



J&T Consulting, Inc.

July 20, 2020

Mr. Peter Hays
Environmental Protection Specialist
State of Colorado
Division of Reclamation, Mining, & Safety
1313 Sherman Street – Room 215
Denver, CO 80203

RE: *Northern Colorado Constructors, Inc. – Bennett Pit – Response to Inspection Report for CT-1
File No. M-2016-085*

Dear Mr. Hays,

Northern Colorado Constructors, Inc. (NCCI) is providing this response to the inspection report for CT-1 based on the information and analysis requested by the Division dated May 21, 2020. The corrective action due date for the response is August 4, 2020.

The inspection report requested more information on hydrologic analysis for storm runoff reaching the existing 36 inch diameter culvert that crosses the entrance road into the gravel mine as well as the two 20 inch diameter high density polyethylene (HDPE) solid wall pipe culverts that cross the entrance road further east of the 36 inch diameter corrugated metal pipe (CMP) culvert. We have attached drainage calculations for the different storm events of the 10-yr, 25-yr, 50-yr, and 100yr frequency.

The peak flows to the entrance road culvert location are as follows:

10-yr peak flow = 47 cfs
25 -yr peak flow = 247 cfs
50-yr peak flow = 419 cfs
100-yr peak flow = 664 cfs

During our initial investigation and sizing analysis for the culverts under the entrance road into the gravel mine we inventoried the upstream culvert crossing on CR 22.5. The drainage basin that discharges into the slough upstream of the entrance road also partially drains across CR 22.5 before it reaches the slough and the entrance road culvert crossings. The existing culvert at CR 22.5 is a squashed CMP culvert or an equivalent 30 inch CMP pipe. The existing culvert crossing was dry and not flowing water 2 days after the inspection at the mine with you when we checked it again.

The 36 inch CMP culvert crossing the entrance road was sized to take the 10-yr frequency storm runoff. This is the same frequency that the culvert crossing (30 inch equivalent CMP culvert) on CR 22.5 is sized to take per Weld County's design criteria where the culvert must pass the 10-yr flow with no more than 6 inches of water overtopping the roadway. We used the same peak flow to compare to check the capacity of the existing 30 inch equivalent CMP at CR 22.5. Culvert calculations are included in the attachments.

We have included a drainage basin map showing the area draining to this location, runoff calculations for the different storm events as stated above, and culvert calculations for the 10-yr and 25-yr events at



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the entrance road into the mine. The Colorado Urban Hydrograph procedure was used per Weld County's design criteria to generate the storm runoff peak flows. We have also included the floodplain modeling results for the existing condition, the mining condition, and the future reclaimed condition that shows no rise in the 100-yr base flood elevation for the entrance road.

We believe the current design meets the requirements of Weld County regulations for rural county roads, however NCCI is willing to add additional 36 inch culverts to accommodate the 25-yr peak flow. Five additional 36 inch CMP culverts are needed to pass the 25-year storm without using any capacity of the two existing 20 inch HDPE culverts (capacity of two 20 inch culverts is 20 cfs). During the larger storm events (50-yr and 100-yr) these areas are inundated as part of the floodplain. Larger culverts will not provide a benefit to draining the water from the area since it is within the floodplain.

NCCI has a maintenance plan for the culverts crossing the entrance road where they are inspected weekly and debris is cleaned from the entrance and exit of each pipe. In the winter months the culverts will be inspected to determine if silt and sediment are depositing into the culverts where they can be cleaned out when the culverts are dry.

NCCI appreciates your consideration of this response and looks forward to coordinating with you for any additional information.

Please feel free to contact me with any questions or comments.

Sincerely,



J.C. York, P.E.

J&T Consulting, Inc.

Attachments:

Drainage Basin Map and Basin Calculations
Entrance Road Culvert Calculations
CR 22.5 Culvert Calculations
Floodplain Modeling Runs and Results

cc: NCCI
File





SCALE IN FEET

[illegible]

CUHP SUBCATCHMENTS

Columns with this color heading are for required user-input

Columns with this color heading are for optional override values

Columns with this color heading are for program-calculated values

								Maximum Depression Storage (Watershed inches)		Horton's Infiltration Parameters			DCIA
Subcatchment Name	EPA SWMM Target Node	Raingage	Area (mi ²)	Length to Centroid (mi)	Length (mi)	Slope (ft/ft)	Percent Imperviousness	Pervious	Impervious	Initial Rate (in/hr)	Decay Coefficient (1/seconds)	Final Rate (in/hr)	Level 0, 1, or 2
Culvert		1 Corrected Raingage	1.3542117	1.139962121	1.9544318	0.015989302	10	0.4	0.05	4.5	0.0018	1	0

Comment	Area Corrected raingage		
1Hr Depth	1.39	inches	2hr Depth 1.60 inches
6Hr Depth	2	inches	3hr Depth 1.75 inches
Correction Area	1.354212078	Sq. Mi.	
Return Period	10	Years	

Time	Adjusted Depth	Unadjusted Depth	NOAA Atlas 14 Point Precipitation
0:05	0.0278	0.0278	
0:10	0.0514	0.0514	
0:15	0.1140	0.1140	
0:20	0.2085	0.2085	
0:25	0.3475	0.3475	
0:30	0.1668	0.1668	
0:35	0.0778	0.0778	
0:40	0.0598	0.0598	
0:45	0.0528	0.0528	
0:50	0.0445	0.0445	
0:55	0.0445	0.0445	
1:00	0.0445	0.0445	
1:05	0.0445	0.0445	
1:10	0.0445	0.0445	
1:15	0.0445	0.0445	
1:20	0.0348	0.0348	
1:25	0.0264	0.0264	
1:30	0.0264	0.0264	
1:35	0.0264	0.0264	
1:40	0.0264	0.0264	
1:45	0.0264	0.0264	
1:50	0.0264	0.0264	
1:55	0.0236	0.0236	
2:00	0.0181	0.0181	
2:05	0.0000	0.0000	

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 2.0.0)

Catchment Name/ID	User Comment for Catchment	Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
		CT	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
Culvert		0.136	0.346	72.7	20.84	37.8	14.73	34.7	559	3,146,105	0.10	299,200	60.0	47	299,168	0.05

Summary of CUHP Input Parameters (Version 2.0.0)

Catchment Name/ID	SWMM Node/ID	Raingage Name/ID	Area (sq.mi.)	Dist. to Centroid (miles)	Length (miles)	Slope (ft./ft.)	Percent Imperv.	Depression Storage		Horton's Infiltration Parameters			DCIA Level and Fractions			Percent Eff. Imperv.
								Pervious (inches)	Imperv. (inches)	Initial Rate (in./hr.)	Final Rate (in.hr.)	Decay Coeff. (1/sec.)	DCIA Level	Dir. Con'ct Imperv. Fraction	Receiv. Perv. Fraction	
Culvert	1	CORRECTED RAINGAGE	1.354	1.140	1.954	0.016	10.0	0.40	0.05	4.50	1.00	0.0018	0.00	0.20	0.10	7.40

Subcatchment Culvert

Time	Flow (cfs)	Precip (in)	Current Horton Time (min)	DCIA				UIA				SPA Infiltratio n (in)	RPA Infiltratio n (in)	SPA Depressi on Storage (in)	SPA Effective Precip (in)	SPA Effective Precip (%)	RPA Depressi on Storage (in)	RPA Effective Precip (in)	RPA Effective Precip (%)	Effective Precip (in)
				Depressi on Storage (in)	DCIA 5% Loss (in)	DCIA Effective Precip (in)	DCIA Effective Precip (%)	Depressi on Storage (in)	5% Loss (in)	UIA Effective Precip (in)	UIA Runoff (in)									
1/1/2005 0:05	0	0.0278	5	0.0278	0	0	0	0.0278	0	0	0	0.0278	0.0278	0	0	0	0	0	0	0
1/1/2005 0:10	0.032833	0.05143	10	0.05	0.001461	0.027768	0.000555	0.05	0.001461	0.027768	0.002221	0.05143	0.076113	0	0	0	0	0	0.000555	0
1/1/2005 0:15	0.225277	0.11398	15	0.05	0.005699	0.108281	0.002166	0.05	0.005699	0.108281	0.008662	0.11398	0.161718	0	0	0	0.048512	0	0	0.002166
1/1/2005 0:20	0.78461	0.2085	20	0.05	0.010425	0.198075	0.003962	0.05	0.010425	0.198075	0.015846	0.129012	0.129012	0.079488	0	0	0.304067	0	0	0.003962
1/1/2005 0:25	4.299052	0.3475	25	0.05	0.017375	0.330125	0.006602	0.05	0.017375	0.330125	0.02641	0.109952	0.109952	0.317036	0	0	0.4	0.435059	0.039155	0.045758
1/1/2005 0:30	11.71553	0.1668	30	0.05	0.00834	0.15846	0.003169	0.05	0.00834	0.15846	0.012677	0.098846	0.098846	0.38499	0	0	0.4	0.208808	0.018793	0.021962
1/1/2005 0:35	21.35053	0.07784	35	0.05	0.003892	0.073948	0.001479	0.05	0.003892	0.073948	0.005916	0.07784	0.092373	0.38499	0	0	0.4	0.051199	0.004608	0.006087
1/1/2005 0:40	30.64693	0.05977	40	0.05	0.002989	0.056782	0.001136	0.05	0.002989	0.056782	0.004543	0.05977	0.088601	0.38499	0	0	0.4	0.021641	0.001948	0.003083
1/1/2005 0:45	38.17925	0.05282	45	0.05	0.002641	0.050179	0.001004	0.05	0.002641	0.050179	0.004014	0.05282	0.086403	0.38499	0	0	0.4	0.01102	0.000992	0.001995
1/1/2005 0:50	43.4366	0.04448	50	0.05	0.002224	0.042256	0.000845	0.05	0.002224	0.042256	0.00338	0.04448	0.082041	0.38499	0	0	0.4	0	0	0.000845
1/1/2005 0:55	46.26238	0.04448	55	0.05	0.002224	0.042256	0.000845	0.05	0.002224	0.042256	0.00338	0.04448	0.082041	0.38499	0	0	0.4	0	0	0.000845
1/1/2005 1:00	47.07612	0.04448	60	0.05	0.002224	0.042256	0.000845	0.05	0.002224	0.042256	0.00338	0.04448	0.082041	0.38499	0	0	0.4	0	0	0.000845
1/1/2005 1:05	46.47113	0.04448	65	0.05	0.002224	0.042256	0.000845	0.05	0.002224	0.042256	0.00338	0.04448	0.082041	0.38499	0	0	0.4	0	0	0.000845
1/1/2005 1:10	44.71677	0.04448	70	0.05	0.002224	0.042256	0.000845	0.05	0.002224	0.042256	0.00338	0.04448	0.082041	0.38499	0	0	0.4	0	0	0.000845
1/1/2005 1:15	41.95893	0.04448	75	0.05	0.002224	0.042256	0.000845	0.05	0.002224	0.042256	0.00338	0.04448	0.082041	0.38499	0	0	0.4	0	0	0.000845
1/1/2005 1:20	39.0047	0.03475	80	0.05	0.001738	0.033013	0.00066	0.05	0.001738	0.033013	0.002641	0.03475	0.064094	0.38499	0	0	0.4	0	0	0.00066
1/1/2005 1:25	36.79386	0.02641	85	0.05	0.00132	0.025089	0.000502	0.05	0.00132	0.025089	0.002007	0.02641	0.048712	0.38499	0	0	0.4	0	0	0.000502
1/1/2005 1:30	34.88342	0.02641	90	0.05	0.00132	0.025089	0.000502	0.05	0.00132	0.025089	0.002007	0.02641	0.048712	0.38499	0	0	0.4	0	0	0.000502
1/1/2005 1:35	33.00501	0.02641	95	0.05	0.00132	0.025089	0.000502	0.05	0.00132	0.025089	0.002007	0.02641	0.048712	0.38499	0	0	0.4	0	0	0.000502
1/1/2005 1:40	31.1376	0.02641	100	0.05	0.00132	0.025089	0.000502	0.05	0.00132	0.025089	0.002007	0.02641	0.048712	0.38499	0	0	0.4	0	0	0.000502
1/1/2005 1:45	29.28659	0.02641	105	0.05	0.00132	0.025089	0.000502	0.05	0.00132	0.025089	0.002007	0.02641	0.048712	0.38499	0	0	0.4	0	0	0.000502
1/1/2005 1:50	27.75724	0.02641	110	0.05	0.00132	0.025089	0.000502	0.05	0.00132	0.025089	0.002007	0.02641	0.048712	0.38499	0	0	0.4	0	0	0.000502
1/1/2005 1:55	26.52627	0.02363	115	0.05	0.001182	0.022449	0.000449	0.05	0.001182	0.022449	0.001796	0.02363	0.043584	0.38499	0	0	0.4	0	0	0.000449
1/1/2005 2:00	25.38939	0.01807	120	0.05	0.000904	0.017167	0.000343	0.05	0.000904	0.017167	0.001373	0.01807	0.033329	0.38499	0	0	0.4	0	0	0.000343
1/1/2005 2:05	24.24599	1.73E-16	125	0.05	8.67E-18	1.65E-16	3.3E-18	0.05	8.67E-18	1.65E-16	1.32E-17	1.73E-16	3.2E-16	0.38499	0	0	0.4	0	0	3.3E-18
1/1/2005 2:10	23.06185	1.04E-30	130	0.05	5.18E-32	9.84E-31	1.97E-32	0.05	5.18E-32	9.84E-31	7.87E-32	1.04E-30	1.91E-30	0.38499	0	0	0.4	0	0	1.97E-32
1/1/2005 2:15	21.82414	0	135	0.05	0	0	0	0.05	0	0	0	0	0	0.38499	0	0	0.4	0	0	0
1/1/2005 2:20	20.53761	0	140	0.05	0	0	0	0.05	0	0	0	0	0	0.38499	0	0	0.4	0	0	0
1/1/2005 2:25	19.2154	0	145	0.05	0	0	0	0.05	0	0	0	0	0	0.38499	0	0	0.4	0	0	0
1/1/2005 2:30	17.87309	0	150	0.05	0	0	0	0.05	0	0	0	0	0	0.38499	0	0	0.4	0	0	0
1/1/2005 2:35	16.52535	0	155	0.05	0	0	0	0.05	0	0	0	0	0	0.38499	0	0	0.4	0	0	0
1/1/2005 2:40	15.18783	0	160	0.05	0	0	0	0.05	0	0	0	0	0	0.38499	0	0	0.4	0	0	0
1/1/2005 2:45	13.8803	0	165	0.05	0	0	0	0.05	0	0	0	0	0	0.38499	0	0	0.4	0	0	0
1/1/2005 2:50	12.66817	0	170	0.05	0	0	0	0.05	0	0	0	0	0	0.38499	0	0	0.4	0	0	0
1/1/2005 2:55	11.8514	0	175	0.05	0	0	0	0.05	0	0	0	0	0	0.38499	0	0	0.4	0	0	0
1/1/2005 3:00	11.22385	0	180	0.05	0	0	0	0.05	0	0	0	0	0	0.38499	0	0	0.4	0	0	0
1/1/2005 3:05	10.65255	0	185	0.05	0	0	0	0.05	0	0	0	0	0	0.38499	0	0	0.4	0	0	0
1/1/2005 3:10	10.11294	0	190	0.05	0	0	0	0.05	0	0	0	0	0	0.38499	0	0	0.4	0	0	0
1/1/2005 3:15	9.595246	0	195	0.05	0	0	0	0.05	0	0	0	0	0	0.38499	0	0	0.4	0	0	0
1/1/2005 3:20	9.09016	0	200	0.05	0	0	0	0.05	0	0	0	0	0	0.38499	0	0	0.4	0	0	0
1/1/2005 3:25	8.596712	0	205	0.05	0	0	0	0.05	0	0	0	0	0	0.38499	0	0	0.4	0	0	0
1/1/2005 3:30	8.111993	0	210	0.05	0	0	0	0.05	0	0	0	0	0	0.38499	0	0	0.4	0	0	0
1/1/2005 3:35	7.634799	0	215	0.05	0	0	0	0.05	0	0	0	0	0	0.38499	0	0	0.4	0	0	0
1/1/2005 3:40	7.16513	0	220	0.05	0	0	0	0.05	0	0	0	0	0	0.38499	0	0	0.4	0	0	0
1/1/2005 3:45	6.702774	0	225	0.05	0	0	0	0.05	0	0	0	0	0	0.38499	0	0	0.4	0	0	0
1/1/2005 3:50	6.246116	0	230	0.05	0	0	0	0.05	0	0	0	0	0	0.38499	0	0	0.4	0	0	0
1/1/2005 3:55	5.793926	0	235	0.05	0	0	0	0.05	0	0	0	0	0	0.38499	0	0	0.4	0	0	0

CUHP SUBCATCHMENTS

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								Maximum Depression Storage (Watershed inches)		Horton's Infiltration Parameters			DCIA
Subcatchment Name	EPA SWMM Target Node	Raingage	Area (mi ²)	Length to Centroid (mi)	Length (mi)	Slope (ft/ft)	Percent Imperviousness	Pervious	Impervious	Initial Rate (in/hr)	Decay Coefficient (1/seconds)	Final Rate (in/hr)	Level 0, 1, or 2
Culvert		1 Corrected Raingage	1.3542117	1.139962121	1.9544318	0.015989302	10	0.4	0.05	4.5	0.0018	1	0

Comment	Area Corrected raingage		
1Hr Depth	1.84	inches	2hr Depth 2.11 inches
6Hr Depth	2.63	inches	3hr Depth 2.31 inches
Correction Area	1.354212078	Sq. Mi.	
Return Period	25	Years	

Time	Adjusted Depth	Unadjusted Depth	NOAA Atlas 14 Point Precipitation
0:05	0.0239	0.0239	
0:10	0.0644	0.0644	
0:15	0.0920	0.0920	
0:20	0.1472	0.1472	
0:25	0.2760	0.2760	
0:30	0.4600	0.4600	
0:35	0.2208	0.2208	
0:40	0.1472	0.1472	
0:45	0.0920	0.0920	
0:50	0.0920	0.0920	
0:55	0.0589	0.0589	
1:00	0.0589	0.0589	
1:05	0.0589	0.0589	
1:10	0.0442	0.0442	
1:15	0.0442	0.0442	
1:20	0.0331	0.0331	
1:25	0.0331	0.0331	
1:30	0.0258	0.0258	
1:35	0.0258	0.0258	
1:40	0.0258	0.0258	
1:45	0.0258	0.0258	
1:50	0.0258	0.0258	
1:55	0.0258	0.0258	
2:00	0.0258	0.0258	
2:05	0.0000	0.0000	

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 2.0.0)

Catchment Name/ID	User Comment for Catchment	Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
		CT	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f.)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
Culvert		0.133	0.342	72.6	20.54	37.7	14.52	34.2	560	3,146,105	0.47	1,467,028	65.0	247	1,466,926	0.29

Summary of CUHP Input Parameters (Version 2.0.0)

Catchment Name/ID	SWMM Node/ID	Raingage Name/ID	Area (sq.mi.)	Dist. to Centroid (miles)	Length (miles)	Slope (ft./ft.)	Percent Imperv.	Depression Storage		Horton's Infiltration Parameters			DCIA Level and Fractions			Percent Eff. Imperv.
								Pervious (inches)	Imperv. (inches)	Initial Rate (in./hr.)	Final Rate (in.hr.)	Decay Coeff. (1/sec.)	DCIA Level	Dir. Con'ct Imperv. Fraction	Receiv. Perv. Fraction	
Culvert	1	CORRECTED RAINGAGE	1.354	1.140	1.954	0.016	10.0	0.40	0.05	4.50	1.00	0.0018	0.00	0.20	0.10	7.97

Subcatchment Culvert

Time	Flow (cfs)	Precip (in)	Current Horton Time (min)	DCIA			UIA			SPA			RPA			RPA			Effective Precip (in)	
				Depressi on Storage (in)	DCIA 5% Loss (in)	DCIA Effective Precip (in)	Depressi on Storage (in)	UIA 5% Loss (in)	UIA Effective Precip (in)	Depressi on Storage (in)	SPA Effective Precip (in)	SPA Effective Precip (%)	Depressi on Storage (in)	Effective Precip (in)	Effective Precip (%)					
1/1/2005 0:05	0	0.02392	5	0.02392	0	0	0	0.02392	0	0	0	0.02392	0.02392	0	0	0	0	0	0	
1/1/2005 0:10	0.044096	0.0644	10	0.05	0.001916	0.036404	0.000728	0.05	0.001916	0.036404	0.002912	0.0644	0.096759	0	0	0	0	0	0.000728	
1/1/2005 0:15	0.236418	0.092	15	0.05	0.0046	0.0874	0.001748	0.05	0.0046	0.0874	0.006992	0.092	0.161718	0	0	0	0.007971	0	0.001748	
1/1/2005 0:20	0.71187	0.1472	20	0.05	0.00736	0.13984	0.002797	0.05	0.00736	0.13984	0.011187	0.129012	0.129012	0.018188	0	0	0.150461	0	0.002797	
1/1/2005 0:25	2.493996	0.276	25	0.05	0.0138	0.2622	0.005244	0.05	0.0138	0.2622	0.020976	0.109952	0.109952	0.184236	0	0	0.4	0.149576	0.013462	0.018706
1/1/2005 0:30	17.09163	0.46	30	0.05	0.023	0.437	0.00874	0.05	0.023	0.437	0.03496	0.098846	0.098846	0.4	0.14539	0.117766	0.4	0.749599	0.067464	0.19397
1/1/2005 0:35	51.40448	0.2208	35	0.05	0.01104	0.20976	0.004195	0.05	0.01104	0.20976	0.016781	0.092373	0.092373	0.4	0.128427	0.104026	0.4	0.31488	0.028339	0.13656
1/1/2005 0:40	100.2792	0.1472	40	0.05	0.00736	0.13984	0.002797	0.05	0.00736	0.13984	0.011187	0.088601	0.088601	0.4	0.058599	0.047465	0.4	0.182901	0.016461	0.066723
1/1/2005 0:45	150.5907	0.092	45	0.05	0.0046	0.0874	0.001748	0.05	0.0046	0.0874	0.006992	0.086403	0.086403	0.4	0.005597	0.004533	0.4	0.083286	0.007496	0.013777
1/1/2005 0:50	193.243	0.092	50	0.05	0.0046	0.0874	0.001748	0.05	0.0046	0.0874	0.006992	0.085122	0.085122	0.4	0.006878	0.005571	0.4	0.084567	0.007611	0.01493
1/1/2005 0:55	223.9276	0.05888	55	0.05	0.002944	0.055936	0.001119	0.05	0.002944	0.055936	0.004475	0.05888	0.084376	0.4	0	0	0.4	0.024225	0.00218	0.003299
1/1/2005 1:00	241.346	0.05888	60	0.05	0.002944	0.055936	0.001119	0.05	0.002944	0.055936	0.004475	0.05888	0.083941	0.4	0	0	0.4	0.02466	0.002219	0.003338
1/1/2005 1:05	247.4542	0.05888	65	0.05	0.002944	0.055936	0.001119	0.05	0.002944	0.055936	0.004475	0.05888	0.083687	0.4	0	0	0.4	0.024914	0.002242	0.003361
1/1/2005 1:10	245.0956	0.04416	70	0.05	0.002208	0.041952	0.000839	0.05	0.002208	0.041952	0.003356	0.04416	0.081451	0.4	0	0	0.4	0	0	0.000839
1/1/2005 1:15	235.9121	0.04416	75	0.05	0.002208	0.041952	0.000839	0.05	0.002208	0.041952	0.003356	0.04416	0.081451	0.4	0	0	0.4	0	0	0.000839
1/1/2005 1:20	220.7736	0.03312	80	0.05	0.001656	0.031464	0.000629	0.05	0.001656	0.031464	0.002517	0.03312	0.061088	0.4	0	0	0.4	0	0	0.000629
1/1/2005 1:25	203.9279	0.03312	85	0.05	0.001656	0.031464	0.000629	0.05	0.001656	0.031464	0.002517	0.03312	0.061088	0.4	0	0	0.4	0	0	0.000629
1/1/2005 1:30	189.6664	0.02576	90	0.05	0.001288	0.024472	0.000489	0.05	0.001288	0.024472	0.001958	0.02576	0.047513	0.4	0	0	0.4	0	0	0.000489
1/1/2005 1:35	177.4808	0.02576	95	0.05	0.001288	0.024472	0.000489	0.05	0.001288	0.024472	0.001958	0.02576	0.047513	0.4	0	0	0.4	0	0	0.000489
1/1/2005 1:40	166.1072	0.02576	100	0.05	0.001288	0.024472	0.000489	0.05	0.001288	0.024472	0.001958	0.02576	0.047513	0.4	0	0	0.4	0	0	0.000489
1/1/2005 1:45	154.9265	0.02576	105	0.05	0.001288	0.024472	0.000489	0.05	0.001288	0.024472	0.001958	0.02576	0.047513	0.4	0	0	0.4	0	0	0.000489
1/1/2005 1:50	144.0513	0.02576	110	0.05	0.001288	0.024472	0.000489	0.05	0.001288	0.024472	0.001958	0.02576	0.047513	0.4	0	0	0.4	0	0	0.000489
1/1/2005 1:55	134.8142	0.02576	115	0.05	0.001288	0.024472	0.000489	0.05	0.001288	0.024472	0.001958	0.02576	0.047513	0.4	0	0	0.4	0	0	0.000489
1/1/2005 2:00	127.2625	0.02576	120	0.05	0.001288	0.024472	0.000489	0.05	0.001288	0.024472	0.001958	0.02576	0.047513	0.4	0	0	0.4	0	0	0.000489
1/1/2005 2:05	120.6267	2.5E-16	125	0.05	1.25E-17	2.37E-16	4.75E-18	0.05	1.25E-17	2.37E-16	1.9E-17	2.5E-16	4.61E-16	0.4	0	0	0.4	0	0	4.75E-18
1/1/2005 2:10	114.2196	1.48E-30	130	0.05	7.4E-32	1.41E-30	2.81E-32	0.05	7.4E-32	1.41E-30	1.12E-31	1.48E-30	2.73E-30	0.4	0	0	0.4	0	0	2.81E-32
1/1/2005 2:15	107.8987	0	135	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 2:20	101.5825	0	140	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 2:25	95.25484	0	145	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 2:30	88.92994	0	150	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 2:35	82.6048	0	155	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 2:40	76.28953	0	160	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 2:45	69.99795	0	165	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 2:50	63.77383	0	170	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 2:55	58.07147	0	175	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 3:00	54.00469	0	180	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 3:05	51.02877	0	185	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 3:10	48.55233	0	190	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 3:15	46.20653	0	195	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 3:20	43.97704	0	200	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 3:25	41.78244	0	205	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 3:30	39.61904	0	210	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 3:35	37.48081	0	215	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 3:40	35.35008	0	220	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 3:45	33.22644	0	225	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 3:50	31.10842	0	230	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 3:55	28.99575	0	235	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0

CUHP SUBCATCHMENTS

Columns with this color heading are for required user-input

Columns with this color heading are for optional override values

Columns with this color heading are for program-calculated values

								Maximum Depression Storage (Watershed inches)		Horton's Infiltration Parameters			DCIA
Subcatchment Name	EPA SWMM Target Node	Raingage	Area (mi ²)	Length to Centroid (mi)	Length (mi)	Slope (ft/ft)	Percent Imperviousness	Pervious	Impervious	Initial Rate (in/hr)	Decay Coefficient (1/seconds)	Final Rate (in/hr)	Level 0, 1, or 2
Culvert		1 Corrected Raingage	1.3542117	1.139962121	1.9544318	0.015989302	10	0.4	0.05	4.5	0.0018	1	0

Comment	Area Corrected raingage		
1Hr Depth	2.24	inches	2hr Depth 2.57 inches
6Hr Depth	3.2	inches	3hr Depth 2.81 inches
Correction Area	1.354212078	Sq. Mi.	
Return Period	50	Years	

Time	Adjusted Depth	Unadjusted Depth	NOAA Atlas 14 Point Precipitation
0:05	0.0291	0.0291	
0:10	0.0784	0.0784	
0:15	0.1120	0.1120	
0:20	0.1792	0.1792	
0:25	0.3360	0.3360	
0:30	0.5600	0.5600	
0:35	0.2688	0.2688	
0:40	0.1792	0.1792	
0:45	0.1120	0.1120	
0:50	0.1120	0.1120	
0:55	0.0717	0.0717	
1:00	0.0717	0.0717	
1:05	0.0717	0.0717	
1:10	0.0538	0.0538	
1:15	0.0538	0.0538	
1:20	0.0403	0.0403	
1:25	0.0403	0.0403	
1:30	0.0314	0.0314	
1:35	0.0314	0.0314	
1:40	0.0314	0.0314	
1:45	0.0314	0.0314	
1:50	0.0314	0.0314	
1:55	0.0314	0.0314	
2:00	0.0314	0.0314	
2:05	0.0000	0.0000	

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 2.0.0)

Catchment Name/ID	User Comment for Catchment	Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
		CT	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f.)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
Culvert		0.132	0.339	72.5	20.37	37.7	14.40	34.0	561	3,146,105	0.79	2,492,063	65.0	419	2,491,914	0.48

Summary of CUHP Input Parameters (Version 2.0.0)

Catchment Name/ID	SWMM Node/ID	Raingage Name/ID	Area (sq.mi.)	Dist. to Centroid (miles)	Length (miles)	Slope (ft./ft.)	Percent Imperv.	Depression Storage		Horton's Infiltration Parameters			DCIA Level and Fractions			Percent Eff. Imperv.
								Pervious (inches)	Imperv. (inches)	Initial Rate (in./hr.)	Final Rate (in.hr.)	Decay Coeff. (1/sec.)	DCIA Level	Dir. Con'ct Imperv. Fraction	Receiv. Perv. Fraction	
Culvert	1	CORRECTED RAINGAGE	1.354	1.140	1.954	0.016	10.0	0.40	0.05	4.50	1.00	0.0018	0.00	0.20	0.10	8.28

Subcatchment Culvert

Time	Flow (cfs)	Precip (in)	Current Horton Time (min)	DCIA			UIA			SPA			RPA			RPA			Effective Precip (in)	
				Depressi on Storage (in)	DCIA 5% Loss (in)	DCIA Effective Precip (in)	Depressi on Storage (in)	UIA 5% Loss (in)	UIA Effective Precip (in)	Depressi on Storage (in)	SPA Effective Precip (in)	SPA Effective Precip (%)	Depressi on Storage (in)	RPA Effective Precip (in)	RPA Effective Precip (%)					
1/1/2005 0:05	0	0.02912	5	0.02912	0	0	0	0.02912	0	0	0	0.02912	0.02912	0	0	0	0	0	0	
1/1/2005 0:10	0.067095	0.0784	10	0.05	0.002876	0.054644	0.001093	0.05	0.002876	0.054644	0.004372	0.0784	0.126972	0	0	0	0	0	0.001093	
1/1/2005 0:15	0.329228	0.112	15	0.05	0.0056	0.1064	0.002128	0.05	0.0056	0.1064	0.008512	0.112	0.161718	0	0	0	0.04486	0	0.002128	
1/1/2005 0:20	0.943431	0.1792	20	0.05	0.00896	0.17024	0.003405	0.05	0.00896	0.17024	0.013619	0.129012	0.129012	0.050188	0	0	0.246373	0	0.003405	
1/1/2005 0:25	4.124356	0.336	25	0.05	0.0168	0.3192	0.006384	0.05	0.0168	0.3192	0.025536	0.109952	0.109952	0.276236	0	0	0.4	0.356153	0.032054	0.038438
1/1/2005 0:30	32.1259	0.56	30	0.05	0.028	0.532	0.01064	0.05	0.028	0.532	0.04256	0.098846	0.098846	0.4	0.33739	0.273286	0.4	0.934043	0.084064	0.36799
1/1/2005 0:35	93.55184	0.2688	35	0.05	0.01344	0.25536	0.005107	0.05	0.01344	0.25536	0.020429	0.092373	0.092373	0.4	0.176427	0.142906	0.4	0.403414	0.036307	0.18432
1/1/2005 0:40	176.625	0.1792	40	0.05	0.00896	0.17024	0.003405	0.05	0.00896	0.17024	0.013619	0.088601	0.088601	0.4	0.090599	0.073385	0.4	0.241923	0.021773	0.098563
1/1/2005 0:45	259.612	0.112	45	0.05	0.0056	0.1064	0.002128	0.05	0.0056	0.1064	0.008512	0.086403	0.086403	0.4	0.025597	0.020733	0.4	0.120175	0.010816	0.033677
1/1/2005 0:50	329.8521	0.112	50	0.05	0.0056	0.1064	0.002128	0.05	0.0056	0.1064	0.008512	0.085122	0.085122	0.4	0.026878	0.021771	0.4	0.121456	0.010931	0.03483
1/1/2005 0:55	380.533	0.07168	55	0.05	0.003584	0.068096	0.001362	0.05	0.003584	0.068096	0.005448	0.07168	0.084376	0.4	0	0	0.4	0.047834	0.004305	0.005667
1/1/2005 1:00	408.9722	0.07168	60	0.05	0.003584	0.068096	0.001362	0.05	0.003584	0.068096	0.005448	0.07168	0.083941	0.4	0	0	0.4	0.048269	0.004344	0.005706
1/1/2005 1:05	418.9702	0.07168	65	0.05	0.003584	0.068096	0.001362	0.05	0.003584	0.068096	0.005448	0.07168	0.083687	0.4	0	0	0.4	0.048522	0.004367	0.005729
1/1/2005 1:10	414.9611	0.05376	70	0.05	0.002688	0.051072	0.001021	0.05	0.002688	0.051072	0.004086	0.05376	0.08354	0.4	0	0	0.4	0.015618	0.001406	0.002427
1/1/2005 1:15	399.204	0.05376	75	0.05	0.002688	0.051072	0.001021	0.05	0.002688	0.051072	0.004086	0.05376	0.083454	0.4	0	0	0.4	0.015704	0.001413	0.002435
1/1/2005 1:20	373.3043	0.04032	80	0.05	0.002016	0.038304	0.000766	0.05	0.002016	0.038304	0.003064	0.04032	0.074368	0.4	0	0	0.4	0	0	0.000766
1/1/2005 1:25	345.9584	0.04032	85	0.05	0.002016	0.038304	0.000766	0.05	0.002016	0.038304	0.003064	0.04032	0.074368	0.4	0	0	0.4	0	0	0.000766
1/1/2005 1:30	322.974	0.03136	90	0.05	0.001568	0.029792	0.000596	0.05	0.001568	0.029792	0.002383	0.03136	0.057842	0.4	0	0	0.4	0	0	0.000596
1/1/2005 1:35	302.2334	0.03136	95	0.05	0.001568	0.029792	0.000596	0.05	0.001568	0.029792	0.002383	0.03136	0.057842	0.4	0	0	0.4	0	0	0.000596
1/1/2005 1:40	282.4309	0.03136	100	0.05	0.001568	0.029792	0.000596	0.05	0.001568	0.029792	0.002383	0.03136	0.057842	0.4	0	0	0.4	0	0	0.000596
1/1/2005 1:45	263.1334	0.03136	105	0.05	0.001568	0.029792	0.000596	0.05	0.001568	0.029792	0.002383	0.03136	0.057842	0.4	0	0	0.4	0	0	0.000596
1/1/2005 1:50	244.5079	0.03136	110	0.05	0.001568	0.029792	0.000596	0.05	0.001568	0.029792	0.002383	0.03136	0.057842	0.4	0	0	0.4	0	0	0.000596
1/1/2005 1:55	229.1297	0.03136	115	0.05	0.001568	0.029792	0.000596	0.05	0.001568	0.029792	0.002383	0.03136	0.057842	0.4	0	0	0.4	0	0	0.000596
1/1/2005 2:00	216.2317	0.03136	120	0.05	0.001568	0.029792	0.000596	0.05	0.001568	0.029792	0.002383	0.03136	0.057842	0.4	0	0	0.4	0	0	0.000596
1/1/2005 2:05	204.6159	3.05E-16	125	0.05	1.53E-17	2.9E-16	5.8E-18	0.05	1.53E-17	2.9E-16	2.32E-17	3.05E-16	5.63E-16	0.4	0	0	0.4	0	0	5.8E-18
1/1/2005 2:10	193.4673	1.82E-30	130	0.05	9.12E-32	1.73E-30	3.47E-32	0.05	9.12E-32	1.73E-30	1.39E-31	1.82E-30	3.36E-30	0.4	0	0	0.4	0	0	3.47E-32
1/1/2005 2:15	182.6265	0	135	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 2:20	171.8372	0	140	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 2:25	161.0519	0	145	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 2:30	150.2885	0	150	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 2:35	139.541	0	155	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 2:40	128.8233	0	160	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 2:45	118.1384	0	165	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 2:50	107.5822	0	170	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 2:55	98.17536	0	175	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 3:00	91.64108	0	180	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 3:05	86.5593	0	185	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 3:10	82.21197	0	190	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 3:15	78.17537	0	195	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 3:20	74.38766	0	200	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 3:25	70.65728	0	205	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 3:30	66.9794	0	210	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 3:35	63.34494	0	215	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 3:40	59.73222	0	220	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 3:45	56.13733	0	225	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 3:50	52.5493	0	230	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0
1/1/2005 3:55	48.96773	0	235	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0

CUHP SUBCATCHMENTS

Columns with this color heading are for required user-input

Columns with this color heading are for optional override values

Columns with this color heading are for program-calculated values

								Maximum Depression Storage (Watershed inches)		Horton's Infiltration Parameters			DCIA
Subcatchment Name	EPA SWMM Target Node	Raingage	Area (mi ²)	Length to Centroid (mi)	Length (mi)	Slope (ft/ft)	Percent Imperviousness	Pervious	Impervious	Initial Rate (in/hr)	Decay Coefficient (1/seconds)	Final Rate (in/hr)	Level 0, 1, or 2
Culvert		1 Corrected Raingage	1.3542117	1.139962121	1.9544318	0.015989302	10	0.4	0.05	4.5	0.0018	1	0

Comment	Area Corrected raingage		
1Hr Depth	2.7	inches	2hr Depth 3.09 inches
6Hr Depth	3.84	inches	3hr Depth 3.38 inches
Correction Area	1.354212078	Sq. Mi.	
Return Period	100	Years	

Time	Adjusted Depth	Unadjusted Depth	NOAA Atlas 14 Point Precipitation
0:05	0.0270	0.0270	
0:10	0.0810	0.0810	
0:15	0.1242	0.1242	
0:20	0.2160	0.2160	
0:25	0.3780	0.3780	
0:30	0.6750	0.6750	
0:35	0.3780	0.3780	
0:40	0.2160	0.2160	
0:45	0.1674	0.1674	
0:50	0.1350	0.1350	
0:55	0.1080	0.1080	
1:00	0.1080	0.1080	
1:05	0.1080	0.1080	
1:10	0.0540	0.0540	
1:15	0.0540	0.0540	
1:20	0.0324	0.0324	
1:25	0.0324	0.0324	
1:30	0.0324	0.0324	
1:35	0.0324	0.0324	
1:40	0.0324	0.0324	
1:45	0.0324	0.0324	
1:50	0.0324	0.0324	
1:55	0.0324	0.0324	
2:00	0.0324	0.0324	
2:05	0.0000	0.0000	

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 2.0.0)

Catchment Name/ID	User Comment for Catchment	Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
		CT	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
Culvert		0.131	0.337	72.4	20.24	37.6	14.30	33.7	561	3,146,105	1.29	4,054,971	70.0	664	4,054,731	0.77

Summary of CUHP Input Parameters (Version 2.0.0)

Catchment Name/ID	SWMM Node/ID	Raingage Name/ID	Area (sq.mi.)	Dist. to Centroid (miles)	Length (miles)	Slope (ft./ft.)	Percent Imperv.	Depression Storage		Horton's Infiltration Parameters			DCIA Level and Fractions			Percent Eff. Imperv.
								Pervious (inches)	Imperv. (inches)	Initial Rate (in./hr.)	Final Rate (in.hr.)	Decay Coeff. (1/sec.)	DCIA Level	Dir. Con'ct Imperv. Fraction	Receiv. Perv. Fraction	
Culvert	1	CORRECTED RAINGAGE	1.354	1.140	1.954	0.016	10.0	0.40	0.05	4.50	1.00	0.0018	0.00	0.20	0.10	8.54

Subcatchment Culvert

Time	Flow (cfs)	Precip (in)	Current Horton Time (min)	DCIA			DCIA Effective Precip (in)	DCIA Effective Precip (%)	UIA		UIA Effective Precip (in)	UIA Runoff (in)	SPA Infiltratio n (in)	RPA Infiltratio n (in)	SPA		SPA Effective Precip (in)	SPA Effective Precip (%)	RPA		RPA Effective Precip (in)	RPA Effective Precip (%)	Effective Precip (in)	
				Depressi on Storage (in)	DCIA 5% Loss (in)	DCIA Precip (in)			Depressi on Storage (in)	5% Loss (in)					Depressi on Storage (in)	Effective Precip (in)			Effective Precip (%)	Depressi on Storage (in)				Effective Precip (in)
1/1/2005 0:05	0	0.027	5	0.027	0	0	0	0	0.027	0	0	0	0.027	0.027	0	0	0	0	0	0	0	0	0	0
1/1/2005 0:10	0.068416	0.081	10	0.05	0.0029	0.0551	0.001102	0.05	0.0029	0.0551	0.004408	0.081	0.129978	0	0	0	0	0	0	0	0	0	0.001102	
1/1/2005 0:15	0.348948	0.1242	15	0.05	0.00621	0.11799	0.00236	0.05	0.00621	0.11799	0.009439	0.1242	0.161718	0	0	0	0.067362	0	0	0	0	0	0.00236	
1/1/2005 0:20	1.042197	0.216	20	0.05	0.0108	0.2052	0.004104	0.05	0.0108	0.2052	0.016416	0.129012	0.129012	0.086988	0	0	0.33675	0	0	0	0	0	0.004104	
1/1/2005 0:25	5.361513	0.378	25	0.05	0.0189	0.3591	0.007182	0.05	0.0189	0.3591	0.028728	0.109952	0.109952	0.355036	0	0	0	0.4	0.523998	0.04716	0.054342	0	0.054342	
1/1/2005 0:30	46.79393	0.675	30	0.05	0.03375	0.64125	0.012825	0.05	0.03375	0.64125	0.0513	0.098846	0.098846	0.4	0.53119	0.430264	0.4	1.146154	0.103154	0.546243	0.4	0.103154	0.546243	
1/1/2005 0:35	139.5696	0.378	35	0.05	0.0189	0.3591	0.007182	0.05	0.0189	0.3591	0.028728	0.092373	0.092373	0.4	0.285627	0.231358	0.4	0.604827	0.054434	0.292974	0.4	0.054434	0.292974	
1/1/2005 0:40	265.1167	0.216	40	0.05	0.0108	0.2052	0.004104	0.05	0.0108	0.2052	0.016416	0.088601	0.088601	0.4	0.127399	0.103193	0.4	0.309799	0.027882	0.135179	0.4	0.027882	0.135179	
1/1/2005 0:45	392.2371	0.1674	45	0.05	0.00837	0.15903	0.003181	0.05	0.00837	0.15903	0.012722	0.086403	0.086403	0.4	0.080997	0.065607	0.4	0.222357	0.020012	0.0888	0.4	0.020012	0.0888	
1/1/2005 0:50	502.0641	0.135	50	0.05	0.00675	0.12825	0.002565	0.05	0.00675	0.12825	0.01026	0.085122	0.085122	0.4	0.049878	0.040401	0.4	0.163878	0.014749	0.057715	0.4	0.014749	0.057715	
1/1/2005 0:55	584.5147	0.108	55	0.05	0.0054	0.1026	0.002052	0.05	0.0054	0.1026	0.008208	0.084376	0.084376	0.4	0.023624	0.019136	0.4	0.114824	0.010334	0.031522	0.4	0.010334	0.031522	
1/1/2005 1:00	635.2773	0.108	60	0.05	0.0054	0.1026	0.002052	0.05	0.0054	0.1026	0.008208	0.083941	0.083941	0.4	0.024059	0.019488	0.4	0.115259	0.010373	0.031913	0.4	0.010373	0.031913	
1/1/2005 1:05	660.3462	0.108	65	0.05	0.0054	0.1026	0.002052	0.05	0.0054	0.1026	0.008208	0.083687	0.083687	0.4	0.024313	0.019693	0.4	0.115513	0.010396	0.032141	0.4	0.010396	0.032141	
1/1/2005 1:10	664.3345	0.054	70	0.05	0.0027	0.0513	0.001026	0.05	0.0027	0.0513	0.004104	0.054	0.08354	0.4	0	0	0.4	0.01606	0.001445	0.002471	0.4	0.001445	0.002471	
1/1/2005 1:15	648.266	0.054	75	0.05	0.0027	0.0513	0.001026	0.05	0.0027	0.0513	0.004104	0.054	0.083454	0.4	0	0	0.4	0.016146	0.001453	0.002479	0.4	0.001453	0.002479	
1/1/2005 1:20	613.8555	0.0324	80	0.05	0.00162	0.03078	0.000616	0.05	0.00162	0.03078	0.002462	0.0324	0.05976	0.4	0	0	0.4	0	0	0.000616	0.4	0	0.000616	
1/1/2005 1:25	574.8884	0.0324	85	0.05	0.00162	0.03078	0.000616	0.05	0.00162	0.03078	0.002462	0.0324	0.05976	0.4	0	0	0.4	0	0	0.000616	0.4	0	0.000616	
1/1/2005 1:30	539.958	0.0324	90	0.05	0.00162	0.03078	0.000616	0.05	0.00162	0.03078	0.002462	0.0324	0.05976	0.4	0	0	0.4	0	0	0.000616	0.4	0	0.000616	
1/1/2005 1:35	506.3665	0.0324	95	0.05	0.00162	0.03078	0.000616	0.05	0.00162	0.03078	0.002462	0.0324	0.05976	0.4	0	0	0.4	0	0	0.000616	0.4	0	0.000616	
1/1/2005 1:40	473.2775	0.0324	100	0.05	0.00162	0.03078	0.000616	0.05	0.00162	0.03078	0.002462	0.0324	0.05976	0.4	0	0	0.4	0	0	0.000616	0.4	0	0.000616	
1/1/2005 1:45	440.706	0.0324	105	0.05	0.00162	0.03078	0.000616	0.05	0.00162	0.03078	0.002462	0.0324	0.05976	0.4	0	0	0.4	0	0	0.000616	0.4	0	0.000616	
1/1/2005 1:50	408.8486	0.0324	110	0.05	0.00162	0.03078	0.000616	0.05	0.00162	0.03078	0.002462	0.0324	0.05976	0.4	0	0	0.4	0	0	0.000616	0.4	0	0.000616	
1/1/2005 1:55	382.2911	0.0324	115	0.05	0.00162	0.03078	0.000616	0.05	0.00162	0.03078	0.002462	0.0324	0.05976	0.4	0	0	0.4	0	0	0.000616	0.4	0	0.000616	
1/1/2005 2:00	360.1009	0.0324	120	0.05	0.00162	0.03078	0.000616	0.05	0.00162	0.03078	0.002462	0.0324	0.05976	0.4	0	0	0.4	0	0	0.000616	0.4	0	0.000616	
1/1/2005 2:05	340.0582	3.12E-16	125	0.05	1.56E-17	2.97E-16	5.93E-18	0.05	1.56E-17	2.97E-16	2.37E-17	3.12E-16	5.76E-16	0.4	0	0	0.4	0	0	5.93E-18	0.4	0	5.93E-18	
1/1/2005 2:10	321.0268	1.92E-30	130	0.05	9.61E-32	1.83E-30	3.65E-32	0.05	9.61E-32	1.83E-30	1.46E-31	1.92E-30	3.55E-30	0.4	0	0	0.4	0	0	3.65E-32	0.4	0	3.65E-32	
1/1/2005 2:15	302.6099	0	135	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0	0.4	0	0	
1/1/2005 2:20	284.5033	0	140	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0	0.4	0	0	
1/1/2005 2:25	266.6816	0	145	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0	0.4	0	0	
1/1/2005 2:30	249.1687	0	150	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0	0.4	0	0	
1/1/2005 2:35	231.7215	0	155	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0	0.4	0	0	
1/1/2005 2:40	214.3057	0	160	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0	0.4	0	0	
1/1/2005 2:45	196.9251	0	165	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0	0.4	0	0	
1/1/2005 2:50	179.7335	0	170	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0	0.4	0	0	
1/1/2005 2:55	164.4086	0	175	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0	0.4	0	0	
1/1/2005 3:00	153.2984	0	180	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0	0.4	0	0	
1/1/2005 3:05	144.3867	0	185	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0	0.4	0	0	
1/1/2005 3:10	136.566	0	190	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0	0.4	0	0	
1/1/2005 3:15	129.4626	0	195	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0	0.4	0	0	
1/1/2005 3:20	122.8111	0	200	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0	0.4	0	0	
1/1/2005 3:25	116.4502	0	205	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0	0.4	0	0	
1/1/2005 3:30	110.3772	0	210	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0	0.4	0	0	
1/1/2005 3:35	104.5106	0	215	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0	0.4	0	0	
1/1/2005 3:40	98.66614	0	220	0.05	0	0	0	0.05	0	0	0	0	0	0.4	0	0	0.4	0	0	0	0.4	0	0	
1/1/2																								

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Thursday, Jul 16 2020

36 in CMP Capacity

Invert Elev Dn (ft)	=	4834.60
Pipe Length (ft)	=	56.00
Slope (%)	=	0.18
Invert Elev Up (ft)	=	4834.70
Rise (in)	=	36.0
Shape	=	Circular
Span (in)	=	36.0
No. Barrels	=	1
n-Value	=	0.020
Culvert Type	=	Circular Corrugate Metal Pipe
Culvert Entrance	=	Mitered to slope (C)
Coeff. K,M,c,Y,k	=	0.021, 1.33, 0.0463, 0.75, 0.7

Embankment

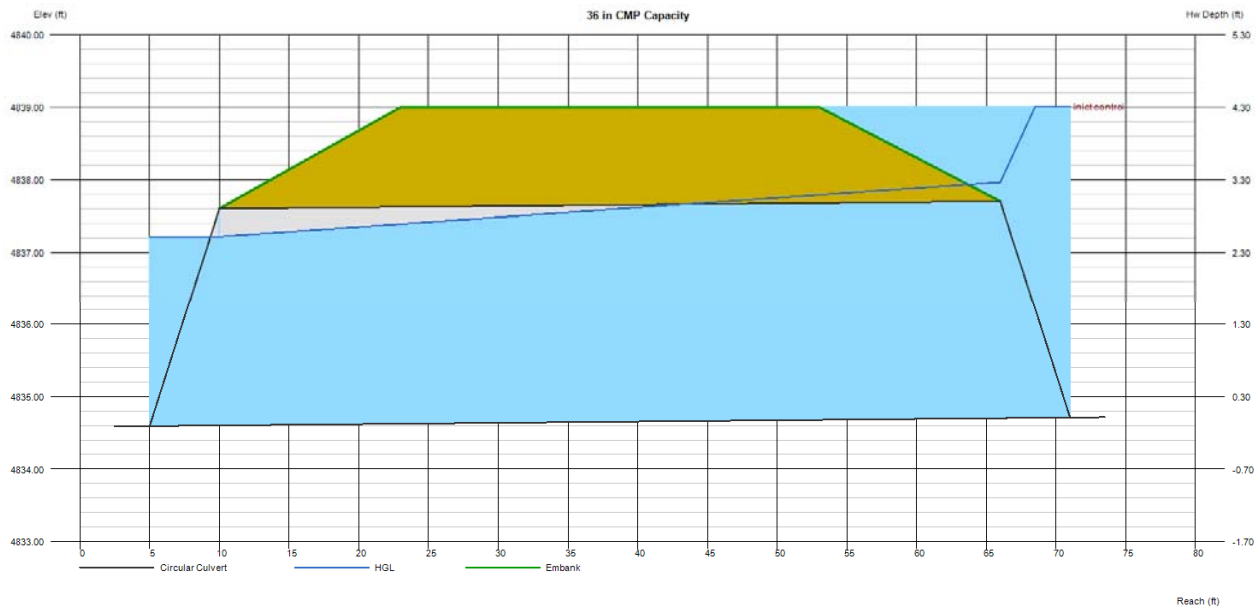
Top Elevation (ft)	=	4839.00
Top Width (ft)	=	30.00
Crest Width (ft)	=	200.00

Calculations

Qmin (cfs)	=	47.08
Qmax (cfs)	=	47.08
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	47.08
Qpipe (cfs)	=	47.08
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	7.20
Veloc Up (ft/s)	=	6.66
HGL Dn (ft)	=	4837.22
HGL Up (ft)	=	4837.96
Hw Elev (ft)	=	4839.01
Hw/D (ft)	=	1.44
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Thursday, Jul 16 2020

36 in CMP Capacity

Invert Elev Dn (ft) = 4834.60
Pipe Length (ft) = 56.00
Slope (%) = 0.18
Invert Elev Up (ft) = 4834.70
Rise (in) = 36.0
Shape = Circular
Span (in) = 36.0
No. Barrels = 1
n-Value = 0.020
Culvert Type = Circular Corrugate Metal Pipe
Culvert Entrance = Mitered to slope (C)
Coeff. K,M,c,Y,k = 0.021, 1.33, 0.0463, 0.75, 0.7

Embankment

Top Elevation (ft) = 4839.00
Top Width (ft) = 30.00
Crest Width (ft) = 200.00

Calculations

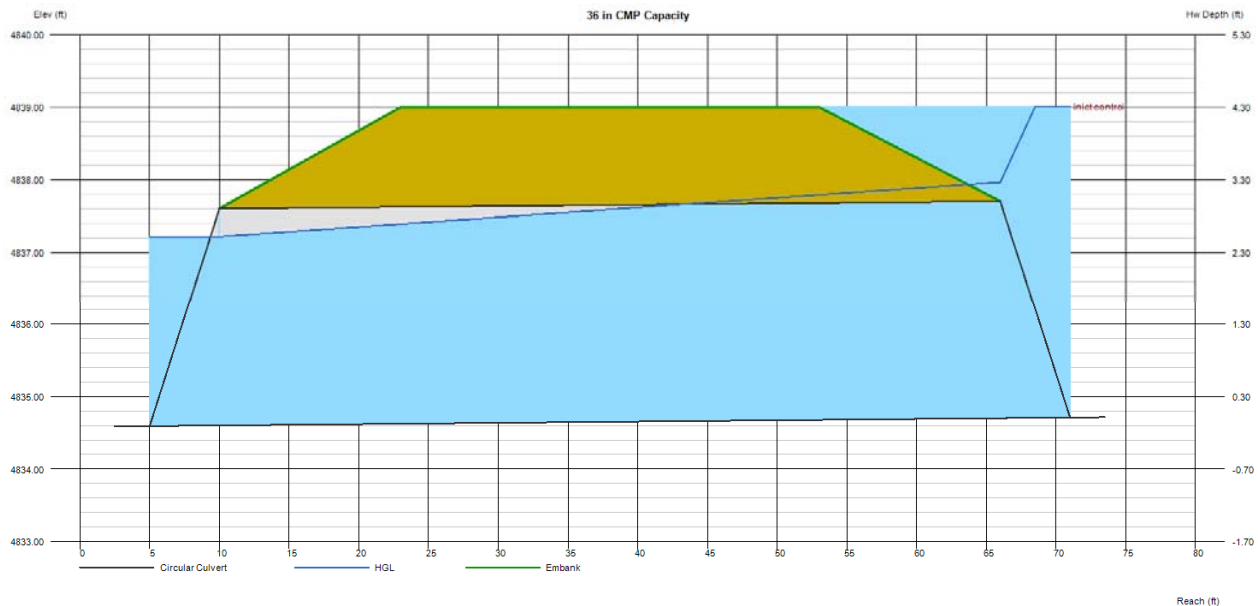
Qmin (cfs) = 47.08
Qmax (cfs) = 47.08
Tailwater Elev (ft) = (dc+D)/2

Highlighted

Qtotal (cfs) = 47.08
Qpipe (cfs) = 47.08
Qovertop (cfs) = 0.00
Veloc Dn (ft/s) = 7.20
Veloc Up (ft/s) = 6.66
HGL Dn (ft) = 4837.22
HGL Up (ft) = 4837.96
Hw Elev (ft) = 4839.01
Hw/D (ft) = 1.44
Flow Regime = Inlet Control

Note:

Six 36 in culverts would be required to convey the 25-Year storm event



Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Monday, Jul 20 2020

20 in DR17 HDPE Capacity

Invert Elev Dn (ft)	= 4835.15
Pipe Length (ft)	= 46.00
Slope (%)	= 0.11
Invert Elev Up (ft)	= 4835.20
Rise (in)	= 17.5
Shape	= Circular
Span (in)	= 17.5
No. Barrels	= 1
n-Value	= 0.015
Culvert Type	= Circular Culvert
Culvert Entrance	= Rough tapered inlet throat
Coeff. K,M,c,Y,k	= 0.519, 0.64, 0.021, 0.9, 0.5

Embankment

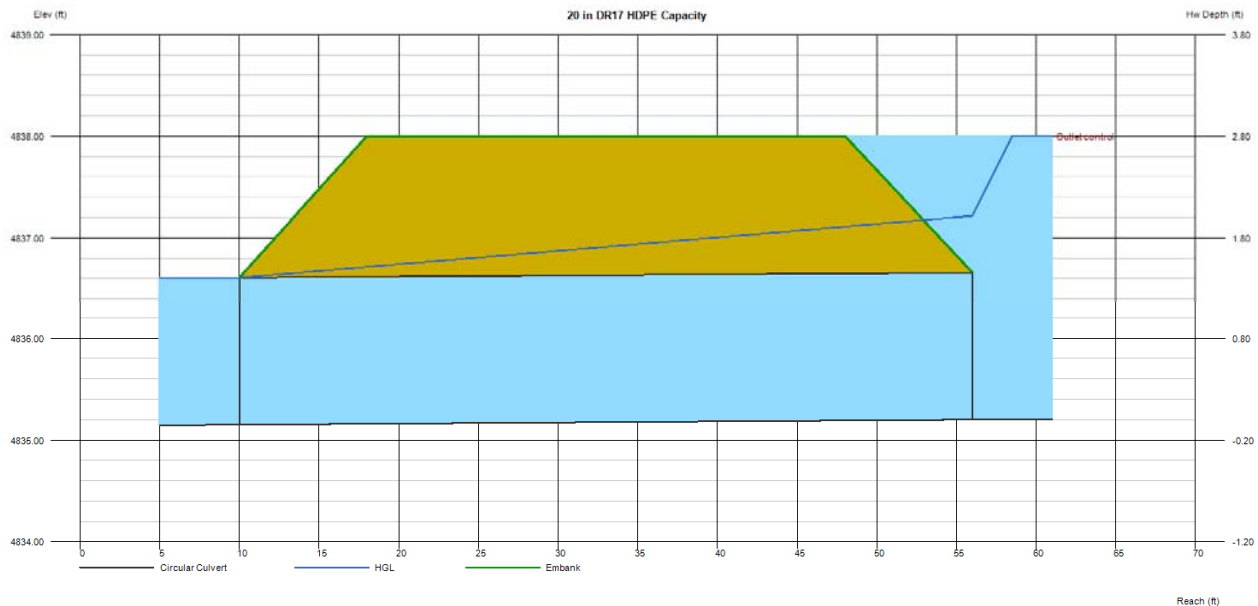
Top Elevation (ft)	= 4838.00
Top Width (ft)	= 30.00
Crest Width (ft)	= 50.00

Calculations

Qmin (cfs)	= 9.00
Qmax (cfs)	= 10.10
Tailwater Elev (ft)	= Normal

Highlighted

Qtotal (cfs)	= 9.70
Qpipe (cfs)	= 9.70
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 5.81
Veloc Up (ft/s)	= 5.81
HGL Dn (ft)	= 4836.61
HGL Up (ft)	= 4837.22
Hw Elev (ft)	= 4838.00
Hw/D (ft)	= 1.92
Flow Regime	= Outlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Wednesday, Jul 15 2020

Weld CR 22.5 Culvert - 10 Yr

Invert Elev Dn (ft) = 95.25
Pipe Length (ft) = 48.00
Slope (%) = 0.87
Invert Elev Up (ft) = 95.67
Rise (in) = 30.0
Shape = Circular
Span (in) = 30.0
No. Barrels = 1
n-Value = 0.015
Culvert Type = Circular Corrugate Metal Pipe
Culvert Entrance = Projecting
Coeff. K,M,c,Y,k = 0.034, 1.5, 0.0553, 0.54, 0.9

Embankment

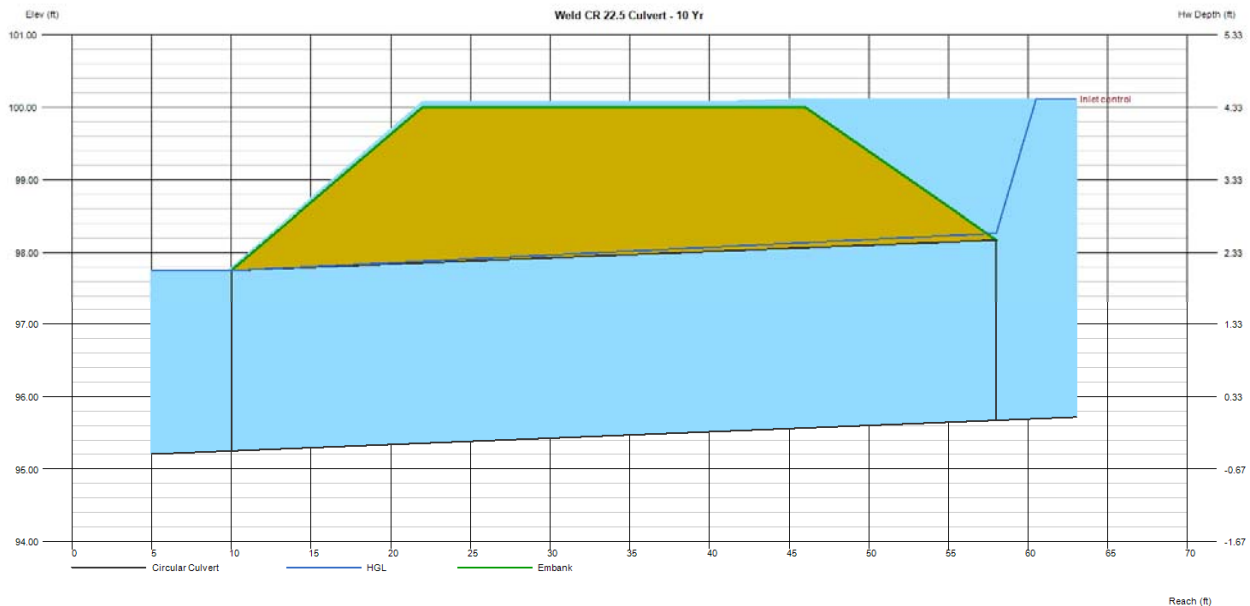
Top Elevation (ft) = 100.00
Top Width (ft) = 24.00
Crest Width (ft) = 100.00

Calculations

Qmin (cfs) = 47.08
Qmax (cfs) = 47.08
Tailwater Elev (ft) = Normal

Highlighted

Qtotal (cfs) = 47.08
Qpipe (cfs) = 36.77
Qovertop (cfs) = 10.31
Veloc Dn (ft/s) = 7.49
Veloc Up (ft/s) = 7.49
HGL Dn (ft) = 97.75
HGL Up (ft) = 98.26
Hw Elev (ft) = 100.11
Hw/D (ft) = 1.78
Flow Regime = Inlet Control





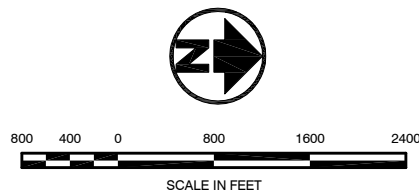
100 Year Flood Elevations

Cross-Section	River Station (feet)	Existing Base Flood Elevation (feet)*	Mining Base Flood Elevation (feet)*	Existing to Mining Change (feet)*	Future Base Flood Elevation (feet)*	Existing to Future Change (feet)*	
Upstream Limit Corps Sec 67	29977.07	South 4849.62					
HecXS1	29977.07	4849.62	4849.62	0.00	4849.62	0.00	
HecXS2	28500	4847.45	4847.45	0.00	4847.45	0.00	
HecXS3	26500	4845.46	4845.46	0.00	4845.46	0.00	
HecXS4	25313.88	4843.42	4843.42	0.00	4843.35	-0.07	
HecXS4.1	25000	4842.62	4842.27	-0.35	4841.84	-0.78	
HecXS5	24421.62	4841.59	4841.26	-0.33	4841.02	-0.57	
HecXS5.1	23701.35	4840.39	4840.01	-0.38	4839.96	-0.43	
HecXS6	22651.94	4839.00	4838.91	-0.09	4838.71	-0.29	
HecXS6.1	22273.76	4838.41	4838.41	0.00	4837.94	-0.47	Entrance Road
HecXS7	21768.17	4837.71	4837.43	-0.28	4837.12	-0.59	
HecXS7.1	20720.93	4835.91	4835.88	-0.03	4835.88	-0.03	
HecXS8	20325.92	4835.60	4835.60	0.00	4835.60	0.00	
HecXS9	17500	4831.11	4831.11	0.00	4831.11	0.00	
HecXS10	15000	4825.77	4825.77	0.00	4825.77	0.00	
HecXS11	12500	4822.20	4822.20	0.00	4822.20	0.00	
HecXS12	10000	4818.04	4818.04	0.00	4818.04	0.00	
HecXS13	7500	4813.67	4813.67	0.00	4813.67	0.00	
HecXS14	5000	4808.85	4808.85	0.00	4808.85	0.00	
HecXS15	2500	4803.00	4803.00	0.00	4803.00	0.00	
HecXS16	100	4799.50	4799.50	0.00	4799.50	0.00	
Downstream Limit Corps Sec 66	100	North 4799.50					

*All elevations on NAVD88 Datum

OWNER:
TOM BENNETT
PIONEER LAND COMPANY, LLC.
4401 CORIOLIS WAY
FREDERICK, CO 80504

LEGAL DESCRIPTION:
LOT A RE-4439, LOT B AMRE-4439,
LOTS A & B RE-4429, 11675 CR 22.5
SECTIONS 1 & 12, TOWNSHIP 2 NORTH,
RANGE 67 WEST



100 Year Flood Elevations	
Cross-Section	Mining Base Flood Elevation (feet)*
Upstream Limit Corps Sec 67	
HecXS1	4849.62
HecXS2	4847.45
HecXS3	4845.46
HecXS4	4843.42
HecXS4.1	4842.27
HecXS5	4841.26
HecXS5.1	4840.01
HecXS6	4838.91
HecXS6.1	4838.41
HecXS7	4837.43
HecXS7.1	4835.88
HecXS8	4835.60
HecXS9	4831.11
HecXS10	4825.77
HecXS11	4822.20
HecXS12	4818.04
HecXS13	4813.67
HecXS14	4808.85
HecXS15	4803.00
HecXS16	4799.50
Downstream Limit Corps Sec 66	

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Bennett Pit

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Floodplain Map - Mining