WESTERN NUCLEAR, INC.
SHERWOOD PROJECT
P. O. BOX 392 • WELLPINIT, WASHINGTON 99040 • (509) XXXXXXX 258-4521

DEC 2 0 1999
DIV. OF RADIATION PROTECTION

December 17, 1999

Mr. Gary Robertson
Washington Department of Health
Waste Management Section
Division of Radiation Protection
P.O. Box 47827
Airdustrial Park, Building 5
Olympia, Washington 98504-7827

RE: Radioactive Materials License WN-I0133-1; License Conditions 22 and 29; Request for license termination: submission of discussion and calculation to demonstrate: 1) the erosional stability provided by the existing vegetation on the reclaimed impoundment; and 2) the level of conservatism inherent in in riprap sizing analyses for the diversion channel.

Dear Mr. Robertson:

As a result of our discussions during our November 30 meeting in Spokane and during a telephone conversation on December 6 regarding issues of erosional stability of the reclaimed impoundment, please find attached the discussions and calculations requested by the Washington Department of Health (WDOH). These attachments provide additional support for prior submittals which have demonstrated the stability of the reclaimed tailing impoundment structure.

Should have any questions regarding the attachments or need additional information, please contact me at your earliest convenience.

Sincerely,

Brad K. DeWaard, Resident Agent

/bd
Attachments

99 DEC 28 AM 9:29
OSP

cc: L. J. Corte, Esq.
E. M. Schern
WNI Central File (L.C. 22 & 29)
L. L. Miller (SMI)
H. W. Shaver, Esq. (S&L)

Prepared For:

WESTERN NUCLEAR, INC.
SHERWOOD PROJECT
Wellpinit, WA

RESPONSE TO WASHINGTON DEPARTMENT OF HEALTH VERBAL QUESTIONS OF DECEMBER 6, 1999

Prepared By:

Shepherd Miller, Inc.
3801 Automation Way, Suite 100
Fort Collins, Colorado 80525

SHEPHERD MILLER
INCORPORATED

DECEMBER 1999

A telephone conference call was held on December 6, 1999 to discuss all remaining issues that need to be addressed before the Sherwood license termination process can be completed. Two issues were raised. The specific request along with Western Nuclear's response for each of the request is provided below.

Issue 1. Provide calculations and discussion to show that the current vegetation on the surface and margins is sufficient for the next few years until the vegetation reaches the required cover to provide erosional stability for the PMP event. The department suggests that the erosional stability be evaluated for 100 year, 1000 year and 10,000 year precipitation events. The Washington Department of Ecology – Dam Safety Section (WDOE-DSS) has calculated various precipitation events for the site, which has been transmitted to WNI.

The Monitoring and Stabilization Plan (MSP) final report was submitted to the WDOH in the "Request For License Termination – Final Data Report" dated November 15, 1999. The MSP final report concluded that the total vegetation on the surface was 35.8% (at the lower 80% confidence level – excluding the pond area which is inherently stable). This is essentially the same as the target success level of 36%. While perennial species cover did not increase each of the previous three years, the plant community is maturing as anticipated. Much of the decline in perennial species from 1998 to 1999 is attributable to the biennial life cycle of sweet clover and <u>does not</u> reflect any deficiency in the revegetation effort nor indicate some unanticipated natural failure or control mechanism.

Similarly, the margin areas (excluding the inherently stable areas with shallow quartz monzonite bedrock) have vegetation that is very close to the required levels (Total vegetation of 37.6% versus the target level of 39%). The perennial species on the margins have increased each of the last 3 years.

Therefore, while the vegetation on the surface and margins do not strictly meet the numerical success criteria, the values are extremely close to the numerical targets. Additionally, the diversity of perennial species including the abundance of trees and shrubs on the surface and margins indicate that the plant community will continue to develop, and vegetation at levels much greater than the target levels will be achieved in the next few years.

As requested, an erosional stability analysis was performed using precipitation events less than the PMP but with very unlikely probability of occurring during the next several years. It needs to be understood that the analysis using precipitation events less than the PMP is not intended to evaluate the long-term performance of the cover. This evaluation is to show that the cover and margins are erosionally stable with the current vegetation cover for events that are highly unlikely in the interim until the vegetation meets the previously approved numerical criteria. Given that the current cover measurements are only a few percentage points away from the target levels and that the diversity of species indicates that the site is progressing very well, the site should have cover values well in excess of the numerical standards within a year or two.

Erosional stability analyses were performed on the cover and margins using precipitation events for the 100-yr, 1000-yr and the 10,000-yr storm events as supplied by the Washington Department of Ecology – Dam Safety Section (via letter dated December 16, 1999). The 6-hour storm event was used since it was previously determined that the 6-hour PMP was the critical storm event for the site. The peak intensity for each storm event was estimated using the depth-duration curve developed for the PMP. The peak intensity is 1.56 times the total precipitation for the design storm, therefore each of the precipitation events was multiplied by 1.56 to determine the peak intensities. A conservative flow concentration factor of 3.0 was used for all the erosional stability calculations. This factor is considered conservative because overland flow conditions can typically be characterized as sheet flow. Sheet flow concentration factors typically range between 2 and 2.5. Visual observations of the site indicate that flow concentration is not occurring and therefore a concentration factor of 3 is very conservative.

The same techniques used in the previous analyses were used to determine the required vegetative cover for each of the storm events. The analyses are attached and are summarized in Table 1.

As can be seen, the existing vegetal coverage for the impoundment margins and cover is able to provide erosional protection for the 100-yr, 1000-yr, and 10,000 yr precipitation events. The impoundment margin cover does not require any vegetal cover to be erosionally stable for the 100-yr, 1000-yr, and 10,000-yr precipitation. The impoundment margins require a maximum of 34 percent vegetal cover to be erosionally stable for the 10,000-yr precipitation event.

Table 1 Summary of Vegetal Coverage Required for Erosional Stability

	100 Year Storm	1,000 Year Storm	10,000 Year Storm
Margins			
Storm Event (in)	2.19	3.13	4.31
Peak Intensity (in/hr)	3.43	4.90	6.75
% Vegetal Cover Required	32-33	33	33-34
Existing Vegetal Cover (%)	37.5	37.5	37.5
Vegetal Cover Target (%)	39	39	39
Cover			
Storm Event (in)	2.19	3.13	4.31
Peak Intensity (in/hr)	3.43	4.90	6.75
% Vegetal Cover Required	0	0	0
Existing Vegetal Cover (%)	35.8	35.8	35.8
Vegetal Cover Target (%)	36	36	36

Issue 2: To assist the WDOH with determining the level of conservatism inherent in the analyses used to size the riprap in the diversion channel, provide calculations for required riprap sizing using the 1000-yr and the 10,000-yr precipitation events as calculated by the WDOE-DSS.

The diversion channels were designed to be erosionally stable during the conveyance of the runoff from the Possible Maximum Precipitation (PMP) event. Two different scenarios were evaluated. First, the channel dimensions and riprap sizing was calculated assuming no vegetation in the channel. This leads to a situation with high velocities and low flow depths. This scenario was used to determine the rock size.

The other scenario that was evaluated was for the situation with trees in the channel. This scenario leads to conditions with low velocities and high water levels. The overall depth of the channel was determined from the scenario.

The performance of the channel using 1000-yr and 10,000-yr precipitation events was previously analyzed for the scenario with trees. This analysis was submitted to WDOH in the Sherwood Project Response to WDOH Comments on the December 1994 Tailing Reclamation Plan (dated August 1995). The results of those analyses were summarized in the August 1995 report (attached) and showed that the 1000-yr and the 10,000-yr event lead to flow conditions that are much less than the PMP and the diversion channel has from 3.5 feet of freeboard at the upstream end of the channel to 10.8 feet near the outlet for the 10,000 year event.

An evaluation of the diversion channel was also performed using the assumption that the channel would not have trees. The PMP analysis was used to design the rock sizing for this scenario and the appropriately sized rock was placed and documented in the Tailing Reclamation Plan Completion Report (dated June, 1997). The evaluation using the 100-yr, 1000-yr, and the 10,000-year precipitation events was performed using the same analytical techniques and input parameters as used in the original PMP analysis. The results of the analysis indicates that much smaller rock would be required for the 100-yr, 1000-yr, and 10,000-yr events. The evaluation is attached and results are summarized on Table 2.

Table 2 – Scenario With No Trees (Roughness Coefficient n = 0.031)

Diversion Channel Reach	Channel Flow (cfs)	Flow Depth (ft)	Maximum Velocity (fps)	Calculated Riprap Size (in)	Design Riprap Size (in)
100 Year Storm Event					
Above A	21	1.26	3.14	0.25	3
A-B	26	1.35	3.38	0.25	3
B-C	93	2.24	4.43	0.50	3
C-D	191	2.69	6.10	1.00	5
D-E	219	3.80	3.68	0.25	3
E-F	254	4.00	3.87	0.25	3
F-G	309	4.34	4.08	0.50	3
G-H	312	4.34	4.08	0.50	3
Below H	312	4.08	4.57	0.25	3

Table 2 – Scenario With No Trees (Roughness Coefficient n = 0.031) (continued)

Diversion Channel Reach	Channel Flow (cfs)	Flow Depth (ft)	Maximum Velocity (fps)	Calculated Riprap Size (in)	Design Riprap Size (in)
1,000 Year Storm Event					
Above A	47	1.70	3.86	0.50	3
A-B	58	1.87	3.93	0.50	3
B-C	208	3.03	5.41	0.75	3
C-D	428	3.88	6.89	2.00	5
D-E	490	5.24	4.51	0.50	3
E-F	570	5.49	4.81	0.50	3
F-G	693	5.95	5.07	0.75	3
G-H	698	5.95	5.07	0.75	3
Below H	698	5.67	5.54	0.75	3
10,000 Year Storm Event					
Above A	86	2.13	4.5	0.50	3
A-B	105	2.35	4.55	0.50	3
B-C	377	3.80	6.32	1.00	3
C-D	779	4.87	8.18	2.25	5
D-E	893	6.72	5.19	0.75	3
E-F	1039	7.00	5.61	0.75	3
F-G	1264	7.57	5.93	1.00	3
G-H	1272	7.57	5.93	1.00	3
Below H	1271	7.26	6.39	0.75	3

MARGIN AND SURFACE STABILITY ANALYSES

Design of Soil Covers; Horton/NRC Method (100 YR)

Tailing Impoundment Margins

(NRC STP August 1990; Appendix A)
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Step	Parameter	Symbol	Units	Strip A	Strip B'	Strip C	Strip D	Strip E	Strip F	Strip G	Strip H	Source
1	soil classification			SW	SW	SW	SW	SW	SW	SW	SW	SMI December 1994; Appendix A
1	plasticity index	PI										
1	75% finer diameter (non-cohesive)	D_{75}	in	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	SMI December 1994; Appendix A; Section A.3; Figure 3.13
1	soil grain roughness	n_s	-	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	Temple 1987, Table 3.3
1	basic allowable effective stress	τ_{ab}	psf									Temple 1987, Figure 3.3
1	void ratio	e	-	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	Design of Small Dams 1977, Table 8
1	void ratio correction factor	C_e	-									Temple 1987, Figure 3.4
1	allowable soil stress	τ_a	psf	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	Temple 1987, Table 3.3
1	retardance curve index	C_I	-	6.79	6.79	6.79	6.79	6.79	6.79	6.79	6.79	SMI December 1994; Appendix C: Attachment C
1	cover factor	C_F	-	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	SMI December 1994; Appendix C; Attachment C
1,2	slope length	L_1	feet	130	130	190	145	130	110	185	155	SMI December 1994; Drawing 3; Rev 2
1	base elevation	E_A	feet	2084.0	2079.0	2076.0	2084.0	2083.0	2082.0	2076.0	2078.0	SMI December 1994; Drawing 3; Rev 2
1	top elevation	E_B	feet	2128.0	2117.0	2114.0	2132.0	2126.0	2118.0	2113.0	2108.0	SMI December 1994; Drawing 3; Rev 2
1	elevation difference	H	feet	44.0	38.0	38.0	48.0	43.0	36.0	37.0	30.0	
1,2	initial slope	S_i	ft/ft	0.338	0.292	0.200	0.331	0.331	0.327	0.200	0.194	
1	runoff coefficient	C	-	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	Chow, 1988; Table 15.1.1
1	peak intensity	i	in/hr	3.43	3.43	3.43	3.43	3.43	3.43	3.43	3.43	=(PMP/10,000 yr total precip.) x (PMP_{max})
1	drainage basin area	A	acres	0.0030	0.0030	0.0044	0.0033	0.0030	0.0025	0.0042	0.0036	
1,3	flow concentration factor	F	-	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	varied so that $S_i = S_s$
	peak unit discharge (w/ concentration factor)	q_o	cfs	0.006	0.006	0.009	0.007	0.006	0.005	0.009	0.008	
1	peak unit discharge (w/o concentration factor)	q	cfs	0.019	0.019	0.028	0.021	0.019	0.016	0.027	0.023	NRC STP; Section A.2.4.1
1,4	roughness factor (Manning's n)	n	-	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	Chow, 1959; Table 5-6
1	depth of flow	y	ft	0.014	0.014	0.020	0.015	0.014	0.012	0.020	0.018	NRC STP; Section 2.2; Step 6
1	allowable vegetal stress	τ_{va}	psf	5.093	5.093	5.093	5.093	5.093	5.093	5.093	5.093	Temple 1987; Eqn 1.17 and Table 3.1
1	percent vegetal coverage	VC	-	33%	32%	32%	33%	33%	32%	32%	32%	39% = min. cover. (Pg. 40 of 2/96 Monitor & STable Plan)
1	reduced allowable vegetal stress	τ_{var}	psf	0.382	0.255	0.255	0.382	0.382	0.255	0.255	0.255	SMI, Jan 1996; Comment 6
1	maximum allowable shear stress	τ_{max}	psf	0.382	0.255	0.255	0.382	0.382	0.255	0.255	0.255	= MAX(τ_a, τ_{var})
5	peak intensity	i	in/hr	3.43	3.43	3.43	3.43	3.43	3.43	3.43	3.43	copied from above
6	stable slope	S_S	ft/ft	0.505	0.283	0.204	0.459	0.505	0.326	0.209	0.243	NRC STP; Section 2.1.1
1	initial slope	S_i	ft/ft	0.338	0.292	0.200	0.331	0.331	0.327	0.200	0.194	copied from step 1
	initial to stable slope comparison			Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Is $S_i <= S_S$?

Design of Soil Covers; Horton/NRC Method (1000 YR)

Tailing Impoundment Margins

(NRC STP August 1990; Appendix A)
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Step	Parameter	Symbol	Units	Strip A	Strip B'	Strip C	Strip D	Strip E	Strip F	Strip G	Strip H	Source
1	soil classification			SW	SW	SW	SW	SW	SW	SW	SW	SMI December 1994; Appendix A
1	plasticity index	PI										
1	75% finer diameter (non-cohesive)	D_{75}	in	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	SMI December 1994; Appendix A; Section A.3; Figure 3.13
1	soil grain roughness	n_s	-	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	Temple 1987, Table 3.3
1	basic allowable effective stress	τ_{ab}	psf									Temple 1987, Figure 3.3
1	void ratio	e	-	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	Design of Small Dams 1977, Table 8
1	void ratio correction factor	C_e	-									Temple 1987, Figure 3.4
1	allowable soil stress	τ_a	psf	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	Temple 1987, Table 3.3
1	retardance curve index	C_I	-	6.79	6.79	6.79	6.79	6.79	6.79	6.79	6.79	SMI December 1994; Appendix C: Attachment C
1	cover factor	C_F	-	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	SMI December 1994; Appendix C; Attachment C
1,2	slope length	L_1	feet	130	130	190	145	130	110	185	155	SMI December 1994; Drawing 3; Rev 2
1	base elevation	E_A	feet	2084.0	2079.0	2076.0	2084.0	2083.0	2082.0	2076.0	2078.0	SMI December 1994; Drawing 3; Rev 2
1	top elevation	E_B	feet	2128.0	2117.0	2114.0	2132.0	2126.0	2118.0	2113.0	2108.0	SMI December 1994; Drawing 3; Rev 2
1	elevation difference	H	feet	44.0	38.0	38.0	48.0	43.0	36.0	37.0	30.0	
1,2	initial slope	S_i	ft/ft	0.338	0.292	0.200	0.331	0.331	0.327	0.200	0.194	
1	runoff coefficient	C	-	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	Chow, 1988; Table 15.1.1
1	peak intensity	i	in/hr	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	=(PMP/10,000 yr total precip.) x (PMP_{max})
1	drainage basin area	A	acres	0.0030	0.0030	0.0044	0.0033	0.0030	0.0025	0.0042	0.0036	
1,3	flow concentration factor	F	-	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	varied so that $S_i = S_s$
	peak unit discharge (w/ concentration factor)	q_o	cfs	0.009	0.009	0.013	0.010	0.009	0.008	0.013	0.011	
1	peak unit discharge (w/o concentration factor)	q	cfs	0.027	0.027	0.040	0.030	0.027	0.023	0.039	0.032	NRC STP; Section A.2.4.1
1,4	roughness factor (Manning's n)	n	-	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	Chow, 1959; Table 5-6
1	depth of flow	y	ft	0.017	0.018	0.025	0.018	0.017	0.015	0.024	0.022	NRC STP; Section 2.2; Step 6
1	allowable vegetal stress	τ_{va}	psf	5.093	5.093	5.093	5.093	5.093	5.093	5.093	5.093	Temple 1987; Eqn 1.17 and Table 3.1
1	percent vegetal coverage	VC	-	33%	33%	33%	33%	33%	33%	33%	33%	39% = min. cover. (Pg. 40 of 2/96 Monitor & STable Plan)
1	reduced allowable vegetal stress	τ_{var}	psf	0.382	0.382	0.382	0.382	0.382	0.382	0.382	0.382	SMI, Jan 1996; Comment 6
1	maximum allowable shear stress	τ_{max}	psf	0.382	0.382	0.382	0.382	0.382	0.382	0.382	0.382	= MAX(τ_a, τ_{var})
5	peak intensity	i	in/hr	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	copied from above
6	stable slope	S_S	ft/ft	0.372	0.372	0.268	0.338	0.372	0.429	0.275	0.320	NRC STP; Section 2.1.1
1	initial slope	S_i	ft/ft	0.338	0.292	0.200	0.331	0.331	0.327	0.200	0.194	copied from step 1
	initial to stable slope comparison			Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Is $S_i <= S_S$?

Design of Soil Covers; Horton/NRC Method (10,000 YR) — Tailing Impoundment Margins

(NRC STP August 1990; Appendix A)
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Step	Parameter	Symbol	Units	Strip A	Strip B'	Strip C	Strip D	Strip E	Strip F	Strip G	Strip H	Source
1	soil classification			SW	SW	SW	SW	SW	SW	SW	SW	SMI December 1994; Appendix A
1	plasticity index	PI										
1	75% finer diameter (non-cohesive)	D_{75}	in	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	SMI December 1994; Appendix A; Section A.3; Figure 3.13
1	soil grain roughness	n_s	-	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	Temple 1987, Table 3.3
1	basic allowable effective stress	τ_{ab}	psf									Temple 1987, Figure 3.3
1	void ratio	e	-	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	Design of Small Dams 1977, Table 8
1	void ratio correction factor	C_e	-									Temple 1987, Figure 3.4
1	allowable soil stress	τ_a	psf	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	Temple 1987, Table 3.3
1	retardance curve index	C_I	-	6.79	6.79	6.79	6.79	6.79	6.79	6.79	6.79	SMI December 1994; Appendix C: Attachment C
1	cover factor	C_F	-	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	SMI December 1994; Appendix C; Attachment C
1,2	slope length	L_1	feet	130	130	190	145	130	110	185	155	SMI December 1994; Drawing 3; Rev 2
1	base elevation	E_A	feet	2084.0	2079.0	2076.0	2084.0	2083.0	2082.0	2076.0	2078.0	SMI December 1994; Drawing 3; Rev 2
1	top elevation	E_B	feet	2128.0	2117.0	2114.0	2132.0	2126.0	2118.0	2113.0	2108.0	SMI December 1994; Drawing 3; Rev 2
1	elevation difference	H	feet	44.0	38.0	38.0	48.0	43.0	36.0	37.0	30.0	
1,2	initial slope	S_i	ft/ft	0.338	0.292	0.200	0.331	0.331	0.327	0.200	0.194	
1	runoff coefficient	C	-	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	Chow, 1988; Table 15.1.1
1	peak intensity	i	in/hr	6.75	6.75	6.75	6.75	6.75	6.75	6.75	6.75	=(PMP/10,000 yr total precip.) x (PMP_{max})
1	drainage basin area	A	acres	0.0030	0.0030	0.0044	0.0033	0.0030	0.0025	0.0042	0.0036	
1,3	flow concentration factor	F	-	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
	peak unit discharge (w/ concentration factor)	q_o	cfs	0.012	0.012	0.018	0.014	0.012	0.011	0.018	0.015	
1	peak unit discharge (w/o concentration factor)	q	cfs	0.037	0.037	0.055	0.042	0.037	0.032	0.053	0.045	NRC STP; Section A.2.4.1
1,4	roughness factor (Manning's n)	n	-	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	Chow, 1959; Table 5-6
1	depth of flow	y	ft	0.020	0.021	0.030	0.022	0.020	0.019	0.029	0.027	NRC STP; Section 2.2; Step 6
1	allowable vegetal stress	τ_{va}	psf	5.093	5.093	5.093	5.093	5.093	5.093	5.093	5.093	Temple 1987; Eqn 1.17 and Table 3.1
1	percent vegetal coverage	VC	-	34%	33%	33%	34%	34%	33%	33%	34%	39% = min. cover. (Pg. 40 of 2/96 Monitor & STable Plan)
1	reduced allowable vegetal stress	τ_{var}	psf	0.509	0.382	0.382	0.509	0.509	0.382	0.382	0.509	SMI, Jan 1996; Comment 6
1	maximum allowable shear stress	τ_{max}	psf	0.509	0.382	0.382	0.509	0.509	0.382	0.382	0.509	= MAX(τ_a, τ_{var})
5	peak intensity	i	in/hr	6.75	6.75	6.75	6.75	6.75	6.75	6.75	6.75	copied from above
6	stable slope	S_S	ft/ft	0.426	0.282	0.204	0.388	0.426	0.326	0.209	0.366	NRC STP; Section 2.1.1
1	initial slope	S_i	ft/ft	0.338	0.292	0.200	0.331	0.331	0.327	0.200	0.194	copied from step 1
	initial to stable slope comparison			Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Is S_i <= S_S ?

Design of Soil Covers; Horton/NRC Method (100 YR)　　Impoundment Surface

(NRC STP August 1990; Appendix A)
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Step	Parameter	Symbol	Units	Strip A	Strip B	Strip C	Basin 6	Basin 7	Source
1	soil classification			SW	SW	SW	SW	SW	SMI December 1994; Appendix A
1	plasticity index	PI							
1	75% finer diameter (non-cohesive)	D_{75}	in	0.070	0.070	0.070	0.070	0.070	SMI December 1994; Appendix G; Section G.A.5
1	soil grain roughness	n_s	-	0.016	0.016	0.016	0.016	0.016	Temple 1987, Table 3.3
1	basic allowable effective stress	τ_{ab}	psf						Temple 1987, Figure 3.3
1	void ratio	e	-	0.37	0.37	0.37	0.37	0.37	Design of Small Dams 1977, Table 8
1	void ratio correction factor	C_e	-						Temple 1987, Figure 3.4
1	allowable soil stress	τ_a	psf	0.028	0.028	0.028	0.028	0.028	Temple 1987, Table 3.3
1	retardance curve index	C_I	-	6.79	6.79	6.79	6.79	6.79	SMI December 1994; Appendix C: Attachment C
1	cover factor	C_F	-	0.60	0.60	0.60	0.60	0.60	SMI December 1994; Appendix C; Attachment C
1,2	slope length	L_1	feet	1978	2195	2517	1310	970	SMI December 1994; Drawing 3; Rev 2
1	base elevation	E_A	feet	2071.0	2069.0	2070.0	2068.0	2075.0	SMI December 1994; Drawing 3; Rev 2
1	top elevation	E_B	feet	2079.0	2080.0	2076.5	2120.0	2115.0	SMI December 1994; Drawing 3; Rev 2
1	elevation difference	H	feet	8.0	11.0	6.5	52.0	40.0	
1,2	initial slope	S_i	ft/ft	0.0040	0.0050	0.0026	0.0397	0.0412	
1	runoff coefficient	C	-	0.58	0.58	0.58	0.61	0.61	Chow, 1988; Table 15.1.1, slopes less than 2%
1	peak intensity	i	in/hr	3.43	3.43	3.43	3.43	3.43	=(PMP/10,000 yr total precip.) x (PMP_{max})
1	drainage basin area	A	acres	0.0454	0.0504	0.0578	0.0301	0.0223	
1,3	flow concentration factor	F	-	3.0	3.0	3.0	3.0	3.0	varied so that $S_i = S_s$
	peak unit discharge (w/ concentration factor)	q_o	cfs	0.090	0.100	0.115	0.063	0.047	
1	peak unit discharge (w/o concentration factor)	q	cfs	0.271	0.301	0.345	0.189	0.140	NRC STP; Section A.2.4.1
1,4	roughness factor (Manning's n)	n	-	0.031	0.031	0.031	0.031	0.031	TRP 12/94, Appendix G, Section G.A-4
1	depth of flow	y	ft	0.234	0.234	0.309	0.095	0.078	NRC STP; Section 2.2; Step 6
1	allowable vegetal stress	τ_{va}	psf	5.093	5.093	5.093	5.093	5.093	Temple 1987; Eqn 1.17 and Table 3.1
1	percent vegetal coverage	VC	-	0%	0%	0%	0%	0%	39% = min. cover. (Pg. 40 of 2/96 Monitor & STable Plan)
1	reduced allowable vegetal stress	τ_{var}	psf	0.000	0.000	0.000	0.000	0.000	SMI, Jan 1996; Comment 6
1	maximum allowable shear stress	τ_{max}	psf	0.028	0.028	0.028	0.028	0.028	= MAX(τ_a, τ_{var})
5	peak intensity	i	in/hr	3.43	3.43	3.43	3.43	3.43	copied from above
6	stable slope	S_S	ft/ft	0.001	0.001	0.001	0.002	0.002	NRC STP; Section 2.1.1
1	initial slope	S_i	ft/ft	0.004	0.005	0.003	0.040	0.041	copied from step 1
	initial to stable slope comparison			Stable	Stable	Stable	Unstable	Unstable	Is $S_i <= S_S$?

Design of Soil Covers; Horton/NRC Method (1000 YR)

Impoundment Surface

(NRC STP August 1990; Appendix A)
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Step	Parameter	Symbol	Units	Strip A	Strip B	Strip C	Basin 6	Basin 7	Source
1	soil classification			SW	SW	SW	SW	SW	SMI December 1994; Appendix A
1	plasticity index	PI							
1	75% finer diameter (non-cohesive)	D_{75}	in	0.070	0.070	0.070	0.070	0.070	SMI December 1994; Appendix G; Section G.A.5
1	soil grain roughness	n_s	-	0.016	0.016	0.016	0.016	0.016	Temple 1987, Table 3.3
1	basic allowable effective stress	τ_{ab}	psf						Temple 1987, Figure 3.3
1	void ratio	e	-	0.37	0.37	0.37	0.37	0.37	Design of Small Dams 1977, Table 8
1	void ratio correction factor	C_e	-						Temple 1987, Figure 3.4
1	allowable soil stress	τ_a	psf	0.028	0.028	0.028	0.028	0.028	Temple 1987, Table 3.3
1	retardance curve index	C_I	-	6.79	6.79	6.79	6.79	6.79	SMI December 1994; Appendix C: Attachment C
1	cover factor	C_F	-	0.60	0.60	0.60	0.60	0.60	SMI December 1994; Appendix C; Attachment C
1,2	slope length	L_1	feet	1978	2195	2517	1310	970	SMI December 1994; Drawing 3; Rev 2
1	base elevation	E_A	feet	2071.0	2069.0	2070.0	2068.0	2075.0	SMI December 1994; Drawing 3; Rev 2
1	top elevation	E_B	feet	2079.0	2080.0	2076.5	2120.0	2115.0	SMI December 1994; Drawing 3; Rev 2
1	elevation difference	H	feet	8.0	11.0	6.5	52.0	40.0	
1,2	initial slope	S_i	ft/ft	0.0040	0.0050	0.0026	0.0397	0.0412	
1	runoff coefficient	C	-	0.58	0.58	0.58	0.61	0.61	Chow, 1988; Table 15.1.1, slopes less than 2%
1	peak intensity	i	in/hr	4.9	4.9	4.9	4.9	4.9	=(PMP/10,000 yr total precip.) x (PMP_{max})
1	drainage basin area	A	acres	0.0454	0.0504	0.0578	0.0301	0.0223	
1,3	flow concentration factor	F	-	3.0	3.0	3.0	3.0	3.0	varied so that $S_i = S_s$
	peak unit discharge (w/ concentration factor)	q_o	cfs	0.129	0.143	0.164	0.090	0.067	
1	peak unit discharge (w/o concentration factor)	q	cfs	0.387	0.430	0.493	0.270	0.200	NRC STP; Section A.2.4.1
1,4	roughness factor (Manning's n)	n	-	0.031	0.031	0.031	0.031	0.031	TRP 12/94, Appendix G, Section G.A-4
1	depth of flow	y	ft	0.290	0.289	0.383	0.118	0.097	NRC STP; Section 2.2; Step 6
1	allowable vegetal stress	τ_{va}	psf	5.093	5.093	5.093	5.093	5.093	Temple 1987; Eqn 1.17 and Table 3.1
1	percent vegetal coverage	VC	-	0%	0%	0%	32%	32%	39% = min. cover. (Pg. 40 of 2/96 Monitor & STable Plan)
1	reduced allowable vegetal stress	τ_{var}	psf	0.000	0.000	0.000	0.255	0.255	SMI, Jan 1996; Comment 6
1	maximum allowable shear stress	τ_{max}	psf	0.028	0.028	0.028	0.255	0.255	= MAX(τ_a, τ_{var})
5	peak intensity	i	in/hr	4.9	4.9	4.9	4.9	4.9	copied from above
6	stable slope	S_S	ft/ft	0.001	0.001	0.001	0.032	0.042	NRC STP; Section 2.1.1
1	initial slope	S_i	ft/ft	0.004	0.005	0.003	0.040	0.041	copied from step 1
	initial to stable slope comparison			Stable	Stable	Stable	Stable	Stable	Is $S_i <= S_S$?

Design of Soil Covers; Horton/NRC Method (10,000 YR) Impoundment Surface

(NRC STP August 1990; Appendix A)
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Step	Parameter	Symbol	Units	Strip A	Strip B	Strip C	Basin 6	Basin 7	Source
1	soil classification			SW	SW	SW	SW	SW	SMI December 1994; Appendix A
1	plasticity index	PI							
1	75% finer diameter (non-cohesive)	D_{75}	in	0.070	0.070	0.070	0.070	0.070	SMI December 1994; Appendix G; Section G.A.5
1	soil grain roughness	n_s	-	0.016	0.016	0.016	0.016	0.016	Temple 1987, Table 3.3
1	basic allowable effective stress	τ_{ab}	psf						Temple 1987, Figure 3.3
1	void ratio	e	-	0.37	0.37	0.37	0.37	0.37	Design of Small Dams 1977, Table 8
1	void ratio correction factor	C_e	-						Temple 1987, Figure 3.4
1	allowable soil stress	τ_a	psf	0.028	0.028	0.028	0.028	0.028	Temple 1987, Table 3.3
1	retardance curve index	C_I	-	6.79	6.79	6.79	6.79	6.79	SMI December 1994; Appendix C: Attachment C
1	cover factor	C_F	-	0.60	0.60	0.60	0.60	0.60	SMI December 1994; Appendix C; Attachment C
1,2	slope length	L_1	feet	1978	2195	2517	1310	970	SMI December 1994; Drawing 3; Rev 2
1	base elevation	E_A	feet	2071.0	2069.0	2070.0	2068.0	2075.0	SMI December 1994; Drawing 3; Rev 2
1	top elevation	E_B	feet	2079.0	2080.0	2076.5	2120.0	2115.0	SMI December 1994; Drawing 3; Rev 2
1	elevation difference	H	feet	8.0	11.0	6.5	52.0	40.0	
1,2	initial slope	S_i	ft/ft	0.0040	0.0050	0.0026	0.0397	0.0412	
1	runoff coefficient	C	-	0.58	0.58	0.58	0.61	0.61	Chow, 1988; Table 15.1.1, slopes less than 2%
1	peak intensity	i	in/hr	6.75	6.75	6.75	6.75	6.75	=(PMP/10,000 yr total precip.) x (PMP_{max})
1	drainage basin area	A	acres	0.0454	0.0504	0.0578	0.0301	0.0223	
1,3	flow concentration factor	F	-	3.0	3.0	3.0	3.0	3.0	varied so that $S_i = S_s$
	peak unit discharge (w/ concentration factor)	q_o	cfs	0.178	0.197	0.226	0.124	0.092	
1	peak unit discharge (w/o concentration factor)	q	cfs	0.533	0.592	0.679	0.371	0.275	NRC STP; Section A.2.4.1
1,4	roughness factor (Manning's n)	n	-	0.031	0.031	0.031	0.031	0.031	TRP 12/94, Appendix G, Section G.A-4
1	depth of flow	y	ft	0.351	0.351	0.464	0.143	0.118	NRC STP; Section 2.2; Step 6
1	allowable vegetal stress	τ_{va}	psf	5.093	5.093	5.093	5.093	5.093	Temple 1987; Eqn 1.17 and Table 3.1
1	percent vegetal coverage	VC	-	0%	0%	0%	33%	33%	39% = min. cover. (Pg. 40 of 2/96 Monitor & STable Plan)
1	reduced allowable vegetal stress	τ_{var}	psf	0.000	0.000	0.000	0.382	0.382	SMI, Jan 1996; Comment 6
1	maximum allowable shear stress	τ_{max}	psf	0.028	0.028	0.028	0.382	0.382	= MAX(τ_a, τ_{var})
5	peak intensity	i	in/hr	6.75	6.75	6.75	6.75	6.75	copied from above
6	stable slope	S_S	ft/ft	0.001	0.001	0.001	0.044	0.057	NRC STP; Section 2.1.1
1	initial slope	S_i	ft/ft	0.004	0.005	0.003	0.040	0.041	copied from step 1
	initial to stable slope comparison			Stable	Stable	Stable	Stable	Stable	Is $S_i <= S_S$?

SHERWOOD PROJECT
RESPONSES TO WDOH COMMENTS ON THE DECEMBER 1994 TAILING RECLAMATION PLAN

Prepared for

Western Nuclear, Inc.
Sherwood Mine
Wellpinit, Washington

Prepared by

Shepherd Miller Inc.
1600 Specht Point Drive, Suite F
Fort Collins, CO 80525

August 1995

SMI
Shepherd Miller, Inc.

Q: <u>Question No. 1 from the July 06, 1995 meeting in Seattle</u> - **The Washington State Department of Ecology (WDOE) has developed a procedure for estimating precipitation values for extreme rainfall events. The procedure is described in WDOE publication, Dam Safety Guidelines, Technical Note. No. 3, Design Storm Construction. This publication should be used to estimate the 1000-year rainfall event for comparison with the PMP used for design of the diversion channel.**

3.7 Values of Extreme Rainfall Events

Criterion 6 of WAC 246-252-030 requires that the reclamation design be effective for 1000 years. To meet this criterion, the diversion channel was designed to safely convey runoff from the Probable Maximum Precipitation (PMP) event, which is 11.5 inches of precipitation in a 6-hour period. For comparison with this rainfall event, precipitation estimates were made using the criteria from the WDOE publication. These are shown in Table 3.9. Flood discharges for recurrence intervals of 1000 and 10,000 years were then estimated using the Corps of Engineers' HEC-1 computer model and HEC-2 was used to estimate flow depths and velocities for the two flood events. (The HEC-1 and HEC-2 models are discussed in detail in Appendix D of the 12/94 TRP). The results of this analysis, are summarized in Tables 3.10 and 3.11. Table 3.10 shows that riprap on the side slopes of the diversion channel is from 4.4 feet to 11.0 feet higher in elevation within the channel than required for the 10,000-year flood. For the 1000-year flood, the riprap is from 5.0 feet to 13.4 feet higher than required. Table 3.11 shows that the maximum design flood discharge is at least an order of magnitude larger for the PMF than it is for the 1000-year flood and almost 6 times larger than the 10,000-year flood.

TABLE 3.9

Projections of Design Precipitation for Eastern Washington, Region 1 (Sherwood site)

Annual exceedance probability, AEP	Return period	Frequency factor, Ki	Precipitation estimate for selected AEP (inches)	Design precipitation (inches)
1/2	2 yr	-0.187	0.704	0.81
1/10	10 yr	1.23	1.056	1.21
1/25	25 yr	2.04	1.257	1.45
1/100	100 yr	3.39	1.593	1.83
step 1	500 yr	5.21	2.045	2.35
step 2	1000 yr	6.1	2.266	2.61
step 3	step 3	7.72	2.668	3.07
step 4	10,000 yr	9.55	3.123	3.59
step 5	step 5	11.62	3.637	4.18
step 6	100,000 yr	13.96	4.218	4.85
step 7	step 7	16.61	4.876	5.61
step 8	1,000,000 yr	19.6	5.619	6.46

Mean annual ppt: 20 inches
duration of interest: 6 hours

X2p(figa3) =	0.8 inches
Cv(fig5a) =	0.331
T3(fig6a) =	0.21
K2(tabB2) =	-0.187
Xbar(eqn2) =	0.750

Source of Information:
Washington State Dept. of Ecology. Dam safety Guidelines.
Technical Note 3: Design Storm Construction. April 1993.

TABLE 3.10

COMPARISON OF DISCHARGES, WATER DEPTHS, AND FLOW VELOCITIES FOR THE PMF, 10,000 YEAR FLOOD AND THE 1000 YEAR FLOOD.

7/18/95 Revised 8/17/95

STATIONS	ELEVATION TOP OF RIPRAP 1) (FT)	PROBABLE MAXIMUM FLOOD			10,000 YEAR FLOOD 3)			1000 YEAR FLOOD 3)		
		DISCHARGE (CFS)	WATER LEVEL ELEVATION 2) (FT)	DIFFERENCE BETWEEN TOP OF RIPRAP AND PMF WATER ELEVATION (FT)	DISCHARGE (CFS)	WATER LEVEL ELEVATION 2) (FT)	DIFFERENCE BETWEEN TOP OF RIPRAP AND WATER ELEVATION (FT)	DISCHARGE (CFS)	WATER LEVEL ELEVATION 2) (FT)	DIFFERENCE BETWEEN TOP OF RIPRAP AND WATER ELEVATION (FT)
88 + 00	2133.50	357	2132.40	1.10	62	2129.94	3.56	32	2129.47	4.03
86 + 00	2133.00	357	2131.65	1.35	62	2128.87	4.13	32	2128.33	4.67
84 + 00	2131.50	357	2130.38	1.12	62	2127.49	4.01	32	2126.91	4.59
82 + 00	2130.50	428	2129.04	1.46	76	2126.10	4.40	40	2125.51	4.99
80 + 00	2129.00	428	2127.65	1.35	76	2124.60	4.40	40	2124.02	4.98
78 + 00	2127.50	428	2126.50	1.00	76	2123.11	4.39	40	2122.52	4.98
76 + 00	2127.00	428	2125.77	1.23	76	2121.61	5.39	40	2121.02	5.98
74 + 00	2126.50	428	2125.39	1.11	76	2120.15	6.35	40	2119.52	6.98
72 + 00	2126.50	428	2125.22	1.28	76	2119.15	7.35	40	2118.11	8.39
70 + 00	2126.50	428	2125.13	1.37	76	2118.86	7.64	40	2117.61	8.89
68 + 00	2126.00	1557	2124.53	1.47	272	2117.96	8.04	141	2116.56	9.44
66 + 00	2125.50	1557	2124.13	1.37	272	2117.27	8.23	141	2115.73	9.77
64 + 00	2124.50	3247	2123.15	1.35	559	2116.20	8.30	290	2114.64	9.86
[illegible] + 00	2123.50	3247	2121.99	1.51	559	2114.70	8.80	290	2113.14	10.36
[illegible] + 00	2122.00	3247	2120.90	1.10	559	2113.24	8.76	290	2111.64	10.36
58 + 00	2121.50	3247	2120.02	1.48	559	2111.85	9.65	290	2110.16	11.34
56 + 00	2120.50	3247	2119.36	1.14	559	2110.69	9.81	290	2108.77	11.73
54 + 00	2120.00	3247	2118.94	1.06	559	2109.95	10.05	290	2107.81	12.19
52 + 00	2120.00	3247	2118.61	1.39	559	2109.51	10.49	290	2107.31	12.69
50 + 00	2119.50	3725	2118.26	1.24	641	2109.11	10.39	332	2106.90	12.60
48 + 00	2119.00	3725	2117.90	1.10	641	2108.70	10.30	332	2106.47	12.53
46 + 00	2119.00	3725	2117.54	1.46	641	2108.29	10.71	332	2106.30	12.70
44 + 00	2118.50	4333	2117.20	1.30	746	2107.92	10.58	386	2105.64	12.86
42 + 00	2118.00	4333	2116.76	1.24	746	2107.47	10.53	386	2105.20	12.80
40 + 00	2117.50	4333	2116.37	1.13	746	2107.02	10.48	386	2104.74	12.76
38 + 00	2117.00	4333	2115.93	1.07	746	2106.55	10.45	386	2104.25	12.75
36 + 00	2117.00	4333	2115.51	1.49	746	2106.09	10.91	386	2103.77	13.23
34 + 00	2116.50	4333	2115.10	1.40	746	2105.64	10.86	386	2103.30	13.20
32 + 00	2116.00	4333	2114.71	1.29	746	2105.20	10.80	386	2102.84	13.16
30 + 00	2115.50	4333	2114.32	1.18	746	2104.78	10.72	386	2102.40	13.10
28 + 00	2115.00	4333	2113.95	1.05	746	2104.38	10.62	386	2101.97	13.03
26 + 00	2115.00	4333	2113.59	1.41	746	2104.00	11.00	386	2101.58	13.42
24 + 00	2114.50	4333	2113.24	1.26	746	2103.63	10.87	386	2101.22	13.28
22 + 00	2114.00	5297	2112.89	1.11	907	2103.19	10.81	470	2100.70	13.30
20 + 00	2113.50	5297	2112.34	1.16	907	2102.72	10.78	470	2100.32	13.18
18 + 00	2113.00	5326	2111.86	1.14	913	2102.22	10.78	473	2099.82	13.18
16 + 00	2112.50	5326	2111.35	1.15	913	2101.72	10.78	473	2099.32	13.18
14 + 00	2112.00	5326	2110.85	1.15	913	2101.22	10.78	473	2098.82	13.18
12 + 00	2111.50	5326	2110.35	1.15	913	2100.73	10.77	473	2098.33	13.17
10 + 00	2111.00	5326	2109.85	1.15	913	2100.23	10.77	473	2097.83	13.17
8 + 00	2110.50	5325	2109.35	1.15	912	2099.73	10.77	473	2097.34	13.16
6 + 00	2110.00	5325	2108.83	1.17	912	2099.21	10.79	473	2096.81	13.19
4 + 00	2109.50	5325	2108.33	1.17	912	2098.71	10.79	473	2096.31	13.19
2 + 00	2109.00	5325	2107.83	1.17	912	2098.21	10.79	473	2095.81	13.19
[illegible] + 00	2108.50	5325	2107.32	1.18	912	2097.71	10.79	473	2095.31	13.19

1) TOP OF RIPRAP ELEVATIONS WERE DETERMINED BY ADDING SUPERELEVATION AND 1 FOOT OF FREEBOARD TO THE HEC-2 ANALYSIS THAT INCLUDED TREES GROWING IN CHANNEL ON 1.5 FEET OF SEDIMENT. THE VALUES WERE THEN ROUNDED UP TO THE NEAREST 0.5 FOOT. VALUES OF SUPERELEVATION ARE SHOWN IN TABLE 3.3.

2) WATER LEVEL ELEVATIONS ARE FROM THE HEC-2 ANALYSIS PRESENTED IN ATTACHMENT 2.

3) DISCHARGES WERE DETERMINED USING PRECIPITATION AMOUNTS ESTIMATED USING WDOE'S TECHNICAL NOTE 3, AND HEC-1.

TABLE 3.11 COMPARISON OF FLOOD DISCHARGES FOR THE 1000-YEAR, 10,000-YEAR AND PMP

RECURRENCE INTERVAL	6-HOUR PRECIPITATION	MAXIMUM FLOOD DISCHARGE
1000-YEAR	2.61 INCHES	473 CFS
10,000-YEAR	3.59 INCHES	912 CFS
PMP	11.5 INCHES	5325 CFS

Q: <u>Question No. 2 from the July 06, 1995 meeting in Seattle</u> - Is it feasible to construct sediment traps (pits) at each tributary to intercept and hold sediment before it enters the diversion channel?.

3.8 Construction of Sediment Traps

The design of the diversion channel presented in the 12/94 TRP will be modified based on the concerns of the State of Washington. The new design will take into account sediment deposition, in addition to vegetation growing in the channel, superelevation, and freeboard. The sediment deposition analysis presented in section 1.3 of this response report indicates that very little sediment will be deposited in the channel. The maximum depth of deposited sediment will be 1.5 feet and this will occur during the PMF. Since the channel design is being revised to accommodate sediment deposition, it is concluded that sediment traps are not necessary to augment the additional conservatism inherent to the revised diversion channel design.

Q: <u>Question No. 3 from the July 06, 1995 meeting in Seattle</u> - Does HEC-6 consider the effect of the tributaries, which are much steeper than the diversion channel, dropping their sediment loads as they enter the much flatter diversion channel and forming deltas?

3.9 Deltas at Intersections of Tributaries and Diversion Channel

The design of the tributary confluences, discussed in Appendix E to the 12/94 TRP, minimizes the potential for the formation of deltas by 1) widening the confluences to reduce flow velocities before flood flows enter the diversion channel, 2) regrading each confluence such that the base of the confluence and bed of the diversion

HEC-1 ANALYSES FOR 100-YR, 1,000-YR, AND 10,000-YR EVENTS

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1*****************************************                  ****************************************
*                                       *                 *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                 *  U.S. ARMY CORPS OF ENGINEERS        *
*           MAY  1991                   *                 *  HYDROLOGIC ENGINEERING CENTER       *
*           VERSION 4.0.1E              *                 *  609 SECOND STREET                   *
*   Lahey F77L-EM/32 version 5.01       *                 *  DAVIS, CALIFORNIA 95616             *
*   Dodson & Associates, Inc.           *                 *  (916) 551-1748                      *
* RUN DATE  12/08/99  TIME  14:49:38    *                 *                                      *
*****************************************                  ****************************************


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

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW. THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY, DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```
1                                HEC-1 INPUT                          PAGE  1

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

       1       ID  Input File Name:   P:\317\TASK12\HEC1\EAST_ 100.IH1
       2       ID  DATE:12-08-99
       3       ID  HEC-1  100 YEAR RUNOFF STUDY, SHERWOOD TAILINGS, WESTERN WASHINGTON
       4       ID  EAST DIVERSION CHANNEL MODIFIED TO REDUCE RIPRAP SIZE
       5       ID          CURVE NUMBER = 78
       6       ID  DESIGNED FOR  100 YEAR PRECIPITATION, 2.19 in. IN 6 HOURS WITH SCS TYPE II DI
       7       ID  ANTECEDENT MOISTURE CONDITION III
              *DIAGRAM
       8       IT     1     0  0000   540     0     0
       9       IN     3     0     0
      10       IO     5     0
              *

      11       KK    B1  RUNOFF FROM BASIN 1
      12       KO                        21
      13       PB  2.19
      14       PC  .0000 0.0024 0.0042 0.0062 0.0086 0.0110 0.0126 0.0148 0.0172 0.0198
      15       PC  .0230 0.0254 0.0278 0.0302 0.0326 0.0350 0.0374 0.0404 0.0432 0.0458
      16       PC  .0490 0.0514 0.0544 0.0572 0.0598 0.0630 0.0662 0.0694 0.0726 0.0760
      17       PC  .0800 0.0840 0.0880 0.0920 0.0960 0.1000 0.1048 0.1102 0.1158 0.1214
      18       PC  .1270 0.1326 0.1388 0.1452 0.1516 0.1580 0.1652 0.1730 0.1822 0.1928
      19       PC  .2040 0.2192 0.2374 0.2622 0.2998 0.3590 0.5174 0.6230 0.6802 0.7050
      20       PC  .7250 0.7450 0.7608 0.7736 0.7848 0.7960 0.8032 0.8104 0.8176 0.8246
      21       PC  .8310 0.8374 0.8438 0.8498 0.8554 0.8610 0.8658 0.8706 0.8750 0.8790
      22       PC  .8830 0.8870 0.8910 0.8950 0.8990 0.9030 0.9070 0.9104 0.9140 0.9178
      23       PC  .9210 0.9250 0.9284 0.9316 0.9348 0.9380 0.9412 0.9438 0.9466 0.9496
      24       PC  .9520 0.9552 0.9578 0.9606 0.9636 0.9660 0.9684 0.9708 0.9732 0.9756
      25       PC  .9780 0.9804 0.9828 0.9852 0.9874 0.9890 0.9914 0.9938 0.9958 0.9976
      26       PC  1.000
      27       BA  0.050
      28       LS     0    78
      29       UD  .288
```

```
              *

 30           KK   R-AB  ROUTE REACH AB
 31           KO                         21
 32           RM     4  .0586   .399
              *

 33           KK    B2   RUNOFF FROM BASIN 2
 34           KO                         21
 35           BA   .023
 36           LS     0     78
 37           UD   0.097

 38           KK    NB COMBINE ROUTED REACH AB WITH BASIN B2 AT NODE B
 39           KO                         21
 40           HC     2

 41           KK   R-BC  ROUTE REACH BC
 42           KO                         21
 43           RM     1   .018   .387
1                            HEC-1 INPUT                          PAGE  2

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


 44           KK   B3  RUNOFF FROM BASIN 3
 45           KO                         21
 46           BA   .162
 47           LS     0     78
 48           UD   .297

 49           KK    NC COMBINE ROUTED REACH BC WITH BASIN B3 AT NODE C
 50           KO                         21
 51           HC     2

 52           KK   R-CD  ROUTE REACH CD
 53           KO                         21
 54           RM     2  .0348   .431
              *

 55           KK    B4  RUNOFF FROM BASIN 4
 56           KO                         21
 57           BA   .354
 58           LS     0     78
 59           UD   0.467
              *

 60           KK    ND  COMBINE ROUTED REACH CD WITH BASIN B4 AT NODE D
 61           KO                         21
 62           HC     2
              *

 63           KK   R-DE   ROUTED REACH DE
 64           KO                         21
 65           RM     2  .0343   .411
              *

 66           KK    B5  RUNOFF FROM BASIN 5
 67           KO                         21
 68           BA   0.086
 69           LS     0     78
 70           UD   0.266
              *

 71           KK    NE  COMBINE ROUTED REACH DE WITH BASIN B5 AT NODE E
 72           KO                         21
 73           HC     2
              *

 74           KK   R-EF   ROUTED REACH EF
```

```
      75       KO                          21
      76       RM    4  .0658   .416
             *
1                              HEC-1 INPUT                         PAGE  3

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

      77       KK    B6   RUNOFF FROM BASIN 6
      78       KO                          21
      79       BA  0.111
      80       LS     0    78
      81       UD  0.311
             *

      82       KK    NF  COMBINE ROUTED REACH EF WITH BASIN B6 AT NODE F
      83       KO                          21
      84       HC     2
             *

      85       KK   R-FG   ROUTE REACH FG
      86       KO                          21
      87       RM     1  .0085   .416
             *

      88       KK    B7   RUNOFF FROM BASIN 7
      89       KO                          21
      90       BA  0.278
      91       LS     0    78
      92       UD  0.647
             *

      93       KK    NG  COMBINE ROUTED REACH FG WITH BASIN B7 AT NODE G
      94       KO                          21
      95       HC     2
             *

      96       KK   R-GH   ROUTE REACH GH
      97       KO                          21
      98       RM     2  .0371   .417
             *

      99       KK    B8   RUNOFF FROM BASIN 8
     100       KO                          21
     101       BA   .020
     102       LS     0    78
     103       UD  0.112
             *

     104       KK    NH   COMBINE ROUTED REACH GH WITH BASIN B8 AT NODE H
     105       KO                          21
     106       HC     2
             *

     107       KK   R-HI  ROUTE REACH HI
     108       KO                          21
     109       RM     2   .030    .417
     110       ZZ
1
          SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE     (V) ROUTING         (--->) DIVERSION OR PUMP FLOW

 NO.      (.) CONNECTOR       (<---) RETURN OF DIVERTED OR PUMPED FLOW

  11        B1
            V
            V
  30       R-AB
            .
```

```
             .
  33         .      B2
             .      .
             .      .
  38         NB............
             V
             V
  41        R-BC
             .
             .
  44         .     B3
             .      .
             .      .
  49         NC ............
             V
             V
  52        R-CD
             .
             .
  55         .      B4
             .      .
             .      .
  60         ND............
             V
             V
  63        R-DE
             .
             .
  66         .      B5
             .      .
             .      .
  71         NE............
             V
             V
  74        R-EF
             .
             .
  77         .      B6
             .      .
             .      .
  82         NF............
             V
             V
  85        R-FG
             .
             .
  88         .      B7
             .      .
             .      .
  93         NG............
             V
             V
  96        R-GH
             .
             .
  99         .      B8
             .      .
             .      .
 104         NH............
             V
             V
 107        R-HI
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************                ***************************************
*                           *                         *                       *
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                 *  U.S. ARMY CORPS OF
ENGINEERS   *
*            MAY   1991           *                         *  HYDROLOGIC ENGINEERING CENTER   *
*          VERSION 4.0.1E           *                         *        609 SECOND STREET        *
```

```
*   Lahey F77L-EM/32 version 5.01   *                    *   DAVIS, CALIFORNIA 95616   *
*    Dodson & Associates, Inc.    *                   *    (916) 551-1748        *
* RUN DATE  12/08/99  TIME  14:49:38  *                      *                        *.
*****************************************              ***************************************


            Input File Name:   P:\317\TASK12\HEC1\EAST_ 100.IH1
            DATE:12-08-99
            HEC-1  100 YEAR RUNOFF STUDY, SHERWOOD TAILINGS, WESTERN WASHINGTON
            EAST DIVERSION CHANNEL MODIFIED TO REDUCE RIPRAP SIZE
                 CURVE NUMBER = 78
            DESIGNED FOR  100 YEAR PRECIPITATION, 2.19 in. IN 6 HOURS WITH SCS TYPE II DI
            ANTECEDENT MOISTURE CONDITION III

 10 IO       OUTPUT CONTROL VARIABLES
               IPRNT          5  PRINT CONTROL
               IPLOT          0  PLOT CONTROL
               QSCAL          0.  HYDROGRAPH PLOT SCALE

  IT       HYDROGRAPH TIME DATA
               NMIN           1  MINUTES IN COMPUTATION INTERVAL
               IDATE      1   0  STARTING DATE
               ITIME       0000  STARTING TIME
                 NQ         540  NUMBER OF HYDROGRAPH ORDINATES
              NDDATE      1.  0  ENDING DATE
              NDTIME       0859  ENDING TIME
              ICENT          19  CENTURY MARK

          COMPUTATION INTERVAL    0.02 HOURS
             TOTAL TIME BASE    8.98 HOURS

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


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


       **************
       *            *
 11 KK    *    B1  *     RUNOFF FROM BASIN 1
       *            *
       **************

 12 KO       OUTPUT CONTROL VARIABLES
               IPRNT          5  PRINT CONTROL
               IPLOT          0  PLOT CONTROL
               QSCAL          0.  HYDROGRAPH PLOT SCALE
               IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                IOUT         21  SAVE HYDROGRAPH ON THIS UNIT
               ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
               ISAV2        540  LAST ORDINATE PUNCHED OR SAVED
              TIMINT      0.017  TIME INTERVAL IN HOURS


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

```
          **************
          *            *
30 KK     *    R-AB    *    ROUTE REACH AB
          *            *
          **************

31 KO          OUTPUT CONTROL VARIABLES
                IPRNT        5  PRINT CONTROL
                IPLOT        0  PLOT CONTROL
                QSCAL       0.  HYDROGRAPH PLOT SCALE
                IPNCH        0  PUNCH COMPUTED HYDROGRAPH
                 IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
               TIMINT    0.017  TIME INTERVAL IN HOURS
```

*** ***

```
          **************
          *            *
33 KK     *     B2     *    RUNOFF FROM BASIN 2
          *            *
          **************

34 KO          OUTPUT CONTROL VARIABLES
                IPRNT        5  PRINT CONTROL
                IPLOT        0  PLOT CONTROL
                QSCAL       0.  HYDROGRAPH PLOT SCALE
                IPNCH        0  PUNCH COMPUTED HYDROGRAPH
                 IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
               TIMINT    0.017  TIME INTERVAL IN HOURS
```

*** ***

```
          **************
          *            *
38 KK     *     NB     *    COMBINE ROUTED REACH AB WITH BASIN B2 AT NODE B
          *            *
          **************

39 KO          OUTPUT CONTROL VARIABLES
                IPRNT        5  PRINT CONTROL
                IPLOT        0  PLOT CONTROL
                QSCAL       0.  HYDROGRAPH PLOT SCALE
                IPNCH        0  PUNCH COMPUTED HYDROGRAPH
                 IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
               TIMINT    0.017  TIME INTERVAL IN HOURS
```

*** ***

```
          **************
          *            *
41 KK     *    R-BC    *    ROUTE REACH BC
          *            *
```

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

 42 KO        OUTPUT CONTROL VARIABLES
               IPRNT        5  PRINT CONTROL
               IPLOT        0  PLOT CONTROL
               QSCAL        0.  HYDROGRAPH PLOT SCALE
               IPNCH        0  PUNCH COMPUTED HYDROGRAPH
                IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
               ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
               ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
              TIMINT    0.017  TIME INTERVAL IN HOURS


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

      **************
      *           *
 44 KK   *    B3   *    RUNOFF FROM BASIN 3
      *           *
      **************

 45 KO        OUTPUT CONTROL VARIABLES
               IPRNT        5  PRINT CONTROL
               IPLOT        0  PLOT CONTROL
               QSCAL        0.  HYDROGRAPH PLOT SCALE
               IPNCH        0  PUNCH COMPUTED HYDROGRAPH
                IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
               ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
               ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
              TIMINT    0.017  TIME INTERVAL IN HOURS


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

      **************
      *           *
 49 KK   *    NC   *    COMBINE ROUTED REACH BC WITH BASIN B3 AT NODE C
      *           *
      **************

 50 KO        OUTPUT CONTROL VARIABLES
               IPRNT        5  PRINT CONTROL
               IPLOT        0  PLOT CONTROL
               QSCAL        0.  HYDROGRAPH PLOT SCALE
               IPNCH        0  PUNCH COMPUTED HYDROGRAPH
                IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
               ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
               ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
              TIMINT    0.017  TIME INTERVAL IN HOURS


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

      **************
      *           *
 52 KK   *   R-CD  *    ROUTE REACH CD
      *           *
      **************

 53 KO        OUTPUT CONTROL VARIABLES
               IPRNT        5  PRINT CONTROL
```

```
             IPLOT        0  PLOT CONTROL
             QSCAL        0.  HYDROGRAPH PLOT SCALE
             IPNCH        0  PUNCH COMPUTED HYDROGRAPH
             IOUT        21  SAVE HYDROGRAPH ON THIS UNIT
             ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
             ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
             TIMINT   0.017  TIME INTERVAL IN HOURS
```

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

       **************
       *            *
55 KK  *      B4    *   RUNOFF FROM BASIN 4
       *            *
       **************

56 KO        OUTPUT CONTROL VARIABLES
             IPRNT        5  PRINT CONTROL
             IPLOT        0  PLOT CONTROL
             QSCAL        0.  HYDROGRAPH PLOT SCALE
             IPNCH        0  PUNCH COMPUTED HYDROGRAPH
             IOUT        21  SAVE HYDROGRAPH ON THIS UNIT
             ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
             ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
             TIMINT   0.017  TIME INTERVAL IN HOURS

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

       **************
       *            *
60 KK  *      ND    *   COMBINE ROUTED REACH CD WITH BASIN B4 AT NODE D
       *            *
       **************

61 KO        OUTPUT CONTROL VARIABLES
             IPRNT        5  PRINT CONTROL
             IPLOT        0  PLOT CONTROL
             QSCAL        0.  HYDROGRAPH PLOT SCALE
             IPNCH        0  PUNCH COMPUTED HYDROGRAPH
             IOUT        21  SAVE HYDROGRAPH ON THIS UNIT
             ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
             ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
             TIMINT   0.017  TIME INTERVAL IN HOURS

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

       **************
       *            *
63 KK  *    R-DE    *   ROUTED REACH DE
       *            *
       **************

64 KO        OUTPUT CONTROL VARIABLES
             IPRNT        5  PRINT CONTROL
             IPLOT        0  PLOT CONTROL
             QSCAL        0.  HYDROGRAPH PLOT SCALE
             IPNCH        0  PUNCH COMPUTED HYDROGRAPH
             IOUT        21  SAVE HYDROGRAPH ON THIS UNIT
```

```
              ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
              ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
              TIMINT   0.017  TIME INTERVAL IN HOURS


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

        **************
        *            *
  66 KK *     B5     *   RUNOFF FROM BASIN 5
        *            *
        **************

  67 KO       OUTPUT CONTROL VARIABLES
              IPRNT        5  PRINT CONTROL
              IPLOT        0  PLOT CONTROL
              QSCAL       0.  HYDROGRAPH PLOT SCALE
              IPNCH        0  PUNCH COMPUTED HYDROGRAPH
              IOUT        21  SAVE HYDROGRAPH ON THIS UNIT
              ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
              ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
              TIMINT   0.017  TIME INTERVAL IN HOURS


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

        **************
        *            *
  71 KK *     NE     *   COMBINE ROUTED REACH DE WITH BASIN B5 AT NODE E
        *            *
        **************

  72 KO       OUTPUT CONTROL VARIABLES
              IPRNT        5  PRINT CONTROL
              IPLOT        0  PLOT CONTROL
              QSCAL       0.  HYDROGRAPH PLOT SCALE
              IPNCH        0  PUNCH COMPUTED HYDROGRAPH
              IOUT        21  SAVE HYDROGRAPH ON THIS UNIT
              ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
              ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
              TIMINT   0.017  TIME INTERVAL IN HOURS


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

        **************
        *            *
  74 KK *    R-EF    *   ROUTED REACH EF
        *            *
        **************

  75 KO       OUTPUT CONTROL VARIABLES
              IPRNT        5  PRINT CONTROL
              IPLOT        0  PLOT CONTROL
              QSCAL       0.  HYDROGRAPH PLOT SCALE
              IPNCH        0  PUNCH COMPUTED HYDROGRAPH
              IOUT        21  SAVE HYDROGRAPH ON THIS UNIT
              ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
              ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
              TIMINT   0.017  TIME INTERVAL IN HOURS
```

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

        **************
        *            *
77 KK   *     B6     *     RUNOFF FROM BASIN 6
        *            *
        **************

78 KO        OUTPUT CONTROL VARIABLES
              IPRNT        5  PRINT CONTROL
              IPLOT        0  PLOT CONTROL
              QSCAL       0.  HYDROGRAPH PLOT SCALE
              IPNCH        0  PUNCH COMPUTED HYDROGRAPH
              IOUT        21  SAVE HYDROGRAPH ON THIS UNIT
              ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
              ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
              TIMINT   0.017  TIME INTERVAL IN HOURS

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

        **************
        *            *
82 KK   *     NF     *     COMBINE ROUTED REACH EF WITH BASIN B6 AT NODE F
        *            *
        **************

83 KO        OUTPUT CONTROL VARIABLES
              IPRNT        5  PRINT CONTROL
              IPLOT        0  PLOT CONTROL
              QSCAL       0.  HYDROGRAPH PLOT SCALE
              IPNCH        0  PUNCH COMPUTED HYDROGRAPH
              IOUT        21  SAVE HYDROGRAPH ON THIS UNIT
              ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
              ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
              TIMINT   0.017  TIME INTERVAL IN HOURS

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

        **************
        *            *
85 KK   *    R-FG    *     ROUTE REACH FG
        *            *
        **************

86 KO        OUTPUT CONTROL VARIABLES
              IPRNT        5  PRINT CONTROL
              IPLOT        0  PLOT CONTROL
              QSCAL       0.  HYDROGRAPH PLOT SCALE
              IPNCH        0  PUNCH COMPUTED HYDROGRAPH
              IOUT        21  SAVE HYDROGRAPH ON THIS UNIT
              ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
              ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
              TIMINT   0.017  TIME INTERVAL IN HOURS

***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    R-FG.
   REDUCE NSTPS OR DECREASE YOUR COMPUTATION INTERVAL (FIRST FIELD OF THE IT RECORD).
```

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

        **************
        *            *
 88 KK  *      B7    *     RUNOFF FROM BASIN 7
        *            *
        **************

 89 KO        OUTPUT CONTROL VARIABLES
               IPRNT         5  PRINT CONTROL
               IPLOT         0  PLOT CONTROL
               QSCAL         0.  HYDROGRAPH PLOT SCALE
               IPNCH         0  PUNCH COMPUTED HYDROGRAPH
               IOUT         21  SAVE HYDROGRAPH ON THIS UNIT
               ISAV1         1  FIRST ORDINATE PUNCHED OR SAVED
               ISAV2       540  LAST ORDINATE PUNCHED OR SAVED
               TIMINT    0.017  TIME INTERVAL IN HOURS


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

        **************
        *            *
 93 KK  *      NG    *     COMBINE ROUTED REACH FG WITH BASIN B7 AT NODE G
        *            *
        **************

 94 KO        OUTPUT CONTROL VARIABLES
               IPRNT         5  PRINT CONTROL
               IPLOT         0  PLOT CONTROL
               QSCAL         0.  HYDROGRAPH PLOT SCALE
               IPNCH         0  PUNCH COMPUTED HYDROGRAPH
               IOUT         21  SAVE HYDROGRAPH ON THIS UNIT
               ISAV1         1  FIRST ORDINATE PUNCHED OR SAVED
               ISAV2       540  LAST ORDINATE PUNCHED OR SAVED
               TIMINT    0.017  TIME INTERVAL IN HOURS


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

        **************
        *            *
 96 KK  *    R-GH    *     ROUTE REACH GH
        *            *
        **************

 97 KO        OUTPUT CONTROL VARIABLES
               IPRNT         5  PRINT CONTROL
               IPLOT         0  PLOT CONTROL
               QSCAL         0.  HYDROGRAPH PLOT SCALE
               IPNCH         0  PUNCH COMPUTED HYDROGRAPH
               IOUT         21  SAVE HYDROGRAPH ON THIS UNIT
               ISAV1         1  FIRST ORDINATE PUNCHED OR SAVED
               ISAV2       540  LAST ORDINATE PUNCHED OR SAVED
               TIMINT    0.017  TIME INTERVAL IN HOURS


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

```
             **************
             *            *
 99 KK       *     B8     *     RUNOFF FROM BASIN 8
             *            *
             **************

100 KO       OUTPUT CONTROL VARIABLES
              IPRNT         5  PRINT CONTROL
              IPLOT         0  PLOT CONTROL
              QSCAL        0.  HYDROGRAPH PLOT SCALE
              IPNCH         0  PUNCH COMPUTED HYDROGRAPH
               IOUT        21  SAVE HYDROGRAPH ON THIS UNIT
              ISAV1         1  FIRST ORDINATE PUNCHED OR SAVED
              ISAV2       540  LAST ORDINATE PUNCHED OR SAVED
             TIMINT     0.017  TIME INTERVAL IN HOURS


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

             **************
             *            *
104 KK       *     NH     *     COMBINE ROUTED REACH GH WITH BASIN B8 AT NODE H
             *            *
             **************

105 KO       OUTPUT CONTROL VARIABLES
              IPRNT         5  PRINT CONTROL
              IPLOT         0  PLOT CONTROL
              QSCAL        0.  HYDROGRAPH PLOT SCALE
              IPNCH         0  PUNCH COMPUTED HYDROGRAPH
               IOUT        21  SAVE HYDROGRAPH ON THIS UNIT
              ISAV1         1  FIRST ORDINATE PUNCHED OR SAVED
              ISAV2       540  LAST ORDINATE PUNCHED OR SAVED
             TIMINT     0.017  TIME INTERVAL IN HOURS


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

             **************
             *            *
107 KK       *    R-HI    *     ROUTE REACH HI
             *            *
             **************

108 KO       OUTPUT CONTROL VARIABLES
              IPRNT         5  PRINT CONTROL
              IPLOT         0  PLOT CONTROL
              QSCAL        0.  HYDROGRAPH PLOT SCALE
              IPNCH         0  PUNCH COMPUTED HYDROGRAPH
               IOUT        21  SAVE HYDROGRAPH ON THIS UNIT
              ISAV1         1  FIRST ORDINATE PUNCHED OR SAVED
              ISAV2       540  LAST ORDINATE PUNCHED OR SAVED
             TIMINT     0.017  TIME INTERVAL IN HOURS

1
                                   RUNOFF SUMMARY
                              FLOW IN CUBIC FEET PER SECOND
                            TIME IN HOURS,  AREA IN SQUARE MILES

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

	HYDROGRAPH AT							
+		B1	21.	3.15	3.	2.	2.	0.05
	ROUTED TO							
+		R-AB	21.	3.22	3.	2.	2.	0.05
	HYDROGRAPH AT							
+		B2	18.	2.93	1.	1.	1.	0.02
	2 COMBINED AT							
+		NB	26.	3.18	5.	3.	3.	0.07
	ROUTED TO							
+		R-BC	26.	3.20	5.	3.	3.	0.07
	HYDROGRAPH AT							
+		B3	67.	3.17	10.	7.	7.	0.16
	2 COMBINED AT							
+		NC	93.	3.17	15.	10.	10.	0.23
	ROUTED TO							
+		R-CD	93.	3.22	15.	10.	10.	0.23
	HYDROGRAPH AT							
+		B4	108.	3.37	23.	15.	15.	0.35
	2 COMBINED AT							
+		ND	191.	3.28	38.	25.	25.	0.59
	ROUTED TO							
+		R-DE	191.	3.32	38.	25.	25.	0.59
	HYDROGRAPH AT							
+		B5	38.	3.13	5.	4.	4.	0.09
	2 COMBINED AT							
+		NE	219.	3.28	43.	29.	29.	0.68
	ROUTED TO							
+		R-EF	218.	3.35	43.	29.	29.	0.68
	HYDROGRAPH AT							
+		B6	44.	3.18	7.	5.	5.	0.11
	2 COMBINED AT							
+		NF	254.	3.33	50.	34.	34.	0.79
	ROUTED TO							
+		R-FG	254.	3.33	50.	34.	34.	0.79
	HYDROGRAPH AT							
+		B7	67.	3.58	18.	12.	12.	0.28
	2 COMBINED AT							
+		NG	309.	3.37	68.	45.	45.	1.06
	ROUTED TO							
+		R-GH	309.	3.40	68.	45.	45.	1.06
	HYDROGRAPH AT							
+		B8	15.	2.95	1.	1.	1.	0.02
	2 COMBINED AT							
+		NH	312.	3.40	69.	46.	46.	1.08
	ROUTED TO							
+		R-HI	312.	3.43	69.	46.	46.	1.08

```
1*****************************************                    ****************************************
*                    *                         *                             *
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *              *  U.S. ARMY CORPS OF ENGINEERS    *
*           MAY   1991             *               *  HYDROLOGIC ENGINEERING CENTER   *
*         VERSION 4.0.1E               *              *       609 SECOND STREET        *
*   Lahey F77L-EM/32 version 5.01    *              *   DAVIS, CALIFORNIA 95616      *
*     Dodson & Associates, Inc.      *                 *      (916) 551-1748         *
* RUN DATE  12/08/99  TIME  14:52:11  *                   *                         *
*****************************************                    ****************************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X         X     X       XX
X     X  X         X              X
XXXXXXXXXXX        X       XXXXX  X
X     X  X         X              X
X     X  X         X     X        X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW. THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY, DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```
1                                HEC-1 INPUT                                PAGE  1

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

        1        ID  Input File Name:    P:\317\TASK12\HEC1\EAST1000.IH1
        2        ID  DATE:12-08-99
        3        ID  HEC-1 1000 YEAR RUNOFF STUDY, SHERWOOD TAILINGS, WESTERN WASHINGTON
        4        ID  EAST DIVERSION CHANNEL MODIFIED TO REDUCE RIPRAP SIZE
        5        ID          CURVE NUMBER = 78
        6        ID  DESIGNED FOR 1000 YEAR PRECIPITATION, 3.13 in. IN 6 HOURS WITH SCS TYPE II DI
        7        ID  ANTECEDENT MOISTURE CONDITION III
                *DIAGRAM
        8        IT     1     0  0000     540     0     0
        9        IN     3     0     0
       10        IO     5     0
                *

       11        KK     B1  RUNOFF FROM BASIN 1
       12        KO                             21
       13        PB   3.13
       14        PC  .0000 0.0024 0.0042 0.0062 0.0086 0.0110 0.0126 0.0148 0.0172 0.0198
       15        PC  .0230 0.0254 0.0278 0.0302 0.0326 0.0350 0.0374 0.0404 0.0432 0.0458
       16        PC  .0490 0.0514 0.0544 0.0572 0.0598 0.0630 0.0662 0.0694 0.0726 0.0760
       17        PC  .0800 0.0840 0.0880 0.0920 0.0960 0.1000 0.1048 0.1102 0.1158 0.1214
       18        PC  .1270 0.1326 0.1388 0.1452 0.1516 0.1580 0.1652 0.1730 0.1822 0.1928
       19        PC  .2040 0.2192 0.2374 0.2622 0.2998 0.3590 0.5174 0.6230 0.6802 0.7050
       20        PC  .7250 0.7450 0.7608 0.7736 0.7848 0.7960 0.8032 0.8104 0.8176 0.8246
       21        PC  .8310 0.8374 0.8438 0.8498 0.8554 0.8610 0.8658 0.8706 0.8750 0.8790
       22        PC  .8830 0.8870 0.8910 0.8950 0.8990 0.9030 0.9070 0.9104 0.9140 0.9178
       23        PC  .9210 0.9250 0.9284 0.9316 0.9348 0.9380 0.9412 0.9438 0.9466 0.9496
       24        PC  .9520 0.9552 0.9578 0.9606 0.9636 0.9660 0.9684 0.9708 0.9732 0.9756
       25        PC  .9780 0.9804 0.9828 0.9852 0.9874 0.9890 0.9914 0.9938 0.9958 0.9976
       26        PC  1.000
       27        BA  0.050
       28        LS     0    78
       29        UD  .288
                *
```

```
  30      KK   R-AB  ROUTE REACH AB
  31      KO                        21
  32      RM     4  .0586   .399
         *

  33      KK    B2   RUNOFF FROM BASIN 2
  34      KO                        21
  35      BA   .023
  36      LS     0     78
  37      UD   0.097

  38      KK     NB COMBINE ROUTED REACH AB WITH BASIN B2 AT NODE B
  39      KO                        21
  40      HC     2

  41      KK   R-BC  ROUTE REACH BC
  42      KO                        21
  43      RM     1   .018   .387
1                          HEC-1 INPUT                              PAGE  2

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


  44      KK   B3  RUNOFF FROM BASIN 3
  45      KO                        21
  46      BA   .162
  47      LS     0     78
  48      UD   .297

  49      KK    NC COMBINE ROUTED REACH BC WITH BASIN B3 AT NODE C
  50      KO                        21
  51      HC     2

  52      KK   R-CD  ROUTE REACH CD
  53      KO                        21
  54      RM     2  .0348   .431
         *

  55      KK     B4  RUNOFF FROM BASIN 4
  56      KO                        21
  57      BA   .354
  58      LS     0     78
  59      UD   0.467
         *

  60      KK     ND  COMBINE ROUTED REACH CD WITH BASIN B4 AT NODE D
  61      KO                        21
  62      HC     2
         *

  63      KK   R-DE   ROUTED REACH DE
  64      KO                        21
  65      RM     2  .0343   .411
         *

  66      KK     B5  RUNOFF FROM BASIN 5
  67      KO                        21
  68      BA   0.086
  69      LS     0     78
  70      UD   0.266
         *

  71      KK     NE  COMBINE ROUTED REACH DE WITH BASIN B5 AT NODE E
  72      KO                        21
  73      HC     2
         *

  74      KK   R-EF   ROUTED REACH EF
  75      KO                        21
```

```
      76        RM     4  .0658   .416
               *
 1                               HEC-1 INPUT                          PAGE  3

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


      77        KK     B6   RUNOFF FROM BASIN 6
      78        KO                            21
      79        BA   0.111
      80        LS      0     78
      81        UD   0.311
               *

      82        KK     NF   COMBINE ROUTED REACH EF WITH BASIN B6 AT NODE F
      83        KO                            21
      84        HC      2
               *

      85        KK   R-FG   ROUTE REACH FG
      86        KO                            21
      87        RM      1  .0085   .416
               *

      88        KK     B7   RUNOFF FROM BASIN 7
      89        KO                            21
      90        BA   0.278
      91        LS      0     78
      92        UD   0.647
               *

      93        KK     NG   COMBINE ROUTED REACH FG WITH BASIN B7 AT NODE G
      94        KO                            21
      95        HC      2
               *

      96        KK   R-GH   ROUTE REACH GH
      97        KO                            21
      98        RM      2  .0371   .417
               *

      99        KK     B8   RUNOFF FROM BASIN 8
     100        KO                            21
     101        BA   .020
     102        LS      0     78
     103        UD   0.112
               *

     104        KK     NH   COMBINE ROUTED REACH GH WITH BASIN B8 AT NODE H
     105        KO                            21
     106        HC      2
               *

     107        KK   R-HI   ROUTE REACH HI
     108        KO                            21
     109        RM      2   .030   .417
     110        ZZ
 1
           SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING         (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR       (<---) RETURN OF DIVERTED OR PUMPED FLOW

   11        B1
             V
             V
   30      R-AB
             .
             .
```

```
  33        .      B2
           .       .
           .       .
  38        NB............
           V
           V
  41      R-BC
           .
           .
  44        .      B3
           .       .
           .       .
  49       NC ............
           V
           V
  52      R-CD
           .
           .
  55        .       B4
           .       .
           .       .
  60        ND............
           V
           V
  63      R-DE
           .
           .
  66        .       B5
           .       .
           .       .
  71        NE............
           V
           V
  74      R-EF
           .
           .
  77        .       B6
           .       .
           .       .
  82        NF............
           V
           V
  85      R-FG
           .
           .
  88        .       B7
           .       .
           .       .
  93        NG............
           V
           V
  96      R-GH
           .
           .
  99        .       B8
           .       .
           .       .
 104        NH............
           V
           V
 107       R-HI

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*******************************************                *****************************************
*                                         *                 *                                       *
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1)      *                 *  U.S. ARMY CORPS OF ENGINEERS         *
*            MAY   1991                   *                 *  HYDROLOGIC ENGINEERING CENTER        *
*          VERSION 4.0.1E                 *                 *         609 SECOND STREET             *
*   Lahey F77L-EM/32 version 5.01         *                 *      DAVIS, CALIFORNIA 95616          *
*     Dodson & Associates, Inc.           *                 *          (916) 551-1748               *
```

```
* RUN DATE  12/08/99  TIME  14:52:11  *                                        *                        *
*******************************************                       *****************************************



                 Input File Name:    P:\317\TASK12\HEC1\EAST1000.IH1
                 DATE:12-08-99
                 HEC-1 1000 YEAR RUNOFF STUDY, SHERWOOD TAILINGS, WESTERN WASHINGTON
                 EAST DIVERSION CHANNEL MODIFIED TO REDUCE RIPRAP SIZE
                        CURVE NUMBER = 78
                 DESIGNED FOR 1000 YEAR PRECIPITATION, 3.13 in. IN 6 HOURS WITH SCS TYPE II DI
                 ANTECEDENT MOISTURE CONDITION III

 10 IO      OUTPUT CONTROL VARIABLES
              IPRNT        5  PRINT CONTROL
              IPLOT        0  PLOT CONTROL
              QSCAL        0.  HYDROGRAPH PLOT SCALE

  IT      HYDROGRAPH TIME DATA
              NMIN         1  MINUTES IN COMPUTATION INTERVAL
             IDATE      1    0  STARTING DATE
             ITIME      0000  STARTING TIME
                NQ       540  NUMBER OF HYDROGRAPH ORDINATES
           NDDATE       1    0  ENDING DATE
           NDTIME       0859  ENDING TIME
            ICENT         19  CENTURY MARK

         COMPUTATION INTERVAL     0.02 HOURS
            TOTAL TIME BASE     8.98 HOURS

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


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


      ***************
      *             *
 11 KK   *      B1 *      RUNOFF FROM BASIN 1
      *             *
      ***************

 12 KO      OUTPUT CONTROL VARIABLES
              IPRNT        5  PRINT CONTROL
              IPLOT        0  PLOT CONTROL
              QSCAL        0.  HYDROGRAPH PLOT SCALE
              IPNCH        0  PUNCH COMPUTED HYDROGRAPH
               IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
              ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
              ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
             TIMINT    0.017  TIME INTERVAL IN HOURS


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


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

```
30 KK   *   R-AB  *    ROUTE REACH AB
        *          *
        **************

31 KO      OUTPUT CONTROL VARIABLES
            IPRNT        5  PRINT CONTROL
            IPLOT        0  PLOT CONTROL
            QSCAL        0.  HYDROGRAPH PLOT SCALE
            IPNCH        0  PUNCH COMPUTED HYDROGRAPH
             IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
            ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
            ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
           TIMINT    0.017  TIME INTERVAL IN HOURS


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

        **************
        *          *
33 KK   *    B2   *    RUNOFF FROM BASIN 2
        *          *
        **************

34 KO      OUTPUT CONTROL VARIABLES
            IPRNT        5  PRINT CONTROL
            IPLOT        0  PLOT CONTROL
            QSCAL        0.  HYDROGRAPH PLOT SCALE
            IPNCH        0  PUNCH COMPUTED HYDROGRAPH
             IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
            ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
            ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
           TIMINT    0.017  TIME INTERVAL IN HOURS


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

        **************
        *          *
38 KK   *    NB   *    COMBINE ROUTED REACH AB WITH BASIN B2 AT NODE B
        *          *
        **************

39 KO      OUTPUT CONTROL VARIABLES
            IPRNT        5  PRINT CONTROL
            IPLOT        0  PLOT CONTROL
            QSCAL        0.  HYDROGRAPH PLOT SCALE
            IPNCH        0  PUNCH COMPUTED HYDROGRAPH
             IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
            ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
            ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
           TIMINT    0.017  TIME INTERVAL IN HOURS


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

        **************
        *          *
41 KK   *   R-BC  *    ROUTE REACH BC
        *          *
        **************
```

```
42 KO      OUTPUT CONTROL VARIABLES
            IPRNT        5  PRINT CONTROL
            IPLOT        0  PLOT CONTROL
            QSCAL        0.  HYDROGRAPH PLOT SCALE
            IPNCH        0  PUNCH COMPUTED HYDROGRAPH
             IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
            ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
            ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
           TIMINT    0.017  TIME INTERVAL IN HOURS


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

          **************
          *            *
44 KK     *     B3     *   RUNOFF FROM BASIN 3
          *            *
          **************

45 KO      OUTPUT CONTROL VARIABLES
            IPRNT        5  PRINT CONTROL
            IPLOT        0  PLOT CONTROL
            QSCAL        0.  HYDROGRAPH PLOT SCALE
            IPNCH        0  PUNCH COMPUTED HYDROGRAPH
             IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
            ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
            ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
           TIMINT    0.017  TIME INTERVAL IN HOURS


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

          **************
          *            *
49 KK     *     NC     *   COMBINE ROUTED REACH BC WITH BASIN B3 AT NODE C
          *            *
          **************

50 KO      OUTPUT CONTROL VARIABLES
            IPRNT        5  PRINT CONTROL
            IPLOT        0  PLOT CONTROL
            QSCAL        0.  HYDROGRAPH PLOT SCALE
            IPNCH        0  PUNCH COMPUTED HYDROGRAPH
             IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
            ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
            ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
           TIMINT    0.017  TIME INTERVAL IN HOURS


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

          **************
          *            *
52 KK     *    R-CD    *   ROUTE REACH CD
          *            *
          **************

53 KO      OUTPUT CONTROL VARIABLES
            IPRNT        5  PRINT CONTROL
            IPLOT        0  PLOT CONTROL
            QSCAL        0.  HYDROGRAPH PLOT SCALE
```

```
               IPNCH        0  PUNCH COMPUTED HYDROGRAPH
                IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
               ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
               ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
              TIMINT    0.017  TIME INTERVAL IN HOURS


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

         **************
         *            *
 55 KK   *     B4     *   RUNOFF FROM BASIN 4
         *            *
         **************

 56 KO          OUTPUT CONTROL VARIABLES
               IPRNT        5  PRINT CONTROL
               IPLOT        0  PLOT CONTROL
               QSCAL       0.  HYDROGRAPH PLOT SCALE
               IPNCH        0  PUNCH COMPUTED HYDROGRAPH
                IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
               ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
               ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
              TIMINT    0.017  TIME INTERVAL IN HOURS


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

         **************
         *            *
 60 KK   *     ND     *   COMBINE ROUTED REACH CD WITH BASIN B4 AT NODE D
         *            *
         **************

 61 KO          OUTPUT CONTROL VARIABLES
               IPRNT        5  PRINT CONTROL
               IPLOT        0  PLOT CONTROL
               QSCAL       0.  HYDROGRAPH PLOT SCALE
               IPNCH        0  PUNCH COMPUTED HYDROGRAPH
                IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
               ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
               ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
              TIMINT    0.017  TIME INTERVAL IN HOURS


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

         **************
         *            *
 63 KK   *    R-DE    *   ROUTED REACH DE
         *            *
         **************

 64 KO          OUTPUT CONTROL VARIABLES
               IPRNT        5  PRINT CONTROL
               IPLOT        0  PLOT CONTROL
               QSCAL       0.  HYDROGRAPH PLOT SCALE
               IPNCH        0  PUNCH COMPUTED HYDROGRAPH
                IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
               ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
               ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
```

```
TIMINT      0.017  TIME INTERVAL IN HOURS


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

       **************
       *          *
66 KK  *     B5 *     RUNOFF FROM BASIN 5
       *          *
       **************

67 KO       OUTPUT CONTROL VARIABLES
             IPRNT        5  PRINT CONTROL
             IPLOT        0  PLOT CONTROL
             QSCAL        0.  HYDROGRAPH PLOT SCALE
             IPNCH        0  PUNCH COMPUTED HYDROGRAPH
             IOUT        21  SAVE HYDROGRAPH ON THIS UNIT
             ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
             ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
            TIMINT    0.017  TIME INTERVAL IN HOURS


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

       **************
       *          *
71 KK  *     NE *     COMBINE ROUTED REACH DE WITH BASIN B5 AT NODE E
       *          *
       **************

72 KO       OUTPUT CONTROL VARIABLES
             IPRNT        5  PRINT CONTROL
             IPLOT        0  PLOT CONTROL
             QSCAL        0.  HYDROGRAPH PLOT SCALE
             IPNCH        0  PUNCH COMPUTED HYDROGRAPH
             IOUT        21  SAVE HYDROGRAPH ON THIS UNIT
             ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
             ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
            TIMINT    0.017  TIME INTERVAL IN HOURS


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

       **************
       *          *
74 KK  *   R-EF *     ROUTED REACH EF
       *          *
       **************

75 KO       OUTPUT CONTROL VARIABLES
             IPRNT        5  PRINT CONTROL
             IPLOT        0  PLOT CONTROL
             QSCAL        0.  HYDROGRAPH PLOT SCALE
             IPNCH        0  PUNCH COMPUTED HYDROGRAPH
             IOUT        21  SAVE HYDROGRAPH ON THIS UNIT
             ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
             ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
            TIMINT    0.017  TIME INTERVAL IN HOURS
```

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

      **************
      *            *
77 KK *      B6    *     RUNOFF FROM BASIN 6
      *            *
      **************

78 KO       OUTPUT CONTROL VARIABLES
             IPRNT        5  PRINT CONTROL
             IPLOT        0  PLOT CONTROL
             QSCAL        0.  HYDROGRAPH PLOT SCALE
             IPNCH        0  PUNCH COMPUTED HYDROGRAPH
              IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
             ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
             ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
            TIMINT    0.017  TIME INTERVAL IN HOURS

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

      **************
      *            *
82 KK *      NF    *     COMBINE ROUTED REACH EF WITH BASIN B6 AT NODE F
      *            *
      **************

83 KO       OUTPUT CONTROL VARIABLES
             IPRNT        5  PRINT CONTROL
             IPLOT        0  PLOT CONTROL
             QSCAL        0.  HYDROGRAPH PLOT SCALE
             IPNCH        0  PUNCH COMPUTED HYDROGRAPH
              IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
             ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
             ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
            TIMINT    0.017  TIME INTERVAL IN HOURS

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

      **************
      *            *
85 KK *    R-FG    *     ROUTE REACH FG
      *            *
      **************

86 KO       OUTPUT CONTROL VARIABLES
             IPRNT        5  PRINT CONTROL
             IPLOT        0  PLOT CONTROL
             QSCAL        0.  HYDROGRAPH PLOT SCALE
             IPNCH        0  PUNCH COMPUTED HYDROGRAPH
              IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
             ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
             ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
            TIMINT    0.017  TIME INTERVAL IN HOURS

***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    R-FG.
   REDUCE NSTPS OR DECREASE YOUR COMPUTATION INTERVAL (FIRST FIELD OF THE IT RECORD).

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

```
              **************
              *            *
 88 KK        *     B7     *     RUNOFF FROM BASIN 7
              *            *
              **************

 89 KO         OUTPUT CONTROL VARIABLES
                IPRNT          5  PRINT CONTROL
                IPLOT          0  PLOT CONTROL
                QSCAL         0.  HYDROGRAPH PLOT SCALE
                IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                 IOUT         21  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2        540  LAST ORDINATE PUNCHED OR SAVED
               TIMINT      0.017  TIME INTERVAL IN HOURS


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

              **************
              *            *
 93 KK        *     NG     *     COMBINE ROUTED REACH FG WITH BASIN B7 AT NODE G
              *            *
              **************

 94 KO         OUTPUT CONTROL VARIABLES
                IPRNT          5  PRINT CONTROL
                IPLOT          0  PLOT CONTROL
                QSCAL         0.  HYDROGRAPH PLOT SCALE
                IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                 IOUT         21  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2        540  LAST ORDINATE PUNCHED OR SAVED
               TIMINT      0.017  TIME INTERVAL IN HOURS


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

              **************
              *            *
 96 KK        *    R-GH    *     ROUTE REACH GH
              *            *
              **************

 97 KO         OUTPUT CONTROL VARIABLES
                IPRNT          5  PRINT CONTROL
                IPLOT          0  PLOT CONTROL
                QSCAL         0.  HYDROGRAPH PLOT SCALE
                IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                 IOUT         21  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2        540  LAST ORDINATE PUNCHED OR SAVED
               TIMINT      0.017  TIME INTERVAL IN HOURS


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

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

```
 99 KK    *     B8  *      RUNOFF FROM BASIN 8
          *         *
          **************

100 KO        OUTPUT CONTROL VARIABLES
              IPRNT         5  PRINT CONTROL
              IPLOT         0  PLOT CONTROL
              QSCAL         0.  HYDROGRAPH PLOT SCALE
              IPNCH         0  PUNCH COMPUTED HYDROGRAPH
               IOUT        21  SAVE HYDROGRAPH ON THIS UNIT
              ISAV1         1  FIRST ORDINATE PUNCHED OR SAVED
              ISAV2       540  LAST ORDINATE PUNCHED OR SAVED
             TIMINT     0.017  TIME INTERVAL IN HOURS


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

          **************
          *         *
104 KK    *     NH  *      COMBINE ROUTED REACH GH WITH BASIN B8 AT NODE H
          *         *
          **************

105 KO        OUTPUT CONTROL VARIABLES
              IPRNT         5  PRINT CONTROL
              IPLOT         0  PLOT CONTROL
              QSCAL         0.  HYDROGRAPH PLOT SCALE
              IPNCH         0  PUNCH COMPUTED HYDROGRAPH
               IOUT        21  SAVE HYDROGRAPH ON THIS UNIT
              ISAV1         1  FIRST ORDINATE PUNCHED OR SAVED
              ISAV2       540  LAST ORDINATE PUNCHED OR SAVED
             TIMINT     0.017  TIME INTERVAL IN HOURS


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

          **************
          *         *
107 KK    *   R-HI  *      ROUTE REACH HI
          *         *
          **************

108 KO        OUTPUT CONTROL VARIABLES
              IPRNT         5  PRINT CONTROL
              IPLOT         0  PLOT CONTROL
              QSCAL         0.  HYDROGRAPH PLOT SCALE
              IPNCH         0  PUNCH COMPUTED HYDROGRAPH
               IOUT        21  SAVE HYDROGRAPH ON THIS UNIT
              ISAV1         1  FIRST ORDINATE PUNCHED OR SAVED
              ISAV2       540  LAST ORDINATE PUNCHED OR SAVED
             TIMINT     0.017  TIME INTERVAL IN HOURS

1
                              RUNOFF SUMMARY
                         FLOW IN CUBIC FEET PER SECOND
                      TIME IN HOURS,  AREA IN SQUARE MILES

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

    HYDROGRAPH AT
+                  B1     47.   3.13        7.       4.       4.    0.05
```

+	ROUTED TO	R-AB	47.	3.18	7.	4.	4.	0.05
+	HYDROGRAPH AT	B2	40.	2.92	3.	2.	2.	0.02
+	2 COMBINED AT	NB	58.	3.15	10.	6.	6.	0.07
+	ROUTED TO	R-BC	58.	3.17	10.	6.	6.	0.07
+	HYDROGRAPH AT	B3	150.	3.15	21.	14.	14.	0.16
+	2 COMBINED AT	NC	208.	3.15	31.	21.	21.	0.23
+	ROUTED TO	R-CD	208.	3.18	31.	21.	21.	0.23
+	HYDROGRAPH AT	B4	241.	3.35	47.	31.	31.	0.35
+	2 COMBINED AT	ND	428.	3.25	77.	52.	52.	0.59
+	ROUTED TO	R-DE	427.	3.28	77.	52.	52.	0.59
+	HYDROGRAPH AT	B5	86.	3.10	11.	8.	8.	0.09
+	2 COMBINED AT	NE	490.	3.25	89.	59.	59.	0.68
+	ROUTED TO	R-EF	489.	3.32	89.	59.	59.	0.68
+	HYDROGRAPH AT	B6	100.	3.17	15.	10.	10.	0.11
+	2 COMBINED AT	NF	570.	3.30	103.	69.	69.	0.79
+	ROUTED TO	R-FG	570.	3.30	103.	69.	69.	0.79
+	HYDROGRAPH AT	B7	149.	3.55	37.	24.	24.	0.28
+	2 COMBINED AT	NG	693.	3.33	140.	93.	93.	1.06
+	ROUTED TO	R-GH	692.	3.37	140.	93.	93.	1.06
+	HYDROGRAPH AT	B8	33.	2.93	3.	2.	2.	0.02
+	2 COMBINED AT	NH	698.	3.37	143.	95.	95.	1.08
+	ROUTED TO	R-HI	698.	3.40	143.	95.	95.	1.08

*** NORMAL END OF HEC-1 ***

```
1*****************************************                    ****************************************
*                      *                     *                    *                             *
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *  U.S. ARMY CORPS OF ENGINEERS   *
*          MAY   1991           *                           *  HYDROLOGIC ENGINEERING CENTER   *
*        VERSION 4.0.1E          *                             *    609 SECOND STREET     *
*   Lahey F77L-EM/32 version 5.01    *                           *    DAVIS, CALIFORNIA 95616     *
*     Dodson & Associates, Inc.     *                             *        (916) 551-1748        *
* RUN DATE  12/08/99  TIME  14:55:01  *                               *                        *
*****************************************                    ****************************************


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

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW. THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY, DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```
1                         HEC-1 INPUT                        PAGE  1

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

    1      ID  Input File Name:    P:\317\TASK12\HEC1\EST10000.IH1
    2      ID  DATE:12-08-99
    3      ID  HEC1 10000 YEAR RUNOFF STUDY, SHERWOOD TAILINGS, WESTERN WASHINGTON
    4      ID  EAST DIVERSION CHANNEL MODIFIED TO REDUCE RIPRAP SIZE
    5      ID          CURVE NUMBER = 78
    6      ID  DESIGNED FOR 10000  YR PRECIPITATION, 4.31 in. IN 6 HOURS WITH SCS TYPE II DI
    7      ID  ANTECEDENT MOISTURE CONDITION III
           *DIAGRAM
    8      IT     1     0  0000    540     0     0
    9      IN     3     0     0
   10      IO     5     0
           *

   11      KK    B1  RUNOFF FROM BASIN 1
   12      KO                         21
   13      PB  4.31
   14      PC  .0000 0.0024 0.0042 0.0062 0.0086 0.0110 0.0126 0.0148 0.0172 0.0198
   15      PC  .0230 0.0254 0.0278 0.0302 0.0326 0.0350 0.0374 0.0404 0.0432 0.0458
   16      PC  .0490 0.0514 0.0544 0.0572 0.0598 0.0630 0.0662 0.0694 0.0726 0.0760
   17      PC  .0800 0.0840 0.0880 0.0920 0.0960 0.1000 0.1048 0.1102 0.1158 0.1214
   18      PC  .1270 0.1326 0.1388 0.1452 0.1516 0.1580 0.1652 0.1730 0.1822 0.1928
   19      PC  .2040 0.2192 0.2374 0.2622 0.2998 0.3590 0.5174 0.6230 0.6802 0.7050
   20      PC  .7250 0.7450 0.7608 0.7736 0.7848 0.7960 0.8032 0.8104 0.8176 0.8246
   21      PC  .8310 0.8374 0.8438 0.8498 0.8554 0.8610 0.8658 0.8706 0.8750 0.8790
   22      PC  .8830 0.8870 0.8910 0.8950 0.8990 0.9030 0.9070 0.9104 0.9140 0.9178
   23      PC  .9210 0.9250 0.9284 0.9316 0.9348 0.9380 0.9412 0.9438 0.9466 0.9496
   24      PC  .9520 0.9552 0.9578 0.9606 0.9636 0.9660 0.9684 0.9708 0.9732 0.9756
   25      PC  .9780 0.9804 0.9828 0.9852 0.9874 0.9890 0.9914 0.9938 0.9958 0.9976
   26      PC  1.000
   27      BA  0.050
   28      LS     0    78
   29      UD  .288
           *
```

```
 30      KK   R-AB  ROUTE REACH AB
 31      KO                         21
 32      RM     4  .0586   .399
        *

 33      KK    B2   RUNOFF FROM BASIN 2
 34      KO                         21
 35      BA   .023
 36      LS     0    78
 37      UD  0.097

 38      KK     NB COMBINE ROUTED REACH AB WITH BASIN B2 AT NODE B
 39      KO                         21
 40      HC     2

 41      KK   R-BC  ROUTE REACH BC
 42      KO                         21
 43      RM     1   .018   .387
1                              HEC-1 INPUT                         PAGE  2

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


 44      KK   B3  RUNOFF FROM BASIN 3
 45      KO                         21
 46      BA   .162
 47      LS     0    78
 48      UD   .297

 49      KK    NC COMBINE ROUTED REACH BC WITH BASIN B3 AT NODE C
 50      KO                         21
 51      HC     2

 52      KK   R-CD  ROUTE REACH CD
 53      KO                         21
 54      RM     2  .0348   .431
        *

 55      KK     B4  RUNOFF FROM BASIN 4
 56      KO                         21
 57      BA   .354
 58      LS     0    78
 59      UD  0.467
        *

 60      KK     ND  COMBINE ROUTED REACH CD WITH BASIN B4 AT NODE D
 61      KO                         21
 62      HC     2
        *

 63      KK   R-DE   ROUTED REACH DE
 64      KO                         21
 65      RM     2  .0343   .411
        *

 66      KK     B5  RUNOFF FROM BASIN 5
 67      KO                         21
 68      BA  0.086
 69      LS     0    78
 70      UD  0.266
        *

 71      KK    NE  COMBINE ROUTED REACH DE WITH BASIN B5 AT NODE E
 72      KO                         21
 73      HC     2
        *

 74      KK   R-EF   ROUTED REACH EF
 75      KO                         21
 76      RM     4  .0658   .416
```

```
1                              HEC-1 INPUT                         PAGE  3

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

        77      KK    B6  RUNOFF FROM BASIN 6
        78      KO                       21
        79      BA  0.111
        80      LS    0    78
        81      UD  0.311
               *

        82      KK    NF  COMBINE ROUTED REACH EF WITH BASIN B6 AT NODE F
        83      KO                       21
        84      HC    2
               *

        85      KK  R-FG  ROUTE REACH FG
        86      KO                       21
        87      RM     1  .0085   .416
               *

        88      KK    B7  RUNOFF FROM BASIN 7
        89      KO                       21
        90      BA  0.278
        91      LS    0    78
        92      UD  0.647
               *

        93      KK    NG  COMBINE ROUTED REACH FG WITH BASIN B7 AT NODE G
        94      KO                       21
        95      HC    2
               *

        96      KK  R-GH  ROUTE REACH GH
        97      KO                       21
        98      RM     2  .0371   .417
               *

        99      KK    B8  RUNOFF FROM BASIN 8
       100      KO                       21
       101      BA   .020
       102      LS    0    78
       103      UD  0.112
               *

       104      KK    NH  COMBINE ROUTED REACH GH WITH BASIN B8 AT NODE H
       105      KO                       21
       106      HC    2
               *

       107      KK  R-HI  ROUTE REACH HI
       108      KO                       21
       109      RM     2  .030   .417
       110      ZZ
1
            SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
 LINE     (V) ROUTING        (--->) DIVERSION OR PUMP FLOW

  NO.     (.) CONNECTOR       (<---) RETURN OF DIVERTED OR PUMPED FLOW

   11       B1
            V
            V
   30      R-AB
            .
            .
   33       .       B2
```

```
              .       .
              .       .
  38         NB............
             V
             V
  41        R-BC
              .
              .
  44          .       B3
              .       .
              .       .
  49         NC ............
             V
             V
  52        R-CD
              .
              .
  55          .        B4
              .       .
              .       .
  60         ND............
             V
             V
  63        R-DE
              .
              .
  66          .        B5
              .       .
              .       .
  71         NE............
             V
             V
  74        R-EF
              .
              .
  77          .        B6
              .       .
              .       .
  82         NF............
             V
             V
  85        R-FG
              .
              .
  88          .        B7
              .       .
              .       .
  93         NG............
             V
             V
  96        R-GH
              .
              .
  99          .        B8
              .       .
              .       .
 104          NH............
             V
             V
 107         R-HI
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*******************************************                ******************************************
*                                          *                *                                        *
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1)       *                *  U.S. ARMY CORPS OF ENGINEERS          *
*        MAY  1991                         *                *  HYDROLOGIC ENGINEERING CENTER         *
*      VERSION 4.0.1E                      *                *        609 SECOND STREET               *
*  Lahey F77L-EM/32 version 5.01           *                *    DAVIS, CALIFORNIA 95616             *
*    Dodson & Associates, Inc.             *                *        (916) 551-1748                  *
* RUN DATE  12/08/99  TIME  14:55:01       *                *                                        *
```

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

              Input File Name:   P:\317\TASK12\HEC1\EST10000.IH1
              DATE:12-08-99
              HEC1 10000 YEAR RUNOFF STUDY, SHERWOOD TAILINGS, WESTERN WASHINGTON
              EAST DIVERSION CHANNEL MODIFIED TO REDUCE RIPRAP SIZE
                   CURVE NUMBER = 78
              DESIGNED FOR 10000  YR PRECIPITATION, 4.31 in. IN 6 HOURS WITH SCS TYPE II DI
              ANTECEDENT MOISTURE CONDITION III

 10 IO       OUTPUT CONTROL VARIABLES
              IPRNT        5  PRINT CONTROL
              IPLOT        0  PLOT CONTROL
              QSCAL        0.  HYDROGRAPH PLOT SCALE

  IT       HYDROGRAPH TIME DATA
              NMIN         1  MINUTES IN COMPUTATION INTERVAL
              IDATE     1   0  STARTING DATE
              ITIME      0000  STARTING TIME
                NQ        540  NUMBER OF HYDROGRAPH ORDINATES
             NDDATE     1   0  ENDING DATE
             NDTIME      0859  ENDING TIME
             ICENT         19  CENTURY MARK

           COMPUTATION INTERVAL    0.02 HOURS
              TOTAL TIME BASE    8.98 HOURS

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

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

        **************
        *           *
 11 KK  *      B1   *    RUNOFF FROM BASIN 1
        *           *
        **************

 12 KO       OUTPUT CONTROL VARIABLES
              IPRNT        5  PRINT CONTROL
              IPLOT        0  PLOT CONTROL
              QSCAL        0.  HYDROGRAPH PLOT SCALE
              IPNCH        0  PUNCH COMPUTED HYDROGRAPH
               IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
              ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
              ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
             TIMINT    0.017  TIME INTERVAL IN HOURS

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

        **************
        *           *
 30 KK  *    R-AB   *    ROUTE REACH AB
```

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

31 KO       OUTPUT CONTROL VARIABLES
              IPRNT        5  PRINT CONTROL
              IPLOT        0  PLOT CONTROL
              QSCAL        0.  HYDROGRAPH PLOT SCALE
              IPNCH        0  PUNCH COMPUTED HYDROGRAPH
              IOUT        21  SAVE HYDROGRAPH ON THIS UNIT
              ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
              ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
              TIMINT   0.017  TIME INTERVAL IN HOURS

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

        **************
        *         *
33 KK   *    B2   *     RUNOFF FROM BASIN 2
        *         *
        **************

34 KO       OUTPUT CONTROL VARIABLES
              IPRNT        5  PRINT CONTROL
              IPLOT        0  PLOT CONTROL
              QSCAL        0.  HYDROGRAPH PLOT SCALE
              IPNCH        0  PUNCH COMPUTED HYDROGRAPH
              IOUT        21  SAVE HYDROGRAPH ON THIS UNIT
              ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
              ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
              TIMINT   0.017  TIME INTERVAL IN HOURS

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

        **************
        *         *
38 KK   *    NB   *     COMBINE ROUTED REACH AB WITH BASIN B2 AT NODE B
        *         *
        **************

39 KO       OUTPUT CONTROL VARIABLES
              IPRNT        5  PRINT CONTROL
              IPLOT        0  PLOT CONTROL
              QSCAL        0.  HYDROGRAPH PLOT SCALE
              IPNCH        0  PUNCH COMPUTED HYDROGRAPH
              IOUT        21  SAVE HYDROGRAPH ON THIS UNIT
              ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
              ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
              TIMINT   0.017  TIME INTERVAL IN HOURS

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

        **************
        *         *
41 KK   *   R-BC  *     ROUTE REACH BC
        *         *
        **************

42 KO       OUTPUT CONTROL VARIABLES
```

```
            IPRNT        5  PRINT CONTROL
            IPLOT        0  PLOT CONTROL
            QSCAL        0.  HYDROGRAPH PLOT SCALE
            IPNCH        0  PUNCH COMPUTED HYDROGRAPH
            IOUT        21  SAVE HYDROGRAPH ON THIS UNIT
            ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
            ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
            TIMINT   0.017  TIME INTERVAL IN HOURS


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

        **************
        *            *
 44 KK  *     B3     *   RUNOFF FROM BASIN 3
        *            *
        **************

 45 KO      OUTPUT CONTROL VARIABLES
            IPRNT        5  PRINT CONTROL
            IPLOT        0  PLOT CONTROL
            QSCAL        0.  HYDROGRAPH PLOT SCALE
            IPNCH        0  PUNCH COMPUTED HYDROGRAPH
            IOUT        21  SAVE HYDROGRAPH ON THIS UNIT
            ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
            ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
            TIMINT   0.017  TIME INTERVAL IN HOURS


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

        **************
        *            *
 49 KK  *     NC     *   COMBINE ROUTED REACH BC WITH BASIN B3 AT NODE C
        *            *
        **************

 50 KO      OUTPUT CONTROL VARIABLES
            IPRNT        5  PRINT CONTROL
            IPLOT        0  PLOT CONTROL
            QSCAL        0.  HYDROGRAPH PLOT SCALE
            IPNCH        0  PUNCH COMPUTED HYDROGRAPH
            IOUT        21  SAVE HYDROGRAPH ON THIS UNIT
            ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
            ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
            TIMINT   0.017  TIME INTERVAL IN HOURS


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

        **************
        *            *
 52 KK  *    R-CD    *   ROUTE REACH CD
        *            *
        **************

 53 KO      OUTPUT CONTROL VARIABLES
            IPRNT        5  PRINT CONTROL
            IPLOT        0  PLOT CONTROL
            QSCAL        0.  HYDROGRAPH PLOT SCALE
            IPNCH        0  PUNCH COMPUTED HYDROGRAPH
```

```
            IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
           ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
           ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
          TIMINT    0.017  TIME INTERVAL IN HOURS


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

      **************
      *            *
55 KK *      B4    *   RUNOFF FROM BASIN 4
      *            *
      **************

56 KO       OUTPUT CONTROL VARIABLES
            IPRNT       5  PRINT CONTROL
            IPLOT       0  PLOT CONTROL
            QSCAL      0.  HYDROGRAPH PLOT SCALE
            IPNCH       0  PUNCH COMPUTED HYDROGRAPH
            IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
           ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
           ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
          TIMINT    0.017  TIME INTERVAL IN HOURS


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

      **************
      *            *
60 KK *      ND    *   COMBINE ROUTED REACH CD WITH BASIN B4 AT NODE D
      *            *
      **************

61 KO       OUTPUT CONTROL VARIABLES
            IPRNT       5  PRINT CONTROL
            IPLOT       0  PLOT CONTROL
            QSCAL      0.  HYDROGRAPH PLOT SCALE
            IPNCH       0  PUNCH COMPUTED HYDROGRAPH
            IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
           ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
           ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
          TIMINT    0.017  TIME INTERVAL IN HOURS


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

      **************
      *            *
63 KK *     R-DE   *   ROUTED REACH DE
      *            *
      **************

64 KO       OUTPUT CONTROL VARIABLES
            IPRNT       5  PRINT CONTROL
            IPLOT       0  PLOT CONTROL
            QSCAL      0.  HYDROGRAPH PLOT SCALE
            IPNCH       0  PUNCH COMPUTED HYDROGRAPH
            IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
           ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
           ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
          TIMINT    0.017  TIME INTERVAL IN HOURS
```

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

       **************
       *          *
66 KK  *     B5  *    RUNOFF FROM BASIN 5
       *          *
       **************

67 KO      OUTPUT CONTROL VARIABLES
            IPRNT        5  PRINT CONTROL
            IPLOT        0  PLOT CONTROL
            QSCAL        0.  HYDROGRAPH PLOT SCALE
            IPNCH        0  PUNCH COMPUTED HYDROGRAPH
             IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
            ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
            ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
           TIMINT    0.017  TIME INTERVAL IN HOURS


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

       **************
       *          *
71 KK  *     NE  *    COMBINE ROUTED REACH DE WITH BASIN B5 AT NODE E
       *          *
       **************

72 KO      OUTPUT CONTROL VARIABLES
            IPRNT        5  PRINT CONTROL
            IPLOT        0  PLOT CONTROL
            QSCAL        0.  HYDROGRAPH PLOT SCALE
            IPNCH        0  PUNCH COMPUTED HYDROGRAPH
             IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
            ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
            ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
           TIMINT    0.017  TIME INTERVAL IN HOURS


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

       **************
       *          *
74 KK  *   R-EF  *    ROUTED REACH EF
       *          *
       **************

75 KO      OUTPUT CONTROL VARIABLES
            IPRNT        5  PRINT CONTROL
            IPLOT        0  PLOT CONTROL
            QSCAL        0.  HYDROGRAPH PLOT SCALE
            IPNCH        0  PUNCH COMPUTED HYDROGRAPH
             IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
            ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
            ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
           TIMINT    0.017  TIME INTERVAL IN HOURS
```

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

      **************
      *           *
77 KK *     B6 *      RUNOFF FROM BASIN 6
      *           *
      **************

78 KO       OUTPUT CONTROL VARIABLES
             IPRNT        5  PRINT CONTROL
             IPLOT        0  PLOT CONTROL
             QSCAL        0.  HYDROGRAPH PLOT SCALE
             IPNCH        0  PUNCH COMPUTED HYDROGRAPH
              IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
             ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
             ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
            TIMINT    0.017  TIME INTERVAL IN HOURS


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

      **************
      *           *
82 KK *     NF *      COMBINE ROUTED REACH EF WITH BASIN B6 AT NODE F
      *           *
      **************

83 KO       OUTPUT CONTROL VARIABLES
             IPRNT        5  PRINT CONTROL
             IPLOT        0  PLOT CONTROL
             QSCAL        0.  HYDROGRAPH PLOT SCALE
             IPNCH        0  PUNCH COMPUTED HYDROGRAPH
              IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
             ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
             ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
            TIMINT    0.017  TIME INTERVAL IN HOURS


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

      **************
      *           *
85 KK *   R-FG *      ROUTE REACH FG
      *           *
      **************

86 KO       OUTPUT CONTROL VARIABLES
             IPRNT        5  PRINT CONTROL
             IPLOT        0  PLOT CONTROL
             QSCAL        0.  HYDROGRAPH PLOT SCALE
             IPNCH        0  PUNCH COMPUTED HYDROGRAPH
              IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
             ISAV1        1  FIRST ORDINATE PUNCHED OR SAVED
             ISAV2      540  LAST ORDINATE PUNCHED OR SAVED
            TIMINT    0.017  TIME INTERVAL IN HOURS

***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    R-FG.
   REDUCE NSTPS OR DECREASE YOUR COMPUTATION INTERVAL (FIRST FIELD OF THE IT RECORD).


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

```
          ***************
          *             *
88 KK     *      B7     *      RUNOFF FROM BASIN 7
          *             *
          ***************

89 KO        OUTPUT CONTROL VARIABLES
              IPRNT         5  PRINT CONTROL
              IPLOT         0  PLOT CONTROL
              QSCAL         0.  HYDROGRAPH PLOT SCALE
              IPNCH         0  PUNCH COMPUTED HYDROGRAPH
              IOUT         21  SAVE HYDROGRAPH ON THIS UNIT
              ISAV1         1  FIRST ORDINATE PUNCHED OR SAVED
              ISAV2       540  LAST ORDINATE PUNCHED OR SAVED
             TIMINT     0.017  TIME INTERVAL IN HOURS
```

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

```
          ***************
          *             *
93 KK     *      NG     *      COMBINE ROUTED REACH FG WITH BASIN B7 AT NODE G
          *             *
          ***************

94 KO        OUTPUT CONTROL VARIABLES
              IPRNT         5  PRINT CONTROL
              IPLOT         0  PLOT CONTROL
              QSCAL         0.  HYDROGRAPH PLOT SCALE
              IPNCH         0  PUNCH COMPUTED HYDROGRAPH
              IOUT         21  SAVE HYDROGRAPH ON THIS UNIT
              ISAV1         1  FIRST ORDINATE PUNCHED OR SAVED
              ISAV2       540  LAST ORDINATE PUNCHED OR SAVED
             TIMINT     0.017  TIME INTERVAL IN HOURS
```

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

```
          ***************
          *             *
96 KK     *     R-GH    *      ROUTE REACH GH
          *             *
          ***************

97 KO        OUTPUT CONTROL VARIABLES
              IPRNT         5  PRINT CONTROL
              IPLOT         0  PLOT CONTROL
              QSCAL         0.  HYDROGRAPH PLOT SCALE
              IPNCH         0  PUNCH COMPUTED HYDROGRAPH
              IOUT         21  SAVE HYDROGRAPH ON THIS UNIT
              ISAV1         1  FIRST ORDINATE PUNCHED OR SAVED
              ISAV2       540  LAST ORDINATE PUNCHED OR SAVED
             TIMINT     0.017  TIME INTERVAL IN HOURS
```

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

```
          ***************
          *             *
99 KK     *      B8     *      RUNOFF FROM BASIN 8
```

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

100 KO      OUTPUT CONTROL VARIABLES
            IPRNT       5  PRINT CONTROL
            IPLOT       0  PLOT CONTROL
            QSCAL       0.  HYDROGRAPH PLOT SCALE
            IPNCH       0  PUNCH COMPUTED HYDROGRAPH
            IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
            ISAV1       1  FIRST ORDINATE PUNCHED OR SAVED
            ISAV2     540  LAST ORDINATE PUNCHED OR SAVED
            TIMINT  0.017  TIME INTERVAL IN HOURS

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

      **************
      *         *
104 KK  *    NH  *     COMBINE ROUTED REACH GH WITH BASIN B8 AT NODE H
      *         *
      **************

105 KO      OUTPUT CONTROL VARIABLES
            IPRNT       5  PRINT CONTROL
            IPLOT       0  PLOT CONTROL
            QSCAL       0.  HYDROGRAPH PLOT SCALE
            IPNCH       0  PUNCH COMPUTED HYDROGRAPH
            IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
            ISAV1       1  FIRST ORDINATE PUNCHED OR SAVED
            ISAV2     540  LAST ORDINATE PUNCHED OR SAVED
            TIMINT  0.017  TIME INTERVAL IN HOURS

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

      **************
      *         *
107 KK  *   R-HI  *    ROUTE REACH HI
      *         *
      **************

108 KO      OUTPUT CONTROL VARIABLES
            IPRNT       5  PRINT CONTROL
            IPLOT       0  PLOT CONTROL
            QSCAL       0.  HYDROGRAPH PLOT SCALE
            IPNCH       0  PUNCH COMPUTED HYDROGRAPH
            IOUT       21  SAVE HYDROGRAPH ON THIS UNIT
            ISAV1       1  FIRST ORDINATE PUNCHED OR SAVED
            ISAV2     540  LAST ORDINATE PUNCHED OR SAVED
            TIMINT  0.017  TIME INTERVAL IN HOURS

1
                              RUNOFF SUMMARY
                         FLOW IN CUBIC FEET PER SECOND
                       TIME IN HOURS,  AREA IN SQUARE MILES

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

    HYDROGRAPH AT
+                   B1      86.   3.12       11.        8.        8.     0.05

    ROUTED TO
```

+		R-AB	86.	3.18	11.	8.	8.	0.05
+	HYDROGRAPH AT	B2	72.	2.92	5.	4.	4.	0.02
+	2 COMBINED AT	NB	105.	3.15	17.	11.	11.	0.07
+	ROUTED TO	R-BC	105.	3.17	17.	11.	11.	0.07
+	HYDROGRAPH AT	B3	273.	3.13	37.	25.	25.	0.16
+	2 COMBINED AT	NC	377.	3.13	54.	36.	36.	0.23
+	ROUTED TO	R-CD	377.	3.17	54.	36.	36.	0.23
+	HYDROGRAPH AT	B4	438.	3.32	81.	54.	54.	0.35
+	2 COMBINED AT	ND	779.	3.23	135.	90.	90.	0.59
+	ROUTED TO	R-DE	778.	3.27	135.	90.	90.	0.59
+	HYDROGRAPH AT	B5	156.	3.10	20.	13.	13.	0.09
+	2 COMBINED AT	NE	893.	3.23	155.	104.	104.	0.68
+	ROUTED TO	R-EF	891.	3.30	155.	104.	104.	0.68
+	HYDROGRAPH AT	B6	182.	3.15	26.	17.	17.	0.11
+	2 COMBINED AT	NF	1039.	3.28	181.	121.	121.	0.79
+	ROUTED TO	R-FG	1039.	3.28	181.	121.	121.	0.79
+	HYDROGRAPH AT	B7	271.	3.53	64.	43.	43.	0.28
+	2 COMBINED AT	NG	1264.	3.32	245.	163.	163.	1.06
+	ROUTED TO	R-GH	1263.	3.35	245.	163.	163.	1.06
+	HYDROGRAPH AT	B8	59.	2.93	5.	3.	3.	0.02
+	2 COMBINED AT	NH	1272.	3.35	249.	166.	166.	1.08
+	ROUTED TO	R-HI	1271.	3.38	249.	166.	166.	1.08

*** NORMAL END OF HEC-1 ***

HEC-2 ANALYSES FOR 100-YR, 1,000-YR, AND 10,000-YR EVENTS

```
1*********************************************                    ****************************************
 * HEC-2 WATER SURFACE PROFILES        *                          * U.S. ARMY CORPS OF ENGINEERS     *
 *                                     *                        * HYDROLOGIC ENGINEERING CENTER     *
 * Version  4.6.2; May 1991            *                           * 609 SECOND STREET, SUITE D      *
 *                                     *                          * DAVIS, CALIFORNIA 95616-4687     *
 * RUN DATE  14DEC99  TIME  13:16:07   *                             *    (916) 756-1104          *
*********************************************                    ****************************************

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

                                   THIS RUN EXECUTED 14DEC99   13:16:07
*************************************
 HEC-2 WATER SURFACE PROFILES

 Version  4.6.2; May 1991
*************************************


T1    INPUT FILE NAME: P:\317\TASK31\SEDIMENT\HEC2\100.IH2---------SUBCRITICAL
T2    DATE: 12/99  DIVERSION CHANNEL ASSUMING GRASS LINED CHAN ("n"=0.031) AND
T3    NO SEDIMENT IN CHANNEL.  100 YR STORM EVENT


J1  ICHECK   INQ     NINV    IDIR    STRT    METRIC   HVINS   Q     WSEL    FQ

      0       2               0     .0025      0       0       0  100.48

J2  NPROF    IPLOT    PRFVS    XSECV    XSECH    FN    ALLDC    IBW    CHNIM    ITRACE

     -1       -1                        -1


J3  VARIABLE CODES FOR SUMMARY PRINTOUT

     38      43       1      42       8       4      25      26      68


NC    .031     .031     .031     0.1      0.3
QT      1      312
X1      0       6      200    290.99      0        0        0
GR    111      170     101      200       87      242     89.93    257.78     101    290.99
GR    111    320.99


X1    200       6      200    290.99    201.61    198.48     200
GR  111.5      170   101.5      200      87.5      242     90.43    257.78   101.5    290.99
GR  111.5    320.99


X1    400       6      200    290.99    203.24    197.46     200
GR    112      170     102      200       88       242     90.93    257.78     102    290.99
GR    112    320.99


X1    600       6      200    290.99     200       200       200
GR  112.5      170   102.5      200      88.5      242     91.43    257.78   102.5    290.99
GR  112.5    320.99


X1    700       6      200    290.99    100.99     99.26     100
GR 112.75      170     103      200       89       242     91.93    257.78     103    290.99
GR 112.75    320.99
```

```
X1   800    6    200  290.99  100.99  99.26   100
GR   113    170  103  200     89      242     91.93  257.78  103    290.99
GR   113    320.99

QT   1      312
X1   1000   6    200    290.99  195.76  204.31  200
GR   113.5  170  103.5  200     89.5    242     92.43  257.78  103.5  290.99
GR   113.5  320.99

X1   1200   6    200  290.99  196.98  203.14  200
GR   114    170  104  200     90      242     92.93  257.78  104    290.99
GR   114    320.99

X1   1400   6    200    290.99  200.1   199.78  200
GR   114.5  170  104.5  200     90.5    242     93.43  257.78  104.5  290.99
GR   114.5  320.99

X1   1600   6    200  290.99  203.63  196     200
GR   115    170  105  200     91      242     93.93  257.78  105    290.99
GR   115    320.99

X1   1800   6    200    290.99  204.45  195.93  200
GR   115.5  137  105.5  200     91.5    242     94.43  257.78  105.5  290.99
GR   115.5  320.99

QT   1      309
X1   2000   8    200    290.99  206.03  194.18  200
GR   116    170  106    200     92      242     94.93  257.78  106    290.99
GR   109.5  303.99  112  333.99  116  338.99

X1   2300    6    200    290.99  302.91  296.91  300
GR   116.75  20   106.5  200     92.5    242     95.43  257.78  106.5  290.99
GR   116.75  320.99

QT   1       254
X1   2500    8       200  290.99  197.98  202.05  200
GR   117.25  133.25  112  166.75  110     191.75  107    200     93    242
GR   95.93   257.78  107  290.99  117.25  320.99

X1   2600   6    200    290.99  95.84   104.14  100
GR   117.5  170  107.5  200     93.5    242     96.43  257.78  107.5  290.99
GR   117.5  320.99

X1   2800   6    200  290.99  195.31  203.77  200
GR   118    170  108  200     94      242     96.93  257.78  108    290.99
GR   118    320.99

X1   3000   6    200    290.99  196.79  203.1   200
GR   118.5  170  108.5  200     94.5    242     97.43  257.78  108.5  290.99
GR   118.5  320.99

X1   3200   6    200  290.99  202.86  196.79  200
GR   119    170  109  200     95      242     97.93  257.78  109    290.99
GR   119    320.99
```

```
X1  3400     7    200   290.99   202.15   197.69    200
GR  119.5   131   114.5  185.5   109.5    200      95.5    242     98.43   257.78
GR  109.5   290.99  119.5  320.99

X1  3600     6    200   290.99   198.73   201.73    200
GR  120     170   110    200     96       242      98.93   257.78  110     290.99
GR  120     320.99

X1  3800     6    200   290.99   196.34   203.70    200
GR  120.5   170   110.5  200     96.5     242      99.43   257.78  110.5   290.99
GR  120.5   320.99

X1  4000     8    200   290.99   199.39   200.58    200
GR  121     117   114.5  158     112      184      111     200     97      242
GR  99.93   257.78  111   290.99  121     320.99

X1  4300     6    200   290.99   305.81   294.2     300
GR  121.75  170   111.5  200     97.5     242      100.43  257.78  111.5   290.99
GR  121.75  320.99

QT  1       219
X1  4400     6    200   290.99   99.71    100.29    100
GR  122     170   112    200     98       242      100.93  257.78  112     290.99
GR  122     320.99

X1  4600     6    200   290.99   199.21   200.78    200
GR  122.5   170   112.5  200     98.5     242      101.43  257.78  112.5   290.99
GR  122.5   320.99

X1  4700     6    200   290.99   103.78   96.24     100
GR  122.75  170   112.75 200     98.75    242      101.68  257.78  112.75  290.99
GR  122.75  320.99

X1  4900     6    200   290.99   202.21   197.8     200
GR  123     118   113.25 200     99.25    242      102.18  257.78  113.25  290.99
GR  125.25  320.99

QT  1       191
X1  5200     6    200   285.89   306.91   294       300
GR  122     130   114    200     100      239      102.63  254.78  114     285.89
GR  124     315.89

X1  5400     6    200   284.99   205.7    194.4     200
GR  123.5   170   113.5  200     101.5    239      104.43  254.78  113.5   284.99
GR  123.5   314.99

X1  5600     6    200   284.99   199.85   200.1     200
GR  126     170   116    200     103      239      105.93  254.78  116     284.99
GR  126     314.99

X1  5800     6    200   284.99   199.86   200.45    200
GR  127.5   170   117.5  200     104.5    239      107.43  254.78  117.5   284.99
GR  127.5   314.99

X1  6000     6    200   284.99   195.23   204.69    200
GR  129     170   119    200     106      239      108.93  254.78  119     284.99
GR  129     314.99
```

X1	6200	6	200	284.99	199.44	200.6	200			
GR	128	115	120.5	200	107.5	239	110.43	254.78	120.5	284.99
GR	130.5	314.99								
X1	6400	6	200	266.99	205.51	194.59	200			
GR	129	120	119	200	109	230	111.93	245.78	119	266.99
GR	129	296.99								
QT	1	93								
X1	6600	6	200	266.99	203.03	196.86	200			
GR	130	108	120.5	200	110.5	230	113.43	245.78	120.5	266.99
GR	130.5	296.99								
X1	6700	6	200	266.99	101.2	98.8	100			
GR	131.25	170	121.25	200	111.25	230	114.18	245.78	121.25	266.99
GR	131.25	296.99								
X1	6800	6	200	266.99	101.19	98.8	100			
GR	132	170	122	200	112	230	114.93	245.78	122	266.99
GR	132	296.99								
X1	6900	6	200	266.99	99.68	100.32	100			
GR	132.75	170	122.75	200	112.75	230	115.68	245.78	122.75	266.99
GR	132.75	296.99								
QT	1	26								
X1	7000	6	200	266.99	99.67	100.33	100			
GR	133.5	170	123.5	200	113.5	230	116.43	245.78	123.5	266.99
GR	133.5	296.99								
X1	7100	6	200	266.99	99.84	100.16	100			
GR	134.25	170	124.25	200	114.25	230	117.18	245.78	124.25	266.99
GR	134.25	296.99								
X1	7200	6	200	266.99	99.83	100.16	100			
GR	135	170	125	200	115	230	117.93	245.78	125	266.99
GR	135	296.99								
X1	7300	6	200	254.99	98.84	101.17	100			
GR	133.75	170	123.75	200	115.75	224	118.68	239.78	123.75	254.99
GR	133.75	284.99								
X1	7400	6	200	254.99	98.85	101.17	100			
GR	134.5	170	124.5	200	116.5	224	119.43	239.78	124.5	254.99
GR	134.5	284.99								
X1	7500	6	200	254.99	99.47	100.52	100			
GR	135.25	170	125.25	200	117.25	224	120.18	239.78	125.25	254.99
GR	135.25	284.99								
X1	7600	6	200	254.99	99.46	100.53	100			
GR	136	170	126	200	118	224	120.93	239.78	126	254.99
GR	136	284.99								
X1	7800	6	200	254.99	196.29	203.71	200			

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GR  137.5    170   127.5    200    119.5     224   122.43   239.78    127.5   254.99
GR  137.5   284.99

X1   8000      6    200  254.99    199.4    200.6     200
GR    139    170    129    200      121      224   123.93   239.78     129    254.99
GR    139  284.99

X1   8200      7    200  254.99   192.62   203.75     200
GR    135     75  130.5    100    130.5      200    122.5      224   125.43   239.78
GR  130.5  254.99  140.5  284.99

QT      1     21
X1   8400      6    200  254.99   191.51   203.39     200
GR    142    135    132    200      124      224   126.93   239.78     132    254.99
GR    142  284.99

X1   8600      6    200  254.99   210.12   190.02     200
GR    139    135  133.5    200    125.5      224   128.43   239.78    133.5   254.99
GR  143.5  284.99

X1   8800      8    211  254.99   198.47   201.87     200
GR    136     37    134     98      130      180      128      211      127      224
GR 129.93  239.78    135  254.99     145   284.99

  SECNO   DEPTH   CWSEL   CRIWS   WSELK   EG    HV    HL    OLOSS   L-BANK ELEV
  Q     QLOB    QCH    QROB    ALOB    ACH    AROB    VOL    TWA    R-BANK ELEV
  TIME   VLOB   VCH    VROB    XNL    XNCH    XNR    WTN    ELMIN   SSTA
  SLOPE   XLOBL   XLCH   XLOBR   ITRIAL  IDC   ICONT   CORAR   TOPWID   ENDST

*PROF 1

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CCHV=   .100 CEHV=   .300
*SECNO .000
   .000   4.34   91.34   90.18  100.48   91.60    .26    .00    .00  101.00
   312.0    .0   312.0     .0      .0    76.6     .0     .0     .0  101.00
    .00    .00    4.07    .00    .000    .031   .000   .000  87.00  228.98
 .002465     0.      0.     0.       0      17      7    .00  33.03  262.01


*SECNO 200.000
 200.000   4.33   91.83   90.68     .00   92.09    .26    .50    .00  101.50
   312.0    .0   312.0     .0      .0    76.4     .0     .4     .2  101.50
    .01    .00    4.08    .00    .000    .031   .000   .000  87.50  229.00
 .002485   202.    200.   198.       0      19      0    .00  32.99  261.99


*SECNO 400.000
 400.000   4.33   92.33   91.18     .00   92.59    .26    .50    .00  102.00
   312.0    .0   312.0     .0      .0    76.3     .0     .7     .3  102.00
    .03    .00    4.09    .00    .000    .031   .000   .000  88.00  229.01
 .002496   203.    200.   197.       0      19      0    .00  32.97  261.98


*SECNO 600.000
 600.000   4.33   92.83   91.68     .00   93.09    .26    .50    .00  102.50
   312.0    .0   312.0     .0      .0    76.3     .0    1.1     .5  102.50
    .04    .00    4.09    .00    .000    .031   .000   .000  88.50  229.01
 .002496   200.    200.   200.       0      19      0    .00  32.97  261.98


*SECNO 700.000
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 700.000    4.08   93.08   92.18     .00   93.40     .32     .29     .02  103.00
   312.0      .0   312.0      .0      .0    68.2      .0     1.2      .5  103.00
     .05     .00    4.57     .00    .000    .031    .000    .000   89.00  229.76
 .003395    101.    100.     99.       0      19       0     .00   31.48  261.23


*SECNO 800.000
 800.000    4.44   93.44   92.18     .00   93.68     .24     .27     .01  103.00
   312.0      .0   312.0      .0      .0    80.0      .0     1.4      .6  103.00
     .05     .00    3.90     .00    .000    .031    .000    .000   89.00  228.67
 .002188    101.    100.     99.       2      15       0     .00   33.64  262.32


*SECNO 1000.000
1000.000    4.39   93.89   92.68     .00   94.13     .25     .45     .00  103.50
   312.0      .0   312.0      .0      .0    78.0      .0     1.8      .8  103.50
     .07     .00    4.00     .00    .000    .031    .000    .000   89.50  228.85
 .002346    196.    200.    204.       2      19       0     .00   33.28  262.14


*SECNO 1200.000
1200.000    4.36   94.36   93.18     .00   94.61     .26     .48     .00  104.00
   312.0      .0   312.0      .0      .0    76.9      .0     2.1      .9  104.00
     .08     .00    4.05     .00    .000    .031    .000    .000   90.00  228.95
 .002436    197.    200.    203.       1      19       0     .00   33.09  262.04


*SECNO 1400.000
1400.000    4.35   94.85   93.68     .00   95.10     .26     .49     .00  104.50
   312.0      .0   312.0      .0      .0    76.7      .0     2.5     1.1  104.50
     .10     .00    4.07     .00    .000    .031    .000    .000   90.50  228.97
 .002457    200.    200.    200.       1      19       0     .00   33.05  262.02


*SECNO 1600.000
1600.000    4.34   95.34   94.18     .00   95.60     .26     .49     .00  105.00
   312.0      .0   312.0      .0      .0    76.5      .0     2.8     1.2  105.00
     .11     .00    4.08     .00    .000    .031    .000    .000   91.00  228.99
 .002476    204.    200.    196.       0      19       0     .00   33.01  262.00


*SECNO 1800.000
1800.000    4.34   95.84   94.68     .00   96.09     .26     .50     .00  105.50
   312.0      .0   312.0      .0      .0    76.4      .0     3.2     1.4  105.50
     .12     .00    4.08     .00    .000    .031    .000    .000   91.50  229.00
 .002485    204.    200.    196.       0      19       0     .00   32.99  261.99


*SECNO 2000.000
2000.000    4.33   96.33   95.17     .00   96.59     .25     .49     .00  106.00
   309.0      .0   309.0      .0      .0    76.3      .0     3.5     1.5  106.00
     .14     .00    4.05     .00    .000    .031    .000    .000   92.00  229.00
 .002443    206.    200.    194.       0      19       0     .00   32.98  261.99


*SECNO 2300.000
2300.000    4.53   97.03   95.67     .00   97.24     .22     .65     .00  106.50
   309.0      .0   309.0      .0      .0    82.9      .0     4.1     1.7  106.50
     .16     .00    3.73     .00    .000    .031    .000    .000   92.50  228.42
 .001945    303.    300.    297.       2      19       0     .00   34.16  262.57


*SECNO 2500.000
2500.000    4.43   97.43   95.95     .00   97.59     .16     .34     .01  107.00
   254.0      .0   254.0      .0      .0    79.7      .0     4.4     1.9  107.00
     .18     .00    3.19     .00    .000    .031    .000    .000   93.00  228.70
 .001466    198.    200.    202.       2      14       0     .00   33.58  262.29


*SECNO 2600.000
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 2600.000    4.07   97.57   96.45    .00   97.79    .22    .18    .02  107.50
   254.0     .0   254.0     .0     .0    67.9     .0    4.6    2.0  107.50
     .18    .00    3.74    .00   .000    .031   .000   .000  93.50  229.79
 .002278     96.    100.   104.      2     14      0    .00  31.42  261.20

*SECNO 2800.000
 2800.000    4.03   98.03   96.94    .00   98.26    .22    .47    .00  108.00
   254.0     .0   254.0     .0     .0    66.7     .0    4.9    2.1  108.00
     .20    .00    3.81    .00   .000    .031   .000   .000  94.00  229.90
 .002394    195.    200.   204.      2     19      0    .00  31.19  261.09

*SECNO 3000.000
 3000.000    4.02   98.52   97.44    .00   98.75    .23    .49    .00  108.50
   254.0     .0   254.0     .0     .0    66.0     .0    5.2    2.3  108.50
     .21    .00    3.85    .00   .000    .031   .000   .000  94.50  229.97
 .002471    197.    200.   203.      1     19      0    .00  31.04  261.02

*SECNO 3200.000
 3200.000    4.01   99.01   97.94    .00   99.24    .23    .50    .00  109.00
   254.0     .0   254.0     .0     .0    65.8     .0    5.5    2.4  109.00
     .23    .00    3.86    .00   .000    .031   .000   .000  95.00  229.99
 .002493    203.    200.   197.      0     19      0    .00  31.00  261.00

*SECNO 3400.000
 3400.000    4.01   99.51   98.44    .00   99.74    .23    .50    .00  109.50
   254.0     .0   254.0     .0     .0    65.9     .0    5.8    2.5  109.50
     .24    .00    3.85    .00   .000    .031   .000   .000  95.50  229.98
 .002475    202.    200.   198.      0     19      0    .00  31.03  261.01

*SECNO 3600.000
 3600.000    4.00  100.00   98.94    .00  100.23    .23    .50    .00  110.00
   254.0     .0   254.0     .0     .0    65.9     .0    6.1    2.7  110.00
     .26    .00    3.85    .00   .000    .031   .000   .000  96.00  229.98
 .002478    199.    200.   202.      0     19      0    .00  31.03  261.01

*SECNO 3800.000
 3800.000    4.00  100.50   99.44    .00  100.73    .23    .50    .00  110.50
   254.0     .0   254.0     .0     .0    65.7     .0    6.4    2.8  110.50
     .27    .00    3.87    .00   .000    .031   .000   .000  96.50  230.00
 .002500    196.    200.   204.      0     19      0    .00  30.99  260.99

*SECNO 4000.000
 4000.000    4.00  101.00   99.94    .00  101.23    .23    .50    .00  111.00
   254.0     .0   254.0     .0     .0    65.7     .0    6.7    3.0  111.00
     .28    .00    3.87    .00   .000    .031   .000   .000  97.00  230.00
 .002502    199.    200.   201.      0     19      0    .00  30.98  260.99

*SECNO 4300.000
 4300.000    4.20  101.70  100.44    .00  101.89    .19    .66    .00  111.50
   254.0     .0   254.0     .0     .0    72.1     .0    7.2    3.2  111.50
     .31    .00    3.52    .00   .000    .031   .000   .000  97.50  229.39
 .001933    306.    300.   294.      2     19      0    .00  32.20  261.60

*SECNO 4400.000
 4400.000    3.91  101.91  100.78    .00  102.09    .19    .20    .00  112.00
   219.0     .0   219.0     .0     .0    63.1     .0    7.4    3.3  112.00
     .32    .00    3.47    .00   .000    .031   .000   .000  98.00  230.25
 .002076    100.    100.   100.      1     14      0    .00  30.49  260.74

*SECNO 4600.000
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 4600.000    3.84  102.34  101.28     .00  102.54     .20     .44     .00  112.50
   219.0      .0   219.0      .0      .0    60.7      .0     7.6     3.4  112.50
     .33     .00    3.61     .00    .000    .031    .000    .000   98.50  230.49
 .002316    199.    200.    201.       2      19       0     .00   30.00  260.50


*SECNO 4700.000
 4700.000    3.82  102.57  101.53     .00  102.77     .21     .24     .00  112.75
   219.0      .0   219.0      .0      .0    60.0      .0     7.8     3.5  112.75
     .34     .00    3.65     .00    .000    .031    .000    .000   98.75  230.57
 .002395    104.    100.     96.       1      19       0     .00   29.86  260.42


*SECNO 4900.000
 4900.000    3.80  103.05  102.03     .00  103.26     .21     .48     .00  113.25
   219.0      .0   219.0      .0      .0    59.5      .0     8.1     3.6  113.25
     .35     .00    3.68     .00    .000    .031    .000    .000   99.25  230.62
 .002451    202.    200.    198.       1      19       0     .00   29.76  260.37


*SECNO 5200.000
 5200.000    3.74  103.74  102.58     .00  103.90     .16     .64     .01  114.00
   191.0      .0   191.0      .0      .0    59.5      .0     8.5     3.8  114.00
     .38     .00    3.21     .00    .000    .031    .000    .000  100.00  228.57
 .001824    307.    300.    294.       2      19       0     .00   29.25  257.82


*SECNO 5400.000

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  .40

 5400.000    2.69  104.19  104.10     .00  104.77     .58     .74     .13  113.50
   191.0      .0   191.0      .0      .0    31.3      .0     8.7     3.9  113.50
     .39     .00    6.10     .00    .000    .031    .000    .000  101.50  230.25
 .011302    206.    200.    194.       2      19       0     .00   23.25  253.50


*SECNO 5600.000
 5600.000    3.04  106.04  105.64     .00  106.42     .37    1.62     .02  116.00
   191.0      .0   191.0      .0      .0    39.0      .0     8.8     4.0  116.00
     .40     .00    4.90     .00    .000    .031    .000    .000  103.00  229.85
 .006116    200.    200.    200.       2       8       0     .00   25.29  255.14


*SECNO 5800.000
 5800.000    2.89  107.39  107.13     .00  107.85     .46    1.41     .03  117.50
   191.0      .0   191.0      .0      .0    35.1      .0     9.0     4.2  117.50
     .41     .00    5.45     .00    .000    .031    .000    .000  104.50  230.33
 .008226    200.    200.    200.       3      15       0     .00   24.25  254.57


*SECNO 6000.000
 6000.000    2.97  108.97  108.63     .00  109.39     .42    1.53     .00  119.00
   191.0      .0   191.0      .0      .0    36.9      .0     9.2     4.3  119.00
     .42     .00    5.18     .00    .000    .031    .000    .000  106.00  230.10
 .007139    195.    200.    205.       1      11       0     .00   24.79  254.89


*SECNO 6200.000
 6200.000    2.93  110.43  110.13     .00  110.87     .44    1.48     .01  120.50
   191.0      .0   191.0      .0      .0    36.1      .0     9.3     4.4  120.50
     .43     .00    5.30     .00    .000    .031    .000    .000  107.50  230.20
 .007627    199.    200.    201.       2      15       0     .00   24.58  254.79


*SECNO 6400.000
 6400.000    2.95  111.95  111.63     .00  112.38     .43    1.51     .00  119.00
   191.0      .0   191.0      .0      .0    36.4      .0     9.5     4.5  119.00
     .44     .00    5.25     .00    .000    .031    .000    .000  109.00  221.16
 .007438    206.    200.    195.       1      15       0     .00   24.66  245.83
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*SECNO 6600.000

6600.000	2.75	113.25	112.47	.00	113.39	.13	.98	.03	120.50
93.0	.0	93.0	.0	.0	31.7	.0	9.7	4.6	120.50
.46	.00	2.93	.00	.000	.031	.000	.000	110.50	221.75
.002544	203.	200.	197.	2	19	0	.00	23.07	244.81

*SECNO 6700.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .62

6700.000	2.29	113.54	113.22	.00	113.82	.28	.39	.04	121.25
93.0	.0	93.0	.0	.0	22.1	.0	9.7	4.7	121.25
.47	.00	4.21	.00	.000	.031	.000	.000	111.25	223.12
.006686	101.	100.	99.	2	19	0	.00	19.24	242.36

*SECNO 6800.000

6800.000	2.24	114.24	113.97	.00	114.54	.30	.71	.01	122.00
93.0	.0	93.0	.0	.0	21.0	.0	9.8	4.7	122.00
.47	.00	4.43	.00	.000	.031	.000	.000	112.00	223.29
.007647	101.	100.	99.	2	15	0	.00	18.77	242.05

*SECNO 6900.000

6900.000	2.25	115.00	114.72	.00	115.30	.30	.76	.00	122.75
93.0	.0	93.0	.0	.0	21.1	.0	9.8	4.7	122.75
.48	.00	4.40	.00	.000	.031	.000	.000	112.75	223.26
.007505	100.	100.	100.	2	15	0	.00	18.83	242.10

*SECNO 7000.000

7000.000	2.14	115.64	114.68	.00	115.67	.03	.35	.03	123.50
26.0	.0	26.0	.0	.0	19.3	.0	9.9	4.8	123.50
.50	.00	1.35	.00	.000	.031	.000	.000	113.50	223.57
.000753	100.	100.	100.	2	11	0	.00	17.97	241.54

*SECNO 7100.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .38

7100.000	1.49	115.74	115.44	.00	115.86	.12	.16	.03	124.25
26.0	.0	26.0	.0	.0	9.4	.0	9.9	4.8	124.25
.51	.00	2.77	.00	.000	.031	.000	.000	114.25	225.51
.005134	100.	100.	100.	2	11	0	.00	12.54	238.05

*SECNO 7200.000

7200.000	1.35	116.35	116.18	.00	116.53	.18	.66	.02	125.00
26.0	.0	26.0	.0	.0	7.7	.0	9.9	4.8	125.00
.52	.00	3.38	.00	.000	.031	.000	.000	115.00	225.94
.008708	100.	100.	100.	2	15	0	.00	11.36	237.29

*SECNO 7300.000

7300.000	1.41	117.16	116.93	.00	117.31	.15	.78	.00	123.75
26.0	.0	26.0	.0	.0	8.4	.0	9.9	4.9	123.75
.53	.00	3.11	.00	.000	.031	.000	.000	115.75	219.76
.006963	99.	100.	101.	2	15	0	.00	11.84	231.61

*SECNO 7400.000

7400.000	1.38	117.88	117.68	.00	118.04	.16	.73	.00	124.50
26.0	.0	26.0	.0	.0	8.1	.0	10.0	4.9	124.50
.54	.00	3.22	.00	.000	.031	.000	.000	116.50	219.84
.007671	99.	100.	101.	1	15	0	.00	11.63	231.47

*SECNO 7500.000

7500.000	1.39	118.64	118.43	.00	118.80	.16	.75	.00	125.25
26.0	.0	26.0	.0	.0	8.2	.0	10.0	4.9	125.25
.55	.00	3.19	.00	.000	.031	.000	.000	117.25	219.81
.007432	99.	100.	101.	1	15	0	.00	11.70	231.51

*SECNO 7600.000

7600.000	1.39	119.39	119.18	.00	119.55	.16	.75	.00	126.00
26.0	.0	26.0	.0	.0	8.1	.0	10.0	5.0	126.00
.55	.00	3.21	.00	.000	.031	.000	.000	118.00	219.83
.007577	99.	100.	101.	1	15	0	.00	11.66	231.49

*SECNO 7800.000

7800.000	1.39	120.89	120.68	.00	121.05	.16	1.49	.00	127.50
26.0	.0	26.0	.0	.0	8.2	.0	10.0	5.0	127.50
.57	.00	3.18	.00	.000	.031	.000	.000	119.50	219.81
.007374	196.	200.	204.	1	15	0	.00	11.72	231.52

*SECNO 8000.000

8000.000	1.39	122.39	122.18	.00	122.55	.16	1.50	.00	129.00
26.0	.0	26.0	.0	.0	8.1	.0	10.1	5.1	129.00
.59	.00	3.22	.00	.000	.031	.000	.000	121.00	219.84
.007648	199.	200.	201.	2	15	0	.00	11.64	231.47

*SECNO 8200.000

8200.000	1.40	123.90	123.68	.00	124.05	.16	1.50	.00	130.50
26.0	.0	26.0	.0	.0	8.2	.0	10.1	5.1	130.50
.61	.00	3.18	.00	.000	.031	.000	.000	122.50	219.81
.007392	193.	200.	204.	2	15	0	.00	11.71	231.52

*SECNO 8400.000

8400.000	1.32	125.32	125.09	.00	125.45	.13	1.39	.00	132.00
21.0	.0	21.0	.0	.0	7.3	.0	10.1	5.2	132.00
.63	.00	2.87	.00	.000	.031	.000	.000	124.00	220.03
.006465	192.	200.	203.	2	15	0	.00	11.08	231.12

*SECNO 8600.000

8600.000	1.26	126.76	126.59	.00	126.91	.15	1.46	.01	133.50
21.0	.0	21.0	.0	.0	6.7	.0	10.2	5.2	133.50
.64	.00	3.14	.00	.000	.031	.000	.000	125.50	220.21
.008272	210.	200.	190.	2	15	0	.00	10.58	230.80

*SECNO 8800.000

8800.000	1.04	128.04	127.79	.00	128.11	.07	1.19	.01	128.00
21.0	.0	21.0	.0	.0	10.0	.0	10.2	5.3	135.00
.67	.03	2.11	.00	.031	.031	.000	.000	127.00	210.36
.004494	198.	200.	202.	4	14	0	.00	19.25	229.61

THIS RUN EXECUTED 14DEC99 13:16:07

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HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991

****

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

NO SEDIMENT IN CHANNEL.

SUMMARY PRINTOUT

SECNO	Q	CWSEL	ELMIN	DEPTH	TOPWID	AREA	VCH	FRCH
.000	312.00	91.34	87.00	4.34	33.03	76.62	4.07	.47
200.000	312.00	91.83	87.50	4.33	32.99	76.39	4.08	.47
400.000	312.00	92.33	88.00	4.33	32.97	76.27	4.09	.47
600.000	312.00	92.83	88.50	4.33	32.97	76.28	4.09	.47
700.000	312.00	93.08	89.00	4.08	31.48	68.25	4.57	.55
800.000	312.00	93.44	89.00	4.44	33.64	80.00	3.90	.45
1000.000	312.00	93.89	89.50	4.39	33.28	78.00	4.00	.46
1200.000	312.00	94.36	90.00	4.36	33.09	76.94	4.05	.47
1400.000	312.00	94.85	90.50	4.35	33.05	76.71	4.07	.47
1600.000	312.00	95.34	91.00	4.34	33.01	76.50	4.08	.47
1800.000	312.00	95.84	91.50	4.34	32.99	76.40	4.08	.47
2000.000	309.00	96.33	92.00	4.33	32.98	76.34	4.05	.47
2300.000	309.00	97.03	92.50	4.53	34.16	82.91	3.73	.42
2500.000	254.00	97.43	93.00	4.43	33.58	79.68	3.19	.36
2600.000	254.00	97.57	93.50	4.07	31.42	67.95	3.74	.45
2800.000	254.00	98.03	94.00	4.03	31.19	66.74	3.81	.46
3000.000	254.00	98.52	94.50	4.02	31.04	65.98	3.85	.47
3200.000	254.00	99.01	95.00	4.01	31.00	65.78	3.86	.47
3400.000	254.00	99.51	95.50	4.01	31.03	65.94	3.85	.47
3600.000	254.00	100.00	96.00	4.00	31.03	65.91	3.85	.47
3800.000	254.00	100.50	96.50	4.00	30.99	65.71	3.87	.47
4000.000	254.00	101.00	97.00	4.00	30.98	65.68	3.87	.47
4300.000	254.00	101.70	97.50	4.20	32.20	72.09	3.52	.41
4400.000	219.00	101.91	98.00	3.91	30.49	63.14	3.47	.42
4600.000	219.00	102.34	98.50	3.84	30.00	60.70	3.61	.45
4700.000	219.00	102.57	98.75	3.82	29.86	59.98	3.65	.45
4900.000	219.00	103.05	99.25	3.80	29.76	59.48	3.68	.46
5200.000	191.00	103.74	100.00	3.74	29.25	59.51	3.21	.40
* 5400.000	191.00	104.19	101.50	2.69	23.25	31.31	6.10	.93
5600.000	191.00	106.04	103.00	3.04	25.29	38.97	4.90	.70
5800.000	191.00	107.39	104.50	2.89	24.25	35.05	5.45	.80

6000.000	191.00	108.97	106.00	2.97	24.79	36.90	5.18	.75
6200.000	191.00	110.43	107.50	2.93	24.58	36.06	5.30	.77
6400.000	191.00	111.95	109.00	2.95	24.66	36.38	5.25	.76
6600.000	93.00	113.25	110.50	2.75	23.07	31.73	2.93	.44
* 6700.000	93.00	113.54	111.25	2.29	19.24	22.08	4.21	.69
6800.000	93.00	114.24	112.00	2.24	18.77	21.00	4.43	.74
6900.000	93.00	115.00	112.75	2.25	18.83	21.15	4.40	.73
7000.000	26.00	115.64	113.50	2.14	17.97	19.25	1.35	.23
* 7100.000	26.00	115.74	114.25	1.49	12.54	9.37	2.77	.57
7200.000	26.00	116.35	115.00	1.35	11.36	7.69	3.38	.72
7300.000	26.00	117.16	115.75	1.41	11.84	8.36	3.11	.65
7400.000	26.00	117.88	116.50	1.38	11.63	8.06	3.22	.68
7500.000	26.00	118.64	117.25	1.39	11.70	8.16	3.19	.67
7600.000	26.00	119.39	118.00	1.39	11.66	8.10	3.21	.68
7800.000	26.00	120.89	119.50	1.39	11.72	8.18	3.18	.67
8000.000	26.00	122.39	121.00	1.39	11.64	8.07	3.22	.68
8200.000	26.00	123.90	122.50	1.40	11.71	8.18	3.18	.67
8400.000	21.00	125.32	124.00	1.32	11.08	7.33	2.87	.62
8600.000	21.00	126.76	125.50	1.26	10.58	6.68	3.14	.70
8800.000	21.00	128.04	127.00	1.04	19.25	9.97	2.11	.51

SUMMARY OF ERRORS AND SPECIAL NOTES

WARNING SECNO= 5400.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 6700.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 7100.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

```
1*********************************************
 * HEC-2 WATER SURFACE PROFILES          *
 *                        *
 * Version  4.6.2; May 1991         *
 *                        *
 * RUN DATE   13DEC99   TIME   14:09:09 *
*********************************************
```

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

```
X   X XXXXXXX  XXXXX       XXXXX
X   X X        X     X     X     X
X   X X        X                X
XXXX XXXX      X        XXXX   X
X   X X        X             X
X   X X        X     X      X
X   X XXXXXXX  XXXXX      XXXXXXX
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                                       THIS RUN EXECUTED 13DEC99    14:09:09
**************************************
 HEC-2 WATER SURFACE PROFILES

 Version  4.6.2; May 1991
**************************************
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```
T1    INPUT FILE NAME: P:\317\TASK31\SEDIMENT\HEC2\NOSED.IH2-------SUBCRITICAL
T2    DATE: 12/99  DIVERSION CHANNEL ASSUMING GRASS LINED CHAN ("n"=0.031) AND
T3    NO SEDIMENT IN CHANNEL.  1000 YR STORM EVENT


J1 ICHECK   INQ    NINV   IDIR   STRT   METRIC  HVINS   Q     WSEL   FQ

    0      2          0   .0025    0      0      0   100.48

J2 NPROF   IPLOT   PRFVS   XSECV   XSECH   FN   ALLDC   IBW    CHNIM   ITRACE

   -1        -1                 -1


J3 VARIABLE CODES FOR SUMMARY PRINTOUT

   38     43     1     42     8     4     25     26     68


NC    .031    .031    .031    0.1    0.3
QT     1    698
X1     0      6     200   290.99     0      0      0
GR   111     170    101     200     87     242    89.93   257.78     101    290.99
GR   111   320.99


X1   200      6     200   290.99   201.61   198.48    200
GR  111.5    170   101.5    200     87.5    242    90.43   257.78   101.5   290.99
GR  111.5  320.99


X1   400      6     200   290.99   203.24   197.46    200
GR   112     170    102     200     88     242    90.93   257.78    102    290.99
GR   112   320.99


X1   600      6     200   290.99     200     200     200
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GR  112.5    170    102.5    200    88.5    242    91.43    257.78    102.5    290.99
GR  112.5    320.99

X1    700      6    200    290.99    100.99    99.26    100
GR  112.75    170    103    200    89    242    91.93    257.78    103    290.99
GR  112.75    320.99

X1    800      6    200    290.99    100.99    99.26    100
GR    113    170    103    200    89    242    91.93    257.78    103    290.99
GR    113    320.99

QT      1    698
X1   1000      6    200    290.99    195.76    204.31    200
GR  113.5    170    103.5    200    89.5    242    92.43    257.78    103.5    290.99
GR  113.5    320.99

X1   1200      6    200    290.99    196.98    203.14    200
GR    114    170    104    200    90    242    92.93    257.78    104    290.99
GR    114    320.99

X1   1400      6    200    290.99    200.1    199.78    200
GR  114.5    170    104.5    200    90.5    242    93.43    257.78    104.5    290.99
GR  114.5    320.99

X1   1600      6    200    290.99    203.63    196    200
GR    115    170    105    200    91    242    93.93    257.78    105    290.99
GR    115    320.99

X1   1800      6    200    290.99    204.45    195.93    200
GR  115.5    137    105.5    200    91.5    242    94.43    257.78    105.5    290.99
GR  115.5    320.99

QT      1    693
X1   2000      8    200    290.99    206.03    194.18    200
GR    116    170    106    200    92    242    94.93    257.78    106    290.99
GR  109.5    303.99    112    333.99    116    338.99

X1   2300      6    200    290.99    302.91    296.91    300
GR  116.75     20    106.5    200    92.5    242    95.43    257.78    106.5    290.99
GR  116.75    320.99

QT      1    570
X1   2500      8    200    290.99    197.98    202.05    200
GR  117.25    133.25    112    166.75    110    191.75    107    200    93    242
GR  95.93    257.78    107    290.99    117.25    320.99

X1   2600      6    200    290.99    95.84    104.14    100
GR  117.5    170    107.5    200    93.5    242    96.43    257.78    107.5    290.99
GR  117.5    320.99

X1   2800      6    200    290.99    195.31    203.77    200
GR    118    170    108    200    94    242    96.93    257.78    108    290.99
GR    118    320.99

X1   3000      6    200    290.99    196.79    203.1    200
GR  118.5    170    108.5    200    94.5    242    97.43    257.78    108.5    290.99
GR  118.5    320.99
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X1   3200      6    200   290.99   202.86   196.79    200
GR    119    170    109      200       95      242    97.93   257.78     109   290.99
GR    119   320.99

X1   3400      7    200   290.99   202.15   197.69    200
GR  119.5    131   114.5   185.5    109.5      200     95.5      242   98.43   257.78
GR  109.5  290.99  119.5  320.99

X1   3600      6    200   290.99   198.73   201.73    200
GR    120    170    110      200       96      242    98.93   257.78     110   290.99
GR    120   320.99

X1   3800      6    200   290.99   196.34   203.70    200
GR  120.5    170   110.5     200     96.5      242    99.43   257.78   110.5   290.99
GR  120.5  320.99

X1   4000      8    200   290.99   199.39   200.58    200
GR    121    117   114.5     158      112      184      111      200      97      242
GR  99.93  257.78    111  290.99      121   320.99

X1   4300      6    200   290.99   305.81    294.2    300
GR 121.75    170   111.5     200     97.5      242   100.43   257.78   111.5   290.99
GR 121.75  320.99

QT      1    490
X1   4400      6    200   290.99    99.71   100.29    100
GR    122    170    112      200       98      242   100.93   257.78     112   290.99
GR    122   320.99

X1   4600      6    200   290.99   199.21   200.78    200
GR  122.5    170   112.5     200     98.5      242   101.43   257.78   112.5   290.99
GR  122.5  320.99

X1   4700      6    200   290.99   103.78    96.24    100
GR 122.75    170  112.75     200    98.75      242   101.68   257.78  112.75   290.99
GR 122.75  320.99

X1   4900      6    200   290.99   202.21    197.8    200
GR    123    118  113.25     200    99.25      242   102.18   257.78  113.25   290.99
GR 125.25  320.99

QT      1    428
X1   5200      6    200   285.89   306.91      294    300
GR    122    130    114      200      100      239   102.63   254.78     114   285.89
GR    124   315.89

X1   5400      6    200   284.99    205.7    194.4    200
GR  123.5    170   113.5     200    101.5      239   104.43   254.78   113.5   284.99
GR  123.5  314.99

X1   5600      6    200   284.99   199.85    200.1    200
GR    126    170    116      200      103      239   105.93   254.78     116   284.99
GR    126   314.99

X1   5800      6    200   284.99   199.86   200.45    200
```

GR 127.5 170 117.5 200 104.5 239 107.43 254.78 117.5 284.99
GR 127.5 314.99

X1 6000 6 200 284.99 195.23 204.69 200
GR 129 170 119 200 106 239 108.93 254.78 119 284.99
GR 129 314.99

X1 6200 6 200 284.99 199.44 200.6 200
GR 128 115 120.5 200 107.5 239 110.43 254.78 120.5 284.99
GR 130.5 314.99

X1 6400 6 200 266.99 205.51 194.59 200
GR 129 120 119 200 109 230 111.93 245.78 119 266.99
GR 129 296.99

QT 1 208
X1 6600 6 200 266.99 203.03 196.86 200
GR 130 108 120.5 200 110.5 230 113.43 245.78 120.5 266.99
GR 130.5 296.99

X1 6700 6 200 266.99 101.2 98.8 100
GR 131.25 170 121.25 200 111.25 230 114.18 245.78 121.25 266.99
GR 131.25 296.99

X1 6800 6 200 266.99 101.19 98.8 100
GR 132 170 122 200 112 230 114.93 245.78 122 266.99
GR 132 296.99

X1 6900 6 200 266.99 99.68 100.32 100
GR 132.75 170 122.75 200 112.75 230 115.68 245.78 122.75 266.99
GR 132.75 296.99

QT 1 58
X1 7000 6 200 266.99 99.67 100.33 100
GR 133.5 170 123.5 200 113.5 230 116.43 245.78 123.5 266.99
GR 133.5 296.99

X1 7100 6 200 266.99 99.84 100.16 100
GR 134.25 170 124.25 200 114.25 230 117.18 245.78 124.25 266.99
GR 134.25 296.99

X1 7200 6 200 266.99 99.83 100.16 100
GR 135 170 125 200 115 230 117.93 245.78 125 266.99
GR 135 296.99

X1 7300 6 200 254.99 98.84 101.17 100
GR 133.75 170 123.75 200 115.75 224 118.68 239.78 123.75 254.99
GR 133.75 284.99

X1 7400 6 200 254.99 98.85 101.17 100
GR 134.5 170 124.5 200 116.5 224 119.43 239.78 124.5 254.99
GR 134.5 284.99

X1 7500 6 200 254.99 99.47 100.52 100
GR 135.25 170 125.25 200 117.25 224 120.18 239.78 125.25 254.99
GR 135.25 284.99

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X1  7600    6    200   254.99   99.46   100.53    100
GR   136   170   126    200     118     224     120.93   239.78    126    254.99
GR   136  284.99

X1  7800    6    200   254.99  196.29   203.71    200
GR  137.5  170   127.5  200    119.5    224     122.43   239.78   127.5   254.99
GR  137.5 284.99

X1  8000    6    200   254.99   199.4   200.6     200
GR   139   170   129    200     121     224     123.93   239.78    129    254.99
GR   139  284.99

X1  8200    7    200   254.99  192.62   203.75    200
GR   135    75   130.5  100    130.5    200     122.5     224    125.43   239.78
GR  130.5 254.99  140.5  284.99

QT    1    47
X1  8400    6    200   254.99  191.51   203.39    200
GR   142   135   132    200     124     224     126.93   239.78    132    254.99
GR   142  284.99

X1  8600    6    200   254.99  210.12   190.02    200
GR   139   135   133.5  200    125.5    224     128.43   239.78   133.5   254.99
GR  143.5 284.99

X1  8800    8    211   254.99  198.47   201.87    200
GR   136    37   134     98     130     180      128      211      127     224
GR 129.93 239.78  135  254.99   145   284.99
```

*PROF 1

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

```
CCHV=   .100 CEHV=   .300
*SECNO .000
   .000   5.96   92.96   91.42  100.48   93.36    .40    .00    .00  101.00
  698.0    .0   698.0     .0      .0   138.0     .0     .0     .0  101.00
    .00   .00    5.06    .00    .000    .031   .000   .000  87.00  224.12
 .002459    0.      0.     0.      0      17      6    .00  42.76  266.87

*SECNO 200.000
 200.000  5.95   93.45   91.91    .00   93.85    .40    .49    .00  101.50
  698.0    .0   698.0     .0      .0   137.7     .0     .6     .2  101.50
    .01   .00    5.07    .00    .000    .031   .000   .000  87.50  224.14
 .002476   202.    200.   198.     0      19      0    .00  42.71  266.85

*SECNO 400.000
 400.000  5.95   93.95   92.41    .00   94.35    .40    .50    .00  102.00
  698.0    .0   698.0     .0      .0   137.4     .0    1.3     .4  102.00
    .02   .00    5.08    .00    .000    .031   .000   .000  88.00  224.16
 .002488   203.    200.   197.     0      19      0    .00  42.67  266.83

*SECNO 600.000
 600.000  5.95   94.45   92.91    .00   94.85    .40    .50    .00  102.50
  698.0    .0   698.0     .0      .0   137.3     .0    1.9     .6  102.50
    .03   .00    5.08    .00    .000    .031   .000   .000  88.50  224.17
 .002493   200.    200.   200.     0      19      0    .00  42.66  266.82
```

*SECNO 700.000

700.000	5.67	94.67	93.41	.00	95.15	.48	.28	.02	103.00
698.0	.0	698.0	.0	.0	125.9	.0	2.2	.7	103.00
.04	.00	5.54	.00	.000	.031	.000	.000	89.00	224.98
.003156	101.	100.	99.	2	19	0	.00	41.03	266.01

*SECNO 800.000

800.000	6.05	95.05	93.41	.00	95.43	.38	.27	.01	103.00
698.0	.0	698.0	.0	.0	141.9	.0	2.5	.8	103.00
.04	.00	4.92	.00	.000	.031	.000	.000	89.00	223.85
.002281	101.	100.	99.	2	15	0	.00	43.30	267.14

*SECNO 1000.000

1000.000	6.01	95.51	93.91	.00	95.89	.39	.47	.00	103.50
698.0	.0	698.0	.0	.0	139.9	.0	3.2	1.0	103.50
.05	.00	4.99	.00	.000	.031	.000	.000	89.50	223.99
.002372	196.	200.	204.	2	19	0	.00	43.01	267.00

*SECNO 1200.000

1200.000	5.98	95.98	94.41	.00	96.38	.39	.48	.00	104.00
698.0	.0	698.0	.0	.0	138.8	.0	3.8	1.2	104.00
.07	.00	5.03	.00	.000	.031	.000	.000	90.00	224.07
.002423	197.	200.	203.	1	19	0	.00	42.86	266.92

*SECNO 1400.000

1400.000	5.97	96.47	94.91	.00	96.87	.40	.49	.00	104.50
698.0	.0	698.0	.0	.0	138.1	.0	4.4	1.4	104.50
.08	.00	5.05	.00	.000	.031	.000	.000	90.50	224.11
.002456	200.	200.	200.	0	19	0	.00	42.77	266.88

*SECNO 1600.000

1600.000	5.96	96.96	95.41	.00	97.36	.40	.49	.00	105.00
698.0	.0	698.0	.0	.0	137.8	.0	5.1	1.6	105.00
.09	.00	5.06	.00	.000	.031	.000	.000	91.00	224.13
.002470	204.	200.	196.	0	19	0	.00	42.73	266.86

*SECNO 1800.000

1800.000	5.95	97.45	95.91	.00	97.85	.40	.49	.00	105.50
698.0	.0	698.0	.0	.0	137.7	.0	5.7	1.8	105.50
.10	.00	5.07	.00	.000	.031	.000	.000	91.50	224.14
.002477	204.	200.	196.	0	19	0	.00	42.71	266.85

*SECNO 2000.000

2000.000	5.95	97.95	96.40	.00	98.35	.39	.49	.00	106.00
693.0	.0	693.0	.0	.0	137.5	.0	6.3	2.0	106.00
.11	.00	5.04	.00	.000	.031	.000	.000	92.00	224.15
.002450	206.	200.	194.	0	19	0	.00	42.68	266.84

*SECNO 2300.000

2300.000	6.17	98.67	96.90	.00	99.02	.34	.67	.01	106.50
693.0	.0	693.0	.0	.0	147.6	.0	7.3	2.3	106.50
.13	.00	4.69	.00	.000	.031	.000	.000	92.50	223.45
.002019	303.	300.	297.	1	19	0	.00	44.08	267.54

*SECNO 2500.000

2500.000	6.13	99.13	97.07	.00	99.37	.24	.34	.01	107.00
570.0	.0	570.0	.0	.0	145.0	.0	8.0	2.5	107.00
.14	.00	3.93	.00	.000	.031	.000	.000	93.00	223.64
.001435	198.	200.	202.	0	14	0	.00	43.72	267.35

*SECNO 2600.000

2600.000	5.75	99.25	97.57	.00	99.56	.30	.17	.02	107.50
570.0	.0	570.0	.0	.0	129.3	.0	8.3	2.6	107.50
.15	.00	4.41	.00	.000	.031	.000	.000	93.50	224.74
.001959	96.	100.	104.	2	14	0	.00	41.51	266.25

*SECNO 2800.000

2800.000	5.65	99.65	98.06	.00	99.97	.32	.41	.01	108.00
570.0	.0	570.0	.0	.0	125.0	.0	8.9	2.7	108.00
.16	.00	4.56	.00	.000	.031	.000	.000	94.00	225.05
.002149	195.	200.	204.	2	19	0	.00	40.89	265.94

*SECNO 3000.000

3000.000	5.58	100.08	98.56	.00	100.42	.34	.44	.00	108.50
570.0	.0	570.0	.0	.0	122.2	.0	9.4	2.9	108.50
.17	.00	4.66	.00	.000	.031	.000	.000	94.50	225.25
.002283	197.	200.	203.	2	19	0	.00	40.48	265.74

*SECNO 3200.000

3200.000	5.54	100.54	99.06	.00	100.89	.35	.47	.00	109.00
570.0	.0	570.0	.0	.0	120.3	.0	10.0	3.1	109.00
.18	.00	4.74	.00	.000	.031	.000	.000	95.00	225.40
.002386	203.	200.	197.	1	19	0	.00	40.19	265.59

*SECNO 3400.000

3400.000	5.52	101.02	99.56	.00	101.37	.35	.48	.00	109.50
570.0	.0	570.0	.0	.0	119.5	.0	10.6	3.3	109.50
.20	.00	4.77	.00	.000	.031	.000	.000	95.50	225.46
.002429	202.	200.	198.	1	19	0	.00	40.07	265.53

*SECNO 3600.000

3600.000	5.51	101.51	100.06	.00	101.86	.36	.49	.00	110.00
570.0	.0	570.0	.0	.0	119.0	.0	11.1	3.5	110.00
.21	.00	4.79	.00	.000	.031	.000	.000	96.00	225.50
.002457	199.	200.	202.	0	19	0	.00	40.00	265.49

*SECNO 3800.000

3800.000	5.50	102.00	100.56	.00	102.36	.36	.49	.00	110.50
570.0	.0	570.0	.0	.0	118.7	.0	11.6	3.7	110.50
.22	.00	4.80	.00	.000	.031	.000	.000	96.50	225.52
.002472	196.	200.	204.	0	19	0	.00	39.96	265.47

*SECNO 4000.000

4000.000	5.49	102.49	101.06	.00	102.85	.36	.50	.00	111.00
570.0	.0	570.0	.0	.0	118.6	.0	12.2	3.9	111.00
.23	.00	4.81	.00	.000	.031	.000	.000	97.00	225.53
.002481	199.	200.	201.	0	19	0	.00	39.93	265.46

*SECNO 4300.000

4300.000	5.72	103.22	101.56	.00	103.52	.31	.67	.01	111.50
570.0	.0	570.0	.0	.0	128.1	.0	13.0	4.1	111.50
.25	.00	4.45	.00	.000	.031	.000	.000	97.50	224.82
.002008	306.	300.	294.	1	19	0	.00	41.34	266.17

*SECNO 4400.000

4400.000	5.45	103.45	101.81	.00	103.72	.27	.20	.00	112.00
490.0	.0	490.0	.0	.0	116.6	.0	13.3	4.2	112.00
.26	.00	4.20	.00	.000	.031	.000	.000	98.00	225.68
.001919	100.	100.	100.	0	19	0	.00	39.64	265.31

```
*SECNO 4600.000
 4600.000    5.34  103.84  102.31     .00  104.13    .29     .40     .01  112.50
    490.0      .0   490.0      .0      .0   112.7     .0    13.8     4.4  112.50
      .27     .00    4.35     .00    .000    .031   .000    .000   98.50  225.97
  .002105    199.    200.    201.       0      19      0     .00   39.04  265.02

*SECNO 4700.000
 4700.000    5.30  104.05  102.56     .00  104.35    .30     .22     .00  112.75
    490.0      .0   490.0      .0      .0   110.7     .0    14.1     4.5  112.75
      .27     .00    4.43     .00    .000    .031   .000    .000   98.75  226.13
  .002214    104.    100.     96.       0      19      0     .00   38.73  264.86

*SECNO 4900.000
 4900.000    5.24  104.49  103.06     .00  104.81    .32     .45     .00  113.25
    490.0      .0   490.0      .0      .0   108.6     .0    14.6     4.7  113.25
      .29     .00    4.51     .00    .000    .031   .000    .000   99.25  226.29
  .002332    202.    200.    198.       1      19      0     .00   38.40  264.70

*SECNO 5200.000
 5200.000    5.18  105.18  103.54     .00  105.43    .25     .62     .01  114.00
    428.0      .0   428.0      .0      .0   107.1     .0    15.3     4.9  114.00
      .31     .00    4.00     .00    .000    .031   .000    .000  100.00  224.58
  .001792    307.    300.    294.       0      19      0     .00   37.16  261.74

*SECNO 5400.000

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .54

 5400.000    4.05  105.55  105.07     .00  106.14    .59     .61     .10  113.50
    428.0      .0   428.0      .0      .0    69.7     .0    15.8     5.1  113.50
      .32     .00    6.14     .00    .000    .031   .000    .000  101.50  225.82
  .006240    206.    200.    194.       2      19      0     .00   32.71  258.53

*SECNO 5600.000
 5600.000    3.88  106.88  106.61     .00  107.62    .74    1.43     .05  116.00
    428.0      .0   428.0      .0      .0    62.1     .0    16.1     5.2  116.00
      .32     .00    6.89     .00    .000    .031   .000    .000  103.00  227.35
  .008297    200.    200.    200.       2      15      0     .00   30.28  257.64

*SECNO 5800.000
 5800.000    4.00  108.50  108.11     .00  109.16    .66    1.54     .01  117.50
    428.0      .0   428.0      .0      .0    65.6     .0    16.4     5.4  117.50
      .33     .00    6.52     .00    .000    .031   .000    .000  104.50  227.01
  .007132    200.    200.    200.       2      11      0     .00   30.97  257.98

*SECNO 6000.000
 6000.000    3.95  109.95  109.61     .00  110.65    .69    1.47     .01  119.00
    428.0      .0   428.0      .0      .0    64.1     .0    16.6     5.5  119.00
      .34     .00    6.68     .00    .000    .031   .000    .000  106.00  227.16
  .007620    195.    200.    205.       2      15      0     .00   30.67  257.83

*SECNO 6200.000
 6200.000    3.97  111.47  111.11     .00  112.15    .68    1.50     .00  120.50
    428.0      .0   428.0      .0      .0    64.7     .0    16.9     5.7  120.50
      .35     .00    6.61     .00    .000    .031   .000    .000  107.50  227.10
  .007403    199.    200.    201.       2      11      0     .00   30.80  257.89

*SECNO 6400.000
 6400.000    3.95  112.95  112.61     .00  113.64    .68    1.49     .00  119.00
    428.0      .0   428.0      .0      .0    64.5     .0    17.2     5.8  119.00
      .36     .00    6.64     .00    .000    .031   .000    .000  109.00  218.12
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 .007474   206.   200.   195.    1    11    0  .00   30.75  248.87
```

*SECNO 6600.000

3301 HV CHANGED MORE THAN HVINS

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6600.000   3.88  114.38  113.22   .00  114.56   .17    .87    .05  120.50
  208.0     .0   208.0     .0     .0    62.1     .0   17.5    5.9  120.50
    .37    .00    3.35    .00   .000    .031   .000   .000 110.50  218.35
.001958    203.    200.   197.      2     19      0    .00  30.29  248.64
```

*SECNO 6700.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .66

```
6700.000   3.32  114.57  113.97   .00  114.88   .32    .28    .04  121.25
  208.0     .0   208.0     .0     .0    46.1     .0   17.7    6.0  121.25
    .38    .00    4.51    .00   .000    .031   .000   .000 111.25  220.03
.004512    101.    100.    99.      2     19      0    .00  26.93  246.96
```

*SECNO 6800.000

```
6800.000   3.04  115.04  114.72   .00  115.49   .44    .56    .04  122.00
  208.0     .0   208.0     .0     .0    38.9     .0   17.8    6.1  122.00
    .39    .00    5.34    .00   .000    .031   .000   .000 112.00  220.86
.007267    101.    100.    99.      2     15      0    .00  25.28  246.13
```

*SECNO 6900.000

```
6900.000   3.03  115.78  115.47   .00  116.23   .45    .74    .00  122.75
  208.0     .0   208.0     .0     .0    38.4     .0   17.8    6.1  122.75
    .39    .00    5.41    .00   .000    .031   .000   .000 112.75  220.91
.007540    100.    100.   100.      2     15      0    .00  25.16  246.08
```

*SECNO 7000.000

```
7000.000   3.04  116.54  115.13   .00  116.58   .03    .30    .04  123.50
   58.0     .0    58.0     .0     .0    38.8     .0   17.9    6.2  123.50
    .41    .00    1.50    .00   .000    .031   .000   .000 113.50  220.87
.000571    100.    100.   100.      2     11      0    .00  25.24  246.12
```

*SECNO 7100.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .50

```
7100.000   2.35  116.60  115.88   .00  116.70   .10    .10    .02  124.25
   58.0     .0    58.0     .0     .0    23.2     .0   18.0    6.2  124.25
    .42    .00    2.50    .00   .000    .031   .000   .000 114.25  222.94
.002271    100.    100.   100.      2     11      0    .00  19.74  242.68
```

*SECNO 7200.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .55

```
7200.000   1.88  116.88  116.63   .00  117.12   .24    .38    .04  125.00
   58.0     .0    58.0     .0     .0    14.9     .0   18.0    6.3  125.00
    .43    .00    3.89    .00   .000    .031   .000   .000 115.00  224.34
.007423    100.    100.   100.      2     19      0    .00  15.81  240.15
```

*SECNO 7300.000

```
7300.000   1.88  117.63  117.38   .00  117.87   .24    .75    .00  123.75
   58.0     .0    58.0     .0     .0    14.8     .0   18.1    6.3  123.75
    .44    .00    3.92    .00   .000    .031   .000   .000 115.75  218.37
.007588     99.    100.   101.      2     15      0    .00  15.74  234.11
```

```
*SECNO 7400.000
 7400.000    1.89  118.39  118.13     .00  118.62    .24    .76    .00  124.50
    58.0     .0    58.0     .0     .0    14.8     .0   18.1    6.4  124.50
     .44    .00    3.92    .00   .000    .031   .000   .000  116.50  218.37
  .007571    99.   100.   101.      0     15      0    .00   15.75  234.12

*SECNO 7500.000
 7500.000    1.89  119.14  118.88     .00  119.37    .23    .74    .00  125.25
    58.0     .0    58.0     .0     .0    15.0     .0   18.1    6.4  125.25
     .45    .00    3.86    .00   .000    .031   .000   .000  117.25  218.32
  .007242    99.   100.   101.      0     15      0    .00   15.88  234.20

*SECNO 7600.000
 7600.000    1.87  119.87  119.63     .00  120.11    .24    .74    .00  126.00
    58.0     .0    58.0     .0     .0    14.8     .0   18.2    6.4  126.00
     .46    .00    3.93    .00   .000    .031   .000   .000  118.00  218.37
  .007626    99.   100.   101.      0     15      0    .00   15.73  234.10

*SECNO 7800.000
 7800.000    1.88  121.38  121.13     .00  121.62    .24   1.51    .00  127.50
    58.0     .0    58.0     .0     .0    14.9     .0   18.2    6.5  127.50
     .47    .00    3.90    .00   .000    .031   .000   .000  119.50  218.35
  .007442   196.   200.   204.      2     15      0    .00   15.80  234.15

*SECNO 8000.000
 8000.000    1.89  122.89  122.63     .00  123.13    .24   1.51    .00  129.00
    58.0     .0    58.0     .0     .0    14.8     .0   18.3    6.6  129.00
     .49    .00    3.93    .00   .000    .031   .000   .000  121.00  218.37
  .007610   199.   200.   201.      1     15      0    .00   15.74  234.11

*SECNO 8200.000
 8200.000    1.89  124.39  124.13     .00  124.62    .23   1.49    .00  130.50
    58.0     .0    58.0     .0     .0    15.0     .0   18.4    6.6  130.50
     .50    .00    3.87    .00   .000    .031   .000   .000  122.50  218.33
  .007313   193.   200.   204.      1     15      0    .00   15.85  234.18

*SECNO 8400.000
 8400.000    1.80  125.80  125.50     .00  125.98    .19   1.36    .00  132.00
    47.0     .0    47.0     .0     .0    13.6     .0   18.5    6.7  132.00
     .52    .00    3.46    .00   .000    .031   .000   .000  124.00  218.60
  .006261   192.   200.   203.      2     15      0    .00   15.08  233.69

*SECNO 8600.000
 8600.000    1.70  127.20  127.00     .00  127.44    .23   1.44    .01  133.50
    47.0     .0    47.0     .0     .0    12.2     .0   18.5    6.8  133.50
     .53    .00    3.86    .00   .000    .031   .000   .000  125.50  218.89
  .008332   210.   200.   190.      2     15      0    .00   14.30  233.18

*SECNO 8800.000

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.49

 8800.000    1.42  128.42  128.10     .00  128.52    .10   1.08    .01  128.00
    47.0    1.4    45.6     .0    1.4    17.5     .0   18.6    6.9  135.00
     .55   1.04    2.61    .00   .031    .031   .000   .000  127.00  204.44
  .003754   198.   200.   202.      3     14      0    .00   27.22  231.66

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 HEC-2 WATER SURFACE PROFILES

 Version  4.6.2;  May 1991
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NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

NO SEDIMENT IN CHANNEL.
SUMMARY PRINTOUT

SECNO	Q	CWSEL	ELMIN	DEPTH	TOPWID	AREA	VCH	FRCH
.000	698.00	92.96	87.00	5.96	42.76	138.02	5.06	.50
200.000	698.00	93.45	87.50	5.95	42.71	137.68	5.07	.50
400.000	698.00	93.95	88.00	5.95	42.67	137.43	5.08	.50
600.000	698.00	94.45	88.50	5.95	42.66	137.34	5.08	.50
700.000	698.00	94.67	89.00	5.67	41.03	125.95	5.54	.56
800.000	698.00	95.05	89.00	6.05	43.30	141.89	4.92	.48
1000.000	698.00	95.51	89.50	6.01	43.01	139.86	4.99	.49
1200.000	698.00	95.98	90.00	5.98	42.86	138.77	5.03	.49
1400.000	698.00	96.47	90.50	5.97	42.77	138.10	5.05	.50
1600.000	698.00	96.96	91.00	5.96	42.73	137.81	5.06	.50
1800.000	698.00	97.45	91.50	5.95	42.71	137.67	5.07	.50
2000.000	693.00	97.95	92.00	5.95	42.68	137.49	5.04	.49
2300.000	693.00	98.67	92.50	6.17	44.08	147.63	4.69	.45
2500.000	570.00	99.13	93.00	6.13	43.72	144.97	3.93	.38
2600.000	570.00	99.25	93.50	5.75	41.51	129.31	4.41	.44
2800.000	570.00	99.65	94.00	5.65	40.89	124.99	4.56	.46
3000.000	570.00	100.08	94.50	5.58	40.48	122.25	4.66	.47
3200.000	570.00	100.54	95.00	5.54	40.19	120.27	4.74	.48
3400.000	570.00	101.02	95.50	5.52	40.07	119.49	4.77	.49
3600.000	570.00	101.51	96.00	5.51	40.00	118.99	4.79	.49
3800.000	570.00	102.00	96.50	5.50	39.96	118.73	4.80	.49
4000.000	570.00	102.49	97.00	5.49	39.93	118.57	4.81	.49
4300.000	570.00	103.22	97.50	5.72	41.34	128.12	4.45	.45
4400.000	490.00	103.45	98.00	5.45	39.64	116.61	4.20	.43
4600.000	490.00	103.84	98.50	5.34	39.04	112.73	4.35	.45
4700.000	490.00	104.05	98.75	5.30	38.73	110.66	4.43	.46
4900.000	490.00	104.49	99.25	5.24	38.40	108.58	4.51	.47
5200.000	428.00	105.18	100.00	5.18	37.16	107.07	4.00	.41
* 5400.000	428.00	105.55	101.50	4.05	32.71	69.70	6.14	.74

	5600.000	428.00	106.88	103.00	3.88	30.28	62.12	6.89	.85
C-D	5800.000	428.00	108.50	104.50	4.00	30.97	65.60	6.52	.79
	6000.000	428.00	109.95	106.00	3.95	30.67	64.05	6.68	.81
	6200.000	428.00	111.47	107.50	3.97	30.80	64.72	6.61	.80
	6400.000	428.00	112.95	109.00	3.95	30.75	64.50	6.64	.81
B-C	6600.000	208.00	114.38	110.50	3.88	30.29	62.14	3.35	.41
	* 6700.000	208.00	114.57	111.25	3.32	26.93	46.10	4.51	.61
	6800.000	208.00	115.04	112.00	3.04	25.28	38.94	5.34	.76
	6900.000	208.00	115.78	112.75	3.03	25.16	38.44	5.41	.77
A-B	7000.000	58.00	116.54	113.50	3.04	25.24	38.79	1.50	.21
	* 7100.000	58.00	116.60	114.25	2.35	19.74	23.23	2.50	.41
	* 7200.000	58.00	116.88	115.00	1.88	15.81	14.90	3.89	.71
	7300.000	58.00	117.63	115.75	1.88	15.74	14.78	3.92	.71
	7400.000	58.00	118.39	116.50	1.89	15.75	14.79	3.92	.71
	7500.000	58.00	119.14	117.25	1.89	15.88	15.04	3.86	.70
	7600.000	58.00	119.87	118.00	1.87	15.73	14.75	3.93	.72
	7800.000	58.00	121.38	119.50	1.88	15.80	14.89	3.90	.71
	8000.000	58.00	122.89	121.00	1.89	15.74	14.76	3.93	.71
	8200.000	58.00	124.39	122.50	1.89	15.85	14.99	3.87	.70
Above A	8400.000	47.00	125.80	124.00	1.80	15.08	13.57	3.46	.64
	8600.000	47.00	127.20	125.50	1.70	14.30	12.19	3.86	.74
	* 8800.000	47.00	128.42	127.00	1.42	27.22	18.84	2.61	.50

SUMMARY OF ERRORS AND SPECIAL NOTES

WARNING SECNO= 5400.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 6700.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 7100.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 7200.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 8800.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

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1*********************************************          ****************************************
 * HEC-2 WATER SURFACE PROFILES          *               * U.S. ARMY CORPS OF ENGINEERS      *
 *                                       *             * HYDROLOGIC ENGINEERING CENTER       *
 * Version  4.6.2; May 1991              *               * 609 SECOND STREET, SUITE D       *
 *                                       *              * DAVIS, CALIFORNIA 95616-4687      *
 * RUN DATE  14DEC99   TIME  13:26:58   *                  *     (916) 756-1104            *
*********************************************           ****************************************
```

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

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                                  THIS RUN EXECUTED 14DEC99    13:26:58
*************************************
 HEC-2 WATER SURFACE PROFILES

 Version  4.6.2; May 1991
*************************************


T1    INPUT FILE NAME: P:\317\TASK31\SEDIMENT\HEC2\10000.IH2-------SUBCRITICAL
T2    DATE: 12/99  DIVERSION CHANNEL ASSUMING GRASS LINED CHAN ("n"=0.031) AND
T3    NO SEDIMENT IN CHANNEL. 10000 YR STORM EVENT


J1 ICHECK  INQ    NINV   IDIR   STRT    METRIC  HVINS  Q     WSEL   FQ

     0      2             0   .0025   0      0      0  100.48

J2 NPROF   IPLOT   PRFVS   XSECV   XSECH   FN    ALLDC  IBW   CHNIM   ITRACE

   -1        -1                    -1


J3 VARIABLE CODES FOR SUMMARY PRINTOUT

   38     43      1     42      8      4     25     26     68


NC    .031     .031     .031     0.1      0.3
QT      1     1271
X1      0       6      200    290.99      0        0       0
GR     111     170     101     200       87      242     89.93    257.78     101     290.99
GR     111    320.99


X1     200       6      200    290.99   201.61   198.48     200
GR   111.5     170    101.5     200      87.5     242     90.43    257.78    101.5    290.99
GR   111.5    320.99


X1     400       6      200    290.99   203.24   197.46     200
GR     112     170     102     200       88      242     90.93    257.78     102     290.99
GR     112    320.99


X1     600       6      200    290.99     200      200      200
GR   112.5     170    102.5     200      88.5     242     91.43    257.78    102.5    290.99
GR   112.5    320.99


X1     700       6      200    290.99   100.99    99.26     100
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GR 112.75 170 103 200 89 242 91.93 257.78 103 290.99
GR 112.75 320.99

X1 800 6 200 290.99 100.99 99.26 100
GR 113 170 103 200 89 242 91.93 257.78 103 290.99
GR 113 320.99

QT 1 1272
X1 1000 6 200 290.99 195.76 204.31 200
GR 113.5 170 103.5 200 89.5 242 92.43 257.78 103.5 290.99
GR 113.5 320.99

X1 1200 6 200 290.99 196.98 203.14 200
GR 114 170 104 200 90 242 92.93 257.78 104 290.99
GR 114 320.99

X1 1400 6 200 290.99 200.1 199.78 200
GR 114.5 170 104.5 200 90.5 242 93.43 257.78 104.5 290.99
GR 114.5 320.99

X1 1600 6 200 290.99 203.63 196 200
GR 115 170 105 200 91 242 93.93 257.78 105 290.99
GR 115 320.99

X1 1800 6 200 290.99 204.45 195.93 200
GR 115.5 137 105.5 200 91.5 242 94.43 257.78 105.5 290.99
GR 115.5 320.99

QT 1 1264
X1 2000 8 200 290.99 206.03 194.18 200
GR 116 170 106 200 92 242 94.93 257.78 106 290.99
GR 109.5 303.99 112 333.99 116 338.99

X1 2300 6 200 290.99 302.91 296.91 300
GR 116.75 20 106.5 200 92.5 242 95.43 257.78 106.5 290.99
GR 116.75 320.99

QT 1 1039
X1 2500 8 200 290.99 197.98 202.05 200
GR 117.25 133.25 112 166.75 110 191.75 107 200 93 242
GR 95.93 257.78 107 290.99 117.25 320.99

X1 2600 6 200 290.99 95.84 104.14 100
GR 117.5 170 107.5 200 93.5 242 96.43 257.78 107.5 290.99
GR 117.5 320.99

X1 2800 6 200 290.99 195.31 203.77 200
GR 118 170 108 200 94 242 96.93 257.78 108 290.99
GR 118 320.99

X1 3000 6 200 290.99 196.79 203.1 200
GR 118.5 170 108.5 200 94.5 242 97.43 257.78 108.5 290.99
GR 118.5 320.99

X1 3200 6 200 290.99 202.86 196.79 200
GR 119 170 109 200 95 242 97.93 257.78 109 290.99
GR 119 320.99
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X1  3400    7    200  290.99  202.15  197.69   200
GR  119.5   131  114.5  185.5  109.5   200   95.5   242   98.43  257.78
GR  109.5  290.99  119.5  320.99

X1  3600    6    200  290.99  198.73  201.73   200
GR   120    170   110   200    96    242   98.93  257.78   110   290.99
GR   120  320.99

X1  3800    6    200  290.99  196.34  203.70   200
GR  120.5   170  110.5   200   96.5   242   99.43  257.78  110.5  290.99
GR  120.5  320.99

X1  4000    8    200  290.99  199.39  200.58   200
GR   121    117  114.5   158   112    184   111    200    97    242
GR  99.93  257.78  111  290.99   121  320.99

X1  4300    6    200  290.99  305.81  294.2   300
GR  121.75  170  111.5   200   97.5   242  100.43  257.78  111.5  290.99
GR  121.75  320.99

QT    1    893
X1  4400    6    200  290.99  99.71  100.29   100
GR   122    170   112   200    98    242  100.93  257.78   112   290.99
GR   122  320.99

X1  4600    6    200  290.99  199.21  200.78   200
GR  122.5   170  112.5   200   98.5   242  101.43  257.78  112.5  290.99
GR  122.5  320.99

X1  4700    6    200  290.99  103.78  96.24   100
GR  122.75  170  112.75  200   98.75   242  101.68  257.78  112.75  290.99
GR  122.75  320.99

X1  4900    6    200  290.99  202.21  197.8   200
GR   123    118  113.25  200   99.25   242  102.18  257.78  113.25  290.99
GR  125.25  320.99

QT    1    779
X1  5200    6    200  285.89  306.91   294   300
GR   122    130   114   200   100    239  102.63  254.78   114   285.89
GR   124  315.89

X1  5400    6    200  284.99  205.7  194.4   200
GR  123.5   170  113.5   200  101.5   239  104.43  254.78  113.5  284.99
GR  123.5  314.99

X1  5600    6    200  284.99  199.85  200.1   200
GR   126    170   116   200   103    239  105.93  254.78   116   284.99
GR   126  314.99

X1  5800    6    200  284.99  199.86  200.45   200
GR  127.5   170  117.5   200  104.5   239  107.43  254.78  117.5  284.99
GR  127.5  314.99

X1  6000    6    200  284.99  195.23  204.69   200
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GR   129     170     119     200     106     239     108.93   254.78   119     284.99
GR   129     314.99

X1   6200    6       200     284.99  199.44  200.6   200
GR   128     115     120.5   200     107.5   239     110.43   254.78   120.5   284.99
GR   130.5   314.99

X1   6400    6       200     266.99  205.51  194.59  200
GR   129     120     119     200     109     230     111.93   245.78   119     266.99
GR   129     296.99

QT   1       377
X1   6600    6       200     266.99  203.03  196.86  200
GR   130     108     120.5   200     110.5   230     113.43   245.78   120.5   266.99
GR   130.5   296.99

X1   6700    6       200     266.99  101.2   98.8    100
GR   131.25  170     121.25  200     111.25  230     114.18   245.78   121.25  266.99
GR   131.25  296.99

X1   6800    6       200     266.99  101.19  98.8    100
GR   132     170     122     200     112     230     114.93   245.78   122     266.99
GR   132     296.99

X1   6900    6       200     266.99  99.68   100.32  100
GR   132.75  170     122.75  200     112.75  230     115.68   245.78   122.75  266.99
GR   132.75  296.99

QT   1       105
X1   7000    6       200     266.99  99.67   100.33  100
GR   133.5   170     123.5   200     113.5   230     116.43   245.78   123.5   266.99
GR   133.5   296.99

X1   7100    6       200     266.99  99.84   100.16  100
GR   134.25  170     124.25  200     114.25  230     117.18   245.78   124.25  266.99
GR   134.25  296.99

X1   7200    6       200     266.99  99.83   100.16  100
GR   135     170     125     200     115     230     117.93   245.78   125     266.99
GR   135     296.99

X1   7300    6       200     254.99  98.84   101.17  100
GR   133.75  170     123.75  200     115.75  224     118.68   239.78   123.75  254.99
GR   133.75  284.99

X1   7400    6       200     254.99  98.85   101.17  100
GR   134.5   170     124.5   200     116.5   224     119.43   239.78   124.5   254.99
GR   134.5   284.99

X1   7500    6       200     254.99  99.47   100.52  100
GR   135.25  170     125.25  200     117.25  224     120.18   239.78   125.25  254.99
GR   135.25  284.99

X1   7600    6       200     254.99  99.46   100.53  100
GR   136     170     126     200     118     224     120.93   239.78   126     254.99
GR   136     284.99
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X1   7800     6    200   254.99   196.29   203.71    200
GR   137.5   170   127.5    200    119.5     224   122.43   239.78   127.5   254.99
GR   137.5  284.99

X1   8000     6    200   254.99   199.4    200.6     200
GR    139    170    129     200     121      224   123.93   239.78    129   254.99
GR    139   284.99

X1   8200     7    200   254.99   192.62   203.75    200
GR    135     75   130.5    100    130.5     200   122.5      224   125.43   239.78
GR   130.5  254.99  140.5  284.99

QT     1     86
X1   8400     6    200   254.99   191.51   203.39    200
GR    142    135    132     200     124      224   126.93   239.78    132   254.99
GR    142   284.99

X1   8600     6    200   254.99   210.12   190.02    200
GR    139    135   133.5    200    125.5     224   128.43   239.78   133.5  254.99
GR   143.5  284.99

X1   8800     8    211   254.99   198.47   201.87    200
GR    136     37    134      98     130      180     128      211     127     224
GR  129.93  239.78   135   254.99    145   284.99

  SECNO  DEPTH  CWSEL  CRIWS  WSELK  EG   HV   HL   OLOSS  L-BANK ELEV
  Q    QLOB   QCH   QROB   ALOB   ACH   AROB   VOL   TWA   R-BANK ELEV
  TIME   VLOB   VCH   VROB   XNL   XNCH   XNR   WTN   ELMIN   SSTA
  SLOPE  XLOBL  XLCH  XLOBR  ITRIAL  IDC   ICONT  CORAR  TOPWID  ENDST

*PROF 1

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CCHV=   .100 CEHV=   .300
*SECNO .000
   .000    7.55   94.55   92.68  100.48   95.10    .55    .00    .00  101.00
  1271.0    .0   1271.0    .0      .0    213.6     .0     .0     .0   101.00
   .00     .00    5.95    .00    .000    .031   .000   .000   87.00  219.35
 .002498    0.      0.      0.      0      18      6     .00   52.29  271.64

*SECNO 200.000
 200.000   7.55   95.05   93.18    .00    95.60    .55    .50    .00  101.50
  1271.0    .0   1271.0    .0      .0    213.5     .0    1.0     .2   101.50
   .01     .00    5.95    .00    .000    .031   .000   .000   87.50  219.35
 .002498   202.    200.    198.     0      19      0     .00   52.29  271.64

*SECNO 400.000
 400.000   7.55   95.55   93.68    .00    96.10    .55    .50    .00  102.00
  1271.0    .0   1271.0    .0      .0    213.5     .0    2.0     .5   102.00
   .02     .00    5.95    .00    .000    .031   .000   .000   88.00  219.35
 .002498   203.    200.    197.     0      19      0     .00   52.29  271.64

*SECNO 600.000
 600.000   7.55   96.05   94.18    .00    96.60    .55    .50    .00  102.50
  1271.0    .0   1271.0    .0      .0    213.5     .0    2.9     .7   102.50
   .03     .00    5.95    .00    .000    .031   .000   .000   88.50  219.35
 .002500   200.    200.    200.     0      19      0     .00   52.28  271.64
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*SECNO 700.000
 700.000    7.26   96.26   94.68    .00   96.90    .63    .27    .03  103.00
  1271.0      .0  1271.0      .0     .0   198.9     .0    3.4     .8  103.00
     .03     .00    6.39     .00   .000    .031   .000   .000  89.00  220.21
 .003028    101.    100.     99.      2      19      0    .00  50.58  270.78

*SECNO 800.000
 800.000    7.65   96.65   94.68    .00   97.17    .52    .26    .01  103.00
  1271.0      .0  1271.0      .0     .0   218.9     .0    3.9    1.0  103.00
     .04     .00    5.81     .00   .000    .031   .000   .000  89.00  219.04
 .002336    101.    100.     99.      2      15      0    .00  52.90  271.95

*SECNO 1000.000
1000.000    7.62   97.12   95.18    .00   97.65    .53    .47    .00  103.50
  1272.0      .0  1272.0      .0     .0   216.9     .0    4.9    1.2  103.50
     .05     .00    5.87     .00   .000    .031   .000   .000  89.50  219.16
 .002400    196.    200.    204.      2      19      0    .00  52.67  271.83

*SECNO 1200.000
1200.000    7.60   97.60   95.68    .00   98.14    .54    .48    .00  104.00
  1272.0      .0  1272.0      .0     .0   215.7     .0    5.9    1.4  104.00
     .06     .00    5.90     .00   .000    .031   .000   .000  90.00  219.23
 .002435    197.    200.    203.      0      19      0    .00  52.54  271.76

*SECNO 1400.000
1400.000    7.58   98.08   96.18    .00   98.63    .54    .49    .00  104.50
  1272.0      .0  1272.0      .0     .0   215.1     .0    6.9    1.7  104.50
     .07     .00    5.91     .00   .000    .031   .000   .000  90.50  219.26
 .002453    200.    200.    200.      0      19      0    .00  52.47  271.73

*SECNO 1600.000
1600.000    7.57   98.57   96.68    .00   99.12    .55    .49    .00  105.00
  1272.0      .0  1272.0      .0     .0   214.7     .0    7.9    1.9  105.00
     .07     .00    5.92     .00   .000    .031   .000   .000  91.00  219.28
 .002466    204.    200.    196.      0      19      0    .00  52.42  271.71

*SECNO 1800.000
1800.000    7.57   99.07   97.18    .00   99.61    .55    .49    .00  105.50
  1272.0      .0  1272.0      .0     .0   214.4     .0    8.8    2.2  105.50
     .08     .00    5.93     .00   .000    .031   .000   .000  91.50  219.30
 .002476    204.    200.    196.      0      19      0    .00  52.39  271.69

*SECNO 2000.000
2000.000    7.57   99.57   97.66    .00  100.11    .54    .49    .00  106.00
  1264.0      .0  1264.0      .0     .0   214.1     .0    9.8    2.4  106.00
     .09     .00    5.90     .00   .000    .031   .000   .000  92.00  219.32
 .002452    206.    200.    194.      0      19      0    .00  52.36  271.67

*SECNO 2300.000
2300.000    7.81  100.31   98.16    .00  100.79    .48    .68    .01  106.50
  1264.0      .0  1264.0      .0     .0   227.1     .0   11.4    2.8  106.50
     .11     .00    5.57     .00   .000    .031   .000   .000  92.50  218.59
 .002093    303.    300.    297.      0      19      0    .00  53.82  272.40

*SECNO 2500.000
2500.000    7.83  100.83   98.21    .00  101.15    .32    .34    .02  107.00
  1039.0      .0  1039.0      .0     .0   228.5     .0   12.4    3.0  107.00
     .12     .00    4.55     .00   .000    .031   .000   .000  93.00  218.51
 .001391    198.    200.    202.      2      19      0    .00  53.98  272.48
```

*SECNO 2600.000

2600.000	7.44	100.94	98.73	.00	101.33	.39	.16	.02	107.50
1039.0	.0	1039.0	.0	.0	207.9	.0	12.9	3.1	107.50
.13	.00	5.00	.00	.000	.031	.000	.000	93.50	219.68
.001794	96.	100.	104.	2	14	0	.00	51.64	271.31

*SECNO 2800.000

2800.000	7.30	101.30	99.21	.00	101.71	.42	.38	.01	108.00
1039.0	.0	1039.0	.0	.0	200.5	.0	13.8	3.4	108.00
.14	.00	5.18	.00	.000	.031	.000	.000	94.00	220.11
.001978	195.	200.	204.	2	19	0	.00	50.78	270.88

*SECNO 3000.000

3000.000	7.19	101.69	99.71	.00	102.13	.44	.41	.01	108.50
1039.0	.0	1039.0	.0	.0	194.8	.0	14.7	3.6	108.50
.15	.00	5.33	.00	.000	.031	.000	.000	94.50	220.45
.002141	197.	200.	203.	1	19	0	.00	50.09	270.54

*SECNO 3200.000

3200.000	7.12	102.12	100.21	.00	102.58	.46	.44	.01	109.00
1039.0	.0	1039.0	.0	.0	191.2	.0	15.6	3.8	109.00
.16	.00	5.44	.00	.000	.031	.000	.000	95.00	220.67
.002252	203.	200.	197.	1	19	0	.00	49.66	270.32

*SECNO 3400.000

3400.000	7.07	102.57	100.71	.00	103.04	.47	.46	.00	109.50
1039.0	.0	1039.0	.0	.0	188.8	.0	16.5	4.1	109.50
.17	.00	5.50	.00	.000	.031	.000	.000	95.50	220.81
.002329	202.	200.	198.	1	19	0	.00	49.37	270.18

*SECNO 3600.000

3600.000	7.03	103.03	101.21	.00	103.51	.48	.47	.00	110.00
1039.0	.0	1039.0	.0	.0	187.0	.0	17.4	4.3	110.00
.18	.00	5.56	.00	.000	.031	.000	.000	96.00	220.92
.002389	199.	200.	202.	0	19	0	.00	49.15	270.07

*SECNO 3800.000

3800.000	7.01	103.51	101.71	.00	104.00	.48	.48	.00	110.50
1039.0	.0	1039.0	.0	.0	186.0	.0	18.2	4.5	110.50
.19	.00	5.59	.00	.000	.031	.000	.000	96.50	220.98
.002426	196.	200.	204.	0	19	0	.00	49.03	270.01

*SECNO 4000.000

4000.000	7.00	104.00	102.21	.00	104.48	.49	.49	.00	111.00
1039.0	.0	1039.0	.0	.0	185.4	.0	19.1	4.7	111.00
.20	.00	5.61	.00	.000	.031	.000	.000	97.00	221.02
.002448	199.	200.	201.	0	19	0	.00	48.95	269.97

*SECNO 4300.000

4300.000	7.23	104.73	102.71	.00	105.17	.43	.68	.01	111.50
1039.0	.0	1039.0	.0	.0	197.0	.0	20.4	5.1	111.50
.21	.00	5.27	.00	.000	.031	.000	.000	97.50	220.32
.002076	306.	300.	294.	0	19	0	.00	50.36	270.67

*SECNO 4400.000

4400.000	7.01	105.01	102.89	.00	105.37	.36	.19	.01	112.00
893.0	.0	893.0	.0	.0	186.1	.0	20.8	5.2	112.00
.22	.00	4.80	.00	.000	.031	.000	.000	98.00	220.97
.001788	100.	100.	100.	2	19	0	.00	49.04	270.02

```
*SECNO 4600.000
 4600.000    6.87   105.37   103.39     .00   105.75     .39     .38     .01   112.50
   893.0      .0    893.0      .0       .0    179.1      .0     21.7     5.4   112.50
     .23     .00     4.98     .00     .000     .031    .000     .000   98.50   221.40
  .001983    199.    200.    201.      2       19       0      .00   48.18   269.59


*SECNO 4700.000
 4700.000    6.81   105.56   103.64     .00   105.96     .40     .20     .00   112.75
   893.0      .0    893.0      .0       .0    176.2      .0     22.1     5.5   112.75
     .24     .00     5.07     .00     .000     .031    .000     .000   98.75   221.59
  .002074    104.    100.     96.      0       19       0      .00   47.81   269.40


*SECNO 4900.000
 4900.000    6.72   105.97   104.14     .00   106.39     .42     .43     .01   113.25
   893.0      .0    893.0      .0       .0    172.0      .0     22.9     5.7   113.25
     .25     .00     5.19     .00     .000     .031    .000     .000   99.25   221.86
  .002216    202.    200.    198.      0       19       0      .00   47.28   269.13


*SECNO 5200.000
 5200.000    6.66   106.66   104.56     .00   106.99     .33     .59     .01   114.00
   779.0      .0    779.0      .0       .0    168.2      .0     24.0     6.1   114.00
     .26     .00     4.63     .00     .000     .031    .000     .000  100.00   220.45
  .001725    307.    300.    294.      2       19       0      .00   45.35   265.80


*SECNO 5400.000

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .63

 5400.000    5.47   106.97   106.06     .00   107.60     .63     .52     .09   113.50
   779.0      .0    779.0      .0       .0    122.8      .0     24.7     6.3   113.50
     .27     .00     6.35     .00     .000     .031    .000     .000  101.50   221.21
  .004395    206.    200.    194.      2       19       0      .00   42.05   263.26


*SECNO 5600.000
 5600.000    4.87   107.87   107.62     .00   108.91    1.04    1.19     .12   116.00
   779.0      .0    779.0      .0       .0     95.2      .0     25.2     6.4   116.00
     .28     .00     8.18     .00     .000     .031    .000     .000  103.00   224.37
  .008453    200.    200.    200.      2       15       0      .00   36.25   260.62


*SECNO 5800.000
 5800.000    5.05   109.55   109.12     .00   110.46     .91    1.54     .01   117.50
   779.0      .0    779.0      .0       .0    101.7      .0     25.7     6.6   117.50
     .29     .00     7.66     .00     .000     .031    .000     .000  104.50   223.84
  .007044    200.    200.    200.      3       11       0      .00   37.32   261.15


*SECNO 6000.000
 6000.000    4.98   110.98   110.62     .00   111.94     .96    1.46     .02   119.00
   779.0      .0    779.0      .0       .0     99.0      .0     26.1     6.8   119.00
     .29     .00     7.87     .00     .000     .031    .000     .000  106.00   224.06
  .007596    195.    200.    205.      3       11       0      .00   36.87   260.93


*SECNO 6200.000
 6200.000    5.00   112.50   112.12     .00   113.45     .95    1.51     .00   120.50
   779.0      .0    779.0      .0       .0     99.5      .0     26.6     7.0   120.50
     .30     .00     7.83     .00     .000     .031    .000     .000  107.50   224.01
  .007480    199.    200.    201.      2       11       0      .00   36.96   260.98


*SECNO 6400.000
 6400.000    5.00   114.00   113.62     .00   114.94     .95    1.49     .00   119.00
   779.0      .0    779.0      .0       .0     99.8      .0     27.0     7.1   119.00
```

.31	.00	7.81	.00	.000	.031	.000	.000	109.00	215.00	
.007433	206.	200.	195.	1	11	0	.00	37.00	251.99	

*SECNO 6600.000

3301 HV CHANGED MORE THAN HVINS

6600.000	5.09	115.59	113.93	.00	115.80	.21	.78	.07	120.50	
377.0	.0	377.0	.0	.0	103.1	.0	27.5	7.3	120.50	
.32	.00	3.66	.00	.000	.031	.000	.000	110.50	214.73	
.001591	203.	200.	197.	2	19	0	.00	37.53	252.26	

*SECNO 6700.000

6700.000	4.47	115.72	114.68	.00	116.05	.34	.22	.04	121.25	
377.0	.0	377.0	.0	.0	80.9	.0	27.7	7.4	121.25	
.33	.00	4.66	.00	.000	.031	.000	.000	111.25	216.59	
.003094	101.	100.	99.	2	19	0	.00	33.81	250.40	

*SECNO 6800.000

6800.000	4.00	116.00	115.43	.00	116.51	.51	.40	.05	122.00	
377.0	.0	377.0	.0	.0	65.7	.0	27.9	7.5	122.00	
.33	.00	5.74	.00	.000	.031	.000	.000	112.00	218.00	
.005515	101.	100.	99.	2	19	0	.00	30.98	248.99	

*SECNO 6900.000

6900.000	3.80	116.55	116.18	.00	117.17	.62	.63	.03	122.75	
377.0	.0	377.0	.0	.0	59.7	.0	28.0	7.5	122.75	
.34	.00	6.32	.00	.000	.031	.000	.000	112.75	218.60	
.007195	100.	100.	100.	2	15	0	.00	29.80	248.39	

*SECNO 7000.000

3301 HV CHANGED MORE THAN HVINS

7000.000	3.95	117.45	115.57	.00	117.49	.04	.27	.06	123.50	
105.0	.0	105.0	.0	.0	64.2	.0	28.2	7.6	123.50	
.36	.00	1.64	.00	.000	.031	.000	.000	113.50	218.15	
.000456	100.	100.	100.	2	11	0	.00	30.69	248.84	

*SECNO 7100.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .59

7100.000	3.24	117.49	116.32	.00	117.58	.09	.07	.01	124.25	
105.0	.0	105.0	.0	.0	44.0	.0	28.3	7.7	124.25	
.37	.00	2.39	.00	.000	.031	.000	.000	114.25	220.27	
.001315	100.	100.	100.	2	11	0	.00	26.44	246.72	

*SECNO 7200.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .56

7200.000	2.62	117.62	117.07	.00	117.83	.21	.22	.03	125.00	
105.0	.0	105.0	.0	.0	28.9	.0	28.4	7.7	125.00	
.38	.00	3.64	.00	.000	.031	.000	.000	115.00	222.13	
.004167	100.	100.	100.	2	14	0	.00	22.01	244.13	

*SECNO 7300.000

7300.000	2.34	118.09	117.82	.00	118.41	.32	.55	.03	123.75	
105.0	.0	105.0	.0	.0	23.1	.0	28.4	7.8	123.75	
.38	.00	4.54	.00	.000	.031	.000	.000	115.75	216.95	
.007537	99.	100.	101.	2	15	0	.00	19.69	236.65	

*SECNO 7400.000
7400.000 2.35 118.85 118.57 .00 119.17 .32 .75 .00 124.50
105.0 .0 105.0 .0 .0 23.1 .0 28.5 7.8 124.50
.39 .00 4.55 .00 .000 .031 .000 .000 116.50 216.96
.007563 99. 100. 101. 2 15 0 .00 19.68 236.64

*SECNO 7500.000
7500.000 2.35 119.60 119.32 .00 119.92 .32 .75 .00 125.25
105.0 .0 105.0 .0 .0 23.2 .0 28.5 7.8 125.25
.39 .00 4.53 .00 .000 .031 .000 .000 117.25 216.95
.007487 99. 100. 101. 0 15 0 .00 19.72 236.66

*SECNO 7600.000
7600.000 2.35 120.35 120.07 .00 120.67 .32 .75 .00 126.00
105.0 .0 105.0 .0 .0 23.2 .0 28.6 7.9 126.00
.40 .00 4.52 .00 .000 .031 .000 .000 118.00 216.94
.007442 99. 100. 101. 0 15 0 .00 19.74 236.68

*SECNO 7800.000
7800.000 2.35 121.85 121.57 .00 122.17 .32 1.50 .00 127.50
105.0 .0 105.0 .0 .0 23.1 .0 28.7 8.0 127.50
.41 .00 4.54 .00 .000 .031 .000 .000 119.50 216.96
.007546 196. 200. 204. 1 15 0 .00 19.69 236.65

*SECNO 8000.000
8000.000 2.35 123.35 123.07 .00 123.67 .32 1.50 .00 129.00
105.0 .0 105.0 .0 .0 23.2 .0 28.8 8.1 129.00
.42 .00 4.53 .00 .000 .031 .000 .000 121.00 216.94
.007474 199. 200. 201. 1 15 0 .00 19.72 236.67

*SECNO 8200.000
8200.000 2.35 124.85 124.57 .00 125.17 .32 1.50 .00 130.50
105.0 .0 105.0 .0 .0 23.2 .0 28.9 8.2 130.50
.44 .00 4.53 .00 .000 .031 .000 .000 122.50 216.95
.007507 193. 200. 204. 1 15 0 .00 19.71 236.66

*SECNO 8400.000
8400.000 2.28 126.28 125.91 .00 126.52 .24 1.35 .01 132.00
86.0 .0 86.0 .0 .0 21.8 .0 29.0 8.3 132.00
.45 .00 3.95 .00 .000 .031 .000 .000 124.00 217.17
.005947 192. 200. 203. 1 15 0 .00 19.10 236.27

*SECNO 8600.000
8600.000 2.13 127.63 127.41 .00 127.95 .31 1.40 .02 133.50
86.0 .0 86.0 .0 .0 19.1 .0 29.1 8.3 133.50
.46 .00 4.50 .00 .000 .031 .000 .000 125.50 217.60
.008407 210. 200. 190. 1 15 0 .00 17.90 235.50

*SECNO 8800.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.62

8800.000 1.82 128.82 128.40 .00 128.95 .13 .98 .02 128.00
86.0 8.0 78.0 .0 5.3 26.3 .0 29.2 8.5 135.00
.48 1.51 2.97 .00 .031 .031 .000 .000 127.00 198.15
.003217 198. 200. 202. 2 14 0 .00 35.70 233.85

THIS RUN EXECUTED 14DEC99 13:26:59

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HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991

****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST
NO SEDIMENT IN CHANNEL.

SUMMARY PRINTOUT

	SECNO	Q	CWSEL	ELMIN	DEPTH	TOPWID	AREA	VCH	FRCH
	.000	1271.00	94.55	87.00	7.55	52.29	213.55	5.95	.52
	200.000	1271.00	95.05	87.50	7.55	52.29	213.53	5.95	.52
Below H	400.000	1271.00	95.55	88.00	7.55	52.29	213.53	5.95	.52
	600.000	1271.00	96.05	88.50	7.55	52.28	213.49	5.95	.52
	700.000	1271.00	96.26	89.00	7.26	50.58	198.87	6.39	.57
	800.000	1271.00	96.65	89.00	7.65	52.90	218.90	5.81	.50
	1000.000	1272.00	97.12	89.50	7.62	52.67	216.86	5.87	.51
	1200.000	1272.00	97.60	90.00	7.60	52.54	215.69	5.90	.51
G-H	1400.000	1272.00	98.08	90.50	7.58	52.47	215.12	5.91	.51
	1600.000	1272.00	98.57	91.00	7.57	52.42	214.69	5.92	.52
	1800.000	1272.00	99.07	91.50	7.57	52.39	214.37	5.93	.52
	2000.000	1264.00	99.57	92.00	7.57	52.36	214.12	5.90	.51
	2300.000	1264.00	100.31	92.50	7.81	53.82	227.06	5.57	.48
	2500.000	1039.00	100.83	93.00	7.83	53.98	228.47	4.55	.39
	2600.000	1039.00	100.94	93.50	7.44	51.64	207.91	5.00	.44
	2800.000	1039.00	101.30	94.00	7.30	50.78	200.54	5.18	.46
	3000.000	1039.00	101.69	94.50	7.19	50.09	194.76	5.33	.48
	3200.000	1039.00	102.12	95.00	7.12	49.66	191.16	5.44	.49
E-F	3400.000	1039.00	102.57	95.50	7.07	49.37	188.80	5.50	.50
	3600.000	1039.00	103.03	96.00	7.03	49.15	187.02	5.56	.50
	3800.000	1039.00	103.51	96.50	7.01	49.03	185.98	5.59	.51
	4000.000	1039.00	104.00	97.00	7.00	48.95	185.36	5.61	.51
	4300.000	1039.00	104.73	97.50	7.23	50.36	197.01	5.27	.47
	4400.000	893.00	105.01	98.00	7.01	49.04	186.13	4.80	.43
D-E	4600.000	893.00	105.37	98.50	6.87	48.18	179.15	4.98	.46
	4700.000	893.00	105.56	98.75	6.81	47.81	176.20	5.07	.47
	4900.000	893.00	105.97	99.25	6.72	47.28	171.95	5.19	.48
	5200.000	779.00	106.66	100.00	6.66	45.35	168.23	4.63	.42

*	5400.000	779.00	106.97	101.50	5.47	42.05	122.77	6.35	.65
	5600.000	779.00	107.87	103.00	4.87	36.25	95.20	8.18	.89
	5800.000	779.00	109.55	104.50	5.05	37.32	101.74	7.66	.82
	6000.000	779.00	110.98	106.00	4.98	36.87	98.98	7.87	.85
	6200.000	779.00	112.50	107.50	5.00	36.96	99.54	7.83	.84
	6400.000	779.00	114.00	109.00	5.00	37.00	99.76	7.81	.84
	6600.000	377.00	115.59	110.50	5.09	37.53	103.09	3.66	.39
	6700.000	377.00	115.72	111.25	4.47	33.81	80.94	4.66	.53
	6800.000	377.00	116.00	112.00	4.00	30.98	65.67	5.74	.69
	6900.000	377.00	116.55	112.75	3.80	29.80	59.69	6.32	.79
	7000.000	105.00	117.45	113.50	3.95	30.69	64.17	1.64	.20
*	7100.000	105.00	117.49	114.25	3.24	26.44	43.96	2.39	.33
*	7200.000	105.00	117.62	115.00	2.62	22.01	28.88	3.64	.56
	7300.000	105.00	118.09	115.75	2.34	19.69	23.12	4.54	.74
	7400.000	105.00	118.85	116.50	2.35	19.68	23.10	4.55	.74
	7500.000	105.00	119.60	117.25	2.35	19.72	23.18	4.53	.74
	7600.000	105.00	120.35	118.00	2.35	19.74	23.23	4.52	.73
	7800.000	105.00	121.85	119.50	2.35	19.69	23.11	4.54	.74
	8000.000	105.00	123.35	121.00	2.35	19.72	23.20	4.53	.74
	8200.000	105.00	124.85	122.50	2.35	19.71	23.16	4.53	.74
	8400.000	86.00	126.28	124.00	2.28	19.10	21.76	3.95	.65
	8600.000	86.00	127.63	125.50	2.13	17.90	19.11	4.50	.77
*	8800.000	86.00	128.82	127.00	1.82	35.70	31.61	2.97	.49

C-D

3-C

A-3

ABOVE A

SUMMARY OF ERRORS AND SPECIAL NOTES

WARNING SECNO= 5400.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 7100.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 7200.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 8800.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

RIPRAP SIZING CALCULATIONS FOR 100-YR, 1,000-YR, AND 10,000-YR EVENTS

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

'ile: P:\03-317\RESP1299\RIPRAP\COE70_2.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
REACHS F-G & G-H (100 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	370
INPUT: topwidth of flow (ft)=	32.99
R/W=	11.2
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	4.080
INPUT: depth (ft)=	4.340

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.16667	2.00	0.156	0.156	0.749	0.654	4.80	4.19
0.08333	1.00	0.124	0.124	0.374	0.327	3.01	2.63
0.0625	0.75	0.114	0.114	0.281	0.245	2.46	2.15
0.04167	0.50	0.101	0.101	0.187	0.164	1.85	1.61
0.02083	0.25	0.084	0.084	0.094	0.082	1.11	0.97
0.01042	0.13	0.071	0.071	0.047	0.041	0.66	0.57

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

ile: P:\03-317\RESP1299\RIPRAP\COE70_2.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
REACHS F-G & G-H (100 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	293
INPUT: topwidth of flow (ft)=	32.99
R/W=	8.9
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	4.080
INPUT: depth (ft)=	4.340

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.16667	2.00	0.156	0.165	0.749	0.654	4.54	3.97
0.08333	1.00	0.124	0.131	0.374	0.327	2.85	2.49
0.0625	0.75	0.114	0.121	0.281	0.245	2.33	2.04
0.04167	0.50	0.101	0.107	0.187	0.164	1.75	1.53
0.02083	0.25	0.084	0.089	0.094	0.082	1.05	0.92
0.01042	0.13	0.071	0.075	0.047	0.041	0.62	0.54

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

ile: P:\03-317\RESP1299\RIPRAP\COE70_2.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
BELOW REACH H (100 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	705
INPUT: topwidth of flow (ft)=	31.48
R/W=	22.4
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	4.570
INPUT: depth (ft)=	4.080

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.16667	2.00	0.200	0.200	0.749	0.654	3.74	3.27
0.08333	1.00	0.159	0.159	0.374	0.327	2.35	2.06
0.0625	0.75	0.146	0.146	0.281	0.245	1.93	1.68
0.04167	0.50	0.129	0.129	0.187	0.164	1.45	1.26
0.02083	0.25	0.107	0.107	0.094	0.082	0.87	0.76
0.01042	0.13	0.091	0.091	0.047	0.041	0.52	0.45

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

File: P:\03-317\RESP1299\RIPRAP\COE70_2.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
REACH E-F (100 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	385
INPUT: topwidth of flow (ft)=	30.98
R/W=	12.4
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	3.870
INPUT: depth (ft)=	4.000

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.16667	2.00	0.145	0.145	0.749	0.654	5.18	4.53
0.08333	1.00	0.115	0.115	0.374	0.327	3.26	2.85
0.0625	0.75	0.105	0.105	0.281	0.245	2.67	2.33
0.04167	0.50	0.093	0.093	0.187	0.164	2.00	1.75
0.02083	0.25	0.077	0.077	0.094	0.082	1.21	1.06
0.01042	0.13	0.065	0.065	0.047	0.041	0.72	0.63

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

File: P:\03-317\RESP1299\RIPRAP\COE70_2.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
REACH E-F (100 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	357
INPUT: topwidth of flow (ft)=	30.98
R/W=	11.5
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	3.870
INPUT: depth (ft)=	4.000

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.16667	2.00	0.145	0.145	0.749	0.654	5.18	4.53
0.08333	1.00	0.115	0.115	0.374	0.327	3.26	2.85
0.0625	0.75	0.105	0.105	0.281	0.245	2.67	2.33
0.04167	0.50	0.093	0.093	0.187	0.164	2.00	1.75
0.02083	0.25	0.077	0.077	0.094	0.082	1.21	1.06
0.01042	0.13	0.065	0.065	0.047	0.041	0.72	0.63

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

'ile: P:\03-317\RESP1299\RIPRAP\COE70_2.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
REACH E-F (100 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	317
INPUT: topwidth of flow (ft)=	30.98
R/W=	10.2
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	3.870
INPUT: depth (ft)=	4.000

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.16667	2.00	0.145	0.145	0.749	0.654	5.18	4.53
0.08333	1.00	0.115	0.115	0.374	0.327	3.26	2.85
0.0625	0.75	0.105	0.105	0.281	0.245	2.67	2.33
0.04167	0.50	0.093	0.093	0.187	0.164	2.00	1.75
0.02083	0.25	0.077	0.077	0.094	0.082	1.21	1.06
0.01042	0.13	0.065	0.065	0.047	0.041	0.72	0.63

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

File: P:\03-317\RESP1299\RIPRAP\COE70_2.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
REACH D-E (100 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	260
INPUT: topwidth of flow (ft)=	29.76
R/W=	8.7
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	3.680
INPUT: depth (ft)=	3.800

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.16667	2.00	0.133	0.142	0.749	0.654	5.28	4.61
0.08333	1.00	0.106	0.112	0.374	0.327	3.33	2.91
0.0625	0.75	0.097	0.103	0.281	0.245	2.73	2.39
0.04167	0.50	0.086	0.091	0.187	0.164	2.05	1.79
0.02083	0.25	0.071	0.076	0.094	0.082	1.24	1.08
0.01042	0.13	0.060	0.064	0.047	0.041	0.74	0.64

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

'ile: P:\03-317\RESP1299\RIPRAP\COE70_2.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
REACH D-E (100 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	484
INPUT: topwidth of flow (ft)=	29.76
R/W=	16.3
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	3.680
INPUT: depth (ft)=	3.800

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.16667	2.00	0.133	0.133	0.749	0.654	5.63	4.92
0.08333	1.00	0.106	0.106	0.374	0.327	3.55	3.10
0.0625	0.75	0.097	0.097	0.281	0.245	2.91	2.54
0.04167	0.50	0.086	0.086	0.187	0.164	2.18	1.91
0.02083	0.25	0.071	0.071	0.094	0.082	1.32	1.15
0.01042	0.13	0.060	0.060	0.047	0.041	0.78	0.68

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

File: P:\03-317\RESP1299\RIPRAP\COE70_2.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
REACH C-D (100 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	260
INPUT: topwidth of flow (ft)=	23.25
R/W=	11.2
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	6.100
INPUT: depth (ft)=	2.690

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.25	3.00	0.487	0.487	1.123	0.982	2.31	2.02
0.16667	2.00	0.415	0.415	0.749	0.654	1.80	1.58
0.08333	1.00	0.324	0.324	0.374	0.327	1.15	1.01
0.0625	0.75	0.295	0.295	0.281	0.245	0.95	0.83
0.04167	0.50	0.260	0.260	0.187	0.164	0.72	0.63
0.02083	0.25	0.214	0.214	0.094	0.082	0.44	0.38

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

'ile: P:\03-317\RESP1299\RIPRAP\COE70_2.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
REACH B-C (100 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	367
INPUT: topwidth of flow (ft)=	18.77
R/W=	19.6
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	4.430
INPUT: depth (ft)=	2.240

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.16667	2.00	0.235	0.235	0.749	0.654	3.19	2.79
0.08333	1.00	0.182	0.182	0.374	0.327	2.06	1.80
0.0625	0.75	0.165	0.165	0.281	0.245	1.70	1.49
0.04167	0.50	0.145	0.145	0.187	0.164	1.29	1.13
0.02083	0.25	0.119	0.119	0.094	0.082	0.79	0.69
0.01042	0.13	0.099	0.099	0.047	0.041	0.47	0.41

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

File: P:\03-317\RESP1299\RIPRAP\COE70_2.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
REACH A-B (100 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	222
INPUT: topwidth of flow (ft)=	11.36
R/W=	19.5
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	3.380
INPUT: depth (ft)=	1.350

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.16667	2.00	0.169	0.169	0.749	0.654	4.44	3.88
0.08333	1.00	0.127	0.127	0.374	0.327	2.94	2.57
0.0625	0.75	0.114	0.114	0.281	0.245	2.45	2.14
0.04167	0.50	0.099	0.099	0.187	0.164	1.88	1.64
0.02083	0.25	0.080	0.080	0.094	0.082	1.17	1.02
0.01042	0.13	0.066	0.066	0.047	0.041	0.71	0.62

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

'ile: P:\03-317\RESP1299\RIPRAP\COE70_2.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
ABOVE REACH A (100 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	714
INPUT: topwidth of flow (ft)=	10.58
R/W=	67.5
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	3.140
INPUT: depth (ft)=	1.260

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.16667	2.00	0.150	0.150	0.749	0.654	4.99	4.36
0.08333	1.00	0.113	0.113	0.374	0.327	3.32	2.90
0.0625	0.75	0.101	0.101	0.281	0.245	2.77	2.42
0.04167	0.50	0.088	0.088	0.187	0.164	2.13	1.86
0.02083	0.25	0.070	0.070	0.094	0.082	1.33	1.16
0.01042	0.13	0.058	0.058	0.047	0.041	0.81	0.71

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

File: P:\03-317\RESP1299\RIPRAP\COE70_3.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
ABOVE REACH A (1,000 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	714
INPUT: topwidth of flow (ft)=	14.30
R/W=	49.9
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	3.860
INPUT: depth (ft)=	1.700

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.25	3.00	0.238	0.238	1.123	0.982	4.73	4.13
0.16667	2.00	0.199	0.199	0.749	0.654	3.76	3.28
0.08333	1.00	0.152	0.152	0.374	0.327	2.46	2.15
0.0625	0.75	0.138	0.138	0.281	0.245	2.04	1.78
0.04167	0.50	0.120	0.120	0.187	0.164	1.56	1.36
0.02083	0.25	0.097	0.097	0.094	0.082	0.96	0.84

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

File: P:\03-317\RESP1299\RIPRAP\COE70_3.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
REACH A-B (1,000 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	222
INPUT: topwidth of flow (ft)=	15.73
R/W=	14.1
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	3.930
INPUT: depth (ft)=	1.870

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.25	3.00	0.236	0.236	1.123	0.982	4.76	4.16
0.16667	2.00	0.199	0.199	0.749	0.654	3.77	3.29
0.08333	1.00	0.153	0.153	0.374	0.327	2.45	2.14
0.0625	0.75	0.138	0.138	0.281	0.245	2.03	1.78
0.04167	0.50	0.121	0.121	0.187	0.164	1.55	1.35
0.02083	0.25	0.098	0.098	0.094	0.082	0.95	0.83

RIPRAP SIZING USING 1970 COE METHOD

Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

File: P:\03-317\RESP1299\RIPRAP\COE70_3.WB3

Date: 12/14/99

Location: SHERWOOD DIVERION DITCH (See Figure C.1)
REACH B-C (1,000 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	367
INPUT: topwidth of flow (ft)=	25.16
R/W=	14.6
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	5.410
INPUT: depth (ft)=	3.030

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.25	3.00	0.365	0.365	1.123	0.982	3.08	2.69
0.16667	2.00	0.312	0.312	0.749	0.654	2.40	2.10
0.08333	1.00	0.245	0.245	0.374	0.327	1.53	1.33
0.0625	0.75	0.224	0.224	0.281	0.245	1.26	1.10
0.04167	0.50	0.198	0.198	0.187	0.164	0.95	0.83
0.02083	0.25	0.163	0.163	0.094	0.082	0.57	0.50

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

File: P:\03-317\RESP1299\RIPRAP\COE70_3.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
REACH C-D (1,000 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	260
INPUT: topwidth of flow (ft)=	30.28
R/W=	8.6
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	6.890
INPUT: depth (ft)=	3.880

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.25	3.00	0.537	0.578	1.123	0.982	1.94	1.70
0.16667	2.00	0.463	0.498	0.749	0.654	1.50	1.31
0.08333	1.00	0.367	0.395	0.374	0.327	0.95	0.83
0.0625	0.75	0.336	0.361	0.281	0.245	0.78	0.68
0.04167	0.50	0.299	0.321	0.187	0.164	0.58	0.51
0.02083	0.25	0.247	0.266	0.094	0.082	0.35	0.31

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

File: P:\03-317\RESP1299\RIPRAP\COE70_3.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
REACH D-E (1,000 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	484
INPUT: topwidth of flow (ft)=	38.40
R/W=	12.6
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	4.510
INPUT: depth (ft)=	5.240

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.25	3.00	0.206	0.206	1.123	0.982	5.45	4.76
0.16667	2.00	0.179	0.179	0.749	0.654	4.19	3.66
0.08333	1.00	0.143	0.143	0.374	0.327	2.61	2.28
0.0625	0.75	0.132	0.132	0.281	0.245	2.13	1.86
0.04167	0.50	0.118	0.118	0.187	0.164	1.59	1.39
0.02083	0.25	0.098	0.098	0.094	0.082	0.95	0.83

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

File: P:\03-317\RESP1299\RIPRAP\COE70_3.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
REACH D-E (1,000 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	260
INPUT: topwidth of flow (ft)=	38.40
R/W=	6.8
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	4.510
INPUT: depth (ft)=	5.240

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.25	3.00	0.206	0.249	1.123	0.982	4.50	3.94
0.16667	2.00	0.179	0.217	0.749	0.654	3.46	3.02
0.08333	1.00	0.143	0.174	0.374	0.327	2.16	1.88
0.0625	0.75	0.132	0.160	0.281	0.245	1.76	1.54
0.04167	0.50	0.118	0.142	0.187	0.164	1.31	1.15
0.02083	0.25	0.098	0.119	0.094	0.082	0.79	0.69

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

File: P:\03-317\RESP1299\RIPRAP\COE70_3.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
REACH E-F (1,000 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	317
INPUT: topwidth of flow (ft)=	39.93
R/W=	7.9
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	4.810
INPUT: depth (ft)=	5.490

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.25	3.00	0.230	0.258	1.123	0.982	4.36	3.81
0.16667	2.00	0.200	0.224	0.749	0.654	3.34	2.92
0.08333	1.00	0.161	0.180	0.374	0.327	2.08	1.82
0.0625	0.75	0.148	0.165	0.281	0.245	1.70	1.48
0.04167	0.50	0.132	0.148	0.187	0.164	1.27	1.11
0.02083	0.25	0.110	0.123	0.094	0.082	0.76	0.66

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

File: P:\03-317\RESP1299\RIPRAP\COE70_3.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
REACH E-F (1,000 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	357
INPUT: topwidth of flow (ft)=	39.93
R/W=	8.9
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	4.810
INPUT: depth (ft)=	5.490

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.25	3.00	0.230	0.243	1.123	0.982	4.63	4.04
0.16667	2.00	0.200	0.211	0.749	0.654	3.55	3.10
0.08333	1.00	0.161	0.170	0.374	0.327	2.21	1.93
0.0625	0.75	0.148	0.156	0.281	0.245	1.80	1.57
0.04167	0.50	0.132	0.139	0.187	0.164	1.34	1.18
0.02083	0.25	0.110	0.116	0.094	0.082	0.80	0.70

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

File: P:\03-317\RESP1299\RIPRAP\COE70_3.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
REACH E-F (1,000 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	385
INPUT: topwidth of flow (ft)=	39.93
R/W=	9.6
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	4.810
INPUT: depth (ft)=	5.490

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.25	3.00	0.230	0.234	1.123	0.982	4.80	4.20
0.16667	2.00	0.200	0.203	0.749	0.654	3.68	3.22
0.08333	1.00	0.161	0.163	0.374	0.327	2.29	2.00
0.0625	0.75	0.148	0.150	0.281	0.245	1.87	1.63
0.04167	0.50	0.132	0.134	0.187	0.164	1.40	1.22
0.02083	0.25	0.110	0.112	0.094	0.082	0.84	0.73

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

File: P:\03-317\RESP1299\RIPRAP\COE70_3.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
REACHS F-G & G-H (1,000 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	293
INPUT: topwidth of flow (ft)=	42.71
R/W=	6.9
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	5.070
INPUT: depth (ft)=	5.950

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.25	3.00	0.249	0.299	1.123	0.982	3.75	3.28
0.16667	2.00	0.217	0.261	0.749	0.654	2.87	2.51
0.08333	1.00	0.175	0.210	0.374	0.327	1.78	1.56
0.0625	0.75	0.161	0.193	0.281	0.245	1.45	1.27
0.04167	0.50	0.144	0.173	0.187	0.164	1.08	0.95
0.02083	0.25	0.120	0.145	0.094	0.082	0.65	0.57

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels, EM 1110-2-1601, pp. 37 - 47.

File: P:\03-317\RESP1299\RIPRAP\COE70_3.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
REACHS F-G & G-H (1,000 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	370
INPUT: topwidth of flow (ft)=	42.71
R/W=	8.7
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	5.070
INPUT: depth (ft)=	5.950

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.25	3.00	0.249	0.266	1.123	0.982	4.22	3.69
0.16667	2.00	0.217	0.232	0.749	0.654	3.23	2.82
0.08333	1.00	0.175	0.187	0.374	0.327	2.00	1.75
0.0625	0.75	0.161	0.172	0.281	0.245	1.63	1.43
0.04167	0.50	0.144	0.154	0.187	0.164	1.22	1.06
0.02083	0.25	0.120	0.129	0.094	0.082	0.73	0.64

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

File: P:\03-317\RESP1299\RIPRAP\COE70_3.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
BELOW REACH H (1,000 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	705
INPUT: topwidth of flow (ft)=	41.03
R/W=	17.2
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	5.540
INPUT: depth (ft)=	5.670

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.25	3.00	0.302	0.302	1.123	0.982	3.72	3.25
0.16667	2.00	0.263	0.263	0.749	0.654	2.85	2.49
0.08333	1.00	0.211	0.211	0.374	0.327	1.77	1.55
0.0625	0.75	0.194	0.194	0.281	0.245	1.44	1.26
0.04167	0.50	0.174	0.174	0.187	0.164	1.08	0.94
0.02083	0.25	0.145	0.145	0.094	0.082	0.64	0.56

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

File: P:\03-317\RESP1299\RIPRAP\COE70_4.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
ABOVE REACH A (10,000 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	714
INPUT: topwidth of flow (ft)=	17.90
R/W=	39.9
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	4.500
INPUT: depth (ft)=	2.130

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.25	3.00	0.292	0.292	1.123	0.982	3.84	3.36
0.16667	2.00	0.247	0.247	0.749	0.654	3.03	2.65
0.08333	1.00	0.191	0.191	0.374	0.327	1.96	1.71
0.0625	0.75	0.173	0.173	0.281	0.245	1.62	1.42
0.04167	0.50	0.152	0.152	0.187	0.164	1.23	1.07
0.02083	0.25	0.124	0.124	0.094	0.082	0.75	0.66

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

File: P:\03-317\RESP1299\RIPRAP\COE70_4.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
REACH A-B (10,000 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	222
INPUT: topwidth of flow (ft)=	19.68
R/W=	11.3
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	4.550
INPUT: depth (ft)=	2.350

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.25	3.00	0.287	0.287	1.123	0.982	3.92	3.43
0.16667	2.00	0.243	0.243	0.749	0.654	3.08	2.69
0.08333	1.00	0.189	0.189	0.374	0.327	1.98	1.73
0.0625	0.75	0.172	0.172	0.281	0.245	1.64	1.43
0.04167	0.50	0.151	0.151	0.187	0.164	1.24	1.08
0.02083	0.25	0.123	0.123	0.094	0.082	0.76	0.66

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

File: P:\03-317\RESP1299\RIPRAP\COE70_4.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
REACH B-C (10,000 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	367
INPUT: topwidth of flow (ft)=	29.80
R/W=	12.3
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	6.320
INPUT: depth (ft)=	3.800

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.25	3.00	0.456	0.456	1.123	0.982	2.46	2.15
0.16667	2.00	0.393	0.393	0.749	0.654	1.91	1.67
0.08333	1.00	0.311	0.311	0.374	0.327	1.20	1.05
0.0625	0.75	0.285	0.285	0.281	0.245	0.99	0.86
0.04167	0.50	0.253	0.253	0.187	0.164	0.74	0.65
0.02083	0.25	0.209	0.209	0.094	0.082	0.45	0.39

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

File: P:\03-317\RESP1299\RIPRAP\COE70_4.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
REACH C-D (10,000 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	260
INPUT: topwidth of flow (ft)=	36.25
R/W=	7.2
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	8.180
INPUT: depth (ft)=	4.870

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.25	3.00	0.696	0.819	1.123	0.982	1.37	1.20
0.22917	2.75	0.674	0.793	1.030	0.900	1.30	1.13
0.20833	2.50	0.652	0.767	0.936	0.818	1.22	1.07
0.1875	2.25	0.628	0.739	0.842	0.736	1.14	1.00
0.16667	2.00	0.603	0.710	0.749	0.654	1.06	0.92
0.14583	1.75	0.577	0.678	0.655	0.573	0.97	0.84

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

File: P:\03-317\RESP1299\RIPRAP\COE70_4.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
REACH D-E (10,000 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	484
INPUT: topwidth of flow (ft)=	47.28
R/W=	10.2
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	5.190
INPUT: depth (ft)=	6.720

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.25	3.00	0.250	0.250	1.123	0.982	4.49	3.93
0.16667	2.00	0.218	0.218	0.749	0.654	3.43	3.00
0.08333	1.00	0.177	0.177	0.374	0.327	2.12	1.85
0.0625	0.75	0.163	0.163	0.281	0.245	1.73	1.51
0.04167	0.50	0.146	0.146	0.187	0.164	1.28	1.12
0.02083	0.25	0.122	0.122	0.094	0.082	0.76	0.67

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

File: P:\03-317\RESP1299\RIPRAP\COE70_4.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
REACH D-E (10,000 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	260
INPUT: topwidth of flow (ft)=	47.28
R/W=	5.5
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	5.190
INPUT: depth (ft)=	6.720

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.25	3.00	0.250	0.336	1.123	0.982	3.35	2.92
0.16667	2.00	0.218	0.293	0.749	0.654	2.55	2.23
0.08333	1.00	0.177	0.237	0.374	0.327	1.58	1.38
0.0625	0.75	0.163	0.219	0.281	0.245	1.28	1.12
0.04167	0.50	0.146	0.196	0.187	0.164	0.96	0.84
0.02083	0.25	0.122	0.164	0.094	0.082	0.57	0.50

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

File: P:\03-317\RESP1299\RIPRAP\COE70_4.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
REACH E-F (10,000 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	317
INPUT: topwidth of flow (ft)=	48.95
R/W=	6.5
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	5.610
INPUT: depth (ft)=	7.000

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.25	3.00	0.288	0.356	1.123	0.982	3.15	2.75
0.16667	2.00	0.252	0.312	0.749	0.654	2.40	2.10
0.08333	1.00	0.204	0.252	0.374	0.327	1.48	1.30
0.0625	0.75	0.188	0.233	0.281	0.245	1.21	1.05
0.04167	0.50	0.168	0.209	0.187	0.164	0.90	0.78
0.02083	0.25	0.142	0.175	0.094	0.082	0.53	0.47

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

File: P:\03-317\RESP1299\RIPRAP\COE70_4.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
REACH E-F (10,000 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	357
INPUT: topwidth of flow (ft)=	48.95
R/W=	7.3
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	5.610
INPUT: depth (ft)=	7.000

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.25	3.00	0.288	0.336	1.123	0.982	3.34	2.92
0.16667	2.00	0.252	0.294	0.749	0.654	2.55	2.23
0.08333	1.00	0.204	0.238	0.374	0.327	1.57	1.38
0.0625	0.75	0.188	0.219	0.281	0.245	1.28	1.12
0.04167	0.50	0.168	0.197	0.187	0.164	0.95	0.83
0.02083	0.25	0.142	0.165	0.094	0.082	0.57	0.50

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

File: P:\03-317\RESP1299\RIPRAP\COE70_4.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
REACH E-F (10,000 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	385
INPUT: topwidth of flow (ft)=	48.95
R/W=	7.9
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	5.610
INPUT: depth (ft)=	7.000

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.25	3.00	0.288	0.323	1.123	0.982	3.47	3.04
0.16667	2.00	0.252	0.283	0.749	0.654	2.65	2.31
0.08333	1.00	0.204	0.229	0.374	0.327	1.64	1.43
0.0625	0.75	0.188	0.211	0.281	0.245	1.33	1.16
0.04167	0.50	0.168	0.189	0.187	0.164	0.99	0.86
0.02083	0.25	0.142	0.159	0.094	0.082	0.59	0.51

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

File: P:\03-317\RESP1299\RIPRAP\COE70_4.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
REACHS F-G & G-H (10,000 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	293
INPUT: topwidth of flow (ft)=	52.39
R/W=	5.6
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	5.930
INPUT: depth (ft)=	7.570

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.25	3.00	0.313	0.417	1.123	0.982	2.69	2.35
0.16667	2.00	0.274	0.365	0.749	0.654	2.05	1.79
0.08333	1.00	0.223	0.297	0.374	0.327	1.26	1.10
0.0625	0.75	0.206	0.274	0.281	0.245	1.03	0.90
0.04167	0.50	0.184	0.246	0.187	0.164	0.76	0.67
0.02083	0.25	0.155	0.207	0.094	0.082	0.45	0.40

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

File: P:\03-317\RESP1299\RIPRAP\COE70_4.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
REACHS F-G & G-H (10,000 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	370
INPUT: topwidth of flow (ft)=	52.39
R/W=	7.1
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	5.930
INPUT: depth (ft)=	7.570

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.25	3.00	0.313	0.371	1.123	0.982	3.03	2.64
0.16667	2.00	0.274	0.325	0.749	0.654	2.30	2.01
0.08333	1.00	0.223	0.264	0.374	0.327	1.42	1.24
0.0625	0.75	0.206	0.244	0.281	0.245	1.15	1.01
0.04167	0.50	0.184	0.219	0.187	0.164	0.86	0.75
0.02083	0.25	0.155	0.184	0.094	0.082	0.51	0.44

RIPRAP SIZING USING 1970 COE METHOD
Ref: COE, 1970. Hydraulic Design of Flood Control Channels,
EM 1110-2-1601, pp. 37 - 47.

File: P:\03-317\RESP1299\RIPRAP\COE70_4.WB3
Date: 12/14/99
Location: SHERWOOD DIVERION DITCH (See Figure C.1)
BELOW REACH H (10,000 YR STORM EVENT)

INPUT COEFFICIENTS: (see manual for description)

INPUT: radius of curv. (ft)=	705
INPUT: topwidth of flow (ft)=	50.58
R/W=	13.9
INPUT: side slope (xH:1V)=	3
side slope angle (deg)=	18.4
INPUT: angle of repose (deg)=	40.5
INPUT: rock specific gravity=	2.8
INPUT: velocity (fps)=	6.390
INPUT: depth (ft)=	7.260

D-50 (ft)	D-50 (in)	BOUNDARY SHEAR (psf)	BEND SHEAR (psf)	BOTTOM SHEAR (psf)	SIDE SLOPE SHEAR (psf)	BOTTOM SF	SIDE SLOPE SF
0.25	3.00	0.369	0.369	1.123	0.982	3.04	2.66
0.16667	2.00	0.323	0.323	0.749	0.654	2.32	2.03
0.08333	1.00	0.262	0.262	0.374	0.327	1.43	1.25
0.0625	0.75	0.241	0.241	0.281	0.245	1.16	1.02
0.04167	0.50	0.217	0.217	0.187	0.164	0.86	0.76
0.02083	0.25	0.182	0.182	0.094	0.082	0.51	0.45