

PROJECT CORRESPONDENCE

POWERS BOULEVARD-SAND CREEK CHANNEL; TRANSITION DESIGN

(SLA PROJECT No. CO-CSR-05)

**SLA**

## **SIMONS, LI & ASSOCIATES, INC.**

419 WEST BIJOU  
COLORADO SPRINGS, COLORADO 80905

TELEPHONE (303) 630-7342

March 19, 1987

Mr. William McCall  
City of Colorado Springs  
Engineering Division  
30 South Nevada Avenue  
Colorado Springs, CO 80903

RE: Powers Boulevard-Sand Creek Channel; Transition Design (SLA Project  
No. CO-CSR-05).

Dear Mr. McCall:

Pursuant to your Division's letter of March 12, 1987, Simons Li & Associates, Inc. (SLA) has prepared the requested technical information in support of the construction drawings for the above referenced project. The design drawings have been submitted under a separate cover, by the Kiewit-Western Companies, on behalf of the METEX District. Specifically, SLA's design responsibility is the transition structure, shown on sheets SC-11 and 12 of the Bridge drawings prepared by KKBNA.

Submitted with this letter are the following technical materials.

ENCLOSURE 1 - Design Review Discussion


ENCLOSURE 2 - Technical calculations

ENCLOSURE 3 - Legal easements and descriptions

SLA remains available to meet with the City staff regarding this submittal. Should additional clarification be required, please do not hesitate to contact us.

Sincerely yours,

**SIMONS, LI & ASSOCIATES, INC.**

  
Richard N. Wray  
Senior Engineer

RNW/jdd  
cc: Doug Jardine

ENCLOSURE 1  
Design Review Discussion

The following discussion has been provided in support of the design plans on the Powers Boulevard - Sand Creek Structure. It will also serve to clarify our calculations and drawings resubmitted to the City on March 19, 1987.

The design drawings submitted have addressed in a substantive manner all of the calculation and plan comments contained in the Division's March 12 letter to the METEX District. The following clarification on individual comments are contained below.

Calculations

1. Hydraulic Jump Calculation: As previously discussed with the staff, the hydraulic calculations in part focused on determining the presence and location of a hydraulic jump upstream of the bridge structure. In order to make this determination, several backwater analyses were conducted. The technical results have been attached in Enclosure 2. Both sub- and super-critical flow conditions were analyzed for the 100-year and 10-year future development condition. From the super-critical runs (Runs #2 and #3), a jump is indicated either within the bridge or immediately upstream. The proposed drop structure would force the flow through critical depth, and because of the constriction of the flow, a jump to sub-critical conditions is anticipated.

For this reason, the sub-critical flow condition was used to determine the height of the soil cement lining. From the freeboard calculations, this height should be at least 12-feet above the invert. The design drawings reflect a 13-foot height, which would match the top of the wingwalls. This is a conservative height of soil cement for existing basin conditions, and generally conforms with the design of the Phase A - D Sand Creek Channel Improvements prepared by Simons, Li & Associates, Inc. (SLA).

2. The remainder of the calculation comments have been addressed in full.

Plans

4. Gas Line - The existing and proposed 12-inch gas line was shown on plan view only. Gas division will relocate this line at the owner's expense. Design details are not available at this time to show proposed grades.
7. El Paso County/Colorado Springs Jurisdiction - The corporate limits have not been placed on the transition plans (Sheet SC-11). This may be more appropriate on an ownership map.

14. Maintenance Road - Gravel maintenance and bottom access trails have been sited upstream and downstream of the bridge structure. Details have been provided. These trails have been considered as temporary. A trail system constructed out of soil cement has been proposed upstream of Powers Boulevard, which will provide permanent maintenance and pedestrian access. The scope of the transition structure does not extend far enough upstream or downstream to begin the construction of permanent trails and ramps for bottom access. All access trails have been designed to be within existing public easements.

23.&

24. Design Details - The drawings, as previously submitted, were "typical" in nature with respect to the grade control and drop structure. Stations and elevations at the crest(s) of these structures have been provided to assist the constructor. The longitudinal stream station in combination with geometric data on the bank linings is sufficient to construct these structures.

#### Drawings

Height of Soil Cement at Outlet of Transition: The soil cement lining has been left below the 100-year future condition water surface at Station 3+50. The water surface at this location is high because of a back-water effect caused by the constriction to the natural channel. In the ultimate channel configuration downstream of Powers Boulevard, we would anticipate flow depths very similar to the reach of Sand Creek upstream of Powers Boulevard, and therefore, soil cement bank heights of seven to eight feet would be typical.

It has been determined to be impractical to design the bank linings at the outlet of the transition to meet the future condition, 100-year, sub-critical flow case. Additionally, the bank height used at Station 3+50 will match with the riprap banks which, through discussions with City Engineering staff, were designed to contain the existing 100-year flow condition.

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# SIMONS, Li & ASSOCIATES, INC.

419 WEST BIJOU  
COLORADO SPRINGS, COLORADO 80905

TELEPHONE (303) 630-7342

March 2, 1987

Mr. Bill McCall  
City Engineering Division  
30 South Nevada  
Colorado Springs, Colorado

Re: Sand Creek Transitions at Powers Boulevard (SLA Project No. PCD.CSR.05)

Dear Mr. McCall:

Submitted herewith are the construction drawings for the above referenced project. These drawings have been prepared in accordance with the City of Colorado Springs review comments concerning the transition structures, and upon your Division's approval will be incorporated into the METEX, Powers Boulevard Improvement Plans, prepared by KKBNA, Inc.

Several comments were made relevant to the transitions in the divisions letter to Mr. Doug Jardine of February 4, 1987. Specifically, comments related to sheet SC-8 of the Improvement Plans have been addressed with SLA's design of the transitions. A short narrative has been provided to assist the City in it's review. These comments were discussed with Ms. Chris Lytle on February 25, 1987 so that SLA could better understand the nature of the review comments.

Enclosed with this submittal are:

1. Channel Transition plan and profile and detail sheets (two sets)
2. HEC-2 analysis for sub- and supercritical flows (one set)
3. Channel cross sections (one set)
4. Design calculations (one set)

A brief narrative discussing SLA's design assumptions and procedures follows:

### 1. Design Frequency:

The box culvert structure has been designed to pass the future 100-year peak flow of 8620 cubic feet per second. The inlet and outlet structures of the box culvert were also designed to safely handle this flow. The rationale behind selecting this discharge for design is the permanent nature of the soil cement improvements and to match the channel linings proposed for Sand Creek upstream of Powers Boulevard.

The riprap channel transitions to the existing channel cross sections have been designed to meet approximately a future condition 10-year design level (4000 cfs). This is also very close to the existing 100-year peak flow of 4400 cfs at Powers Boulevard. We consider this to be a reasonable design discharge since over 90 percent of flood producing storms will be conveyed within the riprap section and still leave adequate freeboard. An additional two to five feet of freeboard is provided by the existing overbanks above the top of the riprap transitions. This in combination with the box culvert at Powers will yield a conservatively designed system capable of providing 100-year protection to the properties adjacent to the drainageway.

### 2. Energy Dissipation:

High velocities are common within this reach of Sand Creek. At the outlet of the box culvert, we have proposed a dissipation basin in the form of a drop structure, constructed of soil cement and riprap (refer to the enclosed plans). The shape of the basin has been determined using the Urban Drainage and Flood Control District procedures. The 100-year discharge was used to size the length of basin and size of rock. The jump length was calculated to be 42 feet and was increased by 20 percent to provide a safety factor. The calculated length of the plunge pool was used as a minimum and occurs along the inside bend of the channel. The design criteria used incorporate many of the concepts presented in Hydraulic Engineering Circular No. 14 which was referenced in the Division's letter of February 4th.

The upstream grade control structure was designed in accordance with the Sand Creek Improvement Plans dated April, 1985 which have been submitted by SLA previously. This structure has been sized to force a hydraulic jump upstream of the box and to keep the flow in supercritical conditions into the box culvert.

### 3. Freeboard:

The freeboard criteria stated in the Division's February 4th letter has been followed for all soil cement channel linings, using the 100-year future condition discharge. Typically, this criteria gives 1.5 foot freeboard for the transition structures. The backwater analysis used to determine the depth and velocity in the box culvert was prepared by KESMA, Inc. and modified to reflect proposed conditions by SLA. These HEC-2 runs reflect 20 percent blockage. This is considered to yield conservative freeboard in light of the supercritical conditions which we feel are present at the culvert location.

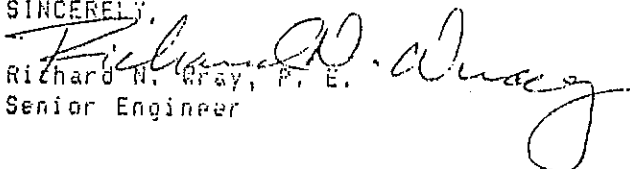
Shown on the cross sections submitted herewith are the top of soil cement, top of riprap, 100-year subcritical water surface, 10-year subcritical water surface and proposed channel bottom elevations. The cross sections have been submitted to assist the Division in it's review, but will not be incorporated into the construction plans.

4. Design Mix:

Soil Cement was selected by the District for the channel transitions and grade control structures. The design mix was determined during the preparation of the Sand Creek Channel Improvement Plan. This mix was used in April, 1986 when the Sand Creek improvements from upstream of Powers Boulevard to Stetson Hills were let for bid. The design mix would be adequate to cover soil cement involved in the transition structure construction. The design mix specifications were submitted to the Division on February 25, 1987 so that Ms. Chris Lytle could review them prior to our submittal.

SLA will remain available to meet with the Division during the course of our review. Should you have any questions, please do not hesitate to contact us.

SINCERELY,

  
Richard N. Gray, P. E.  
Senior Engineer

cc: Doug Jardine, METEX

HYDRAULIC CALCULATIONS

POWERS BOULEVARD-SAND CREEK CHANNEL; TRANSITION DESIGN

WATER SURFACE PROFILES, COMPUTER OUTPUT





SIMONS, LI & ASSOCIATES, INC.

CLIENT METEX

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ENCLOSURE # 2

## TRANSITION CALCULATIONS

CHANNEL XSEC'S 4 sheets

BANK DESIGN CALCULATIONS; w/TRANSITION

1. FREEBOARD CALCULATIONS 5 pages

2. Super elevation Calc's 3 pages

BANK DESIGN; w full channel improvements

1. Supercritical Condition 2 pages

2. Freeboard Criteria Comparison 2 pages

RIP-RAP TRANSITION DESIGN 2 pages

Hinge Pool Design (previously submitted) 1 page  
@ Outlet

DEEP STRUCTURE DESIGN, @ Inlet 1 page

## HEC-2 BACKWATER PROFILES

Run # 1 - Subcritical, w/transition  
to Natural banks

Run # 2 - Supercritical, w/transition  
to Natural banks

Run # 3 - Supercritical with full  
channel improvements



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## SUMMARY OF SOIL CEMENT CRITERIA

Ref Mat'l: Water surface profile runs, by STA  
 Sub - and supercritical conditions,  $Q = \underline{8620}$   
cf/s

<u>XSEC / STA</u>	<u>HEIGHT OF SC*</u>	<u>Flow COND.</u>	<u>Comments</u>
3+50	7.0'	Sub	
4+00	7.0'	Sub	
1+83	9.0' (10')**	Sub	East of Check
5+85	11.0' (12')**	Super	Bridge outlet
7+97	12.0' (13')**	Sub	Bridge inlet
8+50	9.5 - 14.0'	Super-sub	Use 13', even w/top bridge
9+50	8.0	Super	
10+00	8.0	Super	East of Drop

\*  $Q = 8620$  cfs, Temp. channel condition.

\*\* Represents as designed condition.

## SOIL CEMENT BANK DESIGN

USE SUBCRITICAL FLOW CONDITIONS DOWNSTREAM OF Sta 10+00, to bridge opening. Jump should occur at plunge pool, as indicated by HEC-2 printout, supercritical condition. Soil cement should match @ top of box culvert.

This will provide approximately 13.0' of full soil cement height. Wayneska Road provides additional freeboard on left-bank, to achieve A' @ section 8+50

Upstream of Station 10+00, use supercritical flow conditions to size bank linings. Typically, this ranges from 7.0 to 8.0' full soil cement height (as per Phase A-D, Sand Creek Channel Improvements), within straight segments of the drainage way.

Downstream of bridge, it is recommended to use the subcritical condition. A hydraulic jump should occur between Sta's 4+83 and 5+77 as the flow enters the plunge pool. Contraction to the natural drainage way. <sup>should also be subcritical.</sup> This is well downstream of the transition structure.

Beginning at Station 3+50, the subcritical flow condition and  $Q = 4000 \text{ cfs}$ , a total soil cement height



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of 7.5' is suggested for use. This will provide ample freeboard to the transitional period before<sup>a</sup> downstream channel can be constructed. It has been assumed that the basic channel section as proposed upstream of Towers will be followed. This would then return the flow to a supercritical condition, and therefore within the 7 to 8 foot soil cement bank heights.



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CLIENT WESTEX  
 PROJECT SAND CREEK TRANS.  
 DETAIL Temporary Condition

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SOIL CEMENT BANK DESIGN - SUBCRITICAL OPTION

FREEBOARD =  $1 + (0.025 V D^{0.33})$

SuperElevation =  $\Delta d = \frac{V^2 B}{2gR}$

$Q = 2620 cfs$   
 Temporary channel  
 & Transition.

Top of BANK = Depth + Freeboard + S.E.

<u>XSEC</u>	<u>DEPTH<sup>1</sup></u> (ft)	<u>Velocity<sup>2</sup></u> (FPS)	<u>FB</u> (ft)	<u>Δd</u> <u>S.E.</u> (ft)	<u>Top of</u> <u>Soil Cement</u> (ft)
3+50	10.1	6.7	1.4'	NA	11.5'
4+00	9.3	8.4	1.4	NA	10.7 use 11.0
4+83	7.6	12.3	1.6	0.3'	9.5 use 10.0'
5+85	8.9	17.0	1.9	NA	10.8 use 11.0
7+77	8.9	17.0	1.9	N/A	11.0
8+50	12.0	8.2	1.5	0.5'	14.0'
9+50	11.1	7.5	1.4	NA	12.5
10+00	6.0	13.4	1.6	NA	7.6 use 8.0'

<sup>1</sup> Depth obtained from subcritical flow case,  $Q_{100} = 2620 cfs$

<sup>2</sup> Avg Velocity within section; Subcritical flow case,  $Q_{100} = 2620 cfs$



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 DETAIL Temp. Condition CHECKED BY \_\_\_\_\_ COMPUTED BY PROW

SOIL CEMENT DESIGN - SUPERCRITICAL OPTION

$$F.B = 1.0 + (0.25V)D^{.33}$$

$$Q = 80,200 \text{ cfs}$$

Super Elevation =

$$\text{TOP OF BANK} = \text{Depth} + \text{FB} + \text{SE}$$

XSEC	Depth	VELOCITY	FB	SE	Top of Bank
	FT	FPS	FT	FT	FT
3+50	5.1	15.2	1.7	N/A	6.8 use 7.0
4+00	4.8	17.4	1.7	N/A	5.5 use 6.0
4+83	6.7	14.2	1.7	0.5'	8.9 use 9.0
5+85	8.9	17.0	1.9	N/A	10.8 use 11.0
7+97	9.0	17.0	1.9	N/A	10.9 use 11.0
8+50	7.0	14.6	1.7	0.5'	9.2 use 9.5'
9+50	5.9	14.9	1.7	N/A	7.6 use 8.0
10+00	5.8	14.0	1.6	N/A	7.4 use 8.0



Super elevation Calculations:

change in depth on outside bank

$$\Delta d = V^2 B / 2g R \text{ where } V = \text{velocity}$$

R = radius of curvature

B = bottom width.

Station 4+83 :

R = 700' , (Curve # 2)

B = 100' , Velocity = 12.3 fps (Subcritical)  
11.2 fps (Supercritical)

Q = 8620 cfs }  $\Delta d = (12.3)^2 (100) / 2g (700) = .53' \text{ , use } .3' \text{ (Sub)}$

Q = 8620 cfs }  $\Delta d = (11.2)^2 (100) / 2g (700) = .45' \text{ , use } 0.5' \text{ (Super)}$

Q = 4000 cfs }  $\Delta d = (11.1)^2 (100) / 2g (700) = .27' \text{ , use } 0.3' \text{ (Super)}$

TRANSITION  
w/ existing  
channel

Station B+50

$$R = 680', B = 100'$$

$$Q = 8620 \text{ cfs}; \Delta d = \frac{(8.2)^2 (100)}{2g (681)} = .15' \text{ use } \underline{0.2'} \text{ (subcritical)}$$

w/transition to nat. channel

$$Q = 8620 \text{ cfs}; \Delta d = \frac{(11.6)^2 (100)}{2g (681)} = .48', \text{ use } \underline{0.5'} \text{ (super)}$$

$$Q = 4000 \text{ cfs}; \Delta d = \frac{(11.5)^2 (100)}{2g (681)} = 0.30' \text{ (super)}$$

Supercritical Requirements for fully lined, ultimate channel conditions.

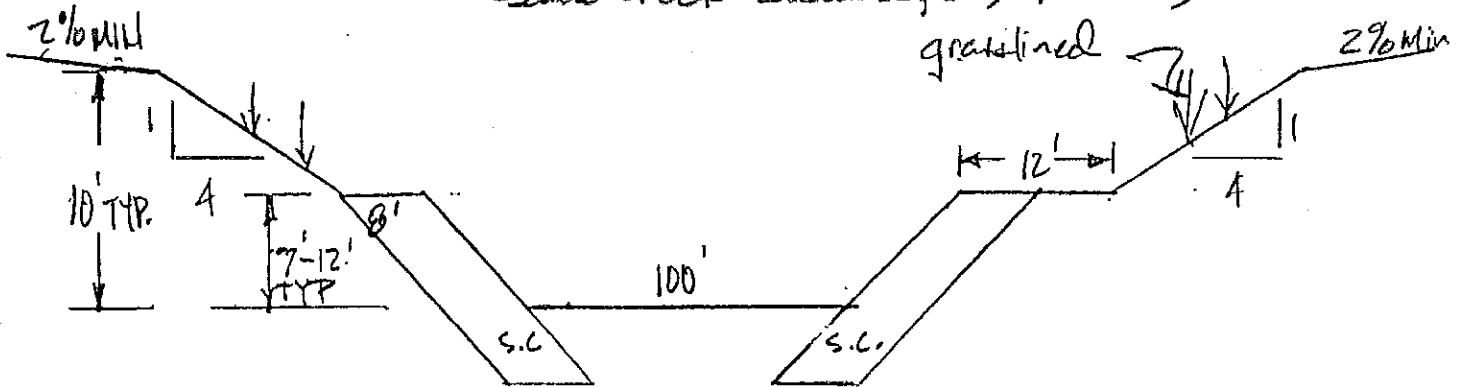
$$Q = 8620 \text{ cfs} \text{ bends at } 4+85 \text{ and } 8+50$$

$$R = 700' \quad R = 680'$$





Typical Section: (as per SLA, Phase A-D Improvements for the Sand Creek Channel, C.S. Panel.)



STA 4+83; Same as Super. w/ transition.

$$Q = 8620 \text{ cfs}$$

$$\text{Super elevation} = 0.5'$$

STA 8+50; Velocity 17.3 fps

$$\Delta d = (17.3)^2 (100) / (2g(600)) = 0.66 \text{ ft. } \approx .7'$$

(i) Use Total depths of Soil Cement as per Soil Cement bank design, improved condition, sheet 1 of 1 for Station 4+83.

(ii) Use Tot. depth at Station 8+50 of 8.4'

$$\text{Total } d = 5.9 + 1.8 + .7 = 8.4', \text{ use } \underline{8.5'}$$



SIMONS, LI &amp; ASSOCIATES, INC.

CLIENT NETEX

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DETAIL Freeboard check

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PAGE 1 of 2DATE 3-12-87COMPUTED BY PNWFREESBOARD & SUPERELEVATION CALCULATION

$Q = 8620$  cfs; Full Impingements,  $4/5$  of Powers  
 Powers; <sup>(ROW # 3)</sup> Supercritical channel condition

$$FB = 1.0 + .025VD^{.23}$$

$$S.E. = V^2B / 2gR$$

$$\text{TOTAL Height} = \text{depth} + FB + SE$$

<u>XSEC</u>	<u>DEPTH</u>	<u>VELOCITY</u>	<u>FB</u>	<u>S.E.</u> <u>Δd'</u>	<u>TOTAL H</u>	<u>Top of SL'</u>	<u>Comment</u>
3+50	5.1	15.2	1.7	-	6.8	7.5'	ok
4+00	4.8	17.4	1.7	-	5.5	7.5'	ok
4+83	4.7	14.2	1.7	0.5'	8.9	10.0'	ok
5+85	8.9	17.0	1.9	-	10.8	12.0'	ok
7+97	8.9	16.9	1.9	-	10.8	13.0'	ok
8+50	5.9	17.3	1.8	0.7	8.4'	13.5'	ok
9+50	4.7	19.0	1.8	-	6.5'	12.5'	ok
10+00	4.0	13.4	1.6	-	7.6'	7.0	ok
11+00	3.7	22.5	1.9'	-	5.6'	7.0	
12+00	3.4	24.4	1.9'	-	5.3'	7.0	
13+00	3.5	23.6	1.9	-	5.2'	7.0	
13+37	3.6	23.0	1.9'	-	5.5'	7.0	
13+79	3.8	22.2	1.9	-	5.7'	7.0	
14+00	3.5	24.0	1.9	-	5.4'	7.0	
14+50	3.6	23.1	1.9	-	5.5'	7.0	

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## Freeboard & Super elevation Calculations cont'd.

Using the supercritical run in combination with the transition to natural channel condition, adequate freeboard is obtained. The concept followed during the design of the Phase A through D channel improvements was to keep the soil cement 1.0' above the freeboard requirement, wherever and whenever practical. The construction of the Powers Boulevard bridge, and realignment of the approach channel (as compared to SEA's original design), will have no effect, or cause no design changes within the upstream reach of the channel improvements.



SIMONS, LI &amp; ASSOCIATES, INC.

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RWS

FREEBOARD COMPARISON: SOIL CEMENT LIMITS

City vs. County Criteria.

\* City Criteria = depth +  $[1.0 + .025VD^{.53}]$  + Super el.\* County = 1.0' min, or  $d/4$  whichever is greater

1. Assumptions: (i) channel transition to natural banks } HEC2  
 (ii) subcritical flow calculations } ROW  
 (iii)  $Q = 6000$  cfs } #1

<u>XSEC</u>	<u>DEPTH of Flow</u>	<u>CITY FB (FE)</u>	<u>COUNTY CRITERIA</u>	<u>Height of SC. above W.S.</u>	<u>Comment</u>
3+50	10.1'	1.4'	2.5'	-2.6'	low'
4+00	9.3'	1.4'	2.3'	-1.8'	low'
4+83	7.6'	1.9'	1.9'	2.4'	ok
5+85	8.9'	1.9'	2.2'	3.1'	ok
7+97	8.9'	1.9'	2.2'	4.1'	ok
8+50	12.0'	2.0'	3.0'	1.5'	low
9+50	11.1'	1.4'	2.8'	1.4'	low
10+00	6.0'	1.6'	1.5'	2.0'	ok

1 Soil Cement bank height based on  $Q = 4000$  cfs, subcritical condition.



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2. Assumptions: (i)  $Q = 8620$  cfs

(ii) Supercritical flow conditions

(iii) Channel transition to natural banks

H  
P  
#  
2

<u>XSEC</u>	<u>Depth of Flow</u>	<u>City FB</u>	<u>County FB</u>	<u>Ht of SC. above W.S.</u>	<u>Comments</u>
3+50	5.1	1.7	1.3	1.9'	ok
4+00	4.8	1.7	1.2	2.2'	ok
4+83	6.7	2.2	1.7	3.3'	ok
5+85	8.9	1.9	2.2	3.1'	ok
7+97	9.0	1.9	2.3	4.0'	ok
8+50	7.0	1.7	1.8	6.5	ok
9+50	5.9	1.7	1.5	6.6	ok
10+00	5.8	1.6	1.5	2.2	ok

Recommended Floodboard Criteria - City of Colo. Spgs.

Use City criteria:

- (i) within City jurisdiction
- (ii) more technically oriented.



SIMONS, LI & ASSOCIATES, INC.

CLIENT METEX

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## Rip-rap transition design

Assumptions: (i)  $Q = 4000 \text{ cfs}$

(ii) Subcritical condition

(iii) Channel transition to vertical banks.

$$FB = 1.0 + [2.025VD^{3.3}]$$

<u>XSEC</u>	<u>Depth</u>	<u>Velocity</u>	<u>FB</u>	<u>Total Depth</u>	<u>Comments</u>
3+00	6.9'	4.8	1.2'	8.1'	Use 8.0' 2:1 S.C. to 3:1 Rip-rap
3+50	6.1'	5.6	1.3'	7.4'	
10+00	3.6'	10.6'	1.4'	5.0'	Use 7.0' 2:1 S.C. to 2:1 Rip-rap
11+00	2.9'	9.3	1.3'	4.2'	Use 5.0'

### SUGGESTED Rip-rap bank heights

- (i) Station 3+00 to 3+50; use constant 8.0' above invert. 8'0 matches soil limit @ 3+50.
- (ii) Station 10+20 to Station 11+65; use 7.0' @ 10+20, tapering to 5.0' at end of transition.



SIMONS, II & ASSOCIATES, INC.

CLIENT METEX  
PROJECT Sand Creek at Powers  
DETAIL Riprap

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### Channel Transition

V = 15 fps D = 9.6 ft Q = 8620 cfs  
Slope: Existing = 0.002 future = 0.013

Riprap size:

$$\frac{V S^{0.17}}{d_{50}^{0.5} (S_s - 1)^{0.66}} = 4.5$$

\* EXISTING = TYPE "M" D<sub>50</sub> = 12"

FUTURE = TYPE "H" D<sub>50</sub> = 18" ←

∴ USE 36" BLANKET OF TYPE H RIPRAP WITH 12" LAYER OF TYPE II BEDDING

\* Table 5-5 USDCM.



Freeboard

Superelevation:

old Formula:  $\Delta H = \frac{V^2 B}{2gR}$  (1)

Proposed formula:  $\Delta H = \frac{V^2(T+B)}{2gR}$  (2)

Method used:  $\Delta H = \frac{V^2 B}{2gR}$  (3)

Station 4+83

$B = 100'$      $R = 700'$      $V = 12.3/14.2$

$T = 100 + 2 \times 7.6 = 115.2/113.4$

(1) old	$(12.3^2 \times 100) \div (32.2 \times 700) = 0.67'$ (0.9)
(2) proposed	$(12.3^2 \times 115.2) \div (2 \times 32.2 \times 700) = 0.39'$ (0.48)
(3) used	$(12.3^2 \times 100) \div (2 \times 32.2 \times 700) = 0.34'$ (0.45)

Freeboard:  $1 + (0.025 V D^{0.33})$   
 $= 1 + (0.025)(12.3)(7.6)^{0.33} = 1.6'$     1.67

w/ Superelevation add  $\frac{0.7'}{2.3'}$     0.9

Plus Depth  $\frac{7.6}{9.9}$      $\frac{6.7}{9.27}$

We used 10'    OK    10' OK





SIMONS, LI & ASSOCIATES, INC.

STA 8+50

STA 8+50: R = 680' B = 100'

D = 12.0  
7.0

V = 8.2  
14.6

Sub  
Super

T = 124  
114

super  
sub

$\Delta H_{SUB}$ : ① 0.31      ② 0.17      ③ 0.16

$\Delta H_{SUPER}$ : ① 0.97      ② 0.52      ③ 0.48

Freeboard: Sub = 1.47'  
Super = 1.73'

Sub:

Super

$\Delta H$	0.31
Free	1.47
Depth	12.0
	<hr/>
	13.98

	0.97
	1.73
	7.10
	<hr/>
	9.70

PLUNGE POOL @ BOX CULVERT OUTLET

$Q_{100} = 8620 \text{ cfs}$  WIDTH = 72 ft

Reference: Urban Storm Drainage Criteria Manual  
 Vol. 2 STRUCTURES Sect. 3 - Drains

1. Determine Drop Number

$D_N = Q^2 / g h^3 = 120^2 / 32.2 \times 72^3 = 55.9$

2.  $L_D / h = 4.3 D_N^{0.27} = 25.5'$

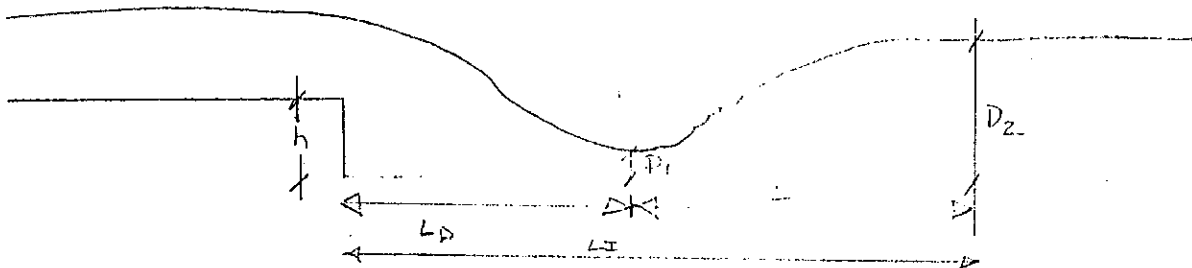
3.  $D_p / h = 1.0 D_N^{0.22} = 4.35'$

4.  $D_1 / h = 0.54 D_N^{0.425} = 5.17'$

5.  $D_2 / h = 1.66 D_N^{0.27} = 9.84'$

From EQN 3-2 through 3-5

Based on Urban Storm Drainage Criteria Manual  
Fig. 2-4



6.  $V_p = 120 / 4.85 = 24.7 \text{ ft/sec}$   $F_r = \frac{24.7}{\sqrt{32.2 \times 4.85}} = 1.2$

7. For medium Froude No. USE Fig 2-4  
 $L_I / D_2 = 4.3$   $L_I = 42.3'$

8. USE 20% factor of Safety 20' DRAIN

Upstream Drop Structure

TOPWIDTH = 112 ft  $q = 8620/112 = 76.96 \text{ cfs/ft}$

1.  $D_{N1} = 8^2/g h^3$   $h = 4'$   $D_{N1} = 2.88$

2.  $L_D = 22.88'$

3.  $D_p = 5.04$

4.  $D_1 = 3.4$

Use  $D_1$  for Formula's

5.  $D_2 = 8.34'$

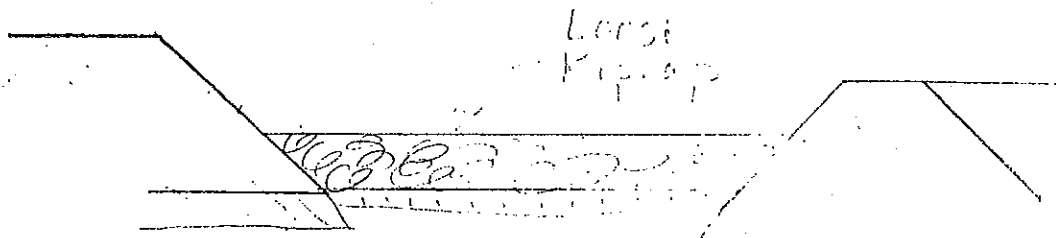
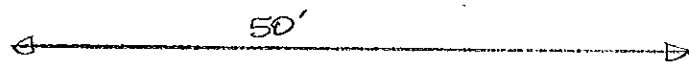
6.  $V_1 = 22.64 \text{ fps}$

$FR_1 = 22.64 / \sqrt{32.2 \times 3.4} = 2.16$

From Fig 2-4  $\frac{L_I}{D_2} = 4.5$

7.  $L_I = 4.5 \times 8.34 = 40 \text{ feet}$

8. Use 50' (25% factor of safety)





SIMONS, LI & ASSOCIATES, INC.

CLIENT METEX JOB NO. \_\_\_\_\_ PAGE \_\_\_\_\_  
PROJECT \_\_\_\_\_ DATE CHECKED \_\_\_\_\_ DATE 8-16  
DETAIL \_\_\_\_\_ CHECKED BY \_\_\_\_\_ COMPUTED BY PLC

Enclosure 3

### LIST OF EASEMENTS

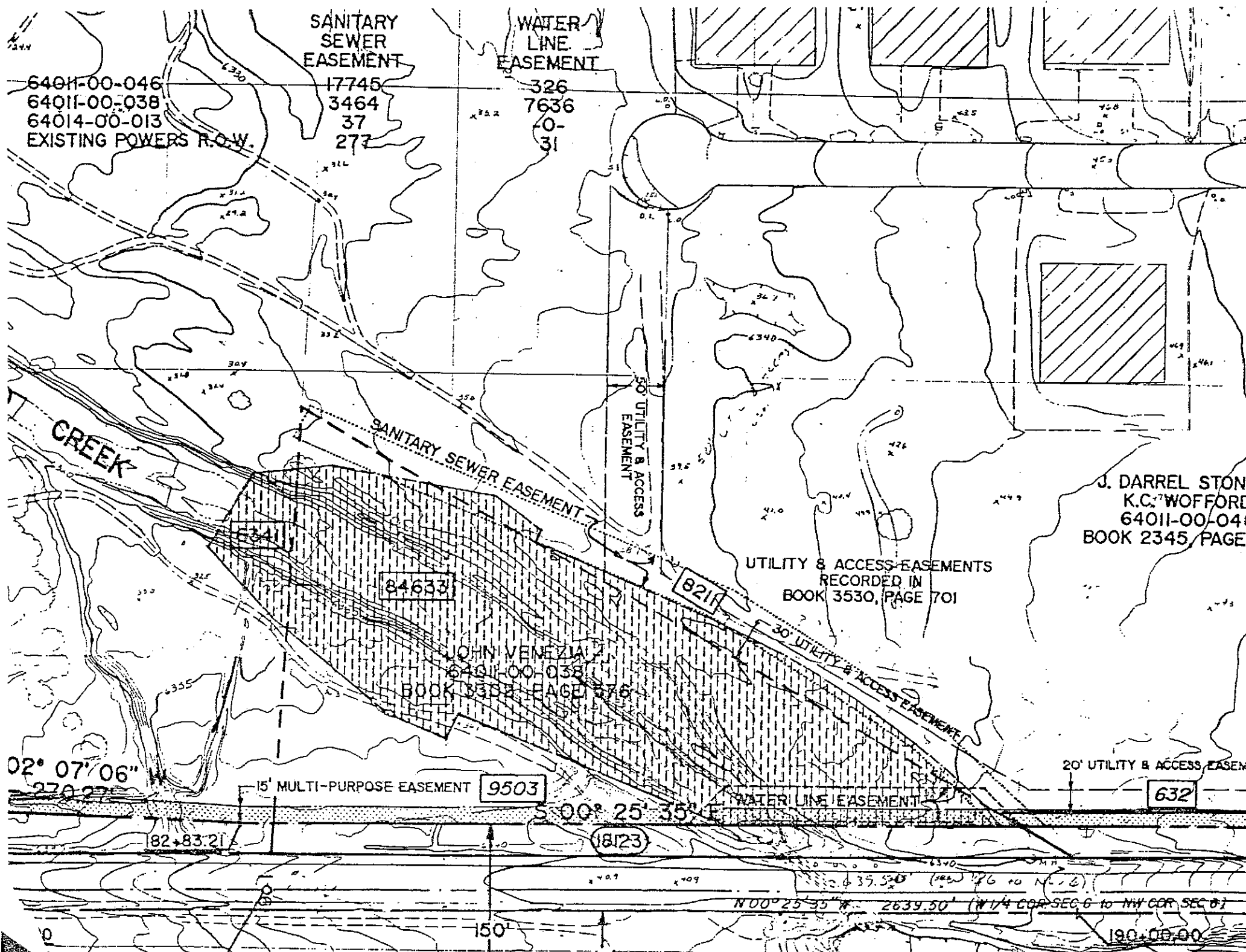
The following easements have been shown on  
by sheet SC-11 of the Plans. All improvements  
and grading lie within public ROW, both  
u/s and d/s of the Sand Creek Bridge Structure.

A property ownership map has been prepared  
as part of the Sand Creek, Phase A through D  
Channel Improvement Plans, prepared by SLA.  
A copy has been attached for reference.

64011-00-046  
64011-00-038  
64014-00-013  
EXISTING POWERS R.O.W.

SANITARY  
SEWER  
EASEMENT  
17745  
3464  
37  
277

WATER  
LINE  
EASEMENT  
326  
7636  
0-  
31



J. DARREL STONE  
K.C. WOFFORD  
64011-00-046  
BOOK 2345 PAGE

UTILITY & ACCESS EASEMENTS  
RECORDED IN  
BOOK 3530, PAGE 701

JOHN VENEZIA  
64011-00-038  
BOOK 2392 PAGE 276

02° 07' 06"  
270.27

15' MULTI-PURPOSE EASEMENT 9503

S 00° 25' 35"

WATER LINE EASEMENT

20' UTILITY & ACCESS EASEMENT

632

82+83.21

18123

N00°25'35" 2639.50' (W/4 COR. SEC. 6 to NW COR. SEC. 8)

190-00-00

POWERS BUSINESS  
 PARK FILE NO. 3  
 PLAT BOOK X-3, PAGE 2

LOT 2, BLOCK 1  
 64011-02-087  
 REITH C. & SANDRA D. KING

64011-00-046  
 64011-00-038  
 64011-02-087  
 64014-00-013  
 EXISTING POWERS R.O.W.

SANITARY SEWER EASEMENT	WATER LINE EASEMENT	SAND CREEK ADDITIONAL RIGHT-OF-WAY
10597	326	5969
3464	7636	84633
7148	-0-	2242
37	-0-	6341
277	81	-0-

J. DARREL STONE &  
 K.C. WOFFORD  
 64011-00-046  
 BOOK 2345, PAGE 334

UTILITY & ACCESS EASEMENTS  
 RECORDED IN  
 BOOK 3530, PAGE 701

84633

JOHN VENTURA  
 64011-00-038  
 BOOK 1332, PAGE 373

15' MULTI-PURPOSE EASEMENT 9503

S 00° 25' 35" E

18123

WATER LINE EASEMENT

20' UTILITY & ACCESS EASEMENT

632

VICTOR PLACE

N 00° 25' 35" E 2639.30' (N 1/4 COR. SEC. 6 to N 1/4 COR. SEC. 5)

SECTION LINE

150'

2918'

J. DARREL STONE &  
K.O. WOFFORD  
64011-00-046  
BOOK 2345, PAGE 334

VICTOR PLACE

9503

632

E21  
-038  
PAGE 376

E22

00° 25' 35" E

2918.39'

(18123)

SECTION LINE

N 00° 25' 35" E 2639.50' (N 1/4 COR. SEC. 6 TO NW COR. SEC. 8)

190,000.00

75'

75'

150'

S 00° 25' 35" E

2918.39'

LEGAL DESCRIPTION

64011-02-087

30' Sanitary Sewer Easement

A portion of Lot 2, Block 1, Powers Business Park Filing No. 3 as recorded in Plat Book X-3 at Page 2 of the records of El Paso County, Colorado and more particularly described as follows:

Commencing at the Southeast corner of said Lot 2; thence N 29'35'21" E along the easterly line of said Lot 2, a distance of 4.39 feet to the Point of Beginning of the parcel herein described; thence N 66'46'03" W, a distance of 4.31 feet; thence N 23'13'58" E, a distance of 330.43 feet; thence N 89'35'08" E, a distance of 32.75 feet; thence S 23'13'58" W, a distance of 112.96 feet to the easterly line of said Lot 2; thence S 29'35'21" W, a distance of 232.03 feet to the Point of Beginning. Said parcel contains 7148 square feet, more or less.



LEGAL DESCRIPTION

64011-02-087

Sand Creek Right-of-Way

A portion of Lot 2, Block 1 Powers Business Park Filing No. 3 as recorded in Plat Book X-3 at Page 2 of the records of El Paso County, Colorado and more particularly described as follows:

Beginning at the Northeast corner of said Lot 2; thence S 29°35'21" W along the easterly line of said Lot 2, a distance of 227.24 feet; thence N 10°07'50" E, a distance of 55.78 feet; thence N 37°04'29" E, a distance of 51.42 feet; thence S 66°25'14" E, a distance of 10.00 feet; thence N 23°34'45" E, a distance of 115.17 feet; thence N 89°35'08" E, a distance of 16.16 feet to the Point of Beginning. Said parcel contains 2242 square feet, more or less.

LEGAL DESCRIPTION

64011-00-046

Sanitary Sewer Easement

Revised 2/12/87

A portion of the Northeast One Quarter of Section 1, T14S, R66W of the 6th P.M. and also being a portion of that tract of land as recorded in Book 2345 at Page 334 of the records of El Paso County, Colorado and more particularly described as follows:

Commencing at the Northeast corner of Lot 2, Block 1, Powers Business Park Filig No. 3 as recorded in Plat Book X-3 at Page 2 of said County records; thence S 89'35'08" W along the northerly line of said Lot 2, a distance of 14.44 feet to the Point of Beginning of the parcel herein described; thence continuing on the last described course, a distance of 32.75 feet; thence N 23'13'58" E, a distance of 72.58 feet; thence N 32'25'30" E, a distance of 202.57 feet; thence N 42'47'43" E, a distance of 114.00 feet; thence S 00'24'04" E, a distance of 25.68 feet; thence S 29'35'21" W, a distance of 54.36 feet; thence S 42'47'43" W, a distance of 39.63 feet; thence S 32'25'30" W, a distance of 197.43 feet; thence S 23'13'58" W, a distance of 57.03 feet to the Point of Beginning. Said parcel contains 10597 square feet, more or less.

LEGAL DESCRIPTION

64011-00-046

Water Line Easement

A portion of the Northeast One-Quarter of Section 1, Township 14 South, Range 66 West of the 6th P.M. and also being a portion of that tract of land as recorded in Book 2345 at Page 334 of the records of El Paso County, Colorado and more particularly described as follows:

Commencing at the Southeast corner of said tract; thence N 29'35'21" E along the easterly line of said tract, a distance of 651.54 feet to the Point of Beginning of the parcel herein described; thence N 00'25'35" W, a distance of 22.84 feet; thence N 44'34'25" E, a distance of 31.10 feet to the westerly line of Powers Boulevard as shown on Powers Business Park Filing No. 1 as recorded in Plat Book P-3 at Page 68 of said County records; thence S 00'24'04" E along said westerly line, a distance of 6.78 feet to the easterly line of said tract; thence S 29'35'21" W along said easterly line, a distance of 43.95 feet to the Point of Beginning. Said parcel contains 326 square feet, more or less.

LEGAL DESCRIPTION

64011-00-046

Sand Creek Right-of-Way

Revised 02/12/87

A portion of the Northeast One Quarter of Section 1, T14S, R66W of the 6th P.M. and also being a portion of that tract of land as recorded in Book 2345 at Page 334 of the records of El Paso County, Colorado and more particularly described as follows:

Beginning at the Northeast corner of Lot 2, Block 1, Powers Business Park Filing No. 3 as recorded in Plat Book X-3 at Page 2 of said County records; thence S 89'35'08" W along the northerly line of said Lot 2, a distance of 16.16 feet; thence N 23'34'45" E, a distance of 64.83 feet; thence along the arc of a 727.00 foot radius curve to the right, through a central angle of 21'00'46" (the long chord of which bears N 34'05'08" E, a long chord distance of 265.13 feet) an arc distance of 266.62 feet to the easterly line of the aforementioned tract; thence S 29'35'21" W along said easterly line, a distance of 320.70 feet to the Point of Beginning. Said parcel contains 5969 square feet, more or less.

LEGAL DESCRIPTION

64011-00-046

Multi-Purpose Easement

A portion of the NE 1/4 of Section 1, Township 14 South, Range 66 West of the 6th P.M. and also being a portion of that tract of land as recorded in Book 2345 at Page 334 of the records of El Paso County, Colorado and more particularly described as follows:

Beginning at the intersection of the southerly line of Victor Place and westerly line of Powers Boulevard as shown on Powers Business Park Filing No. 1 as recorded in Plat Book P-3 at Page 68 of said County records; thence S 00'24'04" E along the westerly line of said Powers Boulevard, a distance of 306.22 feet to the boundary of that tract of land as recorded in Book 3302 at Page 576 (a portion of Parcel J at Page 579 is directly affected) of said County records; thence S 29'35'21" W along said boundary, a distance of 3.97 feet; thence N 00'25'35" W, a distance of 309.66 feet to the southerly line of said Victor Place; thence N 89'34'08" E along said southerly line, a distance of 2.12 feet to the Point of Beginning. Said parcel contains 632 square feet, more or less.

LEGAL DESCRIPTION

64011-00-038

Sand Creek Drainage Right-of-Way

A portion of that tract of land as described in Book 3302 at Page 576 (the portion of Parcel J at Page 579 is directly affected) of the records of El Paso County, Colorado and more particularly described as follows:

Commencing at the Southwest corner of said Parcel J; thence N 29'35'21" E along the westerly line of said Parcel J, a distance of 128.66 feet to the Point of Beginning of the parcel herein described; thence continuing on the last described course, a distance of 547.95 feet; thence along the arc of a 727.00 foot radius curve to the right, through a central angle of 00'29'42" (the long chord of which bears N 44'50'22" E, a long chord distance of 6.28 feet) an arc distance of 6.28 feet; thence N 46'03'54" E, a distance of 24.82 feet; thence S 00'25'35" E, a distance of 233.72 feet; thence S 19'57'47", a distance of 76.11 feet; thence S 23'34'45" W, a distance of 180.00 feet; thence S 66'25'15" E, a distance of 27.00 feet; thence S 23'34'45" W, a distance of 56.00 feet; thence S 39'01'52" W, a distance of 113.35 feet to the southerly line of said Parcel J; thence N 86'53'50" W, along said southerly line, a distance of 139.43 feet; thence N 06'40'38" W, a distance of 30.13 feet; thence N 10'07'50" E, a distance of 86.11 feet to the Point of Beginning. Said parcel contains 84633 square feet, more or less.

LEGAL DESCRIPTION

64011-00-038

Water Line Easement

A portion of that tract of land as described in Book 3302 at Page 576 (the portion of Parcel J at Page 579 is directly affected) of the records of El Paso County, Colorado and more particularly described as follows:

Commencing at the Southwest corner of said Parcel J; thence N 29'35'21" E along the westerly line of said Parcel J, a distance of 651.54 feet to the Point of Beginning of the parcel herein described; thence continuing on the last described course, a distance of 62.47 feet; thence N 44'34'25" E, a distance of 5.30 feet; thence S 00'25'35" E, a distance of 42.43 feet; thence S 44'34'25" W, a distance of 7.07 feet; thence S 00'25'35" E, a distance of 197.53 feet; thence S 45'43'24" E, a distance of 7.04 feet; thence S 00'25'35" E, a distance of 42.21 feet; thence N 45'43'24" W, a distance of 49.24 feet; thence N 00'25'35" W, a distance of 199.63 feet to the Point of Beginning. Said parcel contains 7636 square feet, more or less.

01/26/87

Refer to Sheet 12

LEGAL DESCRIPTION

64011-00-038

Sanitary Sewer Easement

A portion of that tract of land as described in Book 3302 at Page 576 (the portion of Parcel J at Page 579 is directly affected) of the records of El Paso County, Colorado and described in two parcels as follows:

South Parcel

Commencing at the Southwest corner of said Parcel J; thence N 29'35'21" E along the westerly line of said Parcel J, a distance of 4.39 feet to the Point of Beginning of the parcel herein described; thence continuing on the last described course, a distance of 232.03 feet; thence S 23'13'58" W, a distance of 225.37 feet to the southerly line of said Parcel J; thence N 86'53'50" W along said southerly line, a distance of 15.21 feet; thence N 66'46'03" W, a distance of 11.41 feet to the Point of Beginning. Said parcel contains 2925 square feet, more or less.

North Parcel

Commencing at the Southwest corner of said Parcel J; thence N 29'35'21" E along the westerly line of said Parcel J, a distance of 641.13 feet to the Point of Beginning of the parcel herein described; thence continuing on the last described course, a distance of 80.38 feet; thence S 00'25'35" E, a distance of 26.81 feet; thence S 42'47'43" W, a distance of 58.71 feet to the Point of Beginning. Said parcel contains 539 square feet, more or less.

01/26/87

Refer to Sheet 12



LEGAL DESCRIPTION

64011-00-038

Multi-Purpose Easement

A portion of that tract of land as described in Book 3302 at Page 576 (the portion of Parcel J at Page 579 is directly affected) of the records of El Paso County, Colorado and more particularly described as follows:

Commencing at the Northeast corner of said tract; thence S 29'35'21" W along the northwesterly line of said tract, a distance of 53.97 feet to the Point of Beginning of the parcel herein described; thence S 00'25'35" E, a distance of 647.01 feet to the southerly line of said tract; thence N 86'53'50" W along said southerly line a distance of 15.03 feet; thence N 00'25'35" W, a distance of 620.12 feet to the northwesterly line of said tract; thence N 29'35'21" E along said northeasterly line, a distance of 29.99 feet to the Point of Beginning. Said parcel contains 9503 square feet, more or less.



SIMONS, LI & ASSOCIATES, INC.

CLIENT METEX

PROJECT SAND CREEK @ POWERS

DETAIL SOIL CEMENT IT BANK HEIGHT

JOB NO. PROJ. 92.05

DATE CHECKED \_\_\_\_\_

CHECKED BY \_\_\_\_\_

POL  
PAGE \_\_\_\_\_

DATE 3/24/97

COMPUTED BY TF

## Free board Requirements

STA 3+00 4000 cfs Subcritical

STA 4+00 to 10+00 8620 cfs Subcritical

STA 11+65 4000 cfs Subcritical

- SMOOTH TRANSITION BETWEEN DESIGN FLOWS

Freeboard Requirement:

$$\text{Design Depth} + \text{Freeboard} + \text{Superelevation}$$

$$= D + [1 + (0.025 \sqrt{D^{0.33}})] + \left(\frac{V^2 B}{gR}\right)$$

where:

- D = Design Depth from HEC 2 output (ft)
- V = Design Velocity from HEC 2 (ft/sec)
- B = Bottom Width (ft)
- g = accel. of gravity 32.2 (ft/sec<sup>2</sup>)
- R = Radius of Curvature (ft)



SIMONS, II & ASSOCIATES, INC.

CLIENT METEX

PROJECT SAND POINT @ 1300'S

DETAIL BANK HEIGHTS

JOB No. P10.05R.05

PAGE 2

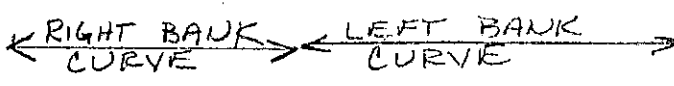
DATE CHECKED \_\_\_\_\_

DATE 3/24/87

CHECKED BY \_\_\_\_\_

COMPUTED BY TF

STATION	BOTTOM WIDTH	DEPTH	VELOCITY	Freeboard	SUPER-ELEVATION	BOTTOM ELEV.	TOP RIGHT	TOP LEFT
3+00	100	6.94*	4.93*	1.23	0	25.66	33.83	33.83
3+50	100	6.07*	5.97*	1.37	0	26.24	33.63	33.63
4+00	100	9.30	8.72	1.46	0.34	26.23	37.59	37.93
4+83.77	84	7.63	12.55	1.61	0.64	27.80	37.04	37.68
5+46.61	76	8.33	16.97	1.87	2.12/6.91'	29.12	39.87	N/A
5+90.09	96	8.88	16.97	1.87	2.12/6.91'	29.12	N/A	N/A
6+27.97	96	8.22	16.97	1.87	2.12/6.91'	29.12	N/A	42.59/40.84
7+64.35	96	8.88	16.97	1.87	1.02	31.88	43.65	N/A
8+02.23	96	8.22	16.97	1.87	1.02	31.88	N/A	N/A
8+48.61	96	8.88	16.97	1.87	1.02	31.88	N/A	42.63
8+50	81	12.03	8.37	1.48	0.27	32.52	46.30	46.03
9+50	92	11.13	7.70	1.43	0	33.85	46.41	46.41
10+00	100	6.00	13.64	1.62	0	38.51	46.13	46.13
11+00	135	2.89*	9.34*	1.33	0	41.21	45.43	45.43
11+65	115	3.56*	9.34*	1.36	0	43.00	47.90	47.90



\* DESIGN FLOW  
= 4000 cfs

1. 1st Number Uses  $\phi$  Radius of 250'.
2. 2nd Number Uses  $\phi$  Bank radius of 700'.



SIMONS, LI & ASSOCIATES, INC.

CLIENT METEX

PROJECT SAND CREEK @ POWERS

DETAIL SOIL CEMENT II PAVE HEIGHT

JOB NO. 770142.05

DATE CHECKED \_\_\_\_\_

CHECKED BY \_\_\_\_\_

PAGE 3

DATE 3/25/12

COMPUTED BY TF

TOP OF SOIL CEMENT  
ELEV.

<u>STATION</u>	<u>RIGHT BANK</u>	<u>Left Bank</u>
3+00* Riprap	33.83	33.83
3+50	35.01	35.88
4+00	37.59	37.93
4+83.77	37.59	37.93
5+46.61	41.10	39.93
6+27.97	—	41.10
7+64.35	44.0	—
8+48.61	46.3	46.41
9+50	46.41	46.41
10+00	46.41	46.41
10+32	46.41	46.41
11+00*	47.30	47.40
11+65*	47.90	47.90

\* Design Flow = 4000 cfs

A:\TYPE SUPER.OUT

```

*****
* WATER SURFACE PROFILES
* VERSION OF NOVEMBER 1976
* UPDATED MAY 1984
* IBM-PC-XT VERSION
* RUN DATE 01/01/80 TIME 01:04:43
*****

```

```

*****
* U.S. ARMY CORPS OF ENGINEERS
* THE HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET, SUITE D
* DAVIS, CALIFORNIA 95616
* (916) 440-2105 (FIS) 440-2105
*****

```

**RUN # 2**  
**Super CRITICAL**  
**Q = 8,620 cfs**  
**& 4000 cfs**  
**Transition to**  
**NATURAL BANKS**

```

X X XXXXXX XXXXX
X X X X X
X X X X
XXXXXX XXXX X XXXX
X X X X
X X X X X
X X XXXXXX XXXX

```

01/01/80 01:04:45

THIS RUN EXECUTED 01/01/80 01:04:46

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*****
REC2 RELEASE DATED NOV 76 UPDATED MAY 1984
ERROR CORR - 01,02,03,04,05,06
MODIFICATION - 50,51,52,53,54,55,56
IBM-PC-XT VERSION 1.1
*****

```

T1 POWERS SLVE CROSSING 100-YEAR FUTURE PEAK FLOW  
T2 SUPERCRITICAL FLOW WITH BLOCKAGE  
T3 SAND CREEK

J1	ICHECK	LOC	LINE	ID:R	START	METRIC	HV:RS	Q	WSEL	FR
	0.	2.	0.	1.	.000000	.00	.0	0.	6348.000	.000
J2	APROF	IPL0T	PRFVS	XSECV	XSECH	FN	ALLDC	ISM	CHNLM	ITRACE
	1.000	.000	-1.000	.000	.000	.000	.000	.000	.000	.000
J3	VARIABLE CODES FOR SUMMARY PRINTOUT									
	38.000	43.000	8.000	26.000	55.000	56.000	1.000	3.000	42.000	39.000

NC	.030	.030	.030	.100	.300	.000	.000	.000	.000	.000
QT	2.000	8.20.000	4000.000	.000	.000	.000	.000	.000	.000	.000
X1	1200.000	9.000	64.000	179.000	100.000	100.000	100.000	.000	.000	.000
GR	6355.000	.000	6350.000	19.000	6345.000	50.000	6344.000	64.000	6344.000	132.000
GR	6343.500	140.000	6344.000	149.000	6344.000	179.000	6350.000	200.000	.000	.000

NR	1100.000	1.000	30.000	165.000	100.000	100.000	100.000	1.000	1.000	1.000
GR	6347.000	.000	6341.000	30.000	6341.000	165.000	6347.000	195.000	.000	.000
NC	.020	.020	.030	.100	.300	.000	.000	.000	.000	.000
X1	1000.000	4.000	8.000	108.000	6.000	6.000	6.000	.000	.000	.000
GR	6346.500	.000	6338.500	8.000	6338.500	108.000	6346.500	118.000	.000	.000
X1	993.000	4.000	14.000	104.000	42.000	42.000	42.000	.000	.000	.000
GR	6346.500	.000	6332.500	14.000	6332.500	104.000	6346.500	118.000	.000	.000
X1	952.000	4.000	15.000	103.000	2.000	2.000	2.000	.000	.000	.000
GR	6346.500	.000	6331.800	15.000	6331.800	103.000	6346.500	118.000	.000	.000
X1	950.000	4.000	13.000	105.000	87.000	117.000	100.000	.000	.000	.000
GR	6346.500	.000	6333.800	13.000	6333.800	105.000	6346.500	118.000	.000	.000
X1	850.000	4.000	13.000	94.000	18.000	88.000	53.000	.000	.000	.000
GR	6345.610	.000	6332.600	13.000	6332.600	94.000	6346.000	95.000	.000	.000

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NC	.013	.013	.013	.300	.500	.000	.000	.000	.000	.000
X1	797.000	24.000	100.000	177.010	212.000	212.000	212.000	.000	2.800	.000
X3	10.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
GR	6341.100	100.000	6329.100	100.010	6329.100	110.500	6341.100	110.600	6341.100	114.400
GR	6329.100	114.450	6329.100	123.500	6341.100	123.550	6341.100	127.450	6329.100	127.500
GR	6329.100	136.500	6341.100	136.550	6341.100	140.450	6329.100	140.500	6329.100	145.500
GR	6341.100	149.550	6341.100	153.450	6329.100	153.500	6329.100	162.500	6341.100	162.600
GR	6341.100	166.500	6329.100	166.600	6329.100	177.000	6341.100	177.010	.000	.000
BT	5.000	100.000	6344.500	6343.900	127.450	6345.200	6343.900	140.450	6345.000	6343.900
BT	153.450	6345.500	6343.900	177.010	6345.400	6343.900	.000	.000	.000	.000
X1	565.000	.000	.000	.000	12.000	12.000	12.000	.000	-2.800	.000
X3	10.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
BT	5.000	100.000	6346.300	6341.100	127.450	6346.300	6341.100	140.450	6345.500	6341.100
BT	153.450	6345.000	6341.100	177.010	6345.000	6341.100	.000	.000	.000	.000
NC	.020	.020	.030	.000	.000	.000	.000	.000	.000	.000
X1	577.000	4.000	12.000	92.000	52.000	132.000	92.000	.000	.000	.000
GR	6339.000	.000	6327.000	12.000	6327.000	92.000	6339.000	104.000	.000	.000
X1	485.000	8.000	32.000	112.000	2.000	2.000	2.000	.000	.000	.000
GR	6340.000	.000	6337.500	10.000	6337.500	20.000	6325.800	32.000	6325.500	112.000
GR	6337.500	124.000	6337.500	134.000	6340.000	144.000	.000	.000	.000	.000
X1	483.000	8.000	30.000	114.000	83.000	83.000	83.000	.000	.000	.000
GR	6340.000	.000	6337.500	10.000	6337.500	20.000	6327.800	30.000	6327.800	114.000
GR	6337.500	124.000	6337.500	134.000	6340.000	144.000	.000	.000	.000	.000
X1	400.000	6.000	41.000	141.000	50.000	50.000	50.000	.000	.000	.000
GR	6341.000	.000	6334.900	25.000	6334.900	35.000	6326.800	41.000	6326.800	141.000
GR	6334.800	147.000	6334.800	157.000	6336.000	162.000	.000	.000	.000	.000
NC	.030	.030	.030	.000	.000	.000	.000	.000	.000	.000
X1	350.000	8.000	51.000	151.000	50.000	50.000	50.000	.000	.000	.000
GR	6340.000	.000	6332.000	20.000	6333.000	38.000	6326.300	51.000	6326.300	151.000
GR	6333.000	164.000	6333.000	174.000	6336.000	186.000	.000	.000	.000	.000
X1	300.000	4.000	.000	139.000	100.000	100.000	100.000	.000	.000	.000
GR	6339.000	.000	6325.500	39.000	6325.500	139.000	6336.000	171.000	.000	.000
X1	200.000	11.000	24.000	112.000	200.000	200.000	200.000	.000	.000	.000
GR	6337.000	.000	6325.000	5.000	6332.500	24.000	6329.000	44.000	6325.000	48.000
GR	6324.500	52.000	6325.000	104.000	6324.500	112.000	6325.000	112.000	6325.000	112.000

BR	6337.000	188.000	.000	.000	.000	.000	.000	.000	.000	.000
XI	1.000	8.000	100.000	175.000	.000	.000	.000	.000	.000	.000
BR	6332.000	.000	6331.000	75.000	6330.000	100.000	6323.000	114.000	6322.500	140.000
BR	6323.000	155.000	6330.000	175.000	6334.000	179.000	.000	.000	.000	.000
EJ	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

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SECNO	DEPTH	CWSEL	CRWS	WSELK	EG	HV	HL	GLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELWIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

\*PROF 1

DCNV= .100 CENV= .300

\*SECNO 1200.000

1200.00	4.50	6348.00	6349.01	6348.00	6351.70	3.70	.00	.00	6344.00
8820.	938.	7409.	273.	77.	464.	28.	0.	0.	6344.00
.00	12.20	15.96	9.74	.030	.030	.030	.000	6343.50	31.40
.016154	0.	0.	0.	0	10	0	.00	161.60	193.00

\*SECNO 1100.000

3301 HV CHANGED MORE THAN HVINS

1100.00	3.19	6344.19	6345.76	.00	6349.39	5.20	2.16	.15	6341.00
8820.	294.	6031.	294.	25.	430.	25.	1.	0.	6341.00
.00	11.62	18.69	11.62	.030	.030	.030	.000	6341.00	14.08
.033402	100.	100.	100.	5	8	0	.00	166.83	190.92

DCNV= .100 CENV= .300

\*SECNO 1000.000

3301 HV CHANGED MORE THAN HVINS

1000.00	5.76	6344.26	6344.49	.00	6347.36	3.09	1.40	.63	6338.50
8820.	177.	6206.	237.	17.	575.	21.	2.	1.	6338.50
.00	10.69	14.25	11.42	.020	.030	.020	.000	6338.50	2.24
.008019	100.	100.	100.	3	14	0	.00	112.96	115.20

\*SECNO 993.000

3301 HV CHANGED MORE THAN HVINS

993.00	3.56	6336.06	6338.92	.00	6346.52	10.46	.10	.74	6332.50
8820.	124.	6372.	124.	6.	321.	6.	3.	1.	6332.50
.00	19.59	25.12	15.59	.020	.030	.020	.000	6332.50	10.44
.051110	6.	6.	6.	7	9	0	.00	97.12	107.56

\*SECNO 952.000

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SECNO	DEPTH	CWSEL	CRWS	WSELK	EG	HV	HL	GLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELWIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3301 HV CHANGED MORE THAN HVINS

952.00	4.08	6335.88	6338.31	.00	6344.15	8.23	1.73	.66	6331.80
8620.	148.	9323.	148.	8.	358.	8.	3.	1.	6331.80
.00	17.54	23.23	17.54	.020	.030	.020	.000	6331.80	10.84
.033806	42.	42.	42.	7	14	0	.00	96.31	107.16

\*SECNO 950.000

3301 HV CHANGED MORE THAN HVING

3665 20 TRIALS ATTEMPTED WSEL,CWSEL

3710 WSEL ASSUMED BASED ON MIN DIFF

950.00	5.91	6339.71	6340.10	.00	6343.18	3.47	.03	1.51	6333.80
8620.	204.	8212.	204.	18.	544.	18.	3.	1.	6333.80
.00	11.41	15.05	11.41	.020	.030	.020	.000	6333.80	6.95
.008684	2.	2.	2.	20	14	0	.00	104.11	111.05

\*SECNO 850.000

3685 20 TRIALS ATTEMPTED WSEL,CWSEL

3693 PROBABLE MINIMUM SPECIFIC ENERGY

3720 CRITICAL DEPTH ASSUMED

850.00	6.98	6339.56	6339.56	.00	6342.92	3.35	.76	.49	6332.60
8620.	269.	8346.	7.	24.	544.	2.	4.	1.	6332.60
.01	11.10	14.80	2.47	.020	.030	.020	.000	6332.60	6.04
.006713	87.	100.	117.	20	6	0	.00	88.48	94.52

DCHV= .300 CEHV= .500

\*SECNO 777.000

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVING

3685 20 TRIALS ATTEMPTED WSEL,CWSEL

3693 PROBABLE MINIMUM SPECIFIC ENERGY

3720 CRITICAL DEPTH ASSUMED

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SECNO	DEPTH	CWSEL	CRINS	WSELK	EG	HV	HL	DLGSE	BANK ELEV
Q	ALOB	QCR	GRGB	ALOB	ACH	ARGB	VOL	TWR	LEFT/RIGHT
TIME	VLOB	VCR	YRDB	XNL	XNCH	XNR	WTN	ELMIN	BSTA
SLOPE	ALDBL	ALCH	XLOBR	ITRIAL	IBC	ICONT	CORAR	TOPWD	ENBST

3495 OVERBACK AREA ASSUMED NON-EFFECTIVE,ELLEA= 6343.90 ELREA= 6343.90

797.00	8.89	6340.79	6340.79	.00	6345.25	4.47	.30	1.13	6343.90
8620.	0.	8329.	9.	0.	508.	0.	5.	1.	6343.90
.01	.00	16.96	.00	.013	.013	.013	.000	6331.90	100.00
.004854	18.	53.	88.	20	11	0	.00	57.44	177.01

\*SECNO 585.000

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVING

3370 NORMAL BRIDGE,WRD= 5 MIN ELTRD= 6345.00 MAX ELLC= 6341.10



585.00	7.13	6336.23	6337.98	.00	6343.18	6.95	1.33	.74	6341.10
8620.	0.	8620.	0.	0.	408.	0.	7.	1.	6341.10
.01	.00	21.15	.00	.013	.013	.013	.000	6329.10	100.00
.008433	212.	212.	212.	7	16	0	.00	57.34	177.01

0

\*SECNO 577.000

3301 HV CHANGED MORE THAN HVINS

3625 20 TRIALS ATTEMPTED WSEL,CWSEL

3710 WSEL ASSUMED BASED ON MIN DIFF

577.00	6.85	6333.85	6333.92	.00	6337.15	3.30	.05	4.73	6327.00
8620.	266.	8100.	266.	23.	548.	23.	7.	1.	6327.00
.01	11.07	14.78	11.09	.020	.030	.020	.000	6327.00	5.15
.006848	12.	12.	12.	20	8	0	.00	93.70	99.85

0

\*SECNO 485.000

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SECNO	DEPTH	CWSEL	CRINS	WSELK	EG	HV	HL	CLOSS	BANK ELEV
0	GLDB	GCH	GRSB	ALDB	ACH	ARDB	VOL	TGA	LEFT/RIGHT
TIME	VLOB	VEH	VRSB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	ALCSL	ALCH	XLSR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDBT

3301 HV CHANGED MORE THAN HVINS

485.00	6.09	6331.89	6332.71	.00	6336.12	4.22	.76	.28	6325.80
8620.	240.	8139.	240.	19.	488.	19.	8.	2.	6325.80
.01	12.62	16.89	12.62	.020	.030	.020	.000	6325.80	25.75
.013197	52.	92.	132.	5	5	0	.00	92.50	118.25

0

\*SECNO 483.000

3301 HV CHANGED MORE THAN HVINS

3665 20 TRIALS ATTEMPTED WSEL,CWSEL

3693 PROBABLE MINIMUM SPECIFIC ENERGY

3720 CRITICAL DEPTH ASSUMED

483.00	6.69	6334.49	6334.49	.00	6337.65	3.16	.02	.23	6327.80
8620.	252.	8116.	252.	23.	562.	23.	8.	2.	6327.80
.01	10.95	14.45	10.95	.020	.030	.020	.000	6327.80	23.11
.006754	2.	2.	2.	20	8	0	.00	97.79	120.89

0

\*SECNO 400.000

3301 HV CHANGED MORE THAN HVINS

400.00	4.77	6331.57	6332.83	.00	6336.34	4.77	.82	.48	6326.80
8620.	101.	8418.	101.	9.	477.	9.	10.	2.	6326.80
.01	11.86	17.65	11.86	.020	.030	.020	.000	6326.80	37.42
.015811	83.	93.	83.	9	11	0	.00	107.15	144.58

0

\*SECNO 350.000

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL

3710 WSEL ASSUMED BASED ON MIN DIFF

350.00	5.16	6331.48	6332.20	.00	6336.18	3.69	.66	.74	6326.30
8620.	238.	8143.	238.	26.	518.	26.	10.	2.	6326.30

011214 50. 50. 50. 20 11 0 .00 120.11 161.06

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SECNO	DEPTH	CWSEL	CRINS	WSELK	EG	HV	HL	QLOSS	BANK ELEV
Q	QLO3	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTH	ELMIN	SSTA
SLOPF	XLOBL	ALCH	XLOBR	ITRIAL	IDC	ICDRT	CORAR	TDPWID	ENDST

\*SECNO 300.000

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL

3710 WSEL ASSUMED BASED ON MIN DIFF

300.00	4.59	6330.09	6331.30	.00	6334.43	4.34	.68	.15	6339.00
8620.	0.	8275.	345.	0.	489.	32.	11.	2.	6325.50
.01	.00	16.92	10.77	.030	.030	.030	.000	6325.50	25.75
.016751	50.	50.	50.	20	8	0	.00	127.22	152.98

0

\*SECNO 200.000

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL

3693 PROBABLE MINIMUM SPECIFIC ENERGY

3720 CRITICAL DEPTH ASSUMED

200.00	8.79	6333.29	6333.29	.00	6336.52	3.23	1.03	.39	6332.50
8620.	5.	8570.	45.	2.	592.	9.	12.	2.	6330.00
.02	2.23	14.46	5.18	.030	.030	.030	.000	6324.50	17.98
.007018	100.	100.	100.	20	14	0	.00	99.29	117.27

0

\*SECNO 1.000

3280 CROSS SECTION 1.00 EXTENDED .17 FEET

3685 20 TRIALS ATTEMPTED WSEL,CWSEL

3710 WSEL ASSUMED BASED ON MIN DIFF

1.00	9.67	6332.17	6332.71	.00	6335.20	3.03	1.26	.16	6330.00
8620.	364.	8249.	7.	92.	579.	2.	15.	3.	6330.00
.02	3.95	14.24	3.13	.030	.030	.030	.000	6322.50	.90
.005694	200.	200.	200.	20	14	0	.00	177.17	177.17

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THIS RUN EXECUTED 01/01/80 01:06:02

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HEC2 RELEASE DATED NOV 76 UPDATED MAY 1984

ERROR CORR - 01,02,03,04,05,06

MODIFICATION - 50,51,52,53,54,55,56

IBM-PC-XT VERSION 1.1

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71 POWERS BLVD CROSSING  
 72 SUPERCRITICAL WITH BLOCKAGE Q=4000 CFS  
 73 SAND CREEK

71 WSELK 113 111 110 109 108 107 106 105 104 103 102 101 100 99 98 97 96 95 94 93 92 91 90 89 88 87 86 85 84 83 82 81 80 79 78 77 76 75 74 73 72 71 70 69 68 67 66 65 64 63 62 61 60 59 58 57 56 55 54 53 52 51 50 49 48 47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

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22	WPROF	IPLDT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIN	ITRACE
	15.000	.000	-1.000	.000	.000	.000	.020	.000	.000	.000

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SECD	DEPTH	CHSEL	CRINS	WSELK	EG	HV	HL	GLOSS	BANK	ELEV
0	0.00	00	000	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT	
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WYN	ELMIN	SSTA	
SLOPE	XLOBL	XLCH	XLSR	ITRIAL	IDC	ICENT	CORAR	TOPWID	ENDBT	

\*PROF 2

CHV= .100 CHV= .300

\*SECD 1200.000

3720 CRITICAL DEPTH ASSUMED

1200.00	3.56	6347.03	6347.03	6330.00	6348.50	1.42	.00	.00	6344.00
4000.	374.	3525.	99.	50.	359.	17.	0.	0.	6344.00
.00	7.58	9.83	5.99	.030	.030	.030	.000	6343.50	37.10
.008654	0.	0.	0.	0	14	0	.00	152.68	189.78

0

\*SECD 1100.000

3301 HV CHANGED MORE THAN HVINS

1100.00	1.50	6342.80	6343.91	.00	6346.58	3.77	1.57	.24	6341.00
4000.	20.	3841.	80.	8.	243.	8.	1.	0.	6341.00
.00	9.81	15.79	9.51	.030	.030	.030	.000	6341.00	20.99
.048303	100.	100.	100.	7	15	0	.00	153.02	174.01

0

CHV= .100 CHV= .300

\*SECD 1000.000

3301 HV CHANGED MORE THAN HVINS

1000.00	3.23	6341.73	6342.13	.00	6343.96	2.23	2.15	.46	6336.50
4000.	47.	3890.	53.	5.	323.	7.	1.	1.	6336.50
.00	9.03	12.05	9.65	.020	.030	.020	.000	6336.50	4.77
.012393	100.	100.	100.	4	14	0	.00	107.27	112.04

0

\*SECD 993.000

3301 HV CHANGED MORE THAN HVINS

993.00	1.83	6334.33	6336.38	.00	6343.14	8.81	.16	.66	6332.50
4000.	30.	3746.	50.	2.	185.	2.	2.	1.	6332.50
.00	17.93	23.90	17.93	.020	.030	.020	.000	6332.50	12.17
.102898	6.	6.	6.	11	11	0	.00	93.66	105.83

0

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SECD	DEPTH	CHSEL	CRINS	WSELK	EG	HV	HL	GLOSS	BANK	ELEV
0	0.00	00	000	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT	
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WYN	ELMIN	SSTA	
SLOPE	XLOBL	XLCH	XLSR	ITRIAL	IDC	ICENT	CORAR	TOPWID	ENDBT	

\*SECD 902.000

3301 HV CHANGED MORE THAN HVINS

952.00	2.43	6334.23	6335.73	.00	6339.41	5.18	2.64	1.09	6331.80
4000.	42.	3917.	42.	3.	213.	3.	2.	1.	6331.80
.00	13.85	18.35	13.85	.020	.030	.020	.000	6331.80	12.52
.042094	42.	42.	42.	7	17	0	.00	92.95	105.48

\*SECNO 950.000

3301 HV CHANGED MORE THAN HVINS

3485 20 TRIALS ATTEMPTED WSEL,CWSEL  
 3693 PROBABLE MINIMUM SPECIFIC ENERGY  
 3720 CRITICAL DEPTH ASSUMED

950.00	3.82	6337.62	6337.62	.00	6339.48	1.86	.03	.96	6333.80
4000.	62.	3675.	62.	7.	352.	7.	2.	1.	6333.80
.00	8.33	11.02	8.33	.020	.030	.020	.000	6333.80	9.09
.008285	2.	2.	2.	20	14	0	.00	99.82	103.91

\*SECNO 850.000

3485 20 TRIALS ATTEMPTED WSEL,CWSEL  
 3693 PROBABLE MINIMUM SPECIFIC ENERGY  
 3720 CRITICAL DEPTH ASSUMED

850.00	4.19	6336.79	6336.79	.00	6338.95	2.06	.82	.42	6332.60
4000.	76.	3923.	1.	9.	339.	1.	3.	1.	6332.60
.01	8.48	11.57	1.93	.020	.030	.020	.000	6332.60	8.81
.008692	57.	100.	117.	20	8	0	.00	85.50	94.31

DENV= .300 DENV= .500

\*SECNO 797.000

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

3485 20 TRIALS ATTEMPTED WSEL,CWSEL  
 3693 PROBABLE MINIMUM SPECIFIC ENERGY

01/01/80 01:04:45

SECNO	DEPTH	CWSEL	CRINS	WSELK	EG	HV	HL	QLOSS	BANK ELEV
2	DLOB	DCH	CRCS	ALOS	ACH	ARCS	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XRL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLCEL	XLCH	ALORR	ITRIAL	INC	ICDNT	CORAR	TDFW10	ENDST

3720 CRITICAL DEPTH ASSUMED

3495 OVBANK AREA ASSUMED NON-EFFECTIVE,ELLEA= 6343.90 ELREA= 6343.90

797.00	5.33	6337.23	6337.23	.00	6339.91	2.68	.29	.72	6343.90
4000.	0.	4000.	0.	0.	304.	0.	3.	1.	6343.90
.01	.00	13.15	.00	.013	.013	.013	.000	6331.90	100.01
.003865	18.	53.	86.	20	11	0	.00	57.24	177.00

\*SECNO 585.000

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 6341.10 ELREA= 6341.10

585.00	3.91	6333.01	6334.41	.00	6338.02	5.01	1.19	.70	6341.10
4000.	0.	4000.	0.	0.	223.	0.	4.	1.	6341.10
.01	.00	17.97	.00	.013	.013	.013	.000	6329.10	100.01
.006926	212.	212.	212.	4	9	0	.00	57.16	177.00

0  
\*SECND 577.000

3301 HV CHANGED MORE THAN HVINS

5685 20 TRIALS ATTEMPTED WSEL, CWSEL

3710 WSEL ASSURED BASED ON NIR DIFF

577.00	4.14	6331.14	6331.19	.00	6333.20	2.06	.10	2.69	6327.00
4000.	75.	3851.	75.	9.	331.	9.	4.	1.	6327.00
.01	8.72	11.63	6.72	.020	.030	.020	.000	6327.00	7.86
.008289	12.	12.	12.	20	8	0	.00	88.28	95.14

0  
\*SECND 485.000

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SECD	DEPTH	WSEL	CRWS	WSELK	EG	HV	HL	DLSS	BANK ELEV
0	CLDE	QCH	QROB	ALDE	ACH	AROS	VGL	TWA	LEFT/RIGHT
TIME	VLOS	VCH	VROB	XNL	XNCH	XNR	WTH	ELMIN	SSTA
SLOPE	XLGBL	XLCH	XLQBR	ITRIAL	IGC	ICONT	CDRAR	TOPWID	ENDST

3301 HV CHANGED MORE THAN HVINS

485.00	3.68	6329.46	6329.59	.00	6332.11	2.63	.92	.17	6325.80
4000.	69.	3662.	69.	7.	294.	7.	5.	2.	6325.80
.01	9.92	13.12	9.92	.020	.030	.020	.000	6325.80	26.23
.012336	52.	92.	132.	6	5	0	.00	87.55	115.77

0  
\*SECND 463.000

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL, CWSEL

3693 PROBABLE MINIMUM SPECIFIC ENERGY

3720 CRITICAL DEPTH ASSUMED

463.00	4.05	6331.85	6331.85	.00	6333.81	1.96	.02	.25	6327.80
4000.	73.	3855.	73.	8.	341.	8.	5.	2.	6327.80
.01	8.57	11.32	8.57	.020	.030	.020	.000	6327.80	25.82
.008073	2.	2.	2.	20	8	0	.00	92.35	118.18

0  
\*SECND 400.000

3301 HV CHANGED MORE THAN HVINS

400.00	2.87	6329.67	6330.43	.00	6332.56	2.89	.98	.28	6326.80
4000.	29.	3943.	29.	3.	288.	3.	6.	2.	6326.80
.02	9.20	13.69	9.20	.020	.030	.020	.000	6326.80	38.84
.019654	83.	83.	93.	8	11	0	.00	104.32	143.16

0  
\*SECND 350.000

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL, CWSEL

3693 PROBABLE MINIMUM SPECIFIC ENERGY

3720 CRITICAL DEPTH ASSUMED

350.00	3.59	6329.89	6329.99	.00	6331.62	1.73	.61	.48	6326.30
4000.	78.	3844.	78.	13.	359.	13.	6.	2.	6326.30
.02	6.24	10.71	6.24	.030	.030	.030	.000	6326.30	44.03
.008502	50.	50.	50.	20	11	0	.00	113.93	157.97

0  
1

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SECD	LEPT	CWSEL	CRINS	WSEL	EG	HV	HL	GLSS	BANK ELEV
0	CLOB	DCH	CRDS	ALOS	ACH	ARDB	VOL	TWA	LEFT/RIGHT
TIME	VLOS	VCH	VROS	XNL	XNCH	XNR	WTR	ELMIN	SSTA
SLOPE	XLOB	XLCH	XLOS	ITRIAL	IDC	ICNT	CORAR	TOPWID	ENDST

\*SECD 300.000

3301 HV CHANGED MORE THAN HVINS

300.00	2.99	6326.49	6329.04	.00	6330.87	2.33	.56	.19	6339.00
4000.	0.	3893.	197.	0.	312.	14.	6.	2.	6325.50
.02	.00	12.47	7.02	.030	.030	.030	.000	6325.50	30.35
.015608	50.	50.	50.	7	5	0	.00	117.77	148.12

0

\*SECD 200.000

3685 20 TRIALS ATTEMPTED WSEL,CWSEL

3693 PROBABLE MINIMUM SPECIFIC ENERGY

3720 CRITICAL DEPTH ASSUMED

200.00	5.37	6330.17	6330.17	.00	6332.41	2.24	1.12	.69	6332.50
4000.	0.	4000.	0.	0.	333.	0.	7.	2.	6330.00
.02	.00	12.01	.05	.030	.030	.030	.000	6324.50	37.32
.008411	100.	100.	100.	20	14	0	.00	74.95	112.27

0

\*SECD 1.000

3685 20 TRIALS ATTEMPTED WSEL,CWSEL

3693 PROBABLE MINIMUM SPECIFIC ENERGY

3720 CRITICAL DEPTH ASSUMED

1.00	6.20	6328.70	6328.70	.00	6331.00	2.38	1.67	.19	6330.00
4000.	0.	4000.	0.	0.	323.	0.	9.	3.	6330.00
.02	.00	12.39	.00	.030	.030	.030	.000	6322.50	102.60
.008297	200.	200.	200.	20	8	0	.00	58.69	171.29

0

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THIS RUN EXECUTED 01/01/80 01:06:55

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 HEC2 RELEASE DATED NOV 78 UPDATED MAY 1984  
 ERROR CORR - 01,02,03,04,05,06  
 MODIFICATION - 50,51,52,53,54,55,56  
 IBM-PC-XT VERSION 1.1  
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NOTE- ASTERISK (\*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

SAND CREEK

SUMMARY PRINTOUT

SECNO	Q	DEPTH	VCH	VLOB	VRQB	CWSEL	EG	ELMIN	XLCH
1200.000	8620.00	4.50	15.96	12.20	9.74	6348.00	6351.70	6343.50	.00
* 1200.000	4000.00	3.58	9.83	7.58	5.99	6347.08	6348.50	6343.50	.00
1100.000	8620.00	3.19	18.69	11.62	11.62	6344.19	6349.39	6341.00	100.00
1100.000	4000.00	1.80	15.79	9.81	9.81	6342.80	6346.58	6341.00	100.00
1000.000	8620.00	5.76	14.25	10.69	11.42	6344.26	6347.36	6338.50	100.00
1000.000	4000.00	3.23	12.09	9.03	9.65	6341.73	6343.96	6335.50	100.00
993.000	8620.00	3.56	26.12	19.59	19.59	6336.06	6346.52	6332.50	6.00
993.000	4000.00	1.80	23.90	17.93	17.93	6334.33	6343.14	6332.50	6.00
952.000	8620.00	4.08	23.23	17.54	17.54	6335.88	6344.13	6331.60	42.00
952.000	4000.00	2.43	18.35	13.85	13.85	6334.23	6339.41	6331.60	42.00
* 950.000	8620.00	5.91	15.09	11.41	11.41	6339.71	6343.18	6333.80	2.00
* 950.000	4000.00	3.82	11.02	8.33	8.33	6337.62	6339.48	6333.80	2.00
* 850.000	8620.00	6.96	14.80	11.10	2.47	6339.56	6342.92	6332.60	100.00
* 850.000	4000.00	4.19	11.57	8.68	1.93	6336.79	6338.85	6332.60	100.00
* 797.000	8620.00	8.89	16.96	.00	.00	6340.79	6345.25	6331.90	53.00
* 797.000	4000.00	5.33	13.15	.00	.00	6337.23	6339.91	6331.90	53.00
555.000	8620.00	7.13	21.15	.00	.00	6336.23	6343.18	6329.10	212.00
555.000	4000.00	3.91	17.97	.00	.00	6333.01	6338.02	6329.10	212.00
* 577.000	8620.00	6.85	14.78	11.09	11.09	6333.85	6337.15	6327.00	12.00
* 577.000	4000.00	4.14	11.63	8.72	8.72	6331.14	6333.20	6327.00	12.00
485.000	8620.00	6.09	16.69	12.62	12.62	6331.89	6336.12	6325.80	92.00
485.000	4000.00	3.68	13.12	9.92	9.92	6329.48	6332.11	6325.80	92.00

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SECNO	Q	DEPTH	VCH	VLOB	VRQB	CWSEL	EG	ELMIN	XLCH
* 483.000	8620.00	6.69	14.45	10.95	10.95	6334.49	6337.65	6327.80	2.00
* 483.000	4000.00	4.05	11.32	8.57	8.57	6331.85	6333.81	6327.80	2.00
400.000	8620.00	6.77	17.65	11.86	11.86	6331.57	6336.34	6326.80	83.00
400.000	4000.00	2.87	13.69	9.20	9.20	6329.67	6332.56	6326.80	83.00
* 350.000	8620.00	5.18	15.71	9.15	9.15	6331.46	6335.18	6325.30	50.00
* 350.000	4000.00	3.57	10.71	6.24	6.24	6329.89	6331.62	6325.30	50.00
* 300.000	8620.00	4.59	16.92	.00	10.77	6330.09	6334.43	6325.50	50.00
300.000	4000.00	2.99	12.47	.00	7.82	6328.49	6330.87	6325.50	50.00
* 200.000	8620.00	8.79	14.46	2.23	5.18	6333.29	6336.52	6324.50	100.00
* 200.000	4000.00	5.67	12.01	.00	.05	6330.17	6332.41	6324.50	100.00
* 1.000	8620.00	9.67	14.24	3.95	3.13	6332.17	6335.20	6322.50	200.00
* 1.000	4000.00	6.20	12.39	.00	.00	6328.70	6331.08	6322.50	200.00

01/01/80 01:04:45

SUMMARY OF ERRORS AND SPECIAL NOTES

CAUTION SECNO= 1200.000 PROFILE= 2 CRITICAL DEPTH ASSUMED

CAUTION SECNO= 950.000 PROFILE= 1 WSEL ASSUMED BASED ON MIN DIFF  
 CAUTION SECNO= 950.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL  
 CAUTION SECNO= 950.000 PROFILE= 2 CRITICAL DEPTH ASSUMED  
 CAUTION SECNO= 950.000 PROFILE= 2 PROBABLE MINIMUM SPECIFIC ENERGY  
 CAUTION SECNO= 950.000 PROFILE= 2 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 850.000 PROFILE= 1 CRITICAL DEPTH ASSUMED  
 CAUTION SECNO= 850.000 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY  
 CAUTION SECNO= 850.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL  
 CAUTION SECNO= 850.000 PROFILE= 2 CRITICAL DEPTH ASSUMED  
 CAUTION SECNO= 850.000 PROFILE= 2 PROBABLE MINIMUM SPECIFIC ENERGY  
 CAUTION SECNO= 850.000 PROFILE= 2 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 797.000 PROFILE= 1 CRITICAL DEPTH ASSUMED  
 CAUTION SECNO= 797.000 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY  
 CAUTION SECNO= 797.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL  
 CAUTION SECNO= 797.000 PROFILE= 2 CRITICAL DEPTH ASSUMED  
 CAUTION SECNO= 797.000 PROFILE= 2 PROBABLE MINIMUM SPECIFIC ENERGY  
 CAUTION SECNO= 797.000 PROFILE= 2 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 577.000 PROFILE= 1 WSEL ASSUMED BASED ON MIN DIFF  
 CAUTION SECNO= 577.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL  
 CAUTION SECNO= 577.000 PROFILE= 2 WSEL ASSUMED BASED ON MIN DIFF  
 CAUTION SECNO= 577.000 PROFILE= 2 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 483.000 PROFILE= 1 CRITICAL DEPTH ASSUMED  
 CAUTION SECNO= 483.000 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY  
 CAUTION SECNO= 483.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL  
 CAUTION SECNO= 483.000 PROFILE= 2 CRITICAL DEPTH ASSUMED  
 CAUTION SECNO= 483.000 PROFILE= 2 PROBABLE MINIMUM SPECIFIC ENERGY  
 CAUTION SECNO= 483.000 PROFILE= 2 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 350.000 PROFILE= 1 WSEL ASSUMED BASED ON MIN DIFF  
 CAUTION SECNO= 350.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL  
 CAUTION SECNO= 350.000 PROFILE= 2 CRITICAL DEPTH ASSUMED  
 CAUTION SECNO= 350.000 PROFILE= 2 PROBABLE MINIMUM SPECIFIC ENERGY  
 CAUTION SECNO= 350.000 PROFILE= 2 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 300.000 PROFILE= 1 WSEL ASSUMED BASED ON MIN DIFF  
 CAUTION SECNO= 300.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 200.000 PROFILE= 1 CRITICAL DEPTH ASSUMED  
 CAUTION SECNO= 200.000 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY  
 CAUTION SECNO= 200.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL  
 CAUTION SECNO= 200.000 PROFILE= 2 CRITICAL DEPTH ASSUMED  
 CAUTION SECNO= 200.000 PROFILE= 2 PROBABLE MINIMUM SPECIFIC ENERGY  
 CAUTION SECNO= 200.000 PROFILE= 2 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 1.000 PROFILE= 1 WSEL ASSUMED BASED ON MIN DIFF

1  
 01/01/80 01:04:45

CAUTION SECNO= 1.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL  
 CAUTION SECNO= 1.000 PROFILE= 2 CRITICAL DEPTH ASSUMED  
 CAUTION SECNO= 1.000 PROFILE= 2 PROBABLE MINIMUM SPECIFIC ENERGY  
 CAUTION SECNO= 1.000 PROFILE= 2 20 TRIALS ATTEMPTED TO BALANCE WSEL

1  
 01/01/80 01:07:07



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HEC2 RELEASE DATED NOV 76 UPDATED MAY 1984  
ERROR CORR - 01,02,03,04,05,06  
MODIFICATION - 50,51,52,53,54,55,56  
IBM-PC-XT VERSION 1.1  
\*\*\*\*\*

THIS RUN EXECUTED 03/17/87 08:31:29

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 NEC2 RELEASE DATED NOV 78 UPDATED MAY 1994  
 ERROR CORR - 01,02,03,04,05,06  
 MODIFICATION - 50,51,52,53,54,55,56  
 INH-PC-XT VERSION 1.1  
 \*\*\*\*\*

*Run #3  
 Supercritical  
 Q = 8620 cfs @ 4000 cfs  
 Full Channel Improvements*

T1 POWERS BLVD CROSSING 100-YEAR FUTURE PEAK FLOW 3-17-87  
 T2 SUPERCRITICAL FLOW WITH LOCKAGE  
 T3 SAND CREEK WITH EXTENDED IMPROVEMENTS DS OF POWERS

J1	ICHECK	INC	NINX	IGIR	STRT	METRIC	HVINS	D	WSEL	FD
	0.	2.	0.	1.	.000000	.00	.0	0.	6348.000	.000
J2	NPROF	IPLDT	PEFVS	XSECV	XSECH	FN	ALLDC	IBH	CHNIN	ITRADE
	1.000	.000	-1.000	.000	.000	.000	.000	.000	.000	.000
J3	VARIABLE CODES FOR SUMMARY PRINTOUT									
	38.000	43.000	8.000	26.000	55.000	56.000	1.000	3.000	42.000	39.000
GT	2.000	8520.000	4000.000	.000	.000	.000	.000	.000	.000	.000
NC	.020	.020	.020	.100	.300	.000	.000	.000	.000	.000
X1	1450.000	8.000	20.000	134.000	.000	.000	.000	.000	.000	.000
BR	6358.400	.000	6355.400	12.000	6355.200	20.000	6348.400	27.000	6348.400	127.000
SR	6355.200	134.000	6355.400	142.000	6358.400	154.000	.000	.000	.000	.000
X1	1400.000	.000	.000	.000	50.000	50.000	50.000	.000	-1.000	.000

X1	1379.000	.000	.000	.000	21.000	21.000	21.000	.000	-3.300	.000
X1	1372.000	.000	.000	.000	7.000	7.000	7.000	.000	-6.500	.000
X1	1341.000	.000	.000	.000	30.000	30.000	30.000	.000	-4.400	.000
X1	1337.000	.000	.000	.000	6.000	6.000	6.000	.000	2.400	.000
X1	1300.000	.000	.000	.000	37.000	37.000	37.000	.000	-5.500	.000
X1	1200.000	.000	.000	.000	100.000	100.000	100.000	.000	-1.300	.000
X1	1100.000	.000	.000	.000	100.000	100.000	100.000	.000	-1.300	.000
X1	1000.000	4.000	8.000	108.000	6.000	6.000	6.000	.000	.000	.000
GR	6346.500	.000	6338.500	9.000	6336.500	108.000	6346.500	118.000	.000	.000

03/17/87 08:31:28

X1	993.000	4.000	14.000	104.000	42.000	42.000	42.000	.000	.000	.000
GR	6346.500	.000	6332.500	14.000	6332.500	104.000	6346.500	118.000	.000	.000
X1	952.000	4.000	15.000	103.000	2.000	2.000	2.000	.000	.000	.000
GR	6346.500	.000	6331.500	15.000	6331.500	103.000	6346.500	118.000	.000	.000
X1	950.000	4.000	13.000	105.000	87.000	117.000	100.000	.000	.000	.000
GR	6346.500	.000	6333.500	13.000	6333.500	105.000	6346.500	118.000	.000	.000
X1	850.000	4.000	13.000	94.000	18.000	88.000	53.000	.000	.000	.000
GR	6346.500	.000	6332.500	13.000	6332.500	94.000	6346.500	95.000	.000	.000
NC	.013	.013	.013	.300	.500	.000	.000	.000	.000	.000
X1	797.000	24.000	100.000	177.010	212.000	212.000	212.000	.000	2.800	.000
X3	10.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
GR	6341.100	100.000	6329.100	100.010	6329.100	110.500	6341.100	110.500	6341.100	114.400
GR	6329.100	114.450	6329.100	123.550	6341.100	123.550	6341.100	127.450	6329.100	127.500
GR	6329.100	136.500	6341.100	136.550	6341.100	140.450	6329.100	140.500	6329.100	149.500
GR	6341.100	149.550	6341.100	153.450	6329.100	153.500	6329.100	162.500	6341.100	162.600
GR	6341.100	166.500	6329.100	166.600	6329.100	177.000	6341.100	177.010	.000	.000
BT	5.000	100.000	6344.500	6343.900	127.450	6345.200	6343.900	140.450	6345.000	6343.900
BT	153.450	6345.500	6341.100	177.010	6345.400	6343.900	.000	.000	.000	.000
X1	585.000	.000	.000	.000	12.000	12.000	12.000	.000	-2.800	.000
X3	10.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
BT	5.000	100.000	6346.300	6341.100	127.450	6346.300	6341.100	140.450	6345.500	6341.100
BT	153.450	6345.000	6341.100	177.010	6345.000	6341.100	.000	.000	.000	.000
NC	.020	.020	.030	.000	.000	.000	.000	.000	.000	.000
X1	577.000	4.000	12.000	92.000	52.000	132.000	92.000	.000	.000	.000
GR	6339.000	.000	6327.000	12.000	6327.000	92.000	6339.000	104.000	.000	.000
X1	485.000	8.000	32.000	112.000	2.000	2.000	2.000	.000	.000	.000
GR	6340.000	.000	6337.500	10.000	6337.500	20.000	6325.800	32.000	6325.800	112.000
GR	6337.500	124.000	6337.500	134.000	6340.000	144.000	.000	.000	.000	.000
X1	483.000	8.000	30.000	114.000	83.000	83.000	83.000	.000	.000	.000
GR	6340.000	.000	6337.500	10.000	6337.500	20.000	6327.800	30.000	6327.800	114.000
GR	6337.500	124.000	6337.500	134.000	6340.000	144.000	.000	.000	.000	.000
X1	400.000	8.000	41.000	141.000	50.000	50.000	50.000	.000	.000	.000
GR	6341.000	.000	6334.800	25.000	6334.800	35.000	6326.800	41.000	6326.800	141.000
GR	6334.800	147.000	6334.800	157.000	6336.000	162.000	.000	.000	.000	.000

X1	350.000	8.000	51.000	151.000	50.000	50.000	50.000	.000	.000	.000
GR	6340.000	.000	6333.000	28.000	6333.000	38.000	6326.300	51.000	6326.300	151.000
GR	6333.000	164.000	6333.000	174.000	6336.000	186.000	.000	.000	.000	.000

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X1	300.000	4.000	.000	139.000	100.000	100.000	100.000	.000	.000	.000
SR	6339.000	.000	6325.500	39.000	6325.500	139.000	6336.000	171.000	.000	.000

X1	200.000	11.000	24.000	112.000	200.000	200.000	200.000	.000	.000	.000
GR	6337.000	.000	6335.000	5.000	6332.500	24.000	6329.000	44.000	6325.000	48.000
GR	6324.500	62.000	6325.000	101.000	6330.000	112.000	6335.000	120.000	6334.000	188.000
GR	6337.000	189.000	.000	.000	.000	.000	.000	.000	.000	.000

X1	1.000	8.000	160.000	175.000	.000	.000	.000	.000	.000	.000
GR	6332.000	.000	6331.000	75.000	6330.000	100.000	6323.000	114.000	6322.500	140.000
GR	6323.000	155.000	6330.000	175.000	6334.000	179.000	.000	.000	.000	.000
EJ	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

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SECD	DEPT	CNSEL	CRTLS	NSLK	ES	HV	HL	CLSS	BANK	ELEV
D	GLB	GR	GRB	ALB	ACH	ARG	VGL	TWA	LEFT	RIGHT
TIME	VLB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSYA	
SLOPE	XLBL	XLCH	XLBR	ITRIAL	IDC	IDCNT	EDRAR	TOPWID	ENDST	

\*PRDF 1

CCNV= .100 CEHV= .300

\*SECD 1450.000

1450.00	5.00	6353.40	6354.40	6348.00	6357.57	4.17	.00	.00	6355.20	
8620.	0.	8620.	0.	0.	525.	0.	0.	0.	6355.20	
.00	.00	16.40	.00	.020	.020	.020	.000	6348.40	21.85	
.006369	0.	0.	0.	0	14	0	.00	110.29	132.15	

\*SECD 1400.000

3301 HV CHANGED MORE THAN HVINS

1400.00	4.52	6352.32	6353.70	.00	6357.46	5.16	.00	.10	6354.60	
8620.	0.	8620.	0.	0.	473.	0.	0.	0.	6354.60	
.00	.00	18.22	.00	.020	.020	.020	.000	6347.80	22.35	
.008916	0.	0.	0.	19	11	0	.00	109.30	131.65	

\*SECD 1379.000

1379.00	4.73	6352.23	6353.49	.00	6356.92	4.70	.41	.14	6354.30	
8620.	0.	8620.	0.	0.	494.	0.	1.	0.	6354.30	
.00	.00	17.39	.00	.020	.020	.020	.000	6347.50	22.14	
.007683	50.	50.	50.	7	11	0	.00	109.73	131.86	

\*SECD 1372.000

3301 HV CHANGED MORE THAN HVINS

1372.00	3.02	6344.02	6346.98	.00	6355.91	11.89	.30	.72	6347.80	
8620.	0.	8620.	0.	0.	312.	0.	1.	0.	6347.80	
.00	.00	27.67	.30	.020	.020	.020	.000	6341.00	23.89	
.034348	21.	21.	21.	16	11	0	.00	106.22	130.11	

\*SECD 1341.000

1341.00	3.00	6343.60	6346.50	.00	6355.65	12.05	.24	.02	6347.80	
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8620.	0.	8620.	0.	0.	309.	0.	1.	0.	6347.40
.00	.00	27.86	.00	.020	.020	.020	.000	6340.60	23.91
.034810	7.	7.	7.	9	14	0	.00	106.18	130.09

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SECD	DEPTH	CNSL	CRINS	WSELK	EG	HV	HL	LOSS	BANK ELEV
Q	QLOB	QCH	QRGB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VRGB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLGBR	ITRIAL	IDC	ICONT	CDRAR	TOPWID	ENDST

\*SECD 1337.000

3301 HV CHANGED MORE THAN HVINS

1337.00	4.15	6347.15	6349.00	.00	6353.32	6.18	.57	1.76	6349.90
8620.	0.	8620.	0.	0.	432.	0.	1.	0.	6349.80
.00	.00	19.94	.00	.020	.020	.020	.000	6343.00	22.73
.011885	30.	30.	30.	12	14	0	.00	108.53	131.27

\*SECD 1300.000

3301 HV CHANGED MORE THAN HVINS

1300.00	3.95	6346.48	6348.50	.00	6353.19	6.71	.08	.05	6349.30
8620.	0.	8620.	0.	0.	415.	0.	1.	0.	6349.30
.00	.00	20.79	.00	.020	.020	.020	.000	6342.50	22.90
.013573	6.	6.	6.	5	11	0	.00	108.20	131.10

\*SECD 1200.000

3301 HV CHANGED MORE THAN HVINS

1200.00	3.76	6344.96	6347.21	.00	6352.85	7.59	.55	.09	6348.00
8620.	0.	8620.	0.	0.	390.	0.	1.	0.	6348.00
.00	.00	22.11	.00	.020	.020	.020	.000	6341.20	23.14
.016550	37.	37.	37.	15	11	0	.00	107.73	130.86

\*SECD 1100.000

3301 HV CHANGED MORE THAN HVINS

1100.00	3.90	6343.80	6345.88	.00	6350.83	7.03	1.55	.17	6346.70
8620.	0.	8620.	0.	0.	405.	0.	2.	1.	6346.70
.00	.00	21.28	.00	.020	.020	.020	.000	6339.90	22.99
.014625	100.	100.	100.	8	14	0	.00	108.02	131.01

\*SECD 1000.000

1000.00	3.94	6342.44	6344.51	.00	6349.42	6.97	1.39	.02	6338.50
8620.	83.	8426.	111.	5.	394.	10.	3.	1.	6338.50
.00	10.66	21.37	11.42	.020	.020	.020	.000	6338.50	4.06
.013280	100.	100.	100.	9	14	0	.00	108.87	112.93

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SECD	DEPTH	CNSL	CRINS	WSELK	EG	HV	HL	LOSS	BANK ELEV
Q	QLOB	QCH	QRGB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VRGB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLGBR	ITRIAL	IDC	ICONT	CDRAR	TOPWID	ENDST

\*SECNO 993.000

3301 HV CHANGED MORE THAN HVINS

993.00	3.23	6335.73	6338.95	.00	6348.70	12.97	.12	.60	6332.50
8620.	76.	8468.	76.	5.	291.	5.	3.	1.	6332.50
.00	14.54	29.09	14.54	.020	.020	.020	.000	6332.50	10.77
.032044	6.	6.	6.	16	14	0	.00	96.47	107.23

\*SECNO 952.000

3301 HV CHANGED MORE THAN HVINS

952.00	3.45	6335.25	6338.36	.00	6347.14	11.89	1.23	.32	6331.80
8620.	85.	8450.	85.	6.	303.	6.	4.	1.	6331.80
.01	14.03	27.88	14.03	.020	.020	.020	.000	6331.80	11.49
.027077	42.	42.	42.	6	14	0	.00	95.03	106.51

\*SECNO 950.000

3301 HV CHANGED MORE THAN HVINS

950.00	3.94	6337.74	6340.16	.00	6346.02	8.28	.04	1.08	6333.80
8620.	93.	8434.	93.	8.	362.	8.	4.	1.	6333.80
.01	11.73	23.28	11.73	.020	.020	.020	.000	6333.80	8.97
.015797	2.	2.	2.	12	14	0	.00	100.06	109.03

\*SECNO 850.000

3301 HV CHANGED MORE THAN HVINS

850.00	4.98	6337.58	6339.56	.00	6344.37	6.79	1.20	.45	6332.60
8620.	130.	8487.	2.	12.	403.	1.	5.	1.	6332.60
.01	10.52	21.04	2.34	.020	.020	.020	.000	6332.60	8.02
.009426	87.	100.	117.	7	14	0	.00	86.35	94.37

CCHV= .300 CEHV= .500

\*SECNO 797.000

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SECNO	DEPTH	CHSEL	CRIBS	WSELK	EG	HV	HL	GLSS	BANK	ELEV
Q	GLSS	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT	
TIME	VLOB	VCP	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA	
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST	

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CHSEL  
3693 PROBABLE MINIMUM SPECIFIC ENERGY  
3720 CRITICAL DEPTH ASSURED

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA= 6343.90 ELREA= 6343.90

797.00	8.89	6340.79	6340.79	.00	6345.25	4.47	.35	.63	6343.90
8620.	0.	8620.	0.	0.	508.	0.	5.	1.	6343.90
.01	.00	16.96	.00	.013	.013	.013	.000	6331.90	100.00
.004856	18.	53.	88.	20	14	0	.00	57.44	177.01

\*SECNO 500.000

3301 HV CHANGED MORE THAN HVINS

3378 NORMAL BRIDGE, NRD= 5 MIA ELTRD= 6345.00 MAX ELLC= 6341.10

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 6341.10 ELREA= 6341.10

585.00	7.13	6336.23	6337.98	.00	6343.18	6.95	1.33	.74	6341.10
8620.	0.	8620.	0.	0.	408.	0.	7.	2.	6341.10
.01	.00	21.15	.00	.013	.013	.013	.000	6329.10	100.00
.006433	212.	212.	212.	7	16	0	.00	57.34	177.61

\*SECNO 577.000

3301 HV CHANGED MORE THAN HVINS

3655 20 TRIALS ATTEMPTED WSEL, CWSEL  
3710 WSEL ASSUMED BASED ON WIR DIFF

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SECNO	DEPTH	WSEL	CRINS	WSELK	EG	HV	HL	QLOSS	BANK ELEV
0	QLOS	BCH	CRDS	ALOS	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VRC6	XNL	XACH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOS	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPNID	ENOST

577.00	6.85	6333.85	6333.92	.00	6337.15	3.30	.09	4.73	6327.00
8620.	260.	8100.	260.	23.	548.	23.	8.	2.	6327.00
.01	11.09	14.78	11.09	.020	.030	.020	.000	6327.00	5.15
.006848	12.	12.	12.	20	8	0	.00	93.70	98.85

\*SECNO 485.000

3301 HV CHANGED MORE THAN HVINS

485.00	6.09	6331.89	6332.71	.00	6336.12	4.22	.76	.28	6325.80
8620.	240.	8139.	240.	19.	488.	19.	9.	2.	6325.80
.01	12.62	16.89	12.62	.020	.030	.020	.000	6325.80	25.75
.010197	92.	92.	132.	5	5	0	.00	92.50	118.25

\*SECNO 483.000

3301 HV CHANGED MORE THAN HVINS

3695 20 TRIALS ATTEMPTED WSEL, CWSEL  
3693 PROBABLE MINIMUM SPECIFIC ENERGY  
3720 CRITICAL DEPTH ASSUMED

483.00	6.69	6334.49	6334.49	.00	6337.65	3.16	.02	.23	6327.80
8620.	252.	8118.	252.	23.	562.	23.	9.	2.	6327.80
.01	10.95	14.45	10.95	.020	.030	.020	.000	6327.80	23.11
.006754	2.	2.	2.	20	8	0	.00	97.79	120.89

\*SECNO 480.000

3301 HV CHANGED MORE THAN HVINS

480.00	4.77	6331.57	6332.83	.00	6336.34	4.77	.82	.48	6326.80
8620.	101.	8418.	101.	9.	477.	9.	10.	2.	6326.80
.01	11.86	17.65	11.86	.020	.030	.020	.000	6326.80	37.42

\*SECND 350.000

3301 HV CHANGED MORE THAN HVINS

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SECND	DEPTH	CWSEL	CRIMS	WSELK	EE	HV	HL	GLOSS	BANK	ELEV
0	0L0B	0CH	CR0B	AL0B	ACH	AR0B	VOL	TWA	LEFT/RIGHT	
TIME	VLSB	VCH	VR0B	XNL	XNCH	XNR	WTN	ELMIN	SSTA	
SLOPE	XL0BL	AL0H	XL0BR	ITR1AL	IDC	ICONT	CORAR	TOPWID	ENDST	

3685 20 TRIALS ATTEMPTED WSEL,CWSEL  
3710 WSEL ASSUMED BASED ON MIN DIFF

350.00	5.18	6331.48	6332.22	.00	6335.18	3.69	.66	.74	6326.30	
8620.	239.	8143.	239.	26.	518.	26.	10.	2.	6326.30	
.01	9.15	15.71	9.15	.030	.030	.030	.000	6326.30	40.94	
.011214	50.	50.	50.	20	11	0	.00	120.11	161.06	

\*SECND 300.000

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL  
3710 WSEL ASSUMED BASED ON MIN DIFF

300.00	4.59	6330.09	6331.30	.00	6334.43	4.34	.60	.15	6339.00	
8620.	0.	8275.	345.	0.	489.	32.	11.	2.	6325.50	
.02	.00	15.92	16.77	.030	.030	.030	.000	6325.50	25.75	
.016751	50.	50.	50.	20	8	0	.00	127.22	152.98	

\*SECND 200.000

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL  
3693 PROBABLE MINIMUM SPECIFIC ENERGY  
3720 CRITICAL DEPTH ASSUMED

200.00	8.79	6333.29	6333.29	.00	6336.52	3.23	1.03	.39	6332.50	
8620.	5.	8570.	45.	2.	592.	9.	12.	3.	6330.00	
.02	2.23	14.46	5.18	.030	.030	.030	.000	6324.50	17.98	
.007013	100.	100.	100.	20	14	0	.00	99.29	117.27	

\*SECND 1.000

3280 CROSS SECTION 1.00 EXTENDED .17 FEET

3685 20 TRIALS ATTEMPTED WSEL,CWSEL  
3710 WSEL ASSUMED BASED ON MIN DIFF

1.00	9.67	6332.17	6332.71	.00	6335.20	3.03	1.26	.18	6330.00	
8620.	364.	8249.	7.	92.	579.	2.	15.	3.	6330.00	
.02	3.95	14.24	3.13	.030	.030	.030	.000	6322.50	.00	
.005594	200.	200.	200.	20	14	0	.00	177.17	177.17	

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T1 POWERS BLVD CROSSING  
 T2 SUPERCRITICAL WITH BLOCKAGE Q=4000 CFS  
 T3 SAND CREEK

J1	ICHECK	IND	NINV	IEIR	STRT	METRIC	HVINS	Q	#SEL	FR
	0.	3.	0.	1.	.000000	.00	.0	0.	6330.000	.000

J2	NPROF	IPLT	PRFVS	XSECV	XSECH	FN	ALLDC	IDW	CHNIN	ITRACE
	15.000	.000	-1.000	.000	.000	.000	.000	.000	.000	.000

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SEENO	DEPTH	DWSEL	CRINS	WSELK	EG	HV	HL	OLSS	BANK ELEV
Q	GLS	DCH	DRJB	ALOB	ACH	AROB	VCL	TWA	LEFT/RIGHT
TIME	VLOS	VCH	VRCB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	X:DBL	XLCH	XLDBR	ITRIAL	IDC	ICONT	CORAR	TDFWID	ENDST

\*PROF 2

CHV= .100 DEHV= .300  
 \*SEENO 1450.000

3720 CRITICAL DEPTH ASSUMED

1450.00	3.62	6352.02	6352.02	6330.00	6353.78	1.76	.00	.00	6355.20
4000.	0.	4000.	0.	0.	376.	0.	0.	0.	6355.20
.00	.00	10.64	.00	.020	.020	.020	.000	6348.40	23.27
.004005	0.	0.	0.	0	14	0	.00	107.46	130.73

\*SEENO 1400.000

3301 HV CHANGED MORE THAN HVINS

1400.00	2.74	6350.54	6351.42	.00	6353.65	3.10	.00	.13	6354.60
4000.	0.	4000.	0.	0.	283.	0.	0.	0.	6354.60
.00	.00	14.14	.00	.020	.020	.020	.000	6347.80	24.17
.010011	0.	0.	0.	5	5	0	.00	105.66	129.83

\*SEENO 1379.000

3301 HV CHANGED MORE THAN HVINS

1379.00	3.06	6350.52	6351.12	.00	6353.05	2.48	.41	.19	6354.30
4000.	0.	4000.	0.	0.	316.	0.	0.	0.	6354.30
.00	.00	12.65	.00	.020	.020	.020	.000	6347.50	23.84
.006988	50.	50.	50.	8	11	0	.00	106.31	130.16

\*SEENO 1372.000

3301 HV CHANGED MORE THAN HVINS

1372.00	1.60	6342.60	6344.63	.00	6352.03	9.43	.33	.69	6347.80
4000.	0.	4000.	0.	0.	162.	0.	0.	0.	6347.80
.00	.00	24.64	.00	.020	.020	.020	.000	6341.00	25.36
.051185	21.	21.	21.	13	8	0	.00	103.29	128.64

\*SEENO 1341.000

1341.00	1.60	6342.20	6344.22	.00	6351.59	9.39	.43	.01	6347.40
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4000.	0.	4000.	0.	0.	0.	0.	0.	0.	0.	0.
.00	.00	24.59	.00	.020	.020	.020	.000	6340.60	25.35	
.060812	7.	7.	7.	6	17	0	.00	103.29	128.65	

0  
1

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SECD	DEPTH	CWSEL	CRINS	WSELK	EG	HV	HL	GLSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTA	ELNIN	SSTA
SLOPE	XLOB	XLCH	XLOR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

\*SECNO 1337.000

3301 HV CHANGED MORE THAN HVINS

1337.00	2.57	6345.57	6346.62	.00	6349.13	3.56	.71	1.75	6349.80
4000.	0.	4000.	0.	0.	264.	0.	1.	0.	6349.80
.00	.00	15.13	.00	.020	.020	.020	.000	6343.00	24.35
.012437	36.	36.	36.	11	17	0	.00	105.30	129.65

0

\*SECNO 1300.000

3301 HV CHANGED MORE THAN HVINS

1300.00	2.41	6344.91	6346.12	.00	6346.99	4.09	.08	.05	6349.30
4000.	0.	4000.	0.	0.	247.	0.	1.	0.	6349.30
.00	.00	16.22	.00	.020	.020	.020	.000	6342.50	24.52
.015629	6.	6.	6.	15	11	0	.00	104.95	129.48

0

\*SECNO 1200.000

3301 HV CHANGED MORE THAN HVINS

1200.00	2.21	6343.41	6344.83	.00	6348.26	4.84	.66	.08	6348.00
4000.	0.	4000.	0.	0.	227.	0.	1.	0.	6348.00
.00	.00	17.63	.00	.020	.020	.020	.000	6341.20	24.72
.020308	37.	37.	37.	12	11	0	.00	104.56	129.26

0

\*SECNO 1100.000

3301 HV CHANGED MORE THAN HVINS

1100.00	2.47	6342.37	6343.52	.00	6346.26	3.89	1.71	.29	6346.70
4000.	0.	4000.	0.	0.	253.	0.	1.	1.	6346.70
.00	.00	15.82	.00	.020	.020	.020	.000	6339.90	24.46
.014427	106.	106.	106.	6	14	0	.00	105.08	129.54

0

\*SECNO 1000.000

1000.00	2.49	6340.99	6342.14	.00	6344.86	3.86	1.40	.01	6338.50
4000.	25.	3943.	33.	3.	249.	4.	2.	1.	6338.50
.01	7.93	15.86	8.47	.020	.020	.020	.000	6338.50	5.51
.013523	100.	100.	100.	7	11	0	.00	105.59	111.11

0

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SECD	DEPTH	CWSEL	CRINS	WSELK	EG	HV	HL	GLSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTA	ELNIN	SSTA
SLOPE	XLOB	XLCH	XLOR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3301 HV CHANGED MORE THAN HVINS

993.00	1.74	6334.24	6336.39	.00	6344.11	9.87	.15	.60	6332.50
4000.	19.	3962.	19.	2.	157.	2.	2.	1.	6332.50
.01	12.65	25.30	12.65	.020	.020	.020	.000	6332.50	12.26
.055420	6.	6.	6.	13	14	0	.00	93.48	105.74

\*SECD 952.000

3301 HV CHANGED MORE THAN HVINS

952.00	1.99	6333.79	6335.74	.00	6341.62	7.83	1.88	.61	6331.80
4000.	23.	3954.	23.	2.	175.	2.	2.	1.	6331.80
.01	11.35	22.55	11.35	.020	.020	.020	.000	6331.80	12.97
.036758	42.	42.	42.	5	17	0	.00	92.07	105.03

\*SECD 950.000

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL, CWSEL

3710 WSEL ASSUMED BASED ON MIN DIFF

950.00	2.60	6336.40	6337.64	.00	6340.58	4.18	.04	1.15	6333.80
4000.	29.	3943.	29.	3.	239.	3.	2.	1.	6333.80
.01	8.31	16.50	8.31	.020	.020	.020	.000	6333.80	10.34
.013805	2.	2.	2.	20	14	0	.00	97.32	107.66

\*SECD 850.000

3301 HV CHANGED MORE THAN HVINS

850.00	3.28	6335.68	6336.79	.00	6339.30	3.43	1.05	.23	6332.60
4000.	49.	3959.	1.	5.	266.	0.	3.	1.	6332.60
.01	7.45	14.91	1.66	.020	.020	.020	.000	6332.60	9.72
.038260	67.	100.	117.	5	14	0	.00	84.52	94.24

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SECD	DEPTH	CHSEL	CRINS	WSELK	EG	HV	HL	GLSS	BANK	ELEV
Q	GL03	CH	JR02	AL03	ACH	AR03	VOL	TWA	LEFT	RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	MTN	ELMIN	BSTA	
SLOPE	XLOB	XLCH	XL03R	ITRIAL	IDC	ICDNT	CORAR	TOPWID	ENDST	

CCNV= .300 CEHV= .500

\*SECD 797.000

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL, CWSEL

3693 PROBABLE MINIMUM SPECIFIC ENERGY

3720 CRITICAL DEPTH ASSURED

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELREA= 6343.90 ELREA= 6343.90

797.00	5.33	6337.23	6337.23	.00	6339.91	2.58	.29	.70	6343.90
4000.	0.	4000.	0.	0.	304.	0.	3.	1.	6343.90
.01	.00	13.15	.90	.013	.013	.013	.000	6331.90	100.01
.003866	18.	53.	98.	20	14	0	.00	87.24	177.00

\*SECNO 585.000

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

3370 NORMAL BRIDGE,MRD= 5 MIN ELTRD= 6345.00 MAX ELLE= 6341.10

3495 OVERBANK AREA ASSUMED NEG-EFFECTIVE,ELLE= 6341.10 ELREA= 6341.10

585.00	3.91	6333.01	6334.41	.00	6338.02	5.01	1.19	.70	6341.10
4000.	0.	4000.	0.	0.	223.	0.	4.	2.	6341.10
.01	.00	17.97	.00	.013	.013	.013	.000	6329.10	100.01
.008926	212.	212.	212.	4	9	0	.00	57.16	177.00

\*SECNO 577.000

3301 HV CHANGED MORE THAN HVINS

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SECNO	DEPTH	CWSEL	CRINS	WSELK	EG	HV	HL	DLOSS	BANK ELEV
Q	DLCP	OCH	CRDB	ALDB	ACH	ARDB	VDL	TWR	LEFT/RIGHT
TIME	VLOS	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	IDCNT	CDRAR	TOPWID	ENDST

3685 20 TRIALS ATTEMPTED WSEL,CWSEL

3710 WSEL ASSUMED BASED ON MIN DIFF

577.00	4.14	6331.14	6331.18	.00	6333.20	2.07	.10	2.69	6327.00
4000.	75.	3851.	75.	9.	331.	9.	5.	2.	6327.00
.01	8.72	11.63	8.72	.020	.030	.020	.000	6327.00	7.96
.008292	12.	12.	12.	20	8	0	.00	82.28	94.14

\*SECNO 485.000

3301 HV CHANGED MORE THAN HVINS

485.00	3.68	6329.48	6329.99	.00	6332.11	2.63	.92	.17	6325.80
4000.	59.	3852.	59.	7.	294.	7.	5.	2.	6325.80
.02	9.92	13.12	9.92	.020	.030	.020	.000	6325.80	28.23
.012343	52.	92.	132.	6	5	0	.00	87.55	115.77

\*SECNO 483.000

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL

3693 PROBABLE MINIMUM SPECIFIC ENERGY

3720 CRITICAL DEPTH ASSUMED

483.00	4.05	6331.85	6331.85	.00	6333.81	1.96	.02	.25	6327.80
4000.	73.	3855.	73.	8.	340.	8.	5.	2.	6327.80
.02	8.58	11.33	8.58	.020	.030	.020	.000	6327.80	25.82
.003093	2.	2.	2.	20	8	0	.00	92.35	118.18

\*SECNO 400.000

3301 HV CHANGED MORE THAN HVINS

400.00	0.83	6329.48	6329.99	.00	6332.11	2.63	.92	.17	6325.80
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4000.	29.	3943.	29.	3.	288.	3.	6.	2.	6326.80
.02	9.19	13.67	9.19	.020	.030	.020	.000	6326.80	38.84
.019537	83.	83.	83.	9	11	0	.00	104.33	143.16

0

\*SECNO 350.000

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SECNO	DEPTH	DNSEL	CRWS	WSEL	EG	HV	HL	OLGSS	BANK ELEV
Q	QLCB	QCH	QRCS	QCLC	ACH	AROB	VOL	TWR	LEFT/RIGHT
TIRE	VLQB	VCH	VRCS	XNL	XNCH	XNR	WTK	ELMIN	SSTA
SLOPE	XLQBL	XLCH	XLQSR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL  
 3693 PROBABLE MINIMUM SPECIFIC ENERGY  
 3720 CRITICAL DEPTH ASSUMED

350.00	3.59	6329.89	6329.89	.00	6331.62	1.74	.60	.47	6326.30
4000.	78.	3944.	78.	12.	359.	12.	6.	2.	6326.30
.02	6.24	10.71	6.24	.030	.030	.030	.000	6326.30	44.04
.009506	50.	50.	50.	20	11	0	.00	113.93	157.96

0

\*SECNO 300.000

3301 HV CHANGED MORE THAN HVINS

300.00	2.99	6328.49	6329.04	.00	6330.87	2.39	.56	.19	6339.00
4000.	0.	3893.	197.	0.	312.	14.	7.	2.	6325.50
.02	.00	12.47	2.83	.030	.030	.030	.000	6325.50	39.36
.015617	50.	50.	50.	7	5	0	.00	117.76	148.12

0

\*SECNO 200.000

3685 20 TRIALS ATTEMPTED WSEL,CWSEL  
 3693 PROBABLE MINIMUM SPECIFIC ENERGY  
 3720 CRITICAL DEPTH ASSUMED

200.00	5.67	6330.17	6330.17	.00	6332.41	2.24	1.12	.69	6332.50
4000.	0.	4000.	0.	0.	333.	0.	7.	2.	6330.00
.02	.00	12.01	.05	.030	.030	.030	.000	6324.50	37.33
.008424	100.	100.	100.	20	14	0	.00	74.93	112.27

0

\*SECNO 1.000

3685 20 TRIALS ATTEMPTED WSEL,CWSEL  
 3693 PROBABLE MINIMUM SPECIFIC ENERGY  
 3720 CRITICAL DEPTH ASSUMED

1.00	6.20	6328.70	6328.70	.00	6331.08	2.35	1.67	1.21	6330.00
4000.	0.	4000.	0.	0.	323.	0.	9.	3.	6330.00
.03	.00	12.39	.00	.030	.030	.030	.000	6322.50	102.60
.008297	200.	200.	200.	20	8	0	.00	68.69	171.29

0

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THIS RUN EXECUTED 03/17/87 08:34:00

\*\*\*\*\*  
 REC2 RELEASE DATED NOV 76 UPDATED MAY 1984  
 ERROR CORR - 01,02,03,04,05,06.  
 MODIFICATION - 50,51,52,53,54,55,56  
 IPN-PC-YT VERSTOV 1 1

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

SAND CREEK WITH EXTENDED

SUMMARY PRINTOUT

SECNO	Q	DEPTH	VCH	VLOB	VRDB	CWSEL	EG	ELMIN	XLCH
1450.000	8620.00	5.00	16.40	.00	.00	6353.40	6357.57	6348.40	.00
* 1450.000	4000.00	3.62	10.64	.00	.00	6352.02	6353.7E	6348.40	.00
1400.000	8620.00	4.52	18.22	.00	.00	6352.32	6357.48	6347.80	.00
1400.000	4000.00	2.74	14.14	.00	.00	6350.54	6353.65	6347.80	.00
1379.000	8620.00	4.73	17.39	.00	.00	6352.23	6356.92	6347.50	50.00
1379.000	4000.00	3.06	12.65	.00	.00	6350.56	6353.05	6347.50	50.00
1372.000	8620.00	3.02	27.67	.00	.00	6344.02	6355.91	6341.00	21.00
1372.000	4000.00	1.60	24.64	.00	.00	6342.60	6352.03	6341.00	21.00
1341.000	8620.00	3.00	27.86	.00	.00	6343.60	6355.65	6340.60	7.00
1341.000	4000.00	1.60	24.59	.00	.00	6342.20	6351.59	6340.60	7.00
1337.000	8620.00	4.15	19.94	.00	.00	6347.15	6353.32	6343.00	30.00
1337.000	4000.00	2.57	15.13	.00	.00	6345.57	6349.13	6343.00	30.00
1300.000	8620.00	3.98	20.79	.00	.00	6346.48	6353.19	6342.50	6.00
1300.000	4000.00	2.41	16.22	.00	.00	6344.91	6348.99	6342.50	6.00
1200.000	8620.00	3.76	22.11	.00	.00	6344.96	6352.55	6341.20	37.00
1200.000	4000.00	2.21	17.66	.00	.00	6343.41	6348.26	6341.20	37.00
1100.000	8620.00	3.90	21.28	.00	.00	6343.80	6350.83	6339.90	100.00
1100.000	4000.00	2.47	15.82	.00	.00	6342.37	6346.26	6339.90	100.00
1000.000	8620.00	3.94	21.37	10.68	11.42	6342.44	6349.42	6338.50	100.00
1000.000	4000.00	2.49	15.86	7.93	8.47	6340.99	6344.86	6338.50	100.00
993.000	8620.00	3.23	29.09	14.54	14.54	6335.73	6348.70	6332.50	6.00
993.000	4000.00	1.74	25.30	12.65	12.65	6334.24	6344.11	6332.50	6.00

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SECNO	Q	DEPTH	VCH	VLOB	VRDB	CWSEL	EG	ELMIN	XLCH
952.000	8620.00	3.45	27.80	14.03	14.03	6335.25	6347.14	6331.80	43.00
952.000	4000.00	1.99	22.55	11.35	11.35	6333.79	6341.62	6331.80	42.00
950.000	8620.00	3.94	23.26	11.73	11.73	6337.74	6346.02	6333.80	2.00
* 950.000	4000.00	2.69	16.50	8.31	8.31	6336.40	6340.58	6333.80	2.00
850.000	8620.00	4.96	21.04	10.52	2.34	6337.58	6344.37	6332.60	100.00
850.000	4000.00	3.28	14.91	7.45	1.66	6335.88	6339.30	6332.60	100.00
* 797.000	8620.00	8.89	16.96	.00	.00	6340.79	6345.25	6331.90	53.00
* 797.000	4000.00	5.33	13.15	.00	.00	6337.23	6339.91	6331.90	53.00
595.000	8620.00	7.13	21.15	.00	.00	6336.23	6343.18	6329.10	212.00
595.000	4000.00	3.91	17.97	.00	.00	6333.01	6338.02	6329.10	212.00

*	577.000	8620.00	6.85	14.78	11.09	11.09	6333.85	6337.15	6327.00	12.00
*	577.000	4000.00	4.14	11.63	8.72	8.72	6331.14	6333.20	6327.00	12.00
	485.000	8620.00	6.05	16.69	12.62	12.62	6331.89	6336.12	6325.80	92.00
	485.000	4000.00	3.58	13.12	9.92	9.92	6329.48	6332.11	6325.80	92.00
*	483.000	8620.00	6.55	14.45	10.95	10.95	6334.49	6337.65	6327.80	2.00
*	483.000	4000.00	4.05	11.33	8.58	8.58	6331.85	6333.81	6327.80	2.00
	400.000	8620.00	4.77	17.65	11.86	11.86	6331.57	6336.34	6326.50	83.00
	400.000	4000.00	2.36	13.67	9.19	9.19	6329.69	6332.56	6326.80	83.00
*	350.000	8620.00	5.16	15.71	9.15	9.15	6331.48	6335.18	6326.30	50.00
*	350.000	4000.00	3.54	10.71	6.24	6.24	6329.89	6331.62	6326.30	50.00
*	300.000	8620.00	4.55	16.92	.00	10.77	6330.09	6334.43	6325.50	50.00
	300.000	4000.00	2.99	12.47	.00	7.83	6328.49	6330.87	6325.50	50.00
*	200.000	8620.00	3.79	14.46	2.23	5.16	6333.29	6336.52	6324.50	100.00
*	200.000	4000.00	5.67	12.01	.00	.05	6330.17	6332.41	6324.50	100.00
*	1.000	8620.00	9.67	14.24	3.95	3.13	6332.17	6335.20	6322.50	200.00
*	1.000	4000.00	6.20	12.39	.00	.00	6328.70	6331.08	6322.50	200.00

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SUMMARY OF ERRORS AND SPECIAL NOTES

CAUTION SECNO= 1480.000 PROFILE= 2 CRITICAL DEPTH ASSUMED

CAUTION SECNO= 930.000 PROFILE= 2 WSEL ASSUMED BASED ON MIN DIFF

CAUTION SECNO= 950.000 PROFILE= 2 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 797.000 PROFILE= 1 CRITICAL DEPTH ASSUMED

CAUTION SECNO= 757.000 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY

CAUTION SECNO= 797.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 757.000 PROFILE= 2 CRITICAL DEPTH ASSUMED

CAUTION SECNO= 797.000 PROFILE= 2 PROBABLE MINIMUM SPECIFIC ENERGY

CAUTION SECNO= 797.000 PROFILE= 2 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 577.000 PROFILE= 1 WSEL ASSUMED BASED ON MIN DIFF

CAUTION SECNO= 577.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 577.000 PROFILE= 2 WSEL ASSUMED BASED ON MIN DIFF

CAUTION SECNO= 577.000 PROFILE= 2 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 483.000 PROFILE= 1 CRITICAL DEPTH ASSUMED

CAUTION SECNO= 483.000 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY

CAUTION SECNO= 483.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 483.000 PROFILE= 2 CRITICAL DEPTH ASSUMED

CAUTION SECNO= 483.000 PROFILE= 2 PROBABLE MINIMUM SPECIFIC ENERGY

CAUTION SECNO= 483.000 PROFILE= 2 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 350.000 PROFILE= 1 WSEL ASSUMED BASED ON MIN DIFF

CAUTION SECNO= 350.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 350.000 PROFILE= 2 CRITICAL DEPTH ASSUMED

CAUTION SECNO= 350.000 PROFILE= 2 PROBABLE MINIMUM SPECIFIC ENERGY

CAUTION SECNO= 350.000 PROFILE= 2 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 300.000 PROFILE= 1 WSEL ASSUMED BASED ON MIN DIFF

CAUTION SECNO= 300.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 200.000 PROFILE= 1 CRITICAL DEPTH ASSUMED  
CAUTION SECNO= 200.000 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY  
CAUTION SECNO= 200.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL  
CAUTION SECNO= 200.000 PROFILE= 2 CRITICAL DEPTH ASSUMED  
CAUTION SECNO= 200.000 PROFILE= 2 PROBABLE MINIMUM SPECIFIC ENERGY  
CAUTION SECNO= 200.000 PROFILE= 2 20 TRIALS ATTEMPTED TO BALANCE WSEL  
  
CAUTION SECNO= 1.000 PROFILE= 1 WSEL ASSUMED BASED ON MIN DIFF  
CAUTION SECNO= 1.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL  
CAUTION SECNO= 1.000 PROFILE= 2 CRITICAL DEPTH ASSUMED  
CAUTION SECNO= 1.000 PROFILE= 2 PROBABLE MINIMUM SPECIFIC ENERGY  
CAUTION SECNO= 1.000 PROFILE= 2 20 TRIALS ATTEMPTED TO BALANCE WSEL

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03/17/87 08:34:14

PAGE 1

THIS RUN EXECUTED 03/17/87 08:34:14

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HEC2 RELEASE DATED NOV 76 UPDATED MAY 1984  
ERROR CORR - 01,02,03,04,05,06  
MODIFICATION - 50,51,52,53,54,55,56  
IBM-PC-XT VERSION 1.1  
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RUN #1  
 SUBCRITICAL  
 Q = 8,620 CFS & 4,000 CFS  
 TRANSITION TO NATURAL BANKS

THIS RUN EXECUTED 02/13/87 14:58:48

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HEC2 RELEASE DATED NOV 76 UPDATED MAY 1984
ERROR CORR - 01,02,03,04,05,06
MODIFICATION - 50,51,52,53,54,55,56
IBM-PC-XT VERSION 1.1
*****
  
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T1 POWERS BLVD CROSSING 100-YEAR FUTURE PEAK FLOW
T2 SUBCRITICAL FLOW WITH BLOCKAGE
T3 SAND CREEK
  
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J1	ICHECK	IKO	NINX	IDIR	STRT	METRIC	HVINS	Q	WSEL	FO
	0.	2.	0.	0.	.000000	.00	.0	0.	6331.000	.000

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLBC	IDW	CHRM	ITRACE
	1.000	.000	-1.000	.000	.000	.000	.000	.000	.000	.000

J3	VARIABLE CODES FOR SUMMARY PRINTOUT									
	36.000	43.000	8.000	26.000	55.000	52.000	1.000	3.000	42.900	35.000

HC	.030	.030	.030	.100	.300	.000	.000	.000	.000	.000
BT	2.000	8620.000	4000.000	.000	.000	.000	.000	.000	.000	.000
AI	1.000	6.000	100.000	175.000	.000	.000	.000	.000	.000	.000
BR	6332.000	.000	6331.000	75.000	6330.000	100.000	6323.000	114.000	6322.500	140.000
GR	6323.000	155.000	6330.000	175.000	6334.000	179.000	.000	.000	.000	.000
X1	200.000	11.000	24.000	112.000	200.000	200.000	200.000	.000	.000	.000
BR	6337.000	.000	6335.000	5.000	6332.500	24.000	6329.000	44.000	6325.000	49.000
GR	6324.500	62.000	6325.000	101.000	6330.000	112.000	6335.000	120.000	6334.000	188.000
GR	6337.000	199.000	.000	.000	.000	.000	.000	.000	.000	.000
X1	300.000	4.000	.000	139.000	100.000	100.000	100.000	.000	.000	.000
GR	6339.000	.000	6325.500	39.000	6325.500	139.000	6334.000	171.000	.000	.000
HC	.020	.020	.030	.000	.000	.000	.000	.000	.000	.000
X1	350.000	8.000	51.000	151.000	50.000	50.000	50.000	.000	.000	.000
BR	6340.000	.000	6333.000	28.000	6333.000	38.000	6324.300	51.000	6326.300	151.000
GR	6333.000	164.000	6333.000	174.000	6336.000	186.000	.000	.000	.000	.000
X1	400.000	8.000	41.000	141.000	50.000	50.000	50.000	.000	.000	.000
BR	6241.000	.000	6334.800	25.000	6334.800	35.000	6324.800	41.000	6326.800	141.000
GR	6334.800	147.000	6334.800	157.000	6334.000	162.000	.000	.000	.000	.000
X1	483.000	8.000	30.000	114.000	83.000	83.000	83.000	.000	.000	.000
GR	6340.000	.000	6337.500	10.000	6337.500	20.000	6327.800	30.000	6327.800	114.000

GR	6324.000	62.000	6323.000	101.000	6330.000	112.000	6335.000	120.000	6336.000	188.000
GR	6337.000	188.000	.000	.000	.000	.000	.000	.000	.000	.000
X1	300.000	4.000	.000	139.000	100.000	100.000	100.000	.000	.000	.000
GR	6339.000	.000	6325.500	39.000	6325.500	139.000	6336.000	171.000	.000	.000
NC	.020	.020	.030	.000	.000	.000	.000	.000	.000	.000
X1	350.000	5.000	51.000	151.000	50.000	50.000	50.000	.000	.000	.000
GR	6340.000	.000	6333.000	26.000	6333.000	38.000	6326.300	51.000	6325.300	151.000
GR	6333.000	164.000	6333.000	174.000	6336.000	166.000	.000	.000	.000	.000
X1	400.000	8.000	41.000	141.000	50.000	50.000	50.000	.000	.000	.000
GR	6341.000	.000	6334.800	25.000	6334.800	35.000	6326.800	41.000	6326.800	141.000
GR	6334.800	117.000	6334.800	157.000	6336.000	162.000	.000	.000	.000	.000
X1	483.000	8.000	30.000	114.000	83.000	83.000	83.000	.000	.000	.000
GR	6340.000	.000	6337.500	10.000	6337.500	20.000	6327.800	30.000	6327.800	114.000
GR	6337.500	124.000	6337.500	134.000	6340.000	144.000	.000	.000	.000	.000

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X1	435.000	9.000	32.000	112.000	2.000	2.000	2.000	.000	.000	.000
GR	6340.000	.000	6337.500	10.000	6337.500	20.000	6325.800	32.000	6325.800	112.000
GR	6337.500	124.000	6337.500	134.000	6340.000	144.000	.000	.000	.000	.000
X1	577.000	4.000	12.000	92.000	52.000	132.000	92.000	.000	.000	.000
GR	6339.000	.000	6327.000	12.000	6327.000	92.000	6339.000	104.000	.000	.000
NC	.013	.013	.013	.300	.500	.000	.000	.000	.000	.000
X1	585.000	24.000	102.000	177.010	12.000	12.000	12.000	.000	.000	.000
X3	10.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
BT	5.000	100.000	6345.300	6341.100	127.450	6346.300	6341.100	140.450	6345.500	6341.100
BT	153.450	6345.000	6341.100	177.010	6345.000	6341.100	.000	.000	.000	.000
GR	6341.100	110.000	6329.100	100.010	6329.100	110.500	6341.100	110.600	6341.100	114.400
GR	6329.100	114.450	6329.100	123.500	6341.100	123.550	6341.100	127.450	6329.100	127.500
GR	6329.100	136.500	6341.100	136.550	6341.100	140.450	6329.100	140.500	6329.100	149.500
GR	6341.100	149.550	6341.100	153.450	6329.100	153.500	6329.100	162.500	6341.100	162.600
GR	6341.100	166.500	6329.100	166.600	6329.100	177.000	6341.100	177.010	.000	.000
X1	797.000	.000	.000	.000	212.000	212.000	212.000	.000	2.800	.000
BT	5.000	100.000	6344.500	6343.900	127.450	6345.200	6343.900	140.450	6345.000	6343.900
BT	153.450	6345.500	6343.900	177.010	6345.400	6343.900	.000	.000	.000	.000
NC	.020	.020	.030	.100	.300	.000	.000	.000	.000	.000
X1	850.000	4.000	13.000	94.000	18.000	88.000	53.000	.000	.000	.000
GR	6345.600	.000	6332.600	13.000	6332.600	94.000	6346.000	95.000	.000	.000
X1	950.000	4.000	13.000	105.000	87.000	117.000	100.000	.000	.000	.000
GR	6346.500	.000	6333.800	13.000	6333.800	105.000	6346.500	118.000	.000	.000
X1	952.000	4.000	15.000	103.000	2.000	2.000	2.000	.000	.000	.000
GR	6346.500	.000	6331.800	15.000	6331.800	103.000	6346.500	118.000	.000	.000
X1	993.000	4.000	14.000	104.000	42.000	42.000	42.000	.000	.000	.000
GR	6346.500	.000	6332.500	14.000	6332.500	104.000	6346.500	118.000	.000	.000
X1	1000.000	4.000	8.000	108.000	6.000	6.000	6.000	.000	.000	.000
GR	6346.500	.000	6338.500	9.000	6338.500	108.000	6346.500	118.000	.000	.000
X1	1100.000	4.000	36.000	145.000	100.000	100.000	100.000	.000	.000	.000
GR	6347.000	.000	6341.000	30.000	6341.000	145.000	6347.000	195.000	.000	.000
X1	1200.000	9.000	64.000	179.000	100.000	100.000	100.000	.000	.000	.000

BR	6355.000	.000	6355.000	19.000	6345.000	50.000	6344.000	64.000	6344.000	132.000
BR	6343.500	140.000	6344.000	149.000	6344.000	179.000	6350.000	200.000	.000	.000
EJ	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

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SECD0	DEPTH	CWSEL	CRWS	WSELK	EG	HV	HL	QLOSS	BANK ELEV
Q	CL0B	QCH	CR0B	AL0B	ACH	AR0B	VOL	TWA	LEFT/RIGHT
TIME	VLSB	VCH	VR0B	XNL	XNCH	XNR	NTN	ELMIN	SSTA
SLOPE	XL0BL	XLCH	XL0BR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

\*PROF 1

CCHV= .100 CEHV= .300

\*SECD0 1.000

3280 CROSS SECTION 1.00 EXTENDED .73 FEET

3720 CRITICAL DEPTH ASSUMED

1.00	10.23	6332.73	6332.73	6331.00	6335.11	2.38	.00	.00	6330.00
8820.	644.	7969.	12.	148.	621.	4.	0.	0.	6330.00
.00	4.35	12.82	3.14	.030	.030	.030	.000	6322.50	.00
.004205	6.	9.	0.	0	10	0	.00	177.73	177.73

\*SECD0 200.000

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY

3720 CRITICAL DEPTH ASSUMED

200.00	9.80	6333.39	6333.30	.00	6336.52	3.23	1.07	.25	6332.50
8820.	5.	8570.	45.	2.	593.	9.	3.	1.	6330.00
.00	2.33	14.44	5.18	.030	.030	.030	.000	6324.50	17.95
.007004	200.	200.	200.	3	12	0	.00	97.33	117.27

\*SECD0 300.000

3280 CROSS SECTION 300.00 EXTENDED .39 FEET

3301 HV CHANGED MORE THAN HVINS

300.00	10.89	6336.39	.00	.00	6336.97	.57	.18	.27	6339.00
8820.	0.	7856.	764.	0.	1260.	130.	6.	1.	6325.50
.01	.00	6.22	4.24	.030	.030	.030	.000	6325.50	7.54
.000792	100.	100.	100.	3	0	0	.00	163.45	171.00

\*SECD0 350.000

3280 CROSS SECTION 350.00 EXTENDED .35 FEET

350.00	10.05	6336.35	.00	.00	6337.05	.70	.04	.04	6326.30
8820.	885.	8667.	888.	143.	1005.	143.	7.	1.	6326.30
.01	6.05	4.85	5.09	.020	.030	.020	.000	6326.30	14.61
.000883	50.	50.	50.	2	0	0	.00	171.39	188.00

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SECD0	DEPTH	CWSEL	CRWS	WSELK	EG	HV	HL	QLOSS	BANK ELEV
Q	CL0B	QCH	CR0B	AL0B	ACH	AR0B	VOL	TWA	LEFT/RIGHT
TIME	VLSB	VCH	VR0B	XNL	XNCH	XNR	NTN	ELMIN	SSTA
SLOPE	XL0BL	XLCH	XL0BR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

400.00	9.30	6336.10	.00	.00	6337.24	1.14	.06	.13	6326.80
6620.	257.	8166.	257.	48.	930.	48.	8.	1.	6326.80
.01	5.32	9.72	5.32	.020	.030	.020	.000	6326.80	19.76
.001582	50.	50.	50.	2	0	0	.00	142.24	162.00

\*SECNO 463.000

3301 HV CHANGED MORE THAN HVINS

463.00	7.83	6335.43	.00	.00	6337.81	2.33	.20	.37	6327.80
8620.	286.	8045.	286.	30.	641.	30.	10.	2.	6327.80
.01	7.50	12.55	7.50	.020	.030	.020	.000	6327.80	22.13
.004264	33.	83.	33.	3	0	0	.00	99.75	121.87

\*SECNO 495.000

3301 HV CHANGED MORE THAN HVINS

495.00	10.96	6336.76	.00	.00	6337.93	1.18	.00	.12	6325.80
8620.	414.	7752.	414.	62.	876.	62.	10.	2.	6325.80
.01	6.73	8.89	6.73	.020	.030	.020	.000	6325.80	20.77
.001325	2.	2.	2.	3	0	0	.00	102.47	123.23

\*SECNO 577.000

577.00	9.43	6336.63	.00	.00	6338.20	1.57	.15	.12	6327.00
8620.	357.	7966.	357.	46.	771.	46.	12.	2.	6327.00
.02	7.65	10.26	7.65	.020	.030	.020	.000	6327.00	2.37
.002092	52.	92.	132.	2	0	0	.00	99.27	101.63

CHV= .300 CEHV= .500

\*SECNO 585.000

3255 DIVIDED FLOW

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SECNO	DEPTH	CWSEL	CRINS	WSELK	EG	HV	HL	CLOSS	BANK	ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT	
TIME	VLOB	VCH	VROB	XL	XNCH	XAR	WTN	ELMIN	SSTA	
SLOPE	XLOB	XLCH	ALGER	YTRIAL	IDC	ICONT	CORAR	TOPWID	ENDST	

3301 HV CHANGED MORE THAN HVINS

3370 NORMAL BRIDGE, NRD= 5 MIN ELTRD= 6345.00 MAX ELLE= 6341.10

3695 20 TRIALS ATTEMPTED WSEL, CWSEL

3693 PROBABLE MINIMUM SPECIFIC ENERGY

3720 CRITICAL DEPTH ASSUMED

3495 OVBANK AREA ASSUMED NON-EFFECTIVE, ELREA= 6341.10 ELREA= 6341.10

585.00	6.88	6337.93	6337.98	.00	6342.45	4.47	.04	1.45	6341.10
8620.	0.	8620.	0.	0.	508.	0.	12.	2.	6341.10
.02	.00	16.97	.00	.013	.013	.013	.000	6329.10	100.00
.004860	12.	12.	12.	20	16	0	.00	57.44	177.01

\*SECNO 797.000

3370 NORMAL BRIDGE,HRD= 5 MIN ELTRD= 6344.50 MAX ELLC= 6343.90

3585 20 TRIALS ATTEMPTED WSEL,CWSEL  
3693 PROBABLE MINIMUM SPECIFIC ENERGY  
3720 CRITICAL DEPTH ASSUMED

797.00	8.88	6340.78	6340.78	.00	6345.25	4.47	1.03	.00	6343.90
8620.	0.	8620.	0.	0.	508.	0.	13.	2.	6343.90
.02	.00	16.97	.00	.013	.013	.013	.000	6331.90	100.00
.004860	212.	212.	212.	20	16	0	.00	57.44	177.91

0  
CCHV= .100 CEHV= .300  
\*SECNO 850.000

3301 HV CHANGED MORE THAN HVINS

850.00	12.03	6344.63	.00	.00	6345.70	1.06	.10	.34	6332.60
8620.	454.	8158.	8.	72.	975.	5.	14.	2.	6332.60
.02	6.28	8.37	1.40	.020	.030	.020	.000	6332.60	.97
.001936	18.	53.	56.	4	0	0	.00	93.93	94.90

0  
1  
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SECNO	DEPTH	CWSEL	CRLOS	WSELE	ES	HV	HL	OLOSS	BANK ELEV
Q	BLOS	QCH	QROB	ALOB	ACH	AKOB	VCL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	ZACH	XNR	RTN	ELMIN	SSTA
SLOPE	XLOB	XLCH	XLOBR	ITRIAL	LOC	ICONT	CORAR	TOPW.D	ENLST

\*SECNO 950.000

950.00	11.13	6344.93	.00	.00	6345.81	.69	.10	.02	6333.80
8620.	359.	7882.	359.	63.	1024.	63.	18.	2.	6333.80
.03	5.82	7.70	5.82	.020	.030	.020	.000	6333.80	1.60
.000971	97.	100.	117.	0	0	0	.00	114.79	116.40

0

\*SECNO 952.000

952.00	13.41	6345.21	.00	.00	6345.84	.63	.00	.03	6331.80
8620.	453.	7715.	453.	92.	1189.	92.	18.	2.	6331.80
.03	4.94	6.54	4.94	.020	.030	.020	.000	6331.80	1.32
.000547	2.	2.	2.	2	0	0	.00	115.36	116.68

0

\*SECNO 993.000

993.00	12.69	6345.19	.00	.00	6345.88	.69	.02	.02	6332.50
8620.	412.	7796.	412.	81.	1142.	81.	20.	3.	6332.50
.03	5.12	6.83	5.12	.020	.030	.020	.000	6332.50	1.31
.000641	42.	42.	42.	2	0	0	.00	115.38	116.69

0

\*SECNO 1000.000

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL  
3693 PROBABLE MINIMUM SPECIFIC ENERGY  
3720 CRITICAL DEPTH ASSUMED

1000.00	6.00	6344.50	6344.50	.00	6347.34	2.83	.01	.64	6338.50
8620.	184.	8189.	243.	18.	600.	23.	20.	3.	6338.50
.03	10.23	13.64	10.93	.020	.030	.020	.000	6338.50	2.00
.000950	6.	6.	6.	20	11	0	.00	115.51	115.50

0

\*SECNO 1100.000

3301 HV CHANGED MORE THAN HVINS

1100.00	5.58	6346.58	6345.70	.00	6347.98	1.40	.50	.14	6341.00
8620.	697.	7226.	697.	78.	754.	78.	21.	3.	6341.00
.03	8.94	9.58	8.94	.020	.030	.020	.000	6341.00	2.07
.003776	100.	100.	100.	15	15	0	.00	190.85	192.93

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SECD	DEPTH	CWSEL	CRWS	WSELK	EG	HV	HL	OLGSS	BANK ELEV
Q	BLDB	QCH	QRDB	ALDB	ACH	ARDB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VRDB	XL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLDBL	XLCH	XLDBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

\*SECD 1200.000

3301 HV CHANGED MORE THAN HVINS

3695 20 TRIALS ATTEMPTED WSEL,CWSEL  
 3693 PROBABLE MINIMUM SPECIFIC ENERGY  
 3720 CRITICAL DEPTH ASSUMED

1200.00	5.46	6346.96	6346.96	.00	6351.15	2.19	.49	.24	6344.00
8620.	1445.	6696.	460.	111.	575.	43.	23.	3.	6344.00
.03	13.19	11.65	10.68	.020	.030	.020	.000	6343.50	25.45
.005491	100.	100.	100.	20	5	0	.00	170.91	195.36

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 NEC2 RELEASE DATED NOV 76 UPDATED MAY 1984  
 ERROR CORR - 01,02,03,04,05,06  
 MODIFICATION - 50,51,52,53,54,55,56  
 IBM-PC-XT VERSION 1.1  
 \*\*\*\*\*

T1 POWERS BLVD CROSSING  
 T2 SUBCRITICAL WITH BLOCKAGE Q=4000 CFS  
 T3 SAND CREEK

J1	ICHECK	INR	KTRY	IDIR	STRT	METRIC	HVINS	Q	WSEL	FD
	0.	3.	0.	0.	.000000	.00	.0	0.	6330.000	.000

J2	NPROF	IPLCT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHRN	ITRACE
	15.000	.000	-1.000	.000	.000	.000	.000	.000	.000	.000

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SECD	DEPTH	CWSEL	CRWS	WSELK	EG	HV	HL	OLGSS	BANK ELEV
Q	BLDB	QCH	QRDB	ALDB	ACH	ARDB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VRDB	XL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLDBL	XLCH	XLDBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 1.000	1.00	7.50	6330.00	.00	6330.00	6331.43	1.43	.00	.00	6330.00
	4000.	0.	4000.	0.	0.	418.	0.	0.	0.	6330.00
	.00	.00	9.61	.00	.030	.030	.030	.000	6322.50	100.00
	.004625	0.	0.	0.	0	0	0	.00	75.00	175.00

0

*SECNO 200.000	200.00	8.25	6330.75	.00	.00	6332.45	1.74	.96	.09	6332.50
	4000.	0.	3999.	1.	0.	377.	0.	2.	0.	6330.00
	.01	.00	10.68	1.76	.030	.030	.030	.000	6324.50	34.02
	.005878	200.	200.	200.	2	0	0	.00	79.18	113.19

0

*SECNO 300.000										
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3301 HV CHANGED MORE THAN HVINS

	300.00	6.94	6332.44	.00	.00	6332.61	.36	.18	.14	6339.00
	4000.	0.	3765.	235.	0.	764.	73.	3.	1.	6325.50
	.01	.00	4.93	3.20	.030	.030	.030	.000	6325.50	18.94
	.000950	100.	100.	100.	3	0	0	.00	141.22	160.16

0

*SECNO 350.000	350.00	6.07	6332.37	.00	.00	6332.91	.54	.05	.05	6326.30
	4000.	187.	3627.	187.	36.	607.	36.	4.	1.	6326.30
	.01	5.22	5.97	5.22	.020	.030	.020	.000	6326.30	39.22
	.001311	50.	50.	50.	2	0	0	.00	123.57	162.78

0

*SECNO 400.000	400.00	5.50	6332.30	.00	.00	6333.06	.77	.08	.07	6326.80
	4000.	54.	3892.	54.	11.	550.	11.	5.	1.	6326.80
	.02	4.76	7.06	4.76	.020	.030	.020	.000	6326.80	36.88
	.002105	50.	50.	50.	2	0	0	.00	108.25	145.12

0

*SECNO 483.000										
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1  
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SECNO	DEPTH	QWSEL	CRINS	WSELK	EG	HV	HL	GLUSS	BANK ELEV
Q	QLOB	QCH	CRQB	ALOB	ACH	AROB	VOL	TNA	LEFT/RIGHT
TIME	VLOB	VCH	VRQB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLLBL	XLCN	XLQBR	ITRIAL	IDC	ICUNT	CDRAR	TOPWID	ENDST

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY  
3720 CRITICAL DEPTH ASSUMED

	483.00	4.05	6331.85	6331.85	.00	6333.61	1.96	.31	.36	6327.80
	4000.	73.	3635.	73.	8.	340.	8.	6.	1.	6327.80
	.02	6.58	11.32	6.58	.020	.030	.020	.000	6327.80	25.82
	.006090	83.	83.	83.	4	15	0	.00	92.35	119.18

0

*SECNO 485.000										
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3301 HV CHANGED MORE THAN HVINS

	485.00	7.59	6333.39	.00	.00	6333.96	.57	.00	.14	6325.80
	4000.	137.	3726.	137.	29.	607.	29.	6.	1.	6325.80
	.02	4.65	6.14	4.65	.020	.030	.020	.000	6325.80	24.22
	.001032	2.	2.	2.	3	0	0	.00	95.55	119.78

0

*SECNO 577.000	577.00	6.32	6333.32	.00	.00	6334.17	.84	.13	.06	6327.00
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4000. 112. 3776. 112. 20. 506. 20. 7. 1. 6327.00  
 .02 5.59 7.46 5.59 .020 .030 .020 .000 6327.00 5.67  
 .001937 52. 92. 132. 2 0 0 .00 92.66 98.33

0  
 CCHV= .300 CEHV= .500  
 \*SECND 585.000

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

3370 NORMAL BRIDGE,WRD= 5 MIN ELTRD= 6345.00 MAX ELLC= 6341.10

3685 20 TRIALS ATTEMPTED WSEL,CWSEL  
 3693 PROBABLE MINIMUM SPECIFIC ENERGY  
 3720 CRITICAL DEPTH ASSUMED

1  
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SECND	DEPTH	CWSEL	CRINS	WSELK	EG	HV	HL	GLOSS	BANK ELEV
Q	GLDB	BCH	CRDB	ALDB	ACH	ARDB	VOL	TWA	LEFT/RIGHT
TIME	VLOS	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORRR	TOPWID	ENDST

3495 OVBANK AREA ASSUMED NON-EFFECTIVE,ELLEA= 6341.10 ELREA= 6341.10

585.00	5.31	6334.41	6334.41	.00	6337.11	2.70	.03	.93	6341.10
4000.	0.	4000.	0.	0.	303.	0.	7.	1.	6341.10
.02	.00	13.19	.00	.013	.013	.013	.000	6329.10	100.01
.003894	12.	12.	12.	20	9	0	.00	57.24	177.00

0  
 \*SECND 797.000

3265 DIVIDED FLOW

3370 NORMAL BRIDGE,WRD= 5 MIN ELTRD= 6344.50 MAX ELLC= 6343.90

3685 20 TRIALS ATTEMPTED WSEL,CWSEL  
 3693 PROBABLE MINIMUM SPECIFIC ENERGY  
 3720 CRITICAL DEPTH ASSUMED

797.00	5.31	6337.21	6337.21	.00	6339.91	2.70	.83	.00	6343.90
4000.	0.	4000.	0.	0.	303.	0.	9.	2.	6343.90
.03	.00	13.19	.00	.013	.013	.013	.000	6331.90	100.01
.003894	212.	212.	212.	20	9	0	.00	57.24	177.00

0  
 CCHV= .100 CEHV= .300  
 \*SECND 850.000

3301 HV CHANGED MORE THAN HVINS

850.00	6.89	6339.49	.00	.00	6340.23	.74	.12	.20	6332.60
4000.	124.	3874.	2.	24.	558.	2.	9.	2.	6332.60
.03	5.21	6.94	1.16	.020	.030	.020	.000	6332.60	6.11
.001499	18.	53.	88.	4	0	0	.00	88.40	94.51

0  
 \*SECND 950.000

950.00	5.84	6339.64	.00	.00	6340.41	.77	.17	.01	6333.60
4000.	94.	3813.	.94.	17.	537.	17.	10.	2.	6333.80
.03	5.37	7.10	5.37	.020	.030	.020	.000	6333.80	7.02



SECNO	DEPTH	CWSEL	CRINS	WSELK	EG	HV	HL	DLOSS	BANK ELEV
D	DLGE	SEN	BRDF	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLGB	VCH	VROB	YNL	YNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLGR	XLCA	XLGER	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

\*SECNO 952.000

952.00	8.25	5340.05	.00	.00	5340.45	.40	.00	.04	6331.80
4000.	135.	3731.	125.	35.	726.	35.	10.	2.	6331.80
.03	3.59	5.14	3.88	.020	.030	.020	.000	6331.80	6.58
.000645	2.	2.	2.	2	0	0	.00	104.84	111.42

0

\*SECNO 993.000

993.00	7.53	5340.03	.00	.00	5340.50	.47	.03	.02	6332.50
4000.	118.	3764.	110.	28.	678.	28.	11.	2.	6332.50
.03	4.14	5.55	4.16	.020	.030	.020	.000	6332.50	6.47
.000850	42.	42.	42.	2	0	0	.00	105.07	111.53

0

\*SECNO 1000.000

3301 HV CHANGED MORE THAN HVINS

3585 20 TRIALS ATTEMPTED WSEL,CWSEL  
 3593 PROBABLE MINIMUM SPECIFIC ENERGY  
 3720 CRITICAL DEPTH ASSUMED

1000.00	3.53	5342.13	5342.13	.00	5343.88	1.75	.01	.39	6338.50
4000.	53.	3877.	70.	7.	363.	8.	11.	2.	6338.50
.03	8.02	10.69	8.56	.020	.030	.020	.000	6338.50	4.37
.008352	6.	6.	6.	20	11	0	.00	108.16	112.53

0

\*SECNO 1100.000

3585 20 TRIALS ATTEMPTED WSEL,CWSEL  
 3593 PROBABLE MINIMUM SPECIFIC ENERGY  
 3720 CRITICAL DEPTH ASSUMED

1100.00	2.89	5343.89	5343.29	.00	5345.22	1.34	.85	.04	6341.00
4000.	181.	3637.	191.	21.	390.	21.	12.	2.	6341.00
.04	8.71	7.34	8.71	.020	.030	.020	.000	6341.00	15.57
.008643	100.	100.	100.	20	15	0	.00	163.86	179.43

0

\*SECNO 1200.000

3585 20 TRIALS ATTEMPTED WSEL,CWSEL  
 3593 PROBABLE MINIMUM SPECIFIC ENERGY  
 3720 CRITICAL DEPTH ASSUMED

1200.00	3.56	5347.06	5347.05	.00	5348.47	1.41	.82	.02	6344.00
4000.	530.	3330.	140.	49.	355.	16.	13.	3.	6344.00
.04	10.80	9.34	6.53	.020	.030	.020	.000	6343.50	37.21
.007869	100.	100.	100.	20	11	0	.00	152.51	189.72

0

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 HEC2 RELEASE DATED NOV 76 UPDATED MAY 1984  
 ERROR CORR - 01,02,03,04,05,06  
 MODIFICATION - 50,51,52,53,54,55,56  
 IBM-PC-XT VERSION 1.1  
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SAND CREEK

SUMMARY PRINTOUT

SECKD	C	DEPTH	VCH	VLDB	VRDB	CWSEL	EG	ELMIN	ALCH
* 1.000	8620.00	10.23	12.92	4.35	3.14	6332.73	6333.11	6322.50	.00
1.000	4000.00	7.50	9.61	.00	.00	6330.00	6331.43	6322.50	.00
* 200.000	8620.00	8.80	14.46	2.23	5.18	6333.30	6336.52	6324.50	200.00
200.000	4000.00	6.25	10.60	.00	1.76	6330.75	6332.49	6324.50	200.00
300.000	8620.00	10.89	6.23	.00	4.24	6336.39	6336.97	6325.50	100.00
300.000	4000.00	6.94	4.93	.00	3.20	6332.44	6332.81	6325.50	100.00
350.000	8620.00	10.05	6.85	6.05	6.05	6336.35	6337.05	6326.30	50.00
350.000	4000.00	6.07	5.97	5.22	5.22	6332.37	6332.91	6326.30	50.00
400.000	8620.00	9.30	6.72	5.32	5.32	6336.10	6337.24	6326.80	50.00
400.000	4000.00	5.50	7.08	4.76	4.76	6332.30	6333.06	6326.80	50.00
483.000	8620.00	7.63	12.55	9.50	9.50	6335.43	6337.81	6327.80	83.00
* 483.000	4000.00	4.05	11.32	8.58	8.58	6331.85	6333.81	6327.80	83.00
495.000	8620.00	10.96	8.89	6.73	6.73	6336.76	6337.93	6325.80	2.00
495.000	4000.00	7.59	6.14	4.65	4.65	6333.39	6333.96	6325.80	2.00
577.000	8620.00	9.63	10.26	7.69	7.69	6336.63	6338.20	6327.00	92.00
577.000	4000.00	6.32	7.46	5.59	5.59	6333.32	6334.17	6327.00	92.00
* 585.000	8620.00	8.88	16.97	.00	.00	6337.98	6342.45	6329.10	12.00
* 585.000	4000.00	5.31	13.19	.00	.00	6334.41	6337.11	6329.10	12.00
* 797.000	8620.00	8.88	16.97	.00	.00	6340.78	6345.25	6331.90	212.00
* 797.000	4000.00	5.31	13.19	.00	.00	6337.21	6339.51	6331.90	212.00
850.000	8620.00	12.03	8.37	6.28	1.40	6344.63	6345.70	6332.60	53.00
850.000	4000.00	6.89	6.94	5.21	1.16	6339.49	6340.23	6332.60	53.00

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SECKD	C	DEPTH	VCH	VLDB	VRDB	CWSEL	EG	ELMIN	ALCH
950.000	8620.00	11.13	7.70	5.82	5.82	6344.93	6345.81	6333.80	100.00
950.000	4000.00	5.84	7.10	5.37	5.37	6339.64	6340.41	6333.80	100.00
952.000	8620.00	13.41	6.54	4.94	4.94	6345.21	6345.84	6331.50	2.00
952.000	4000.00	8.25	5.14	3.88	3.88	6340.05	6340.45	6331.80	2.00
993.000	8620.00	12.69	6.83	5.12	5.12	6345.19	6345.88	6332.50	42.00
993.000	4000.00	7.53	5.55	4.16	4.16	6340.03	6340.50	6332.50	42.00
* 1000.000	8620.00	6.00	13.64	10.23	10.93	6344.50	6347.34	6338.50	6.00
* 1000.000	4000.00	3.63	10.69	8.02	8.56	6342.13	6343.88	6338.50	6.00
1100.000	8620.00	5.58	9.58	8.94	8.94	6346.58	6347.98	6341.00	100.00
* 1100.000	4000.00	2.89	9.34	8.71	8.71	6343.89	6345.22	6341.00	100.00

*	1200.000	8620.00	3.46	11.93	13.19	10.68	6348.96	6351.15	6343.50	100.00
*	1200.000	4000.00	3.56	9.34	10.80	8.53	6347.06	6348.47	6343.50	100.00

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SUMMARY OF ERRORS AND SPECIAL NOTES

- CAUTION SECNO= 1.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
- CAUTION SECNO= 200.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
- CAUTION SECNO= 200.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY
- CAUTION SECNO= 483.000 PROFILE= 2 CRITICAL DEPTH ASSUMED
- CAUTION SECNO= 483.000 PROFILE= 2 MINIMUM SPECIFIC ENERGY
- CAUTION SECNO= 585.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
- CAUTION SECNO= 585.000 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
- CAUTION SECNO= 585.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL
- CAUTION SECNO= 585.000 PROFILE= 2 CRITICAL DEPTH ASSUMED
- CAUTION SECNO= 585.000 PROFILE= 2 PROBABLE MINIMUM SPECIFIC ENERGY
- CAUTION SECNO= 585.000 PROFILE= 2 20 TRIALS ATTEMPTED TO BALANCE WSEL
- CAUTION SECNO= 797.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
- CAUTION SECNO= 797.000 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
- CAUTION SECNO= 797.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL
- CAUTION SECNO= 797.000 PROFILE= 2 CRITICAL DEPTH ASSUMED
- CAUTION SECNO= 797.000 PROFILE= 2 PROBABLE MINIMUM SPECIFIC ENERGY
- CAUTION SECNO= 797.000 PROFILE= 2 20 TRIALS ATTEMPTED TO BALANCE WSEL
- CAUTION SECNO= 1000.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
- CAUTION SECNO= 1000.000 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
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- CAUTION SECNO= 1000.000 PROFILE= 2 PROBABLE MINIMUM SPECIFIC ENERGY
- CAUTION SECNO= 1000.000 PROFILE= 2 20 TRIALS ATTEMPTED TO BALANCE WSEL
- CAUTION SECNO= 1100.000 PROFILE= 2 CRITICAL DEPTH ASSUMED
- CAUTION SECNO= 1100.000 PROFILE= 2 PROBABLE MINIMUM SPECIFIC ENERGY
- CAUTION SECNO= 1100.000 PROFILE= 2 20 TRIALS ATTEMPTED TO BALANCE WSEL
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- CAUTION SECNO= 1200.000 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
- CAUTION SECNO= 1200.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL
- CAUTION SECNO= 1200.000 PROFILE= 2 CRITICAL DEPTH ASSUMED
- CAUTION SECNO= 1200.000 PROFILE= 2 PROBABLE MINIMUM SPECIFIC ENERGY
- CAUTION SECNO= 1200.000 PROFILE= 2 20 TRIALS ATTEMPTED TO BALANCE WSEL

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 HEC2 RELEASE DATED NOV 76 UPDATED MAY 1984  
 ERROR CORR - 01,02,03,04,05,06  
 MODIFICATION - 50,51,52,53,54,55,56  
 IBM-PC-XT VERSION 1.1  
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