

CHAPTER 3

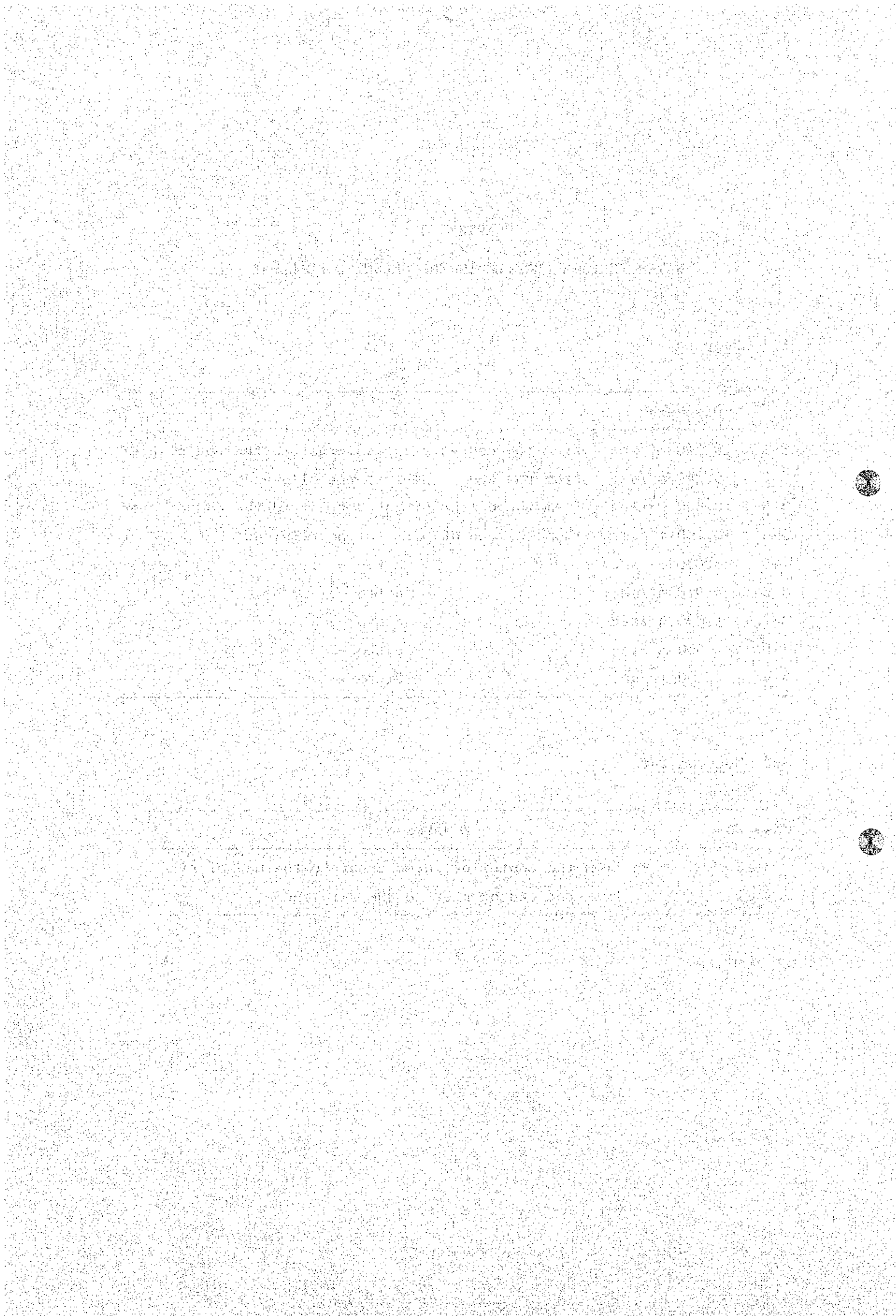
WATER SURFACE PROFILE IN THE SELECTED SPILLWAY

3.1 Results

Case No.	Discharge	Remarks
3-1	16,240 m ³ /sec	from the center of gated crest to the end of pier
3-2	16,240 m ³ /sec	from the end of pier to the flip end
3-3	10,600 m ³ /sec	from the center of gated crest to the end of pier
3-4	10,600 m ³ /sec	from the end of pier to the flip end
3-5	8,830 m ³ /sec	- ditto -
3-6	5,910 m ³ /sec	- ditto -
3-7	1,790 m ³ /sec	- ditto -
3-8	500 m ³ /sec	- ditto -
3-9	100 m ³ /sec	- ditto -

3.2 Section Data

Case No.	Remarks
3-10	from the center of gated crest to the end of pier
3-11	from the end of pier to the flip end



**** WATER SURFACE PROFILE OF OPEN CHANNEL SPILL WAY ****

(THE CASE $Q = 16240.0$ CUBIC METER / SECOND)

NO.	DEPTH (M)	VELOCITY (M/S)	PRESSURE AT BOTTOM (M)	FROUDE NUMBER	ELEVATION (M)	CROSS AREA (SQ.M)	CRITICAL DEPTH (M)	NORMAL DEPTH (M)	SPECIFIC ENERGY (M)	CONJUGATE DEPTH (M)	REMARK
1	11.252	11.102	6.238	1.057	165.252	1462.734	11.252	---	169.584	11.252	CONTROL SECTION
2	9.440	13.233	3.215	1.325	163.113	1222.210	11.304	2.181	169.580	14.239	*
3	8.327	16.651	1.318	1.602	161.437	1108.484	11.424	1.848	169.576	15.522	*
4	7.822	15.971	-0.331	1.823	159.693	1016.874	11.575	1.703	169.566	16.436	*
5	7.192	17.371	-2.092	2.068	157.652	934.913	11.846	1.535	169.557	17.747	*
6	8.179	15.273	6.858	1.705	157.658	1063.288	12.381	1.588	169.552	16.056	*
7	8.521	14.836	9.022	1.533	157.284	1094.671	12.500	1.534	169.545	15.882	*
8	7.765	16.088	8.618	1.844	155.221	1009.460	12.510	1.627	169.536	16.752	*
9	7.496	16.666	8.819	1.944	154.209	974.421	12.089	1.682	169.527	17.197	*
10	7.392	17.131	9.040	2.026	153.371	948.015	11.886	1.882	169.518	17.561	*
11	7.195	17.363	9.236	2.067	152.937	935.320	11.740	2.017	169.508	17.740	*
12	7.086	17.629	9.267	2.115	152.435	921.202	11.683	2.214	169.497	17.944	*
13	7.024	17.789	9.322	2.143	152.129	913.077	11.630	2.627	169.484	18.063	*
14	6.887	18.682	6.682	2.307	151.682	862.304	11.578	0.066	169.476	18.228	*
15	5.317	19.380	5.317	2.684	150.317	837.973	10.269	0.066	169.467	17.697	*

* SUPER-CRITICAL FLOW
 ** SUB-CRITICAL FLOW

**** WATER SURFACE PROFILE OF OPEN CHANNEL SPILL WAY ****

(THE CASE Q = 16240.0 CUBIC METER / SECOND)

NO.	DEPTH (M)	VELOCITY (M/S)	PRESSURE AT BOTTOM (M)	FROUDE NUMBER	ELEVATION (M)	CROSS AREA (M ²)	CRITICAL DEPTH (M)	NORMAL DEPTH (M)	SPECIFIC ENERGY (M)	CONJUGATE DEPTH (M)	REMARK
1	17.143	6.005	17.143	0.463	162.143	2704.450	10.262	---	164.090	5.554	"
2	17.022	6.180	17.022	0.478	162.022	2622.813	10.411	---	164.022	5.808	"
3	17.171	6.264	16.955	0.483	161.955	2592.640	10.611	---	163.361	5.944	"
4	10.594	10.297	8.368	1.010	159.465	1577.127	10.594	2.917	163.968	10.594	CONTROL SECTION
5	6.247	17.622	2.089	2.251	149.750	921.574	10.857	2.386	163.841	17.011	"
6	6.506	16.818	6.476	2.089	149.316	965.604	10.870	3.060	163.737	16.497	"
7	6.227	17.979	6.012	2.301	147.102	903.259	10.980	2.710	163.586	17.386	"
8	5.358	21.606	5.154	2.986	139.504	751.660	11.199	2.828	163.304	20.031	"
9	4.854	24.484	4.687	3.550	132.307	663.027	11.429	2.934	162.896	22.064	"
10	4.549	26.971	4.393	4.038	125.273	602.120	11.672	3.048	162.362	23.804	"
11	4.346	29.164	4.196	4.467	118.336	556.852	11.928	3.173	161.702	25.370	"
12	4.203	31.148	4.064	4.848	111.464	521.390	12.198	3.310	160.929	26.829	"
13	4.118	32.958	3.976	5.186	104.636	492.743	12.484	3.450	160.020	28.215	"
14	4.064	34.629	3.924	5.486	97.854	468.970	12.788	3.624	158.994	29.558	"
15	4.036	36.190	3.897	5.752	91.087	448.742	13.110	3.803	157.864	30.879	"
16	4.033	37.654	3.894	5.987	84.344	431.294	13.455	4.003	156.633	32.193	"
17	4.051	38.031	3.912	6.193	77.622	416.080	13.821	4.226	155.294	33.503	"
18	4.089	40.538	3.947	6.370	70.927	402.596	14.216	4.467	153.890	34.847	"
19	4.178	41.250	3.995	6.343	64.232	393.695	14.606	4.784	152.843	36.043	"
20	4.277	40.625	3.754	6.273	63.109	399.752	14.821	4.948	152.229	35.863	"
21	4.502	38.911	27.124	5.856	62.128	417.362	12.333	5.404	151.679	35.101	"
22	4.751	37.063	39.320	5.424	61.418	438.171	9.615	6.748	151.243	34.219	"
23	4.872	36.354	43.179	5.239	61.195	446.724	8.912	---	150.858	33.883	"
24	4.901	36.270	43.360	5.232	61.051	447.757	8.209	---	150.480	33.823	"
25	4.982	36.100	43.392	5.185	61.254	449.859	8.917	---	150.104	33.857	"
26	4.987	35.912	43.379	5.135	61.528	452.217	8.929	26.440	149.727	33.809	"
27	5.046	35.629	43.614	5.065	62.180	455.815	8.928	---	149.349	33.202	"
28	5.077	35.543	43.307	5.037	62.071	456.912	8.957	23.593	149.012	33.717	"

* SUPER CRITICAL FLOW
* SUB=CRITICAL FLOW

***** WATER SURFACE PROFILE OF OPEN CHANNEL SPILL WAY *****

(THE CASE Q = 10600.0 CUBIC MEYER / SECOND)

NO.	DEPTH (M)	VELOCITY (M/S)	AT BOTTOM	PRESSURE (M)	FROUDE NUMBER	WATER SURFACE ELEVATION (M)	CROSS AREA (M ²)	CRITICAL DEPTH (M)	NORMAL DEPTH (M)	SPECIFIC ENERGY (M)	CONJUGATE DEPTH (M)	REMARK
1	10.009	10.383	6.059	1.048	164.009	1020.901	10.009	10.009	10.009	167.927	10.009	CONTROL SECTION
2	8.381	12.400	3.456	1.348	162.069	854.832	10.056	1.925	1.925	167.923	12.554	*
3	7.537	13.788	1.790	1.684	160.694	748.749	10.164	1.649	1.649	167.916	13.736	*
4	6.884	15.091	0.345	1.836	158.837	702.390	10.299	1.532	1.532	167.908	14.749	*
5	6.311	16.466	-1.179	2.093	156.904	643.740	10.541	1.387	1.387	167.900	15.790	*
6	7.006	14.834	5.874	1.790	156.674	714.582	10.932	1.429	1.429	167.893	14.371	*
7	7.124	14.587	7.560	1.745	156.200	726.694	10.899	1.385	1.385	167.885	14.378	*
8	6.512	15.815	7.220	1.970	154.225	670.355	10.907	1.460	1.460	167.875	15.313	*
9	6.328	16.422	7.380	2.085	153.180	645.493	10.712	1.513	1.513	167.863	15.758	*
10	6.144	16.914	7.556	2.179	152.305	626.686	10.531	1.686	1.686	167.851	16.109	*
11	6.033	17.168	7.715	2.228	151.837	617.443	10.401	1.816	1.816	167.837	16.287	*
12	5.960	17.438	7.739	2.281	151.332	607.880	10.350	1.991	1.991	167.823	16.474	*
13	5.904	17.607	7.783	2.313	151.019	602.222	10.303	2.362	2.362	167.811	16.586	*
14	5.669	18.332	5.664	2.459	150.664	578.236	10.329	0.032	0.032	167.798	17.079	*
15	3.455	19.469	3.455	3.345	148.955	544.461	7.727	0.027	0.027	167.780	14.706	*

* SUPER-CRITICAL FLOW
 * SUB-CRITICAL FLOW

***** WATER SURFACE PROFILE OF OPEN CHANNEL SPILL WAY *****
(THE CASE Q = 10000.0 CUBIC METER / SECOND)

NO.	DEPTH (M)	VELOCITY (M/S)	PRESSURE AT BOTTOM (CM)	FROUDE NUMBER	WATER SURFACE ELEVATION (M)	CROSS AREA (M ²)	CRITICAL DEPTH (M)	NORMAL DEPTH (M)	SPECIFIC ENERGY (M)	CONJUGATE DEPTH (M)	REMARK
1	14.203	4.701	14.293	0.397	159.593	2254.835	7.721	---	160.481	3.600	"
2	14.223	4.827	14.223	0.409	159.233	2195.791	7.834	---	160.441	3.759	"
3	14.366	4.887	14.186	0.412	159.186	2169.160	7.984	---	163.221	3.862	"
4	8.004	8.896	6.702	3.004	156.807	1191.577	8.004	2.099	160.591	8.004	CONTROL SECTION
5	4.448	16.155	1.879	2.446	148.071	656.153	8.205	1.670	160.297	13.322	*
6	4.563	15.895	4.472	2.376	147.312	666.889	8.179	2.128	160.193	13.220	*
7	4.291	17.030	4.143	2.625	145.233	622.832	8.262	1.911	160.020	13.929	*
8	3.639	20.684	3.514	3.462	137.864	512.486	8.427	1.974	159.876	16.082	*
9	3.291	23.582	3.178	4.151	130.798	449.998	8.599	2.041	159.151	17.743	*
10	3.074	26.050	2.968	4.744	123.848	406.904	8.783	2.114	158.449	19.148	*
11	2.932	28.215	2.831	5.262	116.971	375.682	8.975	2.194	157.561	20.403	*
12	2.838	30.153	2.740	5.716	110.140	351.539	9.178	2.281	156.497	21.564	*
13	2.776	31.913	2.680	6.116	103.340	332.150	9.393	2.377	155.267	22.665	*
14	2.739	33.529	2.645	6.469	96.575	316.144	9.622	2.481	153.894	23.729	*
15	2.722	35.025	2.628	6.779	89.818	302.644	9.865	2.596	152.364	24.771	*
16	2.722	36.413	2.628	7.048	83.078	291.102	10.124	2.723	150.682	25.804	*
17	2.736	37.718	2.642	7.281	76.352	281.032	10.399	2.865	148.887	26.841	*
18	2.764	38.942	2.669	7.479	69.649	272.200	10.697	3.018	146.967	27.890	*
19	2.813	39.989	5.024	7.614	62.915	265.072	11.002	3.210	145.612	28.914	*
20	2.861	39.036	8.831	7.483	61.742	267.654	10.961	3.292	144.943	28.880	*
21	2.959	36.642	17.199	7.174	60.634	274.313	10.194	3.499	144.326	28.575	*
22	3.060	37.036	24.744	6.870	59.757	281.648	8.746	4.055	143.802	28.243	*
23	3.104	37.243	27.095	6.750	59.448	284.619	8.260	5.499	143.357	28.121	*
24	3.122	37.162	27.197	6.716	59.272	285.236	8.255	---	142.911	28.134	*
25	3.149	36.986	27.196	6.656	59.474	286.592	8.271	48.748	142.458	28.106	*
26	3.177	36.796	27.168	6.592	59.757	288.072	8.292	23.229	142.031	28.072	*
27	3.213	36.522	27.172	6.507	60.371	290.238	8.291	---	141.600	28.000	*
28	3.234	36.421	27.089	6.467	60.339	291.045	8.346	21.950	141.223	28.004	*

* SUPER CRITICAL FLOW
" SUB-CRITICAL FLOW

**** WATER SURFACE PROFILE OF OPEN CHANNEL SPILL WAY ****

(THE CASE Q = 830.0 CUBIC METER / SECOND)

NO.	DEPTH (M)	VELOCITY (M/S)	PRESSURE AT BOTTOM (M)	PROUPE NUMBER	WATER SURFACE ELEVATION (M)	CROSS AREA (M ²)	CRITICAL DEPTH (M)	NORMAL DEPTH (M)	SPECIFIC ENERGY (M)	CONJUGATE DEPTH (M)	REMARK
1	13.248	4.225	13.248	0.371	158.248	2090.049	6.836	---	159.206	2.923	"
2	13.194	4.335	13.194	0.381	158.194	2036.827	6.935	---	159.325	3.103	"
3	13.331	4.387	13.194	0.384	158.194	2012.862	7.068	---	161.726	3.171	"
4	7.096	8.359	6.059	1.002	156.009	1056.314	7.096	1.828	159.336	7.096	CONTROL SECTION
5	3.835	15.009	1.740	2.545	147.499	565.882	7.274	1.644	159.042	12.019	*
6	3.893	15.518	3.816	2.511	146.656	569.031	7.241	1.832	158.933	12.017	*
7	2.657	16.644	3.531	2.779	146.621	530.923	7.314	1.650	158.746	12.061	*
8	3.088	20.307	2.981	3.690	137.331	434.815	7.460	1.702	158.358	16.645	*
9	2.785	23.209	2.690	4.441	130.310	380.437	7.614	1.758	157.273	18.155	*
10	2.599	25.066	2.510	5.083	123.390	344.038	7.775	1.818	156.976	17.433	*
11	2.478	27.809	2.393	5.641	116.533	317.327	7.946	1.884	155.961	18.570	*
12	2.399	29.716	2.316	6.127	109.716	297.147	8.126	1.956	154.288	18.619	*
13	2.347	31.442	2.266	6.554	102.926	280.832	8.317	2.035	153.332	20.612	*
14	2.317	33.015	2.238	6.925	96.188	267.454	8.519	2.121	151.742	21.588	*
15	2.306	34.469	2.225	7.251	89.445	256.174	8.734	2.215	149.991	22.504	*
16	2.306	35.811	2.226	7.531	82.676	246.572	8.963	2.321	148.002	23.431	*
17	2.320	37.060	2.240	7.770	75.950	238.203	9.207	2.438	145.976	24.357	*
18	2.346	38.231	2.264	8.071	69.244	230.966	9.471	2.564	143.765	25.295	*
19	2.383	39.318	2.300	8.333	62.500	224.278	9.743	2.719	142.271	26.245	*
20	2.420	39.040	2.300	8.014	61.316	226.175	9.728	2.781	141.555	26.245	*
21	2.491	38.237	14.130	7.737	60.181	230.928	9.243	2.933	140.854	26.036	*
22	2.562	37.521	20.274	7.472	59.271	235.772	8.228	3.142	140.310	25.820	*
23	2.594	37.125	22.192	7.361	58.943	237.842	7.849	4.340	139.820	25.737	*
24	2.609	37.048	22.266	7.324	58.759	238.343	7.843	---	139.366	25.750	*
25	2.631	36.866	22.280	7.257	58.961	239.318	7.862	47.858	138.886	25.723	*
26	2.656	36.667	22.289	7.185	59.268	240.819	7.889	22.519	138.424	25.690	*
27	2.686	36.387	22.285	7.090	59.851	242.682	7.886	---	137.966	25.622	*
28	2.704	36.282	22.143	7.046	59.841	243.373	7.954	21.524	137.587	25.625	*

* SUPER CRITICAL FLOW
 * SUB-CRITICAL FLOW

***** WATER SURFACE PROFILE OF OPEN CHANNEL SPILL WAY *****

(THE CASE Q = 5910.0 CUBIC METER / SECOND)

NO.	DEPTH (M)	VELOCITY (M/S)	PRESSURE AT BOTTOM (M)	FROUDE NUMBER	WATER SURFACE ELEVATION (M)	CROSS AREA (SQ.M)	CRITICAL DEPTH (M)	NORMAL DEPTH (M)	SPECIFIC ENERGY (M)	CONJUGATE DEPTH (M)	REMARK
1	11.281	3.321	11.281	0.316	156.281	1779.766	5.231	---	156.872	1.921	"
2	11.248	3.403	11.248	0.324	154.248	1736.530	5.306	---	156.852	2.003	"
3	11.373	3.462	11.230	0.326	156.230	1717.252	5.409	---	158.946	2.047	"
4	1.440	7.298	6.811	0.939	154.376	809.866	5.440	1.357	156.825	5.440	CONTROL SECTION
5	2.752	14.559	1.409	2.803	146.488	405.945	5.578	1.063	156.733	9.617	*
6	2.742	14.749	2.687	2.844	145.527	400.718	5.547	1.336	156.618	9.743	*
7	2.570	15.854	2.481	3.158	141.571	372.770	5.596	1.210	156.387	10.263	*
8	2.148	19.539	2.074	4.257	136.424	302.466	5.708	1.244	155.890	11.903	*
9	1.931	22.411	1.844	5.150	129.484	243.715	5.826	1.281	155.091	15.150	*
10	1.800	24.805	1.738	5.904	122.618	238.261	5.949	1.321	153.988	15.157	*
11	1.717	26.859	1.658	6.545	115.798	220.076	6.080	1.365	152.380	15.061	*
12	1.664	28.465	1.607	7.095	109.007	206.373	6.217	1.413	150.302	15.889	*
13	1.632	30.261	1.576	7.564	102.236	195.301	6.364	1.465	148.925	16.662	*
14	1.615	31.207	1.559	7.967	95.489	184.394	6.518	1.521	146.266	17.408	*
15	1.610	33.009	1.555	8.306	88.745	179.003	6.682	1.584	144.298	18.129	*
16	1.615	34.218	1.559	8.598	82.009	172.716	6.858	1.653	141.707	18.847	*
17	1.628	35.537	1.572	8.843	75.282	167.249	7.045	1.729	138.947	19.565	*
18	1.650	36.370	1.593	9.041	68.573	162.499	7.246	1.812	136.014	20.290	*
19	1.673	37.587	2.818	9.255	61.815	157.833	7.458	1.910	133.878	21.026	*
20	1.694	37.326	4.796	9.158	60.615	156.337	7.471	1.945	133.249	21.108	*
21	1.731	36.833	9.133	8.941	58.445	150.453	7.300	2.026	132.643	21.035	*
22	1.766	36.367	13.027	8.739	58.494	142.512	6.891	2.251	131.851	20.929	*
23	1.783	36.150	14.232	8.645	58.142	143.888	6.706	2.777	131.344	20.925	*
24	1.794	36.059	14.282	8.597	57.924	143.898	6.699	---	130.824	20.932	*
25	1.810	35.866	14.270	8.512	58.146	144.782	6.723	46.208	130.313	20.907	*
26	1.828	35.640	14.239	8.418	58.438	165.796	6.757	21.497	129.797	20.872	*
27	1.850	35.357	14.230	8.301	59.026	167.150	6.754	---	129.319	20.814	*
28	1.864	35.238	14.165	8.243	59.051	167.716	6.842	17.196	128.922	20.812	*

* SUPER CRITICAL FLOW
 " SUB-CRITICAL FLOW

***** WATER SURFACE PROFILE OF OPEN CHANNEL SPILL WAY ****

(THE CASE Q = 1790.0 CUBIC METER / SECOND)

NO.	DEPTH (M)	VELOCITY (M/S)	PRESSURE AT BOTTOM (M)	FROUDE NUMBER	WATER SURFACE ELEVATION (M)	CROSS AREA (M ²)	CRITICAL DEPTH (M)	NORMAL DEPTH (M)	SPECIFIC ENERGY (M)	CONJUGATE DEPTH (M)	REMARK
1	7.464	1.516	7.484	0.177	152.684	1180.710	2.359	---	152.607	0.462	"
2	7.428	1.551	7.528	0.181	152.678	1154.448	2.393	---	152.603	0.462	"
3	7.569	1.566	7.474	0.182	152.674	1142.900	2.439	---	153.692	0.471	"
4	2.460	4.887	2.413	0.995	151.630	366.278	2.460	0.583	152.591	2.460	CONTROL SECTION
5	0.983	12.343	0.615	3.975	144.837	145.019	2.522	0.463	152.456	5.057	*
6	0.931	12.878	0.932	4.217	143.772	139.000	2.599	0.567	152.227	5.216	*
7	0.824	13.803	0.883	4.662	141.953	129.681	2.524	0.524	151.667	5.464	*
8	0.735	17.303	0.709	6.467	135.959	103.448	2.574	0.532	150.325	6.340	*
9	0.636	19.727	0.661	7.739	128.261	90.736	2.528	0.585	148.104	6.986	*
10	0.628	21.524	0.607	8.671	121.487	83.163	2.883	0.558	145.107	7.397	*
11	0.610	22.889	0.589	9.355	114.729	78.203	2.742	0.572	141.441	7.776	*
12	0.602	23.848	0.583	9.815	107.983	74.744	2.806	0.588	137.224	8.104	*
13	0.603	24.827	0.582	10.213	101.242	72.098	2.870	0.605	132.669	8.408	*
14	0.607	25.541	0.586	10.466	94.516	70.085	2.940	0.623	127.776	8.490	*
15	0.615	26.176	0.594	10.658	87.784	68.384	3.014	0.642	122.717	8.968	*
16	0.626	26.738	0.604	10.791	81.054	66.946	3.093	0.664	117.505	9.246	*
17	0.639	27.261	0.617	10.887	74.327	65.662	3.178	0.687	112.217	9.529	*
18	0.655	27.756	0.632	10.952	67.612	64.490	3.268	0.712	106.892	9.822	*
19	0.656	28.933	0.914	11.493	60.834	61.867	3.365	0.740	103.655	10.264	*
20	0.664	28.862	1.376	11.315	59.621	62.019	3.381	0.748	102.465	10.690	*
21	0.672	28.727	2.382	11.199	58.421	62.311	3.383	0.767	101.372	10.305	*
22	0.680	28.606	3.284	11.028	57.234	62.573	3.364	0.821	100.491	10.318	*
23	0.685	28.483	3.563	10.987	57.057	62.843	3.349	0.953	99.895	10.312	*
24	0.691	28.360	3.575	10.896	56.841	63.117	3.344	---	99.320	10.305	*
25	0.700	28.085	3.562	10.717	57.045	63.735	3.360	43.117	98.724	10.269	*
26	0.700	27.787	3.543	10.528	57.345	64.418	3.384	17.362	98.167	10.227	*
27	0.723	27.402	3.535	10.294	57.214	65.106	3.382	---	97.659	10.169	*
28	0.730	27.248	3.502	10.184	57.986	65.693	3.444	16.006	97.279	10.154	*

* SUPER CRITICAL FLOW
" SUB-CRITICAL FLOW

***** WATER SURFACE PROFILE OF OPEN CHANNEL SPILL WAY *****

(THE CASE $Q = 500.0$ CUBIC METER / SECOND)

NO.	DEPTH (M)	VELOCITY (M/S)	AT BOTTOM (M)	PRESSURE	FROUDE NUMBER	WATER SURFACE ELEVATION (CM)	CROSS AREA (M ² M)	CRITICAL DEPTH (M)	NORMAL DEPTH (M)	SPECIFIC ENERGY (M)	CONJUGATE DEPTH (M)	REMARK
1	5.541	0.572	5.541	0.078	150.541	874.188	1.008	---	150.559	0.066	"	
2	5.540	0.585	5.540	0.079	150.540	855.338	1.023	---	150.558	0.069	"	
3	5.610	0.590	5.540	0.080	150.540	847.054	1.042	---	151.059	0.071	"	
4	1.032	3.193	1.017	0.394	150.039	150.581	1.052	0.262	150.548	1.052	CONTROL SECTION	
5	0.312	10.865	0.216	6.212	144.211	46.019	1.078	0.205	150.193	2.589	*	
6	0.506	11.190	0.300	6.463	143.140	44.682	1.067	0.288	149.524	2.646	*	
7	0.802	11.322	0.422	6.513	141.382	43.892	1.078	0.223	147.999	2.482	*	
8	0.955	11.928	0.246	8.809	134.596	35.898	1.100	0.234	144.487	3.051	*	
9	0.243	15.052	0.235	9.246	127.855	33.219	1.123	0.239	139.406	3.232	*	
10	0.242	15.584	0.234	10.107	121.114	32.085	1.146	0.243	133.496	3.346	*	
11	0.245	15.944	0.236	10.291	114.376	31.359	1.171	0.249	127.338	3.442	*	
12	0.249	16.180	0.241	10.345	107.641	30.902	1.198	0.254	120.989	3.522	*	
13	0.254	16.443	0.245	10.416	100.905	30.408	1.226	0.260	116.691	3.618	*	
14	0.260	16.638	0.251	10.412	94.181	30.052	1.256	0.267	108.295	3.706	*	
15	0.267	16.866	0.257	10.430	87.447	29.645	1.288	0.274	101.951	3.802	*	
16	0.273	17.133	0.263	10.473	80.713	29.183	1.321	0.281	95.680	3.907	*	
17	0.280	17.391	0.270	10.526	73.980	28.751	1.358	0.289	89.400	4.018	*	
18	0.288	17.647	0.278	10.506	67.258	28.333	1.396	0.298	83.136	4.133	*	
19	0.277	19.188	0.319	11.634	60.467	26.085	1.438	0.307	79.224	4.418	*	
20	0.281	19.004	0.407	11.358	59.252	26.310	1.446	0.310	77.733	4.415	*	
21	0.285	18.897	0.593	11.296	58.046	26.459	1.451	0.316	76.413	4.418	*	
22	0.288	18.882	0.760	11.241	57.051	26.480	1.453	0.334	75.470	4.433	*	
23	0.291	18.748	0.813	11.101	56.667	26.669	1.450	0.377	74.894	4.423	*	
24	0.295	18.567	0.817	10.920	56.445	26.930	1.448	1.200	74.284	4.407	*	
25	0.303	18.155	0.813	10.539	56.650	27.541	1.455	41.625	73.714	4.361	*	
26	0.312	17.675	0.806	10.106	56.955	28.288	1.466	17.167	73.137	4.305	*	
27	0.324	17.100	0.806	9.598	57.519	29.241	1.465	---	72.623	4.235	*	
28	0.329	16.879	0.791	9.395	57.609	29.623	1.492	15.927	72.379	4.211	*	

* SUPER CRITICAL FLOW
" SUB-CRITICAL FLOW

**** WATER SURFACE PROFILE OF OPEN CHANNEL SPILL WAY ****

(THE CASE Q = 100.0 CUBIC METER / SECOND)

NO.	DEPTH (M)	VELOCITY (M/S)	PRESSURE AT BOTTOM (M)	FROUDE NUMBER	WATER SURFACE ELEVATION (M)	CROSS AREA (M ²)	CRITICAL DEPTH (M)	NORMAL DEPTH (M)	SPECIFIC ENERGY (M)	CONJUGATE DEPTH (M)	REMARK
1	4.544	0.140	4.544	0.021	149.544	716.797	0.345	---	149.545	4.543	"
2	4.544	0.143	4.544	0.021	149.544	701.440	0.169	---	149.545	4.543	"
3	4.601	0.146	4.544	0.021	149.544	694.766	0.356	---	149.722	4.601	"
4	0.350	1.868	0.353	0.925	149.355	53.533	0.360	0.028	149.532	0.360	CONTROL SECTION
5	0.076	8.918	0.059	10.328	143.991	11.214	0.369	0.077	148.039	1.073	*
6	0.090	7.595	0.088	8.081	142.928	13.166	0.365	0.092	145.870	0.986	*
7	0.103	6.870	0.100	6.523	141.190	14.923	0.362	0.085	143.458	0.918	*
8	0.084	8.471	0.081	9.543	134.431	11.805	0.376	0.087	138.090	1.067	*
9	0.089	8.271	0.085	8.878	127.705	12.090	0.384	0.089	131.193	1.068	*
10	0.089	8.461	0.086	9.042	120.966	11.818	0.392	0.090	124.617	1.098	*
11	0.092	8.517	0.088	8.984	114.228	11.741	0.401	0.092	117.927	1.119	*
12	0.093	8.661	0.090	9.059	107.490	11.566	0.410	0.094	111.315	1.148	*
13	0.096	8.747	0.092	9.037	100.752	11.432	0.420	0.096	104.653	1.174	*
14	0.097	8.823	0.094	9.143	94.024	11.207	0.430	0.098	98.083	1.208	*
15	0.099	9.044	0.096	9.158	87.286	11.057	0.440	0.100	91.456	1.240	*
16	0.102	9.186	0.098	9.194	80.548	10.886	0.452	0.103	84.851	1.274	*
17	0.105	9.279	0.101	9.148	73.811	10.727	0.464	0.106	78.202	1.306	*
18	0.107	9.468	0.104	9.231	67.084	10.562	0.478	0.108	71.654	1.347	*
19	0.091	11.679	0.094	12.372	60.288	8.563	0.492	0.111	67.245	1.345	*
20	0.098	10.929	0.110	11.155	59.075	9.150	0.495	0.112	65.172	1.496	*
21	0.103	10.515	0.134	10.484	57.869	9.510	0.496	0.114	63.524	1.471	*
22	0.104	10.434	0.154	10.325	56.872	9.584	0.498	0.120	62.449	1.469	*
23	0.107	10.168	0.163	9.973	56.486	9.835	0.497	0.124	61.785	1.451	*
24	0.111	9.860	0.166	9.530	56.261	10.157	0.496	0.136	61.231	1.428	*
25	0.121	9.114	0.171	8.382	56.470	10.972	0.499	0.132	60.750	1.370	*
26	0.132	8.338	0.176	7.321	56.779	11.994	0.503	0.132	60.347	1.305	*
27	0.152	7.292	0.191	5.972	57.550	12.713	0.502	---	60.082	1.209	*
28	0.159	6.996	0.189	5.603	57.449	14.295	0.511	15.921	59.964	1.163	*

* SUPER CRITICAL FLOW
* SUB-CRITICAL FLOW

***** DIMENSION OF EACH SECTION *****

NO.	ELEVATION (M)	WIDTH (M)	RADIUS OF CURVATURE (M)	HORIZONTAL DISTANCE (M)	TOTAL H.D. (M)	DISTANCE ALONG CHUTE-FLOOR (M)	TOTAL R. ALONG	TAN(I)	SIN(I)	COS(I)	SLOPE OF SIDE WALL 1:M 1:N
1	156.000	130.000	24.000	2.000	0.000	2.000	0.000	0.17250	0.16999	1.00000	0. 0.
2	155.810	130.000	24.000	2.000	2.000	2.062	2.009	0.31750	0.30261	0.98545	0. 0.
3	153.310	130.000	24.000	2.000	4.000	2.143	4.071	0.44250	0.40465	0.95311	0. 0.
4	152.540	130.000	24.000	2.000	6.000	2.236	6.214	0.52800	0.47173	0.91447	0. 0.
5	151.510	130.000	24.000	1.000	8.000	1.244	8.450	0.60000	0.52894	0.84990	0. 0.
6	150.600	130.000	FLAT	1.000	9.000	1.146	9.494	0.65000	0.54499	0.83844	0. 0.
7	150.240	130.000	-100.000	2.000	10.000	2.500	10.840	0.65500	0.54793	0.83653	0. 0.
8	148.740	130.000	-100.000	2.000	12.000	2.302	13.340	0.64000	0.55084	0.83461	0. 0.
9	147.600	130.000	-100.000	2.000	14.000	2.236	15.842	0.53500	0.47173	0.88174	0. 0.
10	146.800	130.000	-100.000	2.000	16.000	2.088	17.828	0.40000	0.37139	0.92848	0. 0.
11	146.000	130.000	-100.000	2.000	18.000	2.042	19.966	0.27500	0.26516	0.96421	0. 0.
12	145.500	130.000	-100.000	2.000	20.000	2.029	22.028	0.21000	0.20352	0.97865	0. 0.
13	143.160	130.000	-100.000	2.000	22.000	2.006	24.056	0.12500	0.12403	0.99228	0. 0.
14	145.000	130.000	FLAT	2.000	24.000	2.000	26.063	0.04000	0.03997	0.99920	0. 0.
15	145.000	152.590	FLAT	0.	26.000	0.	28.063	0.	0.	1.00000	0. 0.

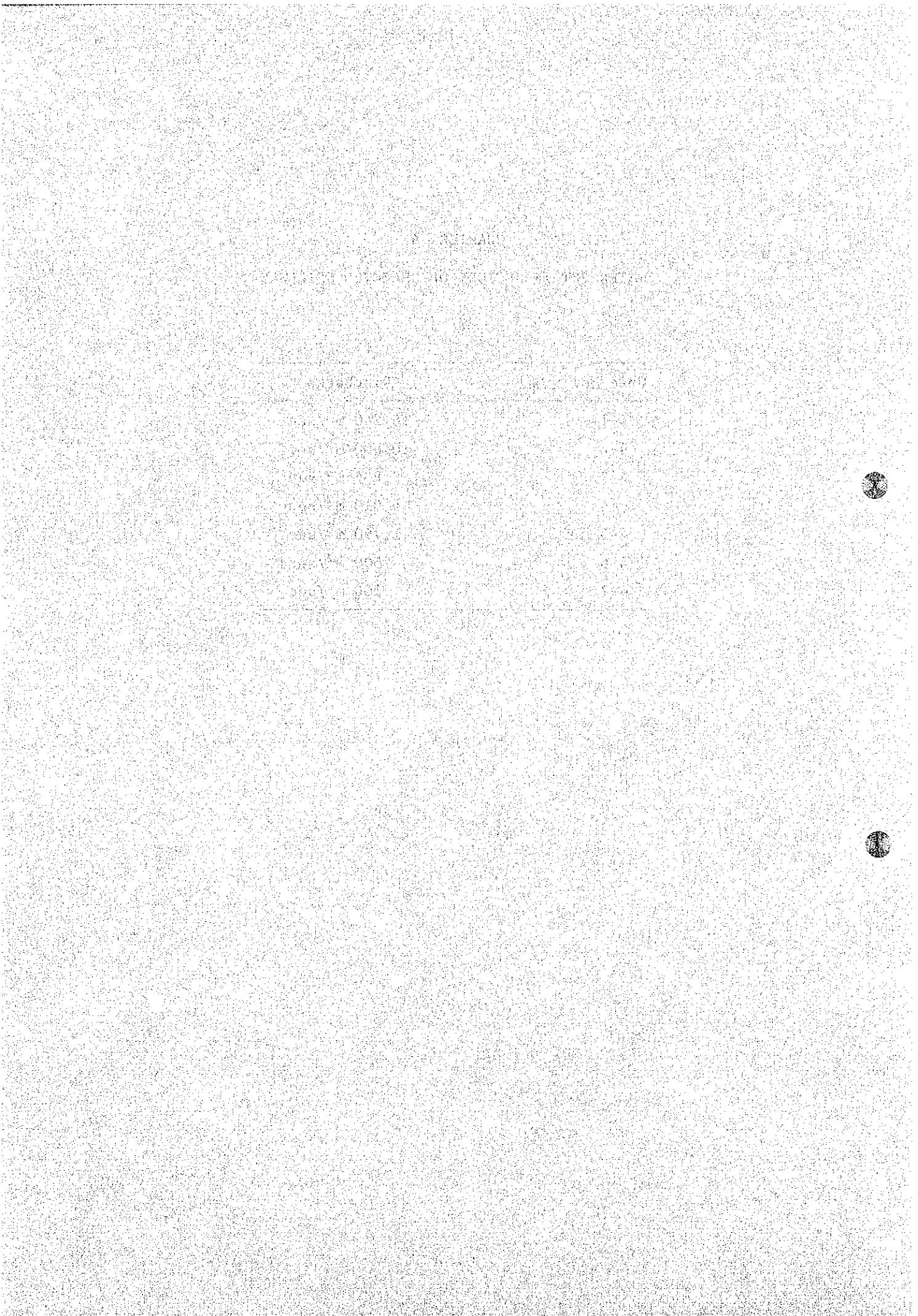
***** DIMENSION OF EACH SECTION *****

NO.	ELEVATION (M)	WIDTH (CM)	RADIUS OF CURVATURE (M)	HORIZONTAL DISTANCE (M)	TOTAL H.D. (M)	DISTANCE ALONG CHUTE-FLOOR (M)	TOTAL D. ALONG C.F. (M)	TAN(°)	SIN(°)	COS(°)	SLOPE OF SIDE WALL	
											1:M	1:N
1	145.000	157.760	FLAT	20.000	0.000	20.000	0.000	0.000	1.000	0.000	0.000	0.000
2	145.000	154.380	FLAT	20.000	20.000	20.000	20.000	0.000	0.000	1.000	0.000	0.000
3	142.000	150.990	FLAT	12.500	40.000	13.124	40.000	-0.16000	-0.15299	0.98266	0.000	0.000
4	149.000	148.870	50.000	8.000	52.500	9.877	53.124	0.15750	0.15358	0.98782	0.000	0.000
5	143.920	147.520	50.000	8.000	60.500	8.073	62.601	0.38500	0.35929	0.93323	0.000	0.000
6	142.840	146.160	FLAT	6.500	68.500	6.731	70.674	0.20212	0.19811	0.98018	0.000	0.000
7	141.090	145.060	FLAT	25.000	75.000	25.893	77.405	0.26942	0.26014	0.96557	0.000	0.000
8	134.350	140.820	FLAT	25.000	100.000	25.890	103.528	0.26940	0.26013	0.96557	0.000	0.000
9	127.620	136.590	FLAT	25.000	125.000	25.893	129.188	0.26940	0.26013	0.96557	0.000	0.000
10	150.650	132.350	FLAT	22.000	150.000	25.893	152.080	0.26940	0.26013	0.96553	0.000	0.000
11	114.140	128.120	FLAT	25.000	175.000	25.893	180.373	0.26940	0.26013	0.96553	0.000	0.000
12	107.400	123.880	FLAT	25.000	200.000	25.893	206.866	0.26940	0.26013	0.96553	0.000	0.000
13	100.650	119.650	FLAT	22.000	225.000	22.890	232.258	0.26940	0.26013	0.96557	0.000	0.000
14	93.930	115.410	FLAT	25.000	250.000	25.893	258.648	0.26940	0.26013	0.96557	0.000	0.000
15	87.190	111.180	FLAT	25.000	275.000	25.893	284.541	0.26940	0.26013	0.96553	0.000	0.000
16	80.450	106.940	FLAT	25.000	300.000	25.893	310.433	0.26940	0.26013	0.96553	0.000	0.000
17	73.710	102.710	FLAT	25.000	325.000	25.890	336.326	0.26940	0.26013	0.96557	0.000	0.000
18	66.980	98.470	FLAT	25.000	350.000	25.893	362.216	0.27020	0.26083	0.96538	0.000	0.000
19	60.200	94.240	-200.000	4.500	375.000	4.662	388.119	0.27116	0.26171	0.96515	0.000	0.000
20	58.980	93.470	-72.000	4.500	379.500	4.560	392.782	0.27000	0.26067	0.96543	0.000	0.000
21	57.770	92.710	-33.000	4.000	384.000	4.123	397.341	0.25844	0.25113	0.96795	0.000	0.000
22	56.770	92.030	-22.000	2.000	388.000	2.038	401.564	0.22250	0.21719	0.97613	0.000	0.000
23	56.350	91.620	-20.000	2.000	390.000	2.013	403.802	0.15500	0.15312	0.98820	0.000	0.000
24	56.150	91.360	-20.000	2.000	392.000	2.010	405.615	0.00750	0.00750	0.99997	0.000	0.000
25	56.350	91.020	-20.000	2.000	394.000	2.022	407.625	-0.12500	-0.12403	0.99228	0.000	0.000
26	56.650	90.680	-20.000	2.000	396.000	2.074	409.648	-0.21250	-0.20786	0.97816	0.000	0.000
27	57.200	90.340	-20.000	2.000	398.000	2.002	411.722	-0.16250	-0.16040	0.98705	0.000	0.000
28	57.300	90.000	-20.000	0.000	400.000	0.000	413.724	-0.36392	-0.34202	0.93969	0.000	0.000

CHAPTER 4

WATER JET TRAJECTORY OF SELECTED SPILLWAY

Case No.	Discharge
4-1	16,240 m ³ /sec
4-2	10,600 m ³ /sec
4-3	8,830 m ³ /sec
4-4	5,910 m ³ /sec
4-5	1,790 m ³ /sec
4-6	500 m ³ /sec
4-7	100 m ³ /sec



***** TRAJECTORY OF FREE DISCHARGING UPTURNED JET *****

HORIZONTAL DISTANCE FROM LIP END (METER)	ELEVATION OF MIDDLE LINE (METER)	ELEVATION OF LOWER SURFACE (METER)
0	59.021	57.300
5.000	60.745	59.026
10.000	62.278	60.565
15.000	63.620	61.917
20.000	64.770	63.081
25.000	65.729	64.057
30.000	66.496	64.846
35.000	67.073	65.448
40.000	67.458	65.862
45.000	67.651	66.089
50.000	67.653	66.129
55.000	67.464	65.981
60.000	67.084	65.666
65.000	66.512	65.123
70.000	65.749	64.413
75.000	64.794	63.515
80.000	63.648	62.430
85.000	62.311	61.157
90.000	60.783	59.697
95.000	59.063	58.050
100.000	57.151	56.215
105.000	55.049	54.193
110.000	52.755	51.984
115.000	50.266	49.581
118.973	51.300	50.581

***** MAXIMUM SCOUR DEPTH OF PLUNGE POOL *****

HS = 29.293 METER

***** TRAJECTORY OF FREE DISCHARGING UPTURNED JET *****

HORIZONTAL DISTANCE FROM LIP END (METER)	ELEVATION OF MIDDLE LINE (METER)	ELEVATION OF LOWER SURFACE (METER)
0	60.001	57.300
5.000	61.733	59.034
10.000	63.288	60.597
15.000	64.664	61.988
20.000	65.867	63.207
25.000	66.892	64.255
30.000	67.740	65.132
35.000	68.411	65.837
40.000	68.905	66.371
45.000	69.223	66.733
50.000	69.364	66.923
55.000	69.329	66.822
60.000	69.117	66.790
65.000	68.728	66.466
70.000	68.162	65.971
75.000	67.419	65.304
80.000	66.500	64.465
85.000	65.405	63.455
90.000	64.132	62.274
95.000	62.683	60.921
100.000	61.057	59.396
105.000	59.255	57.701
110.000	57.275	55.833
112.094	56.393	55.000
115.264	55.000	53.682

***** MAXIMUM SCOUR DEPTH OF PLUNGE POOL *****

HS = 32.781 METER

Case No. 4-3
Case No. 4-4

***** TRAJECTORY OF FREE DISCHARGING UPTURNED JET *****

HORIZONTAL DISTANCE FROM LIP END (METER)	ELEVATION OF MIDDLE LINE (METER)	ELEVATION OF LOWER SURFACE (METER)	HORIZONTAL DISTANCE FROM LIP END (METER)	ELEVATION OF MIDDLE LINE (METER)	ELEVATION OF LOWER SURFACE (METER)
0	58.739	57.300	0	58.292	57.300
5.000	60.459	59.022	5.000	60.000	59.010
10.000	61.980	60.548	10.000	61.486	60.500
15.000	63.301	61.878	15.000	62.789	61.721
20.000	64.422	63.012	20.000	63.789	62.823
25.000	65.345	63.950	25.000	64.607	63.654
30.000	66.062	64.693	30.000	65.282	64.286
35.000	66.590	65.239	35.000	65.875	64.639
40.000	66.914	65.590	40.000	66.384	64.831
45.000	67.038	65.744	45.000	66.851	64.785
50.000	66.963	65.703	50.000	67.355	64.518
55.000	66.689	65.466	55.000	67.837	64.032
60.000	66.214	65.033	60.000	68.096	63.326
65.000	65.541	64.404	65.000	68.132	62.401
70.000	64.668	63.579	70.000	68.946	61.236
75.000	63.595	62.558	75.000	69.537	59.892
80.000	62.323	61.342	80.000	69.905	58.308
85.000	60.851	59.929	85.000	70.050	56.584
90.000	59.180	58.320	90.000	70.000	54.481
95.000	57.310	56.516	95.000	70.000	52.238
100.000	55.239	54.516	100.000	70.000	49.775
105.000	52.970	52.319	105.000	70.000	47.250
110.000	50.866	50.300	110.000	70.000	44.666

***** MAXIMUM SCOUR DEPTH OF PLUNGE POOL *****

HS = 27.288 METER

***** MAXIMUM SCOUR DEPTH OF PLUNGE POOL *****

HS = 23.402 METER

***** TRAJECTORY OF FREE DISCHARGING UPTURNED JET *****

HORIZONTAL DISTANCE FROM LIP END (METER)	ELEVATION OF MIDDLE LINE (METER)	ELEVATION OF LOWER SURFACE (METER)	HORIZONTAL DISTANCE FROM LIP END (METER)	ELEVATION OF MIDDLE LINE (METER)	ELEVATION OF LOWER SURFACE (METER)
0.	57.688	57.300	0.	57.475	57.300
5.000	59.310	58.923	5.000	58.267	58.598
10.000	60.534	60.153	10.000	59.004	58.873
15.000	61.360	60.989	15.000	58.185	58.065
20.000	61.789	61.432	20.000	56.311	56.234
25.000	61.822	61.481	25.000	53.382	53.300
30.000	61.456	61.132	30.000	49.397	48.443
35.000	60.694	60.400	35.000	44.357	44.482
40.000	59.534	59.249	40.000	42.080	42.240
45.000	57.977	57.745	45.000	36.837	42.598
50.000	56.022	55.827			
55.000	53.671	53.516			
60.000	50.922	50.811			
65.000	47.776	47.713			
70.000	44.232	44.222			
70.434	43.905	43.900			
70.442	43.900	43.895			

***** MAXIMUM SCOUR DEPTH OF PLUNGE POOL *****
HS = 2.870 METER

***** TRAJECTORY OF FREE DISCHARGING UPTURNED JET *****

HORIZONTAL DISTANCE FROM LIP END (METER)	ELEVATION OF MIDDLE LINE (METER)	ELEVATION OF LOWER SURFACE (METER)
0.	57.385	57.300
5.000	58.156	56.168
10.000	48.831	49.133
13.241	40.826	41.420
13.032	41.420	41.992

***** MAXIMUM SCOUR DEPTH OF PLUNGE POOL *****
HS = 3.648 METERS

CHAPTER 5

WATER HAMMER CALCULATION OF PENSTOCK LINE

Case No.	RWL (m)	Ho (m)	T (sec)
5-1	165	123.5	5.0
5-2	165	123.5	6.0
5-3	165	123.5	7.0
5-4	165	123.5	8.0
5-5	165	123.5	9.0
5-6	146.5	105	5.0
5-7	146.5	105	6.0
5-8	146.5	105	7.0
5-9	146.5	105	8.0
5-10	146.5	105	9.0

THE UNIVERSITY OF CHICAGO

PHYSICS DEPARTMENT



CALCULATION OF WATER HAMMER
 PRESSURE BY WATER HAMMER AT VANI

TIME	COAS	V	F	RF	F+RF
0.145	2.699	5.274	4.922	0	4.922
0.291	2.418	4.219	9.000	0	9.000
0.436	2.538	5.161	13.705	0	13.705
0.581	2.432	4.100	18.625	0	18.625
0.726	2.376	4.036	23.771	0	23.771
0.872	2.295	3.970	29.155	0	29.155
1.017	2.215	3.900	34.789	0	34.789
1.162	2.134	3.827	40.685	0	40.685
1.307	2.053	3.751	46.856	0	46.856
1.453	1.972	3.671	53.316	0	53.316
1.598	1.892	3.538	59.569	-4.699	55.069
1.743	1.811	3.406	65.893	-9.000	56.893
1.888	1.730	3.287	72.261	-13.705	58.556
2.034	1.649	3.127	78.659	-18.925	60.034
2.179	1.569	2.985	85.072	-23.771	61.301
2.324	1.488	2.839	91.484	-29.155	62.329
2.469	1.407	2.690	97.875	-34.789	63.086
2.615	1.326	2.539	104.222	-40.685	63.537
2.760	1.246	2.385	110.502	-46.856	63.684
2.905	1.165	2.229	116.685	-53.316	63.369
3.050	1.084	2.074	122.935	-59.569	63.367
3.196	1.003	1.919	129.155	-65.893	63.262
3.341	0.922	1.766	135.351	-72.261	63.090
3.486	0.842	1.608	141.523	-78.659	62.865
3.631	0.761	1.453	147.676	-85.072	62.604
3.777	0.680	1.299	153.817	-91.484	62.311
3.922	0.599	1.143	159.955	-97.875	62.080
4.067	0.519	0.988	166.107	-104.222	61.885
4.212	0.438	0.834	172.296	-110.502	61.724
4.358	0.357	0.681	178.550	-116.685	61.805

4,503	0.226	0.527	184,756	=122,935	61,821
4,648	0.196	0.523	190,984	=129,155	61,829
4,793	0.115	0.219	197,256	=135,354	61,885
4,939	0.034	0.065	203,511	=141,523	61,930
5,084	0.	0.	202,612	=147,676	54,936
5,229	0.	0.	196,672	=153,817	42,855
5,375	0.	0.	190,333	=159,955	30,378
5,520	0.	0.	184,181	=166,107	18,073
5,665	0.	0.	177,922	=172,294	5,372
5,810	0.	0.	171,738	=178,550	-6,812
5,956	0.	0.	165,532	=184,756	-19,224
6,101	0.	0.	159,304	=190,984	-31,681
6,246	0.	0.	153,053	=197,236	-44,183
6,391	0.	0.	146,775	=203,513	-56,738
6,537	0.	0.	147,676	=202,612	-54,936
6,682	0.	0.	143,817	=198,472	-54,655
6,827	0.	0.	139,925	=190,333	-30,378

CALCULATION OF WATER HAMMER
 PRESSURE BY WATER HAMMER AL VANI

TIME	CDAG	V	F	RF	F+RF
0.145	2.713	4.283	3.768	0.	3.768
0.291	2.645	4.258	7.477	0.	7.477
0.436	2.578	4.190	11.326	0.	11.326
0.581	2.511	4.141	15.320	0.	15.320
0.726	2.443	4.082	19.467	0.	19.467
0.872	2.376	4.036	23.771	0.	23.771
1.017	2.309	3.981	28.241	0.	28.241
1.162	2.242	3.924	32.883	0.	32.883
1.307	2.174	3.864	37.703	0.	37.703
1.453	2.107	3.802	42.710	0.	42.710
1.598	2.040	3.694	47.887	-3.768	43.918
1.743	1.972	3.586	52.708	-7.477	45.231
1.888	1.905	3.476	57.701	-11.326	46.435
2.034	1.838	3.364	62.838	-15.320	47.518
2.179	1.770	3.250	67.932	-19.467	48.465
2.324	1.703	3.133	73.035	-23.771	49.263
2.469	1.636	3.015	78.137	-28.241	49.896
2.615	1.569	2.895	83.227	-32.883	50.345
2.760	1.501	2.773	88.295	-37.703	50.592
2.905	1.434	2.648	93.328	-42.710	50.617
3.050	1.367	2.525	98.369	-47.687	50.682
3.196	1.299	2.400	103.400	-52.708	50.692
3.341	1.232	2.276	108.422	-57.761	50.661
3.486	1.165	2.151	113.434	-62.838	50.596
3.631	1.097	2.026	118.438	-67.932	50.506
3.777	1.030	1.901	123.435	-73.035	50.400
3.922	0.963	1.777	128.427	-78.137	50.291
4.067	0.896	1.652	133.421	-83.227	50.193
4.212	0.828	1.528	138.420	-88.295	50.125
4.358	0.761	1.403	143.425	-93.328	50.108

4.503	0.694	1.279	148.445	-98.369	50.076
4.648	0.626	1.155	153.459	-103.400	50.058
4.793	0.559	1.031	158.477	-108.422	50.055
4.939	0.492	0.907	163.502	-113.434	50.068
5.084	0.424	0.783	168.533	-118.438	50.095
5.229	0.357	0.659	173.571	-123.435	50.116
5.375	0.290	0.535	178.614	-128.427	50.166
5.520	0.223	0.410	183.659	-133.421	50.218
5.665	0.155	0.286	188.701	-138.420	50.281
5.810	0.088	0.162	193.732	-143.415	50.296
5.956	0.021	0.038	198.769	-148.445	50.324
6.101	0.	0.	196.830	-153.459	43.371
6.246	0.	0.	191.811	-158.477	33.334
6.391	0.	0.	186.786	-163.502	23.284
6.537	0.	0.	181.755	-168.533	13.222
6.682	0.	0.	176.717	-173.571	3.144
6.827	0.	0.	171.674	-178.614	-6.939
6.972	0.	0.	166.629	-183.659	-17.030
7.118	0.	0.	161.587	-188.701	-27.114
7.263	0.	0.	156.556	-193.732	-37.175
7.408	0.	0.	151.519	-198.769	-47.230
7.553	0.	0.	146.459	-196.830	-43.371
7.699	0.	0.	141.477	-191.811	-33.334
7.844	0.	0.	136.502	-186.786	-23.284

CALCULATION OF WATER HAMMER
 PRESSURE BY WATER HAMMER AT VANI.

5-3

TIME	CDAC	V	F	RE	F+RF
0.145	2.722	4.290	3.250	0.	3.250
0.291	2.665	4.251	6.404	0.	6.404
0.436	2.607	4.211	9.659	0.	9.659
0.581	2.549	4.169	13.020	0.	13.020
0.726	2.492	4.124	16.489	0.	16.489
0.872	2.434	4.082	20.072	0.	20.072
1.017	2.376	4.036	23.771	0.	23.771
1.162	2.318	3.989	27.592	0.	27.592
1.307	2.261	3.940	31.538	0.	31.538
1.453	2.203	3.890	35.615	0.	35.615
1.598	2.145	3.798	39.752	-3.250	34.502
1.743	2.088	3.708	43.917	-6.404	37.513
1.888	2.030	3.616	48.106	-9.659	38.447
2.034	1.972	3.522	52.314	-13.020	39.295
2.179	1.915	3.427	56.539	-16.489	40.050
2.324	1.857	3.331	60.774	-20.072	40.702
2.469	1.799	3.232	65.015	-23.771	41.243
2.615	1.742	3.133	69.255	-27.592	41.663
2.760	1.684	3.032	73.490	-31.538	41.952
2.905	1.626	2.929	77.712	-35.615	42.097
3.050	1.569	2.826	81.927	-39.752	42.175
3.196	1.511	2.722	86.139	-43.917	42.222
3.341	1.453	2.619	90.346	-48.106	42.241
3.486	1.395	2.515	94.550	-52.314	42.236
3.631	1.338	2.410	98.750	-56.539	42.211
3.777	1.280	2.306	102.945	-60.774	42.172
3.922	1.222	2.202	107.138	-65.015	42.123
4.067	1.165	2.098	111.329	-69.255	42.074
4.212	1.107	1.994	115.521	-73.490	42.031
4.358	1.049	1.890	119.716	-77.712	42.004

4.503	0.992	1.786	123.912	-81.927	41.985
4.648	0.934	1.682	128.109	-86.139	41.971
4.793	0.874	1.578	132.508	-90.346	41.964
4.939	0.819	1.474	136.908	-94.550	41.957
5.084	0.761	1.370	140.709	-98.750	41.960
5.229	0.703	1.266	144.913	-102.945	41.968
5.375	0.646	1.162	149.119	-107.138	41.981
5.520	0.588	1.059	153.327	-111.329	41.998
5.665	0.530	0.955	157.535	-115.521	42.014
5.810	0.472	0.851	161.741	-119.716	42.024
5.956	0.415	0.747	165.947	-123.912	42.035
6.101	0.357	0.643	170.153	-128.109	42.043
6.246	0.299	0.539	174.358	-132.308	42.050
6.391	0.242	0.435	178.562	-136.508	42.055
6.537	0.184	0.331	182.765	-140.709	42.055
6.682	0.126	0.228	186.966	-144.913	42.052
6.827	0.069	0.124	191.165	-149.119	42.045
6.972	0.011	0.020	195.362	-153.322	42.035
7.118	0.	0.	192.753	-157.535	35.218
7.263	0.	0.	188.542	-161.741	26.806
7.408	0.	0.	184.341	-165.947	18.394
7.553	0.	0.	180.135	-170.153	9.983
7.699	0.	0.	175.930	-174.358	1.572
7.844	0.	0.	171.726	-178.562	-6.836
7.989	0.	0.	167.523	-182.765	-15.241
8.134	0.	0.	163.322	-186.966	-23.643
8.280	0.	0.	159.124	-191.165	-32.041
8.425	0.	0.	154.927	-195.362	-40.435
8.570	0.	0.	150.735	-192.753	-35.218
8.715	0.	0.	146.542	-188.542	-26.806
8.861	0.	0.	142.347	-184.341	-18.394

CALCULATION DE WATER HAMMER
 PRESSURE BY WATER HAMMER AT VANT

TIME	CDAS	V	F	PC	FARS
0.145	2.730	4.295	2.862	0.	2.862
0.291	2.679	4.261	5.606	0.	5.606
0.436	2.629	4.226	8.426	0.	8.426
0.581	2.578	4.190	11.326	0.	11.326
0.726	2.528	4.153	14.308	0.	14.308
0.872	2.477	4.115	17.374	0.	17.374
1.017	2.427	4.076	20.528	0.	20.528
1.162	2.376	4.036	23.771	0.	23.771
1.307	2.326	3.995	27.108	0.	27.108
1.453	2.275	3.952	30.540	0.	30.540
1.598	2.225	3.873	34.082	-2.862	31.220
1.743	2.174	3.795	37.641	-5.606	32.036
1.888	2.124	3.716	41.220	-8.426	32.794
2.034	2.073	3.636	44.814	-11.326	33.488
2.179	2.023	3.555	48.422	-14.308	34.114
2.324	1.972	3.472	52.050	-17.374	34.666
2.469	1.922	3.388	55.666	-20.528	35.139
2.615	1.871	3.303	59.296	-23.771	35.525
2.760	1.821	3.217	62.927	-27.108	35.820
2.905	1.770	3.130	66.554	-30.540	36.015
3.050	1.720	3.041	70.173	-34.082	36.090
3.196	1.670	2.953	73.790	-37.641	36.149
3.341	1.619	2.864	77.406	-41.220	36.187
3.486	1.569	2.775	81.020	-44.814	36.207
3.631	1.518	2.685	84.633	-48.422	36.211
3.777	1.468	2.596	88.243	-52.040	36.203
3.922	1.417	2.507	91.851	-55.666	36.185
4.067	1.367	2.417	95.458	-59.296	36.161
4.212	1.316	2.328	99.064	-62.927	36.136
4.358	1.266	2.238	102.670	-66.554	36.115

4.503	1.215	2.149	106.278	-70.173	36.106
4.648	1.185	2.060	109.886	-73.790	36.096
4.793	1.114	1.970	113.495	-77.406	36.088
4.939	1.064	1.881	117.103	-81.020	36.083
5.084	1.013	1.792	120.713	-84.633	36.080
5.229	0.963	1.702	124.323	-88.243	36.080
5.375	0.912	1.613	127.934	-91.851	36.083
5.520	0.862	1.524	131.545	-95.458	36.087
5.665	0.811	1.435	135.157	-99.064	36.094
5.810	0.761	1.346	138.770	-102.670	36.100
5.956	0.710	1.256	142.381	-106.278	36.103
6.101	0.660	1.167	145.993	-109.886	36.106
6.246	0.609	1.078	149.604	-113.495	36.110
6.391	0.559	0.989	153.216	-117.103	36.112
6.537	0.509	0.899	156.827	-120.713	36.114
6.682	0.458	0.810	160.437	-124.323	36.115
6.827	0.408	0.721	164.048	-127.934	36.114
6.972	0.357	0.631	167.657	-131.545	36.112
7.118	0.307	0.542	171.266	-135.157	36.109
7.263	0.256	0.453	174.875	-138.770	36.106
7.408	0.206	0.364	178.485	-142.381	36.104
7.553	0.155	0.274	182.094	-145.993	36.102
7.699	0.105	0.185	185.704	-149.604	36.099
7.844	0.054	0.096	189.313	-153.216	36.097
7.989	0.004	0.007	192.922	-156.827	36.094
8.134	0.	0.	189.851	-160.437	36.413
8.280	0.	0.	186.240	-164.048	22.193
8.425	0.	0.	182.631	-167.657	14.974
8.570	0.	0.	179.022	-171.266	7.755
8.715	0.	0.	175.413	-174.875	0.537
8.861	0.	0.	171.803	-178.485	-6.682
9.006	0.	0.	168.194	-182.094	-13.901
9.151	0.	0.	164.585	-185.704	-21.119

9.296	0.	0.	160,925	-189,313	-28,337
9.442	0.	0.	157,366	-192,922	-35,554
9.587	0.	0.	160,437	-189,851	-29,413
9.732	0.	0.	164,048	-186,240	-22,193
9.877	0.	0.	167,652	-182,631	-14,976

CALCULATION OF WATER HAMMER
PRESSURE BY WATER HAMMER AI VANI

TIME	CDAG	V	F	GF	Exp
0.145	2.735	4.298	2.562	0	2.562
0.291	2.690	4.268	4.989	0	4.989
0.436	2.645	4.238	7.477	0	7.477
0.581	2.601	4.208	10.027	0	10.027
0.726	2.556	4.174	12.641	0	12.641
0.872	2.511	4.141	15.320	0	15.320
1.017	2.466	4.107	18.067	0	18.067
1.162	2.421	4.072	20.884	0	20.884
1.307	2.376	4.036	23.771	0	23.771
1.453	2.331	4.000	26.732	0	26.732
1.598	2.286	3.930	29.831	-2.362	27.269
1.743	2.242	3.861	32.939	-4.989	27.950
1.888	2.197	3.792	36.062	-7.477	28.585
2.034	2.152	3.722	39.199	-10.027	29.172
2.179	2.107	3.650	42.347	-12.641	29.706
2.324	2.062	3.578	45.505	-15.320	30.185
2.469	2.017	3.505	48.671	-18.067	30.604
2.615	1.972	3.431	51.842	-20.884	30.959
2.760	1.928	3.356	55.017	-23.771	31.245
2.905	1.883	3.280	58.192	-26.732	31.460
3.050	1.838	3.203	61.360	-29.831	31.529
3.196	1.793	3.125	64.528	-32.939	31.589
3.341	1.748	3.047	67.697	-36.062	31.634
3.486	1.703	2.969	70.864	-39.199	31.665
3.631	1.658	2.891	74.031	-42.347	31.683
3.777	1.613	2.813	77.196	-45.505	31.691
3.922	1.569	2.735	80.360	-48.671	31.690
4.067	1.524	2.657	83.524	-51.842	31.681
4.212	1.479	2.578	86.686	-55.017	31.669
4.358	1.434	2.500	89.848	-58.192	31.656

4.503	1.389	2.422	25.011	-83.360	31.651
4.648	1.344	2.544	96.174	-64.528	31.640
4.793	1.299	2.265	99.358	-87.627	31.641
4.938	1.254	2.187	102.501	-70.864	31.637
5.084	1.210	2.109	105.664	-74.031	31.633
5.229	1.165	2.031	108.827	-77.196	31.631
5.375	1.120	1.952	111.991	-80.360	31.631
5.520	1.075	1.874	115.155	-83.524	31.632
5.665	1.030	1.796	118.320	-86.688	31.634
5.810	0.985	1.718	121.484	-89.852	31.636
5.956	0.940	1.639	124.649	-93.011	31.637
6.101	0.896	1.561	127.813	-96.174	31.639
6.246	0.851	1.483	130.977	-99.338	31.640
6.391	0.806	1.405	134.142	-102.501	31.641
6.537	0.761	1.327	137.306	-105.664	31.642
6.682	0.716	1.248	140.471	-108.827	31.643
6.827	0.671	1.170	143.635	-111.991	31.644
6.972	0.626	1.092	146.799	-115.155	31.644
7.118	0.581	1.014	149.963	-118.320	31.643
7.263	0.537	0.935	153.126	-121.484	31.642
7.408	0.492	0.857	156.290	-124.649	31.642
7.553	0.447	0.779	159.454	-127.813	31.641
7.699	0.402	0.701	162.618	-130.977	31.640
7.844	0.357	0.623	165.781	-134.142	31.640
7.989	0.312	0.544	168.945	-137.306	31.639
8.134	0.267	0.466	172.109	-140.471	31.638
8.280	0.223	0.388	175.273	-143.635	31.638
8.425	0.178	0.310	178.437	-146.799	31.638
8.570	0.133	0.231	181.601	-149.963	31.638
8.715	0.088	0.153	184.765	-153.126	31.639
8.861	0.043	0.075	187.929	-156.290	31.639
9.006	0.	0.	190.824	-159.454	31.640
9.151	0.	0.	187.670	-162.618	25.953

9.296	0.	0.	184.507	-165.781	-18.725
9.842	0.	0.	181.343	-169.945	-12.396
9.587	0.	0.	178.179	-172.109	4.020
9.732	0.	0.	175.015	-175.273	-0.257
9.877	0.	0.	171.851	-178.437	-6.585
10.023	0.	0.	168.687	-181.601	-12.914
10.168	0.	0.	165.523	-184.765	-19.242
10.313	0.	0.	162.359	-187.929	-25.570
10.459	0.	0.	159.194	-190.834	-31.380
10.604	0.	0.	162.618	-187.670	-25.051
10.749	0.	0.	165.781	-184.507	-18.725

CALCULATION OF WATER HAMMER
 PRESSURE BY WATER HAMMER AT YAHJ.

TIME	CDAS	V	F	RE	F+RE
0.145	3.515	5.133	3.841	0.	3.841
0.291	3.430	5.076	8.228	0.	8.228
0.436	3.305	5.021	12.851	0.	12.851
0.581	3.199	4.961	17.727	0.	17.727
0.726	3.094	4.897	22.870	0.	22.870
0.872	2.989	4.830	28.297	0.	28.297
1.017	2.884	4.759	34.028	0.	34.028
1.162	2.779	4.685	40.080	0.	40.080
1.307	2.674	4.606	46.474	0.	46.474
1.452	2.568	4.522	53.232	0.	53.232
1.598	2.463	4.434	60.564	-3.841	56.703
1.743	2.358	4.337	68.046	-8.228	59.818
1.888	2.253	4.232	75.706	-12.851	62.855
2.034	2.148	4.129	83.516	-17.727	65.790
2.179	2.043	4.027	91.464	-22.870	68.594
2.324	1.937	3.900	99.534	-28.297	71.237
2.469	1.832	3.768	107.709	-34.028	73.682
2.615	1.727	3.631	115.967	-40.080	75.887
2.760	1.622	3.489	124.281	-46.474	77.807
2.905	1.517	3.343	132.621	-53.232	79.388
3.050	1.412	3.194	140.907	-60.564	80.362
3.196	1.306	3.035	149.132	-68.046	81.347
3.341	1.201	2.871	157.271	-75.706	81.764
3.486	1.096	2.709	165.230	-83.516	82.214
3.631	0.991	2.540	173.060	-91.464	82.496
3.777	0.886	2.365	180.752	-99.534	82.617
3.922	0.781	2.186	188.297	-107.709	82.588
4.067	0.675	2.004	195.794	-115.967	82.427
4.212	0.570	1.819	203.145	-124.281	82.164
4.358	0.465	1.630	210.359	-132.621	81.838

4.503	0.300	0.688	222.688	-140.907	81.582
4.548	0.255	0.487	230.498	-142.192	81.306
4.791	0.150	0.285	238.491	-157.471	81.020
4.939	0.044	0.085	246.478	-165.750	80.747
5.084	0.	0.	245.091	-173.960	71.131
5.229	0.	0.	236.900	-182.152	56.748
5.375	0.	0.	228.754	-190.297	38.457
5.520	0.	0.	220.657	-198.394	22.243
5.665	0.	0.	212.607	-206.445	6.162
5.810	0.	0.	204.593	-214.459	-9.866
5.956	0.	0.	196.563	-222.488	-25.925
6.101	0.	0.	188.554	-230.498	-41.944
6.244	0.	0.	180.561	-238.491	-57.930
6.391	0.	0.	172.574	-246.478	-73.904
6.537	0.	0.	173.960	-245.091	-71.131
6.682	0.	0.	182.152	-236.900	-54.748
6.827	0.	0.	190.297	-228.754	-38.457

CALCULATION OF WATER HAMMER
 PRESSURE BY WATER HAMMER AT VANT

TIME	COAG	V	F	RF	F _{REF}
0.145	3.532	5.141	3.132	0.	3.132
0.291	3.445	5.027	6.790	0.	6.790
0.436	3.357	5.050	10.509	0.	10.509
0.581	3.269	5.001	14.448	0.	14.448
0.726	3.182	4.951	18.565	0.	18.565
0.872	3.094	4.897	22.870	0.	22.870
1.017	3.007	4.842	27.372	0.	27.372
1.162	2.919	4.783	32.083	0.	32.083
1.307	2.831	4.722	37.012	0.	37.012
1.452	2.744	4.659	42.172	0.	42.172
1.598	2.656	4.599	47.569	-3.132	44.437
1.743	2.568	4.532	53.253	-6.740	47.013
1.888	2.481	4.458	59.222	-10.509	49.215
2.034	2.393	4.388	65.791	-14.448	51.363
2.179	2.305	4.301	71.954	-18.565	53.389
2.324	2.218	4.231	78.203	-22.870	55.334
2.469	2.130	4.157	84.532	-27.372	57.160
2.615	2.043	4.059	90.930	-32.083	58.847
2.760	1.955	3.949	97.386	-37.012	60.373
2.905	1.867	3.825	103.887	-42.172	61.715
3.050	1.780	3.724	110.379	-47.569	62.890
3.196	1.692	3.621	116.883	-53.253	63.830
3.341	1.604	3.516	123.399	-59.222	63.677
3.486	1.517	3.411	129.920	-65.791	64.429
3.631	1.429	3.304	136.440	-71.954	64.987
3.777	1.341	3.199	142.955	-78.203	64.752
3.922	1.254	3.088	149.460	-84.532	64.928
4.067	1.166	2.978	155.950	-90.930	65.021
4.212	1.078	2.868	162.422	-97.386	65.039
4.358	0.991	2.760	168.883	-103.887	64.996

6.503	0.903	1.658	125.342	-110.378	64.953
6.648	0.816	1.488	181.794	-116.883	64.910
6.793	0.728	1.328	188.216	-123.199	64.817
6.939	0.640	1.168	194.671	-129.920	64.751
7.084	0.553	1.008	201.102	-136.440	64.662
7.229	0.465	0.848	207.530	-142.955	64.575
7.375	0.377	0.688	213.960	-149.460	64.500
7.520	0.290	0.528	220.396	-155.950	64.445
7.665	0.202	0.368	226.841	-162.425	64.416
7.810	0.114	0.209	233.300	-168.883	64.417
7.956	0.027	0.049	239.757	-175.342	64.415
8.101	0.	0.	247.258	-181.793	55.465
8.246	0.	0.	250.815	-188.236	52.579
8.391	0.	0.	254.380	-194.671	29.709
8.537	0.	0.	257.950	-201.102	16.848
8.682	0.	0.	261.521	-207.530	3.991
8.827	0.	0.	205.091	-213.960	-8.869
8.972	0.	0.	198.656	-220.396	-21.740
9.118	0.	0.	192.210	-226.841	-34.631
9.263	0.	0.	185.752	-233.300	-47.548
9.408	0.	0.	179.295	-239.757	-60.462
9.553	0.	0.	181.793	-247.258	-55.462
9.699	0.	0.	188.236	-250.815	-42.579
9.844	0.	0.	194.671	-254.380	-29.709

CALCULATION OF WATER HAMMER
 PRESSURE BY WATER HAMMER AT VANT

TIME	CDAS	V	E	RE	FRE
0.145	3.545	5.147	2.629	0.	2.629
0.291	3.470	5.110	5.693	0.	5.693
0.436	3.395	5.070	8.874	0.	8.874
0.581	3.320	5.029	12.176	0.	12.176
0.726	3.244	4.987	15.606	0.	15.606
0.872	3.169	4.943	19.168	0.	19.168
1.017	3.094	4.897	22.870	0.	22.870
1.162	3.019	4.850	26.717	0.	26.717
1.307	2.944	4.800	30.715	0.	30.715
1.453	2.869	4.749	34.872	0.	34.872
1.598	2.794	4.698	39.200	-2.629	34.872
1.743	2.719	4.647	43.704	-5.693	38.681
1.888	2.643	4.596	48.389	-8.874	40.389
2.034	2.568	4.545	53.259	-12.176	42.047
2.179	2.493	4.493	58.322	-15.606	43.646
2.324	2.418	4.442	63.585	-19.168	45.177
2.469	2.343	4.391	69.049	-22.870	46.629
2.615	2.268	4.340	74.708	-26.717	47.992
2.760	2.193	4.289	80.568	-30.715	49.253
2.905	2.118	4.238	86.621	-34.872	50.398
3.050	2.043	4.187	92.874	-39.200	51.436
3.196	1.967	4.136	99.332	-43.704	51.562
3.341	1.892	4.085	106.000	-48.389	52.029
3.486	1.817	4.034	112.884	-53.259	52.434
3.631	1.742	3.983	120.000	-58.322	52.779
3.777	1.667	3.932	127.359	-63.585	53.063
3.922	1.592	3.881	135.000	-69.049	53.288
4.067	1.517	3.830	143.000	-74.708	53.456
4.212	1.442	3.779	151.359	-80.568	53.570
4.358	1.366	3.728	160.000	-86.621	53.635

4.503	1.291	2.277	144.271	=90.596	53.675
4.648	1.216	2.146	149.653	=95.937	53.696
4.793	1.141	2.012	154.981	=101.292	53.699
4.939	1.066	1.880	160.366	=106.658	53.688
5.084	0.991	1.747	165.697	=112.031	53.667
5.229	0.916	1.614	171.046	=117.408	53.638
5.375	0.841	1.482	176.393	=122.787	53.606
5.520	0.765	1.349	181.738	=128.166	53.574
5.665	0.690	1.217	187.084	=133.538	53.546
5.810	0.615	1.084	192.432	=138.906	53.526
5.956	0.540	0.952	197.780	=144.271	53.508
6.101	0.465	0.819	203.130	=149.633	53.497
6.246	0.390	0.687	208.481	=154.991	53.490
6.391	0.315	0.555	213.835	=160.346	53.489
6.537	0.240	0.422	219.191	=165.697	53.494
6.682	0.165	0.290	224.550	=171.046	53.504
6.827	0.089	0.158	229.911	=176.393	53.519
6.972	0.014	0.025	235.275	=181.738	53.537
7.118	0.	0.	241.262	=187.084	53.583
7.263	0.	0.	246.620	=192.432	53.618
7.408	0.	0.	251.978	=197.780	53.691
7.553	0.	0.	257.330	=203.130	53.792
7.699	0.	0.	262.681	=208.481	53.889
7.844	0.	0.	268.035	=213.835	53.978
7.989	0.	0.	273.391	=219.191	54.060
8.134	0.	0.	278.740	=224.550	54.138
8.280	0.	0.	284.091	=229.911	54.211
8.425	0.	0.	289.443	=235.275	54.278
8.570	0.	0.	294.797	=240.640	54.340
8.715	0.	0.	300.153	=246.010	54.397
8.861	0.	0.	305.511	=251.381	54.450

CALCULATION OF WATER HAMMER
 PRESSURE BY WATER HAMMER AT WABT

TIME	CDAC	V	F	PF	CAF
0.145	3.854	5.152	2.254	0.	2.254
0.291	3.682	5.119	4.917	0.	4.917
0.436	3.423	5.085	7.667	0.	7.667
0.581	3.352	5.050	10.509	0.	10.509
0.726	3.221	5.014	13.447	0.	13.447
0.872	3.226	4.976	16.486	0.	16.486
1.017	3.160	4.937	19.623	0.	19.623
1.162	3.024	4.897	22.870	0.	22.870
1.307	3.028	4.856	26.228	0.	26.228
1.453	2.963	4.813	29.701	0.	29.701
1.598	2.892	4.736	33.669	-2.254	31.415
1.743	2.831	4.653	37.754	-4.917	32.837
1.888	2.766	4.567	41.893	-7.667	34.226
2.034	2.700	4.480	46.087	-10.509	35.577
2.179	2.634	4.392	50.332	-13.447	36.885
2.324	2.568	4.301	54.627	-16.484	38.144
2.469	2.503	4.208	58.970	-19.623	39.347
2.615	2.437	4.114	63.358	-22.870	40.488
2.760	2.371	4.018	67.787	-26.228	41.560
2.905	2.305	3.920	72.254	-29.701	42.553
3.050	2.240	3.815	76.763	-33.669	43.493
3.196	2.174	3.708	81.289	-37.754	43.536
3.341	2.108	3.601	85.822	-41.893	43.936
3.486	2.043	3.493	90.380	-46.087	44.293
3.631	1.977	3.384	94.940	-50.332	44.608
3.772	1.911	3.275	99.507	-54.627	44.880
3.922	1.845	3.166	104.080	-58.970	45.110
4.067	1.780	3.056	108.654	-63.358	45.298
4.212	1.714	2.942	113.234	-67.787	45.447
4.358	1.648	2.831	117.811	-72.254	45.557

4.503	1.582	2.718	122,386	-76,763	45,623
4.648	1.517	2,606	126,961	-81,289	45,671
4.793	1.451	2,493	131,534	-85,829	45,705
4.939	1.385	2,380	136,106	-90,390	45,727
5.084	1.319	2,267	140,677	-94,940	45,757
5.229	1.254	2,155	145,246	-99,507	45,739
5.375	1.188	2,042	149,814	-104,080	45,734
5.520	1.122	1,929	154,380	-108,656	45,724
5.665	1.057	1,816	158,946	-113,234	45,712
5.810	0.991	1,703	163,511	-117,811	45,699
5.956	0.925	1,590	168,076	-122,386	45,690
6.101	0.859	1,477	172,642	-126,961	45,681
6.246	0.794	1,364	177,207	-131,534	45,673
6.391	0.728	1,251	181,773	-136,106	45,667
6.537	0.662	1,138	186,339	-140,677	45,662
6.682	0.596	1,025	190,906	-145,246	45,660
6.827	0.531	0,912	195,473	-149,814	45,660
6.972	0.465	0,799	200,042	-154,380	45,662
7.118	0.399	0,686	204,611	-158,946	45,665
7.263	0.334	0,573	209,181	-163,511	45,670
7.408	0.268	0,460	213,750	-168,076	45,674
7.553	0.202	0,347	218,320	-172,642	45,678
7.699	0.136	0,234	222,890	-177,207	45,683
7.844	0.071	0,121	227,460	-181,773	45,688
7.989	0.005	0,008	232,030	-186,339	45,691
8.134	0.	0.	236,600	-190,904	45,694
8.280	0.	0.	241,170	-195,473	45,698
8.425	0.	0.	245,740	-200,042	45,702
8.570	0.	0.	250,310	-204,611	45,706
8.715	0.	0.	254,880	-209,181	45,710
8.861	0.	0.	259,450	-213,750	45,714
9.006	0.	0.	264,020	-218,320	45,718
9.151	0.	0.	268,590	-222,890	45,722

9.296	0.	0.	191.591	-227.460	-55.869
9.442	0.	0.	187.021	-232.030	-45.009
9.587	0.	0.	180.904	-228.146	-37.240
9.732	0.	0.	195.423	-223.578	-28.105
9.877	0.	0.	200.082	-219.010	-18.968

CALCULATION OF WATER HAMMER
 PRESSURE BY WATER HAMMER AT YAMU

TIME	CDAG	V	F	RF	F+DF
0.145	3.582	5.156	1.964	0.	1.964
0.291	3.503	5.127	4.312	0.	4.312
0.436	3.445	5.097	6.740	0.	6.740
0.581	3.386	5.066	9.234	0.	9.234
0.726	3.328	5.034	11.803	0.	11.803
0.872	3.269	5.001	14.448	0.	14.448
1.017	3.211	4.968	17.172	0.	17.172
1.162	3.153	4.933	19.979	0.	19.979
1.307	3.094	4.897	22.870	0.	22.870
1.453	3.036	4.860	25.849	0.	25.849
1.598	2.977	4.794	29.287	-1.964	27.323
1.743	2.919	4.721	32.833	-4.317	28.516
1.888	2.860	4.646	36.423	-6.740	29.683
2.034	2.802	4.571	40.055	-9.234	30.820
2.179	2.744	4.494	43.727	-11.803	31.924
2.324	2.685	4.415	47.440	-14.448	32.992
2.469	2.627	4.335	51.190	-17.172	34.018
2.615	2.568	4.253	54.977	-19.979	34.998
2.760	2.510	4.170	58.798	-22.870	35.928
2.905	2.451	4.086	62.652	-25.849	36.802
3.050	2.393	3.995	66.559	-29.287	37.722
3.196	2.335	3.903	70.484	-32.833	37.651
3.341	2.276	3.810	74.421	-36.423	37.598
3.486	2.218	3.716	78.369	-40.055	38.514
3.631	2.159	3.622	82.326	-43.727	38.598
3.777	2.101	3.527	86.290	-47.440	38.851
3.922	2.043	3.431	90.262	-51.190	39.072
4.067	1.984	3.336	94.238	-54.977	39.261
4.212	1.926	3.239	98.219	-58.798	39.420
4.358	1.867	3.142	102.201	-62.652	39.550

4.503	1.809	3.045	106.184	-66.559	39.625
4.648	1.750	7.947	110.167	-70.484	32.683
4.793	1.692	2.849	114.151	-74.421	39.730
4.939	1.634	2.751	118.134	-78.369	32.766
5.084	1.575	2.653	122.117	-82.326	32.792
5.229	1.517	2.555	126.100	-86.290	32.810
5.375	1.458	2.456	130.083	-90.262	32.821
5.520	1.400	2.358	134.064	-94.238	32.826
5.665	1.341	2.259	138.045	-98.219	32.826
5.810	1.283	2.161	142.025	-102.201	32.824
5.956	1.225	2.063	146.005	-106.184	32.821
6.101	1.166	1.964	149.985	-110.167	32.818
6.246	1.108	1.866	153.965	-114.151	32.814
6.391	1.049	1.767	157.945	-118.134	32.810
6.537	0.991	1.669	161.924	-122.117	32.807
6.682	0.932	1.570	165.904	-126.100	32.803
6.827	0.874	1.472	169.883	-130.083	32.801
6.972	0.816	1.374	173.863	-134.064	32.799
7.118	0.757	1.275	177.843	-138.045	32.798
7.263	0.699	1.177	181.824	-142.025	32.792
7.408	0.640	1.078	185.804	-146.005	32.799
7.553	0.582	0.980	189.785	-149.985	32.800
7.699	0.523	0.882	193.766	-153.965	32.801
7.844	0.465	0.783	197.747	-157.945	32.802
7.989	0.407	0.685	201.728	-161.924	32.803
8.134	0.348	0.586	205.709	-165.904	32.805
8.280	0.290	0.488	209.690	-169.883	32.806
8.425	0.231	0.390	213.671	-173.863	32.807
8.570	0.173	0.291	217.651	-177.843	32.808
8.715	0.114	0.193	221.632	-181.824	32.808
8.861	0.056	0.094	225.612	-185.804	32.808
9.006	0	0	229.592	-189.785	32.802
9.151	0	0	225.286	-193.766	31.820

