH River Station: 226.51
Description: SOUTH BRIDGE
Distance from Upstream XS = 5
Deck/Roadway Width = 88
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew =
Upstream Deck/Roadway Coordinates, num = 2

Sta.	Hi Cord	Lo Cord	Sta.	Hi Cord	Lo Cord
17914	1206.83	1204.33	18314	1206.83	1204.33

Downstream Deck/Roadway Coordinates, num = 2

Sta.	Hi Cord	Lo Cord	Sta.	Hi Cord	Lo Cord
17914	1206.83	1204.33	18314	1206.83	1204.33

Elevation at which weir flow begins =
Maximum allowable submergence for weir flow = .95
Submergence criteria :Broad Crested

Number of Abutments = 1

Upstream Abutment Data, num = 4

Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.

```
*****************************************************************
17915.71 1204.3317940.39    1187   18315    1187 18340.5 1204.33
Downstream Abutment Data,  num = 4
    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.
*****************************************************************
17915.71 1204.3317940.39    1187   18315    1187 18340.5 1204.33

Number of Piers =  6

Pier Station     Upstream=17972.45    Downstream=17972.45
Upstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*******************************
  1204.3     2.5    1187     2.5
Downstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*******************************
  1204.3     2.5    1187     2.5

Pier Station     Upstream=18030.95    Downstream=18030.95
Upstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*******************************
    1187     2.5  1204.3     2.5
Downstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*******************************
    1187     2.5  1204.3     2.5

Pier Station     Upstream=18089.45    Downstream=18089.45
Upstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*******************************
    1187     2.5  1204.3     2.5
Downstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*******************************
    1187     2.5  1204.3     2.5

Pier Station     Upstream=18148.95    Downstream=18148.95
Upstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*******************************
    1187     2.5  1204.3     2.5
Downstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*******************************
    1187     2.5  1204.3     2.5

Pier Station     Upstream=18207.45    Downstream=18207.45
Upstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*******************************
    1187     2.5  1204.3     2.5
Downstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*******************************
    1187     2.5  1204.3     2.5

Pier Station     Upstream=18266.95    Downstream=18266.95
Upstream Pier Data,  num = 2
```

```
   Elev.   Width   Elev.   Width
*******************************
    1187     2.5  1204.3     2.5
Downstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*******************************
    1187     2.5  1204.3     2.5

Number of Bridge Coefficient Sets =  1

Low Flow Methods
       Energy
       Momentum                Cd   =       0
       Yarnell                 KVal =    1.25
       W.S. Pro Method         CVal =
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd          =
           Submerged Inlet + Outlet Cd =      .8
           Max Low Cord                =

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the downstream end
       Criteria to check for pressure flow = Upstream water surface

BRIDGE OUTPUT  Reach: SALTRIVSOUTH  Riv Sta: 226.51    Profile # 1
Opening : Bridge #1
*******************************************************************************
* E.G. US. (ft)        *     1209.78 * Element              *Inside BR US *Inside BR DS *
* W.S. US. (ft)        *     1206.24 * E.G. Elev (ft)       *     1209.78 *     1209.78 *
* Q Total (cfs)        *   123250.00 * W.S. Elev (ft)       *     1206.24 *     1206.24 *
* Q Bridge (cfs)       *    68761.84 * Crit W.S. (ft)       *     1207.18 *     1203.54 *
* Q Weir (cfs)         *    54607.91 * Max Chl Dpth (ft)    *             *             *
* Weir Sta Lft (ft)    *    17370.00 * Vel Total (ft/s)     *             *             *
* Weir Sta Rgt (ft)    *    19240.00 * Flow Area (sq ft)    *             *             *
* Weir Submerg         *        0.01 * Froude # Chl         *             *             *
* Weir Max Depth (ft)  *       12.96 * Specif Force (cu ft) *             *             *
* Min Top Rd (ft)      *     1196.81 * Hydr Depth (ft)      *             *             *
* Min El Prs (ft)      *     1204.33 * W.P. Total (ft)      *             *             *
* Delta EG (ft)        *        0.12 * Conv. Total (cfs)    *             *             *
* Delta WS (ft)        *        3.64 * Top Width (ft)       *             *             *
*******************************************************************************

CROSS SECTION INPUT    Reach: SALTRIVSOUTH   River Station: 226.50
Description: DOWNSTREAM  SIDE  BRIDGE

Station Elevation Data,  num = 20
    Sta.    Elev.     Sta.    Elev.     Sta.    Elev.     Sta.    Elev.     Sta.    Elev.
   17370     1204    17590     1204  17915.5  1205.74  17915.6  1202.09  17915.7  1196.84
 17962.5     1188  17971.2     1188  18091.2     1188  18091.2     1188  18149.7     1185
 18149.7     1185  18188.7     1185  18208.2     1185  18208.2     1185  18264.2     1188
 18311.5  1196.26  18322.5   1198.7  18322.7   1205.7    18560     1204    19240     1204

Manning's n Values,  num = 3
    Sta.   Value     Sta.   Value     Sta.   Value
   17370    .028    17590    .028    18560    .031
```

```
Bank Sta: Left   Right    Lengths: Left Channel   Right    Coeff Contr.   Expan.
         17590   18560              280     240     200             .1       .3

CROSS SECTION OUTPUT  Reach: SALTRIVSOUTH  Riv Sta: 226.50    Profile # 1
*******************************************************************************
* W.S. Elev (ft)     *  1202.59 * Element            *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *     7.07 * Wt. n-Val.         *          *    0.028 *          *
* E.G. Elev (ft)     *  1209.66 * Reach Len. (ft)    *   280.00 *   240.00 *   200.00 *
* E.G. Slope (ft/ft)* 0.004877 * Flow Area (sq ft) *          *  5778.04 *          *
* Q Total (cfs)      *123250.00 * Flow (cfs)         *          *123250.00 *          *
* Top Width (ft)     *   407.03 * Top Width (ft)     *          *   407.03 *          *
* Vel Total (ft/s)   *    21.33 * Avg. Vel. (ft/s)   *          *    21.33 *          *
* Max Chl Dpth (ft)  *    17.59 * Hydr. Depth (ft)   *          *    14.20 *          *
* Crit W.S. (ft)     *  1202.59 * Wetted Per. (ft)   *          *   418.43 *          *
* Conv. Total (cfs) *1764899.0 * Conv. (cfs)        *          *1764899.0 *          *
*******************************************************************************

Warning - The energy equation could not be balanced within the specified number
                of iterations.  The program used critical depth for the water surface and
                continued on with the calculations.
Warning - The velocity head has changed by more than 0.5 ft (0.15 m).  This may
                indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream
                conveyance) is less than 0.7 or greater than 1.4.  This may indicate the
                need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and
                previous cross section.  This may indicate the need for additional cross
                sections.
Warning - During the standard step iterations, when the assumed water surface
                was set equal to critical depth, the calculated water surface came back
                below critical depth.  This indicates that there is not a valid
subcritical
                answer.  The program defaulted to critical depth.
Warning - The parabolic search method failed to converge on critical depth.  The
                program will try the cross section slice/secant method to find critical
                depth.
Note - Multiple critical depths were found at this location.  The critical depth with
                the lowest, valid, water surface was used.

FLOW DISTRIBUTION OUTPUT  Reach: SALTRIVSOUTH  Riv Sta: 226.50    Profile # 1
*******************************************************************************
*
* Left Sta   * Right Sta *       %Q *     Area *     W.P. *    Conv. *  Hydr D. * Velocity
*
* (ft)       * (ft)      *          * (sq ft) *     (ft) *    (cfs) *     (ft) *   (ft/s)
*
* 17881.00   * 17929.50  *     0.82 *    97.71 *    19.80 *  15031.5 *     7.02 *    10.34
*
* 17929.50   * 17978.00  *     9.34 *   604.95 *    49.08 * 171295.4 *    12.47 *    19.03
*
* 17978.00   * 18026.50  *    12.23 *   707.80 *    48.50 * 224314.3 *    14.59 *    21.30
*
* 18026.50   * 18075.00  *    12.23 *   707.80 *    48.50 * 224314.3 *    14.59 *    21.30
*
* 18075.00   * 18123.50  *    13.00 *   734.55 *    48.54 * 238483.4 *    15.15 *    21.82
*
* 18123.50   * 18172.00  *    16.12 *   835.70 *    48.53 * 295723.4 *    17.23 *    23.78
*
* 18172.00   * 18220.50  *    16.57 *   849.24 *    48.52 * 303826.0 *    17.51 *    24.04
*
```

```
* 18220.50  * 18269.00  *    13.65 *   756.94 *    48.64 * 250400.0 *    15.61 *    22.23
*
* 18269.00  * 18317.50  *     5.92 *   460.90 *    49.29 * 108564.2 *     9.50 *    15.83
*
* 18317.50  * 18366.00  *     0.12 *    22.46 *     9.03 *   2186.8 *     4.39 *     6.54
*
*****************************************************************************************
*

Warning - The energy equation could not be balanced within the specified number
                of iterations.  The program used critical depth for the water surface and
                continued on with the calculations.
Warning - The velocity head has changed by more than 0.5 ft (0.15 m).  This may
                indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream
                conveyance) is less than 0.7 or greater than 1.4.  This may indicate the
                need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and
                previous cross section.  This may indicate the need for additional cross
                sections.
Warning - During the standard step iterations, when the assumed water surface
                was set equal to critical depth, the calculated water surface came back
                below critical depth.  This indicates that there is not a valid
subcritical
                answer.  The program defaulted to critical depth.
Warning - The parabolic search method failed to converge on critical depth.  The
                program will try the cross section slice/secant method to find critical
                depth.
Note - Multiple critical depths were found at this location.  The critical depth with
                the lowest, valid, water surface was used.

CROSS SECTION INPUT    Reach: SALTRIVSOUTH   River Station: 226.35
Description: DOWNSTREAM 250' AWAY BRIDGE

Station Elevation Data,  num = 61
    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.
   17745  1204.3 17751.4    1204 17801.4  1195.3 17812.7  1192.9 17823.9  1191.5
 17859.1  1191.2 17899.8  1192.1 17918.1  1190.9 17926.5  1189.1   17932    1189
 17996.3  1188.5 18046.6  1188.5 18068.6  1188.5 18086.1  1189.2 18091.9    1189
   18134  1187.2   18147  1183.7 18167.7  1182.2   18184  1179.4 18223.9  1179.3
 18265.3  1178.6 18309.3  1178.4   18326  1178.5 18344.3  1177.4   18388  1177.3
 18431.1  1176.9 18469.8  1176.4 18535.4  1176.3 18542.6  1176.2 18554.3  1178.1
 18560.6  1180.5 18565.7  1183.6 18572.1  1184.1   18591  1180.1 18592.7  1178.8
   18597  1176.9 18643.3  1175.7 18660.7  1175.5 18694.7    1172 18736.1  1171.3
 18745.3  1172.5 18750.4  1172.5 18881.4  1172.3 18909.7  1172.7 18942.1  1172.3
 18947.4  1171.7 18981.1  1172.1 19026.5  1171.6 19034.3  1171.8 19265.7  1172.5
   19308  1172.5 19335.6  1172.9 19477.2  1173.4 19478.6  1173.4 19487.8  1179.8
 19507.4  1194.4 19533.2  1201.1 19538.7  1201.9 19547.6  1202.2 19590.8    1202
 19598.4  1204.3

Manning's n Values,  num = 3
    Sta.   Value    Sta.   Value    Sta.   Value
   17745    .028   17745    .028 19598.4    .028

Bank Sta: Left   Right    Lengths: Left Channel   Right    Coeff Contr.   Expan.
         17745 19598.4               250     200     175             .1       .3

CROSS SECTION OUTPUT  Reach: SALTRIVSOUTH  Riv Sta: 226.35    Profile # 1
*****************************************************************************
* W.S. Elev (ft)    *  1199.02 * Element          *  Left OB *  Channel * Right OB *
* Vel Head (ft)     *     0.18 * Wt. n-Val.       *          *    0.028 *          *
```

```
* E.G. Elev (ft)     *  1199.20 * Reach Len. (ft)    *   250.00 *   200.00 *   175.00 *
* E.G. Slope (ft/ft)* 0.000072 * Flow Area (sq ft) *          * 36273.13 *          *
* Q Total (cfs)      *123250.00 * Flow (cfs)        *          *123250.00 *          *
* Top Width (ft)     *  1745.13 * Top Width (ft)    *          *  1745.13 *          *
* Vel Total (ft/s)   *     3.40 * Avg. Vel. (ft/s)  *          *     3.40 *          *
* Max Chl Dpth (ft)  *    27.72 * Hydr. Depth (ft)  *          *    20.79 *          *
* Crit W.S. (ft)     *  1180.88 * Wetted Per. (ft)  *          *  1757.41 *          *
* Conv. Total (cfs) *14484300.0 * Conv. (cfs)       *          *14484300.0 *          *
*******************************************************************************
```

Warning - The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

FLOW DISTRIBUTION OUTPUT Reach: SALTRIVSOUTH Riv Sta: 226.35 Profile # 1

Left Sta (ft)	Right Sta (ft)	%Q	Area (sq ft)	W.P. (ft)	Conv. (cfs)	Hydr D. (ft)	Velocity (ft/s)
18393.69	18486.36	0.01	2.40	24.78	26.9	0.10	3.03
18486.36	18579.03	0.04	10.41	58.15	175.5	0.18	4.57
18579.03	18671.70	0.44	45.60	59.58	2025.2	0.77	12.03
18671.70	18764.37	12.16	396.40	92.88	55349.2	4.28	37.81
18764.37	18857.04	11.34	379.79	92.67	51615.0	4.10	36.80
18857.04	18949.71	11.36	380.14	92.71	51680.8	4.10	36.82
18949.71	19042.38	14.00	430.97	92.68	63718.3	4.65	40.04
19042.38	19135.05	13.46	420.87	92.67	61251.6	4.54	39.41
19135.05	19227.72	12.10	394.89	92.67	55080.7	4.26	37.77
19227.72	19320.39	10.97	372.33	92.67	49935.7	4.02	36.32
19320.39	19413.06	8.76	325.27	92.67	39866.3	3.51	33.19
19413.06	19505.73	5.36	217.78	70.98	24402.5	3.11	30.34

Warning - The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION INPUT Reach: SALTRIVSOUTH River Station: 226.23
Description: 440 ft. downstream fm. bridge

Station Elevation Data, num = 66

Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
17743.6	1204.2	17776.7	1191.9	17813.8	1190.6	17827.3	1190.1	17871.1	1188.8
17877.4	1188.8	17877.4	1188.8	17916.5	1188.5	17942.6	1187.7	17969.4	1187.6
17973.1	1187.5	17979.5	1189.3	17984	1190.1	17991.3	1188.6	17993.2	1187.8
18001.4	1187.9	18051.2	1188.4	18059.4	1191.5	18074.3	1184.3	18093.6	1184.4

18103.8	1186.4	18106.5	1186.5	18127.1	1187	18142.8	1186.8	18208.7	1185.6
18223.2	1185.3	18234.6	1181.8	18239.8	1181.2	18287.5	1180.1	18290.9	1180
18344.8	1179.02	18359.2	1178.8	18408.1	1177.87	18437	1177.35	18480.3	1176.56
18519.3	1175.86	18554.1	1175.2	18577.7	1174.8	18594.2	1174.5	18658.7	1174.7
18692.9	1174.7	18734.4	1174.8	18796.6	1175	18799.4	1175.5	18835	1176.4
18843.3	1176.9	18851.6	1177	18910.8	1179.6	18953.7	1179.6	18975.1	1179.8
19006.5	1180.1	19029.6	1180.3	19046.8	1180.6	19075	1180.6	19078.5	1181
19096.4	1170.8	19100.9	1171.5	19274.6	1172	19327.9	1172.3	19354.8	1172.5
19507.5	1172.5	19559.6	1172.5	19569.4	1172.8	19577.6	1178.2	19603.5	1195.5
19653.5	1204.2								

Manning's n Values, num = 3

Sta.	Value	Sta.	Value	Sta.	Value
17743.6	.028	17743.6	.028	19653.5	.028

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
17743.6	19653.5	250	250	250	.1	.3

CROSS SECTION OUTPUT Reach: SALTRIVSOUTH Riv Sta: 226.23 Profile # 1

W.S. Elev (ft)	1199.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.		0.028	
E.G. Elev (ft)	1199.18	Reach Len. (ft)	250.00	250.00	250.00
E.G. Slope (ft/ft)	0.000074	Flow Area (sq ft)		37033.93	
Q Total (cfs)	123250.00	Flow (cfs)		123250.00	
Top Width (ft)	1866.08	Top Width (ft)		1866.08	
Vel Total (ft/s)	3.33	Avg. Vel. (ft/s)		3.33	
Max Chl Dpth (ft)	28.21	Hydr. Depth (ft)		19.85	
Crit W.S. (ft)	1181.95	Wetted Per. (ft)		1881.21	
Conv. Total (cfs)	14328890.0	Conv. (cfs)		14328890.0	

Warning - The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

FLOW DISTRIBUTION OUTPUT Reach: SALTRIVSOUTH Riv Sta: 226.23 Profile # 1

Left Sta (ft)	Right Sta (ft)	%Q	Area (sq ft)	W.P. (ft)	Conv. (cfs)	Hydr D. (ft)	Velocity (ft/s)
17743.60	17839.09	0.74	579.72	82.83	112562.1	7.11	1.58
17839.09	17934.59	1.61	975.82	95.52	243811.8	10.22	2.03
17934.59	18030.08	1.79	1043.08	96.13	271296.5	10.92	2.11
18030.08	18125.58	2.10	1155.75	97.91	317965.1	12.10	2.24
18125.58	18221.07	2.33	1219.81	95.51	353691.8	12.77	2.36
18221.07	18316.57	4.16	1730.31	96.07	630917.1	18.12	2.96
18316.57	18412.06	5.06	1941.16	95.51	767196.7	20.33	3.21
18412.06	18507.56	5.80	2107.86	95.51	880104.4	22.07	3.39
18507.56	18603.05	6.58	2272.82	95.51	997891.8	23.80	3.57

```
* 18603.05  * 18698.55  *     6.84 *  2325.97 *    95.50 *1037179.0 *    24.36 *     3.62
*
* 18698.55  * 18794.04  *     6.75 *  2307.44 *    95.49 *1023452.0 *    24.16 *     3.60
*
* 18794.04  * 18889.54  *     5.86 *  2120.64 *    95.60 * 888455.7 *    22.21 *     3.40
*
* 18889.54  * 18985.04  *     4.70 *  1858.61 *    95.52 * 713552.3 *    19.46 *     3.12
*
* 18985.04  * 19080.53  *     4.38 *  1782.16 *    95.83 * 663877.3 *    18.66 *     3.03
*
* 19080.53  * 19176.03  *     7.88 *  2559.59 *    97.95 *1196177.0 *    26.80 *     3.80
*
* 19176.03  * 19271.52  *     8.19 *  2592.97 *    95.49 *1243119.0 *    27.15 *     3.89
*
* 19271.52  * 19367.02  *     7.99 *  2554.20 *    95.50 *1212269.0 *    26.75 *     3.86
*
* 19367.02  * 19462.51  *     7.87 *  2531.25 *    95.49 *1194200.0 *    26.51 *     3.83
*
* 19462.51  * 19558.01  *     7.87 *  2531.30 *    95.50 *1194224.0 *    26.51 *     3.83
*
* 19558.01  * 19653.50  *     1.51 *   843.51 *    72.82 * 229165.0 *    12.85 *     2.21
*
*****************************************************************************************
*

Warning - The parabolic search method failed to converge on critical depth.  The
                program will try the cross section slice/secant method to find critical
                depth.

CROSS SECTION INPUT    Reach: SALTRIVSOUTH   River Station: 226.13
Description: last downstream cross section

Station Elevation Data,  num = 26
    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.
   17980    1203   18007  1190.7 18069.5    1190 18121.5    1190 18147.2  1189.5
 18151.2  1188.4 18168.9  1178.1 18204.8  1177.2 18213.2  1172.4 18256.4  1172.6
 18340.7    1173 18362.9  1172.2 18403.5    1173   18405    1173 18848.8    1173
 18876.1  1171.5 18876.4  1170.6 18925.4  1170.7 19306.5  1170.7 19354.4  1171.3
 19366.1  1171.8 19437.3  1170.5 19485.6  1170.7 19504.1  1172.2 19553.4  1195.1
 19593.2  1197.4

Manning's n Values,  num = 3
    Sta.   Value    Sta.   Value    Sta.   Value
   17980    .028   17980    .028 19593.2    .028

Bank Sta: Left   Right    Lengths: Left Channel   Right    Coeff Contr.   Expan.
         17980 19593.2                                              .1       .3

CROSS SECTION OUTPUT  Reach: SALTRIVSOUTH  Riv Sta: 226.13    Profile # 1
*****************************************************************************
* W.S. Elev (ft)     *  1199.00 * Element            *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *     0.16 * Wt. n-Val.         *          *    0.028 *          *
* E.G. Elev (ft)     *  1199.16 * Reach Len. (ft)    *          *          *          *
* E.G. Slope (ft/ft)* 0.000053 * Flow Area (sq ft) *          * 38505.71 *          *
* Q Total (cfs)      *123250.00 * Flow (cfs)         *          *123250.00 *          *
* Top Width (ft)     *  1604.42 * Top Width (ft)     *          *  1604.42 *          *
* Vel Total (ft/s)   *     3.20 * Avg. Vel. (ft/s)   *          *     3.20 *          *
* Max Chl Dpth (ft)  *    28.50 * Hydr. Depth (ft)   *          *    24.00 *          *
* Crit W.S. (ft)     *  1178.43 * Wetted Per. (ft)   *          *  1617.97 *          *
* Conv. Total (cfs) *16906970.0 * Conv. (cfs)        *          *16906970.0 *          *
*****************************************************************************
```

FLOW DISTRIBUTION OUTPUT Reach: SALTRIVSOUTH Riv Sta: 226.13 Profile # 1

Left Sta (ft)	Right Sta (ft)	%Q	Area (sq ft)	W.P. (ft)	Conv. (cfs)	Hydr D. (ft)	Velocity (ft/s)
17980.00	18060.66	0.60	537.12	73.68	107161.3	7.47	1.38
18060.66	18141.32	0.95	729.33	80.66	167977.5	9.04	1.60
18141.32	18221.98	3.31	1577.63	84.87	587478.6	19.56	2.58
18221.98	18302.64	5.63	2127.10	80.66	1000092.0	26.37	3.26
18302.64	18383.30	5.60	2121.70	80.68	995720.6	26.30	3.26
18383.30	18463.96	5.52	2101.13	80.66	979821.3	26.05	3.24
18463.96	18544.62	5.50	2097.16	80.66	976753.8	26.00	3.23
18544.62	18625.28	5.50	2097.16	80.66	976753.8	26.00	3.23
18625.28	18705.94	5.50	2097.16	80.66	976753.8	26.00	3.23
18705.94	18786.60	5.50	2097.16	80.66	976753.8	26.00	3.23
18786.60	18867.26	5.54	2106.53	80.69	983804.9	26.12	3.24
18867.26	18947.92	6.27	2275.81	81.32	1113251.0	28.21	3.39
18947.92	19028.58	6.33	2282.69	80.66	1124971.0	28.30	3.42
19028.58	19109.24	6.33	2282.69	80.66	1124971.0	28.30	3.42
19109.24	19189.90	6.33	2282.63	80.66	1124944.0	28.30	3.42
19189.90	19270.56	6.33	2282.69	80.66	1124971.0	28.30	3.42
19270.56	19351.22	6.27	2270.16	80.66	1114670.0	28.14	3.41
19351.22	19431.88	6.13	2238.03	80.68	1088337.0	27.75	3.37
19431.88	19512.54	6.11	2245.26	81.59	1086080.0	27.84	3.36
19512.54	19593.20	0.76	656.58	86.52	134557.5	8.14	1.42

SUMMARY OF MANNING'S N VALUES

Reach	River Sta.	n1	n2	n3
SALTRIVSOUTH	226.58	.028	.028	.031
SALTRIVSOUTH	226.521	.028	.028	.028
SALTRIVSOUTH	226.52	.028	.028	.031

```
*SALTRIVSOUTH*    226.51  *  Bridge*        *        *
*SALTRIVSOUTH*    226.50  *    .028*    .028*    .031*
*SALTRIVSOUTH*    226.35  *    .028*    .028*    .028*
*SALTRIVSOUTH*    226.23  *    .028*    .028*    .028*
*SALTRIVSOUTH*    226.13  *    .028*    .028*    .028*
*****************************************************

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

SUMMARY OF REACH LENGTHS

*****************************************************
*    Reach    * River Sta. *  Left  * Channel*  Right *
*SALTRIVSOUTH*    226.58  *     250*     250*     250*
*SALTRIVSOUTH*    226.521 *     240*     210*     190*
*SALTRIVSOUTH*    226.52  *     103*     103*     103*
*SALTRIVSOUTH*    226.51  *  Bridge*        *        *
*SALTRIVSOUTH*    226.50  *     280*     240*     200*
*SALTRIVSOUTH*    226.35  *     250*     200*     175*
*SALTRIVSOUTH*    226.23  *     250*     250*     250*
*SALTRIVSOUTH*    226.13  *        *        *        *
*****************************************************

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

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS

*********************************************
*    Reach    * River Sta. *  Contr.* Expan. *
*********************************************
*SALTRIVSOUTH*    226.58  *      .1*      .3*
*SALTRIVSOUTH*    226.521 *      .1*      .3*
*SALTRIVSOUTH*    226.52  *      .1*      .3*
*SALTRIVSOUTH*    226.51  *  Bridge*        *
*SALTRIVSOUTH*    226.50  *      .1*      .3*
*SALTRIVSOUTH*    226.35  *      .1*      .3*
*SALTRIVSOUTH*    226.23  *      .1*      .3*
*SALTRIVSOUTH*    226.13  *      .1*      .3*
*********************************************

Profile Output Table - Standard Table 1
*******************************************************************************************
*************************************
* River Sta. *  Q Total *Min Ch El *W.S. Elev *Crit W.S. *E.G. Elev *E.G. Slope * Vel Chnl
*Flow Area *Top Width *Froude # Chl *
*            *    (cfs) *     (ft) *     (ft) *     (ft) *     (ft) *   (ft/ft) *   (ft/s)
*  (sq ft) *     (ft) *            *
*******************************************************************************************
*************************************
* 226.58     *123250.00 *  1179.00 *  1210.41 *  1202.65 *  1211.12 *  0.000621 *     6.87
* 18696.04 *  1781.63 *        0.35 *
* 226.521    *123250.00 *  1185.00 *  1206.54 *  1204.66 *  1210.37 *  0.002861 *    15.77
*  7984.22 *   684.00 *        0.76 *
* 226.52     *123250.00 *  1185.00 *  1206.24 *  1202.59 *  1209.78 *  0.001960 *    15.68
* 10045.62 *  1870.00 *        0.65 *
* 226.51     *   Bridge *          *          *          *          *          *
*          *          *          *
* 226.50     *123250.00 *  1185.00 *  1202.59 *  1202.59 *  1209.66 *  0.004877 *    21.33
*  5778.04 *   407.03 *        1.00 *
* 226.35     *123250.00 *  1171.30 *  1199.02 *  1180.88 *  1199.20 *  0.000072 *     3.40
* 36273.13 *  1745.13 *        0.13 *
```

```
* 226.23      *123250.00 *  1170.80 *  1199.01 *  1181.95 *  1199.18 *  0.000074 *     3.33
* 37033.93 *  1866.08 *        0.13 *
* 226.13      *123250.00 *  1170.50 *  1199.00 *  1178.43 *  1199.16 *  0.000053 *     3.20
* 38505.71 *  1604.42 *        0.12 *
*************************************************************************************
************************************
```

Profile Output Table - Standard Table 2

```
*************************************************************************************
*************************
* River Sta. *E.G. Elev *W.S. Elev * Vel Head *Frctn Loss *C & E Loss *   Q Left *Q
Channel *  Q Right *Top Width *
*           *     (ft) *     (ft) *     (ft) *      (ft) *      (ft) *    (cfs) *
(cfs) *    (cfs) *     (ft) *
*************************************************************************************
*************************
* 226.58      *  1211.12 *  1210.41 *     0.71 *      0.44 *      0.31 *
*123250.00 *          *  1781.63 *
* 226.521     *  1210.37 *  1206.54 *     3.83 *      0.51 *      0.09 *  1322.23
*121927.80 *          *   684.00 *
* 226.52      *  1209.78 *  1206.24 *     3.54 *           *           *  3132.04
*113867.70 *  6250.23 *  1870.00 *
* 226.51      *   Bridge *          *          *           *           *           *          *
*          *          *
* 226.50      *  1209.66 *  1202.59 *     7.07 *      0.59 *      2.07 *
*123250.00 *          *   407.03 *
* 226.35      *  1199.20 *  1199.02 *     0.18 *      0.01 *      0.00 *
*123250.00 *          *  1745.13 *
* 226.23      *  1199.18 *  1199.01 *     0.17 *      0.02 *      0.00 *
*123250.00 *          *  1866.08 *
* 226.13      *  1199.16 *  1199.00 *     0.16 *      0.00 *      0.00 *
*123250.00 *          *  1604.42 *
*************************************************************************************
*************************
```

Profile Output Table - Six XS Bridge

```
*************************************************************************************
************************************
* River Sta. *E.G. Elev *W.S. Elev *Crit W.S. *Frctn Loss *C & E Loss *Top Width *   Q
Left *Q Channel *  Q Right * Vel Chnl *
*           *     (ft) *     (ft) *     (ft) *      (ft) *      (ft) *     (ft) *
(cfs) *    (cfs) *    (cfs) *   (ft/s) *
*************************************************************************************
************************************
* 226.521     *  1210.37 *  1206.54 *  1204.66 *      0.51 *      0.09 *   684.00 *
1322.23 *121927.80 *          *    15.77 *
* 226.52      *  1209.78 *  1206.24 *  1202.59 *           *           *  1870.00 *
3132.04 *113867.70 *  6250.23 *    15.68 *
* 226.51    BU*  1209.78 *  1206.24 *  1207.18 *           *           *          *
*          *          *          *
* 226.51    BD*  1209.78 *  1206.24 *  1203.54 *           *           *          *
*          *          *          *
* 226.50      *  1209.66 *  1202.59 *  1202.59 *      0.59 *      2.07 *   407.03 *
*123250.00 *          *    21.33 *
* 226.35      *  1199.20 *  1199.02 *  1180.88 *      0.01 *      0.00 *  1745.13 *
*123250.00 *          *     3.40 *
*************************************************************************************
************************************
```

Profile Output Table - Bridge Comparison

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

```
*************
* River Sta. *E.G. Elev *W.S. Elev *Energy EG *Momen. EG *Yarnell EG * WSPRO EG * Prs O EG
*Prs/Wr EG *
*           *     (ft) *     (ft) *     (ft) *     (ft) *      (ft) *     (ft) *     (ft)
*     (ft) *
*****************************************************************************************
*************
* 226.51     *  1209.78 *  1206.24 *  1210.84 *          *           *          *  1223.26
*  1209.78 *
*****************************************************************************************
*************

Profile Output Table - HEC-FDA
**********************************************
* River Sta. *  Q Total *Min Ch El *W.S. Elev *
*            *    (cfs) *     (ft) *     (ft) *
**********************************************
* 226.58     *123250.00 *  1179.00 *  1210.41 *
* 226.521    *123250.00 *  1185.00 *  1206.54 *
* 226.52     *123250.00 *  1185.00 *  1206.24 *
* 226.51     *   Bridge *          *          *
* 226.50     *123250.00 *  1185.00 *  1202.59 *
* 226.35     *123250.00 *  1171.30 *  1199.02 *
* 226.23     *123250.00 *  1170.80 *  1199.01 *
* 226.13     *123250.00 *  1170.50 *  1199.00 *
**********************************************

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

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Plan 05

Summary for Profiles:1

Reach: SALTRIVSOUTH     Riv Sta: 226.23     Profile:  1
      Warning - The parabolic search method failed to converge on critical depth.  The
program will try the cross section
                slice/secant method to find critical depth.
Reach: SALTRIVSOUTH     Riv Sta: 226.35     Profile:  1
      Warning - The parabolic search method failed to converge on critical depth.  The
program will try the cross section
                slice/secant method to find critical depth.
Reach: SALTRIVSOUTH     Riv Sta: 226.50     Profile:  1
      Warning - The energy equation could not be balanced within the specified number of
iterations.  The program used critical
                depth for the water surface and continued on with the calculations.
      Warning - The velocity head has changed by more than 0.5 ft (0.15 m).  This may
indicate the need for additional cross
                sections.
      Warning - The conveyance ratio (upstream conveyance divided by downstream
conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
      Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and
previous cross section.  This may indicate
                the need for additional cross sections.
      Warning - During the standard step iterations, when the assumed water surface was
set equal to critical depth, the calculated
                water surface came back below critical depth.  This indicates that there
is not a valid subcritical answer.  The
                program defaulted to critical depth.
      Warning - The parabolic search method failed to converge on critical depth.  The
```

program will try the cross section
slice/secant method to find critical depth.
Note - Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
Reach: SALTRIVSOUTH Riv Sta: 226.52 Profile: 1
Warning - The cross-section end points had to be extended vertically for the computed water surface.
Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross
sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Reach: SALTRIVSOUTH Riv Sta: 226.521 Profile: 1
Warning - The cross-section end points had to be extended vertically for the computed water surface.
Warning - The parabolic search method failed to converge on critical depth. The program will try the cross section
slice/secant method to find critical depth.
Reach: SALTRIVSOUTH Riv Sta: 226.58 Profile: 1
Warning - Divided flow computed for this cross-section.
Warning - The cross-section end points had to be extended vertically for the computed water surface.
Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross
sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

HEC-RAS Version 1.2 April 1996
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street, Suite D
Davis, California 95616-4687
(916) 756-1104

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

****

PROJECT DATA
Project Title: ALMA SCHOOL-SOUTH BRIDGE
Project File : alma.prj
Run Date and Time: 4/17/97 2:48:14 PM

Project in English units

****

PLAN DATA

Plan Title: Plan 06
Plan File : c:\hec\ras\alma.p06

Geometry Title: Plan 06
Geometry File : c:\hec\ras\alma.p06

Flow Title : Plan 06
Flow File : c:\hec\ras\alma.p06

Plan Summary Information:

Number of:	Cross Sections =	7	Mulitple Openings =	0
	Culverts =	0	Inline Weirs =	0
	Bridges =	1		

Computational Information

Water surface calculation tolerance =	.01
Critical depth calculaton tolerance =	.01
Maximum number of interations =	20
Maximum difference tolerance =	.3
Flow tolerance factor =	.001

Computational Flow Regime: Mixed Flow

Encroachment Data: None

Flow Distribution Locations

Reach	RS Start	RS End	LOB	Channel	ROB
SALTRIVSOUTH	226.58	226.13	5	20	5

****

FLOW DATA

Flow Title: AL100.DAT
Flow File : c:\hec\ras\alma.f02

Flow Data (cfs)

Reach	Riv Sta	PF#1
SALTRIVSOUTH	226.58	72500

Boundary Conditions

Reach	Profile	Upstream	Downstream
SALTRIVSOUTH	1	Known WS = 1202	Known WS = 1199

GEOMETRY DATA

Geometry Title: ALMA SCOOL-SOUTH BRIDGE
Geometry File : c:\hec\ras\alma.g01

CROSS SECTION INPUT Reach: SALTRIVSOUTH River Station: 226.58
Description: UPSTREAM BOUNDARY

Station Elevation Data, num = 92

Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
17263.7	1205.9	17287.8	1205.5	17314.2	1205.3	17356.2	1206.7	17370.8	1206.7
17448.3	1204.9	17469.9	1204.3	17504	1204.2	17575.1	1209.2	17616	1202.1
17674.1	1202.3	17684.3	1201.9	17708.4	1201.7	17729.6	1201.3	17799.9	1201.1
17835.5	1200.7	17842.6	1200	17855.1	1199.5	17874.99	1200.04	17877.2	1200.1
17880	1200.4	17885.1	1200.1	17885.4	1199.7	17904.6	1190.1	17925.1	1181.4
17928.5	1180.7	17930.2	1179.7	17942.1	1179.8	17943.9	1179.4	18030.2	1179.6
18093.5	1179.8	18103.1	1179	18110.1	1179.9	18135.1	1181.4	18150.1	1188.3
18171.5	1189	18174.4	1189.5	18188.6	1193.8	18199.7	1196.5	18202.3	1197.4
18251.8	1197.9	18278.2	1197.6	18311	1197.1	18315.6	1196.4	18333.3	1199.4
18357.8	1200.5	18396.07	1200.5	18402.8	1201.35	18438.4	1201.5	18459	1202.8
18490.5	1202.9	18515.6	1202.9	18523.4	1202.8	18562.2	1202.9	18568.8	1203.7
18571.7	1203.7	18617.2	1203.2	18626.8	1204.6	18654.2	1204.7	18675.4	1205.3
18706.9	1205.9	18727.2	1206.9	18750.2	1213.4	18773.8	1214.1	18813.2	1211.9
18825.2	1211	18850.7	1211	18882.4	1210.7	18899.2	1210.1	18910.9	1212
18923.2	1212.4	18950.7	1209.1	18958.6	1207.9	18970.4	1207.8	18983.5	1207
19021.8	1207.3	19028.8	1206.7	19045.4	1206.5	19062.3	1218.1	19069	1228.4
19083.1	1228	19097.8	1228.2	19122	1225.3	19157.3	1220.5	19177.8	1203.4
19184	1203.6	19198.3	1203.8	19227.4	1203.6	19258.4	1203.5	19267.3	1203.8
19300.5	1203.7	19353.4	1210.3						

Manning's n Values, num = 3

Sta.	Value	Sta.	Value	Sta.	Value
17263.7	.028	17263.7	.028	18706.9	.031

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
17263.7	18706.9	250	250	250	.1	.3

CROSS SECTION OUTPUT Reach: SALTRIVSOUTH Riv Sta: 226.58 Profile # 1

W.S. Elev (ft)	1204.91	Element	Left OB	Channel	Right OB

Vel Head (ft)	0.86	Wt. n-Val.			0.028	0.031
E.G. Elev (ft)	1205.77	Reach Len. (ft)	250.00		250.00	250.00
E.G. Slope (ft/ft)	0.001133	Flow Area (sq ft)			9687.16	160.15
Q Total (cfs)	72500.00	Flow (cfs)			72500.00	
Top Width (ft)	1262.06	Top Width (ft)			1127.87	134.19
Vel Total (ft/s)	7.36	Avg. Vel. (ft/s)			7.45	1.81
Max Chl Dpth (ft)	25.91	Hydr. Depth (ft)			8.59	1.19
Crit W.S. (ft)	1194.51	Wetted Per. (ft)			1136.26	134.83
Conv. Total (cfs)	2154028.0	Conv. (cfs)			2145418.0	8610.0

Warning - Divided flow computed for this cross-section.
Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Reach: SALTRIVSOUTH Riv Sta: 226.58 Profile # 1

Left Sta (ft)	Right Sta (ft)	%Q	Area (sq ft)	W.P. (ft)	Conv. (cfs)	Hydr D. (ft)	Velocity (ft/s)
17840.98	17913.14	0.87	72.54	19.13	9360.3	4.18	8.69
17913.14	17985.30	29.14	1022.36	73.58	313571.9	14.17	20.66
17985.30	18057.46	32.19	1076.81	72.16	346374.3	14.92	21.67
18057.46	18129.62	31.13	1056.21	72.29	335001.5	14.64	21.37
18129.62	18201.78	6.67	399.76	64.18	71816.3	6.46	12.10

Warning - Divided flow computed for this cross-section.
Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION INPUT Reach: SALTRIVSOUTH River Station: 226.521
Description: NARROWER SECT. BEFORE BR.

Station Elevation Data, num = 7

Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
17791	1204	17891	1204	18141	1185	18311	1185	18351	1200
18441	1204	18475	1204						

Manning's n Values, num = 3

Sta.	Value	Sta.	Value	Sta.	Value
17791	.028	17891	.028	18475	.028

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
17891	18475	240	210	190	.1	.3

CROSS SECTION OUTPUT Reach: SALTRIVSOUTH Riv Sta: 226.521 Profile # 1

W.S. Elev (ft)	1202.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.91	Wt. n-Val.		0.028	
E.G. Elev (ft)	1205.07	Reach Len. (ft)	240.00	210.00	190.00
E.G. Slope (ft/ft)	0.002770	Flow Area (sq ft)		5295.44	
Q Total (cfs)	72500.00	Flow (cfs)		72500.00	
Top Width (ft)	484.54	Top Width (ft)		484.54	
Vel Total (ft/s)	13.69	Avg. Vel. (ft/s)		13.69	
Max Chl Dpth (ft)	17.16	Hydr. Depth (ft)		10.93	
Crit W.S. (ft)	1199.18	Wetted Per. (ft)		487.96	
Conv. Total (cfs)	1377475.0	Conv. (cfs)		1377475.0	

FLOW DISTRIBUTION OUTPUT Reach: SALTRIVSOUTH Riv Sta: 226.521 Profile # 1

Left Sta (ft)	Right Sta (ft)	%Q	Area (sq ft)	W.P. (ft)	Conv. (cfs)	Hydr D. (ft)	Velocity (ft/s)
17891.00	17920.20	0.00	0.97	5.06	17.0	0.19	0.78
17920.20	17949.40	0.18	43.60	29.29	3016.8	1.49	3.06
17949.40	17978.60	0.84	108.40	29.28	13765.4	3.71	5.62
17978.60	18007.80	1.84	173.21	29.29	30061.7	5.93	7.68
18007.80	18037.00	3.12	237.99	29.28	51054.3	8.15	9.49
18037.00	18066.20	4.66	302.79	29.28	76265.9	10.37	11.15
18066.20	18095.40	6.43	367.62	29.29	105372.9	12.59	12.69
18095.40	18124.60	8.43	432.39	29.28	138107.1	14.81	14.14
18124.60	18153.80	10.43	491.00	29.25	170830.7	16.81	15.40
18153.80	18183.00	10.80	501.18	29.20	176977.8	17.16	15.63
18183.00	18212.20	10.80	501.18	29.20	176977.8	17.16	15.63
18212.20	18241.40	10.80	501.22	29.20	176989.6	17.16	15.63
18241.40	18270.60	10.80	501.18	29.20	176977.8	17.16	15.63
18270.60	18299.80	10.80	501.22	29.20	176989.6	17.16	15.63
18299.80	18329.00	8.48	440.43	30.42	138836.0	15.08	13.95
18329.00	18358.20	1.44	152.79	30.70	23635.7	5.23	6.85
18358.20	18387.40	0.13	34.91	29.23	2085.3	1.20	2.64
18387.40	18416.60	0.00	3.36	12.31	75.0	0.27	0.99

CROSS SECTION INPUT Reach: SALTRIVSOUTH River Station: 226.52
Description: UPSTREAM SIDE BRIDGE

Station Elevation Data, num = 20

Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
17370	1204	17590	1204	17915.5	1205.74	17915.6	1202.09	17915.7	1196.84
17962.5	1188	17971.2	1188	18091.2	1188	18091.2	1188	18149.7	1185
18149.7	1185	18188.7	1185	18208.2	1185	18208.2	1185	18264.2	1188
18311.5	1196.26	18322.5	1198.7	18322.7	1205.7	18560	1204	19240	1204

Manning's n Values, num = 3

Sta.	Value	Sta.	Value	Sta.	Value
17370	.028	17915.6	.028	18322.7	.031

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
17915.6	18322.7	103	103	103	.1	.3

CROSS SECTION OUTPUT Reach: SALTRIVSOUTH Riv Sta: 226.52 Profile # 1

W.S. Elev (ft)	1201.76	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.76	Wt. n-Val.		0.028	
E.G. Elev (ft)	1204.52	Reach Len. (ft)	5.00	5.00	5.00
E.G. Slope (ft/ft)	0.002052	Flow Area (sq ft)		5440.40	
Q Total (cfs)	72500.00	Flow (cfs)		72500.00	
Top Width (ft)	406.98	Top Width (ft)		406.98	
Vel Total (ft/s)	13.33	Avg. Vel. (ft/s)		13.33	
Max Chl Dpth (ft)	16.76	Hydr. Depth (ft)		13.37	
Crit W.S. (ft)	1198.30	Wetted Per. (ft)		416.78	
Conv. Total (cfs)	1600595.0	Conv. (cfs)		1600595.0	

Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Reach: SALTRIVSOUTH Riv Sta: 226.52 Profile # 1

Left Sta (ft)	Right Sta (ft)	%Q	Area (sq ft)	W.P. (ft)	Conv. (cfs)	Hydr D. (ft)	Velocity (ft/s)
17915.60	17935.96	1.36	138.72	25.54	22748.6	6.82	7.12
17935.96	17956.31	3.31	217.22	20.71	55230.3	10.67	11.04
17956.31	17976.66	4.99	276.56	20.46	83266.0	13.59	13.07
17976.66	17997.02	5.11	280.18	20.36	85395.4	13.76	13.23
17997.02	18017.38	5.11	280.18	20.36	85395.4	13.76	13.23
18017.38	18037.73	5.11	280.18	20.36	85395.4	13.76	13.23
18037.73	18058.08	5.11	280.15	20.35	85387.2	13.76	13.23
18058.08	18078.44	5.11	280.18	20.36	85395.4	13.76	13.23
18078.44	18098.79	5.16	281.66	20.37	86120.1	13.84	13.27
18098.79	18119.15	5.68	298.70	20.38	94934.2	14.68	13.80

```
*
* 18119.15  * 18139.50  *     6.38 *   319.98 *    20.38 * 106463.1 *    15.72 *    14.44
*
* 18139.50  * 18159.86  *     7.01 *   338.58 *    20.37 * 117027.7 *    16.63 *    15.01
*
* 18159.86  * 18180.21  *     7.10 *   341.24 *    20.36 * 118619.1 *    16.76 *    15.09
*
* 18180.21  * 18200.57  *     7.10 *   341.24 *    20.36 * 118619.1 *    16.76 *    15.09
*
* 18200.57  * 18220.92  *     6.95 *   336.87 *    20.37 * 116036.5 *    16.55 *    14.95
*
* 18220.92  * 18241.28  *     6.25 *   316.27 *    20.38 * 104406.8 *    15.54 *    14.33
*
* 18241.28  * 18261.63  *     5.54 *   294.07 *    20.38 *  92481.5 *    14.45 *    13.65
*
* 18261.63  * 18281.99  *     4.27 *   252.69 *    20.63 *  71266.0 *    12.42 *    12.24
*
* 18281.99  * 18302.34  *     2.44 *   180.76 *    20.66 *  40727.5 *     8.88 *     9.78
*
* 18302.34  * 18322.70  *     0.90 *   104.98 *    23.65 *  15045.9 *     5.19 *     6.22
*
*****************************************************************************************
*

Warning - The velocity head has changed by more than 0.5 ft (0.15 m).  This may
                indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream
                conveyance) is less than 0.7 or greater than 1.4.  This may indicate the
                need for additional cross sections.

BRIDGE INPUT            Reach: SALTRIVSOUTH   River Station: 226.51
Description: SOUTH BRIDGE
Distance from Upstream XS =       5
Deck/Roadway Width        =      88
Weir Coefficient          =     2.6
Bridge Deck/Roadway Skew  =
Upstream Deck/Roadway Coordinates,  num = 2
    Sta. Hi Cord Lo Cord    Sta. Hi Cord Lo Cord
**********************************************
   17914 1206.83 1204.33   18314 1206.83 1204.33
Downstream Deck/Roadway Coordinates,  num = 2
    Sta. Hi Cord Lo Cord    Sta. Hi Cord Lo Cord
**********************************************
   17914 1206.83 1204.33   18314 1206.83 1204.33
Elevation at which weir flow begins         =
Maximum allowable submergence for weir flow =     .95
Submergence criteria :Broad Crested

Number of Abutments =  1

Upstream Abutment Data,  num = 4
    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.
**************************************************************
17915.71 1204.3317940.39    1187   18315    1187 18340.5 1204.33
Downstream Abutment Data,  num = 4
    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.
**************************************************************
17915.71 1204.3317940.39    1187   18315    1187 18340.5 1204.33

Number of Piers =  6
```

```
Pier Station     Upstream=17972.45    Downstream=17972.45
Upstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*******************************
  1204.3     2.5    1187     2.5
Downstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*******************************
  1204.3     2.5    1187     2.5

Pier Station     Upstream=18030.95    Downstream=18030.95
Upstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*******************************
    1187     2.5  1204.3     2.5
Downstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*******************************
    1187     2.5  1204.3     2.5

Pier Station     Upstream=18089.45    Downstream=18089.45
Upstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*******************************
    1187     2.5  1204.3     2.5
Downstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*******************************
    1187     2.5  1204.3     2.5

Pier Station     Upstream=18148.95    Downstream=18148.95
Upstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*******************************
    1187     2.5  1204.3     2.5
Downstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*******************************
    1187     2.5  1204.3     2.5

Pier Station     Upstream=18207.45    Downstream=18207.45
Upstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*******************************
    1187     2.5  1204.3     2.5
Downstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*******************************
    1187     2.5  1204.3     2.5

Pier Station     Upstream=18266.95    Downstream=18266.95
Upstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*******************************
    1187     2.5  1204.3     2.5
Downstream Pier Data,  num = 2
   Elev.   Width   Elev.   Width
*******************************
    1187     2.5  1204.3     2.5

Number of Bridge Coefficient Sets =  1
```

```
Low Flow Methods
       Energy
       Momentum                Cd   =       0
       Yarnell                 KVal =    1.25
       W.S. Pro Method         CVal =
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd          =
           Submerged Inlet + Outlet Cd =       .8
           Max Low Cord                =

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the downstream end
       Criteria to check for pressure flow = Upstream water surface

BRIDGE OUTPUT  Reach: SALTRIVSOUTH  Riv Sta: 226.51    Profile # 1
Opening : Bridge #1
*******************************************************************************
* E.G. US. (ft)        *     1204.52 * Element              *Inside BR US *Inside BR DS *
* W.S. US. (ft)        *     1201.76 * E.G. Elev (ft)       *     1204.26 *     1204.26 *
* Q Total (cfs)        *    72500.00 * W.S. Elev (ft)       *     1199.09 *     1199.09 *
* Q Bridge (cfs)       *    72500.00 * Crit W.S. (ft)       *     1199.09 *     1199.09 *
* Q Weir (cfs)         *             * Max Chl Dpth (ft)    *       12.09 *       12.09 *
* Weir Sta Lft (ft)    *             * Vel Total (ft/s)     *       18.22 *       18.21 *
* Weir Sta Rgt (ft)    *             * Flow Area (sq ft)    *     3979.58 *     3980.53 *
* Weir Submerg         *             * Froude # Chl         *        0.99 *        0.99 *
* Weir Max Depth (ft)  *             * Specif Force (cu ft)*    63005.55 *    61914.98 *
* Min Top Rd (ft)      *     1196.81 * Hydr Depth (ft)      *       10.29 *       10.29 *
* Min El Prs (ft)      *     1204.33 * W.P. Total (ft)      *      533.21 *      533.25 *
* Delta EG (ft)        *        1.20 * Conv. Total (cfs)    *    814978.4 *    815255.6 *
* Delta WS (ft)        *        5.24 * Top Width (ft)       *      386.87 *      386.87 *
*******************************************************************************

Note - The energy method has computed a class B profile.
Warning - The velocity head has changed by more than 0.5 ft (0.15 m).  This may
                indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream
                conveyance) is less than 0.7 or greater than 1.4.  This may indicate the
                need for additional cross sections.

FLOW DISTRIBUTION OUTPUT  Reach: SALTRIVSOUTH  Riv Sta: 226.51    Profile # 1
*******************************************************************************
*
* Left Sta  * Right Sta *       %Q *     Area *     W.P. *    Conv. *  Hydr D. * Velocity
*
* (ft)      * (ft)      *          * (sq ft) *     (ft) *    (cfs) *     (ft) *   (ft/s)
*
* 17915.60  * 17935.52  *     0.51 *    46.55 *    18.52 *   4567.2 *     3.76 *     7.90
*
* 17935.52  * 17955.44  *     3.62 *   156.78 *    20.27 *  32538.3 *     7.87 *    16.72
*
* 17955.44  * 17975.36  *     3.78 *   215.91 *    42.20 *  34022.1 *    10.85 *    12.69
*
* 17975.36  * 17995.28  *     6.47 *   220.83 *    19.92 *  58266.7 *    11.09 *    21.25
*
```

```
* 17995.28  * 18015.20  *     6.47 *   220.83 *    19.92 *  58266.7 *    11.09 *    21.25
*
* 18015.20  * 18035.12  *     3.27 *   193.12 *    39.59 *  29476.2 *    11.09 *    12.29
*
* 18035.12  * 18055.04  *     6.47 *   220.83 *    19.92 *  58266.7 *    11.09 *    21.25
*
* 18055.04  * 18074.96  *     6.47 *   220.83 *    19.92 *  58266.7 *    11.09 *    21.25
*
* 18074.96  * 18094.88  *     3.28 *   193.47 *    39.60 *  29562.1 *    11.11 *    12.31
*
* 18094.88  * 18114.80  *     7.14 *   234.36 *    19.94 *  64286.5 *    11.76 *    22.10
*
* 18114.80  * 18134.72  *     7.48 *   240.75 *    19.92 *  67287.2 *    12.09 *    22.51
*
* 18134.72  * 18154.64  *     3.66 *   210.54 *    41.59 *  32939.4 *    12.09 *    12.60
*
* 18154.64  * 18174.56  *     7.48 *   240.75 *    19.92 *  67287.2 *    12.09 *    22.51
*
* 18174.56  * 18194.48  *     7.48 *   240.75 *    19.92 *  67287.2 *    12.09 *    22.51
*
* 18194.48  * 18214.40  *     3.66 *   210.54 *    41.59 *  32939.4 *    12.09 *    12.60
*
* 18214.40  * 18234.32  *     7.48 *   240.75 *    19.92 *  67287.2 *    12.09 *    22.51
*
* 18234.32  * 18254.24  *     7.37 *   238.72 *    19.93 *  66315.6 *    11.98 *    22.38
*
* 18254.24  * 18274.16  *     3.19 *   188.31 *    38.76 *  28667.8 *    10.81 *    12.26
*
* 18274.16  * 18294.08  *     3.42 *   151.54 *    20.22 *  30798.4 *     7.61 *    16.37
*
* 18294.08  * 18314.00  *     1.23 *    82.10 *    20.24 *  11079.7 *     4.12 *    10.87
*
*****************************************************************************************
*

Note - The energy method has computed a class B profile.
Warning - The velocity head has changed by more than 0.5 ft (0.15 m).  This may
                indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream
                conveyance) is less than 0.7 or greater than 1.4.  This may indicate the
                need for additional cross sections.

CROSS SECTION INPUT    Reach: SALTRIVSOUTH   River Station: 226.50
Description: DOWNSTREAM  SIDE  BRIDGE

Station Elevation Data,  num = 20
    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.
   17370    1204   17590    1204 17915.5 1205.74 17915.6 1202.09 17915.7 1196.84
 17962.5    1188 17971.2    1188 18091.2    1188 18091.2    1188 18149.7    1185
 18149.7    1185 18188.7    1185 18208.2    1185 18208.2    1185 18264.2    1188
 18311.5 1196.26 18322.5  1198.7 18322.7  1205.7   18560    1204   19240    1204

Manning's n Values,  num = 3
    Sta.   Value    Sta.   Value    Sta.   Value
   17370    .028   17590    .028   18560    .031

Bank Sta: Left   Right    Lengths: Left Channel   Right    Coeff Contr.   Expan.
         17590   18560               280     240     200             .1       .3

CROSS SECTION OUTPUT  Reach: SALTRIVSOUTH  Riv Sta: 226.50    Profile # 1
*****************************************************************************************
```

W.S. Elev (ft)	1196.53	Element	Left OB	Channel	Right OB
Vel Head (ft)	7.40	Wt. n-Val.		0.028	
E.G. Elev (ft)	1203.93	Reach Len. (ft)	280.00	240.00	200.00
E.G. Slope (ft/ft)	0.009975	Flow Area (sq ft)		3320.20	
Q Total (cfs)	72500.00	Flow (cfs)		72500.00	
Top Width (ft)	395.34	Top Width (ft)		395.34	
Vel Total (ft/s)	21.84	Avg. Vel. (ft/s)		21.84	
Max Chl Dpth (ft)	11.53	Hydr. Depth (ft)		8.40	
Crit W.S. (ft)	1198.34	Wetted Per. (ft)		397.04	
Conv. Total (cfs)	725917.8	Conv. (cfs)		725917.8	

Warning - The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

FLOW DISTRIBUTION OUTPUT Reach: SALTRIVSOUTH Riv Sta: 226.50 Profile # 1

Left Sta (ft)	Right Sta (ft)	%Q	Area (sq ft)	W.P. (ft)	Conv. (cfs)	Hydr D. (ft)	Velocity (ft/s)
17881.00	17929.50	0.10	13.92	12.36	799.9	1.15	5.43
17929.50	17978.00	7.35	310.68	49.08	56416.5	6.41	17.16
17978.00	18026.50	11.94	413.53	48.50	91590.9	8.53	20.93
18026.50	18075.00	11.94	413.53	48.50	91590.9	8.53	20.93
18075.00	18123.50	13.25	440.28	48.54	101618.8	9.08	21.81
18123.50	18172.00	18.70	541.43	48.53	143452.1	11.16	25.04
18172.00	18220.50	19.49	554.98	48.52	149518.3	11.44	25.46
18220.50	18269.00	14.37	462.67	48.64	110234.6	9.54	22.52
18269.00	18317.50	2.86	169.19	44.37	21913.5	3.87	12.24

Warning - The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION INPUT Reach: SALTRIVSOUTH River Station: 226.35
Description: DOWNSTREAM 250' AWAY BRIDGE

Station Elevation Data, num = 61

Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
17745	1204.3	17751.4	1204	17801.4	1195.3	17812.7	1192.9	17823.9	1191.5
17859.1	1191.2	17899.8	1192.1	17918.1	1190.9	17926.5	1189.1	17932	1189
17996.3	1188.5	18046.6	1188.5	18068.6	1188.5	18086.1	1189.2	18091.9	1189
18134	1187.2	18147	1183.7	18167.7	1182.2	18184	1179.4	18223.9	1179.3
18265.3	1178.6	18309.3	1178.4	18326	1178.5	18344.3	1177.4	18388	1177.3
18431.1	1176.9	18469.8	1176.4	18535.4	1176.3	18542.6	1176.2	18554.3	1178.1
18560.6	1180.5	18565.7	1183.6	18572.1	1184.1	18591	1180.1	18592.7	1178.8
18597	1176.9	18643.3	1175.7	18660.7	1175.5	18694.7	1172	18736.1	1171.3
18745.3	1172.5	18750.4	1172.5	18881.4	1172.3	18909.7	1172.7	18942.1	1172.3
18947.4	1171.7	18981.1	1172.1	19026.5	1171.6	19034.3	1171.8	19265.7	1172.5
19308	1172.5	19335.6	1172.9	19477.2	1173.4	19478.6	1173.4	19487.8	1179.8
19507.4	1194.4	19533.2	1201.1	19538.7	1201.9	19547.6	1202.2	19590.8	1202
19598.4	1204.3								

Manning's n Values, num = 3

Sta.	Value	Sta.	Value	Sta.	Value
17745	.028	17745	.028	19598.4	.028

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
17745	19598.4	250	200	175	.1	.3

CROSS SECTION OUTPUT Reach: SALTRIVSOUTH Riv Sta: 226.35 Profile # 1

W.S. Elev (ft)	1199.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.028	
E.G. Elev (ft)	1199.07	Reach Len. (ft)	250.00	200.00	175.00
E.G. Slope (ft/ft)	0.000025	Flow Area (sq ft)		36254.39	
Q Total (cfs)	72500.00	Flow (cfs)		72500.00	
Top Width (ft)	1745.03	Top Width (ft)		1745.03	
Vel Total (ft/s)	2.00	Avg. Vel. (ft/s)		2.00	
Max Chl Dpth (ft)	27.71	Hydr. Depth (ft)		20.78	
Crit W.S. (ft)	1178.76	Wetted Per. (ft)		1757.30	
Conv. Total (cfs)	14472400.0	Conv. (cfs)		14472400.0	

Warning - The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

FLOW DISTRIBUTION OUTPUT Reach: SALTRIVSOUTH Riv Sta: 226.35 Profile # 1

Left Sta (ft)	Right Sta (ft)	%Q	Area (sq ft)	W.P. (ft)	Conv. (cfs)	Hydr D. (ft)	Velocity (ft/s)
18579.03	18671.70	0.04	3.53	8.33	105.8	0.43	8.91
18671.70	18764.37	12.52	277.22	92.88	30497.7	2.99	32.74
18764.37	18857.04	11.31	260.61	92.67	27555.0	2.81	31.46
18857.04	18949.71	11.33	260.97	92.71	27609.8	2.82	31.48
18949.71	19042.38	15.25	311.79	92.68	37150.8	3.36	35.45
19042.38	19135.05	14.43	301.69	92.67	35168.1	3.26	34.69
19135.05	19227.72	12.42	275.71	92.67	30267.3	2.98	32.67

```
*
* 19227.72  * 19320.39  *    10.77 *   253.15 *    92.67 *  26252.6 *     2.73 *    30.86
*
* 19320.39  * 19413.06  *     7.65 *   206.09 *    92.67 *  18634.2 *     2.22 *    26.90
*
* 19413.06  * 19505.73  *     4.27 *   128.94 *    68.73 *  10408.3 *     1.89 *    24.02
*
*******************************************************************************************
*

Warning - The parabolic search method failed to converge on critical depth.  The
                program will try the cross section slice/secant method to find critical
                depth.

CROSS SECTION INPUT    Reach: SALTRIVSOUTH   River Station: 226.23
Description: 440 ft. downstream fm. bridge

Station Elevation Data,  num = 66
    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.
 17743.6  1204.2 17776.7  1191.9 17813.8  1190.6 17827.3  1190.1 17871.1  1188.8
 17877.4  1188.8 17877.4  1188.8 17916.5  1188.5 17942.6  1187.7 17969.4  1187.6
 17973.1  1187.5 17979.5  1189.3   17984  1190.1 17991.3  1188.6 17993.2  1187.8
 18001.4  1187.9 18051.2  1188.4 18059.4  1191.5 18074.3  1184.3 18093.6  1184.4
 18103.8  1186.4 18106.5  1186.5 18127.1    1187 18142.8  1186.8 18208.7  1185.6
 18223.2  1185.3 18234.6  1181.8 18239.8  1181.2 18287.5  1180.1 18290.9    1180
 18344.8 1179.02 18359.2  1178.8 18408.1 1177.87   18437 1177.35 18480.3 1176.56
 18519.3 1175.86 18554.1  1175.2 18577.7  1174.8 18594.2  1174.5 18658.7  1174.7
 18692.9  1174.7 18734.4  1174.8 18796.6    1175 18799.4  1175.5   18835  1176.4
 18843.3  1176.9 18851.6    1177 18910.8  1179.6 18953.7  1179.6 18975.1  1179.8
 19006.5  1180.1 19029.6  1180.3 19046.8  1180.6   19075  1180.6 19078.5    1181
 19096.4  1170.8 19100.9  1171.5 19274.6    1172 19327.9  1172.3 19354.8  1172.5
 19507.5  1172.5 19559.6  1172.5 19569.4  1172.8 19577.6  1178.2 19603.5  1195.5
 19653.5  1204.2

Manning's n Values,  num = 3
    Sta.   Value    Sta.   Value    Sta.   Value
 17743.6    .028 17743.6    .028 19653.5    .028

Bank Sta: Left   Right    Lengths: Left Channel   Right    Coeff Contr.   Expan.
       17743.6 19653.5               250     250     250             .1       .3

CROSS SECTION OUTPUT  Reach: SALTRIVSOUTH  Riv Sta: 226.23    Profile # 1
*******************************************************************************
* W.S. Elev (ft)     *  1199.00 * Element           *  Left OB *  Channel * Right OB *
* Vel Head (ft)      *     0.06 * Wt. n-Val.        *          *    0.028 *          *
* E.G. Elev (ft)     *  1199.06 * Reach Len. (ft)   *   250.00 *   250.00 *   250.00 *
* E.G. Slope (ft/ft)* 0.000026 * Flow Area (sq ft) *          * 37025.50 *          *
* Q Total (cfs)      * 72500.00 * Flow (cfs)        *          * 72500.00 *          *
* Top Width (ft)     *  1866.04 * Top Width (ft)    *          *  1866.04 *          *
* Vel Total (ft/s)   *     1.96 * Avg. Vel. (ft/s)  *          *     1.96 *          *
* Max Chl Dpth (ft) *    28.20 * Hydr. Depth (ft)  *          *    19.84 *          *
* Crit W.S. (ft)     *  1179.73 * Wetted Per. (ft)  *          *  1881.17 *          *
* Conv. Total (cfs) *14323660.0 * Conv. (cfs)       *          *14323660.0 *          *
*******************************************************************************

FLOW DISTRIBUTION OUTPUT  Reach: SALTRIVSOUTH  Riv Sta: 226.23    Profile # 1
*******************************************************************************************
*
* Left Sta   * Right Sta *       %Q *     Area *     W.P. *    Conv. *  Hydr D. * Velocity
*
* (ft)       * (ft)      *          *  (sq ft) *     (ft) *    (cfs) *     (ft) *   (ft/s)
```

17743.60	17839.09	0.74	579.35	82.82	112454.9	7.11	0.93
17839.09	17934.59	1.61	975.38	95.52	243632.2	10.21	1.19
17934.59	18030.08	1.79	1042.64	96.13	271109.7	10.92	1.24
18030.08	18125.58	2.10	1155.32	97.91	317767.4	12.10	1.31
18125.58	18221.07	2.33	1219.38	95.51	353483.4	12.77	1.39
18221.07	18316.57	4.16	1729.88	96.07	630655.1	18.11	1.74
18316.57	18412.06	5.06	1940.73	95.51	766912.7	20.32	1.89
18412.06	18507.56	5.80	2107.42	95.51	879804.4	22.07	2.00
18507.56	18603.05	6.58	2272.39	95.51	997576.1	23.80	2.10
18603.05	18698.55	6.84	2325.54	95.50	1036858.0	24.35	2.13
18698.55	18794.04	6.75	2307.01	95.49	1023134.0	24.16	2.12
18794.04	18889.54	5.86	2120.20	95.60	888154.6	22.20	2.00
18889.54	18985.04	4.70	1858.17	95.52	713276.3	19.46	1.84
18985.04	19080.53	4.38	1781.73	95.83	663609.4	18.66	1.78
19080.53	19176.03	7.89	2559.16	97.95	1195841.0	26.80	2.23
19176.03	19271.52	8.19	2592.53	95.49	1242774.0	27.15	2.29
19271.52	19367.02	7.99	2553.77	95.50	1211928.0	26.74	2.27
19367.02	19462.51	7.87	2530.82	95.49	1193861.0	26.50	2.26
19462.51	19558.01	7.87	2530.87	95.50	1193885.0	26.50	2.26
19558.01	19653.50	1.51	843.21	72.79	229084.6	12.85	1.30

CROSS SECTION INPUT Reach: SALTRIVSOUTH River Station: 226.13
Description: last downstream cross section

Station Elevation Data, num = 26

Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
17980	1203	18007	1190.7	18069.5	1190	18121.5	1190	18147.2	1189.5
18151.2	1188.4	18168.9	1178.1	18204.8	1177.2	18213.2	1172.4	18256.4	1172.6
18340.7	1173	18362.9	1172.2	18403.5	1173	18405	1173	18848.8	1173
18876.1	1171.5	18876.4	1170.6	18925.4	1170.7	19306.5	1170.7	19354.4	1171.3
19366.1	1171.8	19437.3	1170.5	19485.6	1170.7	19504.1	1172.2	19553.4	1195.1
19593.2	1197.4								

Manning's n Values, num = 3

Sta.	Value	Sta.	Value	Sta.	Value
17980	.028	17980	.028	19593.2	.028

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

17980 19593.2 .1 .3

CROSS SECTION OUTPUT Reach: SALTRIVSOUTH Riv Sta: 226.13 Profile # 1

W.S. Elev (ft)	1199.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.028	
E.G. Elev (ft)	1199.06	Reach Len. (ft)			
E.G. Slope (ft/ft)	0.000018	Flow Area (sq ft)		38505.71	
Q Total (cfs)	72500.00	Flow (cfs)		72500.00	
Top Width (ft)	1604.42	Top Width (ft)		1604.42	
Vel Total (ft/s)	1.88	Avg. Vel. (ft/s)		1.88	
Max Chl Dpth (ft)	28.50	Hydr. Depth (ft)		24.00	
Crit W.S. (ft)	1176.47	Wetted Per. (ft)		1617.97	
Conv. Total (cfs)	16906970.0	Conv. (cfs)		16906970.0	

Warning - The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

FLOW DISTRIBUTION OUTPUT Reach: SALTRIVSOUTH Riv Sta: 226.13 Profile # 1

Left Sta (ft)	Right Sta (ft)	%Q	Area (sq ft)	W.P. (ft)	Conv. (cfs)	Hydr D. (ft)	Velocity (ft/s)
17980.00	18060.66	0.60	537.12	73.68	107161.3	7.47	0.81
18060.66	18141.32	0.95	729.33	80.66	167977.5	9.04	0.94
18141.32	18221.98	3.31	1577.63	84.87	587478.6	19.56	1.52
18221.98	18302.64	5.63	2127.10	80.66	1000092.0	26.37	1.92
18302.64	18383.30	5.60	2121.70	80.68	995720.6	26.30	1.92
18383.30	18463.96	5.52	2101.13	80.66	979821.3	26.05	1.90
18463.96	18544.62	5.50	2097.16	80.66	976753.8	26.00	1.90
18544.62	18625.28	5.50	2097.16	80.66	976753.8	26.00	1.90
18625.28	18705.94	5.50	2097.16	80.66	976753.8	26.00	1.90
18705.94	18786.60	5.50	2097.16	80.66	976753.8	26.00	1.90
18786.60	18867.26	5.54	2106.53	80.69	983804.9	26.12	1.91
18867.26	18947.92	6.27	2275.81	81.32	1113251.0	28.21	2.00
18947.92	19028.58	6.33	2282.69	80.66	1124971.0	28.30	2.01
19028.58	19109.24	6.33	2282.69	80.66	1124971.0	28.30	2.01
19109.24	19189.90	6.33	2282.63	80.66	1124944.0	28.30	2.01
19189.90	19270.56	6.33	2282.69	80.66	1124971.0	28.30	2.01
19270.56	19351.22	6.27	2270.16	80.66	1114670.0	28.14	2.00

```
* 19351.22  * 19431.88  *     6.13 *  2238.03 *    80.68 *1088337.0 *    27.75 *     1.98
*
* 19431.88  * 19512.54  *     6.11 *  2245.26 *    81.59 *1086080.0 *    27.84 *     1.97
*
* 19512.54  * 19593.20  *     0.76 *   656.58 *    86.52 * 134557.5 *     8.14 *     0.84
*
*******************************************************************************************
*
```

Warning - The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

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

SUMMARY OF MANNING'S N VALUES

Reach	River Sta.	n1	n2	n3
SALTRIVSOUTH	226.58	.028	.028	.031
SALTRIVSOUTH	226.521	.028	.028	.028
SALTRIVSOUTH	226.52	.028	.028	.031
SALTRIVSOUTH	226.51	Bridge		
SALTRIVSOUTH	226.50	.028	.028	.031
SALTRIVSOUTH	226.35	.028	.028	.028
SALTRIVSOUTH	226.23	.028	.028	.028
SALTRIVSOUTH	226.13	.028	.028	.028

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SUMMARY OF REACH LENGTHS

Reach	River Sta.	Left	Channel	Right
SALTRIVSOUTH	226.58	250	250	250
SALTRIVSOUTH	226.521	240	210	190
SALTRIVSOUTH	226.52	103	103	103
SALTRIVSOUTH	226.51	Bridge		
SALTRIVSOUTH	226.50	280	240	200
SALTRIVSOUTH	226.35	250	200	175
SALTRIVSOUTH	226.23	250	250	250
SALTRIVSOUTH	226.13			

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SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS

Reach	River Sta.	Contr.	Expan.
SALTRIVSOUTH	226.58	.1	.3
SALTRIVSOUTH	226.521	.1	.3
SALTRIVSOUTH	226.52	.1	.3
SALTRIVSOUTH	226.51	Bridge	
SALTRIVSOUTH	226.50	.1	.3
SALTRIVSOUTH	226.35	.1	.3
SALTRIVSOUTH	226.23	.1	.3
SALTRIVSOUTH	226.13	.1	.3

****

Profile Output Table - Standard Table 1

River Sta.	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
226.58	72500.00	1179.00	1204.91	1194.51	1205.77	0.001133	7.45	9847.31	1262.06	0.45
226.521	72500.00	1185.00	1202.16	1199.18	1205.07	0.002770	13.69	5295.44	484.54	0.73
226.52	72500.00	1185.00	1201.76	1198.30	1204.52	0.002052	13.33	5440.40	406.98	0.64
226.51	Bridge									
226.50	72500.00	1185.00	1196.53	1198.34	1203.93	0.009975	21.84	3320.20	395.34	1.33
226.35	72500.00	1171.30	1199.01	1178.76	1199.07	0.000025	2.00	36254.39	1745.03	0.08
226.23	72500.00	1170.80	1199.00	1179.73	1199.06	0.000026	1.96	37025.50	1866.04	0.08
226.13	72500.00	1170.50	1199.00	1176.47	1199.06	0.000018	1.88	38505.71	1604.42	0.07

Profile Output Table - Standard Table 2

River Sta.	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
226.58	1205.77	1204.91	0.86	0.49	0.21		72500.00		1262.06
226.521	1205.07	1202.16	2.91	0.51	0.05		72500.00		484.54
226.52	1204.52	1201.76	2.76	0.02	0.24		72500.00		406.98
226.51	Bridge								
226.50	1203.93	1196.53	7.40	0.09	0.22		72500.00		395.34
226.35	1199.07	1199.01	0.06	0.01	0.00		72500.00		1745.03
226.23	1199.06	1199.00	0.06	0.01	0.00		72500.00		1866.04
226.13	1199.06	1199.00	0.06	0.00	0.00		72500.00		1604.42

Profile Output Table - Six XS Bridge

```
* River Sta. *E.G. Elev *W.S. Elev *Crit W.S. *Frctn Loss *C & E Loss *Top Width *   Q
Left *Q Channel *  Q Right * Vel Chnl *
*            *     (ft) *     (ft) *     (ft) *      (ft) *      (ft) *     (ft) *
(cfs) *    (cfs) *    (cfs) *   (ft/s) *
*************************************************************************************
***********************************
* 226.521    *  1205.07 *  1202.16 *  1199.18 *      0.51 *      0.05 *   484.54 *
* 72500.00 *          *    13.69 *
* 226.52     *  1204.52 *  1201.76 *  1198.30 *      0.02 *      0.24 *   406.98 *
* 72500.00 *          *    13.33 *
* 226.51   BU*  1204.26 *  1199.09 *  1199.09 *      0.00 *      0.00 *   386.87 *
* 72446.97 *    53.03 *    18.26 *
* 226.51   BD*  1204.26 *  1199.09 *  1199.09 *           *           *   386.87 *
* 72446.83 *    53.17 *    18.25 *
* 226.50     *  1203.93 *  1196.53 *  1198.34 *      0.09 *      0.22 *   395.34 *
* 72500.00 *          *    21.84 *
* 226.35     *  1199.07 *  1199.01 *  1178.76 *      0.01 *      0.00 *  1745.03 *
* 72500.00 *          *     2.00 *
*************************************************************************************
***********************************

Profile Output Table - Bridge Comparison
*************************************************************************************
*************
* River Sta. *E.G. Elev *W.S. Elev *Energy EG *Momen. EG *Yarnell EG * WSPRO EG * Prs O EG
*Prs/Wr EG *
*            *     (ft) *     (ft) *     (ft) *     (ft) *      (ft) *     (ft) *     (ft)
*     (ft) *
*************************************************************************************
*************
* 226.51     *  1204.52 *  1201.76 *  1204.38 *          *   1203.98 *          *
*          *
*************************************************************************************
*************

Profile Output Table - HEC-FDA
**********************************************
* River Sta. *  Q Total *Min Ch El *W.S. Elev *
*            *    (cfs) *     (ft) *     (ft) *
**********************************************
* 226.58     * 72500.00 *  1179.00 *  1204.91 *
* 226.521    * 72500.00 *  1185.00 *  1202.16 *
* 226.52     * 72500.00 *  1185.00 *  1201.76 *
* 226.51     *   Bridge *          *          *
* 226.50     * 72500.00 *  1185.00 *  1196.53 *
* 226.35     * 72500.00 *  1171.30 *  1199.01 *
* 226.23     * 72500.00 *  1170.80 *  1199.00 *
* 226.13     * 72500.00 *  1170.50 *  1199.00 *
**********************************************

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ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Plan 06

Summary for Profiles:1

Reach: SALTRIVSOUTH     Riv Sta: 226.13     Profile:  1
      Warning - The parabolic search method failed to converge on critical depth.  The
program will try the cross section
                slice/secant method to find critical depth.
```

Reach: SALTRIVSOUTH Riv Sta: 226.35 Profile: 1
Warning - The parabolic search method failed to converge on critical depth. The program will try the cross section
slice/secant method to find critical depth.
Reach: SALTRIVSOUTH Riv Sta: 226.50 Profile: 1
Warning - The energy equation could not be balanced within the specified number of iterations. The program used critical
depth for the water surface and continued on with the calculations.
Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross
sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Reach: SALTRIVSOUTH Riv Sta: 226.51 Profile: 1
Note - The energy method has computed a class B profile.
Reach: SALTRIVSOUTH Riv Sta: 226.51 US Profile: 1
Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross
sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Reach: SALTRIVSOUTH Riv Sta: 226.51 DS Profile: 1
Warning - The energy equation could not be balanced within the specified number of iterations. The program used critical
depth for the water surface and continued on with the calculations.
Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross
sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Reach: SALTRIVSOUTH Riv Sta: 226.52 Profile: 1
Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross
sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Reach: SALTRIVSOUTH Riv Sta: 226.58 Profile: 1
Warning - Divided flow computed for this cross-section.
Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross
sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

ATL, INC.
CONSTRUCTION QUALITY CONTROL
GEOTECHNICAL CONSULTANTS

FAX

To Brian Fay
Dibble & Associates

FAX NUMBER 957-2838

Date 4/15/97

Project Alma School Road Bridge

ATL Job No. 196045

From David P. Hayes, P.E.

Fax Number (602) 277-1306

We are transmitting 13 page(s) including this cover page.
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HYDROMETER ANALYSIS
(ASTM D422)

CLIENT : De Leuw Cather

DATE : 04/14/97

LAB. NO.: 97-0197
JOB NO. : 196045
DATE RCVD: 03/25/97
SAMPLED BY: J. Cowell

PROJECT : Alma School Rd. S. Bridge
MATERIAL : Well graded GRAVEL(GW) with sand
SOURCE OF MATERIAL: Boring TP-1 Depth: 0- 1.5 m

WEIGHT OF SAMPLE = 103.43 (GMS) SOIL PASSING #10 SIEVE = 80.08 %

SPECIFIC GRAVITY OF SOIL SAMPLE = 2.616

ELAPSED TIME (MIN)	TIME	TEMP. (oC)	CORR.(K) USING (TAB. 3)	HYDROMETER READING (WATER)	HYDROMETER READING (W/SOIL)	CORR. READING	EFFECTIVE DEPTH (CMS)	PARTICLE SIZE (M.M)	PERCENT FINER IN SUSPENSION
0	START 10:39 AM	21.7	0.01396	1.00375	1.00775	1.00400	14.2	0.037	5.0
2	10:41 AM	21.7	0.01396	1.00375	1.00675	1.00300	14.5	0.038	3.8
5	10:44 AM	21.7	0.01396	1.00375	1.00675	1.00300	14.5	0.024	3.8
15	10:54 AM	21.7	0.01396	1.00375	1.00575	1.00200	14.8	0.014	2.5
30	11:09 AM	22.2	0.01396	1.00375	1.00550	1.00175	14.8	0.010	2.2
60	11:41 AM	22.2	0.01396	1.00375	1.00525	1.00150	14.9	0.007	1.9
250	02:49 PM	23.3	0.01396	1.00375	1.00525	1.00150	14.9	0.003	1.9
04/10/97 1440	10:39 AM	23.3	0.01396	1.00375	1.00500	1.00125	15.0	0.001	1.6

Reviewed By:
Input By: AO

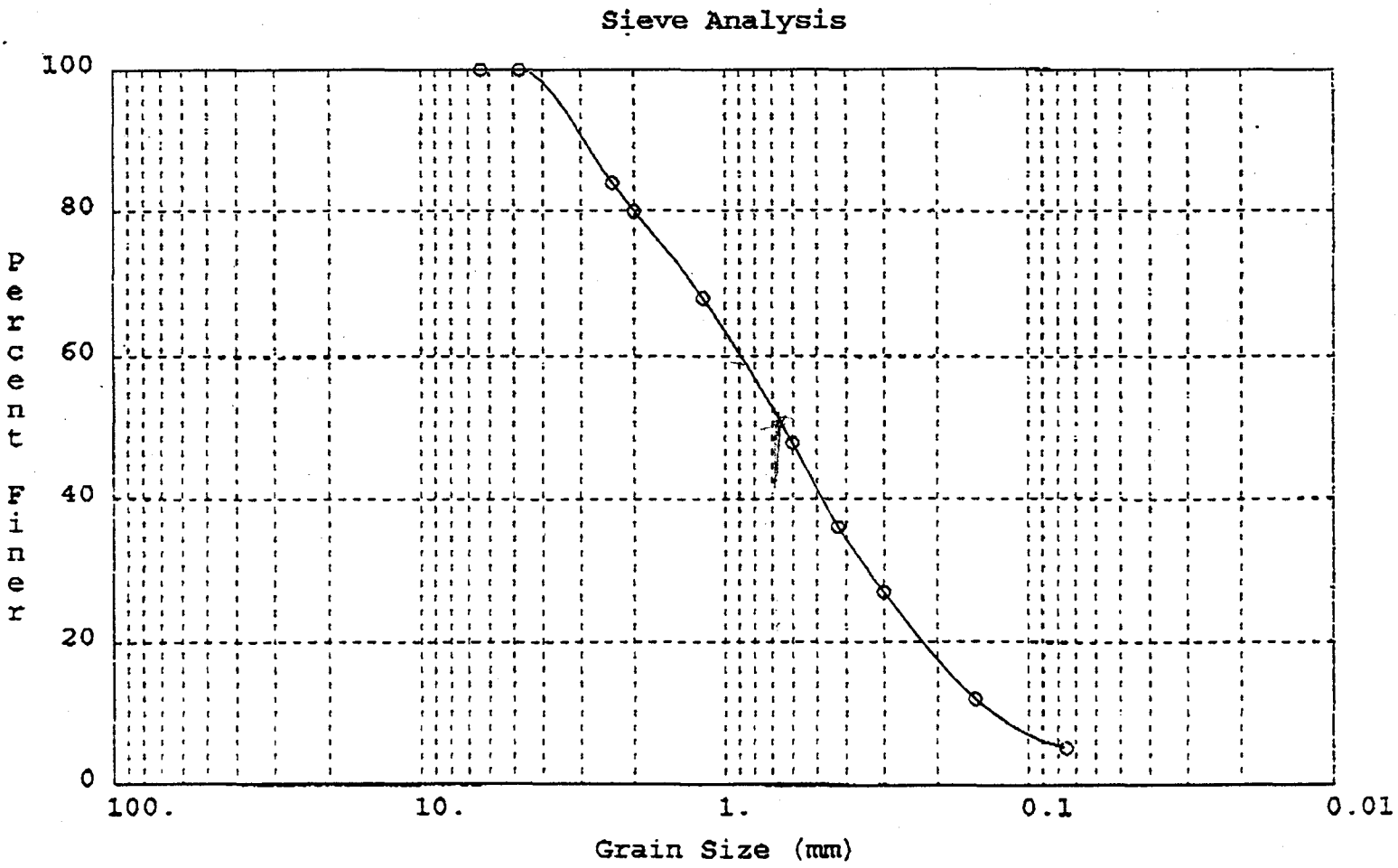
Respectfully Submitted:

J. Michael Addington
Laboratory Supervisor

DeLeuw/Hydro/97-0197Geo

Project Number = 196045 Client: De Leuw Cather
Location = Alma School Road South Bridge
Date = 4/8/97
Tested By = V. Nichols Jr.
Boring Number = TP-1
Depth = 0 - 1.5m
Sample Number = 97-0197
Description = Well graded GRAVEL(GW) with sand
Dry Sample Weight (g) = 1000

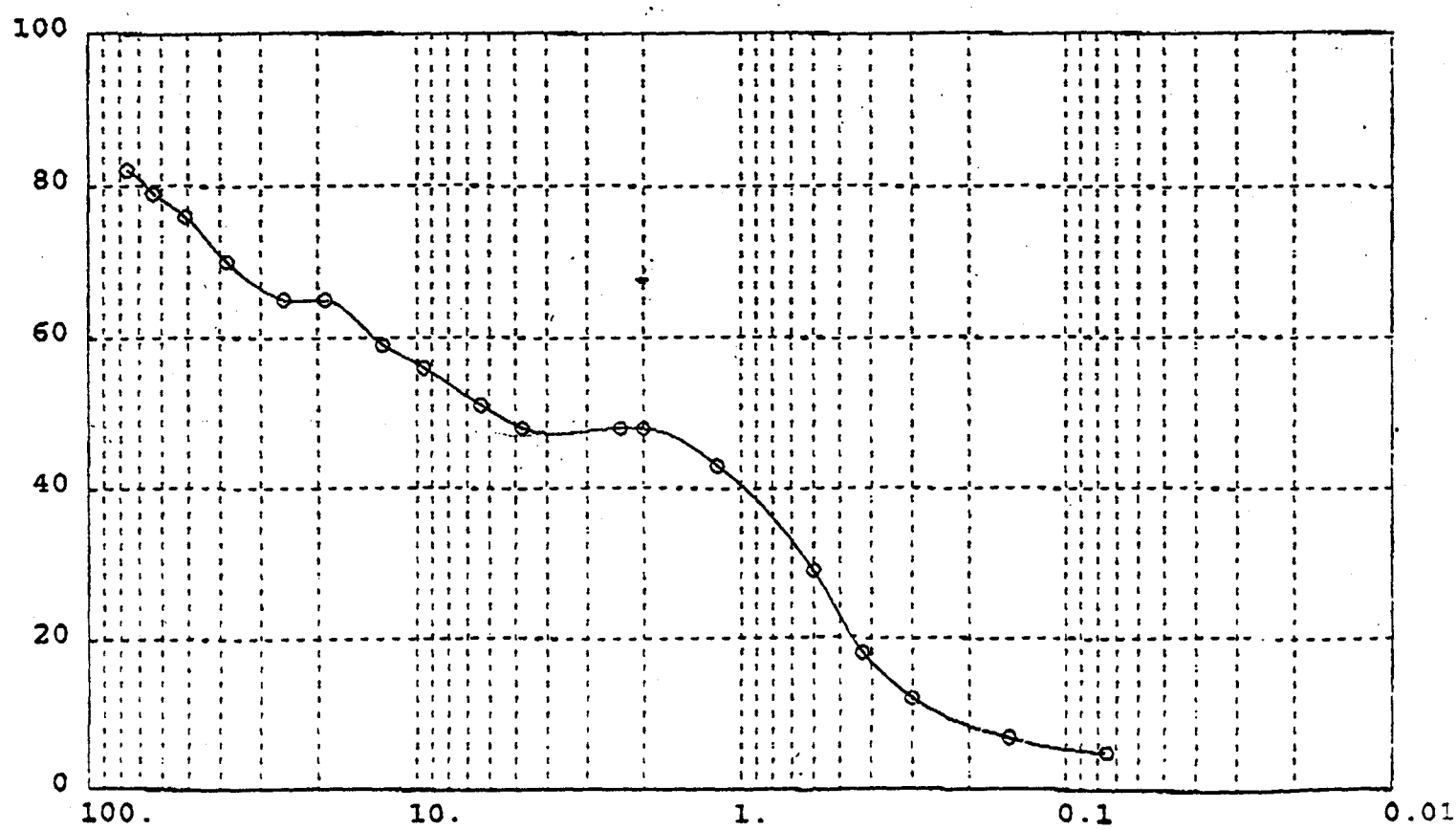
SIEVE NUMBER	SIEVE OPENING (mm)	RETAINED WEIGHT (g)	PERCENT OF WEIGHT RETAINED	CUMULATIVE PERCENT RETAINED	PERCENT FINER (%)
1/4"	6.350	0.00	0.00	0.00	100.00
#4	4.750	0.00	0.00	0.00	100.00
#8	2.360	160.00	16.00	16.00	84.00
#10	2.000	40.00	4.00	20.00	80.00
#16	1.180	120.00	12.00	32.00	68.00
#30	0.600	200.00	20.00	52.00	48.00
#40	0.425	120.00	12.00	64.00	36.00
#50	0.300	90.00	9.00	73.00	27.00
#100	0.150	150.00	15.00	88.00	12.00
#200	0.075	70.00	7.00	95.00	5.00
Pan	0.000	0.00	0.00	95.00	5.00



[illegible]ion = Alma School Road South Bridge
[illegible]e = 4/8/97
[illegible]sted By = V. Nichols Jr.
[illegible]oring Number = TP-4
[illegible]epth = 0-0.30m
[illegible]ample Number = 97-0201
Description = Well-graded GRAVEL(GW) w/ sand
Dry Sample Weight (g) = 1000

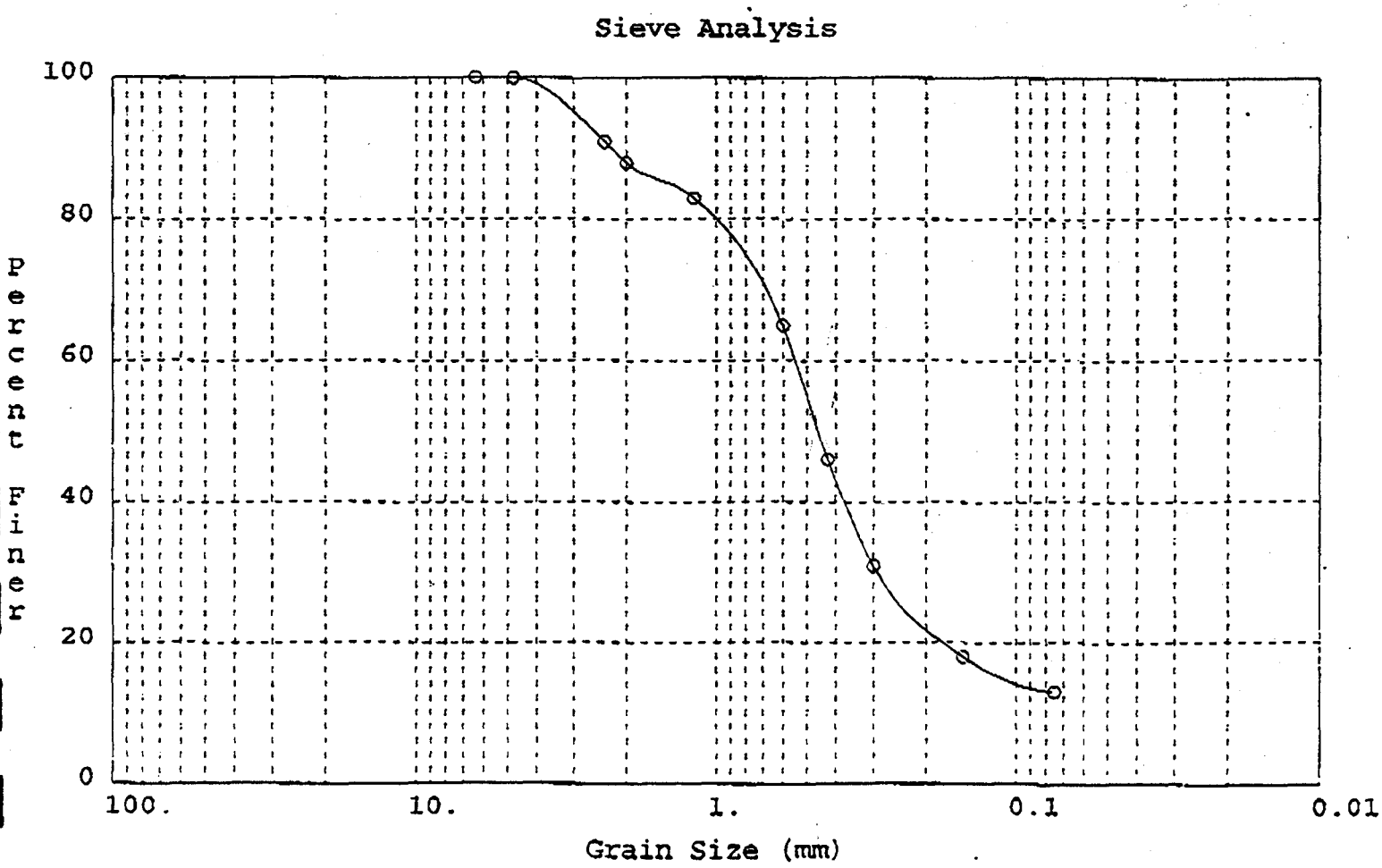
SIEVE [illegible]UMBER	SIEVE OPENING (mm)	RETAINED WEIGHT (g)	PERCENT OF WEIGHT RETAINED	CUMULATIVE PERCENT RETAINED	PERCENT FINER (%)
[illegible]"	76.200	40.00	4.00	18.00	82.00
[illegible] 1/2"	63.500	30.00	3.00	21.00	79.00
2"	50.800	30.00	3.00	24.00	76.00
1 1/2"	38.100	60.00	6.00	30.00	70.00
[illegible]"	25.400	50.00	5.00	35.00	65.00
[illegible]/4"	19.050	0.00	0.00	35.00	65.00
1/2"	12.700	60.00	6.00	41.00	59.00
[illegible]/8"	9.500	30.00	3.00	44.00	56.00
[illegible]/4"	6.350	50.00	5.00	49.00	51.00
#4	4.750	30.00	3.00	52.00	48.00
#8	2.360	0.00	0.00	52.00	48.00
[illegible]10	2.000	0.00	0.00	52.00	48.00
#16	1.180	50.00	5.00	57.00	43.00
#30	0.600	140.00	14.00	71.00	29.00
[illegible]40	0.425	110.00	11.00	82.00	18.00
[illegible]50	0.300	60.00	6.00	88.00	12.00
#100	0.150	50.00	5.00	93.00	7.00
[illegible]200	0.075	20.00	2.00	95.00	5.00
[illegible]an	0.000	0.00	0.00	95.00	5.00

Sieve Analysis



Project Number = 196045 Client: De Leuw Cather
Location = Alma School Road South Bridge
Date = 4/8/97
Tested By = V. Nichols Jr.
Boring Number = TP-2
Depth = 0 - 1.5m
Sample Number = 97-0198
Description = Well graded GRAVEL(GW) with sand
Dry Sample Weight (g) = 1000

SIEVE NUMBER	SIEVE OPENING (mm)	RETAINED WEIGHT (g)	PERCENT OF WEIGHT RETAINED	CUMULATIVE PERCENT RETAINED	PERCENT FINER (%)
1/4"	6.350	0.00	0.00	0.00	100.00
#4	4.750	0.00	0.00	0.00	100.00
#8	2.360	90.00	9.00	9.00	91.00
#10	2.000	30.00	3.00	12.00	88.00
#16	1.180	50.00	5.00	17.00	83.00
#30	0.600	180.00	18.00	35.00	65.00
#40	0.425	190.00	19.00	54.00	46.00
#50	0.300	150.00	15.00	69.00	31.00
#100	0.150	130.00	13.00	82.00	18.00
#200	0.075	50.00	5.00	87.00	13.00
Pan	0.000	0.00	0.00	87.00	13.00



HYDROMETER ANALYSIS
(ASTM D422)

CLIENT : De Leuw Cather

DATE : 04/14/97

LAB. NO.: 97-0199
JOB NO. : 196045
DATE RCVD: 03/25/97
SAMPLED BY: J. Cowell

PROJECT : Alma School Rd. S. Bridge
MATERIAL : Silty SAND(SM) with gravel
SOURCE OF MATERIAL: Boring TP-3 Depth: 0- 0.75m

WEIGHT OF SAMPLE = 49.53 (GMS) SOIL PASSING #10 SIEVE = 80.60 %

SPECIFIC GRAVITY OF SOIL SAMPLE = 2.604

ELAPSED TIME (MIN)	TIME	TEMP. (oC)	CORR.(K) USING (TAB. 3)	HYDROMETER READING (WATER)	HYDROMETER READING (W/SOIL)	CORR. READING	EFFECTIVE DEPTH (CMS)	PARTICLE SIZE (M.M)	PERCENT FINER IN SUSPENSION
0	START 11:20 AM	22.2	0.01396	1.00375	1.01175	1.00800	13.2	0.036	21.1
2	11:22 AM	22.2	0.01396	1.00375	1.01175	1.00800	13.2	0.036	21.1
5	11:25 AM	22.2	0.01396	1.00375	1.01075	1.00700	13.5	0.023	18.5
15	11:35 AM	22.2	0.01396	1.00375	1.01025	1.00650	13.6	0.013	17.2
30	11:50 AM	22.2	0.01396	1.00375	1.00975	1.00600	13.7	0.009	15.9
60	12:20 AM	22.2	0.01396	1.00375	1.00975	1.00600	13.7	0.007	15.9
250	03:30 PM	23.3	0.01396	1.00375	1.00775	1.00400	14.2	0.003	10.6
1440	11:20 AM	23.3	0.01396	1.00375	1.00700	1.00325	14.4	0.001	8.6

Reviewed By:
Input By: AO

Respectfully Submitted:

J. Michael Addington
Laboratory Supervisor

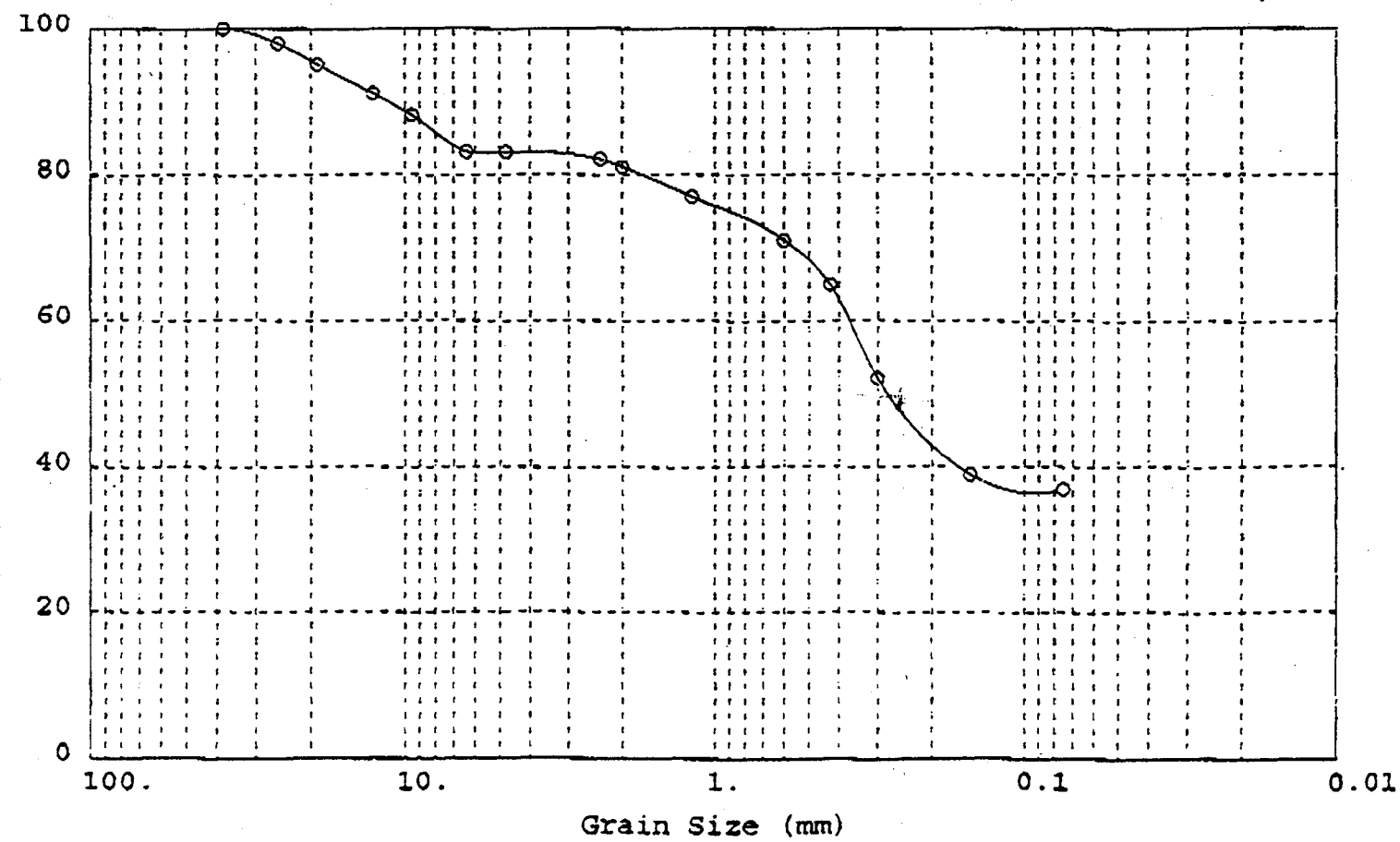
DeLeuw/Hydro/97-0199Geo

Project Number = 196045 Client: De Leuw Cather
Location = Alma School Road South Bridge
Date = 4/8/97
Tested By = V. Nichols Jr.
Boring Number = TP-3
Depth = 0 - 0.75m
Sample Number = 97-0199
Description = silty SAND(SM) with gravel
Dry Sample Weight (g) = 1000

SIEVE NUMBER	SIEVE OPENING (mm)	RETAINED WEIGHT (g)	PERCENT OF WEIGHT RETAINED	CUMULATIVE PERCENT RETAINED	PERCENT FINER (%)
1 1/2"	38.100	0.00	0.00	0.00	100.00
1"	25.400	20.00	2.00	2.00	98.00
3/4"	19.050	30.00	3.00	5.00	95.00
1/2"	12.700	40.00	4.00	9.00	91.00
3/8"	9.500	30.00	3.00	12.00	88.00
1/4"	6.350	50.00	5.00	17.00	83.00
#4	4.750	0.00	0.00	17.00	83.00
#8	2.360	10.00	1.00	18.00	82.00
#10	2.000	10.00	1.00	19.00	81.00
#16	1.180	40.00	4.00	23.00	77.00
#30	0.600	60.00	6.00	29.00	71.00
#40	0.425	60.00	6.00	35.00	65.00
#50	0.300	130.00	13.00	48.00	52.00
#100	0.150	130.00	13.00	61.00	39.00
#200	0.075	20.00	2.00	63.00	37.00
Pan	0.000	0.00	0.00	63.00	37.00

1" = 29 mm

Sieve Analysis



HYDROMETER ANALYSIS
(ASTM D422)

CLIENT : De Leuw Cather

DATE : 04/14/97

LAB. NO.: 97-0200
JOB NO. : 196045
DATE RCVD: 03/25/97
SAMPLED BY: J. Cowell

PROJECT : Alma School Rd. S. Bridge
MATERIAL : Silty SAND (SM) with gravel
SOURCE OF MATERIAL: Boring TP-3 Depth: 0.75 m - 1.5 m

WEIGHT OF SAMPLE = 50.00 (GMS) SOIL PASSING #10 SIEVE = 83.80 %

SPECIFIC GRAVITY OF SOIL SAMPLE = 2.624

ELAPSED TIME (MIN)	TIME	TEMP. (oC)	CORR.(K) USING (TAB. 3)	HYDROMETER READING (WATER)	HYDROMETER READING (W/SOIL)	CORR. READING	EFFECTIVE DEPTH (CMS)	PARTICLE SIZE (M.M)	PERCENT FINER IN SUSPENSION
0	START 01:30 PM	23.3	0.01396	1.00375	1.011	1.00725	13.4	0.036	19.6
2	01:32 PM	23.3	0.01396	1.00375	1.01025	1.00650	13.6	0.036	17.6
5	01:35 PM	23.3	0.01396	1.00375	1.00975	1.00600	13.7	0.023	16.2
15	01:45 PM	23.3	0.01396	1.00375	1.00925	1.00550	13.8	0.013	14.9
30	02:00 PM	23.3	0.01396	1.00375	1.00875	1.00500	14.0	0.010	13.5
60	02:30 PM	23.3	0.01396	1.00375	1.00700	1.00325	14.4	0.007	8.8
250	05:30 PM	23.3	0.01396	1.00375	1.00650	1.00275	14.6	0.003	7.4
04/10/97 1440	01:30 PM	23.3	0.01396	1.00375	1.00550	1.00175	14.8	0.001	4.7

Reviewed By:
Input By: AO

Respectfully Submitted:

J. Michael Addington
Laboratory Supervisor

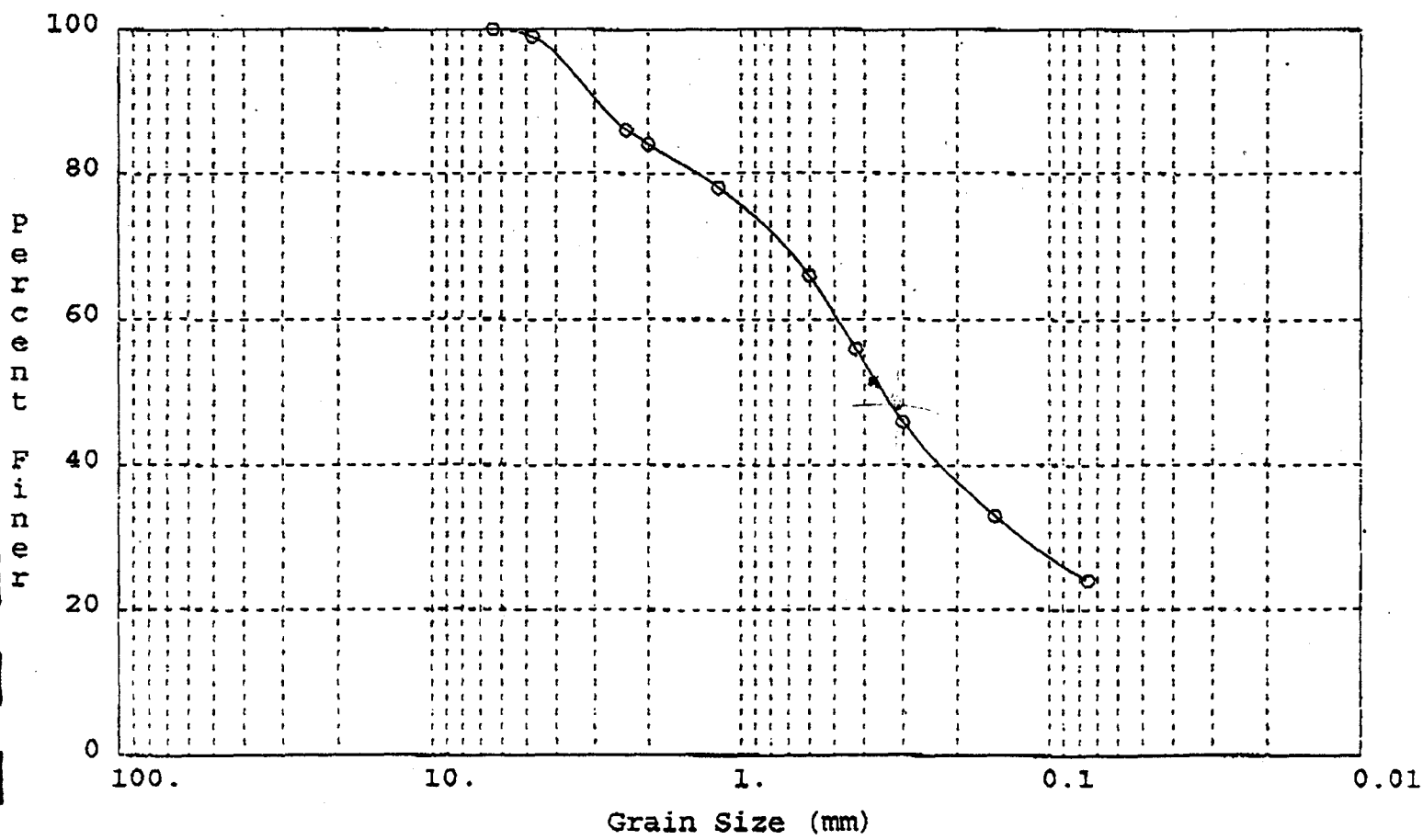
DeLeuw/Hydro/97-200Geo

Project Number = 196045 Client: De Leuw Cather
Location = Alma School Road South Bridge
Date = 4/8/97
Tested By = V. Nichols Jr.
Boring Number = TP-3
Depth = 0.75m - 1.5m
Sample Number = 97-0200
Description = silty SAND(SM) with gravel
Dry Sample Weight (g) = 1000

SIEVE NUMBER	SIEVE OPENING (mm)	RETAINED WEIGHT (g)	PERCENT OF WEIGHT RETAINED	CUMULATIVE PERCENT RETAINED	PERCENT FINER (%)
1/4"	6.350	0.00	0.00	0.00	100.00
#4	4.750	10.00	1.00	1.00	99.00
#8	2.360	130.00	13.00	14.00	86.00
#10	2.000	20.00	2.00	16.00	84.00
#16	1.180	60.00	6.00	22.00	78.00
#30	0.600	120.00	12.00	34.00	66.00
#40	0.425	100.00	10.00	44.00	56.00
#50	0.300	100.00	10.00	54.00	46.00
#100	0.150	130.00	13.00	67.00	33.00
#200	0.075	90.00	9.00	76.00	24.00
Pan	0.000	0.00	0.00	76.00	24.00

0.3

Sieve Analysis



HYDROMETER ANALYSIS
(ASTM D422)

CLIENT : De Leuw Cather

DATE : 04/14/97

LAB. NO.: 97-0201
JOB NO. : 196045
DATE RCVD: 03/25/97
SAMPLED BY: J. Cowell

PROJECT : Alma School Rd. S. Bridge
MATERIAL : Well graded GRAVEL(GW) with sand
SOURCE OF MATERIAL: Boring TP-4 · Depth: 0- 0.30 m

WEIGHT OF SAMPLE = 100.62 (GMS) SOIL PASSING #10 SIEVE = 47.50 %

SPECIFIC GRAVITY OF SOIL SAMPLE = 2.658

ELAPSED TIME (MIN)	TIME	TEMP. (oC)	CORR.(K) USING (TAB. 3)	HYDROMETER READING (WATER)	HYDROMETER READING (W/SOIL)	CORR. READING	EFFECTIVE DEPTH (CMS)	PARTICLE SIZE (M.M)	PERCENT FINER IN SUSPENSION
0	START 01:50 PM	23.3	0.01396	1.00375	1.01025	1.00650	13.6	0.036	4.9
2	01:52 PM	23.3	0.01396	1.00375	1.00875	1.00500	14.0	0.037	3.8
5	01:55 PM	23.3	0.01396	1.00375	1.00775	1.00400	14.2	0.024	3.0
15	02:05 PM	23.3	0.01396	1.00375	1.00725	1.00350	14.4	0.014	2.6
30	02:20 PM	23.3	0.01396	1.00375	1.00750	1.00375	14.3	0.010	2.8
60	02:50 PM	23.3	0.01396	1.00375	1.00675	1.00300	14.5	0.007	2.3
250	06:00 PM	23.3	0.01396	1.00375	1.00500	1.00125	15.0	0.003	0.9
04/10/97 1440	01:50 PM	23.3	0.01396	1.00375	1.00550	1.00175	14.8	0.001	1.3

Reviewed By:
Input By: AO

Respectfully Submitted:

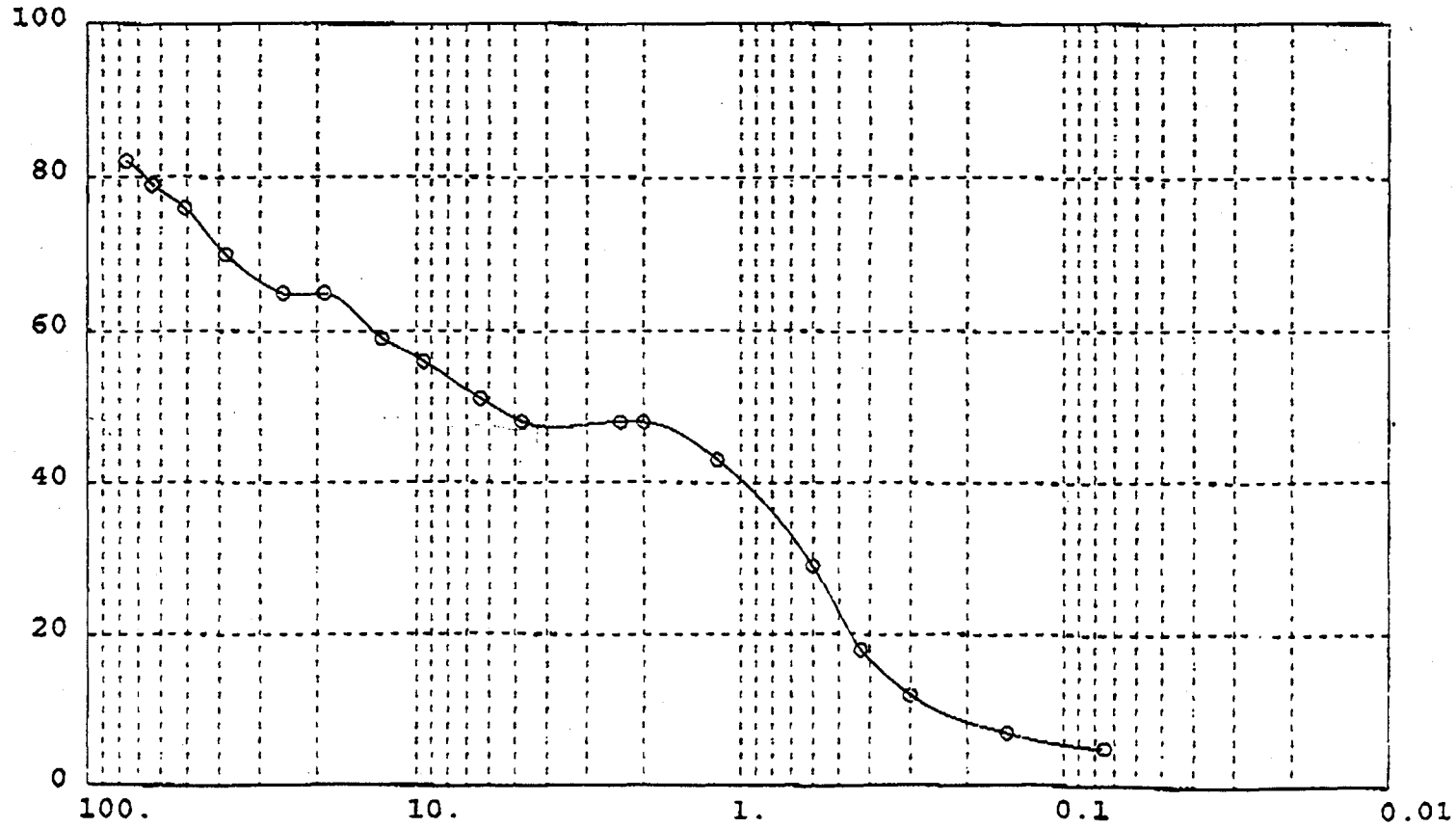
J. Michael Addington
Laboratory Supervisor

DeLeuw/Hydro/97-201Geo

Location = Alma School Road South Bridge
Date = 4/8/97
Tested By = V. Nichols Jr.
Boring Number = TP-4
Depth = 0-0.30m
Sample Number = 97-0201
Description = Well-graded GRAVEL(GW) w/ sand
Dry Sample Weight (g) = 1000

SIEVE NUMBER	SIEVE OPENING (mm)	RETAINED WEIGHT (g)	PERCENT OF WEIGHT RETAINED	CUMULATIVE PERCENT RETAINED	PERCENT FINER (%)
3"	76.200	40.00	4.00	18.00	82.00
2 1/2"	63.500	30.00	3.00	21.00	79.00
2"	50.800	30.00	3.00	24.00	76.00
1 1/2"	38.100	60.00	6.00	30.00	70.00
1"	25.400	50.00	5.00	35.00	65.00
3/4"	19.050	0.00	0.00	35.00	65.00
1/2"	12.700	60.00	6.00	41.00	59.00
3/8"	9.500	30.00	3.00	44.00	56.00
1/4"	6.350	50.00	5.00	49.00	51.00
#4	4.750	30.00	3.00	52.00	48.00
#8	2.360	0.00	0.00	52.00	48.00
#10	2.000	0.00	0.00	52.00	48.00
#16	1.180	50.00	5.00	57.00	43.00
#30	0.600	140.00	14.00	71.00	29.00
#40	0.425	110.00	11.00	82.00	18.00
#50	0.300	60.00	6.00	88.00	12.00
#100	0.150	50.00	5.00	93.00	7.00
#200	0.075	20.00	2.00	95.00	5.00
Pan	0.000	0.00	0.00	95.00	5.00

Sieve Analysis



HYDROMETER ANALYSIS
(ASTM D422)

CLIENT : De Leuw Cather

DATE : 04/14/97

LAB. NO.: 97-0202
JOB NO. : 196045
DATE RCVD: 03/25/97
SAMPLED BY: J. Cowell

PROJECT : Alma School Rd. S. Bridge
MATERIAL : Well graded GRAVEL(GW) with sand
SOURCE OF MATERIAL: Boring TP-4 Depth: 0.30m - 1.5 m

WEIGHT OF SAMPLE = 100.73 (GMS) SOIL PASSING #10 SIEVE = 80.40 %

SPECIFIC GRAVITY OF SOIL SAMPLE = 2.628

ELAPSED TIME (MIN)	TIME	TEMP. (oC)	CORR.(K) USING (TAB. 3)	HYDROMETER READING (WATER)	HYDROMETER READING (W/SOIL)	CORR. READING	EFFECTIVE DEPTH (CMS)	PARTICLE SIZE (M.M)	PERCENT FINER IN SUSPENSION
0	START 02:05 PM	23.3	0.01396	1.00375	1.0075	1.00375	14.3	0.037	4.8
2	02:07 PM	23.3	0.01396	1.00375	1.00675	1.00300	14.5	0.038	3.9
5	02:10 PM	23.3	0.01396	1.00375	1.00675	1.00300	14.5	0.024	3.9
15	02:20 PM	23.3	0.01396	1.00375	1.00650	1.00275	14.6	0.014	3.5
30	02:35 PM	23.3	0.01396	1.00375	1.00650	1.00275	14.6	0.010	3.5
60	03:05 PM	23.3	0.01396	1.00375	1.00650	1.00275	14.6	0.007	3.5
250	06:15 PM	23.3	0.01396	1.00375	1.00625	1.00250	14.6	0.003	3.2
04/10/97 1440	03:05 PM	23.3	0.01396	1.00375	1.00575	1.00200	14.8	0.001	2.6

Reviewed By:
Input By: AO

Respectfully Submitted:

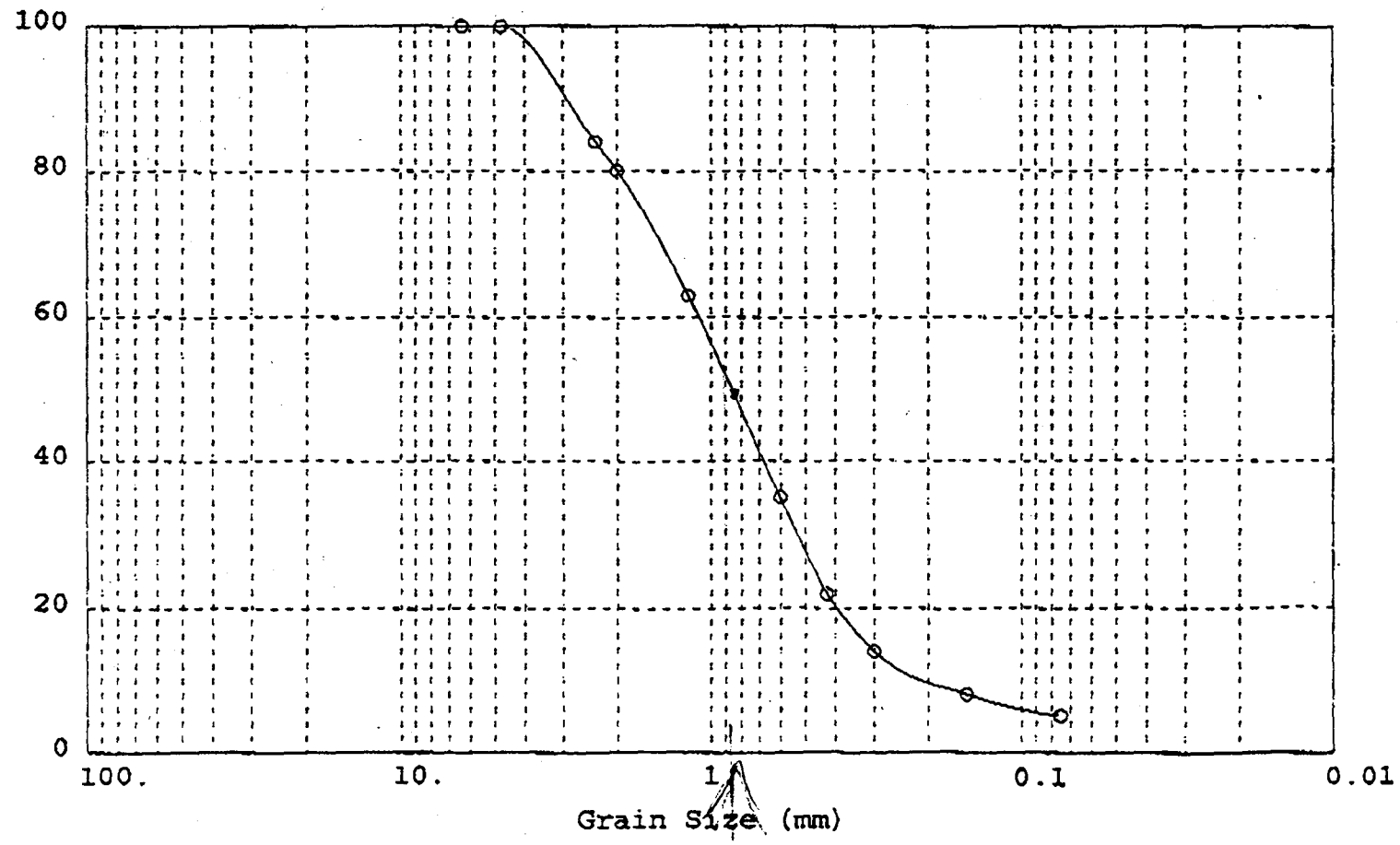
J. Michael Addington
Laboratory Supervisor

DeLeuw/Hydro/97-0202Geo

Project Number = 196045 Client: De Leuw Cather
Location = Alma School Road South Bridge
Date = 4/8/97
Tested By = V. Nichols Jr.
Boring Number = TP-4
Depth = 0.30m - 1.5m
Sample Number = 97-0202
Description = Well-graded GRAVEL(GW) w/ sand
Dry Sample Weight (g) = 1000

SIEVE NUMBER	SIEVE OPENING (mm)	RETAINED WEIGHT (g)	PERCENT OF WEIGHT RETAINED	CUMULATIVE PERCENT RETAINED	PERCENT FINER (%)
1/4"	6.350	0.00	0.00	0.00	100.00
#4	4.750	0.00	0.00	0.00	100.00
#8	2.360	160.00	16.00	16.00	84.00
#10	2.000	40.00	4.00	20.00	80.00
#16	1.180	170.00	17.00	37.00	63.00
#30	0.600	280.00	28.00	65.00	35.00
#40	0.425	130.00	13.00	78.00	22.00
#50	0.300	80.00	8.00	86.00	14.00
#100	0.150	60.00	6.00	92.00	8.00
#200	0.075	30.00	3.00	95.00	5.00
Pan	0.000	0.00	0.00	95.00	5.00

Sieve Analysis



6-REGULATORY AGENCIES

U.S. ARMY CORPS OF ENGINEERS

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

ARIZONA DEPARTMENT OF TRANSPORTATION

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION

SALT RIVER PROJECT