WESTERN NUCLEAR, INC.
SHERWOOD PROJECT
P. O. BOX 392 • WELLPINIT, WASHINGTON 99040 • (509) ~~747-2081~~ 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

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DIV. OF RADIATION PROTECTION

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 does not 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_t	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

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Sherwood Mine
Wellpinit, Washington

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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 DISCHARGE (CFS)	PROBABLE MAXIMUM FLOOD WATER LEVEL ELEVATION 2) (FT)	PROBABLE MAXIMUM FLOOD DIFFERENCE BETWEEN TOP OF RIPRAP AND PMF WATER ELEVATION (FT)	10,000 YEAR FLOOD 3) DISCHARGE (CFS)	10,000 YEAR FLOOD 3) WATER LEVEL ELEVATION 2) (FT)	10,000 YEAR FLOOD 3) DIFFERENCE BETWEEN TOP OF RIPRAP AND WATER ELEVATION (FT)	1000 YEAR FLOOD 3) DISCHARGE (CFS)	1000 YEAR FLOOD 3) WATER LEVEL ELEVATION 2) (FT)	1000 YEAR FLOOD 3) 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: **Question No. 2 from the July 06, 1995 meeting in Seattle - 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: **Question No. 3 from the July 06, 1995 meeting in Seattle - 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
                    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\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          *
*                                       *
* Version  4.6.2;  May 1991             *
*                                       *
* RUN DATE   14DEC99   TIME  13:16:07 *
*********************************************
```

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

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
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*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

****
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
Below H	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
G-H	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
F-G	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
E-F	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
D-E	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

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

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

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

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*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
BELOW H	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
G-H	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
F-G	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
E-F	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
D-E	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
		6600.000	208.00	114.38	110.50	3.88	30.29	62.14	3.35	.41
B-C	*	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
		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
A-B		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
		8400.000	47.00	125.80	124.00	1.80	15.08	13.57	3.46	.64
ABOVE A		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          *
*                                       *
* Version  4.6.2; May 1991              *
*                                       *
* RUN DATE  14DEC99   TIME  13:26:58 *
*********************************************
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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                 *
*****************************************
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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 14DEC99 13:26:58

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************************************
HEC-2 WATER SURFACE PROFILES

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

****
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
Below H	.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
	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
G-H	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
	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
E-F	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
	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
D-E	4400.000	893.00	105.01	98.00	7.01	49.04	186.13	4.80	.43
	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
C-D		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
B-C		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
A-B		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
ABOVE A		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

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.

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)=	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.

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)=	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