(EAST MARICOPA)
RWCD FLOODWAY REACH 4
DESIGN COMPUTATIONS #2

CHANDLER, AZ
1985

A121.808

(EAST MARICOPA)
RWCD FLOODWAY
REACH 4

DESIGN COMPUTATIONS

CHANDLER, AZ

1985

U.S. DEPARTMENT OF AGRICULTURE

SPEED-MEMO

PART NUMBER 3

DATE 1/9/81

TO: RALPH ABRINGTON, SCE, SCS PHOENIX
DON PAULUS, DC, SCS, PHOENIX

SUBJECT: RWCD FLOODWAY REACH 4 RSV. STATUS

FROM: DAVE THACKERAY

MESSAGE

1. WE ARE RUNNING BEHIND OUR SCHEDULE TO COMPLETE THIS TOR BY JAN. 31. AND WILL FORWARD A REVISED REALISTIC SCHEDULE.

2. WE HAVE CHANGED THE LAYOUT AND TRAPEZOIDAL R/C LINING DESIGN IN THE AREA OF THE NEW POWER RD. BRIDGE AS FOLLOWS:

A. EXTEND THE PORTION OF THE LINING TO BE CONSTRUCTED BY MCHD DOWNSTREAM 10 FT. FROM THAT SHOWN ON THE PRELIMINARY BRIDGE DRAWINGS. THE EXTENT IS THEN FROM 550+80 TO STA 553+00.

B. THE GRADE HAS BEEN REVISED: THE CHANNEL INVERT IS NOW LEVEL FROM STA 550+80 TO STA 553+00 AT EL 1310.78. THE CROSS SECTION HAS NOT BEEN CHANGED (B=50, z=2, d=11.0, thickness = 6in)

C. THE LAYOUT FOR THE PAVED TURNOUTS FOR THE MAINTENANCE ROADS AT POWER ROAD HAS BEEN REVISED AS SHOWN ON THE ATTACHED WORKSHEET.

D. WE ARE ASSUMING THAT THE BRIDGE DRWG ELS ARE 0.74 FT HIGHER THAN THE PLAN ELS.

3. WE UNDERSTAND THAT WILLIAMS AFB IS REVISING THEIR SEWAGE OUTLET THAT CURRENTLY CROSSES THE FLOODWAY AT APPROXIMATE STATION 528+75 AND THAT THERE MAY BE SOME NEW INFORMATION ON THIS THAT SHOULD BE INCLUDED ON OUR DRAWINGS.

SIGNATURE: Dave Thackeray

REPLY

SIGNATURE

DATE

(DESTROY THIS PART 3 UPON RECEIPT OF REPLY)

FORM AD-311 (REV. 5-68)

18 NOV 1985

Arrington

FLOOD CONTROL DISTRICT
of
Maricopa County

3335 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 262-1501

D. E. Sagramoso, P.E., Chief Engineer and General Manager

BOARD of DIRECTORS
Tom Freestone, Chairman
George L. Campbell
Carole Carpenter
Fred Koory, Jr.
Ed Pastor

OCT 29 1985

Mr. Verne M. Bathurst
State Conservationist
Soil Conservation Service
201 East Indianola Avenue, Suite 200
Phoenix, Arizona 85012

Re: RWCD Reach 4: Preliminary Plan Review Comments

Dear Mr. Bathurst:

We have completed our review of the referenced project and have the following concerns. Please review with the attached red lined plans.

Sheet #2: Delete the spoil sites between Pecos Road and Germann Road. Add the spoil sites outlined in red on the attached plans.

Sheet #3: A. The portion between Station 485+13 to Station 495+00 does not agree with Detail Sheet 21.

B. Change in top of berm from Station 489+30.57 to Station 491+50.6, does not agree with Sheet 21.

C. Our operation and maintenance road on the canal side from Station 494+15 to Station 537+00 is approximately 10' below the canal operation and maintenance road. I see this as an erosion problem and suggest that the elevation of our operation and maintenance road be raised to match that of the canal operation and maintenance road.

D. The collector ditch between our operation and maintenance road and Williams Field Air Force Base should be extended north to collect the water that will pond between Station 491+50 to Station 495+35, fill and grade that same area to drain.

Sheet #5: A. Need operation and maintenance road down ramps just north of Williams Field Road bridge.

B. Fill and grade to drain the area between the floodway and Williams Field Air Force Base north of Williams Field Road.

C. Show operation and maintenance road access ramps to Williams Field Road on the west side of the floodway.

D. Show retaining wall in profile.

E. What is to happen to the 18" pipe south of Williams Field Road, on the east side of the floodway?

F. Mark power pole at Station 534+18 to be relocated by others.

Sheet #6: A. Coordinate with the County Highway Department on Power Road realignment.

B. Operation and maintenance road on the east side of the floodway is to be 14' wide between Station 543+45 and Station 551+50.

C. Need operation and maintenance road down-ramp on the west side of the floodway at Station 561+00.

Sheet #26: A. Need more details about the operation and maintenance roads.

Additional comments are to be found marked in red on the plans. If you have any questions, please call R. W. Shobe of my staff.

Sincerely,

for Stanley L. Smith
D. E. Sagramoso, P.E.

United States
Department of
Agriculture

Soil
Conservation
Service

201 E. Indianola
Suite 200
Phoenix, Arizona 85012

Subject: ENG-Review Comments RWCD Reach-4, Williams-Chandler WPP, Arizona

Date: October 17, 1985

To: Jack Stevenson, Head Engineering Staff WNTC, Portland

File Code: 210

We are returning one set of bluelines and construction details of the specifications of the review comments made to date for your information and use.

If you have any questions call Bill Payne.

Ralph M. Arrington
State Conservation Engineer

Voting

cc: Wayne Kilgore
Joe Knisley

Bill:
Here is my review of Roads 4.

Comment – 21-6
23-8
23-9
24-5
Specs 31-20 – Size 57 is the more common – need to check Supplier
31-21
31-22
61-6
62-7
Sheet 3 – Asphalt & ect.
4
5
~~5 – A gasline crosses the road~~
12 way
Drainage 16
18
19
20
22
23
25
26
29
30
31
32

John L.

United States
Department of
Agriculture

Soil
Conservation
Service

Chandler Project Office
23428 S. Gilbert Road
Chandler, Arizona 85224

Subject: RWCD Reach 4
Plan Review

Date: July 11, 1985

To: Bill Payne
State Design Engineer

File Code:

I have reviewed the plans and have the following comments:

Sheet 1: - Structural Notes, Item 2, AGAINST is misspelled.
- Might want to add a "Blue Stake" emblem.

Sheet 2: - Grading details are not shown for spoil fields.

Sheet 3: - Plan: - Riprap shown on left bank and upstream of Sta. 485 + 88.08 is not shown on Detail sheet 21.
- PT curve A Sta. 1 + 83.00 is shown as Sta. 1 + 81.16 on sheet 21.
Profile: - Temporary Inlet detail is on sheet 21, not 26.

Sheet 5: - Plan: - Delta for curve #5 should be 51°09' 19" to match centerline bearings, not 51°09' 18".

Sheet 6: - Plan: - Delta for curve #5 is 51°09' 19".
Profile: - Elevation 1320.51 for side inlet #4 computes to be El. 1320.28 from data on sheet 32.
- Sta. 551 + 00 does not seem to designate anything significant.

Sheet 7: - Profile: - Show left O & M road grade to be S = 0.00 from inlet #5 to inlet #7.

Sheet 9: - Plan: - At Sta. 608 + 36.29, Angle Point, add the actual deflection of 0° 01' 43" left.
Profile: - Channel invert @ 625 + 00 should be 1309.05

Sheet 12: -Plan & Profile: Sta. 679 + 50 should refer to detail sheet 33, not sheet 32.

Sheet 14: -Plan: - P.C. Sta. appears to be labeled 921 + 58.44, should be 721 + 58.44

Sheet 18: See comments for specifications, Structural Backfill.

Sheet 21: - Loose rock riprap referenced at Sta. P.C. 458 + 88.08 should read "Begin" not "End". Plan and profile on sheet #3 also shows riprap on the temporary dike slope.
- The 2:1 side slope on the temporary inlet right bank must warp into a 3:1 at station 485 + 88.08.
- The transition from 3+49 to 3+14 on Powerline Floodway should show side slopes varying from 2:1 to 3:1.
- The P.T. Curve A at Sta. 1+81.16 is called out as Sta. 1 + 83.00 on sheet 3.

Sheet 22: - Dowel Detail: Are the dowels smooth?
- Section F: Waterstops specified are B, D, or E.

Sheet 24: - Plan: - The slope varies from station 555+00 to 555+20.
Profile - Is expansion joint required between concrete and grout @ 551+50?

Sheet 25: - Section B: The distance from centerline to toe of slopes varies.

Sheet 26: - Elev. for Inlet No. 8 computes to be 1318.24 from sheet 32, not 1318.27.
- Invert Elevation @ 600+00 computes to be 1309.67 from profile sheets, not 1309.09

Sheet 27: - Southern Pacific RR Bridge: There are four bents of abandoned H-Piles near the right bank of floodway from the old railroad bridge. Also, the new pile's have x-bracing to be added by others after excavation.
- Typical Slope Protection: The distance to centerline of floodway is 87' - 6" for station 555+20 to 560+10. Sta. 680+00 should read 681+00 according to plan & profile sheets.

Sheet 30: - Section A: Reads "Formed bottom surface of Slab" Is it formed against the earth? If not, how backfilled?

Sheet 32: - The 87.5 ft. dimension shown in the plan view is 75 ft. for inlets #11, #12, and #13.
- Inlet #10 is located at about Station 625+25 on plan and profile sheet, not 626+75.

Sheet 33: - Plan: The 46.84 ft. dimension computes to be 45.23 ft. using the 15° angle shown on O & M road. If so, the 53.84 ft. dimension should be 52.23 ft.
Schedule: For entrance station 593+00, the corresponding Exit station should be 593+57.94 and the length should be 57.94 ft.

Specifications

Clearing & Grubbing: No information given for spoil field grading or fill heights etc.

Structure Excavation: Spelling of "neat" lines in part (4).

Structure Backfill: - All of the backfill around the three items (a), (b), and (c) will be accomplished in the same manner up to the neat lines shown for excavation for the structures, therefore, I recommend the limits not be only within 2 feet laterally of the structures.
- Item (7), there are no significant embedded items in (a), (b), and (c).

Concrete Channel Lining: - In part (9), power?

Concrete Piles: - Part (3), will size No. 57 (1" minus) also work?

Cement: - Part (1) do we pay for cement outside the neat line volume for piles?

Loose Rock Riprap: - Part (4), the #10 sieve should be a #100 sieve.

John M. Harrington
Project Engineer

Tom Jayo
3/22/85

RWCD FLOODWAY - REACH 4

Comment on RWCD - R4

(These comments may not be valid now but I just got them in.)

1. slope ~~tha~~ maintenance roads away from lining -

2. Side inlets upstream of 560+00 - need some protection for underside of concrete lining at inlet. Piping could be problem. Need cutoff wall.

3. Consider deeper cutoff at upstream side of inlets downstream of STA 560+00 -

4. Velocity is quite high for side inlet No 9 - may want to consider widening "B". May infringe on Free board. 100 year storm -

5. Plans - side inlet No 2 not listed on plan remaining side inlets need to be numbered & stationed on plans

6. No channel grade shown on plan

7. No bearing shown between STA 726+06.99 and STA 745+28.37

8. Last curve PT STA 726+06.99 - curve data supports a Δ of one second larger.

9. bearing & channel below STA 495+35 does not agree sheet 2 and 15.

10. No bearing shown on Power line Floodway

11. Other corrections shown in red on plans -

Arizona

Tom Jayo 3-22-85

check on Curves -

RWCD RY Review

1

Curve No 1

Δ = 49 17 48 ✓
R = 653.00 ✓
~~A =~~
T = 300.00 ✓
L = 562.52 ✓

PC - 485+83.08 ✓
PT 491+50.60 ✓

S 19 32 33 E ✓ going in
S 29 45 15 W ✓ coming out

Curve No 2

Δ = 6-57-25 ✓
T = 299.06 ✓
R = ~~4930~~ ~~4119.98~~
L = 600.26 ✓ ~~599.34~~

PC = 521+93.42 ✓
PT = 527+93.68 back ✓
= 527+91.29 Ahead

does NOT agree with SHT 15

S 15-45-50 W ✓
S 22 43 16 W ✓

Curve No 3

Δ = 23-30-36 ✓
R = 961.12 ✓
T = 200 ✓
C = 391.61 ✓
A = 394.37 = L ✓

PC - 536+39.88 ✓
PT - 540+34.25 ✓

S 22 43 16 W going into Curve
S 0 47 20 E coming out of Curve

Curve No 4

Δ - 51 09 18
R = 480.53 ✓
A = 429.03 = L ✓
T = 230.00 ✓
C = 414.98

PC - 543+45.88 ✓
PT - 547+74.91 ✓

S 0-47-20 E going in
S 50 21 59 W coming out

Curve No 5

Δ = 30-37-43 ✓
R = 730.36 ✓
A = 380.43 = L ✓
T = 200.00 ✓
C = 385.80 ✓

PC - 555+18.34
PT - 559+88.77

S 50 21 59 W going in
S 19 44 16 W coming out

Arizona
Tom Joyo 3-22-85
CK on Curves

RWCD R4

Curve No 6
Δ = 22-06 14
R = 1077.56
A = 415.71 = L
T = 210.47
C = 413.18

PC = 584+71.00
PT = 588+86.71

S 19 44 16 W going in
S 41 50 30 W coming out

Curve NO 7
Δ = 13 28 49
R = 1555.02
A = 365.86 = L
T = 183.78
C = 365.02

PC - 636+64.70
PT = 640+30.56

S 41 48 47 W going in
S 28 19 57 W coming out

Curve No 8
Δ = 33-55-26
R = 921.88
A = 545.66 = L
T = 281.09
C = 537.73

PC - 666+30.59
PT - 671+76.25

S 28 19 57 W going in
S 62 15 23 W coming out

Curve No 9
Δ = 36-27-36
R = 505.00
A = 321.36 = L
T = 166.33
C = 315.96

PC - 681+44.42
PT - 684+65.78

S 62 15 23 W coming in
S 25 47 47 W going out

Curve No 10
Δ = 22-13-57
R = 1472.58
A = 571.40 = L
T = 289.34
C = 567.83

PC - 699+30.01
PT - 705+01.41

S 25-47-47 W coming in
S 48-01 44 W going out

Ck on Curves

Curve No 11
Δ = 17-45-17
R = 1447.49
A = 448.55 = L
T = 226.09
C = 446.76

PC - 721+58.44
PT - 726+06.99
?

S 48 01 44 W coming in
No bearing coming out

Curve No 1A
Δ = 14°00-00
R = 488.66
T = 60.00
L = 117.4

PC - 494+15.60
PT - 495+35.0

S 29 45-15 W going in
S 15 45 +15 W coming out
does not agree with sht 2
sht 2 shows 51'

Dave

10/7/85

Telephone call from Bill Payne

RWCD - R4

Bridge dwgs (Powers Rd.)

- Highway Dept. is anticipating construction of Bridge early 86 - Final Dwgs by Mid. Nov.
- They will construct concrete lining under bridge (see dwgs for beg. & end stations) to floodway elevations.

  This will require us to determine final hydraulic design as soon as possible "At least by first wk in Nov."

- Dwgs show round piers - They will modify if not satisfactory
- Elev. on dwgs (bridge) maybe wrong A-E is checking and will correct to match RWCD survey.
- A CMP culvert under paved access road will be installed under bridge contract -

  We will need to check drainage and need for other ~~cull~~ culverts. also Bill questioned the cover over CMP - loading - heavy equip. travel during R4 construction.

- If questions on drainage call Bill.

We will need to include an item in Specs for removal of sed. under bridge and cleaning since bridge may be subject to flow prior to Reach 4 const.

Bill will try to get a set of red lined dwgs and Specs. to us by next cut with comments.

I advised him to get any comments on batte drop as soon as possible. He will most likely send copy of draft comments. ~~and with notes~~
I also asked him to comment on the FCD comments.

LMS

Tolman:

10/15/85
PM

280

8.07 ft

1310.86
.07
1310.79

Bill Payne

435+75 STRUCTURE & REMOVAL [illegible]
[illegible] CONCRETE

[illegible] AVG.

[illegible] ENGR. DRWGS [illegible] WHERE IN MOV AS [illegible]

[illegible] EXCAV. SOIL REMOVAL →

PAIL [illegible] → CO. ENGR. → [illegible] → [illegible]

10 OCT

DEPT HEALTH SOIL, APC'L F
[illegible]

Plans & Specs

NPDS

27 SEPT

SHORE →

COMMENTS

will send

U.S. DEPARTMENT OF AGRICULTURE

REFERENCE SLIP

DATE 10/23/85

TO

Lee Sachs
Design
WNTC

- [ ] ACTION
- [ ] NOTE AND RETURN
- [ ] APPROVAL
- [x] PER PHONE CALL
- [x] AS REQUESTED
- [ ] RECOMMENDATION
- [ ] FOR COMMENT
- [ ] REPLY FOR SIGNATURE OF
- [x] FOR INFORMATION
- [ ] RETURNED
- [ ] INITIALS
- [ ] SEE ME
- [ ] NOTE AND FILE
- [ ] YOUR SIGNATURE

REMARKS Ilde's comments on Low drop loading. Any questions give me a call.

FROM

WILLIAM E. PAYNE, JR.
Civil Engineer

GPO 048—16—83471-1 FORM AD-514 (8-64)

W Walker

201 E. Indianola, Suite 200 YMt 10/28/85
Phoenix, Arizona 85012

port RWCD Reach-4 Date: October 23, 1985

g Staff, WNTC File Code: 210

s from Ilde Chavez on the low drop in RWCD

ve us a call.

United States
Department of
Agriculture

Soil
Conservation
Service

201 E. Indianola, Suite 200
Phoenix, Arizona 85012

w Wallin
LMt 10/28/85

Subject: ENG-Comments on Final Design Report RWCD Reach-4
Williams-Chandler WPP

Date: October 23, 1985

To: Jack Stevenson, Head Engineering Staff, WNTC

File Code: 210

Enclosed are additional comments from Ilde Chavez on the low drop in RWCD Reach-4.

If you have questions please give us a call.

Acting

Ralph M. Arrington
State Conservation Engineer

Enclosures

cc: Joe Knisley
Wayne Kilgore
Steve Revie

Ilde Chavez Arizona

$\Sigma M_o = 0 \circlearrowleft$ $\Rightarrow$ Ref. to pg.1

$339.5^k(10.67) + 116.6^k(3.9) - P_2(10) = 0$

$P_2 = 407.7$ Kips

$\Sigma F_y = 0 \uparrow$

$P_1 + P_2 - W = 0$

$P_1 = 116.6 - 407.7 = -291.1^k$

P_1 piles have to develop frictional strength equal to $\frac{291.1}{4} = \underline{\underline{72.8^k}}$

P_2 piles have to develop bearing strength equal to $\frac{407.7}{4} = \underline{\underline{102^k}}$

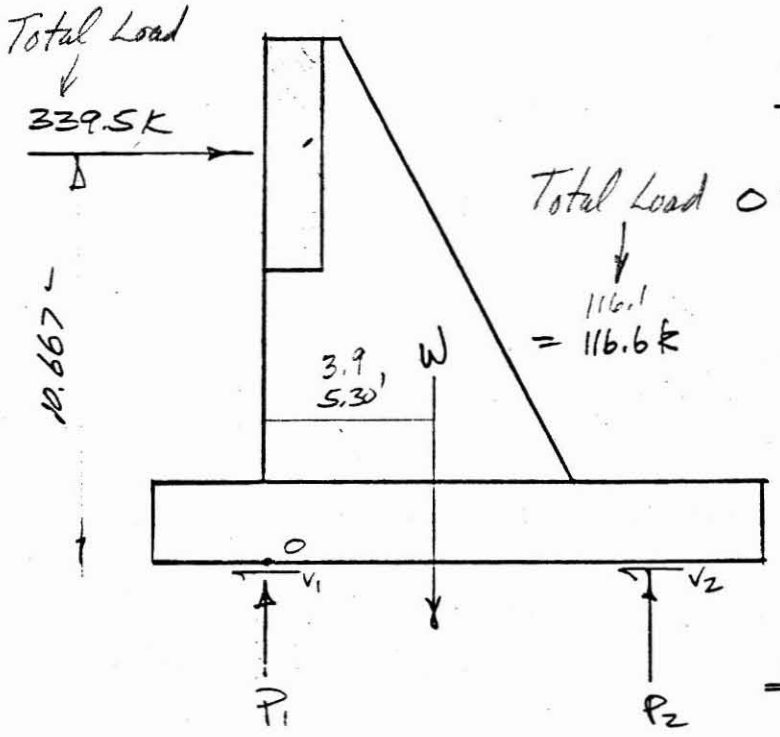
BAFFLE

USE $\gamma_b = 87$ pcf

* ALL VALUES ULTIMATE INCLUDE LF = 1.8

DESCRIPTION			WT (K)	ARM*	M (K-P)*
(A) BAFFLE	$(35-3)(1.5)(6) = 288$		25.06	0.75	18.8 ✓
(B) BUTT	$5.5(2)(1.5)^2$ ✓	= 24.75	2.15	0.75	1.61 ✓
(C) BUTT	$2(11.5)1.5(0.5)$ ✓	= ~~23~~ 17.25	1.5 2.00	1.75	2.63 3.50
(D) BUTT	$2(11.5)(6)(1.5)(0.5)$ ✓	= 103.5	9.00	5.4	36.02 45.02
(E) BASE	$16(26)\left(\frac{26}{12}\right)$	= 901	78.42	7.5	392.08 548.91
			116.13 116.63		451.14 617.84

$\bar{X} = \cancel{5.30}$ 3.9



Total Load = 116.6 K (116.1)

$\underline{P_2}$ $\Sigma M_o = 0 =$

$0 = 339.5(10.67) + 116.6(\cancel{5.3}\ 3.9) - P_2(10)$

$P_2 = \frac{1}{10}(3621 + 618) = \underline{424k}$ (405.8)

PER PILE $P_2 = 424/4 = \underline{106k}$ (101.5)

$\underline{P_1}$ $\Sigma F_v = 0$

$= P_1 + P_2 - W$

PER PILE $P_1 = 116.6 - 106 = \underline{\cancel{10.6k}}$ 14.6k

$\underline{V_1 \& V_2}$ $\Sigma F_H = 0$

$V_1 = V_2$

$V_1 + V_2 = 339.5k$

$V_2 = V_1 = 169.75$ ✓

$V_{pile} = 169.75/4 = \underline{42.4k}$

PILE CAPACITY

VERTICAL

• MACD
• HIGLEY RD. BR
SH 7
SH 6 DRWGS
"

• COMPARISON W/ HIGLEY RD. BRIDGE DRWGS

- PILES L = 22' · 24¢ · ABUT #1
- MATERIAL BORING B-1 = SPSC
- $\bar{N} \approx 43$ BLOWS/FT
- ABUT #1 DES LOAD = 58 TONS = $\boxed{116 \text{ KIPS}}$
- PILE TOP EL 1306 [≅ 1302.5 RCH 4]
  BTT EL 1284 [≈ 1286.5 RCH 4]
- REACH 4 P_{MAX} WORKING = 106/1.8 = $\boxed{59 \text{ KIPS}}$

"DRILLED PIER FOUND." WOODWARD, BLAK. 1972

- SKIN FRICTION:

$$P = \frac{a s f_s}{F_s} = \frac{20\pi 2(0.86)}{1.8} \text{ ksf}$$

$= 60$ TONS SKIN FRICTION ONLY
units ?

$f_s = 0.01N < 0.5$ tsf
$= 0.01(43) = 0.43$ tsf
$= 0.86$ ksf

- BEARING: ~~PROVIDES~~ ADD'L ES
  Is $P_s < 73^K$?

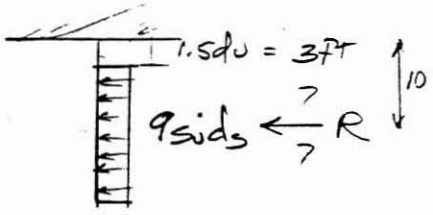
LATERAL

ABOVE P EFF

CHECK ULTIMATE LAT. RES:

- PILE IS FIXED-HEAD, SHORT

COHESIONLESS:



FIND s_u FOR

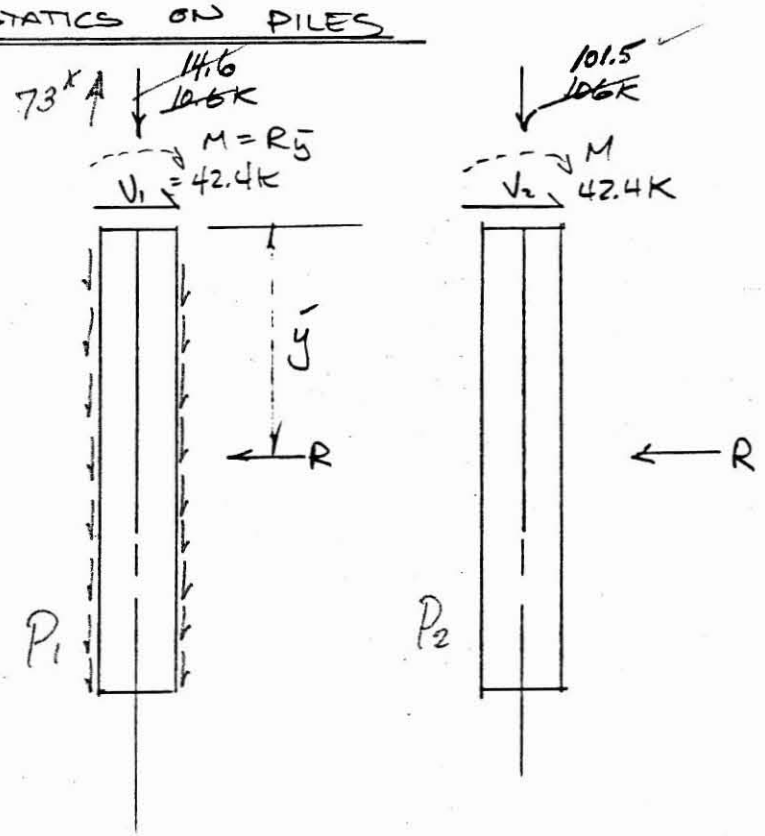
$R_{ULT} = 42.5K = q_{s_u}(2)(14)$

$s_u = \frac{42.5}{9(2)(14)}$

$= .169$ KSF

$q_{u_{req}} = 337$ PSF OK

STATICS ON PILES



R = RESULTANT OF LATERAL RESISTANCE

ASSUME $\bar{Y} = 10'$

$M_{\bar{y}} = 420$ FT-K

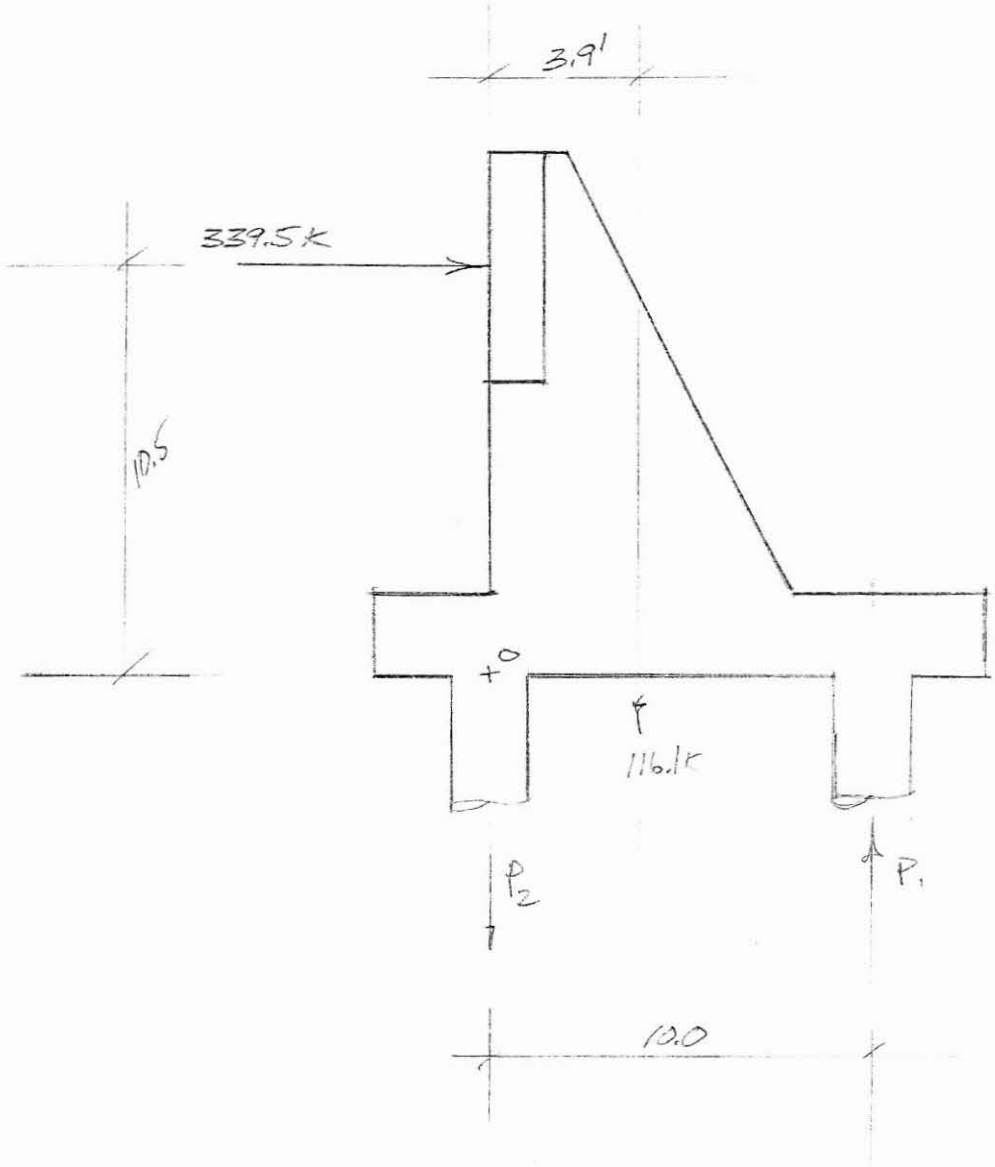
- CHECK THIS ASSUMPTION

ARIZONA RWCD FLOODWAY - PEARCE

D.T. 2/26/86

CHECK O.T. STABILITY 3rd LOAD CASE

LOADS (FROM PREVIOUS COMPS.)



$\Sigma M_O = 339.5(10.5) + 116.1(3.9) - 10P_1$

$P_1 = 401.75\ K$ $\approx 100K$/PILE UP COMP.

$P_2 = 401.75 - 116.1 = 285.65$

P_2/pile $= 285.65/4 = 71.4\ K$ down. TENS.

ABERDEEN

DT 2/27/86

ROUCC R2

2 5

NET FORCE ON PILE:

Buoyant Pile Wt = $(\pi 2^2 20)(85) = 5341$ #

5.34 K

Net downward force required ~~on~~ Pier upstream piles =

$71.4 - 5.34 = 66$ K

Ultimate soil tensile load:

cohesive soil:

$T_p = \pi d_b \Sigma \alpha s_u L$

$= \pi(2)(0.4)(4)(20)$

$= 201$ kips

from Bowles "Found Anal. & Des" Tbl 10.1: for N = 32, $q_u = 8$ ksf, $s_u = q_u/2 = 4$ ksf

For $s_u = 4$, $\alpha = 0.4$

cohesionless soil:

$T_p = \pi d_b \Sigma K_s \sigma'_v \tan\delta_f \Delta L$ (3-65)

substitute $K_s = 0.01 N < 0.5$ tsf (3-7)

using N = 43 bpf for Higley Rd Bridge

$\delta_s = 0.01(43) = 0.43$ tsf $= 0.86$ ksf

→ $T_p = \pi(2)\, 0.86\, 20 = 108$ kips

[check for cohesionless soil Bowles Tbl 3-2 p.100

For N = 40 $\phi \approx 40$ $\delta \approx 40$

$T_p = \pi 2 (1 - \sin(40))(10(135-62))\, 20$

$= 32.7$ kips LOWEST BOUND]

check w/ K_a:

$T_p = \pi 2 (0.6)(10(135-62))(20) = 55.0$ K

→ Common practice is to use the value based on the empirical correlation to blow count (p 47, DPF) (108 K/FT)

"Drilled Pier Foundations," Woodward, Gardner, Greer

ARIZONA RIVER FLOODWAY REACH 4

DAVIS TRACKER 2/28/86

3 5

NO SAMPLING OR TESTING HAS BEEN DONE AT THIS SITE. ADDITIONAL TESTING HAS BEEN RECOMMENDED TO CONFIRM THE DESIGN ASSUMPTION THAT Pt VALUES AND STRENGTH PARAMETERS WILL BE ESSENTIALLY AS FOUND FOR THE BRIDGE PIERS AT HIGLEY ROAD.

THE DESIGN ASSUMPTION IS THEN THAT THE ULTIMATE TENSILE LOAD PER PILE IS FROM APPROXIMATELY 110 TO 200K. THIS COULD BE VERIFIED ADEQUATELY BY SPT OR CONE PENETROMETER TEST RESULTS PRIOR TO CONSTRUCTION.

THE FACTOR OF SAFETY THEN WOULD RANGE FROM: 110/66 = 1.67 TO 200/66 = 3.03.

RECHECK COMPRESSIVE LOAD:

The original analysis neglected point bearing capacity and use conservative S.F.!
The revised computations show max. compressive load to be 100K.

Check allowable compressive load:

$$P = \frac{P_b}{F_b} + \frac{P_s}{F_s} = \frac{a_b P_b}{F_b} + \frac{a_s P_s}{F_s}$$

Cohesive: $P_s = \Sigma \pi d_s \Delta L_s K S_u$

FOR $\bar{N} = 43$ blows/ft (Higley Rd Bt)

Bowles Tbl 101: $N = 32$ $q_u = 8$ ksf

$S_u = q_u/2 = 4$ ksf

Use $K = 0.5$ from Table 3-1

$$P_s = \pi(2)(20)(0.5)\,4 = 251 \text{ kips}$$

Cohesionless:

$$P_s = \Sigma \pi d_s \Delta L K_s \sigma_v' \tan\delta$$

From curves for tensile load $P_s = 108$ kips

Conclusion:

The factor of safety for compressive load will range from:

$$\frac{18}{100}^{*} = \underline{1.08} \text{ to } \frac{251}{100} = \underline{2.51}$$

For the soil parameters assumed in design.

Pond bearing capacity will provide an additional factor of safety.

Considering the conservatism incorporated in the design loadings the resulting factors of safety seem reasonable.

Verification of predicted pile capacity should be made by conducting SPT or cone penetrometer test data.

* the

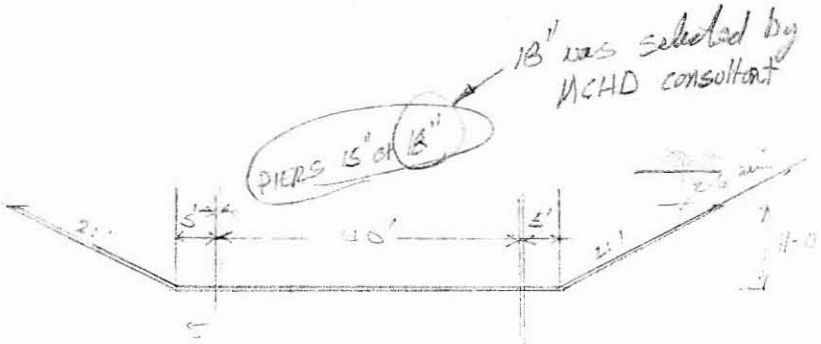
ARIZONA D.T. 10/30/86 RWCD RW 4 LMS REVISION 1/86

BRIDGE PIER MOMENTUM ANALYSIS

PROBLEM: CHECK HYDRAULICS THROUGH BRIDGE PIER.

ANALYSIS:

1. TENTATIVE CONFIGURATION PER HENRY HAALS ASSOC. DEC. & PHONE CONVERSATIONS.



℄ BR = ℄ FLW 4 STA 551 + 91.14, SKEW ∠ = 81°23'46"

55'±
45' U.S.
PIER L = 97'

2. Q = 6500 cfs.

* DOWNSTREAM FLOW COND. WILL BE DEPENDENT ON THE TRANSITION LAYOUT.

3. DEVELOP BRIDGE PIER MOM. ANALYSIS PER FAR WEST STATES

ARIZONA RWCD R4

D.T 10/30/85 LMS 1/86

BRIDGE PIER MOMENTUM

PROBLEM: DEVELOP PROGRAM TO DETERMINE MOMENTUM CURVES FOR TRAP CH. W/ OBSTR.

ANALYSIS: 1. DEVELOP PROG TO PRINT DATA
2. LATER DEVELOP PLOT

3. BASIC EQUATIONS:

MOMENTUM:

$$I = M_1 - M_0 + \frac{Q^2(A_1 - A_0)}{g A_1^2}$$

$$II = M_1 - M_0 + \frac{Q^2}{g(A_1 - A_0)}$$

$$III = M_1 - M_0 + \frac{Q^2}{g A_3} = M_1 - M_0 + \frac{Q^2}{g A_1}$$

where $A_1 = A_3$

$$M_1 = \bar{y} A$$

$$A = bd + zd^2$$

$$\bar{y} = \frac{d(T + 2b)}{3(T + b)}$$

$$T = b + 2zd$$

$$A_0 = xd$$

$$M_0 = A_0 d/2$$

$$K_1 = \frac{Q^2}{g A_1}$$

$$K_2 = \frac{Q^2}{g(A_1 - A_0)}$$

$$\text{LOSS} = \frac{Q^2}{g A_1}(A_0/A_1)$$

ARIZ BRIDGE PIER MOM. ANALYSIS

DT 10/85

SYMPHONY BRIDGE PIER MOM. ANAL.

FRA WEST DES. STDS. APPROACH

UPSTREAM

I) STAT. MOM. − OBST. MOM + KIN. MOM ① − LOSS

= II) STAT. MOM. − OBST. MOM. + KIN. MOM. ②

= III STAT. MOM − OBST MOM + KIN MOM ③

STAT MOM = $\bar{y}A$

OBST MOM = $X d^2/2$

$X = \Sigma$ OBST MOM

KIN MOM ① = Q^2/gA_1 = K1

KIN MOM ② = $Q^2/g(A_1 - A_0)$ = K2

KIN MOM ③ = Q^2/gA_1 = K1

LOSS = $Q^2/gA_1 (A_0/A_1)$ = $K1(A_0/A_1)$

ALL

OT

10/85

SYMPHONY SPREADSHEET FOR BPM

BRIDGE PIER MOMENTUM

SYMPHONY

	A	B	C	D	H	I	J	K	L	M	N	O	P
1	BRIDGE	PIER	MOM.	ANAL									
2	(range: Q)	(range: B)	(range: Z	(range: X)									
3	Q	B	Z	TOT OBST									
4													
5	DEPTH	UPSTR.	UNDER	DOWN.	T_1	Y	A_1	M_1	A_0	M_0	K_1	K_2	LOSS
FORMULAS 7		$(K10 - M10 + H10 - P10)$ / $H_7 - J_7 + K7 - M_7$	$K10 - M10 + O10$ / $H_7 - J_7 + L7$	$K10 + M10 + N10$ / $H_7 + J_7 + K7$	$+B + Z * Z * AD$	$+ AD * (HD + Z * L) / (Z * (HD + L))$	$+ AD * (L + AD * B)$	$+ AD * AD$	$+ X * AD$	$+ AD * HD / 2$	$+ G * Q / (32.16 * (GD * AD))$	$+ Q * Q / (32.16 * (GD - AD))$	$+ MD * GD / GM$

RWCD FLOODWAY RCH 4 — DT 11/85

15 BRIDGE PIER MOMENTUM ANALYSIS - FAR WEST STATES DESIGN STANDARD PROC.

Q	B	Z	TOTAL OBSTRUCTION WIDTH
6500	50	2	1.67

DEPTH	=========MOMENTUM==========		
	UP	MID	DOWN
11.00	5,432	5,509	5,470
10.50	5,157	5,241	5,198
10.00	4,915	5,006	4,960
9.50	4,708	4,806	4,757
9.00	4,537	4,644	4,590
8.50	4,405	4,521	4,462
8.00	4,313	4,441	4,376
7.50	4,266	4,406	4,335
7.00	4,269	4,424	4,345
6.50	4,327	4,500	4,412
6.00	4,450	4,643	4,546
5.50	4,650	4,868	4,758
5.00	4,945	5,192	5,067
4.50	5,358	5,642	5,498
4.00	5,929	6,260	6,092
3.50	6,717	7,109	6,910

T	Y	A1	M1	A0	M0	K1	K2	LOSS
94.00	4.94	792.00	3912.33	18.37	101.04	1658.77	1698.16	38.47
92.00	4.73	745.50	3528.00	17.54	92.06	1762.23	1804.68	41.45
90.00	4.52	700.00	3166.67	16.70	83.50	1876.78	1922.55	44.77
88.00	4.31	655.50	2827.83	15.87	75.36	2004.19	2053.90	48.51
86.00	4.10	612.00	2511.00	15.03	67.64	2146.64	2200.69	52.72
84.00	3.89	569.50	2215.67	14.20	60.33	2306.84	2365.81	57.50
82.00	3.68	528.00	1941.33	13.36	53.44	2488.15	2552.74	62.96
80.00	3.46	487.50	1687.50	12.53	46.97	2694.86	2765.92	69.24
78.00	3.24	448.00	1453.67	11.69	40.92	2932.46	3011.03	76.52
76.00	3.03	409.50	1239.33	10.86	35.28	3208.17	3295.52	85.04
74.00	2.81	372.00	1044.00	10.02	30.06	3531.57	3629.33	95.12
72.00	2.58	335.50	867.17	9.19	25.26	3915.78	4026.00	107.20
70.00	2.36	300.00	708.33	8.35	20.88	4379.15	4504.52	121.89
68.00	2.14	265.50	567.00	7.52	16.91	4948.19	5092.33	140.06
66.00	1.91	232.00	442.67	6.68	13.36	5662.69	5830.57	163.05
64.00	1.68	199.50	334.83	5.85	10.23	6585.18	6783.94	192.93

RDCD FLOODWAY RCH 4 11/85

15 BRIDGE PIER MOMENTUM ANALYSIS - FAR WEST STATES DESIGN STANDARD PROC.

Q	B	Z	TOTAL OBSTRUCTION WIDTH
6500	50	2	2

DEPTH	=========MOMENTUM========== UP	MID	DOWN	T	Y	A1	M1	A0	M0	K1	K2	LOSS
11.00	5,404	5,497	5,450	94.00	4.94	792.00	3912.33	22.00	121.00	1658.77	1706.16	46.08
10.50	5,130	5,231	5,180	92.00	4.73	745.50	3528.00	21.00	110.25	1762.23	1813.31	49.64
10.00	4,890	4,999	4,943	90.00	4.52	700.00	3166.67	20.00	100.00	1876.78	1931.98	53.62
9.50	4,684	4,802	4,742	88.00	4.31	655.50	2827.83	19.00	90.25	2004.19	2064.01	58.09
9.00	4,514	4,642	4,577	86.00	4.10	612.00	2511.00	18.00	81.00	2146.64	2211.69	63.14
8.50	4,381	4,521	4,450	84.00	3.89	569.50	2215.67	17.00	72.25	2306.84	2377.82	68.86
8.00	4,290	4,443	4,365	82.00	3.68	528.00	1941.33	16.00	64.00	2488.15	2565.91	75.40
7.50	4,243	4,412	4,326	80.00	3.46	487.50	1687.50	15.00	56.25	2694.86	2780.41	82.92
7.00	4,245	4,432	4,337	78.00	3.24	448.00	1453.67	14.00	49.00	2932.46	3027.06	91.64
6.50	4,303	4,510	4,405	76.00	3.03	409.50	1239.33	13.00	42.25	3208.17	3313.35	101.85
6.00	4,426	4,657	4,540	74.00	2.81	372.00	1044.00	12.00	36.00	3531.57	3649.29	113.92
5.50	4,624	4,885	4,753	72.00	2.58	335.50	867.17	11.00	30.25	3915.78	4048.52	128.39
5.00	4,917	5,213	5,062	70.00	2.36	300.00	708.33	10.00	25.00	4379.15	4530.15	145.97
4.50	5,327	5,669	5,495	68.00	2.14	265.50	567.00	9.00	20.25	4948.19	5121.81	167.74
4.00	5,894	6,292	6,089	66.00	1.91	232.00	442.67	8.00	16.00	5662.69	5864.93	195.27
3.50	6,677	7,147	6,908	64.00	1.68	199.50	334.83	7.00	12.25	6585.18	6824.64	231.06

RWCD FLOODWAY RCH 4 11/85

15 BRIDGE PIER MOMENTUM ANALYSIS - FAR WEST STATES DESIGN STANDARD PROC.

Q	B	Z	TOTAL OBSTRUCTION WIDTH
6500	50	2	2.5

DEPTH	=========MOMENTUM========== UP	MID	DOWN	T	Y	A1	M1	A0	M0	K1	K2	LOSS
11	5362.3	5479.5	5419.9	94.00	4.94	792.00	3912.33	27.50	151.25	1658.77	1718.44	57.60
10.5	5090.4	5216.7	5152.4	92.00	4.73	745.50	3528.00	26.25	137.81	1762.23	1826.55	62.05
10	4851.4	4988.0	4918.4	90.00	4.52	700.00	3166.67	25.00	125.00	1876.78	1946.29	67.03
9.5	4646.6	4794.6	4719.2	88.00	4.31	655.50	2827.83	23.75	112.81	2004.19	2079.53	72.62
9	4477.5	4638.3	4556.4	86.00	4.10	612.00	2511.00	22.50	101.25	2146.64	2228.57	78.92
8.5	4346.1	4521.6	4432.2	84.00	3.89	569.50	2215.67	21.25	90.31	2306.84	2396.25	86.08
8	4255.2	4447.4	4349.5	82.00	3.68	528.00	1941.33	20.00	80.00	2488.15	2586.11	94.25
7.5	4208.4	4419.8	4312.0	80.00	3.46	487.50	1687.50	18.75	70.31	2694.86	2802.65	103.65
7	4210.3	4444.1	4324.9	78.00	3.24	448.00	1453.67	17.50	61.25	2932.46	3051.67	114.55
6.5	4267.4	4527.3	4394.7	76.00	3.03	409.50	1239.33	16.25	52.81	3208.17	3340.73	127.31
6	4388.2	4679.0	4530.6	74.00	2.81	372.00	1044.00	15.00	45.00	3531.57	3679.95	142.40
5.5	4584.7	4912.5	4745.1	72.00	2.58	335.50	867.17	13.75	37.81	3915.78	4083.12	160.48
5	4873.8	5246.6	5056.2	70.00	2.36	300.00	708.33	12.50	31.25	4379.15	4569.54	182.46
4.5	5280.2	5708.8	5489.9	68.00	2.14	265.50	567.00	11.25	25.31	4948.19	5167.13	209.67
4	5841.3	6340.4	6085.4	66.00	1.91	232.00	442.67	10.00	20.00	5662.69	5917.76	244.08
3.5	6615.9	7206.8	6904.7	64.00	1.68	199.50	334.83	8.75	15.31	6585.18	6887.25	288.82

RWCD FLOODWAY REACH 4 11/85 D1

15 BRIDGE PIER MOMENTUM ANALYSIS - FAR WEST STATES DESIGN STANDARD PROC.

Q	B	Z	TOTAL OBSTRUCTION WIDTH
6500	50	2	3

DEPTH	=========MOMENTUM========== UP	MID	DOWN	T	Y	A1	M1	A0	M0	K1	K2	LOSS
11	5320.5	5461.7	5389.6	94.00	4.94	792.00	3912.33	33.00	181.50	1658.77	1730.89	69.12
10.5	5050.4	5202.6	5124.9	92.00	4.73	745.50	3528.00	31.50	165.38	1762.23	1839.98	74.46
10	4813.0	4977.5	4893.4	90.00	4.52	700.00	3166.67	30.00	150.00	1876.78	1960.81	80.43
9.5	4609.5	4787.7	4696.6	88.00	4.31	655.50	2827.83	28.50	135.38	2004.19	2095.29	87.14
9	4441.4	4635.2	4536.1	86.00	4.10	612.00	2511.00	27.00	121.50	2146.64	2245.72	94.70
8.5	4310.8	4522.3	4414.1	84.00	3.89	569.50	2215.67	25.50	108.38	2306.84	2414.97	103.29
8	4220.4	4452.0	4333.5	82.00	3.68	528.00	1941.33	24.00	96.00	2488.15	2606.63	113.10
7.5	4173.6	4428.4	4298.0	80.00	3.46	487.50	1687.50	22.50	84.38	2694.86	2825.26	124.38
7	4175.2	4456.8	4312.6	78.00	3.24	448.00	1453.67	21.00	73.50	2932.46	3076.68	137.46
6.5	4231.4	4544.5	4384.1	76.00	3.03	409.50	1239.33	19.50	63.38	3208.17	3366.57	152.77
6	4350.7	4701.1	4521.6	74.00	2.81	372.00	1044.00	18.00	54.00	3531.57	3711.14	170.88
5.5	4545.0	4940.1	4737.6	72.00	2.58	335.50	867.17	16.50	45.38	3915.78	4118.32	192.58
5	4831.0	5280.5	5050.0	70.00	2.36	300.00	708.33	15.00	37.50	4379.15	4609.63	218.96
4.5	5233.2	5749.9	5484.8	68.00	2.14	265.50	567.00	13.50	30.38	4948.19	5213.27	251.60
4	5788.5	6390.2	6081.4	66.00	1.91	232.00	442.67	12.00	24.00	5662.69	5971.56	292.90
3.5	6555.1	7267.5	6901.6	64.00	1.68	199.50	334.83	10.50	18.38	6585.18	6951.03	346.59

15BRIDGE PIER MOMENTUM ANALYSIS - FAR WEST STATES DESIGN STANDARD PROC.

RWCD FLOODWAY REACH4 DT 11/85

Q	B	Z	TOTAL OBSTRUCTION WIDTH
6500	50	2	3.5

DEPTH	=========MOMENTUM==========		
	UP	MID	DOWN
11	5278.7	5444.1	5359.4
10.5	5010.4	5188.7	5097.3
10	4774.6	4967.2	4868.4
9.5	4572.4	4781.2	4674.1
9	4405.4	4632.4	4515.9
8.5	4273.6	4523.2	4396.1
8	4185.5	4456.8	4317.5
7.5	4138.8	4437.3	4283.9
7	4140.0	4470.0	4300.4
6.5	4195.3	4562.3	4373.6
6	4313.2	4723.9	4512.6
5.5	4505.3	4968.4	4730.0
5	4788.3	5315.0	5043.7
4.5	5186.2	5791.8	5479.7
4	5735.6	6441.0	6077.4
3.5	6494.2	7329.4	6898.6

T	Y	A1	M1	A0	M0	K1	K2	LOSS
94.00	4.94	792.00	3912.33	38.50	211.75	1658.77	1743.52	80.63
92.00	4.73	745.50	3528.00	36.75	192.94	1762.23	1853.61	86.87
90.00	4.52	700.00	3166.67	35.00	175.00	1876.78	1975.55	93.84
88.00	4.31	655.50	2827.83	33.25	157.94	2004.19	2111.28	101.66
86.00	4.10	612.00	2511.00	31.50	141.75	2146.64	2263.12	110.49
84.00	3.89	569.50	2215.67	29.75	126.44	2306.84	2433.99	120.51
82.00	3.68	528.00	1941.33	28.00	112.00	2488.15	2627.49	131.95
80.00	3.46	487.50	1687.50	26.25	98.44	2694.86	2848.22	145.11
78.00	3.24	448.00	1453.67	24.50	85.75	2932.46	3102.11	160.37
76.00	3.03	409.50	1239.33	22.75	73.94	3208.17	3396.88	178.23
74.00	2.81	372.00	1044.00	21.00	63.00	3531.57	3742.86	199.36
72.00	2.58	335.50	867.17	19.25	52.94	3915.78	4154.13	224.68
70.00	2.36	300.00	708.33	17.50	43.75	4379.15	4650.42	255.45
68.00	2.14	265.50	567.00	15.75	35.44	4948.19	5260.24	293.54
66.00	1.91	232.00	442.67	14.00	28.00	5662.69	6026.35	341.71
64.00	1.68	199.50	334.83	12.25	21.44	6585.18	7015.99	404.35

15 BRIDGE PIER MOMENTUM ANALYSIS - FAR WEST STATES DESIGN STANDARD PROC.

RWCD FLOODWAY REACH 4 AT 11/85

Q	B	Z	TOTAL OBSTRUCTION WIDTH
6500	50	2	4

DEPTH	=========MOMENTUM========== UP	MID	DOWN	T	Y	A1	M1	A0	M0	K1	K2	LOSS
11	5236.9	5426.7	5329.1	94.00	4.94	792.00	3912.33	44.00	242.00	1658.77	1756.34	92.15
10.5	4970.5	5174.9	5069.7	92.00	4.73	745.50	3528.00	42.00	220.50	1762.23	1867.44	99.28
10	4736.2	4957.2	4843.4	90.00	4.52	700.00	3166.67	40.00	200.00	1876.78	1990.52	107.24
9.5	4535.3	4774.9	4651.5	88.00	4.31	655.50	2827.83	38.00	180.50	2004.19	2127.52	116.18
9	4369.4	4629.8	4495.6	86.00	4.10	612.00	2511.00	36.00	162.00	2146.64	2280.81	126.27
8.5	4240.3	4524.5	4378.0	84.00	3.89	569.50	2215.67	34.00	144.50	2306.84	2453.30	137.72
8	4150.7	4462.0	4301.5	82.00	3.68	528.00	1941.33	32.00	128.00	2488.15	2648.68	150.80
7.5	4104.0	4446.6	4269.9	80.00	3.46	487.50	1687.50	30.00	112.50	2694.86	2871.57	165.84
7	4104.9	4483.6	4288.1	78.00	3.24	448.00	1453.67	28.00	98.00	2932.46	3127.96	183.28
6.5	4159.3	4580.5	4363.0	76.00	3.03	409.50	1239.33	26.00	84.50	3208.17	3425.67	203.69
6	4275.7	4747.1	4503.6	74.00	2.81	372.00	1044.00	24.00	72.00	3531.57	3775.13	227.84
5.5	4465.7	4997.2	4722.4	72.00	2.58	335.50	867.17	22.00	60.50	3915.78	4190.57	256.77
5	4745.5	5350.3	5037.5	70.00	2.36	300.00	708.33	20.00	50.00	4379.15	4691.94	291.94
4.5	5139.2	5834.6	5474.7	68.00	2.14	265.50	567.00	18.00	40.50	4948.19	5308.06	335.47
4	5682.8	6492.8	6073.4	66.00	1.91	232.00	442.67	16.00	32.00	5662.69	6082.15	390.53
3.5	6433.4	7392.5	6895.5	64.00	1.68	199.50	334.83	14.00	24.50	6585.18	7082.18	462.12

15 BRIDGE PIER MOMENTUM ANALYSIS - FAR WEST STATES DESIGN STANDARD PROC.

RWCD FLOODWAY REACH 4 OT 11/85

Q	B	Z	TOTAL OBSTRUCTION WIDTH
6500	50	2	5

DEPTH	=========MOMENTUM========== UP	MID	DOWN	T	Y	A1	M1	A0	M0	K1	K2	LOSS
11	5153.4	5392.4	5268.6	94.00	4.94	792.00	3912.33	55.00	302.50	1658.77	1782.56	115.19
10.5	4890.5	5148.1	5014.6	92.00	4.73	745.50	3528.00	52.50	275.63	1762.23	1895.73	124.10
10	4659.4	4937.8	4793.4	90.00	4.52	700.00	3166.67	50.00	250.00	1876.78	2021.14	134.06
9.5	4461.2	4763.0	4606.4	88.00	4.31	655.50	2827.83	47.50	225.63	2004.19	2160.76	145.23
9	4297.3	4625.5	4455.1	86.00	4.10	612.00	2511.00	45.00	202.50	2146.64	2317.01	157.84
8.5	4169.7	4527.9	4341.9	84.00	3.89	569.50	2215.67	42.50	180.63	2306.84	2492.87	172.15
8	4081.0	4473.4	4269.5	82.00	3.68	528.00	1941.33	40.00	160.00	2488.15	2692.10	188.50
7.5	4034.4	4466.3	4241.7	80.00	3.46	487.50	1687.50	37.50	140.63	2694.86	2919.43	207.30
7	4034.5	4512.1	4263.6	78.00	3.24	448.00	1453.67	35.00	122.50	2932.46	3180.98	229.10
6.5	4087.3	4618.4	4341.9	76.00	3.03	409.50	1239.33	32.50	105.63	3208.17	3484.73	254.62
6	4200.8	4795.4	4485.6	74.00	2.81	372.00	1044.00	30.00	90.00	3531.57	3841.36	284.80
5.5	4386.4	5056.9	4707.3	72.00	2.58	335.50	867.17	27.50	75.63	3915.78	4265.40	320.97
5	4660.1	5423.1	5025.0	70.00	2.36	300.00	708.33	25.00	62.50	4379.15	4777.25	364.93
4.5	5045.2	5922.7	5464.6	68.00	2.14	265.50	567.00	22.50	50.63	4948.19	5406.35	419.34
4	5577.2	6599.6	6065.4	66.00	1.91	232.00	442.67	20.00	40.00	5662.69	6196.90	488.16
3.5	6311.7	7522.6	6889.4	64.00	1.68	199.50	334.83	17.50	30.63	6585.18	7218.37	577.65

15 BRIDGE PIER MOMENTUM ANALYSIS - FAR WEST STATES DESIGN STANDARD PROC.

RWCD FLOODWAY REACH 4 DT 11/85

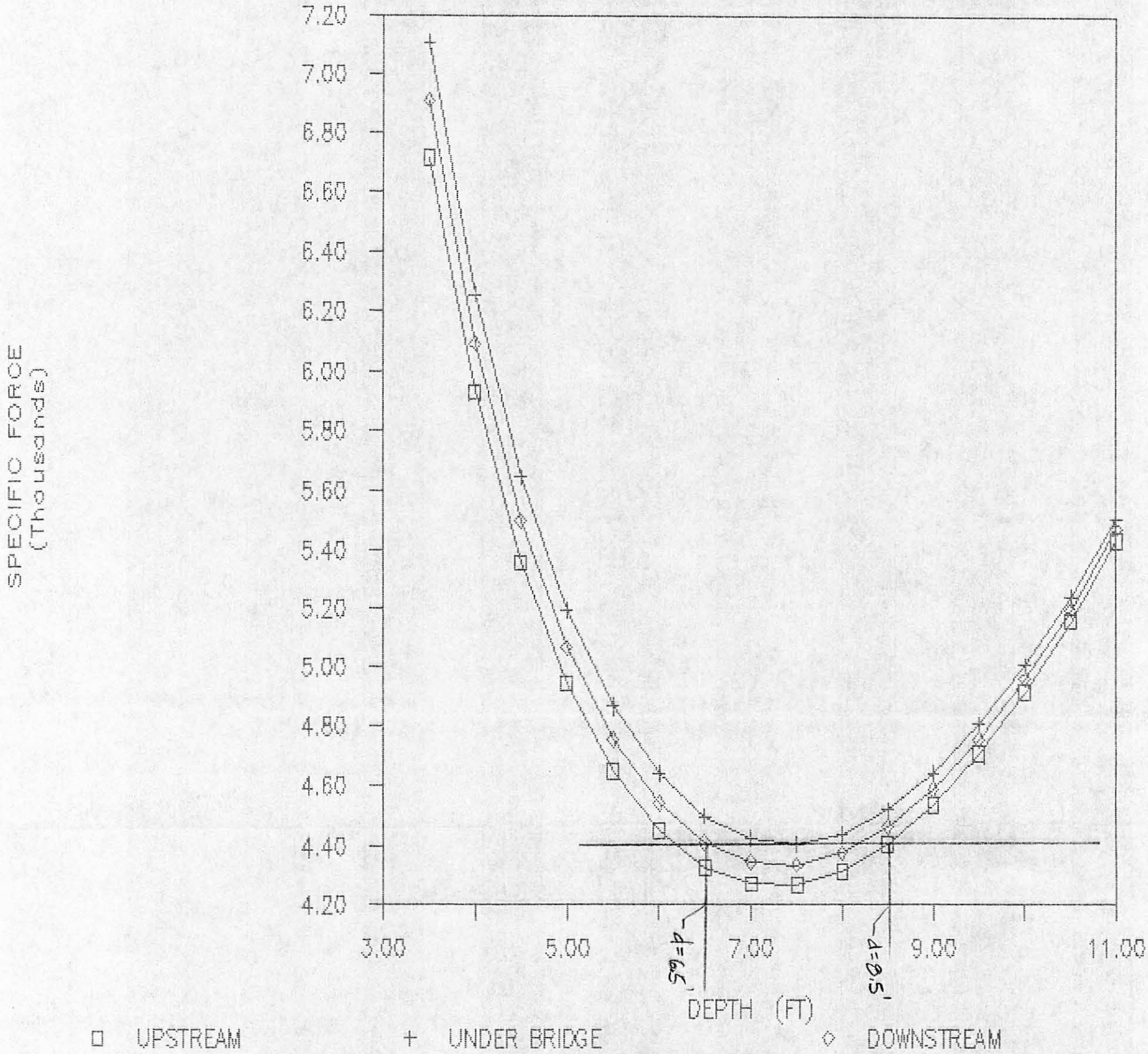
Q	B	Z	TOTAL OBSTRUCTION WIDTH
6500	50	2	6

DEPTH	=========MOMENTUM========= UP	MID	DOWN	T	Y	A1	M1	A0	M0	K1	K2	LOSS
11	5069.9	5358.9	5208.1	94.00	4.94	792.00	3912.33	66.00	363.00	1658.77	1809.56	138.23
10.5	4810.6	5122.1	4959.5	92.00	4.73	745.50	3528.00	63.00	330.75	1762.23	1924.90	148.92
10	4582.6	4919.4	4743.4	90.00	4.52	700.00	3166.67	60.00	300.00	1876.78	2052.72	160.87
9.5	4387.0	4752.1	4561.3	88.00	4.31	655.50	2827.83	57.00	270.75	2004.19	2195.06	174.28
9	4225.2	4622.4	4414.6	86.00	4.10	612.00	2511.00	54.00	243.00	2146.64	2354.38	189.41
8.5	4099.2	4532.7	4305.8	84.00	3.89	569.50	2215.67	51.00	216.75	2306.84	2533.74	206.58
8	4011.3	4486.3	4237.5	82.00	3.68	528.00	1941.33	48.00	192.00	2488.15	2736.97	226.20
7.5	3964.9	4487.7	4213.6	80.00	3.46	487.50	1687.50	45.00	168.75	2694.86	2968.91	248.76
7	3964.2	4542.5	4239.1	78.00	3.24	448.00	1453.67	42.00	147.00	2932.46	3235.82	274.92
6.5	4015.2	4658.5	4320.7	76.00	3.03	409.50	1239.33	39.00	126.75	3208.17	3545.87	305.54
6	4125.8	4846.0	4467.6	74.00	2.81	372.00	1044.00	36.00	108.00	3531.57	3909.95	341.76
5.5	4307.0	5119.4	4692.2	72.00	2.58	335.50	867.17	33.00	90.75	3915.78	4342.95	385.16
5	4574.6	5499.1	5012.5	70.00	2.36	300.00	708.33	30.00	75.00	4379.15	4865.72	437.91
4.5	4951.2	6014.6	5454.4	68.00	2.14	265.50	567.00	27.00	60.75	4948.19	5508.36	503.21
4	5471.6	6710.7	6057.4	66.00	1.91	232.00	442.67	24.00	48.00	5662.69	6316.08	585.80
3.5	6190.1	7658.0	6883.3	64.00	1.68	199.50	334.83	21.00	36.75	6585.18	7359.91	693.18

RWCD FLOODWAY REACH 4
DT 11/85

BRIDGE PIER MOMENTUM ANALYSIS

Q=6500 cfs B=50.00 ft Z=2.00 TOTAL OBST WIDTH=1.67 ft

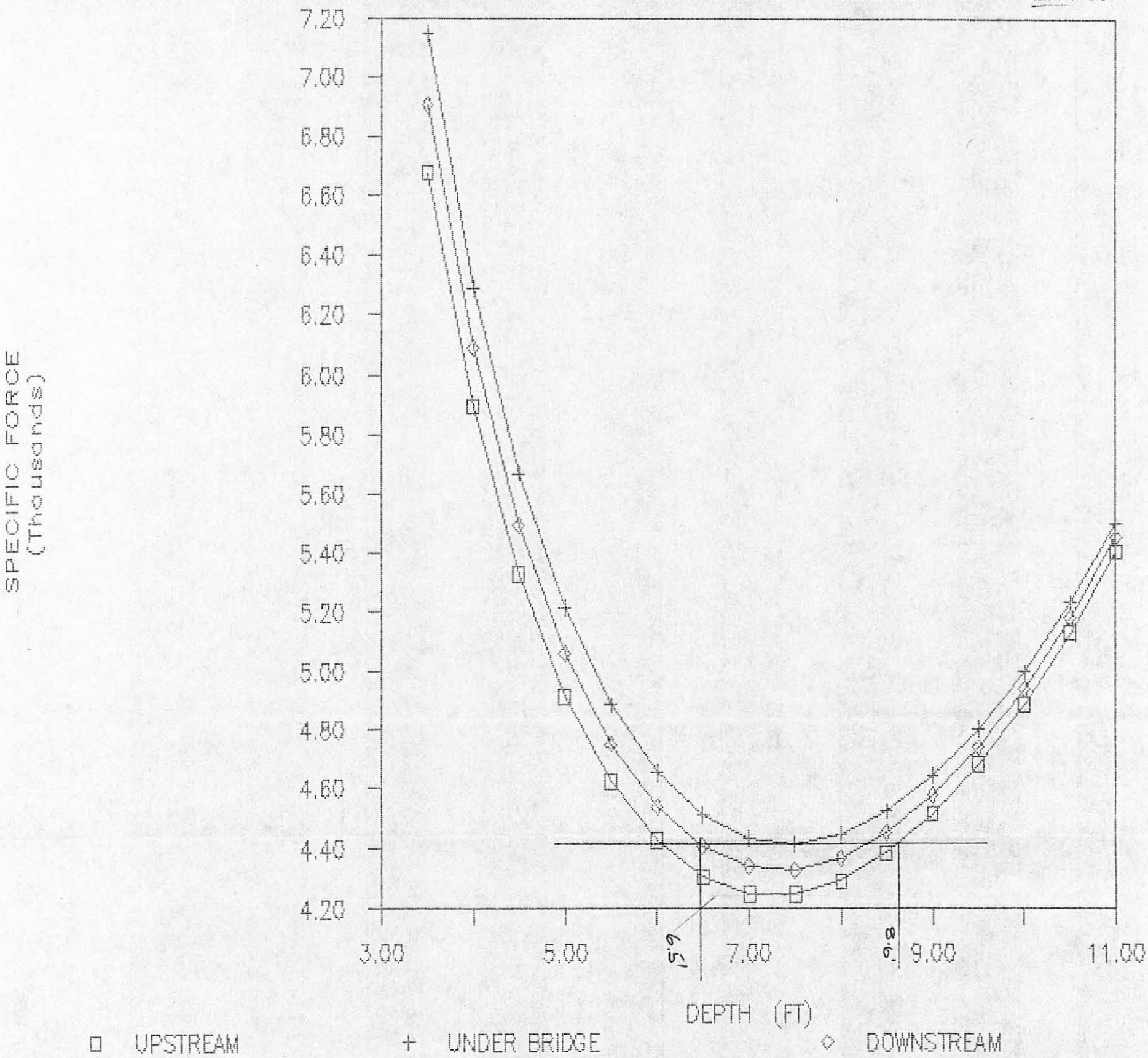


RWCD FLOODWAY REACH 4
DT 11/85

BRIDGE PIER MOMENTUM ANALYSIS

18" piers, round nose

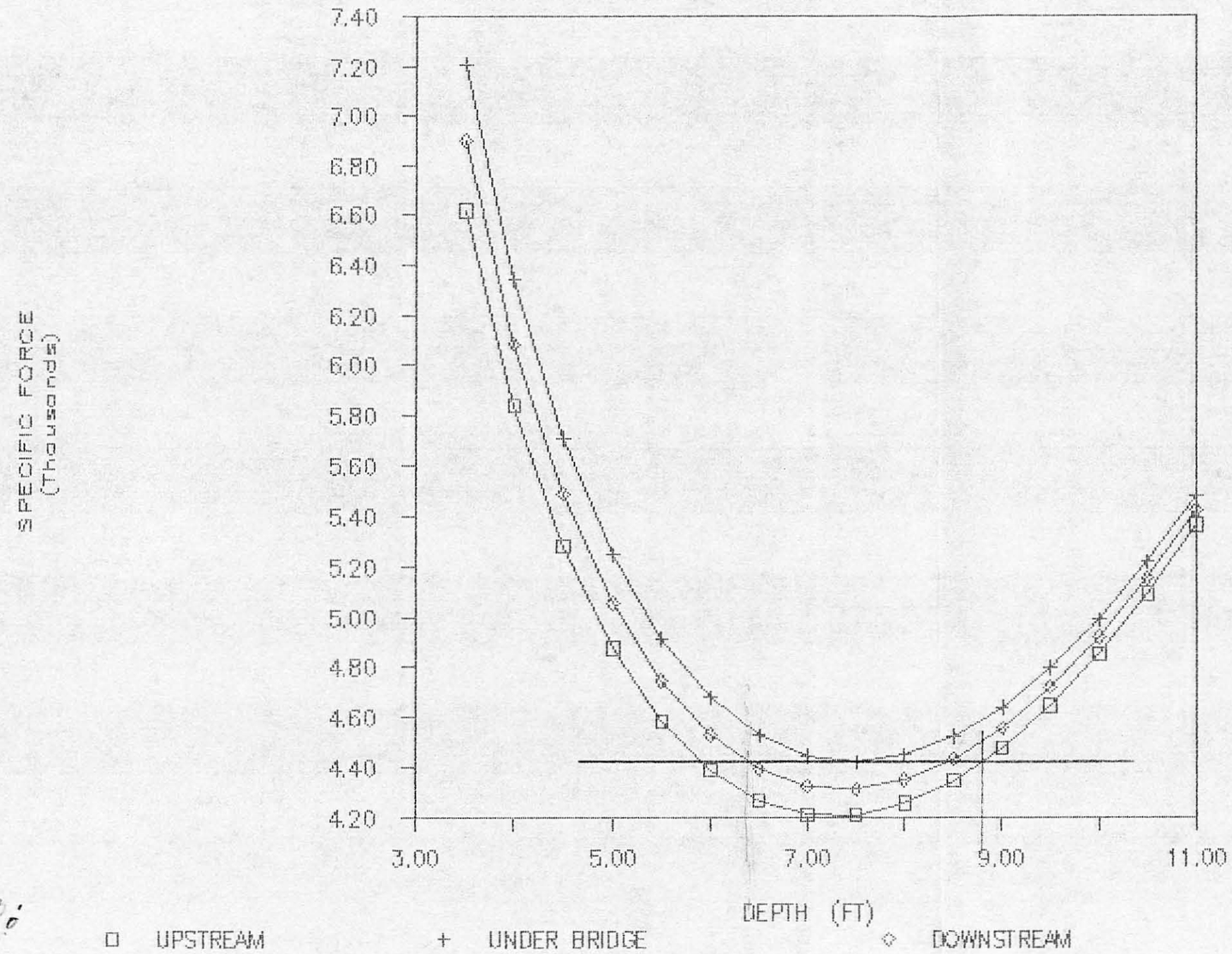
Q=6500 cfs B=50.00 ft Z=2.00 TOTAL OBST WIDTH=2.00 ft



RNCD FLOODWAY RCH. 4
11/4/85 DT

BRIDGE PIER MOMENTUM ANALYSIS

Q=6500 cfs B=50.00 ft Z=2.00 TOTAL OBST WIDTH=2.50 ft

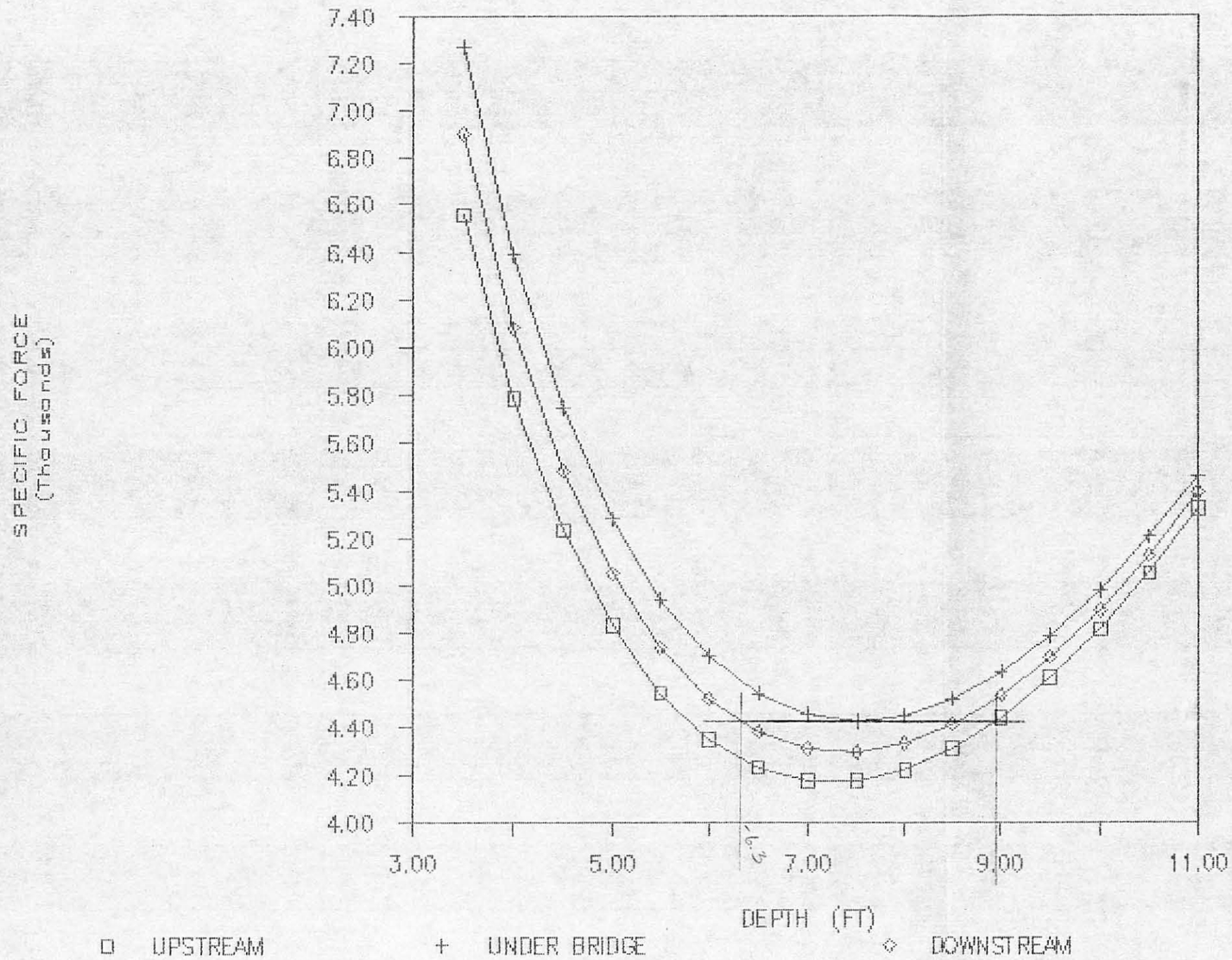


30'
0.5
x 2/3
1.67'
3'
x 2/3
2.0'

RWCD FLOODWAY R4H4
11/4/85 D.T.

BRIDGE PIER MOMENTUM ANALYSIS

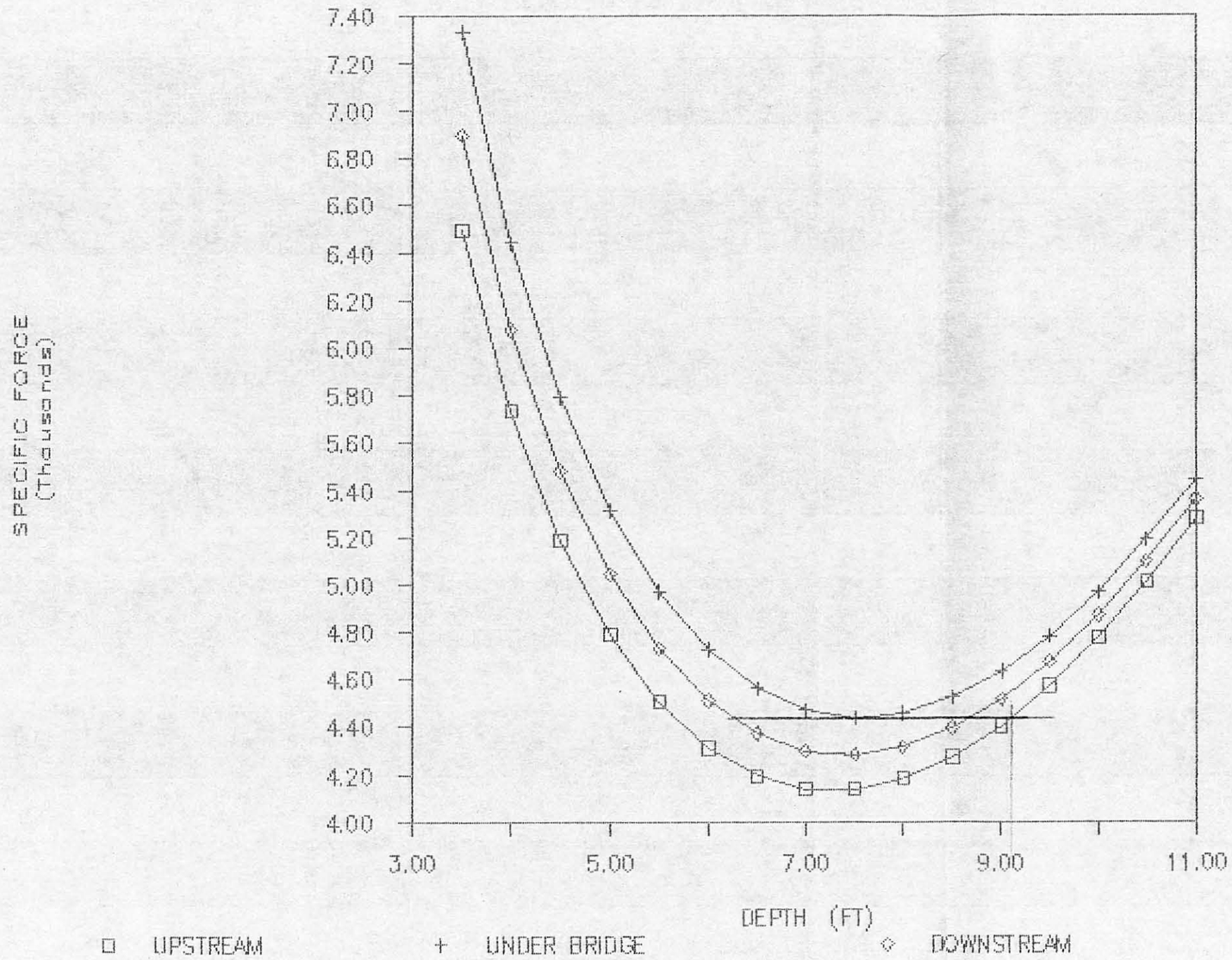
Q=6500 cfs B=50.00 ft Z=2.00 TOTAL OBST WIDTH=3.00 ft



RWCD FLOODWAY RCH 4
11/4/85 DT

BRIDGE PIER MOMENTUM ANALYSIS

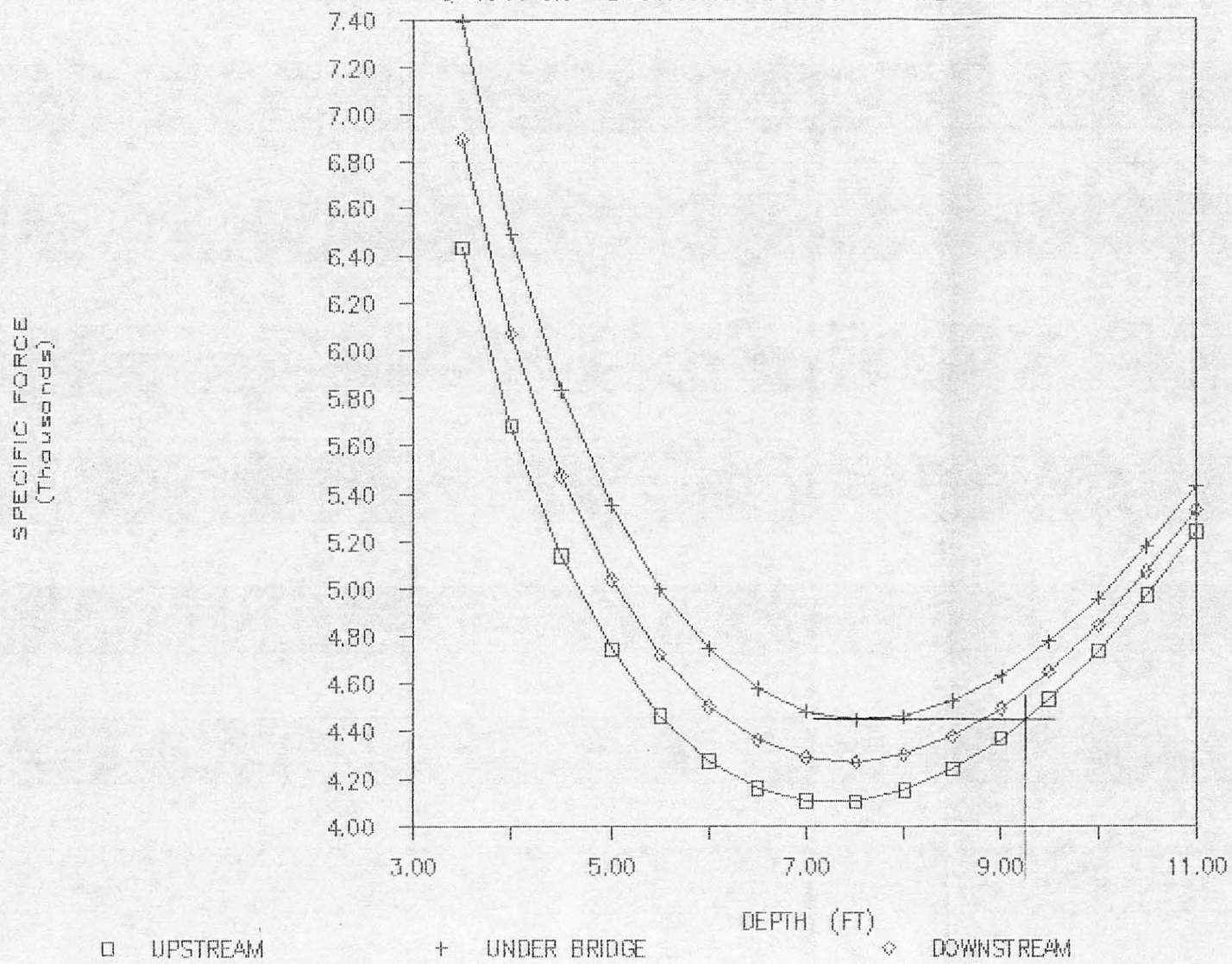
Q=6500 cfs B=50.00 ft Z=2.00 TOTAL OBST WIDTH=3.50 ft



RWCD FLOODWAY RCH 4
11/4/05
DT

BRIDGE PIER MOMENTUM ANALYSIS

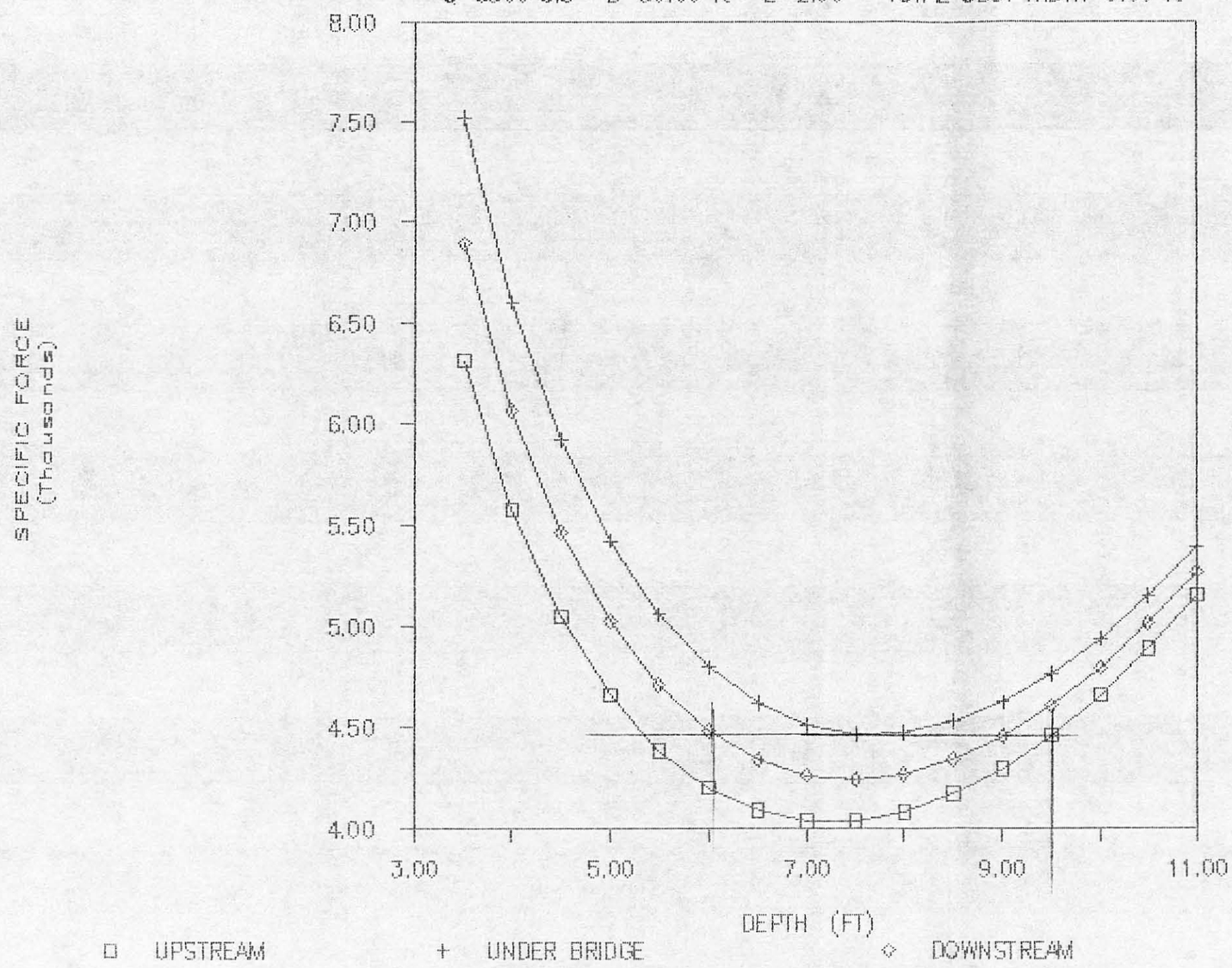
Q=6500 cfs B=50.00 ft Z=2.00 TOTAL OBST WIDTH=4.00 ft



RWCD FLOODWAY RCH 4
11/85
DT

BRIDGE PIER MOMENTUM ANALYSIS

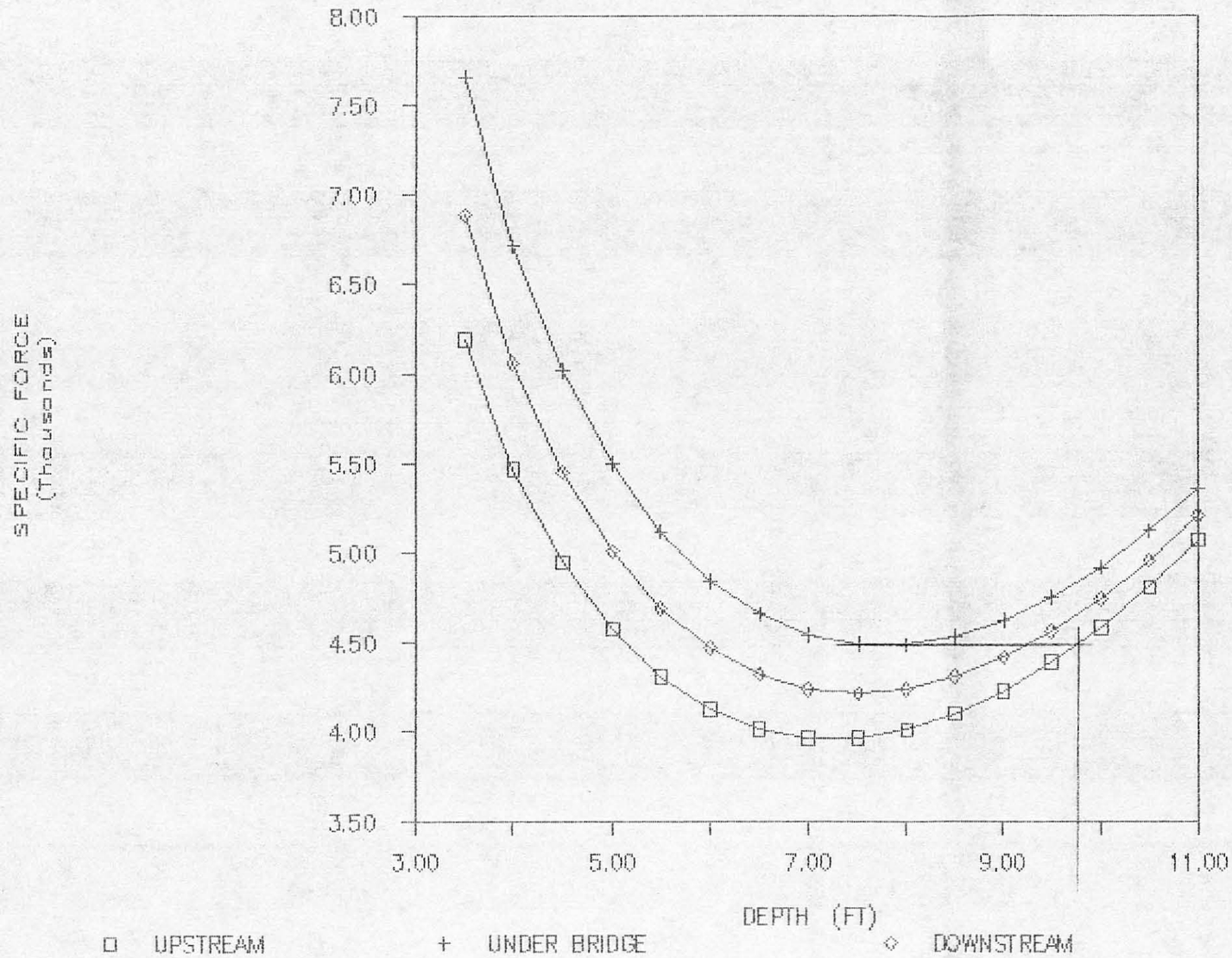
Q=6500 cfs B=50.00 ft Z=2.00 TOTAL OBST WIDTH=5.00 ft



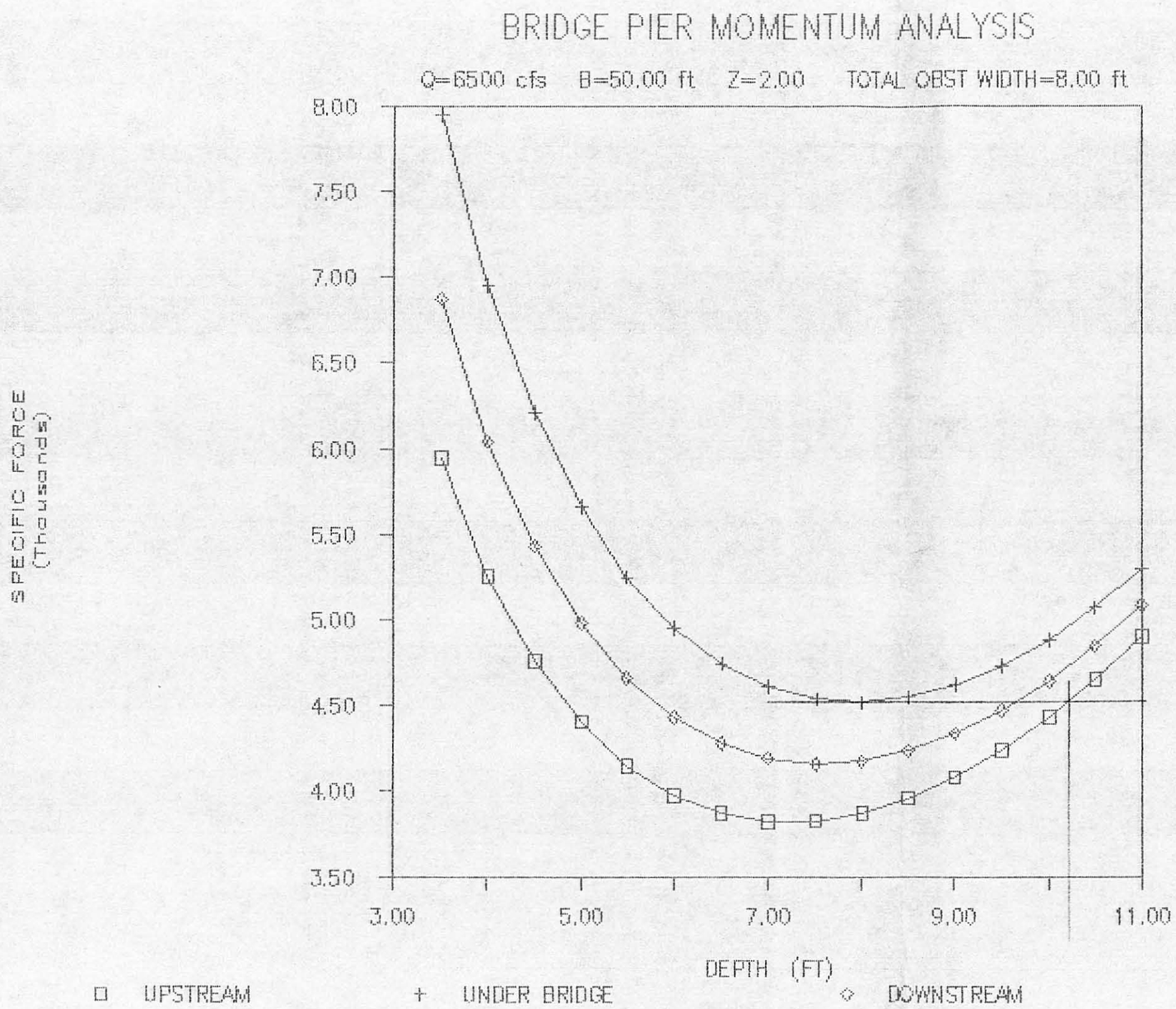
RWCD FLOODWAY RCH 4
DT 11/85

BRIDGE PIER MOMENTUM ANALYSIS

Q=6500 cfs B=50.00 ft Z=2.00 TOTAL OBST WIDTH=6.00 ft



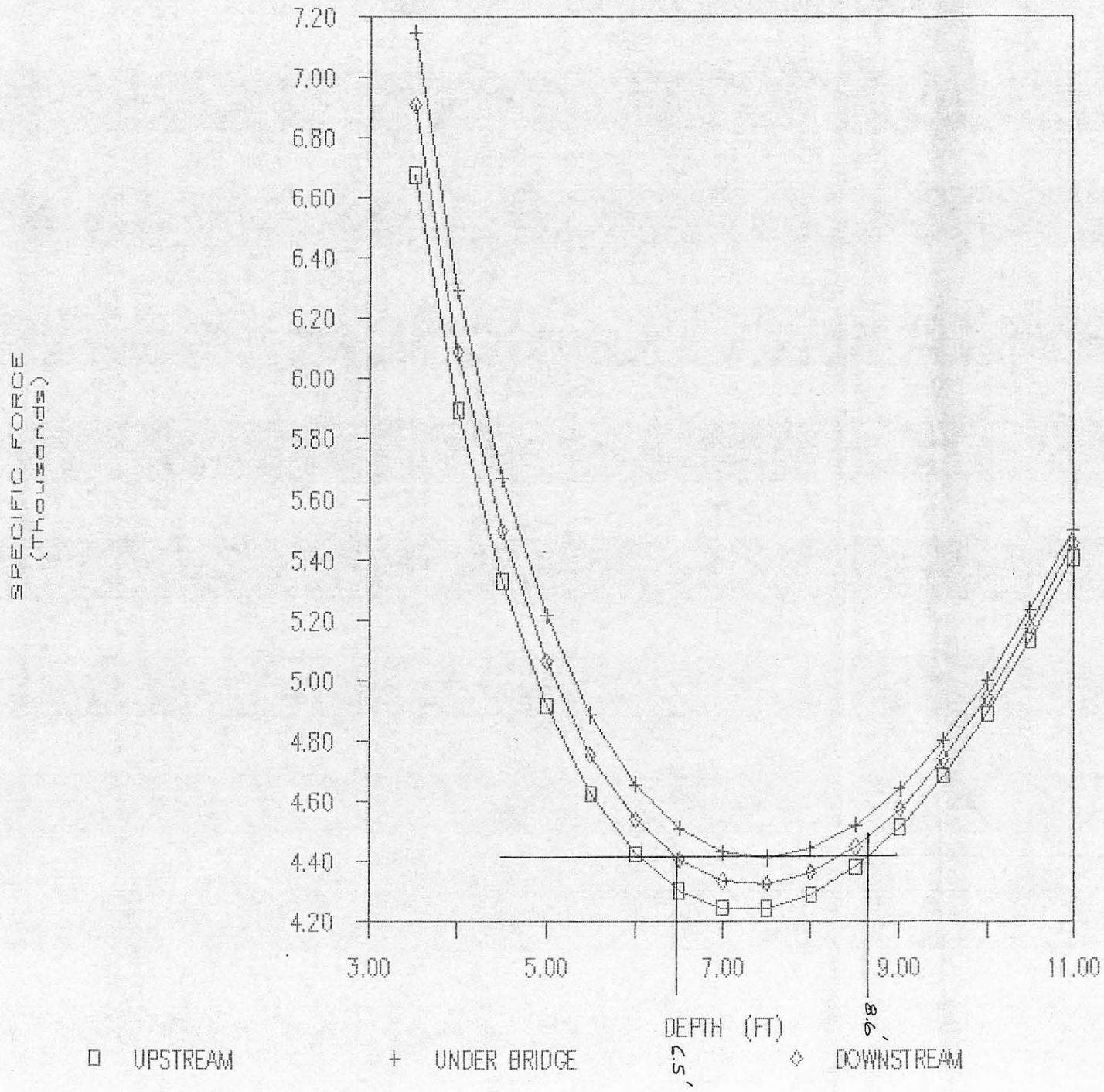
RWLD FLOODWAY RCH 4
DT 11/85



RNCD FLOODWAY RCH 4
DT 11/85

BRIDGE PIER MOMENTUM ANALYSIS

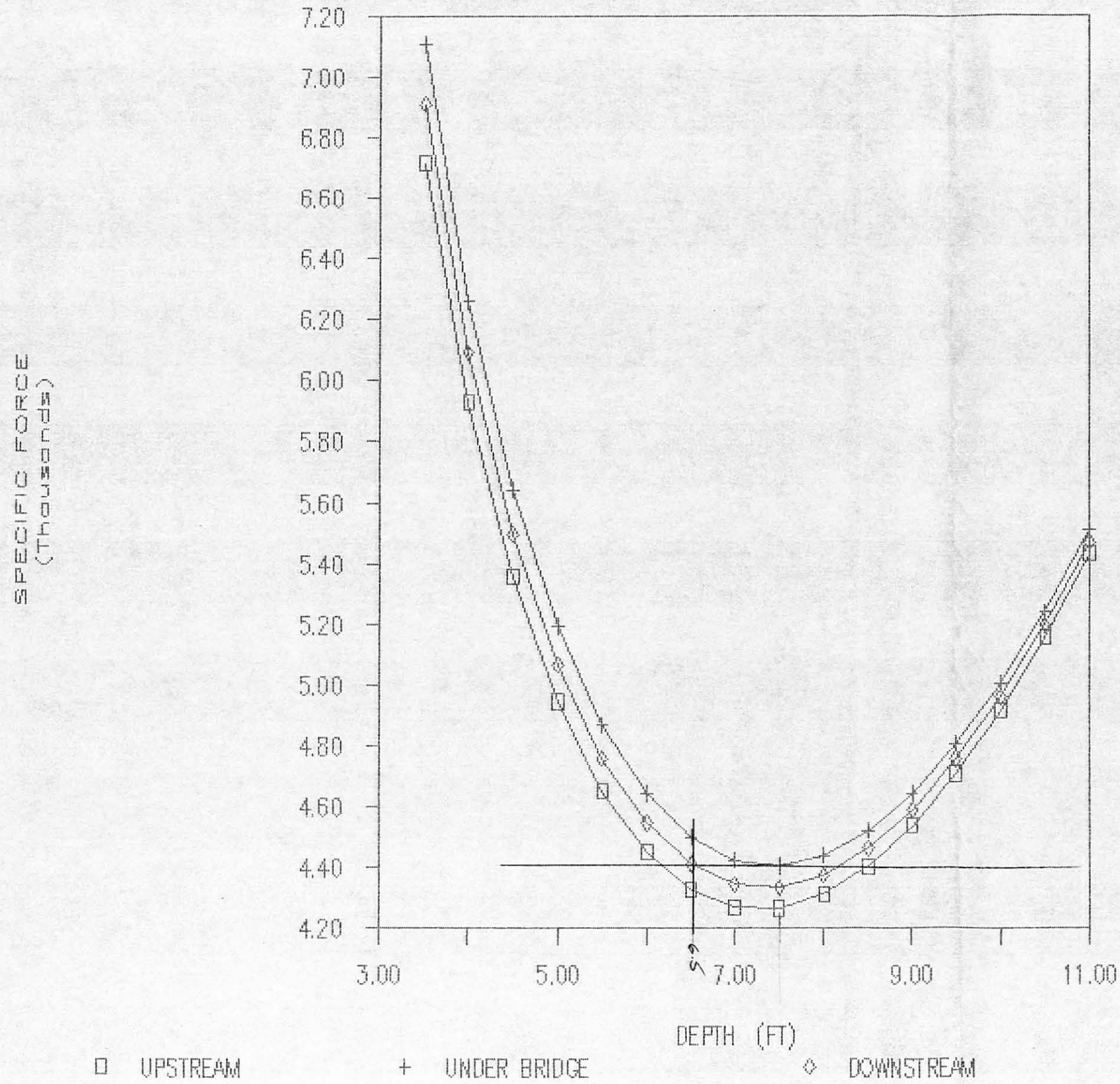
Q=6500 cfs B=50.00 ft Z=2.00 TOTAL OBST WIDTH=2.00 ft



RWCD FLOODWAY RCH 4
DT 11/85

BRIDGE PIER MOMENTUM ANALYSIS

Q=6500 cfs B=50.00 ft Z=2.00 TOTAL OBST WIDTH=1.67 ft



ARIZONA RWCD 24

DT 11/5/85

CHANNEL EXPANSION @ POWER RD.

NEED TO REVISE TRANSITION BELOW NEW POWER RD. BRIDGE:

- CHECK APPROX LENGTH REQ'D FOR 12.5° DS FLARE (≈ 4.5:1)

U.S. WIDTH ≈ 50 + 6.5×2×2 = 76
D.S. WIDTH ≈ 175 + 3×9×2 = 229

$\Delta W = 153$
$L \approx 153 \times 2.25 = 344'$

- CHECK LENGTH ASSUMING SUPERCRITICAL FLOW UNDER BRIDGE:

USE FIG 17-13 "OPEN CHANNEL HYDRAULICS", CHOW.
OR FIG 17-12

ASSUME DEPTH D.S. ~ 6.3 FT:

GENERALIZED BOUNDARY CURVES PROVIDED ARE A FUNCTION OF FROUDE NUMBER:

$$F = V/\sqrt{gL} \qquad L = D = A/T = \frac{(b+zd)d}{b+2zd}$$

HP41C PROG.

f lbl A	STO 04	X	STO 02
f lbl 01	↑	RCL 01	
B.?	↑	+	
PR	↑	STO 06	
STO 01	RCL 02	÷ (STO 07)	
E.?	X	32.16	
PR	RCL 01	X	
STO 02	↑	√ 1/X	
Q.?	X	RCL 03	
PR	STO 05	X	
STO 03	RCL 04	RCL 05	
f lbl B	RCL 02	÷	
f lbl 02	X	F=	
D.?	2	ARCL X	
PR		RTN	

LBL

01	b	50
02	z	2
03	Q	6500
04	d	6.3
05	A	394.38
06	T	75.2
07	D	5.244
08	F	1.269

OK

ARIZONA RWCD Rcll d

DT 11/5/85

CHANNEL EXPANSION @ POWER RD.

FIND: FOR Q = 6500
b = 50
z = 2

d	F	$b_1 F_1$
5.75	1.473	73.65
6.0	1.374	
6.3	1.269	
6.5	1.206	
6.75	1.133	
7.00	1.063	
7.25	1.007	

$b = / b_1 = \frac{75}{50} = 3.5$

∘ FIG 17-13 GIONS TOTAL $L \approx 9 b_1 F_1$
$\approx 9(50)(1.269)$
≈ 571 ft (TOO LONG)

∘ FIG 17-12 PROVIDES A MORE ABRUPT EXPANSION:

$$z/b_1 = \frac{1}{2}\left(\frac{x}{b_1 F_1}\right)^{z/2} + 1/2$$

$z = b_x$

$$z/b_1 = \frac{1}{2}\left(\frac{x}{bF}\right)^{z/2} + 1/2$$

$$z = b\left(\frac{1}{2}\left(\frac{x}{bF}\right)^{z/2} + \frac{1}{2}\right)$$

CHECK FOR:
d = 6.3 , x = 100
FIND:
F = 1.269

$$bN = 2z = \left(50\left(\frac{1}{2}\left(\frac{100}{50(1.269)}\right)^{2/2} + \frac{1}{2}\right)\right)$$

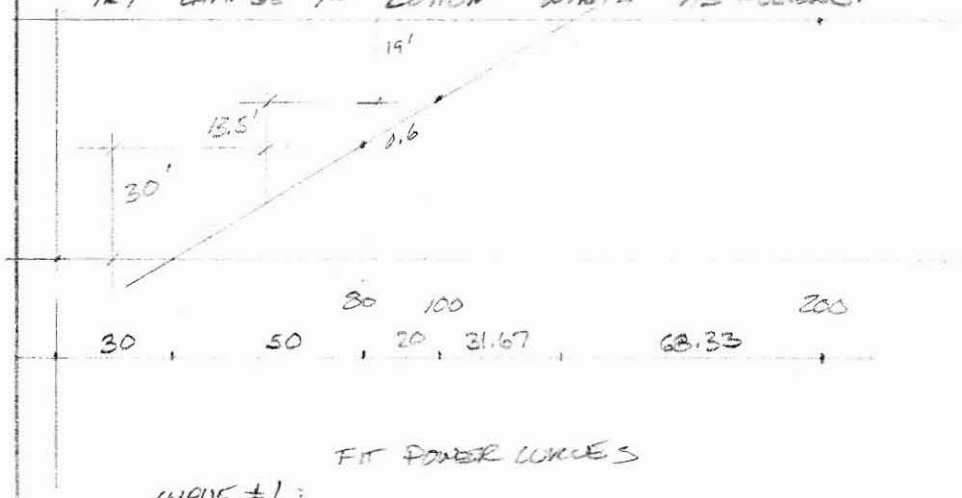
$= (74.46)2$
$= 148.93$

ARIZONA RWCD R.4

DT 11/12/85

CHANNEL EXPANSION @ POWER RD.

TRY CHANGE IN BOTTOM WIDTH AS FOLLOWS:



FIT POWER CURVES

<u>CURVE #1</u>:

$$y = ax^b \qquad \text{at } x = 80 \quad \frac{dy}{dx} = 0.6, \; y = 30$$

$$\frac{dy}{dx} = abx^{b-1}$$

$$0.6 = ab(80)^{b-1}$$

$$\left[\begin{aligned} 30 &= a\,80^b \\ a &= 30(80)^{-b} \end{aligned}\right]$$

$$0.6 = 30(80)^{-b}\, b(80)^{b-1}$$

$$0.6 = \frac{30b}{80}$$

$$b = 1.6$$

$$a = 30(80)^{-1.6} = 0.02705$$

$$\boxed{y = 0.02705\,x^{1.6}}$$

ARIZONA DT 11/12/85 RUCO R4

CHANNEL EXPANSION @ POWER RD.

CURVE #2

$$y = ax^b$$

$$dy/dx = abx^{b-1} \quad \text{at } x=100;\ y=19;\ dy/dx=0.6$$

$$0.6 = \frac{ab(100)^b}{100}$$

$$a = \frac{60}{b(100)^b}$$

$$19 = ax^b = \frac{60}{b\cancel{(100)^b}}\cancel{(100)^b}$$

$$b = 60/19 = 3.158$$

$$a = \frac{60}{3.158(100)^{3.158}} = 9.178\times10^{-6}$$

$$\boxed{y = 9.178\times10^{-6}\times x^{3.158}}$$

ARIZONA
DT

RWCD RCI

11/13/85

CHANNEL EXPANSION @ POWER RD.

BOTTOM WIDTH

$x = 0$ to 80

$b_w/2 = 25 + 0.02705\, x^{1.6}$

$x = 100$ to 200

$b_w/2 = 87.5 - 9.178 \times 10^{-6} (200 - x)^{3.158}$

ARIZONA ROJCD RL

DT 11/18

CHANNEL EXPANSION @ POWER RD.

NOT USED DT 8/10/86

TRY A MORE GRADUAL FLARE:

USE CURVE PER FIG 17-13:

$$z = 0.125 b\, b^{-3/2} F^{-3/2} x^{3/2} + \tfrac{1}{2} b$$

$$z = 0.125\, b^{-1/2} F^{-3/2} x^{3/2} + \tfrac{1}{2} b$$

$$\frac{\partial z}{\partial x} = \tfrac{3}{2}(0.125)\, b^{-1/2} F^{-3/2} x^{1/2}$$

$$= 0.1875 \left(\frac{1}{b^{1/2} F^{3/2}}\right) x^{1/2}$$

Check: $Q = 6500$, $b = 50$, $z = 2$, $d = 6.7$, $x = 100$

$F = 1.15$

$$\partial z/\partial x = 0.1875 \left(\frac{1}{(50)^{1/2}(1.15)^{1.5}}\right)(100)^{1/2} = 0.215$$

TRY PARAB W/ $\partial z/\partial x$ @ $x = 100 = (40-25)/50 = 0.30$

FIND INTERSECTION W/ SIDE:

$$L = 100 + (87.5 - 40)/0.3 = 258.33$$

- USE EXIT CURVE FROM $(300 - 258.33 = \underline{41.67}$ FT

$(300 - 41.67 \times 2) = \underline{216.66}$ FT

$$\Delta z = 41.67(0.3) = 12.5 \text{ FT}$$

ARIZONA RWCD R4

DT 11/18/85

CHANNEL EXPANSION @ FUTURE FL

NOT USED
DT 3/10/86

EIT CURVE #1:

$$z = aX^n + c \qquad c = 25$$

at X=100

$$\frac{dz}{dX} = 0.3 = n a X^{n-1} = n a (100)^{n-1} = \frac{n a (100)^n}{100}$$

$$30 = n a (100)^n$$

$$z = 40 = a(100)^n + 25$$

$$a(100)^n = 15$$

$$a = \frac{15}{100^n}$$

$$n = \frac{30}{a(100)^n} = \frac{30}{\frac{15}{100^n}(100)^n} = 2$$

$$a = \frac{15}{100^2} = 0.0015$$

$$\boxed{z = 0.0015 X^2 + 25}$$

CURVE #2:

$n = 2$; $\Delta z = 12.50$

at $X = 41.67 \times 2 = 83.34$

$$z = aX^2$$
$$12.5 = a(83.34)^2$$

$$a = 12.5/83.34^2 = 0.0018$$

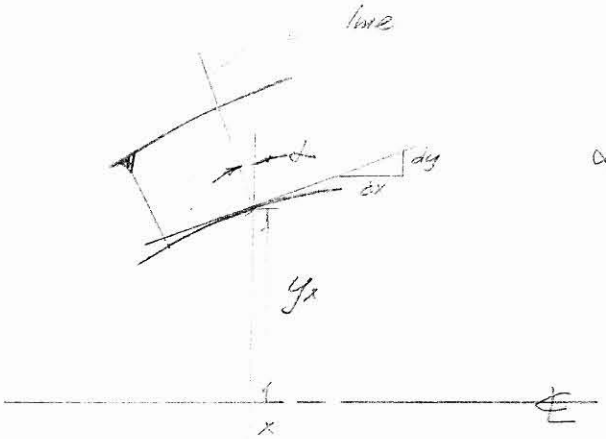
$$\boxed{z = 0.0018 X^2 \qquad (X = 300 - X) \quad (W = 175 - 2z)}$$

ARIZONA RUDCD R4

DT 12/10/85

SUBJ: TRANSITION LAYOUT

STATION	DIST.	SW/2	dy/dx	α
553+00	0	25	0	0
	10	26.08	0.172	9° 46.3'
	20	28.26	0.261	14° 38.1'
	30	31.25	0.333	18° 25.2'
	40	34.90	0.396	21° 35.5'
	50	39.14	0.453	24° 20.6'
	60	43.93	0.505	26° 47.2'
	70	49.23	0.554	28° 58.4'
	80	55.00	0.600	30° 57.5'



$\alpha = \tan^{-1} dy/dx$

curve #1 $y = 0.02705\, x^{1.6}$

$$\frac{dy}{dx} = 1.6\,(0.02705)\, x^{0.6} = 0.04328\, x^{0.6}$$

ARIZONA RIVER

DI 12/10/85

CHER TRANSITION LAYOUT

CURVE #2 $y = 9.178 \times 10^{-6} x^{2.158}$

$$\frac{dy}{dx} = 2.898 \times 10^{-5} x^{2.158}$$

STATION	DIST.	B W/2	db/dx	α
554+00	100	68.50	0.600	30° 57.4'
	110	73.88	0.478	25° 32.4'
	120	78.11	0.371	20° 20.1'
	130	81.34	0.278	15° 31.4'
	140	83.71	0.199	11° 16.0'
	150	85.37	0.134	7° 39.2'
	160	86.45	0.083	4° 44.5'
	170	87.08	0.045	2° 33.2'
	180	87.38	0.019	1° 03.6'
	190	87.49	0.004	0° 14.2'
	200	87.50	0.000	0° 00.0'

ARIZONA RWCD FLOODWAY REACH 4

DT 11/8/85

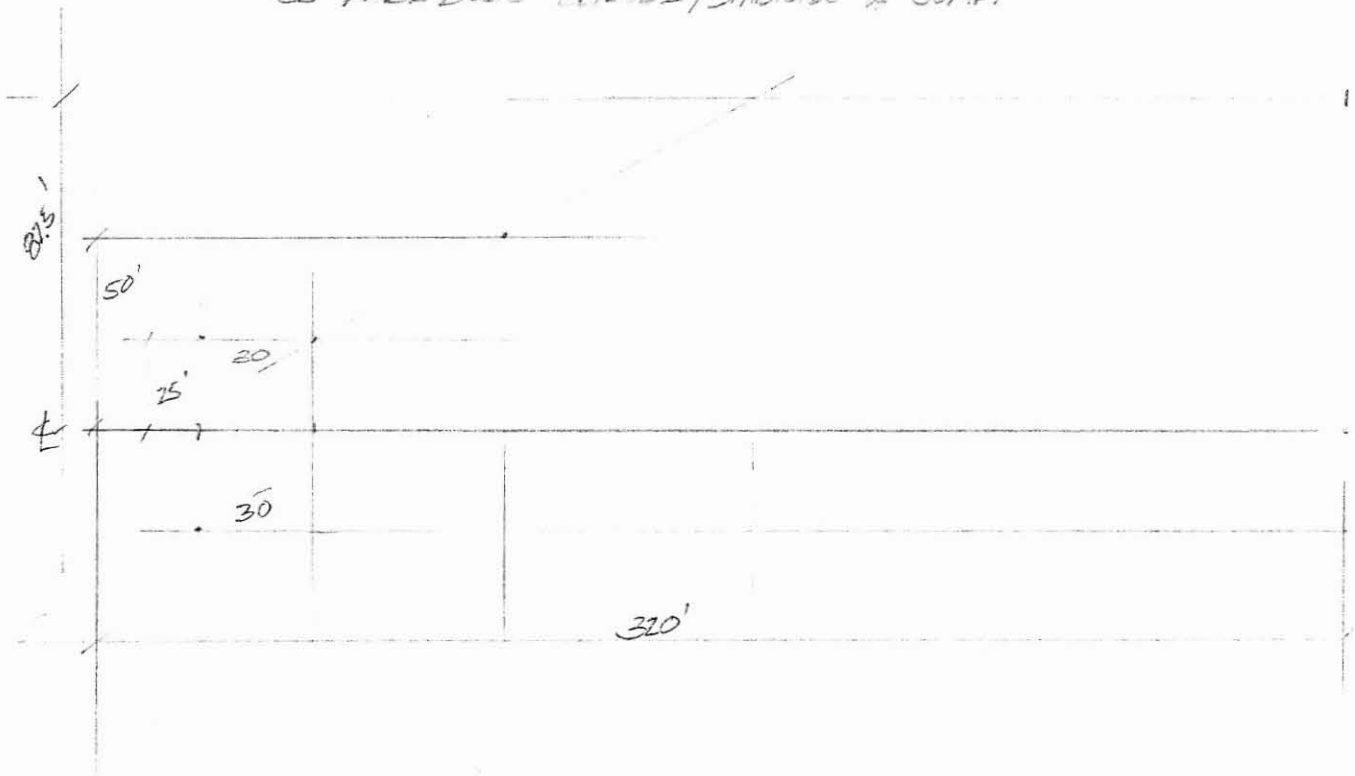
CH. EXP.

TRIAL 1

TRIAL LAYOUT:

- APPROXIMATE THE CURVES OBT. FROM "OPEN CH. AND" CALT

USE PARABOLIC CURVES / STABILIZE W/ JOMP.



D.T.

- RWCD R4 11/85
- TRIAL BOTTOM WIDTH TRANSITION
- ADAPTATION OF FIG. 17-12 "OPEN CHANNEL HYDRAULICS"

TAPERED BOTTOM WIDTH

DIST	BW/2	BW	DIST	BW/2	BW
0	25.00	50.00	100.00	68.50	137.00
5	25.36	50.71	105.00	71.34	142.68
10	26.08	52.15	110.00	73.88	147.76
15	27.06	54.12	115.00	76.13	152.26
20	28.26	56.53	120.00	78.11	156.22
25	29.67	59.33	125.00	79.84	159.68
30	31.25	62.49	130.00	81.34	162.68
35	32.99	65.98	135.00	82.63	165.25
40	34.90	69.79	140.00	83.71	167.43
45	36.95	73.90	145.00	84.62	169.25
50	39.14	78.28	150.00	85.37	170.74
55	41.47	82.94	155.00	85.97	171.95
60	43.93	87.87	160.00	86.45	172.90
65	46.52	93.04	165.00	86.81	173.62
70	49.23	98.46	170.00	87.08	174.15
75	52.06	104.11	175.00	87.26	174.52
80	55.00	110.00	180.00	87.38	174.76
			185.00	87.45	174.90
			190.00	87.49	174.97
			195.00	87.50	175.00
			200.00	87.50	175.00

TAPERED BOTTOM WIDTH

	DIST	BW/2	BW		DIST	BW/2	BW	Σ
553+00	0	25.00	50.00	554+00 ~~553+70~~	100.00	68.50	137.00	100
	5	25.36	50.71		105.00	71.34	142.68	
	+ 10	26.08	52.15	554+10 ~~90~~	110.00	73.88	147.76	90
	15	27.06	54.12		115.00	76.13	152.26	
	+ 20	28.26	56.53	554+20 ~~80~~	120.00	78.11	156.22	80
	25	29.67	59.33		125.00	79.84	159.68	
	+ 30	31.25	62.49	~~554+00~~	130.00	81.34	162.68	70
	35	32.99	65.98	554+30	135.00	82.63	165.25	
	+ 40	34.90	69.79	40 ~~70~~	140.00	83.71	167.43	60
	45	36.95	73.90		145.00	84.62	169.25	
	+ 50	39.14	78.28	50 - ~~60~~	150.00	85.37	170.74	50
	55	41.47	82.94		155.00	85.97	171.95	
	+ 60	43.93	87.87	60 - ~~50~~	160.00	86.45	172.90	40
	65	46.52	93.04		165.00	86.81	173.62	
	+ 70	49.23	98.46	70 ~~40~~	170.00	87.08	174.15	30
	75	52.06	104.11		175.00	87.26	174.52	
	+ 80	55.00	110.00	80 - ~~30~~	180.00	87.38	174.76	20
					185.00	87.45	174.90	
				90 - ~~20~~	190.00	87.49	174.97	10
					195.00	87.50	175.00	
				555+00 ~~554+70~~	200.00	87.50	175.00	0

FINAL EXPANSION USED.

- WILLIAMS -
- POWER -

TAPERED BOTTOM WIDTH

DIST	BW/2	BW
0	25+0.02705*A5^1.6	2*B5
5	25+0.02705*A6^1.6	2*B6
10	25+0.02705*A7^1.6	2*B7
15	25+0.02705*A8^1.6	2*B8
20	25+0.02705*A9^1.6	2*B9
25	25+0.02705*A10^1.6	2*B10
30	25+0.02705*A11^1.6	2*B11
35	25+0.02705*A12^1.6	2*B12
40	25+0.02705*A13^1.6	2*B13
45	25+0.02705*A14^1.6	2*B14
50	25+0.02705*A15^1.6	2*B15
55	25+0.02705*A16^1.6	2*B16
60	25+0.02705*A17^1.6	2*B17
65	25+0.02705*A18^1.6	2*B18
70	25+0.02705*A19^1.6	2*B19
75	25+0.02705*A20^1.6	2*B20
80	25+0.02705*A21^1.6	2*B21

DIST	BW/2	BW
100	87.5-0.000009178*(200-E5)^3.158	2*F5
105	87.5-0.000009178*(200-E6)^3.158	2*F6
110	87.5-0.000009178*(200-E7)^3.158	2*F7
115	87.5-0.000009178*(200-E8)^3.158	2*F8
120	87.5-0.000009178*(200-E9)^3.158	2*F9
125	87.5-0.000009178*(200-E10)^3.158	2*F10
130	87.5-0.000009178*(200-E11)^3.158	2*F11
135	87.5-0.000009178*(200-E12)^3.158	2*F12
140	87.5-0.000009178*(200-E13)^3.158	2*F13
145	87.5-0.000009178*(200-E14)^3.158	2*F14
150	87.5-0.000009178*(200-E15)^3.158	2*F15
155	87.5-0.000009178*(200-E16)^3.158	2*F16
160	87.5-0.000009178*(200-E17)^3.158	2*F17
165	87.5-0.000009178*(200-E18)^3.158	2*F18
170	87.5-0.000009178*(200-E19)^3.158	2*F19
175	87.5-0.000009178*(200-E20)^3.158	2*F20
180	87.5-0.000009178*(200-E21)^3.158	2*F21
185	87.5-0.000009178*(200-E22)^3.158	2*F22
190	87.5-0.000009178*(200-E23)^3.158	2*F23
195	87.5-0.000009178*(200-E24)^3.158	2*F24
200	87.5-0.000009178*(200-E25)^3.158	2*F25

SUPERCRITICAL CHANNEL EXPANSION , "OPEN CHANNEL HYDRAULICS", CHOW, FIG.17-12

ROCKS FLOODWAY REACH
DT 11/85

FLOW Q (cfs)	BOT. WIDTH B (ft)	SDE SLPE Z	DEPTH D (ft)	FRDE NO F	VELOC. V (ft)	AREA A	TOP WIDTH T	HYD DEPTH L
6500.00	50.00	2.00	6.00	1.37	17.47	372.00	74.00	5.03

DISTANCE	WIDTH	WIDTH /2
0.00	50.00	25.00
5.00	50.98	25.49
10.00	52.78	26.39
15.00	55.10	27.55
20.00	57.85	28.93
30.00	64.42	32.21
40.00	72.21	36.10
50.00	81.04	40.52
60.00	90.80	45.40
70.00	101.41	50.71
80.00	112.82	56.41
90.00	124.95	62.48
100.00	137.79	68.89
110.00	151.28	75.64
111.06	152.75	76.37
116.00	159.68	79.84
116.88	160.93	80.46
120.00	165.40	82.70
125.00	172.69	86.34
126.56	174.99	87.49
	50.00	25.00

SUPERCRITICAL CHANNEL EXPANSION , "OPEN CHANNEL HYDRAULICS", CHOW, FIG.17-12

RWCD FLOODWAY RCH 4
DT 11105

FLOW Q (cfs)	BOT. WIDTH B (ft)	SDE SLPE Z	DEPTH D (ft)	FRDE NO F	VELOC. V (ft)	AREA A	TOP WIDTH T	HYD DEPTH L
6500.00	50.00	2.00	6.30	1.27	16.48	394.38	75.20	5.24

DISTANCE	WIDTH	WIDTH /2
0.00	50.00	25.00
5.00	51.11	25.55
10.00	53.13	26.56
15.00	55.75	27.87
20.00	58.85	29.42
30.00	66.25	33.13
40.00	75.02	37.51
50.00	84.97	42.49
60.00	95.97	47.99
70.00	107.93	53.97
80.00	120.78	60.39
90.00	134.46	67.23
100.00	148.92	74.46
110.00	164.12	82.06
111.06	165.77	82.89
116.00	173.58	86.79
116.88	174.99	87.50
120.00	180.03	90.02
125.00	188.24	94.12
126.56	190.84	95.42
50.00		25.00

SUPERCRITICAL CHANNEL EXPANSION , "OPEN CHANNEL HYDRAULICS", CHOW, FIG.17-12

RWCD FLOODWAY RCH4
DT 11/85

FLOW Q (cfs)	BOT. WIDTH B (ft)	SDE SLPE Z	DEPTH D (ft)	FRDE NO F	VELOC. V (ft)	AREA A	TOP WIDTH T	HYD DEPTH L
6500.00	50.00	2.00	6.50	1.21	15.87	409.50	76.00	5.39

DISTANCE	WIDTH	WIDTH /2
0.00	50.00	25.00
5.00	51.19	25.60
10.00	53.38	26.69
15.00	56.20	28.10
20.00	59.55	29.78
30.00	67.55	33.77
40.00	77.02	38.51
50.00	87.76	43.88
60.00	99.64	49.82
70.00	112.55	56.28
80.00	126.42	63.21
90.00	141.19	70.60
100.00	156.81	78.40
110.00	173.22	86.61
111.06	175.01	87.50
116.00	183.44	91.72
116.88	184.96	92.48
120.00	190.40	95.20
125.00	199.27	99.63
126.56	202.07	101.03
	50.00	25.00

SUPERCRITICAL CHANNEL EXPANSION , "OPEN CHANNEL HYDRAULICS", CHOW, FIG.17-12

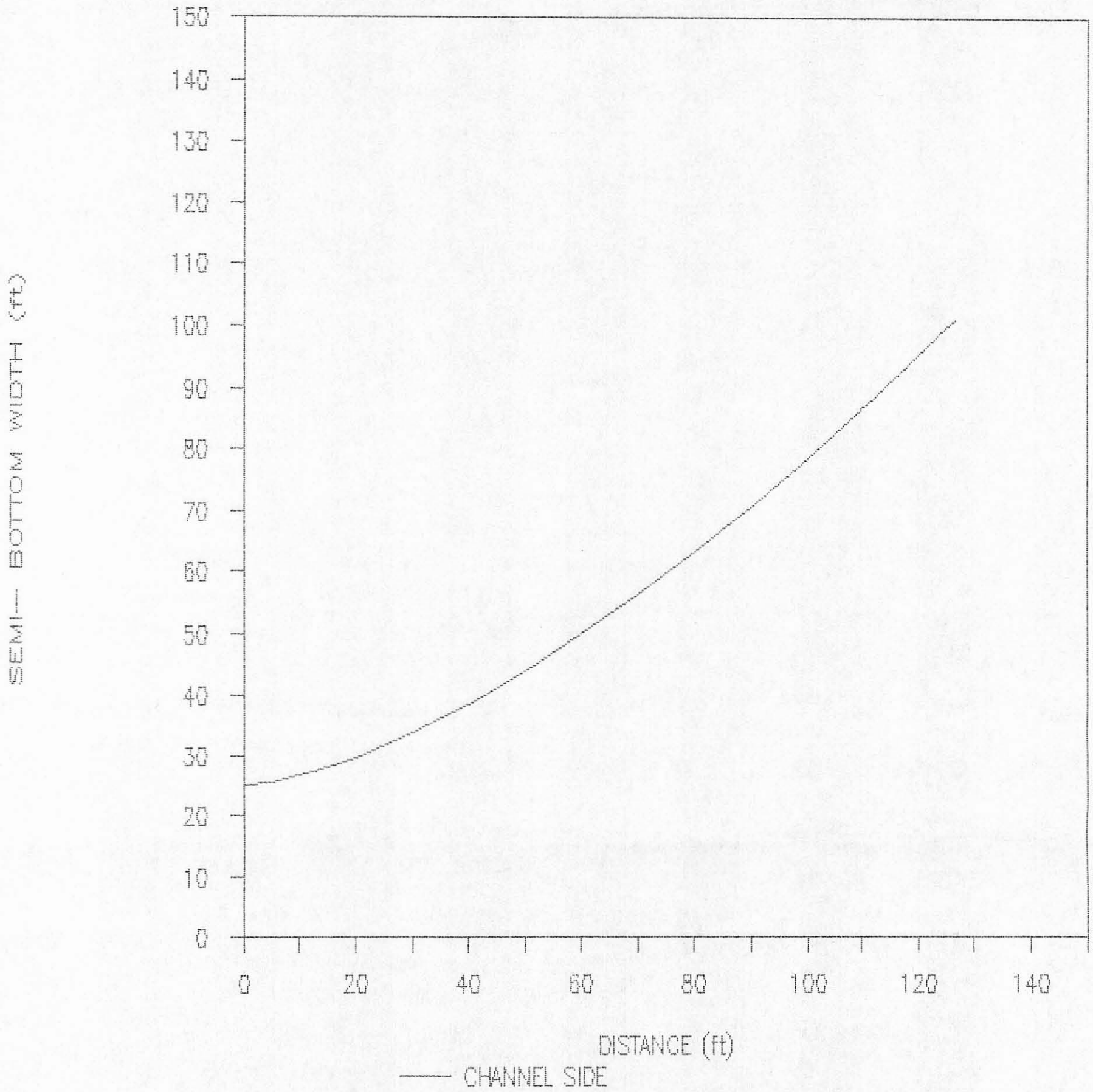
PWCD FLOODWAY RCH 4
DT 11/05

FLOW Q (cfs)	BOT. WIDTH B (ft)	SDE SLPE Z	DEPTH D (ft)	FRDE NO F	VELOC. V (ft)	AREA A	TOP WIDTH T	HYD DEPTH L
6500.00	50.00	2.00	7.00	1.07	14.51	448.00	78.00	5.74

DISTANCE	WIDTH	WIDTH /2
0.00	50.00	25.00
5.00	51.43	25.72
10.00	54.05	27.03
15.00	57.45	28.72
20.00	61.47	30.73
30.00	71.07	35.53
40.00	82.44	41.22
50.00	95.33	47.67
60.00	109.59	54.79
70.00	125.09	62.55
80.00	141.74	70.87
90.00	159.47	79.74
98.32	175.00	87.50
110.00	197.92	98.96
111.06	200.06	100.03
116.00	210.19	105.09
116.88	212.01	106.01
120.00	218.54	109.27
125.00	229.18	114.59
126.56	232.55	116.27
	50.00	25.00

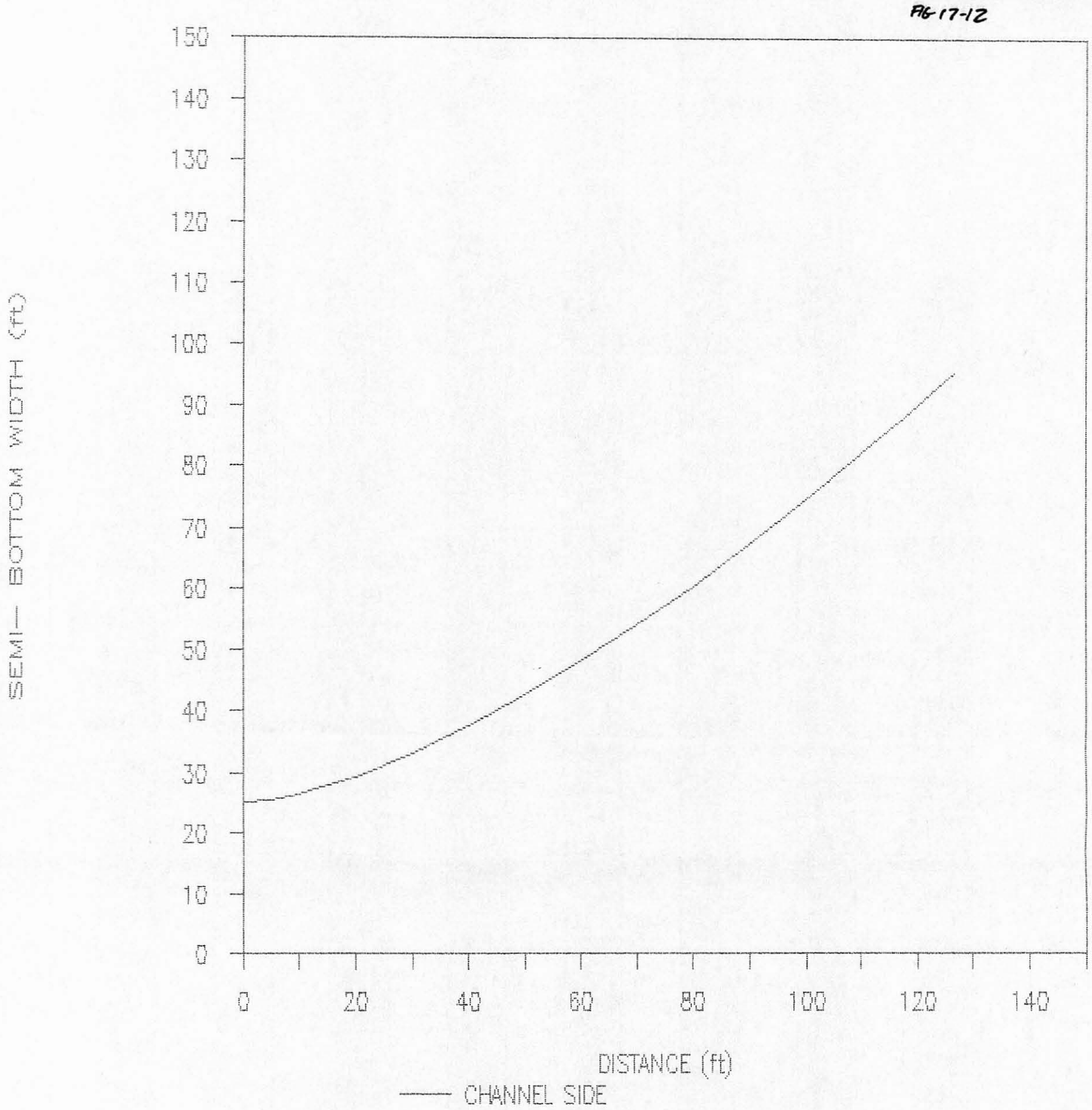
RWCD FLOODWAY RCH 4
DT 11/85
$z_0 = 6.5$
"OPEN CHANNEL HYDRAULICS", CHOW
FIG 17-12

SUPERCRIT. EXPANSION

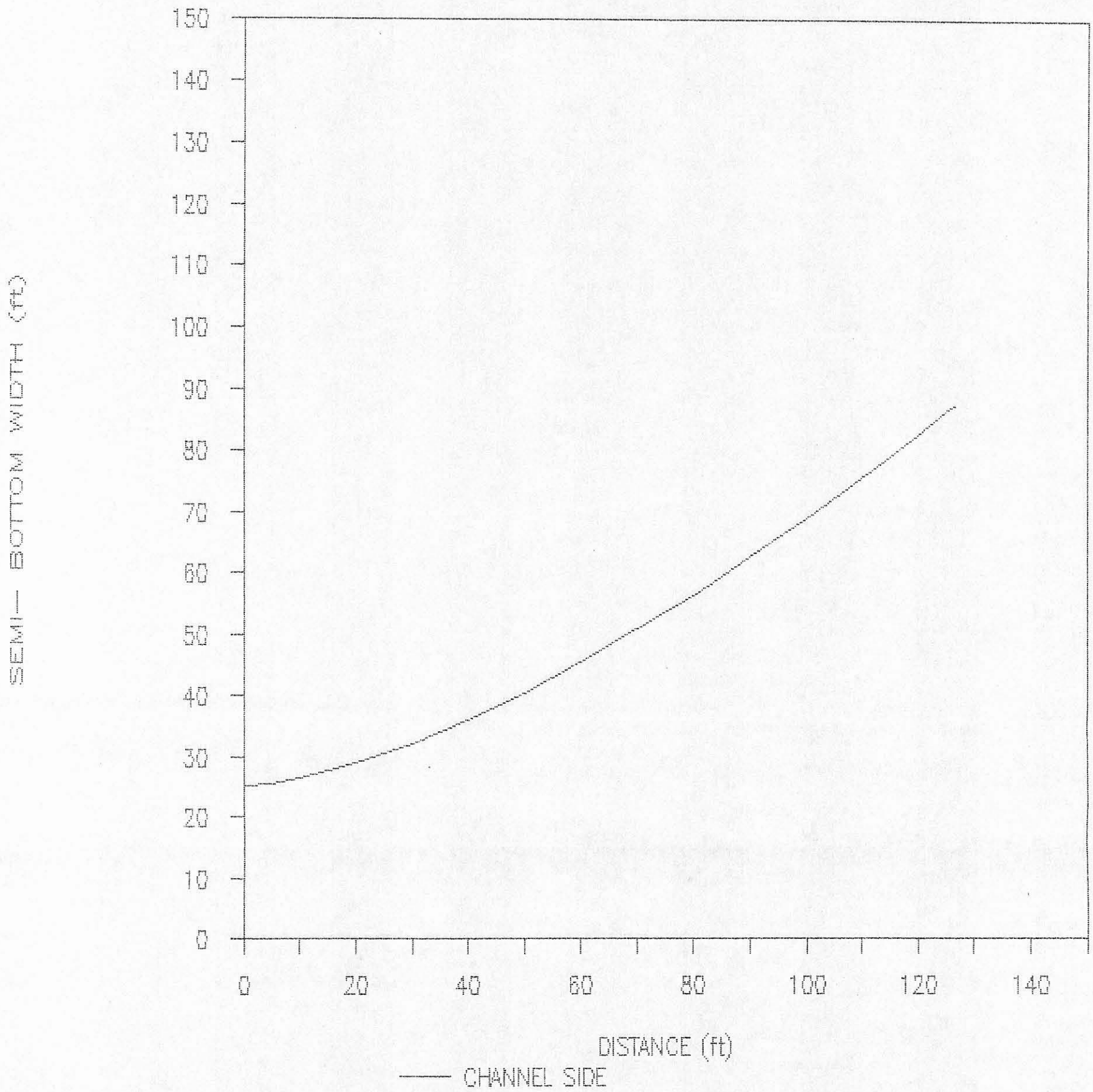


RWCD FLOODWAY RCH 4
DT 11/85
d_o = 6.3
"OPEN CHANNEL HYDRAULICS", CHOW
FIG 17-12

SUPERCRIT. EXPANSION



RWCD FLOODWAY REACH 4
DT 11/85
$d_0 = 6.0$
"OPEN CHANNEL HYDRAULICS", CHOW
FIG 17-12



SUPERCRITICAL CHANNEL EXPANSION , "OPEN CHANNEL HYDRAULICS", CHOW, FIG.17-13
(EXPAN2.WRK)

RWCD FLOODWAY REACH 11/85 DJ

FLOW Q (cfs)	BOT. WIDTH B (ft)	SDE SLPE Z	DEPTH D (ft)	FRDE NO F	VELOC. V (ft)	AREA A	TOP WIDTH T
6500.00	50.00	2.00	6.70	1.15	15.30	424.78	76.80
				1.47			

B1*F= 57.4 ft

DISTANCE	WIDTH	WIDTH /2	DZ/DX
0.00	50.00	25.00	0.000
5.00	50.32	25.16	0.048
10.00	50.91	25.45	0.068
15.00	51.67	25.84	0.084
20.00	52.57	26.29	0.096
30.00	54.73	27.36	0.118
40.00	57.28	28.64	0.136
50.00	60.17	30.09	0.153
60.00	63.37	31.69	0.167
70.00	66.85	33.42	0.181
80.00	70.59	35.29	0.193
90.00	74.56	37.28	0.205
100.00	78.77	39.38	0.216
110.00	83.19	41.60	0.226
115.00	85.48	42.74	0.231
116.00	85.94	42.97	0.232
116.88	86.35	43.18	0.233
120.00	87.82	43.91	0.236
125.00	90.21	45.10	0.241
126.56	90.96	45.48	0.243
150.00	102.85	51.43	0.264
175.00	116.60	58.30	0.285
200.00	131.37	65.69	0.305
225.00	147.09	73.55	0.324
247.80	162.22	81.11	0.340
275.00	181.20	90.60	0.358
300.00	199.49	99.74	0.374
319.00	213.91	106.96	0.385

SUPERCRITICAL CHANNEL EXPANSION , "OPEN CHANNEL HYDRAULICS", CHOW, FIG.17-13
(EXPAN2.WRK)

RUCD FLOODWAY REACH 4 DT 11/85

FLOW Q (cfs)	BOT. WIDTH B (ft)	SDE SLPE Z	DEPTH D (ft)	FRDE NO F	VELOC. V (ft)	AREA A	TOP WIDTH T
6500.00	50.00	2.00	7.00	1.07	14.51	448.00	78.00

B1*F= 53.4 ft

DISTANCE	WIDTH	WIDTH /2	DZ/DX
0.00	50.00	25.00	0.000
5.00	50.36	25.18	0.054
10.00	51.01	25.51	0.076
15.00	51.86	25.93	0.093
20.00	52.87	26.43	0.108
30.00	55.27	27.63	0.132
40.00	58.11	29.05	0.152
50.00	61.33	30.67	0.170
60.00	64.90	32.45	0.186
70.00	68.77	34.39	0.201
80.00	72.94	36.47	0.215
90.00	77.37	38.68	0.228
100.00	82.05	41.03	0.240
110.00	86.98	43.49	0.252
115.00	89.53	44.76	0.258
116.00	90.05	45.02	0.259
116.88	90.50	45.25	0.260
120.00	92.14	46.07	0.263
125.00	94.80	47.40	0.269
126.56	95.64	47.82	0.270
150.00	108.89	54.44	0.294
175.00	124.21	62.10	0.318
200.00	140.66	70.33	0.340
225.00	158.18	79.09	0.361
247.80	175.03	87.52	0.378
275.00	196.18	98.09	0.399
300.00	216.56	108.28	0.416
319.00	232.63	116.31	0.429

SUPERCRITICAL CHANNEL EXPANSION , "OPEN CHANNEL HYDRAULICS", CHOW, FIG.17-13
(EXPAN2.WRK)

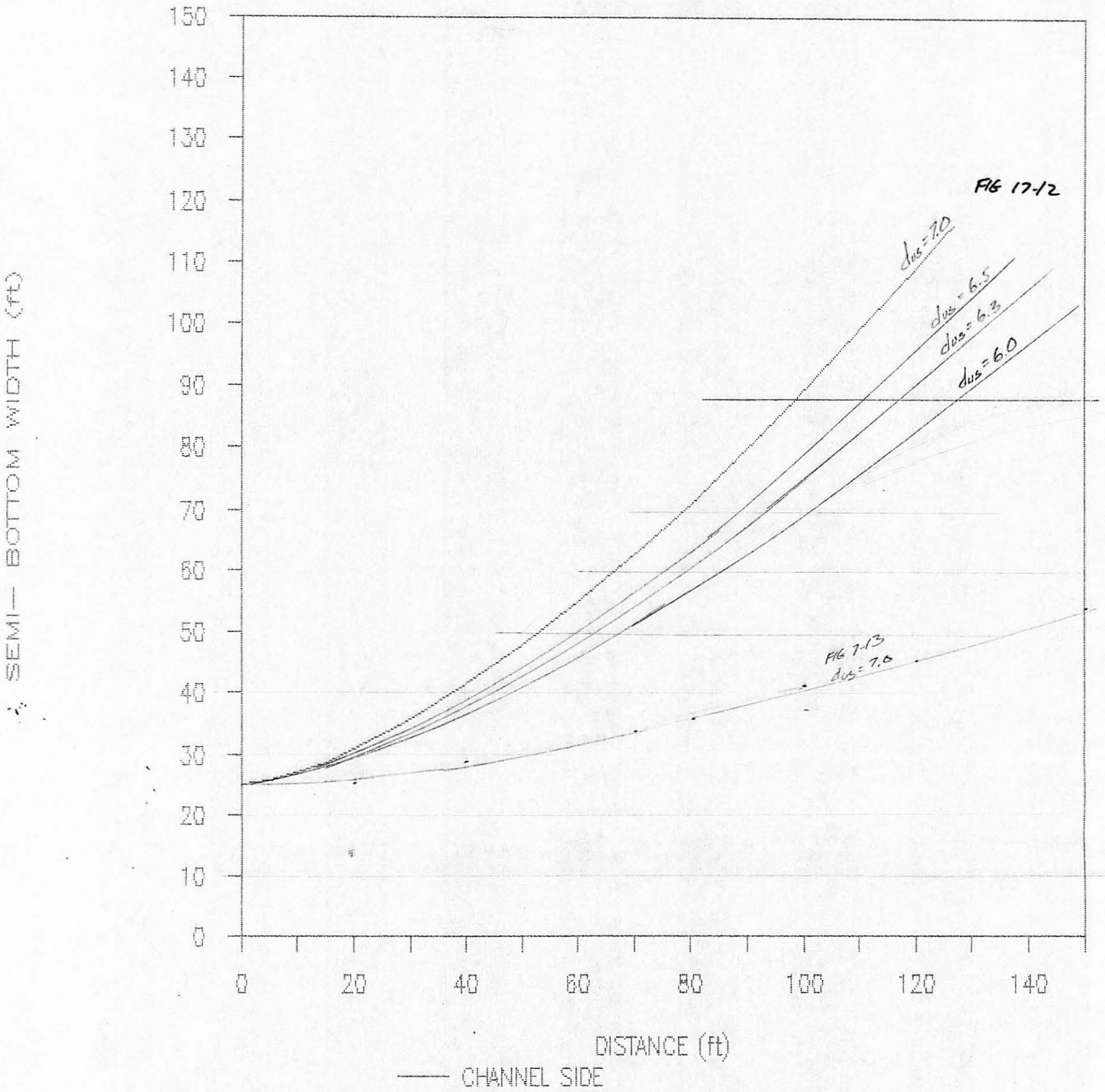
RWQD FLOODWAY REACH 4 DT 11/85

FLOW Q (cfs)	BOT. WIDTH B (ft)	SDE SLPE Z	DEPTH D (ft)	FRDE NO F	VELOC. V (ft)	AREA A	TOP WIDTH T	HYD DEPTH L
6500.00	50.00	2.00	7.00	1.07	14.51	448.00	78.00	5.74

B1*F= 53.4 ft

DISTANCE	WIDTH	WIDTH /2	DZ/DX
0.00	50.00	25.00	0.000
5.00	50.36	25.18	0.083
10.00	51.01	25.51	0.118
15.00	51.86	25.93	0.144
20.00	52.87	26.43	0.167
30.00	55.27	27.63	0.204
40.00	58.11	29.05	0.236
50.00	61.33	30.67	0.263
60.00	64.90	32.45	0.289
70.00	68.77	34.39	0.312
80.00	72.94	36.47	0.333
90.00	77.37	38.68	0.353
100.00	82.05	41.03	0.373
110.00	86.98	43.49	0.391
115.00	89.53	44.76	0.400
116.00	90.05	45.02	0.401
116.88	90.50	45.25	0.403
120.00	92.14	46.07	0.408
125.00	94.80	47.40	0.417
126.56	95.64	47.82	0.419
150.00	108.89	54.44	0.456
175.00	124.21	62.10	0.493
200.00	140.66	70.33	0.527
225.00	158.18	79.09	0.559
247.80	175.03	87.52	0.587
275.00	196.18	98.09	0.618
300.00	216.56	108.28	0.645
319.00	232.63	116.31	0.665
	50.00	25.00	0.000
	50.00	25.00	0.000
	50.00	25.00	0.000
	50.00	25.00	0.000
	50.00	25.00	0.000
	50.00	25.00	0.000
	50.00	25.00	0.000
	50.00	25.00	0.000
	50.00	25.00	0.000
	50.00	25.00	0.000
	50.00	25.00	0.000
	50.00	25.00	0.000
	50.00	25.00	0.000
	50.00	25.00	0.000
	50.00	25.00	0.000

SUPERCRIT. EXPANSION 7.0 "OPEN CHANNEL HYDRAULICS", Chow DT 11/85



BOTTOM WIDTH IN TRANSITION 1/18//85 DT RWCD R4 - 2ND TRIAL -
(BOTTOM3.WRK)

NOT USED

=========CURVE #1==========

DIST	DIST2	STATION	BW/2	BW
0	300	55270.00	25.00	50.00
10	290	55280.00	25.15	50.30
20	280	55290.00	25.60	51.20
30	270	55300.00	26.35	52.70
40	260	55310.00	27.40	54.80
50	250	55320.00	28.75	57.50
60	240	55330.00	30.40	60.80
70	230	55340.00	32.35	64.70
80	220	55350.00	34.60	69.20
90	210	55360.00	37.15	74.30
100	200	55370.00	40.00	80.00

Z=2
N=0.30
Z=3

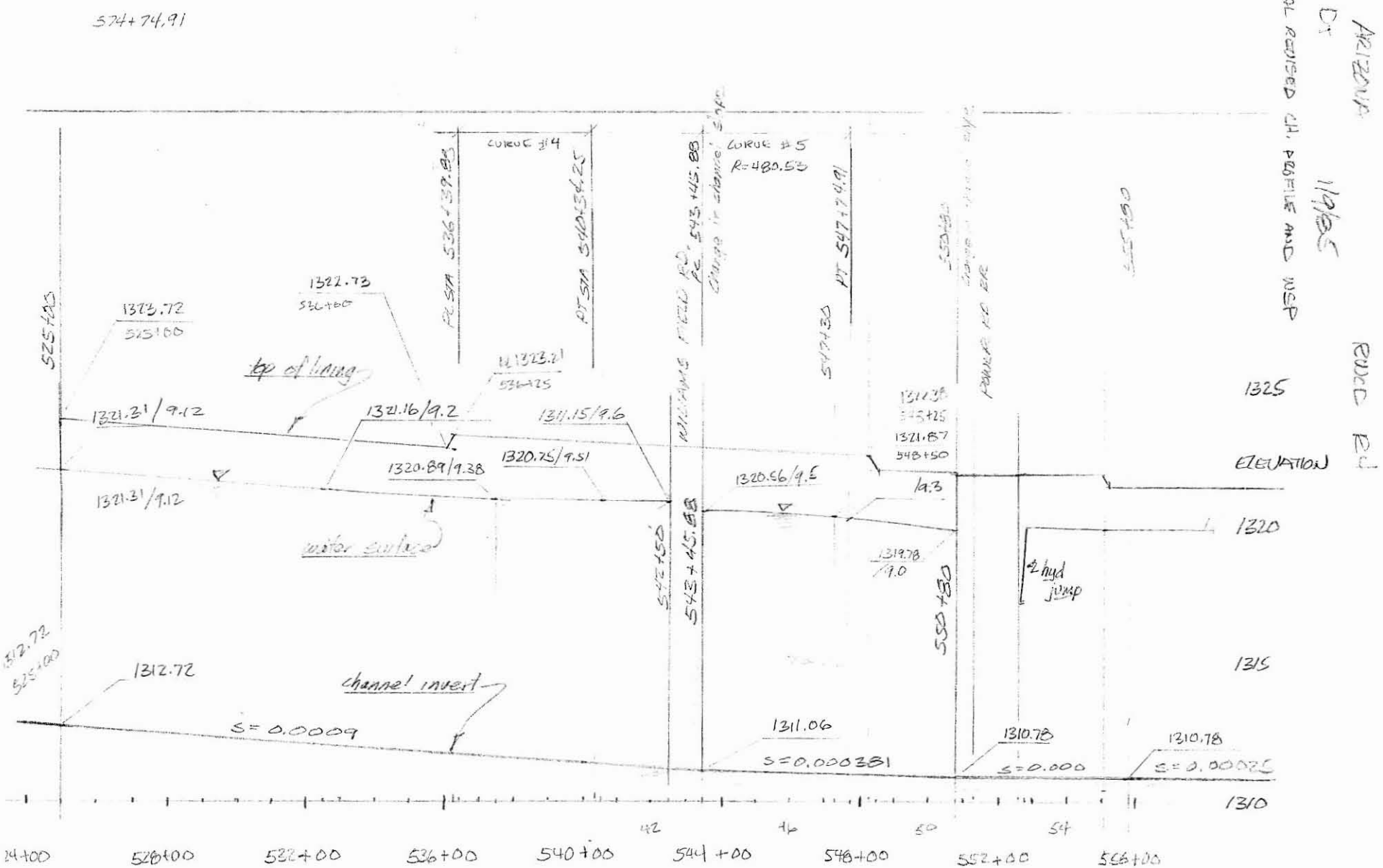
==========TANGENT==========

DISTANCE	DIST2	STATION	BW/2	BW
100.00	200.00	55370.00	40.00	80.00
110.00	190.00	55380.00	43.00	86.00
120.00	180.00	55390.00	46.00	92.00
130.00	170.00	55400.00	49.00	98.00
140.00	160.00	55410.00	52.00	104.00
150.00	150.00	55420.00	55.00	110.00
160.00	140.00	55430.00	58.00	116.00
170.00	130.00	55440.00	61.00	122.00
180.00	120.00	55450.00	64.00	128.00
190.00	110.00	55460.00	67.00	134.00
200.00	100.00	55470.00	70.00	140.00
210.00	90.00	55480.00	73.00	146.00
216.66	83.34	55486.66	75.00	150.00

Z

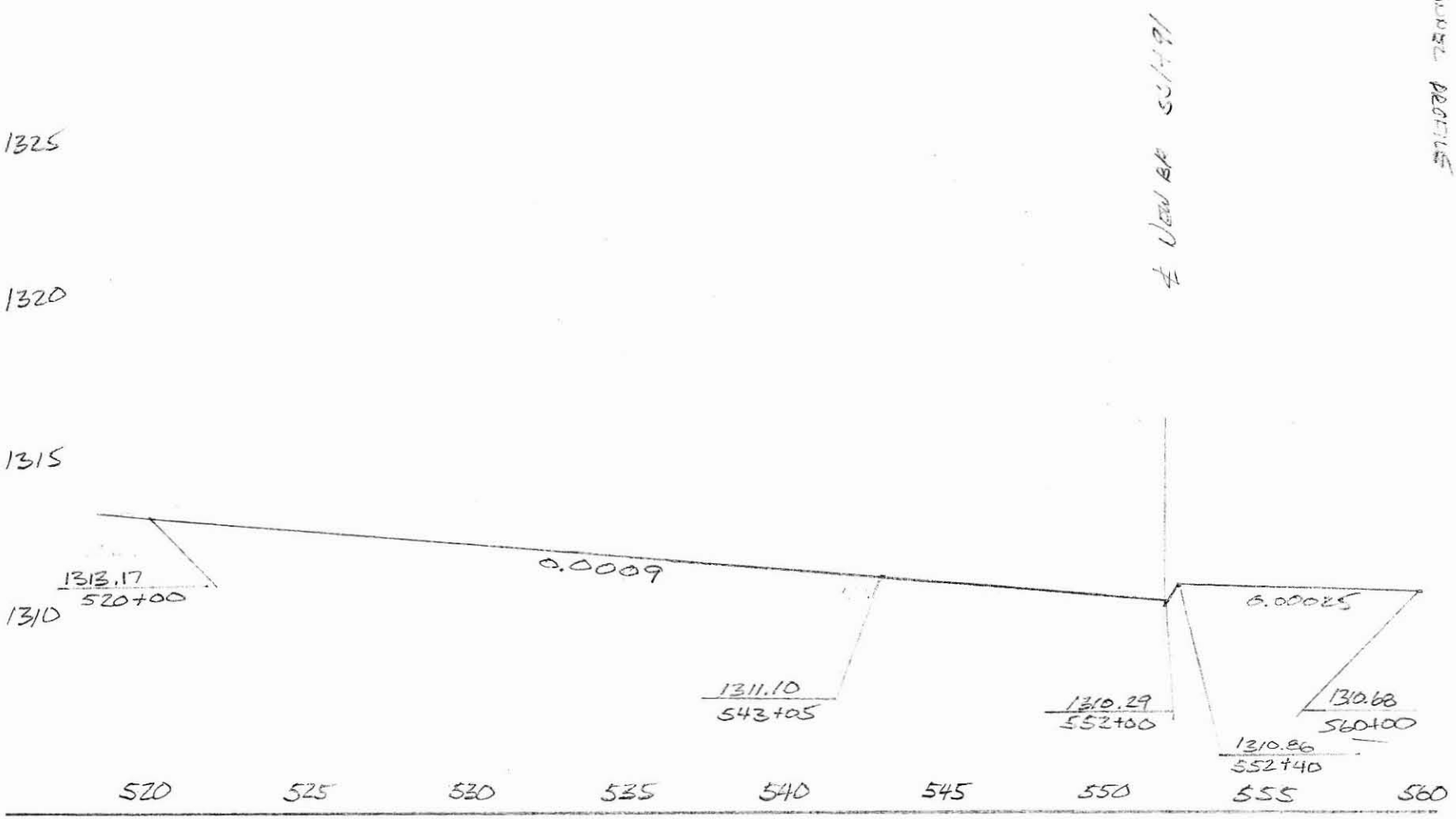
==========CURVE #2==========

DISTANCE	DIST 2	STATION	BW/2	BW
216.66	83.34	55486.66	75.00	150.00
220.00	80.00	55490.00	75.98	151.96
220.00	80.00	55490.00	75.98	151.96
230.00	70.00	55500.00	78.68	157.36
240.00	60.00	55510.00	81.02	162.04
250.00	50.00	55520.00	83.00	166.00
260.00	40.00	55530.00	84.62	169.24
270.00	30.00	55540.00	85.88	171.76
280.00	20.00	55550.00	86.78	173.56
290.00	10.00	55560.00	87.32	174.64
300.00	0.00	55570.00	87.50	175.00


ARIZONA
DT
11/9/85
FINAL REVISED CH. PROFILE AND WSP
RWCD RD
524+74.91
CURVE #4
CURVE #5
R=480.53
PT STA 536+39.85
PT STA 540+34.25
PT STA 547+70.91
PC STA 543+45.88
Change in channel slope
WILLIAMS FIELD RD
POWER RD BR
525+00
525+50
542+50
543+45.88
550+50
1322.73
526+00
1323.72
525+00
top of lining
1323.21
526+25
1321.31/9.12
1321.16/9.2
1311.15/9.6
1320.89/9.38
1320.75/9.51
1321.31/9.12
water surface
1320.66/9.5
1319.78
/9.0
1321.87
548+50
9.3
±hyd jump
1312.72
525+00
1312.72
channel invert
S=0.0009
1311.06
S=0.000381
1310.78
S=0.000
1310.78
S=0.00026
1325
ELEVATION
1320
1315
1310
24+00
526+00
528+00
532+00
536+00
540+00
544+00
548+00
552+00
556+00
42
46
50
54

ARIZONA
DT
PREVIOUS CHANNEL PROFILE

RWCD REACH 4



TRIAL 1 PROFILE

ARIZONA RWCC FLOODWAY REACH 1

DT 11/1/86

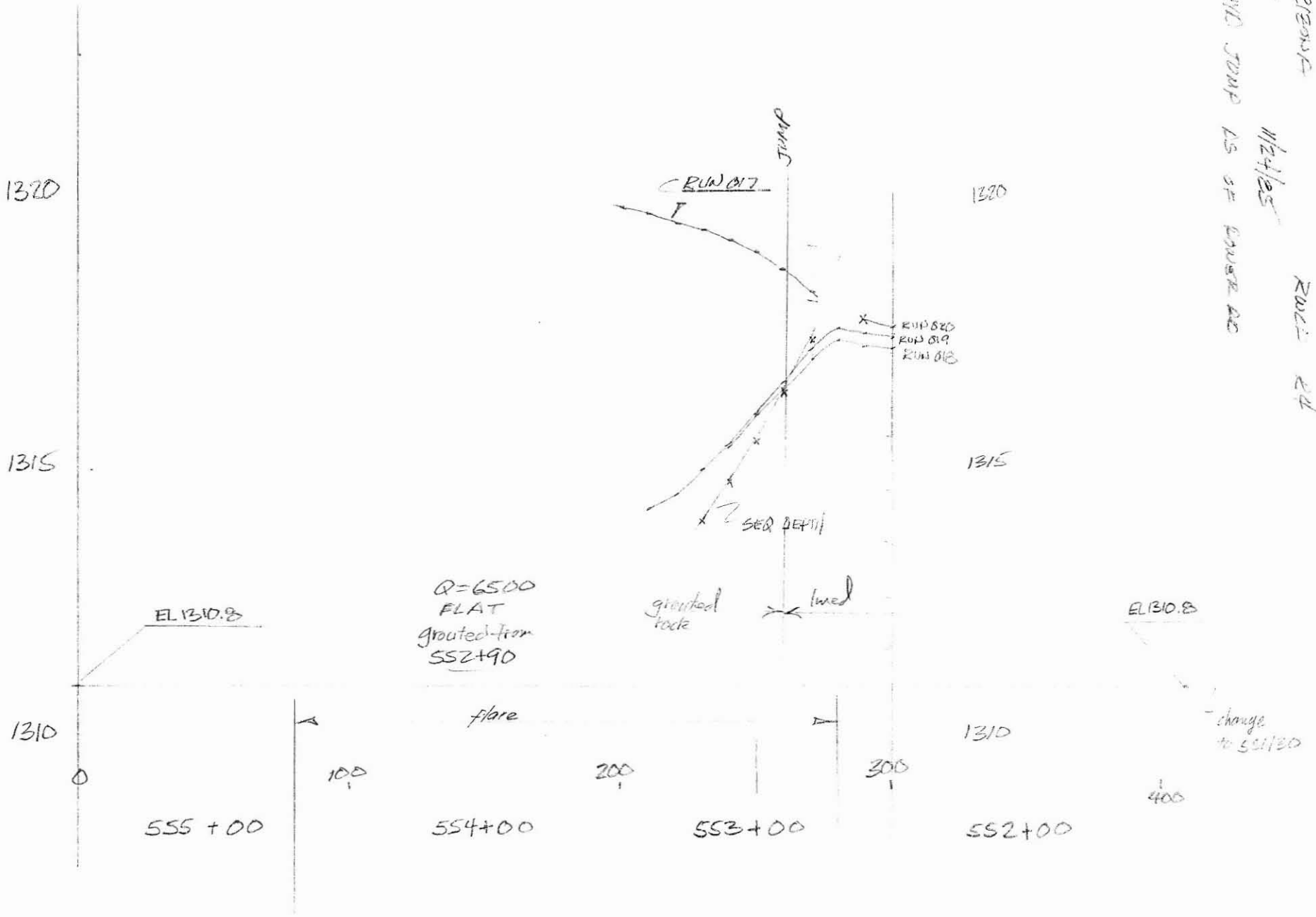
REMOVAL OF THE "HUMP" UNDER POWER RD. BRIDGE REQUIRED FLATTENING THE CHANNEL SLOPE FROM WILLIAMS FIELD RD. TO POWER RD.

THE INCREASED FLOW DEPTH WILL NECESSITATE INCREASING THE LINING DEPTH TO MAINTAIN FREEBOARD = 20% x depth + SUPERELEV.

STA	d	V	Rad	Super	0.2d + S	DEPTH
PT 547+74.91	9.3	10.2	480.53	0.30	2.16	11.46
PC 543+45.88	9.5	9.9	480.53	0.29	2.19	11.69
542+50	9.6	—	—	—	1.92	11.52
(548+00	9.3	—	—	—	1.86	11.16)
540+34.25	9.5	9.9	961.12	0.14	2.04	11.54
536+39.88	9.35	10.12	961.12	0.15	2.02	11.37
536+00.00	9.32	10.16	—	—	1.86	11.18

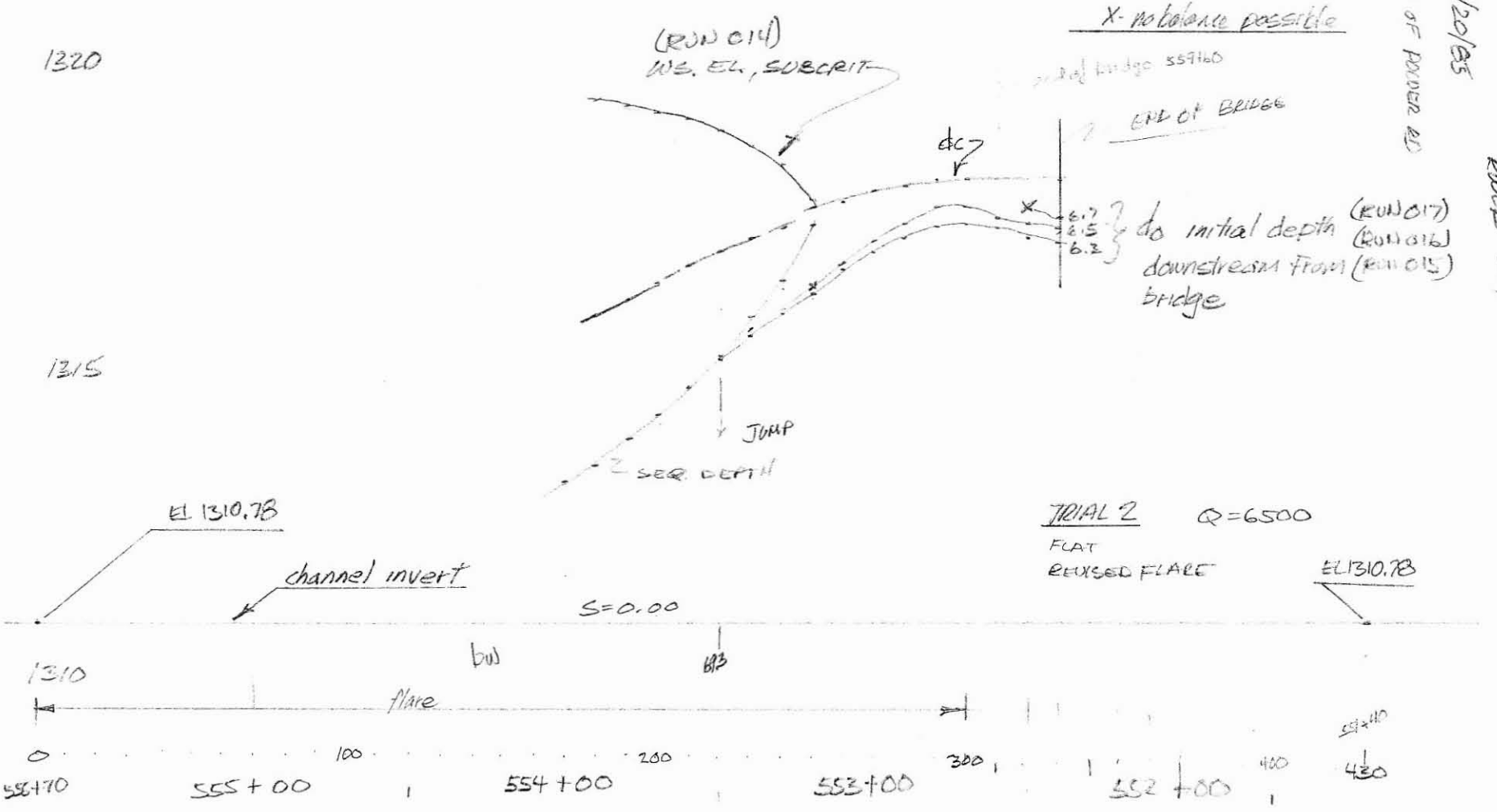
— INCREASE LINING DEPTH TO 11.5 FT FROM STA 536+25 TO 548+25

ARIZONA DT
11/24/85
HYD JUMP DS OF DAMSR RC
RWC RL



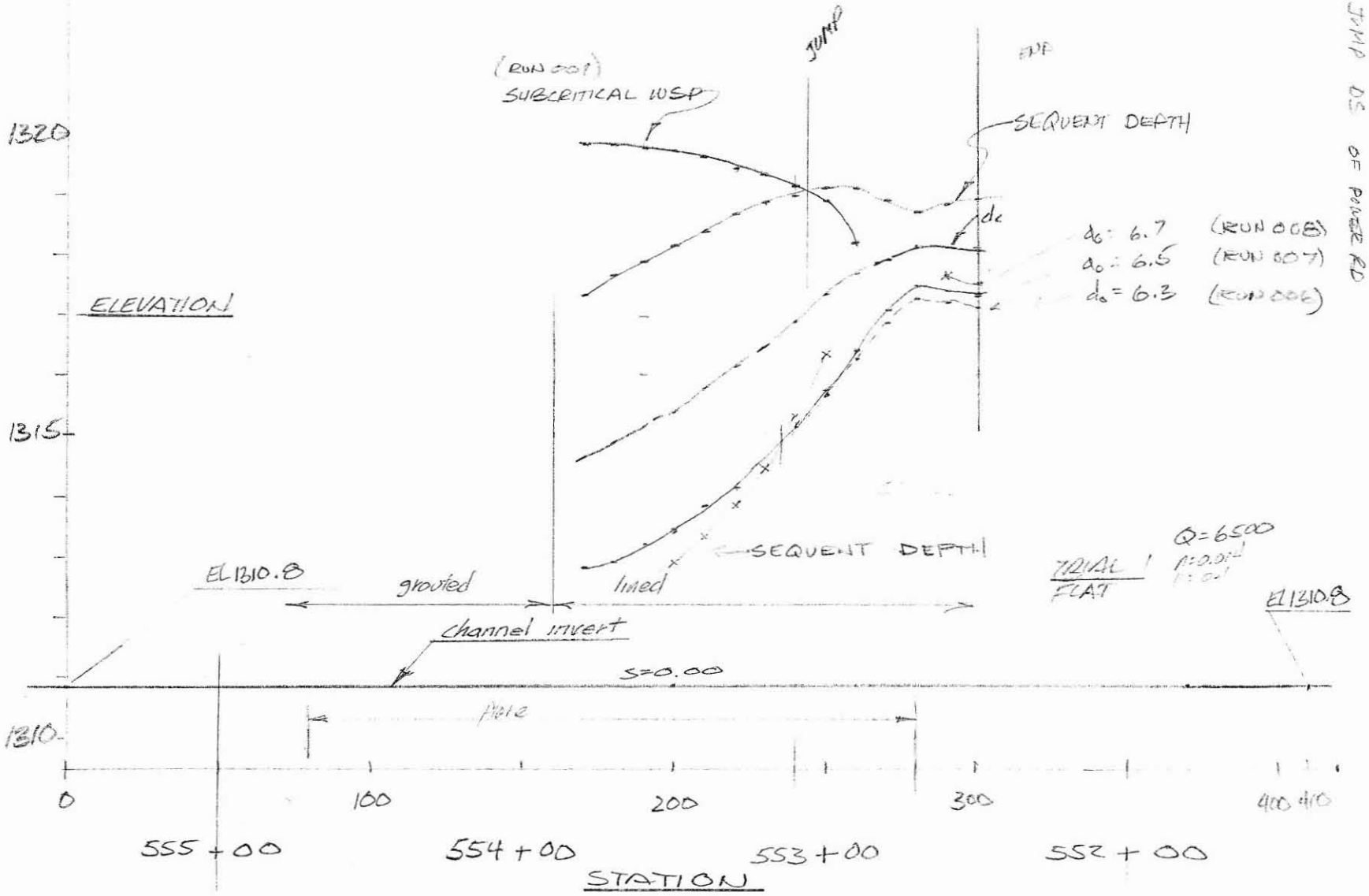
ARIZONA
" UT
11/20/85
HYDRAULIC JUMP DS OF POWER RD

RUCD R4



ARIZONA DT 11/85 RUCD R4

HYDRAULIC JUMP DS OF POWER RD

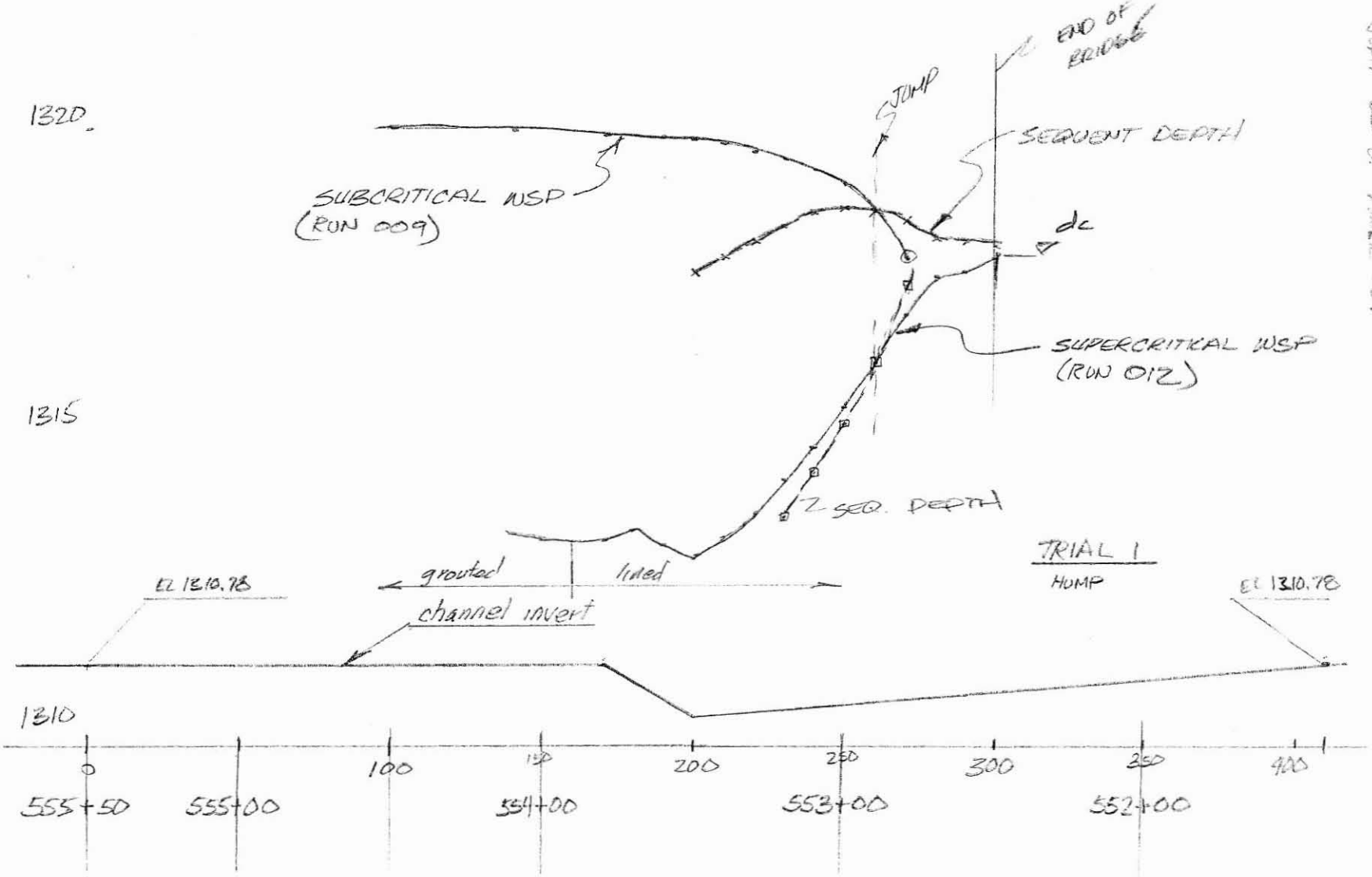


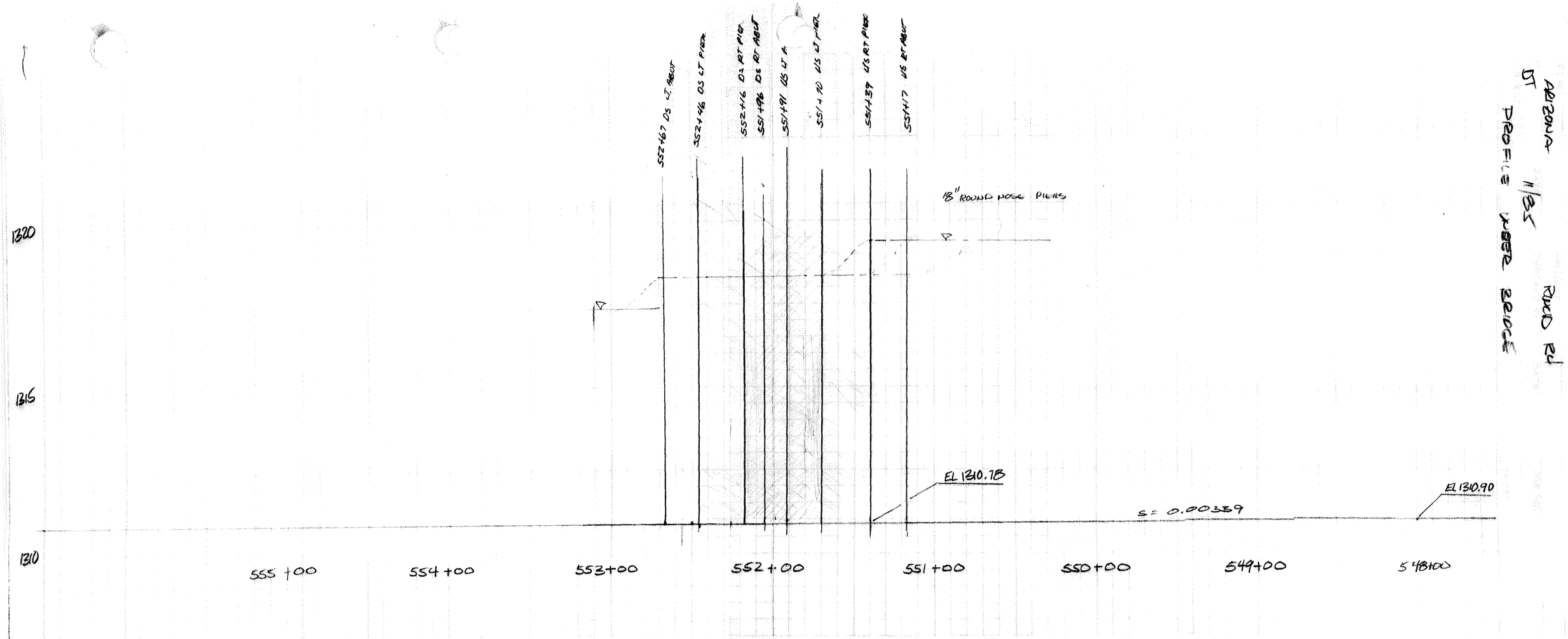
ARIZONA DT

11/85

HYDRAULIC JUMP DS OF FORCE EDI

REED R4




ARIZONA
DT
11/85
RIND RD
PROFILE WEST BRIDGE
552+67 DS LT ABUT
552+46 DS LT PIER
552+16 DS RT PIER
551+96 DS RT ABUT
551+91 US LT A
551+70 US LT PIER
551+39 US RT PIER
551+17 US RT ABUT
18" ROUND NOSE PIERS
EL 1310.78
S= 0.00339
EL 1310.90
1320
1315
1310
555+00
554+00
553+00
552+00
551+00
550+00
549+00
548+00

RWCD R4
DT 11/21
WSP SUMMARY
TRANSITION DES.

#	TRIAL	SUB/SUPER	Q	n	K	HUMP	d_o
001	1	SUB	6500	0.014	0.1	FLAT	—
002					0.0		
003				0.010	0.1		
004					0.0		
005			4875	0.014	0.1		
006		SUPER	6500	0.014	0.1	FLAT	6.3
007							6.5
008							6.7
009		SUB	6500	0.014	0.1	HUMP	
010					0.0		
011				0.010	0.6	HUMP	
012		SUPER	6500	0.014	0.1	HUMP	
013			4875	0.014	0.1	HUMP	

KUCD RW
OT 11/21
WSP SUMMARY
TRANSITION DES.

#	TRIAL	SUB/SUPER	Q	n	K	hump	d_0
014	2	SUB	6500	0.014	0.1	FLAT	—
015		SUPER		0.014	0.1	FLAT	-6.3
016							-6.5
~~[illegible]~~ 016A							-6.7
017		SUB	6500	0.030	0.1	FLAT	
018		SUPER	"	"	"	"	6.3
019		"	"	"	"	"	6.5
020		"	"	"	"	"	6.7
021		SUB	6500	0.014	from 551+30 UP		$d_0 = 8.6$
022							$d_0 = 9.0$

11:00 AM 11/14

SUB
Q=6500
n=0.014
K=0.1
FLAT

''WASP2''SUBCRITICAL WATER SURFACE PROFILE

COMPUTED BY: DATE: DATA FILE: R4NOV2 CHECKED BY:_____ DATE:_____

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
0+00.00	6500.00	175.00	3.00	3.430	8.990	1815.7	3.58	1319.99	1310.80	1319.79	8.81	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000336	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000339							
0+10.00	6500.00	175.00	3.00	3.430	8.994	1816.5	3.58	1319.99	1310.80	1319.79	10.83	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000335	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000340							
0+20.00	6500.00	175.00	3.00	3.430	8.997	1817.4	3.58	1320.00	1310.80	1319.80	10.84	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000335	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000334							
0+30.00	6500.00	175.00	3.00	3.430	9.001	1818.2	3.57	1320.00	1310.80	1319.80	10.84	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000334	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000340							
0+40.00	6500.00	175.00	3.00	3.430	9.004	1819.0	3.57	1320.00	1310.80	1319.80	10.84	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000334	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000321							
0+50.00	6500.00	175.00	3.00	3.430	9.008	1819.8	3.57	1320.01	1310.80	1319.81	10.85	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000333	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000326							
0+60.00	6500.00	175.00	3.00	3.430	9.011	1820.6	3.57	1320.01	1310.80	1319.81	10.85	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000333	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000319							
0+70.00	6500.00	175.00	3.00	3.430	9.015	1821.4	3.57	1320.01	1310.80	1319.81	10.86	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000332	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000324							
0+80.00	6500.00	175.00	3.00	3.430	9.018	1822.2	3.57	1320.02	1310.80	1319.82	10.86	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000332	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000328							
0+90.00	6500.00	174.97	3.00	3.430	9.022	1822.7	3.57	1320.02	1310.80	1319.82	10.87	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000332	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000328							
1+00.00	6500.00	174.76	3.00	3.433	9.025	1821.5	3.57	1320.02	1310.80	1319.82	10.87	0.22	0.87

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
	n=0.0300	So=0.000000	Sf=0.000333	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000338							

	n=0.0300	So=0.000000	Sf=0.000336	Headloss Factor=0.100	Total Headloss=0.004 ft.	Se=0.000364								00/2
1+20.00	6500.00	172.90	3.00	3.456	9.028	1805.5	3.60	1320.03	1310.80	1319.83	10.87	0.22	0.89	
	n=0.0300	So=0.000000	Sf=0.000343	Headloss Factor=0.100	Total Headloss=0.004 ft.	Se=0.000389								
1+30.00	6500.00	170.74	3.00	3.484	9.028	1785.9	3.64	1320.03	1310.80	1319.83	10.87	0.23	0.90	
	n=0.0300	So=0.000000	Sf=0.000357	Headloss Factor=0.100	Total Headloss=0.005 ft.	Se=0.000494								
1+40.00	6500.00	167.43	2.67	3.535	9.018	1727.1	3.76	1320.04	1310.80	1319.82	10.87	0.23	0.95	
	n=0.0300	So=0.000000	Sf=0.000382	Headloss Factor=0.100	Total Headloss=0.006 ft.	Se=0.000584								
1+50.00	6500.00	162.68	2.33	3.610	9.004	1653.8	3.93	1320.04	1310.80	1319.80	10.85	0.24	1.01	
	n=0.0300	So=0.000000	Sf=0.000419	Headloss Factor=0.100	Total Headloss=0.007 ft.	Se=0.000689								
1+60.00	6500.00	156.22	2.00	3.714	8.983	1564.8	4.15	1320.05	1310.80	1319.78	10.83	0.26	1.10	
	n=0.0300	So=0.000000	Sf=0.000468	Headloss Factor=0.100	Total Headloss=0.008 ft.	Se=0.000764								
1+70.00	6500.00	147.76	2.00	3.848	8.961	1484.7	4.38	1320.06	1310.80	1319.76	10.81	0.27	1.22	
	n=0.0140	So=0.000000	Sf=0.000224	Headloss Factor=0.100	Total Headloss=0.007 ft.	Se=0.000679								
1+80.00	6500.00	137.00	2.00	4.037	8.922	1381.5	4.70	1320.07	1310.80	1319.72	10.78	0.29	1.39	
	n=0.0140	So=0.000000	Sf=0.000141	Headloss Factor=0.100	Total Headloss=0.009 ft.	Se=0.000899								
1+90.00	6500.00	123.50	2.00	4.310	8.855	1250.5	5.20	1320.07	1310.80	1319.66	10.71	0.33	1.67	
	n=0.0140	So=0.000000	Sf=0.000180	Headloss Factor=0.100	Total Headloss=0.012 ft.	Se=0.001238								
2+00.00	6500.00	110.00	2.00	4.632	8.762	1117.3	5.82	1320.09	1310.80	1319.56	10.62	0.37	1312.85 2.05	
	n=0.0140	So=0.000000	Sf=0.000232	Headloss Factor=0.100	Total Headloss=0.015 ft.	Se=0.001524								
2+10.00	6500.00	98.46	2.00	4.959	8.648	1001.0	6.49	1320.10	1310.80	1319.45	10.51	0.42	1313.28 2.48	
	n=0.0140	So=0.000000	Sf=0.000302	Headloss Factor=0.100	Total Headloss=0.020 ft.	Se=0.002006								
2+20.00	6500.00	87.87	2.00	5.311	8.496	890.9	7.30	1320.12	1310.80	1319.30	10.36	0.48	1313.81 3.01	

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
	n=0.0140	So=0.000000	Sf=0.000402	Headloss Factor=0.100	Total Headloss=0.027 ft.	Se=0.002742							
2+30.00	6500.00	78.28	2.00	5.687	8.289	786.3	8.27	1320.15	1310.80	1319.09	10.16	0.55	1314.46 3.66
	n=0.0140	So=0.000000	Sf=0.000552	Headloss Factor=0.100	Total Headloss=0.039 ft.	Se=0.003886							
2+40.00	6500.00	69.79	2.00	6.077	7.994	685.7	9.48	1320.19	1310.80	1318.79	9.87	0.64	1315.27 4.47
	n=0.0140	So=0.000000	Sf=0.000801	Headloss Factor=0.100	Total Headloss=0.061 ft.	Se=0.006134							
2+50.00	6500.00	62.49	2.00	6.465	7.521	583.1	11.15	1320.25	1310.80	1318.32	9.41	0.78	1316.30 5.50

Jump

002

SOB
Q=6500
n=0.014
K= 0.0
FLAT

''WASP2''SUBCRITICAL WATER SURFACE PROFILE

10:30 AM

COMPUTED BY: DT DATE: 11/14/85 DATA FILE: R4NOV2 CHECKED BY:_____ DATE:_____

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
0+00.00	6500.00	175.00	3.00	3.430	8.990	1815.7	3.58	1319.99	1310.80	1319.79	9.70	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000336	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000326							
0+10.00	6500.00	175.00	3.00	3.430	8.993	1816.5	3.58	1319.99	1310.80	1319.79	10.83	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000335	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000327							
0+20.00	6500.00	175.00	3.00	3.430	8.997	1817.3	3.58	1320.00	1310.80	1319.80	10.84	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000335	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000320							
0+30.00	6500.00	175.00	3.00	3.430	9.000	1818.1	3.58	1320.00	1310.80	1319.80	10.84	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000334	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000325							
0+40.00	6500.00	175.00	3.00	3.430	9.004	1818.9	3.57	1320.00	1310.80	1319.80	10.84	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000334	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000330							
0+50.00	6500.00	175.00	3.00	3.430	9.007	1819.7	3.57	1320.01	1310.80	1319.81	10.85	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000333	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000324							
0+60.00	6500.00	175.00	3.00	3.430	9.011	1820.5	3.57	1320.01	1310.80	1319.81	10.85	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000333	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000329							
0+70.00	6500.00	175.00	3.00	3.430	9.014	1821.3	3.57	1320.01	1310.80	1319.81	10.86	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000333	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000322							
0+80.00	6500.00	175.00	3.00	3.430	9.018	1822.1	3.57	1320.02	1310.80	1319.82	10.86	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000332	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000326							
0+90.00	6500.00	174.97	3.00	3.430	9.021	1822.6	3.57	1320.02	1310.80	1319.82	10.86	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000332	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000325							
1+00.00	6500.00	174.76	3.00	3.433	9.024	1821.4	3.57	1320.02	1310.80	1319.82	10.87	0.22	0.87

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
	n=0.0300	So=0.000000	Sf=0.000333	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000324							

002/2

n=0.0300 So=0.000000 Sf=0.000336 Headloss Factor=0.000 Total Headloss=0.003 ft. Se=0.000336

1+20.00	6500.00	172.90	3.00	3.456	9.027	1805.3	3.60	1320.03	1310.80	1319.83	10.87	0.23	0.89

n=0.0300 So=0.000000 Sf=0.000343 Headloss Factor=0.000 Total Headloss=0.003 ft. Se=0.000336

1+30.00	6500.00	170.74	3.00	3.484	9.026	1785.6	3.64	1320.03	1310.80	1319.83	10.87	0.23	0.91

n=0.0300 So=0.000000 Sf=0.000357 Headloss Factor=0.000 Total Headloss=0.004 ft. Se=0.000352

1+40.00	6500.00	167.43	2.67	3.535	9.016	1726.5	3.76	1320.04	1310.80	1319.82	10.86	0.23	0.95

n=0.0300 So=0.000000 Sf=0.000383 Headloss Factor=0.000 Total Headloss=0.004 ft. Se=0.000373

1+50.00	6500.00	162.68	2.33	3.610	8.999	1652.7	3.93	1320.04	1310.80	1319.80	10.85	0.24	1.01

n=0.0300 So=0.000000 Sf=0.000420 Headloss Factor=0.000 Total Headloss=0.004 ft. Se=0.000414

1+60.00	6500.00	156.22	2.00	3.714	8.975	1563.2	4.16	1320.04	1310.80	1319.78	10.82	0.26	1.10

n=0.0300 So=0.000000 Sf=0.000470 Headloss Factor=0.000 Total Headloss=0.005 ft. Se=0.000454

1+70.00	6500.00	147.76	2.00	3.848	8.950	1482.6	4.38	1320.05	1310.80	1319.75	10.80	0.27	1.22

n=0.0140 So=0.000000 Sf=0.000225 Headloss Factor=0.000 Total Headloss=0.002 ft. Se=0.000214

1+80.00	6500.00	137.00	2.00	4.037	8.905	1378.6	4.71	1320.05	1310.80	1319.71	10.76	0.29	1.40

n=0.0140 So=0.000000 Sf=0.000143 Headloss Factor=0.000 Total Headloss=0.001 ft. Se=0.000144

1+90.00	6500.00	123.50	2.00	4.310	8.830	1246.4	5.22	1320.05	1310.80	1319.63	10.68	0.33	1.68

n=0.0140 So=0.000000 Sf=0.000182 Headloss Factor=0.000 Total Headloss=0.002 ft. Se=0.000181

2+00.00	6500.00	110.00	2.00	4.632	8.723	1111.7	5.85	1320.05	1310.80	1319.52	10.57	0.37	2.06

n=0.0140 So=0.000000 Sf=0.000236 Headloss Factor=0.000 Total Headloss=0.002 ft. Se=0.000229

2+10.00	6500.00	98.46	2.00	4.959	8.591	993.5	6.54	1320.06	1310.80	1319.39	10.44	0.42	2.51

n=0.0140 So=0.000000 Sf=0.000310 Headloss Factor=0.000 Total Headloss=0.003 ft. Se=0.000304

2+20.00	6500.00	87.87	2.00	5.311	8.414	880.9	7.38	1320.06	1310.80	1319.21	10.27	0.48	3.05

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH

n=0.0140 So=0.000000 Sf=0.000419 Headloss Factor=0.000 Total Headloss=0.004 ft. Se=0.000407

2+30.00	6500.00	78.28	2.00	5.687	8.163	772.3	8.42	1320.06	1310.80	1318.96	10.02	0.56	3.74

n=0.0140 So=0.000000 Sf=0.000593 Headloss Factor=0.000 Total Headloss=0.006 ft. Se=0.000596

2+40.00	6500.00	69.79	2.00	6.077	7.782	664.3	9.79	1320.07	1310.80	1318.58	9.64	0.67	4.62

n=0.0140 So=0.000000 Sf=0.000952 Headloss Factor=0.000 Total Headloss=0.010 ft. Se=0.000947

2+50.00	6500.00	62.49	2.00	6.465	6.956	531.4	12.23	1320.08	1310.80	1317.76	8.81	0.89	5.99

JUMP

11/14/85 8:00 A

SUB
Q=6500
n=0.010
K=0.1
FLAT

003

''WASP2''SUBCRITICAL WATER SURFACE PROFILE

COMPUTED BY: DATE: DATA FILE: R4NOV2 CHECKED BY:_____ DATE:_____

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
0+00.00	6500.00	175.00	3.00	3.430	8.990	1815.7	3.58	1319.99	1310.80	1319.79	11.96	0.22	0.87
	n=0.0300		So=0.000000		Sf=0.000336		Headloss Factor=0.100		Total Headloss=0.003 ft.		Se=0.000339		
0+10.00	6500.00	175.00	3.00	3.430	8.994	1816.5	3.58	1319.99	1310.80	1319.79	10.83	0.22	0.87
	n=0.0300		So=0.000000		Sf=0.000335		Headloss Factor=0.100		Total Headloss=0.003 ft.		Se=0.000340		
0+20.00	6500.00	175.00	3.00	3.430	8.997	1817.4	3.58	1320.00	1310.80	1319.80	10.84	0.22	0.87
	n=0.0300		So=0.000000		Sf=0.000335		Headloss Factor=0.100		Total Headloss=0.003 ft.		Se=0.000334		
0+30.00	6500.00	175.00	3.00	3.430	9.001	1818.2	3.57	1320.00	1310.80	1319.80	10.84	0.22	0.87
	n=0.0300		So=0.000000		Sf=0.000334		Headloss Factor=0.100		Total Headloss=0.003 ft.		Se=0.000340		
0+40.00	6500.00	175.00	3.00	3.430	9.004	1819.0	3.57	1320.00	1310.80	1319.80	10.84	0.22	0.87
	n=0.0300		So=0.000000		Sf=0.000334		Headloss Factor=0.100		Total Headloss=0.003 ft.		Se=0.000321		
0+50.00	6500.00	175.00	3.00	3.430	9.008	1819.8	3.57	1320.01	1310.80	1319.81	10.85	0.22	0.87
	n=0.0300		So=0.000000		Sf=0.000333		Headloss Factor=0.100		Total Headloss=0.003 ft.		Se=0.000326		
0+60.00	6500.00	175.00	3.00	3.430	9.011	1820.6	3.57	1320.01	1310.80	1319.81	10.85	0.22	0.87
	n=0.0300		So=0.000000		Sf=0.000333		Headloss Factor=0.100		Total Headloss=0.003 ft.		Se=0.000319		
0+70.00	6500.00	175.00	3.00	3.430	9.015	1821.4	3.57	1320.01	1310.80	1319.81	10.86	0.22	0.87
	n=0.0300		So=0.000000		Sf=0.000332		Headloss Factor=0.100		Total Headloss=0.003 ft.		Se=0.000324		
0+80.00	6500.00	175.00	3.00	3.430	9.018	1822.2	3.57	1320.02	1310.80	1319.82	10.86	0.22	0.87
	n=0.0300		So=0.000000		Sf=0.000332		Headloss Factor=0.100		Total Headloss=0.003 ft.		Se=0.000328		
0+90.00	6500.00	174.97	3.00	3.430	9.022	1822.7	3.57	1320.02	1310.80	1319.82	10.87	0.22	0.87
	n=0.0300		So=0.000000		Sf=0.000332		Headloss Factor=0.100		Total Headloss=0.003 ft.		Se=0.000328		
1+00.00	6500.00	174.76	3.00	3.433	9.025	1821.5	3.57	1320.02	1310.80	1319.82	10.87	0.22	0.87

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH

n=0.0300 So=0.000000 Sf=0.000333 Headloss Factor=0.100 Total Headloss=0.003 ft. Se=0.000338

n=0.0300 So=0.000000 Sf=0.000336 Headloss Factor=0.100 Total Headloss=0.003 ft. Se=0.000336

1+20.00	6500.00	172.90	3.00	3.456	9.028	1805.5	3.60	1320.03	1310.80	1319.83	10.87	0.22	0.89	

n=0.0300 So=0.000000 Sf=0.000343 Headloss Factor=0.100 Total Headloss=0.004 ft. Se=0.000389

1+30.00	6500.00	170.74	3.00	3.484	9.028	1785.9	3.64	1320.03	1310.80	1319.83	10.87	0.23	0.90	

n=0.0300 So=0.000000 Sf=0.000357 Headloss Factor=0.100 Total Headloss=0.005 ft. Se=0.000494

1+40.00	6500.00	167.43	2.67	3.535	9.018	1727.1	3.76	1320.04	1310.80	1319.82	10.87	0.23	0.95	

n=0.0300 So=0.000000 Sf=0.000382 Headloss Factor=0.100 Total Headloss=0.006 ft. Se=0.000584

1+50.00	6500.00	162.68	2.33	3.610	9.004	1653.8	3.93	1320.04	1310.80	1319.80	10.85	0.24	1.01	

n=0.0300 So=0.000000 Sf=0.000419 Headloss Factor=0.100 Total Headloss=0.007 ft. Se=0.000689

1+60.00	6500.00	156.22	2.00	3.714	8.983	1564.8	4.15	1320.05	1310.80	1319.78	10.83	0.26	1.10	

n=0.0300 So=0.000000 Sf=0.000468 Headloss Factor=0.100 Total Headloss=0.008 ft. Se=0.000764

1+70.00	6500.00	147.76	2.00	3.848	8.961	1484.7	4.38	1320.06	1310.80	1319.76	10.81	0.27	1.22	

n=0.0100 So=0.000000 Sf=0.000140 Headloss Factor=0.100 Total Headloss=0.006 ft. Se=0.000593

1+80.00	6500.00	137.00	2.00	4.037	8.921	1381.4	4.71	1320.07	1310.80	1319.72	10.77	0.29	1.39	

n=0.0100 So=0.000000 Sf=0.000072 Headloss Factor=0.100 Total Headloss=0.008 ft. Se=0.000830

1+90.00	6500.00	123.50	2.00	4.310	8.853	1250.2	5.20	1320.07	1310.80	1319.65	10.71	0.33	1.67	

n=0.0100 So=0.000000 Sf=0.000092 Headloss Factor=0.100 Total Headloss=0.012 ft. Se=0.001146

2+00.00	6500.00	110.00	2.00	4.632	8.759	1116.9	5.82	1320.08	1310.80	1319.56	10.62	0.37	2.05	1312.85

n=0.0100 So=0.000000 Sf=0.000118 Headloss Factor=0.100 Total Headloss=0.014 ft. Se=0.001408

2+10.00	6500.00	98.46	2.00	4.959	8.643	1000.4	6.50	1320.10	1310.80	1319.44	10.50	0.42	2.48	1313.28

n=0.0100 So=0.000000 Sf=0.000154 Headloss Factor=0.100 Total Headloss=0.019 ft. Se=0.001879

2+20.00	6500.00	87.87	2.00	5.311	8.490	890.1	7.30	1320.12	1310.80	1319.29	10.35	0.48	3.02	1313.82

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH	

n=0.0100 So=0.000000 Sf=0.000206 Headloss Factor=0.100 Total Headloss=0.026 ft. Se=0.002559

2+30.00	6500.00	78.28	2.00	5.687	8.279	785.2	8.28	1320.14	1310.80	1319.08	10.15	0.55	3.67	1314.47

n=0.0100 So=0.000000 Sf=0.000283 Headloss Factor=0.100 Total Headloss=0.037 ft. Se=0.003653

2+40.00	6500.00	69.79	2.00	6.077	7.978	684.1	9.50	1320.18	1310.80	1318.78	9.85	0.65	4.48	1315.28

n=0.0100 So=0.000000 Sf=0.000413 Headloss Factor=0.100 Total Headloss=0.059 ft. Se=0.005870

2+50.00	6500.00	62.49	2.00	6.465	7.490	580.3	11.20	1320.24	1310.80	1318.29	9.38	0.79	5.53	1316.33

JUMP

11/14/85 8:30a

SUM
Q=6500
n=0.10
K=0
FLAT

004

''WASP2''SUBCRITICAL WATER SURFACE PROFILE

COMPUTED BY: DATE: DATA FILE: R4NOV2 CHECKED BY:_____ DATE:_____

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
0+00.00	6500.00	175.00	3.00	3.430	8.990	1815.7	3.58	1319.99	1310.80	1319.79	9.38	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000336	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000326							
0+10.00	6500.00	175.00	3.00	3.430	8.993	1816.5	3.58	1319.99	1310.80	1319.79	10.83	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000335	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000327							
0+20.00	6500.00	175.00	3.00	3.430	8.997	1817.3	3.58	1320.00	1310.80	1319.80	10.84	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000335	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000320							
0+30.00	6500.00	175.00	3.00	3.430	9.000	1818.1	3.58	1320.00	1310.80	1319.80	10.84	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000334	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000325							
0+40.00	6500.00	175.00	3.00	3.430	9.004	1818.9	3.57	1320.00	1310.80	1319.80	10.84	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000334	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000330							
0+50.00	6500.00	175.00	3.00	3.430	9.007	1819.7	3.57	1320.01	1310.80	1319.81	10.85	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000333	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000324							
0+60.00	6500.00	175.00	3.00	3.430	9.011	1820.5	3.57	1320.01	1310.80	1319.81	10.85	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000333	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000329							
0+70.00	6500.00	175.00	3.00	3.430	9.014	1821.3	3.57	1320.01	1310.80	1319.81	10.86	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000333	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000322							
0+80.00	6500.00	175.00	3.00	3.430	9.018	1822.1	3.57	1320.02	1310.80	1319.82	10.86	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000332	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000326							
0+90.00	6500.00	174.97	3.00	3.430	9.021	1822.6	3.57	1320.02	1310.80	1319.82	10.86	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000332	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000325							
1+00.00	6500.00	174.76	3.00	3.433	9.024	1821.4	3.57	1320.02	1310.80	1319.82	10.87	0.22	0.87

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
	n=0.0300	So=0.000000	Sf=0.000333	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000324							
1+10.00	6500.00	174.15	3.00	3.440	9.026	1816.4	3.58	1320.03	1310.80	1319.83	10.87	0.22	0.87

004/2

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        n=0.0300      So=0.000000      Sf=0.000336     Headloss Factor=0.000    Total Headloss=0.003 ft.   Se=0.000336
1+20.00  6500.00  172.90   3.00   3.456   9.027   1805.3    3.60   1320.03   1310.80   1319.83   10.87   0.23   0.89
        n=0.0300      So=0.000000      Sf=0.000343     Headloss Factor=0.000    Total Headloss=0.003 ft.   Se=0.000336
1+30.00  6500.00  170.74   3.00   3.484   9.026   1785.6    3.64   1320.03   1310.80   1319.83   10.87   0.23   0.91
        n=0.0300      So=0.000000      Sf=0.000357     Headloss Factor=0.000    Total Headloss=0.004 ft.   Se=0.000352
1+40.00  6500.00  167.43   2.67   3.535   9.016   1726.5    3.76   1320.04   1310.80   1319.82   10.86   0.23   0.95
        n=0.0300      So=0.000000      Sf=0.000383     Headloss Factor=0.000    Total Headloss=0.004 ft.   Se=0.000373
1+50.00  6500.00  162.68   2.33   3.610   8.999   1652.7    3.93   1320.04   1310.80   1319.80   10.85   0.24   1.01
        n=0.0300      So=0.000000      Sf=0.000420     Headloss Factor=0.000    Total Headloss=0.004 ft.   Se=0.000414
1+60.00  6500.00  156.22   2.00   3.714   8.975   1563.2    4.16   1320.04   1310.80   1319.78   10.82   0.26   1.10
        n=0.0300      So=0.000000      Sf=0.000470     Headloss Factor=0.000    Total Headloss=0.005 ft.   Se=0.000454
1+70.00  6500.00  147.76   2.00   3.848   8.950   1482.6    4.38   1320.05   1310.80   1319.75   10.80   0.27   1.22
        n=0.0100      So=0.000000      Sf=0.000141     Headloss Factor=0.000    Total Headloss=0.001 ft.   Se=0.000141
1+80.00  6500.00  137.00   2.00   4.037   8.904   1378.5    4.72   1320.05   1310.80   1319.70   10.75   0.29   1.40
        n=0.0100      So=0.000000      Sf=0.000073     Headloss Factor=0.000    Total Headloss=0.001 ft.   Se=0.000065
1+90.00  6500.00  123.50   2.00   4.310   8.828   1246.1    5.22   1320.05   1310.80   1319.63   10.68   0.33   1.68
        n=0.0100      So=0.000000      Sf=0.000093     Headloss Factor=0.000    Total Headloss=0.001 ft.   Se=0.000091
2+00.00  6500.00  110.00   2.00   4.632   8.720   1111.3    5.85   1320.05   1310.80   1319.52   10.57   0.37   2.06
        n=0.0100      So=0.000000      Sf=0.000121     Headloss Factor=0.000    Total Headloss=0.001 ft.   Se=0.000119
2+10.00  6500.00   98.46   2.00   4.959   8.587    993.0    6.55   1320.05   1310.80   1319.39   10.44   0.42   2.51
        n=0.0100      So=0.000000      Sf=0.000159     Headloss Factor=0.000    Total Headloss=0.002 ft.   Se=0.000157
2+20.00  6500.00   87.87   2.00   5.311   8.407    880.1    7.39   1320.05   1310.80   1319.21   10.26   0.48   3.06
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PAGE 3

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STATION     Q        B       Z       Dc      DEPTH    AREA     VELOC    E.G.L    INV EL   W.S.EL   FREE     FROUDE   SEQUENT
                                                                                                   BOARD    NUMBER   DEPTH

        n=0.0100      So=0.000000      Sf=0.000215     Headloss Factor=0.000    Total Headloss=0.002 ft.   Se=0.000211
2+30.00  6500.00   78.28   2.00   5.687   8.153    771.2    8.43   1320.06   1310.80   1318.95   10.00   0.56   3.75
        n=0.0100      So=0.000000      Sf=0.000304     Headloss Factor=0.000    Total Headloss=0.003 ft.   Se=0.000303
2+40.00  6500.00   69.79   2.00   6.077   7.764    662.5    9.81   1320.06   1310.80   1318.56    9.62   0.67   4.63
        n=0.0100      So=0.000000      Sf=0.000496     Headloss Factor=0.000    Total Headloss=0.005 ft.   Se=0.000499
2+50.00  6500.00   62.49   2.00   6.465   6.883    524.9   12.38   1320.06   1310.80   1317.68    8.74   0.90   6.06
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JUMP

11/14/85

SUB
Q=4875
n=0.14
K=0.1
FLAT

665

''WASP2''SUBCRITICAL WATER SURFACE PROFILE

COMPUTED BY: DATE: DATA FILE: R4NOV3 CHECKED BY:_____ DATE:_____

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
0+00.00	4875.00	175.00	3.00	2.841	7.630	1509.9	3.23	1318.59	1310.80	1318.43	9.41	0.22	0.70
	n=0.0300	So=0.000000	Sf=0.000332	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000330							
0+10.00	4875.00	175.00	3.00	2.841	7.633	1510.7	3.23	1318.60	1310.80	1318.43	9.19	0.22	0.70
	n=0.0300	So=0.000000	Sf=0.000331	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000328							
0+20.00	4875.00	175.00	3.00	2.841	7.637	1511.5	3.23	1318.60	1310.80	1318.44	9.20	0.22	0.70
	n=0.0300	So=0.000000	Sf=0.000331	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000320							
0+30.00	4875.00	175.00	3.00	2.841	7.640	1512.2	3.22	1318.60	1310.80	1318.44	9.20	0.22	0.69
	n=0.0300	So=0.000000	Sf=0.000330	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000324							
0+40.00	4875.00	175.00	3.00	2.841	7.644	1513.0	3.22	1318.61	1310.80	1318.44	9.20	0.22	0.69
	n=0.0300	So=0.000000	Sf=0.000330	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000328							
0+50.00	4875.00	175.00	3.00	2.841	7.647	1513.7	3.22	1318.61	1310.80	1318.45	9.21	0.22	0.69
	n=0.0300	So=0.000000	Sf=0.000329	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000320							
0+60.00	4875.00	175.00	3.00	2.841	7.651	1514.5	3.22	1318.61	1310.80	1318.45	9.21	0.22	0.69
	n=0.0300	So=0.000000	Sf=0.000329	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000324							
0+70.00	4875.00	175.00	3.00	2.841	7.654	1515.3	3.22	1318.62	1310.80	1318.45	9.22	0.22	0.69
	n=0.0300	So=0.000000	Sf=0.000328	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000328							
0+80.00	4875.00	175.00	3.00	2.841	7.658	1516.0	3.22	1318.62	1310.80	1318.46	9.22	0.22	0.69
	n=0.0300	So=0.000000	Sf=0.000328	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000320							
0+90.00	4875.00	174.97	3.00	2.841	7.661	1516.6	3.21	1318.62	1310.80	1318.46	9.23	0.22	0.69
	n=0.0300	So=0.000000	Sf=0.000328	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000319							
1+00.00	4875.00	174.76	3.00	2.844	7.664	1515.6	3.22	1318.62	1310.80	1318.46	9.23	0.22	0.69

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH

n=0.0300 So=0.000000 Sf=0.000329 Headloss Factor=0.100 Total Headloss=0.003 ft. Se=0.000336

005/2

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          n=0.0300      So=0.000000     Sf=0.000332    Headloss Factor=0.100    Total Headloss=0.004 ft.   Se=0.000346
1+20.00   4875.00  172.90    3.00    2.863    7.668    1502.3     3.25   1318.63    1310.80   1318.47     9.23    0.22    0.70
          n=0.0300      So=0.000000     Sf=0.000338    Headloss Factor=0.100    Total Headloss=0.004 ft.   Se=0.000378
1+30.00   4875.00  170.74    3.00    2.886    7.668    1485.7     3.28   1318.64    1310.80   1318.47     9.24    0.22    0.72
          n=0.0300      So=0.000000     Sf=0.000352    Headloss Factor=0.100    Total Headloss=0.005 ft.   Se=0.000463
1+40.00   4875.00  167.43    2.67    2.928    7.662    1439.6     3.39   1318.64    1310.80   1318.46     9.23    0.23    0.75
          n=0.0300      So=0.000000     Sf=0.000375    Headloss Factor=0.100    Total Headloss=0.005 ft.   Se=0.000524
1+50.00   4875.00  162.68    2.33    2.989    7.652    1381.3     3.53   1318.65    1310.80   1318.45     9.22    0.24    0.80
          n=0.0300      So=0.000000     Sf=0.000410    Headloss Factor=0.100    Total Headloss=0.006 ft.   Se=0.000611
1+60.00   4875.00  156.22    2.00    3.074    7.637    1309.6     3.72   1318.65    1310.80   1318.44     9.21    0.25    0.87
          n=0.0300      So=0.000000     Sf=0.000457    Headloss Factor=0.100    Total Headloss=0.007 ft.   Se=0.000694
1+70.00   4875.00  147.76    2.00    3.186    7.619    1242.0     3.93   1318.66    1310.80   1318.42     9.19    0.26    0.96
          n=0.0140      So=0.000000     Sf=0.000219    Headloss Factor=0.100    Total Headloss=0.006 ft.   Se=0.000594
1+80.00   4875.00  137.00    2.00    3.345    7.588    1154.7     4.22   1318.66    1310.80   1318.39     9.16    0.28    1.11
          n=0.0140      So=0.000000     Sf=0.000138    Headloss Factor=0.100    Total Headloss=0.008 ft.   Se=0.000747
1+90.00   4875.00  123.50    2.00    3.573    7.534    1043.9     4.67   1318.67    1310.80   1318.33     9.11    0.32    1.33
          n=0.0140      So=0.000000     Sf=0.000176    Headloss Factor=0.100    Total Headloss=0.010 ft.   Se=0.001031
2+00.00   4875.00  110.00    2.00    3.843    7.457    931.5      5.23   1318.68    1310.80   1318.26     9.03    0.36    1.64
          n=0.0140      So=0.000000     Sf=0.000227    Headloss Factor=0.100    Total Headloss=0.013 ft.   Se=0.001278
2+10.00   4875.00   98.46    2.00    4.118    7.364    833.6      5.85   1318.70    1310.80   1318.16     8.94    0.40    1.99
          n=0.0140      So=0.000000     Sf=0.000295    Headloss Factor=0.100    Total Headloss=0.017 ft.   Se=0.001704
2+20.00   4875.00   87.87    2.00    4.416    7.241    741.1      6.58   1318.71    1310.80   1318.04     8.82    0.46    2.42
                                                                                                                   PAGE  3
STATION      Q        B        Z       Dc      DEPTH     AREA      VELOC     E.G.L     INV EL    W.S.EL    FREE    FROUDE  SEQUENT
                                                                                                            BOARD   NUMBER   DEPTH

          n=0.0140      So=0.000000     Sf=0.000393    Headloss Factor=0.100    Total Headloss=0.023 ft.   Se=0.002296
2+30.00   4875.00   78.28    2.00    4.736    7.072    653.6      7.46   1318.74    1310.80   1317.87     8.66    0.53    2.96
          n=0.0140      So=0.000000     Sf=0.000538    Headloss Factor=0.100    Total Headloss=0.032 ft.   Se=0.003243
2+40.00   4875.00   69.79    2.00    5.068    6.833    570.3      8.55   1318.77    1310.80   1317.63     8.43    0.62    3.61
          n=0.0140      So=0.000000     Sf=0.000772    Headloss Factor=0.100    Total Headloss=0.049 ft.   Se=0.004938
2+50.00   4875.00   62.49    2.00    5.402    6.466    487.7     10.00   1318.82    1310.80   1317.27     8.07    0.75    4.45
                                                                                                                   PAGE  1

  ''WASP2''SUPERCRITICAL WATER SURFACE PROFILE
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006

SUPER
Q=6500
n=0.014
k=0.10
FLAT
d_o=6.3

''WASP2''SUPERCRITICAL WATER SURFACE PROFILE

COMPUTED BY: DATE: DATA FILE: R4NOV6 CHECKED BY:_____ DATE:_____

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
3+00.00	6500.00	50.00	2.00	7.280	6.300	394.4	16.48	1321.32	1310.80	1317.10	8.57	1.27	8.36
	n=0.0140	So=0.000000		Sf=0.002737		Headloss Factor=0.100		Total Headloss=0.038 ft.			Se=0.003745		
2+90.00	6500.00	50.00	2.00	7.280	6.364	399.2	16.28	1321.28	1310.80	1317.16	7.96	1.25	8.28
	n=0.0140	So=0.000000		Sf=0.002637		Headloss Factor=0.100		Total Headloss=0.037 ft.			Se=0.003697		
2+80.00	6500.00	50.00	2.00	7.280	6.435	404.5	16.07	1321.24	1310.80	1317.23	8.04	1.23	8.20
	n=0.0140	So=0.000000		Sf=0.002763		Headloss Factor=0.100		Total Headloss=0.059 ft.			Se=0.005887		
2+70.00	6500.00	52.15	2.00	7.124	6.061	389.5	16.69	1321.18	1310.80	1316.86	7.58	1.30	8.30
	n=0.0140	So=0.000000		Sf=0.003287		Headloss Factor=0.100		Total Headloss=0.085 ft.			Se=0.008453		
2+60.00	6500.00	56.53	2.00	6.827	5.457	368.1	17.66	1321.10	1310.80	1316.26	6.82	1.44	8.38
	n=0.0140	So=0.000000		Sf=0.004092		Headloss Factor=0.100		Total Headloss=0.093 ft.			Se=0.009258		
2+50.00	6500.00	62.49	2.00	6.465	4.846	349.8	18.58	1321.01	1310.80	1315.65	6.06	1.58	8.38
	n=0.0140	So=0.000000		Sf=0.005086		Headloss Factor=0.100		Total Headloss=0.098 ft.			Se=0.009739		
2+40.00	6500.00	69.79	2.00	6.077	4.282	335.5	19.37	1320.91	1310.80	1315.08	5.35	1.74	8.27
	n=0.0140	So=0.000000		Sf=0.006256		Headloss Factor=0.100		Total Headloss=0.102 ft.			Se=0.010224		
2+30.00	6500.00	78.28	2.00	5.687	3.781	324.6	20.02	1320.81	1310.80	1314.58	4.73	1.89	8.10
	n=0.0140	So=0.000000		Sf=0.007601		Headloss Factor=0.100		Total Headloss=0.109 ft.			Se=0.010862		
2+20.00	6500.00	87.87	2.00	5.311	3.346	316.4	20.54	1320.70	1310.80	1314.15	4.18	2.05	7.88
	n=0.0140	So=0.000000		Sf=0.009117		Headloss Factor=0.100		Total Headloss=0.117 ft.			Se=0.011668		
2+10.00	6500.00	98.46	2.00	4.959	2.973	310.4	20.94	1320.58	1310.80	1313.77	3.72	2.20	7.64
	n=0.0140	So=0.000000		Sf=0.010791		Headloss Factor=0.100		Total Headloss=0.127 ft.			Se=0.012690		
2+00.00	6500.00	110.00	2.00	4.632	2.655	306.1	21.23	1320.46	1310.80	1313.46	3.32	2.35	7.38

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
	n=0.0140	So=0.000000		Sf=0.012691		Headloss Factor=0.100		Total Headloss=0.142 ft.			Se=0.014177		

n=0.0140 So=0.000000 Sf=0.014742 Headloss Factor=0.100 Total Headloss=0.155 ft. Se=0.015474

1+80.00	6500.00	137.00	2.00	4.037	2.133	301.3	21.57	1320.16	1310.80	1312.93	2.67	2.64	6.82

n=0.0300 So=0.000000 Sf=0.029782 Headloss Factor=0.100 Total Headloss=0.318 ft. Se=0.031734

1+70.00	6500.00	147.76	2.00	3.848	2.013	305.5	21.28	1319.84	1310.80	1312.81	2.52	2.68	6.55

n=0.0300 So=0.000000 Sf=0.070891 Headloss Factor=0.100 Total Headloss=0.789 ft. Se=0.078895

1+60.00	6500.00	156.22	2.00	3.714	2.025	324.6	20.03	1319.05	1310.80	1312.83	2.53	2.51	6.14

n=0.0300 So=0.000000 Sf=0.061736 Headloss Factor=0.100 Total Headloss=0.690 ft. Se=0.068986

1+50.00	6500.00	162.68	2.33	3.610	2.062	345.4	18.82	1318.36	1310.80	1312.86	2.58	2.34	5.77

n=0.0300 So=0.000000 Sf=0.052876 Headloss Factor=0.100 Total Headloss=0.595 ft. Se=0.059462

1+40.00	6500.00	167.43	2.67	3.535	2.127	368.1	17.66	1317.77	1310.80	1312.93	2.66	2.17	5.45

n=0.0300 So=0.000000 Sf=0.044505 Headloss Factor=0.100 Total Headloss=0.504 ft. Se=0.050419

1+30.00	6500.00	170.74	3.00	3.484	2.215	393.0	16.54	1317.26	1310.80	1313.02	2.77	1.99	5.15

n=0.0300 So=0.000000 Sf=0.036643 Headloss Factor=0.100 Total Headloss=0.421 ft. Se=0.042070

1+20.00	6500.00	172.90	3.00	3.456	2.339	420.9	15.44	1316.84	1310.80	1313.14	2.92	1.81	4.87

n=0.0300 So=0.000000 Sf=0.029523 Headloss Factor=0.100 Total Headloss=0.345 ft. Se=0.034455

1+10.00	6500.00	174.15	3.00	3.440	2.490	452.2	14.37	1316.50	1310.80	1313.29	3.11	1.64	4.60

n=0.0300 So=0.000000 Sf=0.023299 Headloss Factor=0.100 Total Headloss=0.279 ft. Se=0.027934

1+00.00	6500.00	174.76	3.00	3.433	2.675	489.0	13.29	1316.22	1310.80	1313.48	3.34	1.46	4.32

n=0.0300 So=0.000000 Sf=0.017636 Headloss Factor=0.100 Total Headloss=0.224 ft. Se=0.022375

0+90.00	6500.00	174.97	3.00	3.430	2.927	537.8	12.09	1316.00	1310.80	1313.73	3.66	1.27	3.99

SOPER
Q=6500
n=0.014
K=0.10
FLAT
d_0=6.5

007

''WASP2''SUPERCRITICAL WATER SURFACE PROFILE

COMPUTED BY: DATE: DATA FILE: R4NOV6 CHECKED BY:_____ DATE:_____

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
3+00.00	6500.00	50.00	2.00	1318.08 7.280	6.500	409.5	15.87	1321.21	1310.80	1317.30	0.00	1.21	18.92 8.12
	n=0.0140	So=0.000000		Sf=0.002437		Headloss Factor=0.100		Total Headloss=0.037 ft.			Se=0.003658		
2+90.00	6500.00	50.00	2.00	7.280	6.587	416.1	15.62	1321.18	1310.80	1317.39	8.23	1.18	18.82 8.02
	n=0.0140	So=0.000000		Sf=0.002315		Headloss Factor=0.100		Total Headloss=0.037 ft.			Se=0.003715		
2+80.00	6500.00	50.00	2.00	1318.08 7.280	6.692	424.2	15.32	1321.14	1310.80	1317.49	8.36	1.15	18.70 7.90
	n=0.0140	So=0.000000		Sf=0.002449		Headloss Factor=0.100		Total Headloss=0.064 ft.			Se=0.006349		
2+70.00	6500.00	52.15	2.00	1317.92 7.124	6.238	403.1	16.12	1321.08	1310.80	1317.04	7.80	1.24	18.89 8.09
	n=0.0140	So=0.000000		Sf=0.003013		Headloss Factor=0.100		Total Headloss=0.088 ft.			Se=0.008780		
2+60.00	6500.00	56.53	2.00	1317.63 6.827	5.571	377.0	17.24	1320.99	1310.80	1316.37	6.96	1.39	19.04 8.24
	n=0.0140	So=0.000000		Sf=0.003839		Headloss Factor=0.100		Total Headloss=0.094 ft.			Se=0.009341		
2+50.00	6500.00	62.49	2.00	1317.27 6.465	4.925	356.3	18.24	1320.89	1310.80	1315.73	6.16	1.54	19.07 8.27
	n=0.0140	So=0.000000		Sf=0.004833		Headloss Factor=0.100		Total Headloss=0.097 ft.			Se=0.009697		
2+40.00	6500.00	69.79	2.00	1316.88 6.077	4.340	340.6	19.09	1320.80	1310.80	1315.14	5.43	1.70	18.99 8.19
	n=0.0140	So=0.000000		Sf=0.005993		Headloss Factor=0.100		Total Headloss=0.101 ft.			Se=0.010111		
2+30.00	6500.00	78.28	2.00	1316.49 5.687	3.826	328.8	19.77	1320.70	1310.80	1314.63	4.78	1.86	18.83 8.03
	n=0.0140	So=0.000000		Sf=0.007320		Headloss Factor=0.100		Total Headloss=0.107 ft.			Se=0.010683		
2+20.00	6500.00	87.87	2.00	1316.11 5.311	3.381	320.0	20.31	1320.59	1310.80	1314.18	4.23	2.02	18.65 7.82
	n=0.0140	So=0.000000		Sf=0.008813		Headloss Factor=0.100		Total Headloss=0.115 ft.			Se=0.011443		
2+10.00	6500.00	98.46	2.00	1315.76 4.959	3.002	313.6	20.73	1320.47	1310.80	1313.80	3.75	2.17	18.39 7.59
	n=0.0140	So=0.000000		Sf=0.010460		Headloss Factor=0.100		Total Headloss=0.124 ft.			Se=0.012434		
2+00.00	6500.00	110.00	2.00	1315.43 4.632	2.679	309.0	21.04	1320.35	1310.80	1313.48	3.35	2.32	18.13 7.33

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
	n=0.0140	So=0.000000		Sf=0.012329		Headloss Factor=0.100		Total Headloss=0.139 ft.			Se=0.013884		
				1315.11									17.85

n=0.0140 So=0.000000 Sf=0.014347 Headloss Factor=0.100 Total Headloss=0.152 ft. Se=0.015132

				1314.84									17.58
1+80.00	6500.00	137.00	2.00	4.037	2.150	303.8	21.40	1320.06	1310.80	1312.95	2.69	2.61	6.78

n=0.0300 So=0.000000 Sf=0.029023 Headloss Factor=0.100 Total Headloss=0.309 ft. Se=0.030880

				1314.65									17.31
1+70.00	6500.00	147.76	2.00	3.848	2.028	307.8	21.11	1319.75	1310.80	1312.83	2.53	2.65	6.51

n=0.0300 So=0.000000 Sf=0.069234 Headloss Factor=0.100 Total Headloss=0.771 ft. Se=0.077043

				1314.51									
1+60.00	6500.00	156.22	2.00	3.714	2.039	326.8	19.89	1318.98	1310.80	1312.84	2.55	2.49	6.11

n=0.0300 So=0.000000 Sf=0.060405 Headloss Factor=0.100 Total Headloss=0.675 ft. Se=0.067497

				1314.41									
1+50.00	6500.00	162.68	2.33	3.610	2.075	347.6	18.70	1318.31	1310.80	1312.88	2.59	2.32	5.75

n=0.0300 So=0.000000 Sf=0.051817 Headloss Factor=0.100 Total Headloss=0.583 ft. Se=0.058275

				1314.34									
1+40.00	6500.00	167.43	2.67	3.535	2.139	370.3	17.55	1317.72	1310.80	1312.94	2.67	2.15	5.42

n=0.0300 So=0.000000 Sf=0.043667 Headloss Factor=0.100 Total Headloss=0.495 ft. Se=0.049478

				1314.28									
1+30.00	6500.00	170.74	3.00	3.484	2.228	395.2	16.45	1317.23	1310.80	1313.03	2.78	1.98	5.13

n=0.0300 So=0.000000 Sf=0.035976 Headloss Factor=0.100 Total Headloss=0.414 ft. Se=0.041340

				1314.26									
1+20.00	6500.00	172.90	3.00	3.456	2.352	423.3	15.36	1316.81	1310.80	1313.15	2.94	1.80	4.85

n=0.0300 So=0.000000 Sf=0.028984 Headloss Factor=0.100 Total Headloss=0.339 ft. Se=0.033872

1+10.00	6500.00	174.15	3.00	3.440	2.504	454.8	14.29	1316.48	1310.80	1313.30	3.13	1.62	4.58

n=0.0300 So=0.000000 Sf=0.022848 Headloss Factor=0.100 Total Headloss=0.275 ft. Se=0.027460

1+00.00	6500.00	174.76	3.00	3.433	2.692	492.1	13.21	1316.20	1310.80	1313.49	3.36	1.45	4.30

n=0.0300 So=0.000000 Sf=0.017216 Headloss Factor=0.100 Total Headloss=0.220 ft. Se=0.021989

0+90.00	6500.00	174.97	3.00	3.430	2.951	542.4	11.98	1315.98	1310.80	1313.75	3.69	1.26	3.96

008

SUPER
Q=6500
n=0.014
K=0.10
FLAT
d_c=6.7

''WASP2''SUPERCRITICAL WATER SURFACE PROFILE

COMPUTED BY: DATE: DATA FILE: R4NOV6 CHECKED BY:_____ DATE:_____

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
3+00.00	6500.00	50.00	2.00	7.280	6.700	424.8	15.30	1321.14	1310.80	1317.50	9.00	1.15	7.89
n=0.0140		So=0.000000		Sf=0.002153		Headloss Factor=0.100			Total Headloss=0.041 ft.		Se=0.004111		
2+90.00	6500.00	50.00	2.00	7.280	6.854	436.7	14.88	1321.09	1310.80	1317.65	8.57	1.10	7.72

1317.65

SUB
Q=6500
n=0.014
K=0.1
HUMP

609

''WASP2''SUPERCRITICAL WATER SURFACE PROFILE

COMPUTED BY: DATE: DATA FILE: R4NOV2 CHECKED BY:_____ DATE:_____

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
0+00.00	6500.00	175.00	3.00	3.430	8.990	1815.7	3.58	1319.99	1310.80	1319.79	0.00	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000336	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000339							
0+10.00	6500.00	175.00	3.00	3.430	8.994	1816.5	3.58	1319.99	1310.80	1319.79	10.83	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000335	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000340							
0+20.00	6500.00	175.00	3.00	3.430	8.997	1817.4	3.58	1320.00	1310.80	1319.80	10.84	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000335	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000334							
0+30.00	6500.00	175.00	3.00	3.430	9.001	1818.2	3.57	1320.00	1310.80	1319.80	10.84	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000334	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000340							
0+40.00	6500.00	175.00	3.00	3.430	9.004	1819.0	3.57	1320.00	1310.80	1319.80	10.84	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000334	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000321							
0+50.00	6500.00	175.00	3.00	3.430	9.008	1819.8	3.57	1320.01	1310.80	1319.81	10.85	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000333	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000326							
0+60.00	6500.00	175.00	3.00	3.430	9.011	1820.6	3.57	1320.01	1310.80	1319.81	10.85	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000333	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000319							
0+70.00	6500.00	175.00	3.00	3.430	9.015	1821.4	3.57	1320.01	1310.80	1319.81	10.86	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000332	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000324							
0+80.00	6500.00	175.00	3.00	3.430	9.018	1822.2	3.57	1320.02	1310.80	1319.82	10.86	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000332	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000328							
0+90.00	6500.00	174.97	3.00	3.430	9.022	1822.7	3.57	1320.02	1310.80	1319.82	10.87	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000332	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000328							
1+00.00	6500.00	174.76	3.00	3.433	9.025	1821.5	3.57	1320.02	1310.80	1319.82	10.87	0.22	0.87

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH

n=0.0300 So=0.000000 Sf=0.000333 Headloss Factor=0.100 Total Headloss=0.003 ft. Se=0.000338

009/2

n=0.0300 So=0.000000 Sf=0.000336 Headloss Factor=0.100 Total Headloss=0.004 ft. Se=0.000364

1+20.00	6500.00	172.90	3.00	3.456	9.028	1805.5	3.60	1320.03	1310.80	1319.83	10.87	0.22	0.89

n=0.0300 So=0.000000 Sf=0.000343 Headloss Factor=0.100 Total Headloss=0.004 ft. Se=0.000389

1+30.00	6500.00	170.74	3.00	3.484	9.028	1785.9	3.64	1320.03	1310.80	1319.83	10.87	0.23	0.90

n=0.0300 So=0.000000 Sf=0.000357 Headloss Factor=0.100 Total Headloss=0.005 ft. Se=0.000494

1+40.00	6500.00	167.43	2.67	3.535	9.018	1727.1	3.76	1320.04	1310.80	1319.82	10.87	0.23	0.95

n=0.0300 So=0.000000 Sf=0.000382 Headloss Factor=0.100 Total Headloss=0.006 ft. Se=0.000584

1+50.00	6500.00	162.68	2.33	3.610	9.004	1653.8	3.93	1320.04	1310.80	1319.80	10.85	0.24	1.01

n=0.0300 So=0.000000 Sf=0.000419 Headloss Factor=0.100 Total Headloss=0.007 ft. Se=0.000689

1+60.00	6500.00	156.22	2.00	3.714	8.983	1564.8	4.15	1320.05	1310.80	1319.78	10.83	0.26	1.10

n=0.0300 So=0.000000 Sf=0.000468 Headloss Factor=0.100 Total Headloss=0.008 ft. Se=0.000764

1+70.00	6500.00	147.76	2.00	3.848	8.961	1484.7	4.38	1320.06	1310.80	1319.76	10.81	0.27	1.22

n=0.0140 So=0.000000 Sf=0.000224 Headloss Factor=0.100 Total Headloss=0.007 ft. Se=0.000679

1+80.00	6500.00	137.00	2.00	4.037	8.922	1381.5	4.70	1320.07	1310.80	1319.72	10.78	0.29	1.39

n=0.0140 So=-.040002 Sf=0.000131 Headloss Factor=0.100 Total Headloss=0.005 ft. Se=0.000448

1+90.00	6500.00	123.50	2.00	4.310	9.294	1320.6	4.92	1320.07	1310.40	1319.69	11.23	0.30	1.54

n=0.0140 So=-.040002 Sf=0.000140 Headloss Factor=0.100 Total Headloss=0.006 ft. Se=0.000583

11.75

2+00.00	6500.00	110.00	2.00	4.632	9.655	1248.5	5.21	1320.08	1310.00	1319.66	11.67	0.32	1.75

n=0.0140 So=0.003809 Sf=0.000166 Headloss Factor=0.100 Total Headloss=0.012 ft. Se=0.001195

2+10.00	6500.00	98.46	2.00	4.959	9.527	1119.5	5.81	1320.09	1310.04	1319.56	11.54	0.36	2.13

n=0.0140 So=0.003796 Sf=0.000215 Headloss Factor=0.100 Total Headloss=0.016 ft. Se=0.001542

2+20.00	6500.00	87.87	2.00	5.311	9.370	999.0	6.51	1320.10	1310.08	1319.45	11.38	0.41	2.61

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH

n=0.0140 So=0.003796 Sf=0.000284 Headloss Factor=0.100 Total Headloss=0.021 ft. Se=0.002050

13.29

2+30.00	6500.00	78.28	2.00	5.687	9.176	886.7	7.33	1320.12	1310.11	1319.29	11.18	0.47	3.18

n=0.0140 So=0.003809 Sf=0.000381 Headloss Factor=0.100 Total Headloss=0.027 ft. Se=0.002739

14.02

2+40.00	6500.00	69.79	2.00	6.077	8.928	782.5	8.31	1320.15	1310.15	1319.08	10.93	0.54	3.87

n=0.0140 So=0.003894 Sf=0.000523 Headloss Factor=0.100 Total Headloss=0.038 ft. Se=0.003769

14.87

2+50.00	6500.00	62.49	2.00	6.465	8.603	685.6	9.48	1320.19	1310.19	1318.79	10.60	0.63	4.68

n=0.0140 So=0.003796 Sf=0.000740 Headloss Factor=0.100 Total Headloss=0.054 ft. Se=0.005375

15.85

2+60.00	6500.00	56.53	2.00	6.827	8.155	594.0	10.94	1320.24	1310.23	1318.38	10.16	0.75	5.63

n=0.0110 Sc=0.005005 Sf=0.001155 Headloss factor=0.100 Total Headloss=0.094 ft. Se=0.003450

17.11 2009/3

2+70.00	6500.00	52.15	2.00	7.124	7.380	493.8	13.16	1320.34	1310.27	1317.65	9.39	0.94	6.84

11/14/85 10:16

SUB
Q=6500
n=0.014
K=0
HOMP

010

''WASP2''SUBCRITICAL WATER SURFACE PROFILE

COMPUTED BY: DATE: DATA FILE: R4NOV2 CHECKED BY:_____ DATE:_____

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
0+00.00	6500.00	175.00	3.00	3.430	8.990	1815.7	3.58	1319.99	1310.80	1319.79	9.66	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000336	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000326							
0+10.00	6500.00	175.00	3.00	3.430	8.993	1816.5	3.58	1319.99	1310.80	1319.79	10.83	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000335	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000327							
0+20.00	6500.00	175.00	3.00	3.430	8.997	1817.3	3.58	1320.00	1310.80	1319.80	10.84	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000335	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000320							
0+30.00	6500.00	175.00	3.00	3.430	9.000	1818.1	3.58	1320.00	1310.80	1319.80	10.84	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000334	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000325							
0+40.00	6500.00	175.00	3.00	3.430	9.004	1818.9	3.57	1320.00	1310.80	1319.80	10.84	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000334	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000330							
0+50.00	6500.00	175.00	3.00	3.430	9.007	1819.7	3.57	1320.01	1310.80	1319.81	10.85	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000333	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000324							
0+60.00	6500.00	175.00	3.00	3.430	9.011	1820.5	3.57	1320.01	1310.80	1319.81	10.85	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000333	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000329							
0+70.00	6500.00	175.00	3.00	3.430	9.014	1821.3	3.57	1320.01	1310.80	1319.81	10.86	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000333	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000322							
0+80.00	6500.00	175.00	3.00	3.430	9.018	1822.1	3.57	1320.02	1310.80	1319.82	10.86	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000332	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000326							
0+90.00	6500.00	174.97	3.00	3.430	9.021	1822.6	3.57	1320.02	1310.80	1319.82	10.86	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000332	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000325							
1+00.00	6500.00	174.76	3.00	3.433	9.024	1821.4	3.57	1320.02	1310.80	1319.82	10.87	0.22	0.87

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
	n=0.0300	So=0.000000	Sf=0.000333	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000324							

010/2

	n=0.0300	So=0.000000	Sf=0.000336	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000336							
1+20.00	6500.00	172.90	3.00	3.456	9.027	1805.3	3.60	1320.03	1310.80	1319.83	10.87	0.23	0.89
	n=0.0300	So=0.000000	Sf=0.000343	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000336							
1+30.00	6500.00	170.74	3.00	3.484	9.026	1785.6	3.64	1320.03	1310.80	1319.83	10.87	0.23	0.91
	n=0.0300	So=0.000000	Sf=0.000357	Headloss Factor=0.000	Total Headloss=0.004 ft.	Se=0.000352							
1+40.00	6500.00	167.43	2.67	3.535	9.016	1726.5	3.76	1320.04	1310.80	1319.82	10.86	0.23	0.95
	n=0.0300	So=0.000000	Sf=0.000383	Headloss Factor=0.000	Total Headloss=0.004 ft.	Se=0.000373							
1+50.00	6500.00	162.68	2.33	3.610	8.999	1652.7	3.93	1320.04	1310.80	1319.80	10.85	0.24	1.01
	n=0.0300	So=0.000000	Sf=0.000420	Headloss Factor=0.000	Total Headloss=0.004 ft.	Se=0.000414							
1+60.00	6500.00	156.22	2.00	3.714	8.975	1563.2	4.16	1320.04	1310.80	1319.78	10.82	0.26	1.10
	n=0.0300	So=0.000000	Sf=0.000470	Headloss Factor=0.000	Total Headloss=0.005 ft.	Se=0.000454							
1+70.00	6500.00	147.76	2.00	3.848	8.950	1482.6	4.38	1320.05	1310.80	1319.75	10.80	0.27	1.22
	n=0.0140	So=0.000000	Sf=0.000225	Headloss Factor=0.000	Total Headloss=0.002 ft.	Se=0.000214							
1+80.00	6500.00	137.00	2.00	4.037	8.905	1378.6	4.71	1320.05	1310.80	1319.71	10.76	0.29	1.40
	n=0.0140	So=-.040002	Sf=0.000131	Headloss Factor=0.000	Total Headloss=0.001 ft.	Se=0.000132							
1+90.00	6500.00	123.50	2.00	4.310	9.274	1317.3	4.93	1320.05	1310.40	1319.67	11.20	0.30	1.55
	n=0.0140	So=-.040002	Sf=0.000141	Headloss Factor=0.000	Total Headloss=0.001 ft.	Se=0.000140							
2+00.00	6500.00	110.00	2.00	4.632	9.630	1244.7	5.22	1320.05	1310.00	1319.63	11.64	0.32	1.76
	n=0.0140	So=0.003809	Sf=0.000168	Headloss Factor=0.000	Total Headloss=0.002 ft.	Se=0.000169							
2+10.00	6500.00	98.46	2.00	4.959	9.489	1114.3	5.83	1320.05	1310.04	1319.53	11.49	0.36	2.15
	n=0.0140	So=0.003796	Sf=0.000219	Headloss Factor=0.000	Total Headloss=0.002 ft.	Se=0.000211							
2+20.00	6500.00	87.87	2.00	5.311	9.314	992.0	6.55	1320.06	1310.08	1319.39	11.31	0.41	2.63

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
	n=0.0140	So=0.003796	Sf=0.000291	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000290							
2+30.00	6500.00	78.28	2.00	5.687	9.094	877.2	7.41	1320.06	1310.11	1319.21	11.08	0.47	3.22
	n=0.0140	So=0.003809	Sf=0.000396	Headloss Factor=0.000	Total Headloss=0.004 ft.	Se=0.000385							
2+40.00	6500.00	69.79	2.00	6.077	8.804	769.4	8.45	1320.06	1310.15	1318.96	10.79	0.55	3.95
	n=0.0140	So=0.003894	Sf=0.000558	Headloss Factor=0.000	Total Headloss=0.006 ft.	Se=0.000555							
2+50.00	6500.00	62.49	2.00	6.465	8.399	666.0	9.76	1320.07	1310.19	1318.59	10.38	0.65	4.82
	n=0.0140	So=0.003796	Sf=0.000844	Headloss Factor=0.000	Total Headloss=0.008 ft.	Se=0.000835							
2+60.00	6500.00	56.53	2.00	6.827	7.731	556.6	11.68	1320.08	1310.23	1317.96	9.70	0.82	5.98

11/14/05 9:00A

SOB
Q=6500
n=0.00
k=0
HUMP

011

''WASP2''SUBCRITICAL WATER SURFACE PROFILE

COMPUTED BY: DATE: DATA FILE: R4NOV2. CHECKED BY:_____ DATE:_____

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
0+00.00	6500.00	175.00	3.00	3.430	8.990	1815.7	3.58	1319.99	1310.80	1319.79	0.00	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000336	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000326							
0+10.00	6500.00	175.00	3.00	3.430	8.993	1816.5	3.58	1319.99	1310.80	1319.79	10.83	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000335	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000327							
0+20.00	6500.00	175.00	3.00	3.430	8.997	1817.3	3.58	1320.00	1310.80	1319.80	10.84	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000335	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000320							
0+30.00	6500.00	175.00	3.00	3.430	9.000	1818.1	3.58	1320.00	1310.80	1319.80	10.84	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000334	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000325							
0+40.00	6500.00	175.00	3.00	3.430	9.004	1818.9	3.57	1320.00	1310.80	1319.80	10.84	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000334	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000330							
0+50.00	6500.00	175.00	3.00	3.430	9.007	1819.7	3.57	1320.01	1310.80	1319.81	10.85	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000333	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000324							
0+60.00	6500.00	175.00	3.00	3.430	9.011	1820.5	3.57	1320.01	1310.80	1319.81	10.85	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000333	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000329							
0+70.00	6500.00	175.00	3.00	3.430	9.014	1821.3	3.57	1320.01	1310.80	1319.81	10.86	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000333	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000322							
0+80.00	6500.00	175.00	3.00	3.430	9.018	1822.1	3.57	1320.02	1310.80	1319.82	10.86	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000332	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000326							
0+90.00	6500.00	174.97	3.00	3.430	9.021	1822.6	3.57	1320.02	1310.80	1319.82	10.86	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000332	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000325							
1+00.00	6500.00	174.76	3.00	3.433	9.024	1821.4	3.57	1320.02	1310.80	1319.82	10.87	0.22	0.87

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
	n=0.0300	So=0.000000	Sf=0.000333	Headloss Factor=0.000	Total Headloss=0.003 ft.	Se=0.000324							

011/2

	n=0.0300		So=0.000000		Sf=0.000336	Headloss Factor=0.000			Total Headloss=0.003 ft.			Se=0.000336	
1+20.00	6500.00	172.90	3.00	3.456	9.027	1805.3	3.60	1320.03	1310.80	1319.83	10.87	0.23	0.89
	n=0.0300		So=0.000000		Sf=0.000343	Headloss Factor=0.000			Total Headloss=0.003 ft.			Se=0.000336	
1+30.00	6500.00	170.74	3.00	3.484	9.026	1785.6	3.64	1320.03	1310.80	1319.83	10.87	0.23	0.91
	n=0.0300		So=0.000000		Sf=0.000357	Headloss Factor=0.000			Total Headloss=0.004 ft.			Se=0.000352	
1+40.00	6500.00	167.43	2.67	3.535	9.016	1726.5	3.76	1320.04	1310.80	1319.82	10.86	0.23	0.95
	n=0.0300		So=0.000000		Sf=0.000383	Headloss Factor=0.000			Total Headloss=0.004 ft.			Se=0.000373	
1+50.00	6500.00	162.68	2.33	3.610	8.999	1652.7	3.93	1320.04	1310.80	1319.80	10.85	0.24	1.01
	n=0.0300		So=0.000000		Sf=0.000420	Headloss Factor=0.000			Total Headloss=0.004 ft.			Se=0.000414	
1+60.00	6500.00	156.22	2.00	3.714	8.975	1563.2	4.16	1320.04	1310.80	1319.78	10.82	0.26	1.10
	n=0.0300		So=0.000000		Sf=0.000470	Headloss Factor=0.000			Total Headloss=0.005 ft.			Se=0.000454	
1+70.00	6500.00	147.76	2.00	3.848	8.950	1482.6	4.38	1320.05	1310.80	1319.75	10.80	0.27	1.22
	n=0.0100		So=0.000000		Sf=0.000141	Headloss Factor=0.000			Total Headloss=0.001 ft.			Se=0.000141	
1+80.00	6500.00	137.00	2.00	4.037	8.904	1378.5	4.72	1320.05	1310.80	1319.70	10.75	0.29	1.40
	n=0.0100		So=-.040002		Sf=0.000067	Headloss Factor=0.000			Total Headloss=0.001 ft.			Se=0.000052	
1+90.00	6500.00	123.50	2.00	4.310	9.272	1317.1	4.94	1320.05	1310.40	1319.67	11.20	0.30	1.55
	n=0.0100		So=-.040002		Sf=0.000072	Headloss Factor=0.000			Total Headloss=0.001 ft.			Se=0.000064	
2+00.00	6500.00	110.00	2.00	4.632	9.627	1244.4	5.22	1320.05	1310.00	1319.63	11.64	0.32	1.76
	n=0.0100		So=0.003809		Sf=0.000086	Headloss Factor=0.000			Total Headloss=0.001 ft.			Se=0.000083	
2+10.00	6500.00	98.46	2.00	4.959	9.485	1113.8	5.84	1320.05	1310.04	1319.52	11.49	0.36	2.15
	n=0.0100		So=0.003796		Sf=0.000112	Headloss Factor=0.000			Total Headloss=0.001 ft.			Se=0.000104	
2+20.00	6500.00	87.87	2.00	5.311	9.309	991.3	6.56	1320.05	1310.08	1319.39	11.30	0.41	2.63

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
	n=0.0100		So=0.003796		Sf=0.000149	Headloss Factor=0.000			Total Headloss=0.001 ft.			Se=0.000145	
2+30.00	6500.00	78.28	2.00	5.687	9.086	876.4	7.42	1320.05	1310.11	1319.20	11.07	0.47	3.23
	n=0.0100		So=0.003809		Sf=0.000203	Headloss Factor=0.000			Total Headloss=0.002 ft.			Se=0.000200	
2+40.00	6500.00	69.79	2.00	6.077	8.793	768.3	8.46	1320.06	1310.15	1318.95	10.77	0.55	3.95
	n=0.0100		So=0.003894		Sf=0.000286	Headloss Factor=0.000			Total Headloss=0.003 ft.			Se=0.000278	
2+50.00	6500.00	62.49	2.00	6.465	8.382	664.3	9.79	1320.06	1310.19	1318.57	10.36	0.66	4.84
	n=0.0100		So=0.003796		Sf=0.000436	Headloss Factor=0.000			Total Headloss=0.004 ft.			Se=0.000433	
2+60.00	6500.00	56.53	2.00	6.827	7.688	552.8	11.76	1320.06	1310.23	1317.92	9.66	0.82	6.02

11/14/85

SUPER
Q = 6500
n = 0.014
K = 0.1
HUMP

012

''WASP2''SUPERCRITICAL WATER SURFACE PROFILE

COMPUTED BY: DATE: DATA FILE: R4NOV5 CHECKED BY:_____ DATE:_____

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
3+00.00	6500.00	50.00	2.00	7.280	7.200	463.7	14.02	1320.63	1310.38	1317.58	3.15	1.02	17.79 7.41
	n=0.0140	So=0.003809	Sf=0.001788	Headloss Factor=0.100	Total Headloss=0.030 ft.	Se=0.003037							
2+90.00	6500.00	50.00	2.00	7.280	7.083	454.5	14.30	1320.60	1310.34	1317.43	8.85	1.05	17.85 7.51
	n=0.0140	So=0.003796	Sf=0.001880	Headloss Factor=0.100	Total Headloss=0.028 ft.	Se=0.002801							
2+80.00	6500.00	50.00	2.00	7.280	6.999	447.9	14.51	1320.57	1310.31	1317.30	8.75	1.07	17.92 7.61
	n=0.0140	So=0.003796	Sf=0.002193	Headloss Factor=0.100	Total Headloss=0.083 ft.	Se=0.008317							
2+70.00	6500.00	52.15	2.00	7.124	6.339	411.0	15.82	1320.49	1310.27	1316.61	7.92	1.21	18.24 7.97
	n=0.0140	So=0.003809	Sf=0.002902	Headloss Factor=0.100	Total Headloss=0.097 ft.	Se=0.009736							
2+60.00	6500.00	56.53	2.00	6.827	5.596	378.9	17.15	1320.39	1310.23	1315.82	6.99	1.38	18.45 8.22
	n=0.0140	So=0.003796	Sf=0.003816	Headloss Factor=0.100	Total Headloss=0.100 ft.	Se=0.009956							
2+50.00	6500.00	62.49	2.00	6.465	4.918	355.7	18.27	1320.29	1310.19	1315.11	6.15	1.55	18.47 8.28
	n=0.0140	So=0.003894	Sf=0.004886	Headloss Factor=0.100	Total Headloss=0.103 ft.	Se=0.010247							
2+40.00	6500.00	69.79	2.00	6.077	4.318	338.6	19.20	1320.19	1310.15	1314.47	5.40	1.72	18.39 8.22
	n=0.0140	So=0.003809	Sf=0.006126	Headloss Factor=0.100	Total Headloss=0.107 ft.	Se=0.010648							
2+30.00	6500.00	78.28	2.00	5.687	3.796	326.0	19.94	1320.08	1310.11	1313.91	4.74	1.88	18.19 8.08
	n=0.0140	So=0.003796	Sf=0.007547	Headloss Factor=0.100	Total Headloss=0.113 ft.	Se=0.011277							
2+20.00	6500.00	87.87	2.00	5.311	3.347	316.5	20.54	1319.97	1310.08	1313.42	4.18	2.05	17.96 7.88
	n=0.0140	So=0.003796	Sf=0.009152	Headloss Factor=0.100	Total Headloss=0.121 ft.	Se=0.012131							
2+10.00	6500.00	98.46	2.00	4.959	2.965	309.5	21.00	1319.85	1310.04	1313.00	3.71	2.21	17.69 7.65
	n=0.0140	So=0.003809	Sf=0.010933	Headloss Factor=0.100	Total Headloss=0.132 ft.	Se=0.013222							
2+00.00	6500.00	110.00	2.00	4.632	2.641	304.5	21.35	1319.72	1310.00	1312.64	3.30	2.37	17.40 7.40

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
	n=0.0140	So=-.040002	Sf=0.012207	Headloss Factor=0.100	Total Headloss=0.157 ft.	Se=0.015684							
1+90.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	17.35 [illegible]

012/2

	n=0.0140	So=-.040002	Sf=0.012600	Headloss Factor=0.100	Total Headloss=0.167 ft.	Se=0.016693								
														17.32
1+80.00	6500.00	137.00	2.00	4.037	2.276	322.2	20.17	1319.39	1310.80	1313.08	2.85	2.39	6.52	
	n=0.0300	So=0.000000	Sf=0.024061	Headloss Factor=0.100	Total Headloss=0.252 ft.	Se=0.025188								
														17.08
1+70.00	6500.00	147.76	2.00	3.848	2.139	325.2	19.99	1319.14	1310.80	1312.94	2.67	2.44	6.28	
	n=0.0300	So=0.000000	Sf=0.058342	Headloss Factor=0.100	Total Headloss=0.649 ft.	Se=0.064844								
														16.70
1+60.00	6500.00	156.22	2.00	3.714	2.142	343.7	18.91	1318.49	1310.80	1312.94	2.68	2.31	5.90	
	n=0.0300	So=0.000000	Sf=0.051591	Headloss Factor=0.100	Total Headloss=0.577 ft.	Se=0.057640								
														16.36
1+50.00	6500.00	162.68	2.33	3.610	2.171	364.2	17.85	1317.92	1310.80	1312.97	2.71	2.17	5.56	
	n=0.0300	So=0.000000	Sf=0.044751	Headloss Factor=0.100	Total Headloss=0.504 ft.	Se=0.050374								
														16.06
1+40.00	6500.00	167.43	2.67	3.535	2.231	386.9	16.80	1317.41	1310.80	1313.03	2.79	2.02	5.26	
	n=0.0300	So=0.000000	Sf=0.038021	Headloss Factor=0.100	Total Headloss=0.432 ft.	Se=0.043198								
														15.77
1+30.00	6500.00	170.74	3.00	3.484	2.319	412.1	15.77	1316.98	1310.80	1313.12	2.90	1.86	4.97	
	n=0.0300	So=0.000000	Sf=0.031450	Headloss Factor=0.100	Total Headloss=0.364 ft.	Se=0.036349								
														15.50
1+20.00	6500.00	172.90	3.00	3.456	2.448	441.2	14.73	1316.62	1310.80	1313.25	3.06	1.69	4.70	
	n=0.0300	So=0.000000	Sf=0.025293	Headloss Factor=0.100	Total Headloss=0.299 ft.	Se=0.029879								
														15.23
1+10.00	6500.00	174.15	3.00	3.440	2.609	474.8	13.69	1316.32	1310.80	1313.41	3.26	1.53	4.43	
	n=0.0300	So=0.000000	Sf=0.019700	Headloss Factor=0.100	Total Headloss=0.242 ft.	Se=0.024215								
														14.93
1+00.00	6500.00	174.76	3.00	3.433	2.820	516.7	12.58	1316.08	1310.80	1313.62	3.53	1.35	4.13	
	n=0.0300	So=0.000000	Sf=0.013855	Headloss Factor=0.100	Total Headloss=0.196 ft.	Se=0.019536								
														13.48
0+90.00	6500.00	174.97	3.00	3.430	3.195	589.6	11.02	1315.88	1310.80	1313.99	3.99	1.11	3.68	

11/14/85 SUPER CRIT

COMPUTED BY: DATE: DATA FILE: R4NOV5 CHECKED BY:_____ DATE:_____

SUPER
Q = 4875
n = 0.014
K = 0.1
HUMP

013

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
3+00.00	4875.00	50.00	2.00	6.110	6.100	379.4	12.85	1319.04	1310.38	1316.48	0.00	1.00	6.13
	n=0.0140	So=0.003809		Sf=0.001826		Headloss Factor=0.100		Total Headloss=0.032 ft.			Se=0.003221		
2+90.00	4875.00	50.00	2.00	6.110	5.965	369.4	13.20	1319.01	1310.34	1316.31	7.46	1.04	6.28
	n=0.0140	So=0.003796		Sf=0.001948		Headloss Factor=0.100		Total Headloss=0.029 ft.			Se=0.002872		
2+80.00	4875.00	50.00	2.00	6.110	5.879	363.1	13.43	1318.98	1310.31	1316.18	7.35	1.06	6.38
	n=0.0140	So=0.003796		Sf=0.002297		Headloss Factor=0.100		Total Headloss=0.077 ft.			Se=0.007735		
2+70.00	4875.00	52.15	2.00	5.973	5.295	332.2	14.68	1318.91	1310.27	1315.56	6.62	1.22	6.71
	n=0.0140	So=0.003809		Sf=0.003078		Headloss Factor=0.100		Total Headloss=0.090 ft.			Se=0.008979		
2+60.00	4875.00	56.53	2.00	5.715	4.651	306.2	15.92	1318.82	1310.23	1314.88	5.81	1.39	6.93
	n=0.0140	So=0.003796		Sf=0.004083		Headloss Factor=0.100		Total Headloss=0.093 ft.			Se=0.009299		
2+50.00	4875.00	62.49	2.00	5.402	4.073	287.7	16.95	1318.72	1310.19	1314.26	5.09	1.56	6.97
	n=0.0140	So=0.003894		Sf=0.005261		Headloss Factor=0.100		Total Headloss=0.098 ft.			Se=0.009736		
2+40.00	4875.00	69.79	2.00	5.068	3.564	274.2	17.78	1318.63	1310.15	1313.72	4.46	1.73	6.92
	n=0.0140	So=0.003809		Sf=0.006627		Headloss Factor=0.100		Total Headloss=0.103 ft.			Se=0.010334		
2+30.00	4875.00	78.28	2.00	4.736	3.127	264.3	18.44	1318.52	1310.11	1313.24	3.91	1.90	6.79
	n=0.0140	So=0.003796		Sf=0.008186		Headloss Factor=0.100		Total Headloss=0.112 ft.			Se=0.011167		
2+20.00	4875.00	87.87	2.00	4.416	2.754	257.1	18.96	1318.41	1310.08	1312.83	3.44	2.07	6.61
	n=0.0140	So=0.003796		Sf=0.009933		Headloss Factor=0.100		Total Headloss=0.122 ft.			Se=0.012222		
2+10.00	4875.00	98.46	2.00	4.118	2.438	252.0	19.35	1318.29	1310.04	1312.48	3.05	2.23	6.41
	n=0.0140	So=0.003809		Sf=0.011854		Headloss Factor=0.100		Total Headloss=0.135 ft.			Se=0.013525		
2+00.00	4875.00	110.00	2.00	3.843	2.172	248.4	19.63	1318.15	1310.00	1312.17	2.72	2.39	6.19

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
	n=0.0140	So=-.040002		Sf=0.013012		Headloss Factor=0.100		Total Headloss=0.172 ft.			Se=0.017185		
1+90.00	4875.00	123.50	2.00	3.573	2.020	257.6	18.93	1317.98	1310.40	1312.42	2.52	2.38	5.76
	n=0.0140	So=-.040002		Sf=0.012965		Headloss Factor=0.100		Total Headloss=0.176 ft.			Se=0.017620		
1+80.00	4875.00	137.00	2.00	3.345	1.911	269.2	18.11	1317.81	1310.80	1312.71	2.39	2.34	5.35
	n=0.0300	So=0.000000		Sf=0.024163		Headloss Factor=0.100		Total Headloss=0.257 ft.			Se=0.025656		

1+70.00	4875.00	147.70	2.00	3.168	1.605	273.2	17.64	1317.55	1310.80	1312.61	2.26	2.37	5.13

013/2

n=0.0300 So=0.000000 Sf=0.056347 Headloss Factor=0.100 Total Headloss=0.629 ft. Se=0.062933

1+60.00	4875.00	156.22	2.00	3.074	1.836	293.5	16.61	1316.92	1310.80	1312.64	2.29	2.18	4.77

n=0.0300 So=0.000000 Sf=0.047270 Headloss Factor=0.100 Total Headloss=0.531 ft. Se=0.053121

1+50.00	4875.00	162.68	2.33	2.989	1.891	316.0	15.43	1316.39	1310.80	1312.69	2.36	2.00	4.44

n=0.0300 So=0.000000 Sf=0.038873 Headloss Factor=0.100 Total Headloss=0.441 ft. Se=0.044109

1+40.00	4875.00	167.43	2.67	2.928	1.975	341.1	14.29	1315.95	1310.80	1312.78	2.47	1.82	4.14

n=0.0300 So=0.000000 Sf=0.031214 Headloss Factor=0.100 Total Headloss=0.360 ft. Se=0.035932

1+30.00	4875.00	170.74	3.00	2.886	2.090	369.9	13.18	1315.59	1310.80	1312.89	2.61	1.64	3.86

n=0.0300 So=0.000000 Sf=0.024090 Headloss Factor=0.100 Total Headloss=0.286 ft. Se=0.028610

1+20.00	4875.00	172.90	3.00	2.863	2.257	405.5	12.02	1315.30	1310.80	1313.06	2.82	1.44	3.57

n=0.0300 So=0.000000 Sf=0.017207 Headloss Factor=0.100 Total Headloss=0.220 ft. Se=0.021992

1+10.00	4875.00	174.15	3.00	2.850	2.518	457.5	10.66	1315.08	1310.80	1313.32	3.15	1.21	3.21

file R42A. TRIAL 2
SUB
Q = 6500
n = 0.014
R = 0.1
FLAT

014

''WASP2''SUBCRITICAL WATER SURFACE PROFILE

COMPUTED BY: DATE: DATA FILE: R42A CHECKED BY:_____ DATE:_____

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
0+00.00	6500.00	175.00	3.00	3.430	8.990	1815.7	3.58	1319.97	1310.78	1319.77	0.00	0.22	0.87
	n=0.0300	So=0.000000	Sf=0.000336	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000339							
0+10.00	6500.00	174.64	3.00	3.434	8.993	1813.1	3.58	1319.97	1310.78	1319.77	10.83	0.22	0.88
	n=0.0300	So=0.000000	Sf=0.000339	Headloss Factor=0.100	Total Headloss=0.004 ft.	Se=0.000350							
0+20.00	6500.00	173.56	3.00	3.448	8.994	1803.7	3.60	1319.98	1310.78	1319.77	10.83	0.23	0.89
	n=0.0300	So=0.000000	Sf=0.000344	Headloss Factor=0.100	Total Headloss=0.004 ft.	Se=0.000374							
0+30.00	6500.00	171.76	3.00	3.470	8.994	1787.6	3.64	1319.98	1310.78	1319.77	10.83	0.23	0.90
	n=0.0300	So=0.000000	Sf=0.000352	Headloss Factor=0.100	Total Headloss=0.004 ft.	Se=0.000398							
0+40.00	6500.00	169.24	3.00	3.503	8.993	1764.6	3.68	1319.98	1310.78	1319.77	10.83	0.23	0.93
	n=0.0300	So=0.000000	Sf=0.000364	Headloss Factor=0.100	Total Headloss=0.004 ft.	Se=0.000434							
0+50.00	6500.00	166.00	3.00	3.546	8.990	1734.8	3.75	1319.99	1310.78	1319.77	10.83	0.24	0.96
	n=0.0300	So=0.000000	Sf=0.000380	Headloss Factor=0.100	Total Headloss=0.005 ft.	Se=0.000474							
0+60.00	6500.00	162.04	3.00	3.600	8.985	1698.2	3.83	1319.99	1310.78	1319.77	10.83	0.24	1.00
	n=0.0300	So=0.000000	Sf=0.000400	Headloss Factor=0.100	Total Headloss=0.005 ft.	Se=0.000525							
0+70.00	6500.00	157.36	3.00	3.667	8.979	1654.7	3.93	1320.00	1310.78	1319.76	10.82	0.25	1.05
	n=0.0300	So=0.000000	Sf=0.000426	Headloss Factor=0.100	Total Headloss=0.006 ft.	Se=0.000570							
0+80.00	6500.00	151.96	3.00	3.748	8.969	1604.3	4.05	1320.00	1310.78	1319.75	10.81	0.26	1.12
	n=0.0300	So=0.000000	Sf=0.000447	Headloss Factor=0.100	Total Headloss=0.002 ft.	Se=0.000596							
0+83.34	6500.00	150.00	3.00	3.779	8.965	1585.9	4.10	1320.01	1310.78	1319.75	10.81	0.26	1.14
	n=0.0300	So=0.000000	Sf=0.000452	Headloss Factor=0.100	Total Headloss=0.003 ft.	Se=0.000451							
0+90.00	6500.00	150.00	3.00	3.779	8.968	1586.6	4.10	1320.01	1310.78	1319.75	10.81	0.26	1.14

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
	n=0.0300	So=0.000000	Sf=0.000484	Headloss Factor=0.100	Total Headloss=0.008 ft.	Se=0.000824							

014/2

n=0.0300 So=0.000000 Sf=0.000541 Headloss Factor=0.100 Total Headloss=0.008 ft. Se=0.000779

1+10.00	6500.00	134.00	3.00	4.052	8.927	1435.2	4.53	1320.03	1310.78	1319.71	10.78	0.29	1.39

n=0.0300 So=0.000000 Sf=0.000592 Headloss Factor=0.100 Total Headloss=0.009 ft. Se=0.000848

1+20.00	6500.00	128.00	3.00	4.167	8.908	1378.4	4.72	1320.03	1310.78	1319.69	10.76	0.30	1.50

n=0.0300 So=0.000000 Sf=0.000650 Headloss Factor=0.100 Total Headloss=0.010 ft. Se=0.000949

1+30.00	6500.00	122.00	3.00	4.291	8.887	1321.2	4.92	1320.04	1310.78	1319.67	10.74	0.32	1.63

n=0.0300 So=0.000000 Sf=0.000717 Headloss Factor=0.100 Total Headloss=0.011 ft. Se=0.001059

1+40.00	6500.00	116.00	3.00	4.424	8.863	1263.8	5.14	1320.05	1310.78	1319.64	10.72	0.33	1.77

n=0.0300 So=0.000000 Sf=0.000796 Headloss Factor=0.100 Total Headloss=0.012 ft. Se=0.001191

1+50.00	6500.00	110.00	3.00	4.567	8.835	1206.0	5.39	1320.07	1310.78	1319.61	10.69	0.35	1.93

n=0.0300 So=0.000000 Sf=0.000899 Headloss Factor=0.100 Total Headloss=0.015 ft. Se=0.001517

1+60.00	6500.00	104.00	2.80	4.736	8.787	1130.1	5.75	1320.08	1310.78	1319.57	10.65	0.37	2.14

n=0.0300 So=0.000000 Sf=0.001037 Headloss Factor=0.100 Total Headloss=0.018 ft. Se=0.001799

														1313.17
1+70.00	6500.00	98.00	2.60	4.922	8.728	1053.4	6.17	1320.10	1310.78	1319.51	10.59	0.40	2.39

n=0.0300 So=0.000000 Sf=0.001214 Headloss Factor=0.100 Total Headloss=0.022 ft. Se=0.002188

														1313.47
1+80.00	6500.00	92.00	2.40	5.128	8.652	975.6	6.66	1320.12	1310.78	1319.43	10.52	0.43	2.69

n=0.0300 So=0.000000 Sf=0.001445 Headloss Factor=0.100 Total Headloss=0.027 ft. Se=0.002714

														1313.83
1+90.00	6500.00	86.00	2.20	5.357	8.552	896.4	7.25	1320.15	1310.78	1319.33	10.43	0.47	3.05

n=0.0300 So=0.000000 Sf=0.001762 Headloss Factor=0.100 Total Headloss=0.035 ft. Se=0.003471

														1314.26
2+00.00	6500.00	80.00	2.00	5.615	8.415	814.8	7.98	1320.18	1310.78	1319.20	10.30	0.53	3.48

n=0.0140 So=0.000000 Sf=0.000909 Headloss Factor=0.100 Total Headloss=0.027 ft. Se=0.002658

														1314.72
2+10.00	6500.00	74.30	2.00	5.862	8.266	750.8	8.66	1320.21	1310.78	1319.05	10.15	0.58	3.94	

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH

n=0.0140 So=0.000000 Sf=0.000578 Headloss Factor=0.100 Total Headloss=0.027 ft. Se=0.002742

														1315.24
2+20.00	6500.00	69.20	2.00	6.106	8.077	689.4	9.43	1320.24	1310.78	1318.86	9.97	0.64	4.46	

n=0.0140 So=0.000000 Sf=0.000720 Headloss Factor=0.100 Total Headloss=0.034 ft. Se=0.003439

														1315.81
2+30.00	6500.00	64.70	2.00	6.342	7.839	630.1	10.32	1320.27	1310.78	1318.62	9.74	0.71	5.03	

n=0.0140 So=0.000000 Sf=0.000917 Headloss Factor=0.100 Total Headloss=0.046 ft. Se=0.004552

														1316.46
2+40.00	6500.00	60.80	2.00	6.563	7.521	570.4	11.40	1320.32	1310.78	1318.30	9.43	0.80	5.68	

n=0.0140 So=0.000000 Sf=0.001255 Headloss Factor=0.100 Total Headloss=0.077 ft. Se=0.007705

														1317.54
2+50.00	6500.00	57.50	2.00	6.765	6.951	496.3	13.10	1320.39	1310.78	1317.73	8.87	0.96	6.56	

015

TRIAL 2
SUPER
Q=6500
n=0.014
K=0.1
FLAT
d_o= 6.3

''WASP2''SUPERCRITICAL WATER SURFACE PROFILE

COMPUTED BY: DATE: DATA FILE: R42B CHECKED BY:_____ DATE:_____

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
3+30.00	6500.00	50.00	2.00	1318.06 7.280	6.300	394.4	16.48	1321.30	1310.78	1317.08	0.00	1.27	8.36
	n=0.0140	So=0.000000		Sf=0.002737	Headloss Factor=0.100		Total Headloss=0.038 ft.			Se=0.003745			
3+20.00	6500.00	50.00	2.00	1318.06 7.280	6.364	399.2	16.28	1321.26	1310.78	1317.14	7.96	1.25	8.28
	n=0.0140	So=0.000000		Sf=0.002637	Headloss Factor=0.100		Total Headloss=0.037 ft.			Se=0.003697			
3+10.00	6500.00	50.00	2.00	1318.06 7.280	6.435	404.5	16.07	1321.22	1310.78	1317.21	8.04	1.23	8.20
	n=0.0140	So=0.000000		Sf=0.002532	Headloss Factor=0.100		Total Headloss=0.037 ft.			Se=0.003653			
3+00.00	6500.00	50.00	2.00	1318.06 7.280	6.512	410.4	15.84	1321.19	1310.78	1317.29	8.14	1.20	8.11
	n=0.0140	So=0.000000		Sf=0.002484	Headloss Factor=0.100		Total Headloss=0.025 ft.			Se=0.002496			
2+90.00	6500.00	50.30	2.00	1318.04 7.258	6.485	410.3	15.84	1321.16	1310.78	1317.27	8.11	1.20	8.09
	n=0.0140	So=0.000000		Sf=0.002556	Headloss Factor=0.100		Total Headloss=0.037 ft.			Se=0.003724			
2+80.00	6500.00	51.20	2.00	1317.97 7.192	6.330	404.3	16.08	1321.12	1310.78	1317.11	7.91	1.23	8.13
	n=0.0140	So=0.000000		Sf=0.002741	Headloss Factor=0.100		Total Headloss=0.047 ft.			Se=0.004736			
2+70.00	6500.00	52.70	2.00	1317.87 7.085	6.082	394.5	16.48	1321.08	1310.78	1316.86	7.60	1.28	8.19
	n=0.0140	So=0.000000		Sf=0.003023	Headloss Factor=0.100		Total Headloss=0.055 ft.			Se=0.005509			
2+60.00	6500.00	54.80	2.00	1317.72 6.941	5.777	383.3	16.96	1321.02	1310.78	1316.56	7.22	1.35	8.25
	n=0.0140	So=0.000000		Sf=0.003387	Headloss Factor=0.100		Total Headloss=0.061 ft.			Se=0.006123			
2+50.00	6500.00	57.50	2.00	1317.55 6.765	5.440	372.0	17.47	1320.96	1310.78	1316.22	6.80	1.42	8.27
	n=0.0140	So=0.000000		Sf=0.003826	Headloss Factor=0.100		Total Headloss=0.067 ft.			Se=0.006636			
2+40.00	6500.00	60.80	2.00	1317.34 6.563	5.091	361.4	17.99	1320.89	1310.78	1315.87	6.36	1.50	8.27
	n=0.0140	So=0.000000		Sf=0.004337	Headloss Factor=0.100		Total Headloss=0.071 ft.			Se=0.007107			
2+30.00	6500.00	64.70	2.00	1317.12 6.342	4.742	351.8	18.48	1320.82	1310.78	1315.52	5.93	1.59	8.23

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
	n=0.0140	So=0.000000		Sf=0.004923	Headloss Factor=0.100		Total Headloss=0.076 ft.			Se=0.007573			
2+20.00	6500.00	69.30	2.00	1316.89 6.106	4.401	343.3	18.93	1320.75	1310.78	1315.18	5.50	1.68	8.17

n=0.0140 So=0.000000 Sf=0.005585 Headloss Factor=0.100 Total Headloss=0.080 ft. Se=0.008028 015/2

2+10.00	6500.00	74.30	2.00	5.862 (1316.64)	4.075	336.0	19.35	1320.67	1310.78	1314.85	5.09	1.77	8.07
n=0.0300	So=0.000000	Sf=0.011447	Headloss Factor=0.100	Total Headloss=0.130 ft.	Se=0.013035								
2+00.00	6500.00	80.00	2.00	5.615 (1316.40)	3.785	331.4	19.61	1320.54	1310.78	1314.57	4.73	1.85	7.92
n=0.0300	So=0.000000	Sf=0.031280	Headloss Factor=0.100	Total Headloss=0.323 ft.	Se=0.032271								
1+90.00	6500.00	86.00	2.20	5.357 (1316.14)	3.562	334.3	19.45	1320.21	1310.78	1314.34	4.45	1.89	7.63
n=0.0300	So=0.000000	Sf=0.032680	Headloss Factor=0.100	Total Headloss=0.344 ft.	Se=0.034341								
1+80.00	6500.00	92.00	2.40	5.128 (1315.91)	3.387	339.2	19.17	1319.87	1310.78	1314.17	4.23	1.91	7.34
n=0.0300	So=0.000000	Sf=0.033402	Headloss Factor=0.100	Total Headloss=0.356 ft.	Se=0.035555								
1+70.00	6500.00	98.00	2.60	4.922	3.249	345.8	18.80	1319.52	1310.78	1314.03	4.06	1.91	7.05
n=0.0300	So=0.000000	Sf=0.033530	Headloss Factor=0.100	Total Headloss=0.360 ft.	Se=0.036013								
1+60.00	6500.00	104.00	2.80	4.736	3.138	354.0	18.36	1319.15	1310.78	1313.92	3.92	1.90	6.77
n=0.0300	So=0.000000	Sf=0.033152	Headloss Factor=0.100	Total Headloss=0.359 ft.	Se=0.035845								
1+50.00	6500.00	110.00	3.00	4.567	3.051	363.5	17.88	1318.80	1310.78	1313.83	3.81	1.87	6.49
n=0.0300	So=0.000000	Sf=0.032090	Headloss Factor=0.100	Total Headloss=0.351 ft.	Se=0.035081								
1+40.00	6500.00	116.00	3.00	4.424	3.000	375.0	17.33	1318.45	1310.78	1313.78	3.75	1.83	6.21
n=0.0300	So=0.000000	Sf=0.030526	Headloss Factor=0.100	Total Headloss=0.335 ft.	Se=0.033458								
1+30.00	6500.00	122.00	3.00	4.291	2.960	387.4	16.78	1318.11	1310.78	1313.74	3.70	1.78	5.95
n=0.0300	So=0.000000	Sf=0.028855	Headloss Factor=0.100	Total Headloss=0.317 ft.	Se=0.031710								
1+20.00	6500.00	128.00	3.00	4.167	2.930	400.8	16.22	1317.79	1310.78	1313.71	3.66	1.72	5.69
n=0.0300	So=0.000000	Sf=0.027115	Headloss Factor=0.100	Total Headloss=0.299 ft.	Se=0.029880								
1+10.00	6500.00	134.00	3.00	4.052	2.909	415.2	15.66	1317.50	1310.78	1313.69	3.64	1.67	5.45

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
n=0.0300	So=0.000000	Sf=0.025340	Headloss Factor=0.100	Total Headloss=0.280 ft.	Se=0.027998								
1+00.00	6500.00	140.00	3.00	3.944	2.896	430.5	15.10	1317.22	1310.78	1313.68	3.62	1.61	5.21
n=0.0300	So=0.000000	Sf=0.024586	Headloss Factor=0.100	Total Headloss=0.260 ft.	Se=0.025948								
0+90.00	6500.00	150.00	3.00	3.779	2.774	439.2	14.80	1316.96	1310.78	1313.55	3.47	1.61	4.99
n=0.0300	So=0.000000	Sf=0.022829	Headloss Factor=0.100	Total Headloss=0.183 ft.	Se=0.027517								
0+83.34	6500.00	150.00	3.00	3.779	2.904	460.9	14.10	1316.77	1310.78	1313.68	3.63	1.50	4.81
n=0.0300	So=0.000000	Sf=0.020864	Headloss Factor=0.100	Total Headloss=0.078 ft.	Se=0.023231								
0+80.00	6500.00	151.96	3.00	3.748	2.907	467.0	13.92	1316.69	1310.78	1313.69	3.63	1.48	4.74

0+70.00	6500.00	157.36	3.00	3.667	2.934	487.5	13.33	1316.47	1310.78	1313.71	3.67	1.41	4.51

n=0.0300 So=0.000000 Sf=0.017424 Headloss Factor=0.100 Total Headloss=0.201 ft. Se=0.020055

0+60.00	6500.00	162.04	3.00	3.600	2.997	512.7	12.68	1316.27	1310.78	1313.78	3.75	1.32	4.28

n=0.0300 So=0.000000 Sf=0.014947 Headloss Factor=0.100 Total Headloss=0.179 ft. Se=0.017883

0+50.00	6500.00	166.00	3.00	3.546	3.114	545.9	11.91	1316.09	1310.78	1313.89	3.89	1.22	4.02

016

TRIAL 2
SUPER
Q=6500
n=0.014
K=0.1
FLAT
d_o = 6.5

''WASP2''SUPERCRITICAL WATER SURFACE PROFILE

COMPUTED BY: DATE: DATA FILE: R42B CHECKED BY:_____ DATE:_____

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
3+30.00	6500.00	50.00	2.00	7.280	6.500	409.5	15.87	1321.19	1310.78	1317.28	0.00	1.21	8.12
	n=0.0140	So=0.000000		Sf=0.002437	Headloss Factor=0.100		Total Headloss=0.037 ft.			Se=0.003658			
3+20.00	6500.00	50.00	2.00	7.280	6.587	416.1	15.62	1321.16	1310.78	1317.37	8.23	1.18	8.02
	n=0.0140	So=0.000000		Sf=0.002315	Headloss Factor=0.100		Total Headloss=0.037 ft.			Se=0.003715			
3+10.00	6500.00	50.00	2.00	7.280	6.692	424.2	15.32	1321.12	1310.78	1317.47	8.36	1.15	7.90
	n=0.0140	So=0.000000		Sf=0.002166	Headloss Factor=0.100		Total Headloss=0.040 ft.			Se=0.004029			
3+00.00	6500.00	50.00	2.00	7.280	6.839	435.5	14.93	1321.08	1310.78	1317.62	8.55	1.11	7.74
	n=0.0140	So=0.000000		Sf=0.002097	Headloss Factor=0.100		Total Headloss=0.023 ft.			Se=0.002270			
2+90.00	6500.00	50.30	2.00	7.258	6.797	434.3	14.97	1321.06	1310.78	1317.58	8.50	1.11	7.74
	n=0.0140	So=0.000000		Sf=0.002193	Headloss Factor=0.100		Total Headloss=0.039 ft.			Se=0.003899			
2+80.00	6500.00	51.20	2.00	7.192	6.585	423.9	15.33	1321.02	1310.78	1317.37	8.23	1.16	7.84
	n=0.0140	So=0.000000		Sf=0.002418	Headloss Factor=0.100		Total Headloss=0.050 ft.			Se=0.004976			
2+70.00	6500.00	52.70	2.00	7.085	6.279	409.7	15.86	1320.97	1310.78	1317.06	7.85	1.22	7.96
	n=0.0140	So=0.000000		Sf=0.002732	Headloss Factor=0.100		Total Headloss=0.057 ft.			Se=0.005660			
2+60.00	6500.00	54.80	2.00	6.941	5.928	395.1	16.45	1320.91	1310.78	1316.71	7.41	1.29	8.06
	n=0.0140	So=0.000000		Sf=0.003118	Headloss Factor=0.100		Total Headloss=0.062 ft.			Se=0.006175			
2+50.00	6500.00	57.50	2.00	6.765	5.559	381.4	17.04	1320.85	1310.78	1316.34	6.95	1.37	8.13
	n=0.0140	So=0.000000		Sf=0.003570	Headloss Factor=0.100		Total Headloss=0.066 ft.			Se=0.006623			
2+40.00	6500.00	60.80	2.00	6.563	5.186	369.1	17.61	1320.78	1310.78	1315.97	6.48	1.46	8.14
	n=0.0140	So=0.000000		Sf=0.004087	Headloss Factor=0.100		Total Headloss=0.071 ft.			Se=0.007040			
2+30.00	6500.00	64.70	2.00	6.342	4.819	358.2	18.15	1320.71	1310.78	1315.60	6.02	1.55	8.13

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
	n=0.0140	So=0.000000		Sf=0.004674	Headloss Factor=0.100		Total Headloss=0.075 ft.			Se=0.007457			
2+20.00	6500.00	69.20	2.00	6.106	4.464	348.8	18.64	1320.64	1310.78	1315.24	5.58	1.64	8.07

016/2

n=0.0140 So=0.000000 Sf=0.005333 Headloss Factor=0.100 Total Headloss=0.079 ft. Se=0.007891

2+10.00	6500.00	74.30	2.00	5.862	4.128	340.7	19.08	1320.56	1310.78	1314.91	5.16	1.74	7.99

n=0.0300 So=0.000000 Sf=0.010970 Headloss Factor=0.100 Total Headloss=0.127 ft. Se=0.012664

2+00.00	6500.00	80.00	2.00	5.615	3.830	335.7	19.36	1320.43	1310.78	1314.61	4.79	1.82	7.85

n=0.0300 So=0.000000 Sf=0.030137 Headloss Factor=0.100 Total Headloss=0.309 ft. Se=0.030903

1+90.00	6500.00	86.00	2.20	5.357	3.599	338.0	19.23	1320.12	1310.78	1314.38	4.50	1.86	7.58

n=0.0300 So=0.000000 Sf=0.031629 Headloss Factor=0.100 Total Headloss=0.331 ft. Se=0.033128

1+80.00	6500.00	92.00	2.40	5.128	3.418	342.5	18.98	1319.79	1310.78	1314.20	4.27	1.88	7.29

n=0.0300 So=0.000000 Sf=0.032444 Headloss Factor=0.100 Total Headloss=0.345 ft. Se=0.034438

1+70.00	6500.00	98.00	2.60	4.922	3.275	348.8	18.63	1319.45	1310.78	1314.06	4.09	1.89	7.01

n=0.0300 So=0.000000 Sf=0.032667 Headloss Factor=0.100 Total Headloss=0.350 ft. Se=0.035017

1+60.00	6500.00	104.00	2.80	4.736	3.161	356.7	18.22	1319.10	1310.78	1313.94	3.95	1.88	6.73

n=0.0300 So=0.000000 Sf=0.032381 Headloss Factor=0.100 Total Headloss=0.350 ft. Se=0.034955

1+50.00	6500.00	110.00	3.00	4.567	3.071	366.1	17.76	1318.75	1310.78	1313.85	3.84	1.85	6.46

n=0.0300 So=0.000000 Sf=0.031410 Headloss Factor=0.100 Total Headloss=0.343 ft. Se=0.034300

1+40.00	6500.00	116.00	3.00	4.424	3.018	377.4	17.22	1318.40	1310.78	1313.80	3.77	1.81	6.19

n=0.0300 So=0.000000 Sf=0.029930 Headloss Factor=0.100 Total Headloss=0.328 ft. Se=0.032782

1+30.00	6500.00	122.00	3.00	4.291	2.977	389.8	16.68	1318.08	1310.78	1313.76	3.72	1.76	5.92

n=0.0300 So=0.000000 Sf=0.028337 Headloss Factor=0.100 Total Headloss=0.311 ft. Se=0.031112

1+20.00	6500.00	128.00	3.00	4.167	2.945	403.0	16.13	1317.76	1310.78	1313.73	3.68	1.71	5.67

n=0.0300 So=0.000000 Sf=0.026668 Headloss Factor=0.100 Total Headloss=0.294 ft. Se=0.029363

1+10.00	6500.00	134.00	3.00	4.052	2.923	417.3	15.58	1317.47	1310.78	1313.70	3.65	1.65	5.43

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH

n=0.0300 So=0.000000 Sf=0.024956 Headloss Factor=0.100 Total Headloss=0.276 ft. Se=0.027556

1+00.00	6500.00	140.00	3.00	3.944	2.908	432.5	15.03	1317.20	1310.78	1313.69	3.64	1.60	5.19

n=0.0300 So=0.000000 Sf=0.024258 Headloss Factor=0.100 Total Headloss=0.256 ft. Se=0.025558

0+90.00	6500.00	150.00	3.00	3.779	2.784	440.9	14.74	1316.94	1310.78	1313.56	3.48	1.60	4.98

n=0.0300 So=0.000000 Sf=0.022541 Headloss Factor=0.100 Total Headloss=0.181 ft. Se=0.027205

0+83.34	6500.00	150.00	3.00	3.779	2.916	462.8	14.04	1316.76	1310.78	1313.70	3.64	1.49	4.79

n=0.0300 So=0.000000 Sf=0.020599 Headloss Factor=0.100 Total Headloss=0.077 ft. Se=0.022897

0+80.00	6500.00	151.96	3.00	3.748	2.917	468.9	13.86	1316.68	1310.78	1313.70	3.65	1.47	4.72

0+70.00	6500.00	157.36	3.00	3.667	2.945	489.4	13.28	1316.46	1310.78	1313.72	3.68	1.40	4.50

n=0.0300 So=0.000000 Sf=0.017220 Headloss Factor=0.100 Total Headloss=0.198 ft. Se=0.019814

0+60.00	6500.00	162.04	3.00	3.600	3.008	514.5	12.63	1316.27	1310.78	1313.79	3.76	1.32	4.27

n=0.0300 So=0.000000 Sf=0.014762 Headloss Factor=0.100 Total Headloss=0.177 ft. Se=0.017693

0+50.00	6500.00	166.00	3.00	3.546	3.126	548.2	11.86	1316.09	1310.78	1313.91	3.91	1.21	4.00

TRIAL 2
SUPER
Q= 6500
n= 0.014
K= 0.1
FLAT
d_0 = 6.7

016A

''WASP2''SUPERCRITICAL WATER SURFACE PROFILE

COMPUTED BY: DATE: DATA FILE: R42B CHECKED BY:_____ DATE:_____

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
3+30.00	6500.00	50.00	2.00	7.280	6.700	424.8	15.30	1321.12	1310.78	1317.48	8.87	1.15	7.89
	n=0.0140	So=0.000000	Sf=0.002153	Headloss Factor=0.100	Total Headloss=0.041 ft.	Se=0.004111							
3+20.00	6500.00	50.00	2.00	7.280	6.854	436.7	14.88	1321.07	1310.78	1317.63	8.57	1.10	7.72

''WASP2''SUBCRITICAL WATER SURFACE PROFILE

RUN 017

COMPUTED BY: DATE: DATA FILE: R4NOV7 CHECKED BY:_____ DATE:_____

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
0+00.00	6500.00	175.00	3.00	3.430	8.990	1815.7	3.58	1319.99	1310.80	1319.79	0.00	0.22	0.87
	n=0.0300	So=0.000000		Sf=0.000336		Headloss Factor=0.100		Total Headloss=0.003 ft.			Se=0.000339		
0+10.00	6500.00	175.00	3.00	3.430	8.994	1816.5	3.58	1319.99	1310.80	1319.79	10.83	0.22	0.87
	n=0.0300	So=0.000000		Sf=0.000335		Headloss Factor=0.100		Total Headloss=0.003 ft.			Se=0.000340		
0+20.00	6500.00	175.00	3.00	3.430	8.997	1817.4	3.58	1320.00	1310.80	1319.80	10.84	0.22	0.87
	n=0.0300	So=0.000000		Sf=0.000335		Headloss Factor=0.100		Total Headloss=0.003 ft.			Se=0.000334		
0+30.00	6500.00	175.00	3.00	3.430	9.001	1818.2	3.57	1320.00	1310.80	1319.80	10.84	0.22	0.87
	n=0.0300	So=0.000000		Sf=0.000334		Headloss Factor=0.100		Total Headloss=0.003 ft.			Se=0.000340		
0+40.00	6500.00	175.00	3.00	3.430	9.004	1819.0	3.57	1320.00	1310.80	1319.80	10.84	0.22	0.87
	n=0.0300	So=0.000000		Sf=0.000334		Headloss Factor=0.100		Total Headloss=0.003 ft.			Se=0.000321		
0+50.00	6500.00	175.00	3.00	3.430	9.008	1819.8	3.57	1320.01	1310.80	1319.81	10.85	0.22	0.87
	n=0.0300	So=0.000000		Sf=0.000333		Headloss Factor=0.100		Total Headloss=0.003 ft.			Se=0.000326		
0+60.00	6500.00	175.00	3.00	3.430	9.011	1820.6	3.57	1320.01	1310.80	1319.81	10.85	0.22	0.87
	n=0.0300	So=0.000000		Sf=0.000333		Headloss Factor=0.100		Total Headloss=0.003 ft.			Se=0.000319		
0+70.00	6500.00	175.00	3.00	3.430	9.015	1821.4	3.57	1320.01	1310.80	1319.81	10.86	0.22	0.87
	n=0.0300	So=0.000000		Sf=0.000332		Headloss Factor=0.100		Total Headloss=0.003 ft.			Se=0.000324		
0+80.00	6500.00	175.00	3.00	3.430	9.018	1822.2	3.57	1320.02	1310.80	1319.82	10.86	0.22	0.87
	n=0.0300	So=0.000000		Sf=0.000332		Headloss Factor=0.100		Total Headloss=0.003 ft.			Se=0.000328		
0+90.00	6500.00	174.97	3.00	3.430	9.022	1822.7	3.57	1320.02	1310.80	1319.82	10.87	0.22	0.87
	n=0.0300	So=0.000000		Sf=0.000332		Headloss Factor=0.100		Total Headloss=0.003 ft.			Se=0.000328		
1+00.00	6500.00	174.76	3.00	3.433	9.025	1821.5	3.57	1320.02	1310.80	1319.82	10.87	0.22	0.87

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
	n=0.0300	So=0.000000		Sf=0.000333		Headloss Factor=0.100		Total Headloss=0.003 ft.			Se=0.000338		
1+10.00	6500.00	174.15	3.00	3.440	9.027	1814.5	3.58	1320.03	1310.80	1319.83	[illegible]	[illegible]	[illegible]

017/2

n=0.0300 So=0.000000 Sf=0.000336 Headloss Factor=0.100 Total Headloss=0.004 ft. Se=0.000364

1+20.00	6500.00	172.90	3.00	3.456	9.028	1805.5	3.60	1320.03	1310.80	1319.83	10.87	0.22	0.89

n=0.0300 So=0.000000 Sf=0.000343 Headloss Factor=0.100 Total Headloss=0.004 ft. Se=0.000389

1+30.00	6500.00	170.74	3.00	3.484	9.028	1785.9	3.64	1320.03	1310.80	1319.83	10.87	0.23	0.90

n=0.0300 So=0.000000 Sf=0.000357 Headloss Factor=0.100 Total Headloss=0.005 ft. Se=0.000494

1+40.00	6500.00	167.43	2.67	3.535	9.018	1727.1	3.76	1320.04	1310.80	1319.82	10.87	0.23	0.95

n=0.0300 So=0.000000 Sf=0.000382 Headloss Factor=0.100 Total Headloss=0.006 ft. Se=0.000584

1+50.00	6500.00	162.68	2.33	3.610	9.004	1653.8	3.93	1320.04	1310.80	1319.80	10.85	0.24	1.01

n=0.0300 So=0.000000 Sf=0.000419 Headloss Factor=0.100 Total Headloss=0.007 ft. Se=0.000689

1+60.00	6500.00	156.22	2.00	3.714	8.983	1564.8	4.15	1320.05	1310.80	1319.78	10.83	0.26	1.10

n=0.0300 So=0.000000 Sf=0.000468 Headloss Factor=0.100 Total Headloss=0.008 ft. Se=0.000764

1+70.00	6500.00	147.76	2.00	3.848	8.961	1484.7	4.38	1320.06	1310.80	1319.76	10.81	0.27	1.22

n=0.0300 So=0.000000 Sf=0.000536 Headloss Factor=0.100 Total Headloss=0.010 ft. Se=0.000984

1+80.00	6500.00	137.00	2.00	4.037	8.925	1382.1	4.70	1320.07	1310.80	1319.73	10.78	0.29	1.39

n=0.0300 So=-.040002 Sf=0.000598 Headloss Factor=0.100 Total Headloss=0.009 ft. Se=0.000904

1+90.00	6500.00	123.50	2.00	4.310	9.303	1322.0	4.92	1320.08	1310.40	1319.70	11.24	0.30	1.54

n=0.0300 So=-.040002 Sf=0.000642 Headloss Factor=0.100 Total Headloss=0.011 ft. Se=0.001076

2+00.00	6500.00	110.00	2.00	4.632	9.669	1250.6	5.20	1320.09	1310.00	1319.67	11.69	0.32	1.74

n=0.0300 So=0.003809 Sf=0.000757 Headloss Factor=0.100 Total Headloss=0.018 ft. Se=0.001763

2+10.00	6500.00	98.46	2.00	4.959	9.548	1122.4	5.79	1320.11	1310.04	1319.59	11.56	0.36	2.12

n=0.0300 So=0.003796 Sf=0.000979 Headloss Factor=0.100 Total Headloss=0.023 ft. Se=0.002287

2+20.00	6500.00	87.87	2.00	5.311	9.401	1002.8	6.48	1320.13	1310.08	1319.48	11.41	0.40	1313.39 2.59

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH

n=0.0300 So=0.003796 Sf=0.001285 Headloss Factor=0.100 Total Headloss=0.030 ft. Se=0.003010

2+30.00	6500.00	78.28	2.00	5.687	9.221	891.9	7.29	1320.16	1310.11	1319.33	11.23	0.46	1313.96 3.16

n=0.0300 So=0.003809 Sf=0.001712 Headloss Factor=0.100 Total Headloss=0.040 ft. Se=0.003989

2+40.00	6500.00	69.79	2.00	6.077	8.995	789.6	8.23	1320.20	1310.15	1319.15	11.00	0.53	1314.63 3.83

n=0.0300 So=0.003894 Sf=0.002320 Headloss Factor=0.100 Total Headloss=0.054 ft. Se=0.005355

2+50.00	6500.00	62.49	2.00	6.465	8.707	695.7	9.34	1320.25	1310.19	1318.90	10.72	0.62	1315.41 4.61

n=0.0300 So=0.003796 Sf=0.003204 Headloss Factor=0.100 Total Headloss=0.073 ft. Se=0.007276

2+60.00	6500.00	56.53	2.00	6.827	8.334	610.0	10.66	1320.33	1310.23	1318.56	10.35	0.72	1316.29 5.49

2+70.00	6500.00	52.15	2.00	7.124	7.840	531.8	12.22	1320.43	1310.27	1318.11	9.87	0.85	1317.24 6.44

017/3

''WASP2''SUPERCRITICAL WATER SURFACE PROFILE

RUN 018

COMPUTED BY: DATE: DATA FILE: R4NOV8 CHECKED BY:_____ DATE:_____

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
3+00.00	6500.00	50.00	2.00	7.280	6.300	394.4	16.48	1321.32	1310.80	1317.10	0.00	1.27	8.36
	n=0.0140	So=0.000000	Sf=0.002737	Headloss Factor=0.100	Total Headloss=0.038 ft.	Se=0.003745							
2+90.00	6500.00	50.00	2.00	7.280	6.364	399.2	16.28	1321.28	1310.80	1317.16	7.96	1.25	8.28
	n=0.0140	So=0.000000	Sf=0.002637	Headloss Factor=0.100	Total Headloss=0.037 ft.	Se=0.003697							
2+80.00	6500.00	50.00	2.00	7.280	6.435	404.5	16.07	1321.24	1310.80	1317.23	8.04	1.23	8.20
	n=0.0300	So=0.000000	Sf=0.004992	Headloss Factor=0.100	Total Headloss=0.077 ft.	Se=0.007682							
2+70.00	6500.00	52.15	2.00	7.124	6.087	391.5	16.60	1321.17	1310.80	1316.89	7.61	1.29	8.27
	n=0.0300	So=0.000000	Sf=0.014477	Headloss Factor=0.100	Total Headloss=0.179 ft.	Se=0.017851							
2+60.00	6500.00	56.53	2.00	6.827	5.570	376.9	17.25	1320.99	1310.80	1316.37	6.96	1.39	8.24
	n=0.0300	So=0.000000	Sf=0.017148	Headloss Factor=0.100	Total Headloss=0.207 ft.	Se=0.020665							
2+50.00	6500.00	62.49	2.00	6.465	5.010	363.3	17.89	1320.78	1310.80	1315.81	6.26	1.50	8.15
	n=0.0300	So=0.000000	Sf=0.020426	Headloss Factor=0.100	Total Headloss=0.234 ft.	Se=0.023350							
2+40.00	6500.00	69.79	2.00	6.077	4.482	353.0	18.42	1320.55	1310.80	1315.28	5.60	1.62	7.98
	n=0.0300	So=0.000000	Sf=0.024072	Headloss Factor=0.100	Total Headloss=0.262 ft.	Se=0.026151							
2+30.00	6500.00	78.28	2.00	5.687	4.011	346.1	18.78	1320.29	1310.80	1314.81	5.01	1.73	7.74
	n=0.0300	So=0.000000	Sf=0.027913	Headloss Factor=0.100	Total Headloss=0.291 ft.	Se=0.029077							
2+20.00	6500.00	87.87	2.00	5.311	3.602	342.5	18.98	1320.00	1310.80	1314.40	4.50	1.83	7.46
	n=0.0300	So=0.000000	Sf=0.031768	Headloss Factor=0.100	Total Headloss=0.320 ft.	Se=0.032024							
2+10.00	6500.00	98.46	2.00	4.959	3.255	341.7	19.03	1319.68	1310.80	1314.05	4.07	1.92	7.14
	n=0.0300	So=0.000000	Sf=0.035358	Headloss Factor=0.100	Total Headloss=0.361 ft.	Se=0.036070							
2+00.00	6500.00	110.00	2.00	4.632	2.966	343.9	18.90	1319.31	1310.80	1313.77	3.71	1.98	6.81

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
	n=0.0300	So=0.000000	Sf=0.038695	Headloss Factor=0.100	Total Headloss=0.400 ft.	Se=0.040038							
1+80.00	6500.00	123.50	2.00	4.310	2.701	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

018/2

n=0.0300 So=0.000000 Sf=0.041257 Headloss Factor=0.100 Total Headloss=0.437 ft. Se=0.043702

1+80.00	6500.00	137.00	2.00	4.037	2.509	356.3	18.24	1318.48	1310.80	1313.31	3.14	2.07	6.07

n=0.0300 So=0.000000 Sf=0.041470 Headloss Factor=0.100 Total Headloss=0.451 ft. Se=0.045084

1+70.00	6500.00	147.76	2.00	3.848	2.421	369.5	17.59	1318.03	1310.80	1313.22	3.03	2.02	5.74

n=0.0300 So=0.000000 Sf=0.039196 Headloss Factor=0.100 Total Headloss=0.433 ft. Se=0.043290

1+60.00	6500.00	156.22	2.00	3.714	2.400	386.4	16.82	1317.59	1310.80	1313.20	3.00	1.94	5.43

n=0.0300 So=0.000000 Sf=0.035778 Headloss Factor=0.100 Total Headloss=0.399 ft. Se=0.039867

1+50.00	6500.00	162.68	2.33	3.610	2.411	405.8	16.02	1317.19	1310.80	1313.21	3.01	1.85	5.14

n=0.0300 So=0.000000 Sf=0.031823 Headloss Factor=0.100 Total Headloss=0.359 ft. Se=0.035910

1+40.00	6500.00	167.43	2.67	3.535	2.463	428.5	15.17	1316.84	1310.80	1313.26	3.08	1.74	4.87

n=0.0300 So=0.000000 Sf=0.027484 Headloss Factor=0.100 Total Headloss=0.315 ft. Se=0.031487

1+30.00	6500.00	170.74	3.00	3.484	2.550	454.9	14.29	1316.52	1310.80	1313.35	3.19	1.61	4.61

n=0.0300 So=0.000000 Sf=0.022787 Headloss Factor=0.100 Total Headloss=0.269 ft. Se=0.026922

1+20.00	6500.00	172.90	3.00	3.456	2.696	488.0	13.32	1316.25	1310.80	1313.50	3.37	1.46	4.35

n=0.0300 So=0.000000 Sf=0.017906 Headloss Factor=0.100 Total Headloss=0.222 ft. Se=0.022208

1+10.00	6500.00	174.15	3.00	3.440	2.906	531.5	12.23	1316.03	1310.80	1313.71	3.63	1.29	4.04

''WASP2''SUPERCRITICAL WATER SURFACE PROFILE

RUN 019

COMPUTED BY: DATE: DATA FILE: R4NOV8 CHECKED BY:_____ DATE:_____

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
3+00.00	6500.00	50.00	2.00	7.280	6.500	409.5	15.87	1321.21	1310.80	1317.30	3.63	1.21	8.12
	n=0.0140	So=0.000000		Sf=0.002437		Headloss Factor=0.100		Total Headloss=0.037 ft.			Se=0.003658		
2+90.00	6500.00	50.00	2.00	7.280	6.587	416.1	15.62	1321.18	1310.80	1317.39	8.23	1.18	8.02
	n=0.0140	So=0.000000		Sf=0.002315		Headloss Factor=0.100		Total Headloss=0.037 ft.			Se=0.003715		
2+80.00	6500.00	50.00	2.00	7.280	6.692	424.2	15.32	1321.14	1310.80	1317.49	8.36	1.15	7.90
	n=0.0300	So=0.000000		Sf=0.004394		Headloss Factor=0.100		Total Headloss=0.079 ft.			Se=0.007862		
2+70.00	6500.00	52.15	2.00	7.124	6.266	405.3	16.04	1321.06	1310.80	1317.07	7.83	1.23	8.06
	n=0.0300	So=0.000000		Sf=0.013262		Headloss Factor=0.100		Total Headloss=0.173 ft.			Se=0.017303		
2+60.00	6500.00	56.53	2.00	6.827	5.687	386.1	16.83	1320.89	1310.80	1316.49	7.11	1.34	8.11
	n=0.0300	So=0.000000		Sf=0.016094		Headloss Factor=0.100		Total Headloss=0.201 ft.			Se=0.020049		
2+50.00	6500.00	62.49	2.00	6.465	5.089	369.8	17.58	1320.69	1310.80	1315.89	6.36	1.47	8.05
	n=0.0300	So=0.000000		Sf=0.019457		Headloss Factor=0.100		Total Headloss=0.227 ft.			Se=0.022679		
2+40.00	6500.00	69.79	2.00	6.077	4.538	357.9	18.16	1320.46	1310.80	1315.34	5.67	1.59	7.90
	n=0.0300	So=0.000000		Sf=0.023146		Headloss Factor=0.100		Total Headloss=0.255 ft.			Se=0.025449		
2+30.00	6500.00	78.28	2.00	5.687	4.053	350.1	18.57	1320.21	1310.80	1314.85	5.07	1.70	7.68
	n=0.0300	So=0.000000		Sf=0.027011		Headloss Factor=0.100		Total Headloss=0.284 ft.			Se=0.028347		
2+20.00	6500.00	87.87	2.00	5.311	3.635	345.8	18.80	1319.92	1310.80	1314.43	4.54	1.80	7.41
	n=0.0300	So=0.000000		Sf=0.030885		Headloss Factor=0.100		Total Headloss=0.313 ft.			Se=0.031285		
2+10.00	6500.00	98.46	2.00	4.959	3.280	344.5	18.87	1319.61	1310.80	1314.08	4.10	1.89	7.10
	n=0.0300	So=0.000000		Sf=0.034513		Headloss Factor=0.100		Total Headloss=0.351 ft.			Se=0.035070		
2+00.00	6500.00	110.00	2.00	4.632	2.986	346.3	18.77	1319.26	1310.80	1313.79	3.73	1.96	6.77

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
	n=0.0300	So=0.000000		Sf=0.037911		Headloss Factor=0.100		Total Headloss=0.391 ft.			Se=0.039104		
1+90.00	6500.00	123.50	2.00	4.310	2.714	350.5	18.54	1319.07	1310.80	1313.52	3.39	2.07	6.41

RUN 020

''WASP2''SUPERCRITICAL WATER SURFACE PROFILE

COMPUTED BY: DATE: DATA FILE: R4NOV8 CHECKED BY:_____ DATE:_____

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
3+00.00	6500.00	50.00	2.00	7.280	6.700	424.8	15.30	1321.14	1310.80	1317.50	3.65	1.15	7.89
n=0.0140	So=0.000000	Sf=0.002153	Headloss Factor=0.100	Total Headloss=0.041 ft.	Se=0.004111								
2+90.00	6500.00	50.00	2.00	7.280	6.854	436.7	14.88	1321.09	1310.80	1317.65	8.57	1.10	7.72

RON 021

''WASP2''SUBCRITICAL WATER SURFACE PROFILE

COMPUTED BY: DATE: DATA FILE: r4dec1r CHECKED BY:_____ DATE:_____

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
SSI +30 0+00.00	6500.00	50.00	2.00	7.280	8.600	577.9	11.25	1321.36	1310.80	1319.40	0.00	0.76	6.08
	n=0.0140	So=0.000000	Sf=0.000915	Headloss Factor=0.000	Total Headloss=0.009 ft.	Se=0.000908							
0+10.00	6500.00	50.00	2.00	7.280	8.621	579.7	11.21	1321.37	1310.80	1319.42	10.74	0.75	6.06
	n=0.0140	So=0.000000	Sf=0.000907	Headloss Factor=0.000	Total Headloss=0.009 ft.	Se=0.000900							
0+20.00	6500.00	50.00	2.00	7.280	8.642	581.5	11.18	1321.38	1310.80	1319.44	10.76	0.75	6.05
	n=0.0140	So=0.000000	Sf=0.000899	Headloss Factor=0.000	Total Headloss=0.009 ft.	Se=0.000898							
0+30.00	6500.00	50.00	2.00	7.280	8.663	583.2	11.14	1321.39	1310.80	1319.46	10.78	0.75	6.03
	n=0.0140	So=0.000000	Sf=0.000892	Headloss Factor=0.000	Total Headloss=0.009 ft.	Se=0.000886							
0+40.00	6500.00	50.00	2.00	7.280	8.683	584.9	11.11	1321.40	1310.80	1319.48	10.80	0.75	6.01
	n=0.0140	So=0.000000	Sf=0.000884	Headloss Factor=0.000	Total Headloss=0.009 ft.	Se=0.000874							
0+50.00	6500.00	50.00	2.00	7.280	8.703	586.6	11.08	1321.41	1310.80	1319.50	10.82	0.74	6.00
	n=0.0140	So=0.000361	Sf=0.000876	Headloss Factor=0.000	Total Headloss=0.022 ft.	Se=0.000873							
0+75.00	6500.00	50.00	2.00	7.280	8.731	589.0	11.04	1321.43	1310.81	1319.54	10.86	0.74	5.98
	n=0.0140	So=0.000361	Sf=0.000866	Headloss Factor=0.000	Total Headloss=0.022 ft.	Se=0.000862							
1+00.00	6500.00	50.00	2.00	7.280	8.758	591.3	10.99	1321.45	1310.82	1319.58	10.89	0.73	5.95
	n=0.0140	So=0.000317	Sf=0.000856	Headloss Factor=0.000	Total Headloss=0.021 ft.	Se=0.000852							
1+25.00	6500.00	50.00	2.00	7.280	8.787	593.8	10.95	1321.47	1310.83	1319.61	10.92	0.73	5.93
	n=0.0140	So=0.000361	Sf=0.000846	Headloss Factor=0.000	Total Headloss=0.021 ft.	Se=0.000843							
1+50.00	6500.00	50.00	2.00	7.280	8.813	596.0	10.91	1321.50	1310.84	1319.65	10.95	0.73	5.91
	n=0.0140	So=0.000356	Sf=0.000837	Headloss Factor=0.000	Total Headloss=0.021 ft.	Se=0.000834							
1+75.00	6500.00	50.00	2.00	7.280	8.838	598.2	10.87	1321.52	1310.84	1319.68	10.97	0.72	5.89

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
	n=0.0140	So=0.000361	Sf=0.000829	Headloss Factor=0.000	Total Headloss=0.021 ft.	Se=0.000828							

	n=0.0140	So=0.000361	Sf=0.000821	Headloss Factor=0.000	Total Headloss=0.021 ft.	Se=0.000817							
2+25.00	6500.00	50.00	2.00	7.280	8.887	602.3	10.79	1321.56	1310.86	1319.75	11.03	0.72	5.85
	n=0.0140	So=0.000361	Sf=0.000813	Headloss Factor=0.000	Total Headloss=0.020 ft.	Se=0.000810							
2+50.00	6500.00	50.00	2.00	7.280	8.910	604.2	10.76	1321.58	1310.87	1319.78	11.05	0.71	5.83
	n=0.0140	So=0.000356	Sf=0.000805	Headloss Factor=0.000	Total Headloss=0.020 ft.	Se=0.000803							
2+75.00	6500.00	50.00	2.00	7.280	8.932	606.2	10.72	1321.60	1310.88	1319.81	11.08	0.71	5.82
	n=0.0140	So=0.000322	Sf=0.000798	Headloss Factor=0.000	Total Headloss=0.020 ft.	Se=0.000795							
3+00.00	6500.00	50.00	2.00	7.280	8.956	608.2	10.69	1321.62	1310.89	1319.84	11.10	0.71	5.80
	n=0.0140	So=0.000361	Sf=0.000791	Headloss Factor=0.000	Total Headloss=0.020 ft.	Se=0.000791							
3+25.00	6500.00	50.00	2.00	7.280	8.978	610.1	10.65	1321.64	1310.90	1319.87	11.13	0.70	5.78
	n=0.0140	So=0.000356	Sf=0.000784	Headloss Factor=0.000	Total Headloss=0.020 ft.	Se=0.000784							
3+50.00	6500.00	50.00	2.00	7.280	8.999	611.9	10.62	1321.66	1310.91	1319.90	11.15	0.70	5.76
	n=0.0140	So=0.000361	Sf=0.000777	Headloss Factor=0.000	Total Headloss=0.019 ft.	Se=0.000775							
3+75.00	6500.00	50.00	2.00	7.280	9.019	613.7	10.59	1321.68	1310.92	1319.93	11.17	0.70	5.75
	n=0.0140	So=0.000361	Sf=0.000771	Headloss Factor=0.000	Total Headloss=0.019 ft.	Se=0.000770							
4+00.00	6500.00	50.00	2.00	7.280	9.039	615.4	10.56	1321.70	1310.92	1319.96	11.19	0.70	5.73
	n=0.0140	So=0.000361	Sf=0.000765	Headloss Factor=0.000	Total Headloss=0.019 ft.	Se=0.000767							
4+25.00	6500.00	50.00	2.00	7.280	9.059	617.1	10.53	1321.71	1310.93	1319.99	11.22	0.69	5.72
	n=0.0140	So=0.000356	Sf=0.000759	Headloss Factor=0.000	Total Headloss=0.019 ft.	Se=0.000753							
4+50.00	6500.00	50.00	2.00	7.280	9.078	618.7	10.51	1321.73	1310.94	1320.02	11.24	0.69	5.70
	n=0.0140	So=0.000317	Sf=0.000753	Headloss Factor=0.000	Total Headloss=0.019 ft.	Se=0.000750							
4+75.00	6500.00	50.00	2.00	7.280	9.099	620.5	10.48	1321.75	1310.95	1320.05	11.26	0.69	5.69

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
	n=0.0140	So=0.000366	Sf=0.000747	Headloss Factor=0.000	Total Headloss=0.019 ft.	Se=0.000745							
5+00.00	6500.00	50.00	2.00	7.280	9.117	622.1	10.45	1321.77	1310.96	1320.08	11.28	0.69	5.67
	n=0.0140	So=0.000356	Sf=0.000742	Headloss Factor=0.000	Total Headloss=0.019 ft.	Se=0.000740							
5+25.00	6500.00	50.00	2.00	7.280	9.135	623.7	10.42	1321.79	1310.97	1320.10	11.30	0.68	5.66
	n=0.0140	So=0.000361	Sf=0.000736	Headloss Factor=0.000	Total Headloss=0.018 ft.	Se=0.000735							
5+50.00	6500.00	50.00	2.00	7.280	9.153	625.2	10.40	1321.81	1310.98	1320.13	11.32	0.68	5.65
	n=0.0140	So=0.000361	Sf=0.000731	Headloss Factor=0.000	Total Headloss=0.018 ft.	Se=0.000729							
5+75.00	6500.00	50.00	2.00	7.280	9.170	626.7	10.37	1321.83	1310.99	1320.16	11.34	0.68	5.63

021/3

6+00.00	6500.00	50.00	2.00	7.280	9.187	628.1	10.35	1321.84	1311.00	1320.18	11.36	0.68	5.62

n=0.0140 So=0.000317 Sf=0.000721 Headloss Factor=0.000 Total Headloss=0.018 ft. Se=0.000721

6+25.00	6500.00	50.00	2.00	7.280	9.206	629.8	10.32	1321.86	1311.00	1320.21	11.38	0.68	5.61

n=0.0140 So=0.000361 Sf=0.000716 Headloss Factor=0.000 Total Headloss=0.018 ft. Se=0.000716

6+50.00	6500.00	50.00	2.00	7.280	9.222	631.2	10.30	1321.88	1311.01	1320.23	11.40	0.67	5.60

n=0.0140 So=0.000356 Sf=0.000712 Headloss Factor=0.000 Total Headloss=0.018 ft. Se=0.000711

6+75.00	6500.00	50.00	2.00	7.280	9.238	632.6	10.28	1321.90	1311.02	1320.26	11.41	0.67	5.58

n=0.0140 So=0.000361 Sf=0.000707 Headloss Factor=0.000 Total Headloss=0.018 ft. Se=0.000706

7+00.00	6500.00	50.00	2.00	7.280	9.254	634.0	10.25	1321.92	1311.03	1320.28	11.43	0.67	5.57

n=0.0140 So=0.000361 Sf=0.000703 Headloss Factor=0.000 Total Headloss=0.018 ft. Se=0.000702

7+25.00	6500.00	50.00	2.00	7.280	9.269	635.3	10.23	1321.93	1311.04	1320.31	11.45	0.67	5.56

n=0.0140 So=0.000361 Sf=0.000699 Headloss Factor=0.000 Total Headloss=0.017 ft. Se=0.000695

7+50.00	6500.00	50.00	2.00	7.280	9.285	636.6	10.21	1321.95	1311.05	1320.33	11.47	0.67	5.55

n=0.0140 So=0.000356 Sf=0.000695 Headloss Factor=0.000 Total Headloss=0.017 ft. Se=0.000691

7+75.00	6500.00	50.00	2.00	7.280	9.300	637.9	10.19	1321.97	1311.06	1320.36	11.48	0.66	5.54

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH

n=0.0140 So=0.000334 Sf=0.000691 Headloss Factor=0.000 Total Headloss=0.010 ft. Se=0.000691

7+90.00	6500.00	50.00	2.00	7.280	9.309	638.8	10.18	1321.98	1311.06	1320.37	11.49	0.66	5.53

''WASP2''SUBCRITICAL WATER SURFACE PROFILE

RON 022

COMPUTED BY: DATE: DATA FILE: r4dec1r CHECKED BY:_____ DATE:_____

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
551+30 0+00.00	6500.00	50.00	2.00	7.280	9.000	612.0	10.62	1321.55	1310.80	1319.80	11.49	0.70	5.76
	n=0.0140	So=0.000000		Sf=0.000778		Headloss Factor=0.000		Total Headloss=0.008 ft.			Se=0.000779		
0+10.00	6500.00	50.00	2.00	7.280	9.015	613.3	10.60	1321.56	1310.80	1319.82	11.17	0.70	5.75
	n=0.0140	So=0.000000		Sf=0.000773		Headloss Factor=0.000		Total Headloss=0.008 ft.			Se=0.000768		
0+20.00	6500.00	50.00	2.00	7.280	9.030	614.6	10.58	1321.57	1310.80	1319.83	11.18	0.70	5.74
	n=0.0140	So=0.000000		Sf=0.000768		Headloss Factor=0.000		Total Headloss=0.008 ft.			Se=0.000769		
0+30.00	6500.00	50.00	2.00	7.280	9.045	615.9	10.55	1321.57	1310.80	1319.85	11.20	0.70	5.73
	n=0.0140	So=0.000000		Sf=0.000764		Headloss Factor=0.000		Total Headloss=0.008 ft.			Se=0.000765		
0+40.00	6500.00	50.00	2.00	7.280	9.060	617.2	10.53	1321.58	1310.80	1319.86	11.22	0.69	5.72
	n=0.0140	So=0.000000		Sf=0.000759		Headloss Factor=0.000		Total Headloss=0.008 ft.			Se=0.000751		
550+80 0+50.00	6500.00	50.00	2.00	7.280	9.075	618.4	10.51	1321.59	1310.80	1319.87	11.23	0.69	5.71
	n=0.0140	So=0.000361		Sf=0.000754		Headloss Factor=0.000		Total Headloss=0.019 ft.			Se=0.000751		
0+75.00	6500.00	50.00	2.00	7.280	9.093	620.1	10.48	1321.61	1310.81	1319.90	11.25	0.69	5.69
	n=0.0140	So=0.000361		Sf=0.000749		Headloss Factor=0.000		Total Headloss=0.019 ft.			Se=0.000746		
1+00.00	6500.00	50.00	2.00	7.280	9.112	621.6	10.46	1321.63	1310.82	1319.93	11.27	0.69	5.68
	n=0.0140	So=0.000317		Sf=0.000743		Headloss Factor=0.000		Total Headloss=0.019 ft.			Se=0.000738		
1+25.00	6500.00	50.00	2.00	7.280	9.132	623.4	10.43	1321.65	1310.83	1319.96	11.30	0.68	5.66
	n=0.0140	So=0.000361		Sf=0.000737		Headloss Factor=0.000		Total Headloss=0.018 ft.			Se=0.000734		
1+50.00	6500.00	50.00	2.00	7.280	9.149	624.9	10.40	1321.66	1310.84	1319.98	11.32	0.68	5.65
	n=0.0140	So=0.000356		Sf=0.000732		Headloss Factor=0.000		Total Headloss=0.018 ft.			Se=0.000731		
1+75.00	6500.00	50.00	2.00	7.280	9.167	626.4	10.38	1321.68	1310.84	1320.01	11.33	0.68	5.64

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
	n=0.0140	So=0.000361		Sf=0.000727		Headloss Factor=0.000		Total Headloss=0.018 ft.			Se=0.000725		

02412

	n=0.0140	So=0.000361	Sf=0.000723	Headloss Factor=0.000	Total Headloss=0.018 ft.	Se=0.000721							
2+25.00	6500.00	50.00	2.00	7.280	9.201	629.3	10.33	1321.72	1310.86	1320.06	11.37	0.68	5.61
	n=0.0140	So=0.000361	Sf=0.000718	Headloss Factor=0.000	Total Headloss=0.018 ft.	Se=0.000717							
2+50.00	6500.00	50.00	2.00	7.280	9.217	630.8	10.30	1321.74	1310.87	1320.09	11.39	0.67	5.60
	n=0.0140	So=0.000356	Sf=0.000713	Headloss Factor=0.000	Total Headloss=0.018 ft.	Se=0.000710							
2+75.00	6500.00	50.00	2.00	7.280	9.233	632.2	10.28	1321.75	1310.88	1320.11	11.41	0.67	5.59
	n=0.0140	So=0.000322	Sf=0.000708	Headloss Factor=0.000	Total Headloss=0.018 ft.	Se=0.000706							
3+00.00	6500.00	50.00	2.00	7.280	9.251	633.7	10.26	1321.77	1310.89	1320.14	11.43	0.67	5.57
	n=0.0140	So=0.000361	Sf=0.000704	Headloss Factor=0.000	Total Headloss=0.018 ft.	Se=0.000701							
3+25.00	6500.00	50.00	2.00	7.280	9.266	635.0	10.24	1321.79	1310.90	1320.16	11.44	0.67	5.56
	n=0.0140	So=0.000356	Sf=0.000700	Headloss Factor=0.000	Total Headloss=0.017 ft.	Se=0.000697							
3+50.00	6500.00	50.00	2.00	7.280	9.282	636.4	10.21	1321.81	1310.91	1320.19	11.46	0.67	5.55
	n=0.0140	So=0.000361	Sf=0.000696	Headloss Factor=0.000	Total Headloss=0.017 ft.	Se=0.000690							
3+75.00	6500.00	50.00	2.00	7.280	9.297	637.7	10.19	1321.83	1310.92	1320.21	11.48	0.66	5.54
	n=0.0140	So=0.000361	Sf=0.000692	Headloss Factor=0.000	Total Headloss=0.017 ft.	Se=0.000690							
547+30 4+00.00	6500.00	50.00	2.00	7.280	9.311	639.0	10.17	1321.84	1310.92	1320.24	11.50	0.66	5.53
	n=0.0140	So=0.000361	Sf=0.000688	Headloss Factor=0.000	Total Headloss=0.017 ft.	Se=0.000686							
4+25.00	6500.00	50.00	2.00	7.280	9.326	640.2	10.15	1321.86	1310.93	1320.26	11.51	0.66	5.52
	n=0.0140	So=0.000356	Sf=0.000684	Headloss Factor=0.000	Total Headloss=0.017 ft.	Se=0.000682							
4+50.00	6500.00	50.00	2.00	7.280	9.341	641.5	10.13	1321.88	1310.94	1320.28	11.53	0.66	5.51
	n=0.0140	So=0.000317	Sf=0.000680	Headloss Factor=0.000	Total Headloss=0.017 ft.	Se=0.000676							
4+75.00	6500.00	50.00	2.00	7.280	9.356	642.9	10.11	1321.89	1310.95	1320.31	11.55	0.66	5.50

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
	n=0.0140	So=0.000366	Sf=0.000676	Headloss Factor=0.000	Total Headloss=0.017 ft.	Se=0.000672							
5+00.00	6500.00	50.00	2.00	7.280	9.370	644.1	10.09	1321.91	1310.96	1320.33	11.56	0.66	5.49
	n=0.0140	So=0.000356	Sf=0.000672	Headloss Factor=0.000	Total Headloss=0.017 ft.	Se=0.000671							
5+25.00	6500.00	50.00	2.00	7.280	9.384	645.3	10.07	1321.93	1310.97	1320.35	11.58	0.65	5.48
	n=0.0140	So=0.000361	Sf=0.000669	Headloss Factor=0.000	Total Headloss=0.017 ft.	Se=0.000666							
5+50.00	6500.00	50.00	2.00	7.280	9.397	646.5	10.05	1321.94	1310.98	1320.37	11.59	0.65	5.47
	n=0.0140	So=0.000361	Sf=0.000665	Headloss Factor=0.000	Total Headloss=0.017 ft.	Se=0.000660							
5+75.00	6500.00	50.00	2.00	7.280	9.410	647.6	10.04	1321.96	1310.99	1320.40	11.61	0.65	5.46

022/3

6+00.00	6500.00	50.00	2.00	7.280	9.423	648.8	10.02	1321.98	1311.00	1320.42	11.62	0.65	5.45
	n=0.0140	So=0.000317	Sf=0.000658	Headloss Factor=0.000	Total Headloss=0.016 ft.	Se=0.000658							
6+25.00	6500.00	50.00	2.00	7.280	9.438	650.1	10.00	1321.99	1311.00	1320.44	11.64	0.65	5.44
	n=0.0140	So=0.000361	Sf=0.000655	Headloss Factor=0.000	Total Headloss=0.016 ft.	Se=0.000653							
6+50.00	6500.00	50.00	2.00	7.280	9.451	651.2	9.98	1322.01	1311.01	1320.46	11.65	0.65	5.43
	n=0.0140	So=0.000356	Sf=0.000652	Headloss Factor=0.000	Total Headloss=0.016 ft.	Se=0.000645							
6+75.00	6500.00	50.00	2.00	7.280	9.463	652.3	9.97	1322.03	1311.02	1320.48	11.66	0.64	5.42
	n=0.0140	So=0.000361	Sf=0.000649	Headloss Factor=0.000	Total Headloss=0.016 ft.	Se=0.000648							
7+00.00	6500.00	50.00	2.00	7.280	9.476	653.4	9.95	1322.04	1311.03	1320.51	11.68	0.64	5.41
	n=0.0140	So=0.000361	Sf=0.000646	Headloss Factor=0.000	Total Headloss=0.016 ft.	Se=0.000642							
7+25.00	6500.00	50.00	2.00	7.280	9.488	654.4	9.93	1322.06	1311.04	1320.53	11.69	0.64	5.40
	n=0.0140	So=0.000361	Sf=0.000643	Headloss Factor=0.000	Total Headloss=0.016 ft.	Se=0.000644							
7+50.00	6500.00	50.00	2.00	7.280	9.500	655.5	9.92	1322.07	1311.05	1320.55	11.71	0.64	5.39
	n=0.0140	So=0.000356	Sf=0.000640	Headloss Factor=0.000	Total Headloss=0.016 ft.	Se=0.000638							
7+75.00	6500.00	50.00	2.00	7.280	9.512	656.5	9.90	1322.09	1311.06	1320.57	11.72	0.64	5.38

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
	n=0.0140	So=0.000334	Sf=0.000637	Headloss Factor=0.000	Total Headloss=0.010 ft.	Se=0.000632							
5+3+40 7+90.00	6500.00	50.00	2.00	7.280	9.519	657.2	9.89	1322.10	1311.06	1320.58	11.73	0.64	5.38

RUN 023

''WASP2''SUBCRITICAL WATER SURFACE PROFILE

COMPUTED BY: DT DATE: 1/16/85 DATA FILE: r4jan10 CHECKED BY:_____ DATE:_____

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH
542+50													
0+00.00	6500.00	50.00	2.00	7.280	9.600	664.3	9.78	1322.15	1311.06	1320.66	0.00	0.63	5.33
	n=0.0140	So=0.000900	Sf=0.000623	Headloss Factor=0.000	Total Headloss=0.062 ft.	Se=0.000622							
541+50													
1+00.00	6500.00	50.00	2.00	7.280	9.554	660.2	9.84	1322.21	1311.15	1320.70	11.77	0.63	5.35
	n=0.0140	So=0.000901	Sf=0.000633	Headloss Factor=0.000	Total Headloss=0.063 ft.	Se=0.000633							
+ 540+50													
2+00.00	6500.00	50.00	2.00	7.280	9.509	656.3	9.90	1322.27	1311.24	1320.75	11.72	0.64	5.39
	n=0.0140	So=0.000900	Sf=0.000644	Headloss Factor=0.000	Total Headloss=0.064 ft.	Se=0.000644							
539+50													
3+00.00	6500.00	50.00	2.00	7.280	9.466	652.5	9.96	1322.34	1311.33	1320.80	11.67	0.64	5.42
	n=0.0140	So=0.000900	Sf=0.000655	Headloss Factor=0.000	Total Headloss=0.065 ft.	Se=0.000654							
538+50													
4+00.00	6500.00	50.00	2.00	7.280	9.423	648.8	10.02	1322.40	1311.42	1320.84	11.62	0.65	5.45
	n=0.0140	So=0.000901	Sf=0.000665	Headloss Factor=0.000	Total Headloss=0.067 ft.	Se=0.000665							
537+50													
5+00.00	6500.00	50.00	2.00	7.280	9.383	645.2	10.07	1322.47	1311.51	1320.89	11.57	0.65	5.48
	n=0.0140	So=0.000900	Sf=0.000676	Headloss Factor=0.000	Total Headloss=0.068 ft.	Se=0.000676							
536+50													
6+00.00	6500.00	50.00	2.00	7.280	9.343	641.8	10.13	1322.54	1311.60	1320.94	11.53	0.66	5.51
	n=0.0140	So=0.000900	Sf=0.000686	Headloss Factor=0.000	Total Headloss=0.069 ft.	Se=0.000685							
+ 535+50													
7+00.00	6500.00	50.00	2.00	7.280	9.305	638.4	10.18	1322.60	1311.69	1321.00	11.49	0.66	5.53
	n=0.0140	So=0.000901	Sf=0.000696	Headloss Factor=0.000	Total Headloss=0.070 ft.	Se=0.000695							
534+50													
8+00.00	6500.00	50.00	2.00	7.280	9.268	635.2	10.23	1322.67	1311.78	1321.05	11.45	0.67	5.56
	n=0.0140	So=0.000900	Sf=0.000706	Headloss Factor=0.000	Total Headloss=0.071 ft.	Se=0.000705							
533+50													
9+00.00	6500.00	50.00	2.00	7.280	9.233	632.2	10.28	1322.74	1311.87	1321.10	11.41	0.67	5.59
	n=0.0140	So=0.000900	Sf=0.000716	Headloss Factor=0.000	Total Headloss=0.072 ft.	Se=0.000715							
532+50													
10+00.00	6500.00	50.00	2.00	7.280	9.200	629.2	10.33	1322.82	1311.96	1321.16	11.37	0.68	5.61

STATION	Q	B	Z	Dc	DEPTH	AREA	VELOC	E.G.L	INV EL	W.S.EL	FREE BOARD	FROUDE NUMBER	SEQUENT DEPTH

RON 123/2

```
531+50
                n=0.0140      So=0.000900      Sf=0.000725      Headloss Factor=0.000    Total Headloss=0.073 ft.    Se=0.000725
11+00.00   6500.00   50.00    2.00    7.280    9.167    626.4    10.38   1322.89    1312.05   1321.22    11.34    0.68    5.64

530+50
                n=0.0140      So=0.000901      Sf=0.000734      Headloss Factor=0.000    Total Headloss=0.073 ft.    Se=0.000733
12+00.00   6500.00   50.00    2.00    7.280    9.136    623.7    10.42   1322.96    1312.14   1321.28    11.30    0.68    5.66

529+50
                n=0.0140      So=0.000900      Sf=0.000743      Headloss Factor=0.000    Total Headloss=0.074 ft.    Se=0.000743
13+00.00   6500.00   50.00    2.00    7.280    9.106    621.2    10.46   1323.04    1312.23   1321.34    11.27    0.69    5.68

528+50
                n=0.0140      So=0.000900      Sf=0.000752      Headloss Factor=0.000    Total Headloss=0.075 ft.    Se=0.000751
14+00.00   6500.00   50.00    2.00    7.280    9.078    618.7    10.51   1323.11    1312.32   1321.40    11.24    0.69    5.70

527+50
                n=0.0140      So=0.000900      Sf=0.000760      Headloss Factor=0.000    Total Headloss=0.076 ft.    Se=0.000760
15+00.00   6500.00   50.00    2.00    7.280    9.052    616.4    10.54   1323.19    1312.41   1321.46    11.21    0.69    5.72

526+50
                n=0.0140      So=0.000901      Sf=0.000768      Headloss Factor=0.000    Total Headloss=0.077 ft.    Se=0.000767
16+00.00   6500.00   50.00    2.00    7.280    9.026    614.2    10.58   1323.26    1312.50   1321.53    11.18    0.70    5.74

525+50
                n=0.0140      So=0.000900      Sf=0.000776      Headloss Factor=0.000    Total Headloss=0.078 ft.    Se=0.000776
17+00.00   6500.00   50.00    2.00    7.280    9.002    612.1    10.62   1323.34    1312.59   1321.59    11.15    0.70    5.76

524+50
                n=0.0140      So=0.000900      Sf=0.000783      Headloss Factor=0.000    Total Headloss=0.078 ft.    Se=0.000783
18+00.00   6500.00   50.00    2.00    7.280    8.979    610.2    10.65   1323.42    1312.68   1321.66    11.13    0.70    5.78

523+50
                n=0.0140      So=0.000901      Sf=0.000790      Headloss Factor=0.000    Total Headloss=0.079 ft.    Se=0.000789
19+00.00   6500.00   50.00    2.00    7.280    8.956    608.3    10.69   1323.50    1312.77   1321.73    11.10    0.71    5.80

522+50
                n=0.0140      So=0.000900      Sf=0.000797      Headloss Factor=0.000    Total Headloss=0.080 ft.    Se=0.000796
20+00.00   6500.00   50.00    2.00    7.280    8.936    606.5    10.72   1323.58    1312.86   1321.80    11.08    0.71    5.81
```

ARIZONA DT LAYOUT

Wells

RWCD K4

- COMPARE DATUMS USED ON RWCD AND HPHD

	HPHD	SCS 4/85
STATION 552+00	1311.03	1310.29

$\Delta = +0.74$ ft

- Add 0.74 ft to SCS DRWG ELS TO OBTAIN BRIDGE DRWG ELS

FOR AN INVERT EL 1310.78 (SCS)

BRIDGE 0.74

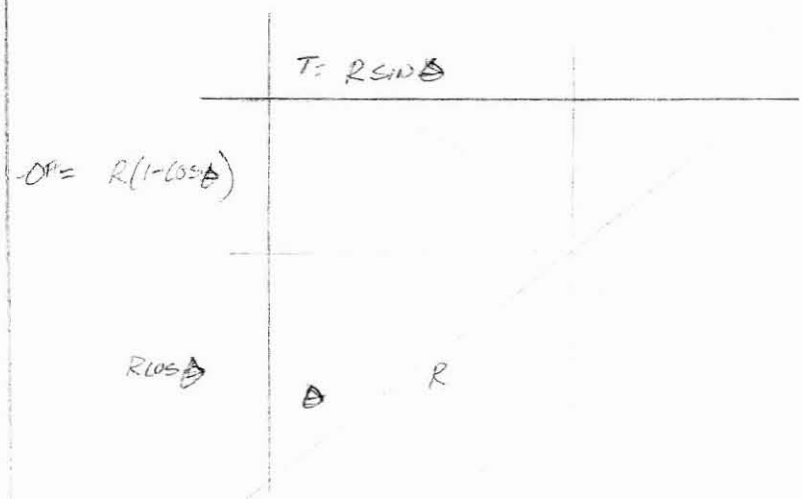
1311.52

552+90
550+80

ARIZONA RWCD R4

LT 11/5/85

TANGENT OFFSET



GIVEN: T, R

FIND: OFF

SOLN: $\theta = \sin^{-1}(T/R)$

$OFF = R(1-\cos\theta)$

REG	
01	R
02	T
03	θ
04	OFF

```
                    AUTO
FLBL TOFF           RCL 02        STO 04
LBL A               RCL 01
LBL 01              ÷
  R.?               SIN⁻¹
  PROMPT            STO 03
  STO 01            COS
"AOU"               1
"R="  → LBL B       ⇄
ARCLX   LBL 02      -
  T.?               RCL 01
  PROMPT            ×
  STO 02
"T="
ARCLX
```

ARIZONA RWCD Rd

DT 1/6/85

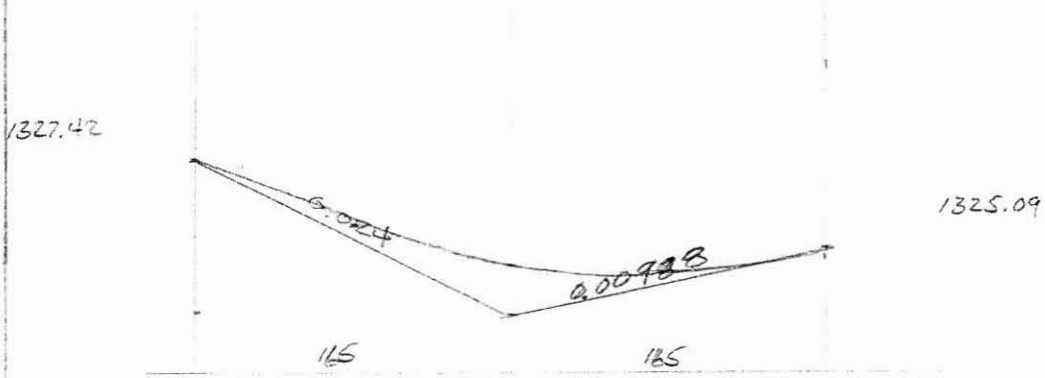
NEW POWER RD BRIDGE LAYOUT

POWER RD ℄ ELS STA 369+75 TO 373+05

PVI 371+40 EL 1323.46

STA 369+75 , EL 1327.42

STA 373+05 , EL 1325.09



$EL = Ax^2 + Bx + C$ $C = 1327.42$

$B = -0.024$

AT $x = 330$: $EL = 1325.09$

$$1325.09 = A(330)^2 - 0.024(330) + 1327.42$$

$$A = 5.59/330^2 = 5.1332 \times 10^{-5}$$

	STA	℄ EL	SUBTRACT 0.74 FT TO OBTAIN RWCD ELS
0	369+75	1327.42	1326.68
25	370+00	1326.85	1326.11
50	370+25	1326.35	1325.61
75	370+50	1325.91	1325.17
100	370+75	1325.53	1324.79
125	371+00	1325.22	1324.48

ARIZONA RWCD 24

DT 1/6/86

NEW POWER RD. BRIDGE LAYOUT

CROWN TRANSITION:

	373+18.19	0.0126 ft/ft	left
STA.	369+70.94	0.08 ft/ft	right
	4+37.25		
		0.0926	

change 0.0002118 ft/ft/ft left

DIST	STA.	SLOPE	½ WIDTH	Δ EL	EL
	369+70.94	0.08	30		
	370 +00				
	370+20	0.0696	30	2.09	1325.71

MARICOPA CO. HWY. DEPT.

RWCD EL

STATION	W/2	ΔEL	℄ EL	RT EL (-)	LT EL (+)	RWCD RIGHT	ELS (MACD +0.74ft) LEFT
366+00	21.49	1.72	1333.38	1331.66	1335.10	1330.92	1334.36
+25	21.94	1.76	1333.16	1331.40	1334.92	1330.66	1334.18
50	22.40	1.79	1332.91	1331.12	1334.70	1330.38	1333.96
75	22.85	1.83	1332.64	1330.81	1334.47	1330.07	1333.73
367+00	23.30	1.86	1332.34	1330.48	1334.20	1329.74	1333.46
25	23.76	1.90	1332.02	1329.12	1332.92	1328.38	1332.18
50	24.21	1.94	1331.67	1329.70	1333.64	1328.96	1332.90
75	24.67	1.97	1331.30	1329.33	1333.27	1328.59	1332.53
369+40							
369+15							
370+30							

CMP 47ft RT. STA 369+41.5
370+40

ARIZONA DT
POWER ED ELS
12/24/85
RWCD R4

EL ADJUSTMENT FROM MCHD

BLD 552400 ON ℄ MCHD 1311.03
RWCD 1310.29

MACD EL = RWCD EL. + 0.74ft.

Pipe Inlets | RWCD Reach 4 | G. Conaway 1-86

Hydrology for area between Channel and Road

Area is 1000' by 60' = 1.38 ac or 0.0022 mi.^{2} ✓

From hydrology – Desert Veg. with "2" soil CN = 75

100 year – 24 hr. Precip. = 3.7 inch
100 year – 24 hr. Runoff = 1.45 in.

T_c – 1002 ft @ 3.2 fps (overland flow @ .005 slope)
= 1.37 hr. ✓

Estimate peak discharge using Hydrology PO-2
for Type II storm

q_p = 230 csm/in/hr

Q = .74 cfs ✓

Pipe Inlets RWCD Reach 4 G. Conway 1-86
JMK 2/86

Hydraulics -

Used E.F.M. Fig. 6-51 Plan for a corrugated metal pipe drop

With 12" head over inlet - a 10" diameter barrel with riser drop will discharge more than 1.6 cfs. ✓

below the pipe - down the slope - use a triangular shaped grouted rock riprap section -

look at critical depth for 0.74 cfs discharge with $z = 2$

$$D_c = \sqrt[5]{\frac{2Q^2}{g z^2}} = \sqrt[5]{\frac{2 \times (.74)^2}{32.2\,(2)^2}} = .39' \quad \text{use } D = 1.0' \checkmark$$

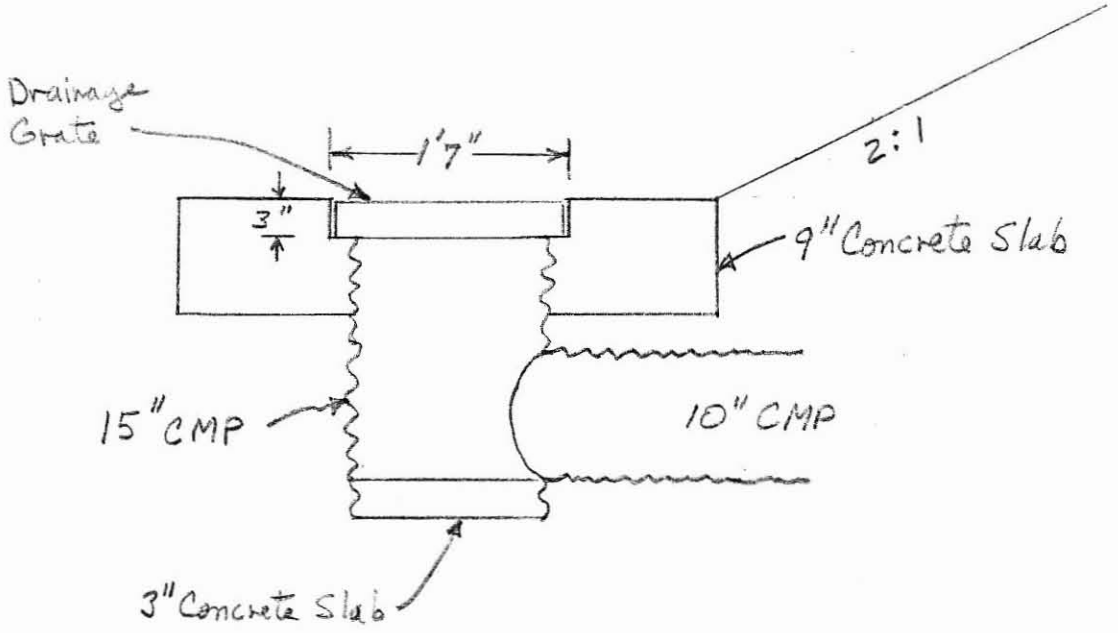
Grate -

use Heavy Duty Round Drainage Grate

for 15" pipe riser - 18¼" Dia. Grate with 2¾" thickness (R4030 Neenah Grate)

Heavy Duty Grate -

Load AASHTO H20-44



ARIZONA RWCD R4 Rev.

LT 2/3/86 LMS 2/86

PROBLEM: CHECK ADEQUACY OF ASTM C14 CONCRETE PIPE FOR USE IN THE MAINT. RD. DRAINS.

HS20 LIVE LOAD

- SPECIFY TRENCH CONDITIONS: MIN COVER = 2' ✓
- $\phi = 30$; $\gamma = 135$ pcf MAX COVER = 3' ✓
- O.D. = 15" < 15"
- TRENCH WIDTH ASSUME 9" CLEARANCE:
  $D_2 = 1.25 + 1.5 = 2.75$
  $B_c = 1.25$

Check:

- Assume soil load is equal to the prism load (neglect friction on trench sidewalls). OK

After D-57 "CONCRETE PIPE DESIGN MANUAL"

$W_d = \gamma H B_c$

H	W_d	
2	359	✓
3	539	✓

TABLE 45

LIVE LOAD: (USE $B_c = 1.33$) ✓

H	W_L	
2	1080	✓
3	550	✓

BEDDING: CLASS C Bedding ; $B_f = 1.5$ ✓

FS = 1.0

$$D_{0.01} = \frac{W_L + W_E}{B_f \times D} \times F.S = \frac{1080 + 359}{1.5\,(1.25)} \times 1 = 767 \text{ plf}$$

(1.25 → .83; 1156)

ASTM C-14 TABLE 1: 18" id, class 1,

Three edge bearing = $(1156)(\frac{10}{12}) = 963 < 1600$ class 1 OK

NOTE: Dwgs to show min. of 2' of cover

ARIZONA RDCD R4

DT 2/3/86 LMS 2/86

Design Q = 0.74 cfs:

Try placing conc. pipe on a slope s.t. V = 3 ft/s for
Q = 0.74/4 = 0.19 cfs

Area = 0.19/3 = 0.063 ft²

$$A = \frac{D^2}{8}\left(\frac{\pi\theta}{180} - \sin\theta\right)$$

D = 10"
D = 0.83 ft

$$P = \frac{\pi D \theta}{360}$$

θ	A	P	R
98°	0.063 ft²	0.713 ft	0.088

$$Q = \frac{1.486\, A R^{2/3} S^{1/2}}{n}$$

$$S = \left(\frac{nQ}{1.486\, A R^{2/3}}\right)^2 = \left(\frac{0.012\,(0.19)}{1.486\,(0.063)\,(0.088)^{2/3}}\right)^2$$

S = 0.015 ft/ft

place on 1½% grade ✓

ARIZONA RWCD FLOODWAY REACH 4

DT 3/3/86

COST ESTIMATE & QUANTITY COMPS.

ENR USBI Composite Index

April 1985 1.56

~ April 1986 1.58

Ratio = 1.58/1.56 = 1.013

USE NO CORRECTION

CHANGES TO BID QUANTITIES

1. Clearing and Grubbing – Check showed 156 A
Old 160 A

Use 158 A

2. Mobilization – No Change

3. Water – No Change

4. Channel Excavation, Common

No recomputation made for changes made in area of the revised expansion. Overlay of the new and old layouts indicates minor relative change.

Channel Exc for maint. Rd. Drains
= rock rip rap + grouted rock rip rap vol.

= 3.75 + 13.6 = 17.35 cy / inlet

Total = 19 (17.35) = 330 cy

Bid Qty = Old 1522663 + 330 = 1522993 = 1523,000 cy

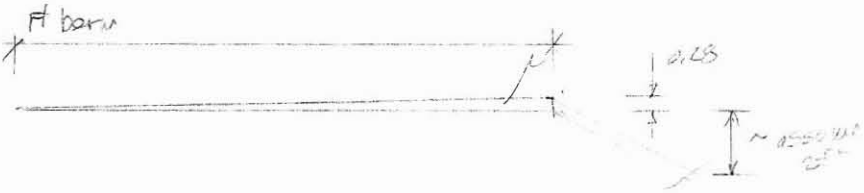
ARIZONA

DT 3/3/86

RWCD FLOODWAY REMEDIAL

5. Structure excavation – No change

6. Earth Fill – Some change will occur due to changes in the expansion layout and in the right berm slope.



$0.28 \times \sqrt{3} = 0.25$ ft

$A = 14(0.28)/2 + \sim 0.25(\sqrt{3}) = \underline{2.519}$ ft²

$V = \frac{(855-744)(100)}{27}(2.519) = 1035$ cy

OLD 356,912
− 1 036
355,876 cy

→ USE 355,900 cy

7. Structure backfill – No change

8. Drain Fill – Lining length reduced 70 ft.

Net Red = 8.16 ft²/ft of ch (both sides) 70 = 571 ft²
= −21 cy

OLD 1804
− 21
NEW 1783 cy

Rchd
Comps
3/13/86

ARIZONA DT

PROJ FLOODWAY REDACT d (NEW)

3/3/86

9. Conc Ch. Lining - (LMS comps) 3/3/86

-81 cy
OLD 11475
NEW 11394 cy

10. Conc Structures - No Change:

11. Cement:

Δ conc = -81 cy

Δ cem = -81 (6 bags/cy) × 94#/bag / 376 #/bbl

Δ cem = -121.8 bbls
OLD 17697
→ NEW 17576 bbls

12. Steel Reinf (LMS 3/3/86)

13. Manil Rd Drain

(LMS comps 2/27/86) Use $750 ea.

14. Loose Rock Rip Rap

OLD QTY = 15,395 cy
- OLD CURVE -1441
+ NEW CURVE +2885.9
+ MAINT RD DR + 71.25
- OLD EXP -3334.5
+ NEW EXP +1390.5
14,968 cy

15. Grouted Rock Rip Rap

OLD VOL. 4476.2 cy
- OLD TRANS 832.9
+ NEW 756.5
4400 cy

ARIZONA RWRD FLOODWAY RANCH

DT 3/3/86

16. Metal Fab N.C.

17. Drain Pipe =

- 70 + (2) = - 140

OLD 12000
NEW 140
11860 lf

18. Surveys - N.C.

19. Cast-in-Place Piles N.C.

COMPUTATION SHEET
SCS–ENG–523 Rev. 8–69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE		PROJECT		
AZ		PVCD R4		
BY LMS	DATE 3/3/86	CHECKED BY	DATE	JOB NO.
SUBJECT Guam				SHEET ____ OF ____

Loose Rock Riprap STA. 555+20 To STA. 560+10

Area of rock on side slope

$A = 79.51\ ft^2$ from 4/18/85 comps by EBA.

$A = (2)(79.51) = 159.02$ for both sides

Length = 490 ft.

$Vol = (490)(159.02) = 77{,}919.8\ ft^3 = \underline{\underline{2885.9\ yd^3}}$

COMPUTATION SHEET
SCS–ENG–523 Rev. 8–69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE		PROJECT		
AZ		RWCD R4		
BY LMS	DATE 2/86	CHECKED BY	DATE	JOB NO.
SUBJECT Guam				SHEET ____ OF ____

Loose Rock Riprap. STA 553+80 to 555+20

Side slopes –

Section A (same as grouted rock)

$A = 98.34\ ft^2/ft$ (includes both sides)

L = length (scaled from dwgs) = 155'

$Vol = (155)(98.34) = 15,242.7\ ft^3$

Bottom –

section B (same as grouted rock)

$B_1 = [9.88 + (2)(BW)]\ ft^2/ft$

	l	B_1/BW	B_1 (area)	Σ_1
553+80		110.0		
	20		123.5	2470
		137.0		
	20		146.61	2932
		156.22		
	20		161.8	3236.4
		167.42		
	20		170.16	3403.2
		172.90		
	20		173.83	3476.6
		174.76		
	20		174.88	3497.6
555+00		175.00		
	20		175.00	3500
555+20		175.00		
				22,516 ft^3

Loose Rock Bottom & Side Slopes = **1390.5 yd^3**

COMPUTATION SHEET
SCS–ENG–523 Rev. 8–69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE		PROJECT		
AZ		RWCD R4		
BY LMS	DATE 2/86	CHECKED BY OT	DATE 3/3/86	JOB NO.
SUBJECT Quan.				SHEET ____ OF ____

9. Channel Lining – Concrete

Rev. Lining ends @ STA. 550 + 80
Previous " " " " 551 + 50

Net reduction of 70'

∴ Reduce concrete for Lining:
$(50.8467\ ft^2/ft)(70') \div 27 = \underline{131.8}\ yd^3$

Increased lining depth

STA	548 + 25	d = 11.0
STA	548 + 15	d = 11.5
STA	536 + 25	d = 11.5
STA	536 + 00	d = 11.0

slope dist = 1.118' for Δd = 0.5
∴ $A = (0.5)(1.118)(2) = 1.118\ ft^2/ft$ of Lining
$l = 1190 + \cancel{25}^{12.5} = \cancel{1215}^{1202.5}$
ok
Vol increase $= (\cancel{1215}^{1202.5})(1.118) \div 27 = \underline{50.31}\ yd^3$ (50)

⟹ Net change in Concrete Vol.
$131.8 - 50.3 = \underline{81.5}\ yd^3$ reduction (8)

COMPUTATION SHEET
SCS–ENG–523 Rev. 8–69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE		PROJECT		
AZ		RWCD R4		
BY LMS	DATE 2/86	CHECKED BY DT	DATE 3/3/86	JOB NO.
SUBJECT Quan.				SHEET ____ OF ____

12. Channel Lining – Reinforcement

STA. 550+80 to 551+50

from 5/85 comps STA 551+50 to 550+25
257.424 lbs/ft

∴ (70)(257.424) = 18,020 lbs reduction

STA 548+15 to 536+25
Est. ≈ 4' of #5 per ft of channel

STA 548+25 to 548+15 & 536+25 to 536+00
Est. ≈ 2' of #5 per ft of channel

∴ [(4)(1190) + (2)(50)][1.043 #/ft] = 5069 lbs

Net Change Lining Steel Reinf. = 12,951 lbs reduction

COMPUTATION SHEET
SCS–ENG–523 Rev. 8–69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE		PROJECT		
AZ		RWCD R 4		
BY LMS	DATE 2/86	CHECKED BY DJ	DATE 3/3/86	JOB NO.
SUBJECT Quan				SHEET ____ OF ____

Maintenance Rd Drain Inlet Base Slab

vs. Steel Reinforcement

8 — #5 bars 3' long per base

19 Drains

∴ (8)(19)(3)(1.043 #/ft) = 476 lbs

TOTAL CHANGE IN STEEL SCHEDULE

12,951 − 476 = 12,475 lbs reduction

COMPUTATION SHEET
SCS-ENG-523 Rev. 8-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE		PROJECT		
AZ		RWCD R-4		
BY LMS	DATE 2/27/80	CHECKED BY DT	DATE 3/3/80	JOB NO.
SUBJECT				SHEET ____ OF ____

13. Maintenance Rd Drains

TRENCH EXCAVATION:

Pipe 30' x 3.0' x 4.5 = 15 yd³
Riser 6' x 6' x 4.5' = 6 yd³

21 yd³ @ 4.50 = 94.50

Pipe: 24.5' @ 5.84 = 143.08

7 - 3.5" sections
10" i.d. C-14 Class I

(3.5)(3.85) = 13.47
Gasket = 1.25
freight = 5.00
20.43 ÷ 3.5 = 5.84'

Riser 24" x 4' $80.-
Grate 97.00
Base:
0.34 yd³ @ 250 = 85.-
262.-

262.-

Backfill 21 yd³ @ ~~3.00~~ 5.50

115.5
~~42.-~~

~~544.58~~ 615.08

TOTAL

Profit & O.H. 20% ~~$650.-~~

758.10
use $750.00

COMPUTATION SHEET
SCS-ENG-523 Rev. 8-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE		PROJECT		
A.E.		RWCD R4		
BY LMS	DATE 2/27/86	CHECKED BY DT	DATE 3/2/86	JOB NO.
SUBJECT				SHEET ____ OF ____

14. Maintenance Rd Drain
Loose Rock

$3.375\ ft^2/ft \times 30' = 101.25\ ft^3 = \underline{\underline{3.75\ yd^3}}$

19 Drains

$\therefore (3.75)(19) \Rightarrow \underline{\underline{71.25\ yd^3}}$

COMPUTATION SHEET
SCS-ENG-523 Rev. 8-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE		PROJECT		
Az.		RWCD R-4		
BY LMS	DATE 3/86	CHECKED BY	DATE	JOB NO.
SUBJECT Quan.				SHEET ____ OF ____

15. Grouted Rock Riprap STA. 553+00 to 553+80

Side slopes —

SECTION A 4/18/85 comps (sht 1)

$A = 98.34 \ ft^2/ft$

Length — scaled from dwgs — 80 ft

$Vol = (80)(98.34) = 7867.2 \ ft^3$

Bottom —

Section B 4/18/85 comps (sht 1)

$B = 109.88 \ ft^2$

Rev. Section $\Rightarrow B_1 = [109.88 - 100] + (2)(BW) = 9.88 \ ft^2/ft + (2)(BW)$

ℓ	B BW	B wtd Area	Σ Ave
20	B_1 50 =	109.88	
20	B_1 56.52 =	122.92	2328.0
20	B_1 69.8	149.48	2724.0
20	B_1 87.86	185.60	3350.8
	B_1 110.0	229.88	4154.8

$\Sigma_1 = 12,557.6 \ ft^3$

Grouted - Bottom & Side Slopes = $\underline{\underline{756.5 \ yd^3}}$

COMPUTATION SHEET
SCS–ENG–523 Rev. 8–69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE	PROJECT		
AZ	RWCD R4		
BY LMS	DATE 2/27/86	CHECKED BY DT	DATE 3/3/86	JOB NO.
SUBJECT			SHEET ____ OF ____

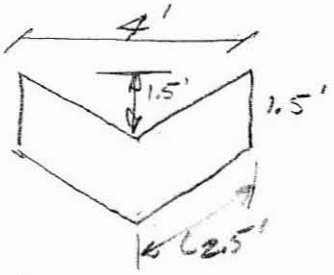
Maintenance Road Drains:

15. Grouted Rock Quantity

SECTION 1

$A = (1.5)(\cancel{5.0}\ 4)$

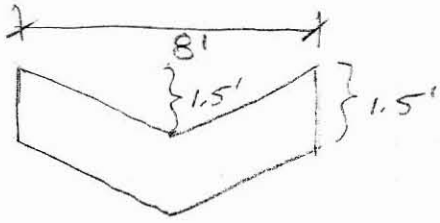
$A = \cancel{7.5}\ 6\ \square'$



SECTION 2

$A = (1.5)(\cancel{8.7}\ 8\ \cancel{44})$

$A = \cancel{12.82}\ 12\ \square'$



Ave slope length ≈ ~~28'~~ ≈ 26 by scale

Ave Area = 10.2 □'

(Prismoidal Formula: $V = \frac{(A_1 + 4A + A_2)L}{6} = \frac{(6 + 4(9) + 12)26}{6} = 23$)

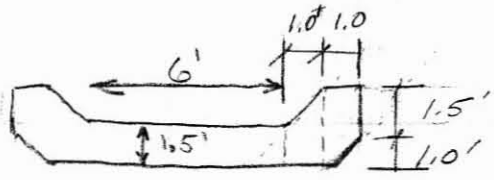
Sub. Vol = (23)(10.2) = 234.6 ft³ ok

Upper end

$(3.5)\left(\frac{7.5}{2}\right) =$ 13.1 ft³

Lower end

A = 17 □'



Sub Vol = (17)(7) ≈ 119 ft³

Grouted Rock ok 13.6 yd³

19 Drains ∴ (13.6)(19) ⇒ 258.4 yd³

RWCD FLOODWAY/
REACH 4 Rev
3/5/86 DT

(1)

SPECIFICATION
CROSS - CHECK

ITEM	Work or Material	SUB ITEMS
✓ 1	CLEARING AND GRUBBING	✓ STRUCTURE REMOVAL ✓ REMOVAL OF WATER
2	MOBILIZATION	- NONE -
3	WATER	✓ POLLUTION CONTROL
4	CHANNEL EXCAVATION, COMMON	✓ POLLUTION CONTROL ✓ REMOVAL OF WATER ✓ SPOIL DISPOSAL
5	STRUCTURE EXCAVATION, COMMON	✓ REMOVAL OF WATER
6	EARTH FILL	✓ REMOVAL OF WATER
7	STRUCTURE BACKFILL	✓ REMOVAL OF WATER

ITEM	Work or Material	SUB ITEMS
8	DRAIN FILL	- NONE
9	CONCRETE CHANNEL LINING	✓ REMOVAL OF WATER
10	CONCRETE STRUCTURES	✓ REMOVAL OF WATER
11	CEMENT	- NONE -
12	STEEL REINFORCEMENT	- NONE -
13	MAINTENANCE ROAD DRAIN	✓ MAINT RD. DRAIN INC. BASE SLAB ✓ CEMENT FOR MINOR COMP. ✓ TRENCH EXCAV. - PIPE BACKFILL

ITEM	Work or Material	SUB ITEMS
14	LOOSE ROCK RIP RAP	-NONE-
15	GROUTED ROCK RIPRAP	-NONE-
16	METAL FABRICATION	-NONE-
17	DRAIN PIPE	-NONE-
18	SURVEYS	-NONE-
19	CAST IN PLACE CONCRETE PILES	

✓ CONCRETE PILES
✓ REMOVAL OF WATER
✓ CEMENT FOR MINOR COMPONENT

KNOLL FLOODWAY
REACH 4 ROW.
3/5/86 DT

SUB ITEMS	SUB TO
✓ STRUCTURE REMOVAL	✓ 1 CLEARING & GRUBB
POLLUTION CONTROL	✓ 3 WATER
	✓ 4 CHANN EX
REMOVAL OF WATER	✓ 1 CL & GRUBB
	✓ 4 CH EX
	✓ 5 STR EX
	6 EARTH FILL
	7 STRUCTURE BACKFILL
	✓ 9 CONC. CH LNG
	✓ 10 CONC. STR.
	✓ 19 CAST IN PL PI
PIPE BACKF.	✓ 13 MAINT RD DRAIN
SPOIL DISP.	✓ 4 CHANN. EX.
CONC PILES	✓ 19 CIP PILES
MAINT. RD. INL. BASE SLAB	✓ 13 MAINT RD. DR.
CEM FOR MIN COMP	✓ 13 MAINT RD DR
	19 CIP PILES
TRENCH EXCAV	13 MAINT RD DR