

Earthwork Report for SR 288 Rockfall
Mitigation Project Tracs# H8671 01 C

Background:

This project widens the road and cuts back the slopes on the “south site” of this project. The waste generated will be used to fill the “North site” which is a “Hairpin” curve just ½ mile north from the “south site”. An improved roadway curve will then be designed for this “north site” over the new fill. The existing drain pipe will be extended along with the fill.

No geotech report was prepared for this project, so there are no published soil values. The soil swell was directed by email which stated the swell to be used would be 20%.

Approach:

To ensure use of the created fill the North site was modeled filling edge to edge of the existing canyon or inside of the curve. The roadway was then modeled over the new fill surface. This generated three (3) areas of cross sections to quantify the earthwork.

The first area which includes plan sheets 2-5, show and quantify the generated cut from the slopes of the South Site.

The second area of cross sections, plan sheets 6-8 are the normal roadway cross sections that show and quantify the roadway of the North Site. Because the roadway curve is tight and the canyon fill long, the roadway cross sections overlap themselves. This distorts/disqualifies the fill quantities where they overlap.

In the third area, an alignment and profile was created along the pipe which follows down the canyon. This allowed a controllable and quantifiable fill design. These are plan sheets 9-14.

End area volumes were done for each of the three areas.

Summary of Calculations:

Volumes

Area 1, Cut volume = 17,900 cy (Roadway Excavation) (See pg. 4)

Volume with 20% swell = $17,900\text{cy} \times 1.2 = 21,480\text{cy}$

Area 2, Fill Volume needed = 400 cy (Embankment) (See pg. 5)

Area 3, Fill Volume needed=21,600cy (Embankment) (See pg 6)

These quantities result in a slight borrow of 520 cy (21480-400-21600=-520)minus

Because it would be a desirable thing to have a waste shown, the earthwork quantities in the plan summary were altered to show a 5% waste. This was advised in roadway design guidelines and also in the comment resolution.

Summary:

Should the actual swell be larger than 20 % there is ample room on the “North Site” for the excess. Should the actual swell be less than 20%, less of the downhill slope could be built with less impact to the area.

End Area Volume Report

Report Created: 12/8/2015
Time: 3:09pm

Cross Section Set Name: south2210

Alignment Name: H8617_SR288-SOUTH

Input Grid Factor: 1.000000 Note: All units in this report are in feet, square feet and cubic yards unless specified otherwise.

Baseline Station	----- Station Quantities -----								----- Added Quantities -----								Mass Ordinate
	Factor	----- Cut -----			----- Fill -----			----- Cut -----			----- Fill -----						
		Area	Volume	Adjusted	Factor	Area	Volume	Adjusted	Factor	Volume	Adjusted	Factor	Volume	Adjusted			
50+00.00	1.00	153.29	0.00	0.00	1.00	14.41	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	0.00		
50+00.00	1.00	153.24	0.01	0.01	1.00	14.41	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	0.00		
50+25.00	1.00	139.72	135.62	135.62	1.00	58.30	33.66	33.66	1.00	0.00	0.00	1.00	0.00	0.00	101.97		
50+50.00	1.00	403.75	251.61	251.61	1.00	0.00	26.99	26.99	1.00	0.00	0.00	1.00	0.00	0.00	326.59		
50+75.00	1.00	568.18	449.97	449.97	1.00	0.15	0.07	0.07	1.00	0.00	0.00	1.00	0.00	0.00	778.49		
50+91.49	1.00	583.57	351.79	351.79	1.00	0.22	0.11	0.11	1.00	0.00	0.00	1.00	0.00	0.00	1128.17		
51+00.00	1.00	557.93	179.81	179.81	1.00	0.21	0.07	0.07	1.00	0.00	0.00	1.00	0.00	0.00	1307.92		
51+25.00	1.00	588.81	530.90	530.90	1.00	0.64	0.39	0.39	1.00	0.00	0.00	1.00	0.00	0.00	1838.42		
51+50.00	1.00	567.21	535.19	535.19	1.00	1.89	1.17	1.17	1.00	0.00	0.00	1.00	0.00	0.00	2372.44		
51+75.00	1.00	685.57	579.99	579.99	1.00	0.10	0.92	0.92	1.00	0.00	0.00	1.00	0.00	0.00	2951.51		
51+78.37	1.00	731.70	88.41	88.41	1.00	0.25	0.02	0.02	1.00	0.00	0.00	1.00	0.00	0.00	3039.89		
52+00.00	1.00	778.14	604.82	604.82	1.00	2.69	1.18	1.18	1.00	0.00	0.00	1.00	0.00	0.00	3643.54		
52+25.00	1.00	647.46	659.99	659.99	1.00	1.46	1.92	1.92	1.00	0.00	0.00	1.00	0.00	0.00	4301.61		
52+31.14	1.00	649.60	147.56	147.56	1.00	4.92	0.73	0.73	1.00	0.00	0.00	1.00	0.00	0.00	4448.44		
52+50.00	1.00	644.38	451.85	451.85	1.00	7.74	4.42	4.42	1.00	0.00	0.00	1.00	0.00	0.00	4895.87		
52+75.00	1.00	490.64	525.47	525.47	1.00	10.32	8.36	8.36	1.00	0.00	0.00	1.00	0.00	0.00	5412.98		
53+00.00	1.00	584.03	497.53	497.53	1.00	11.13	9.93	9.93	1.00	0.00	0.00	1.00	0.00	0.00	5900.58		
53+25.00	1.00	889.71	682.29	682.29	1.00	6.05	7.95	7.95	1.00	0.00	0.00	1.00	0.00	0.00	6574.92		
53+50.00	1.00	1195.94	965.58	965.58	1.00	2.63	4.02	4.02	1.00	0.00	0.00	1.00	0.00	0.00	7536.48		
53+63.34	1.00	1317.23	620.93	620.93	1.00	1.98	1.14	1.14	1.00	0.00	0.00	1.00	0.00	0.00	8156.27		
53+75.00	1.00	1537.56	616.33	616.33	1.00	0.00	0.43	0.43	1.00	0.00	0.00	1.00	0.00	0.00	8772.17		
54+00.00	1.00	1650.46	1475.93	1475.93	1.00	0.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	10248.10		
54+25.00	1.00	1525.49	1470.35	1470.35	1.00	0.18	0.09	0.09	1.00	0.00	0.00	1.00	0.00	0.00	11718.37		
54+50.00	1.00	1474.50	1388.89	1388.89	1.00	0.09	0.13	0.13	1.00	0.00	0.00	1.00	0.00	0.00	13107.12		
54+75.00	1.00	1283.92	1277.05	1277.05	1.00	0.25	0.16	0.16	1.00	0.00	0.00	1.00	0.00	0.00	14384.01		
55+00.00	1.00	1105.00	1105.98	1105.98	1.00	0.00	0.11	0.11	1.00	0.00	0.00	1.00	0.00	0.00	15489.88		
55+25.00	1.00	886.91	922.18	922.18	1.00	0.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	16412.06		
55+49.61	1.00	650.65	700.79	700.79	1.00	0.97	0.44	0.44	1.00	0.00	0.00	1.00	0.00	0.00	17112.40		
55+50.00	1.00	647.59	9.33	9.33	1.00	0.88	0.01	0.01	1.00	0.00	0.00	1.00	0.00	0.00	17121.72		
55+75.00	1.00	394.97	482.67	482.67	1.00	1.29	1.01	1.01	1.00	0.00	0.00	1.00	0.00	0.00	17603.38		
56+00.00	1.00	0.60	183.13	183.13	1.00	1.95	1.50	1.50	1.00	0.00	0.00	1.00	0.00	0.00	17785.02		
56+01.00	1.00	0.17	0.01	0.01	1.00	2.27	0.08	0.08	1.00	0.00	0.00	1.00	0.00	0.00	17784.95		
Grand Total:		17891.97	17891.97			107.02	107.02			0.00	0.00		0.00	0.00			

End Area Volume Report

End Area Volume Report

Report Created: 2/17/2016
Time: 3:22pm

Cross Section Set Name: north@95%

Alignment Name: north@95%

Input Grid Factor: 1.000000 Note: All units in this report are in feet, square feet and cubic yards unless specified otherwise.

Baseline Station	----- Station Quantities -----				----- Added Quantities -----				Mass Ordinate			
	----- Cut -----		----- Fill -----		----- Cut -----		----- Fill -----					
Factor Area	Volume	Adjusted	Factor Area	Volume	Adjusted	Factor Volume	Adjusted	Factor Volume	Adjusted			
81+78.77	1.00 0.00	0.00	0.00	1.00 0.00	0.00	0.00	1.00 0.00	0.00	1.00 0.00	0.00	0.00	
81+78.78	1.00 0.00	0.00	0.00	1.00 0.00	0.00	0.00	1.00 0.00	0.00	1.00 0.00	0.00	0.00	
82+00.00	1.00 0.00	0.00	0.00	1.00 0.00	0.00	0.00	1.00 0.00	0.00	1.00 0.00	0.00	0.00	
82+25.00	1.00 0.26	0.12	0.12	1.00 0.92	0.43	0.43	1.00 0.00	0.00	1.00 0.00	0.00	-0.31	
82+28.77	1.00 4.48	0.33	0.33	1.00 2.25	0.22	0.22	1.00 0.00	0.00	1.00 0.00	0.00	-0.20	
82+50.00	1.00 5.21	3.81	3.81	1.00 13.04	6.01	6.01	1.00 0.00	0.00	1.00 0.00	0.00	-2.40	
82+75.00	1.00 6.83	5.58	5.58	1.00 30.08	19.96	19.96	1.00 0.00	0.00	1.00 0.00	0.00	-16.79	
83+00.00	1.00 5.96	5.92	5.92	1.00 54.45	39.13	39.13	1.00 0.00	0.00	1.00 0.00	0.00	-50.00	
83+25.00	1.00 4.24	4.72	4.72	1.00 74.94	59.90	59.90	1.00 0.00	0.00	1.00 0.00	0.00	-105.19	
83+50.00	1.00 1.54	2.67	2.67	1.00 87.73	75.31	75.31	1.00 0.00	0.00	1.00 0.00	0.00	-177.63	
83+60.00	1.00 0.98	0.47	0.47	1.00 82.81	31.58	31.58	1.00 0.00	0.00	1.00 0.00	0.00	-208.94	
83+75.00	1.00 0.00	0.27	0.27	1.00 96.69	49.86	49.86	1.00 0.00	0.00	1.00 0.00	0.00	-258.53	
84+00.00	1.00 0.03	0.01	0.01	1.00 62.63	73.76	73.76	1.00 0.00	0.00	1.00 0.00	0.00	-332.28	
84+25.00	1.00 1.06	0.50	0.50	1.00 30.99	43.34	43.34	1.00 0.00	0.00	1.00 0.00	0.00	-375.11	
84+50.00	1.00 0.17	0.57	0.57	1.00 13.39	20.54	20.54	1.00 0.00	0.00	1.00 0.00	0.00	-395.08	
84+70.54	1.00 3.68	1.46	1.46	1.00 2.19	5.92	5.92	1.00 0.00	0.00	1.00 0.00	0.00	-399.54	
84+75.00	1.00 2.98	0.55	0.55	1.00 2.12	0.36	0.36	1.00 0.00	0.00	1.00 0.00	0.00	-399.35	
85+00.00	1.00 0.00	1.38	1.38	1.00 0.00	0.98	0.98	1.00 0.00	0.00	1.00 0.00	0.00	-398.95	
85+20.53	1.00 0.00	0.00	0.00	1.00 0.00	0.00	0.00	1.00 0.00	0.00	1.00 0.00	0.00	-398.95	
85+20.54	1.00 0.00	0.00	0.00	1.00 0.00	0.00	0.00	1.00 0.00	0.00	1.00 0.00	0.00	-398.95	
Grand Total:		28.37	28.37		427.31	427.31		0.00	0.00		0.00	0.00

End Area Volume Report

End Area Volume Report

Report Created: 2/23/2016
Time: 2:01pm

Cross Section Set Name: piperetry

Alignment Name: pipe

Input Grid Factor: 1.000000

Note: All units in this report are in feet, square feet and cubic yards unless specified otherwise.

Baseline Station	Station Quantities				Added Quantities				Mass Ordinate				
	Cut		Fill		Cut		Fill						
Factor Area	Volume	Adjusted	Factor Area	Volume	Adjusted	Factor Volume	Adjusted	Factor Volume	Adjusted				
0+00.00	1.00 0.00	0.00	0.00	1.00 4.85	0.00	0.00	0.00	1.00 0.00	0.00	0.00	0.00	0.00	
0+25.00	1.00 5.15	2.38	2.38	1.00 367.13	172.22	172.22	1.00 0.00	0.00	0.00	1.00 0.00	0.00	0.00	-169.83
0+50.00	1.00 2.79	3.67	3.67	1.00 1158.37	705.33	705.33	1.00 0.00	0.00	0.00	1.00 0.00	0.00	0.00	-871.49
0+75.00	1.00 1.18	1.84	1.84	1.00 1747.98	1344.61	1344.61	1.00 0.00	0.00	0.00	1.00 0.00	0.00	0.00	-2214.26
1+00.00	1.00 0.31	0.69	0.69	1.00 2460.69	1948.46	1948.46	1.00 0.00	0.00	0.00	1.00 0.00	0.00	0.00	-4162.03
1+25.00	1.00 0.74	0.48	0.48	1.00 3252.64	2645.06	2645.06	1.00 0.00	0.00	0.00	1.00 0.00	0.00	0.00	-6806.61
1+40.00	1.00 2.04	0.77	0.77	1.00 3647.42	1916.68	1916.68	1.00 0.00	0.00	0.00	1.00 0.00	0.00	0.00	-8722.52
1+50.00	1.00 2.70	0.88	0.88	1.00 3523.85	1328.01	1328.01	1.00 0.00	0.00	0.00	1.00 0.00	0.00	0.00	10049.66
1+75.00	1.00 17.05	9.14	9.14	1.00 3280.73	3150.27	3150.27	1.00 0.00	0.00	0.00	1.00 0.00	0.00	0.00	13190.78
1+76.78	1.00 18.95	1.19	1.19	1.00 3266.64	216.01	216.01	1.00 0.00	0.00	0.00	1.00 0.00	0.00	0.00	13405.60
1+83.00	1.00 23.88	4.93	4.93	1.00 3149.61	738.87	738.87	1.00 0.00	0.00	0.00	1.00 0.00	0.00	0.00	14139.54
2+00.00	1.00 30.56	17.14	17.14	1.00 2792.33	1870.61	1870.61	1.00 0.00	0.00	0.00	1.00 0.00	0.00	0.00	15993.02
2+25.00	1.00 18.34	22.64	22.64	1.00 2235.35	2327.63	2327.63	1.00 0.00	0.00	0.00	1.00 0.00	0.00	0.00	18298.01
2+50.00	1.00 0.00	8.49	8.49	1.00 1479.45	1719.82	1719.82	1.00 0.00	0.00	0.00	1.00 0.00	0.00	0.00	20009.34
2+75.00	1.00 0.66	0.30	0.30	1.00 813.29	1061.46	1061.46	1.00 0.00	0.00	0.00	1.00 0.00	0.00	0.00	21070.49
3+00.00	1.00 0.00	0.30	0.30	1.00 182.88	461.19	461.19	1.00 0.00	0.00	0.00	1.00 0.00	0.00	0.00	21531.38
3+17.28	1.00 0.00	0.00	0.00	1.00 0.00	58.51	58.51	1.00 0.00	0.00	0.00	1.00 0.00	0.00	0.00	21589.88
3+22.01	1.00 0.00	0.00	0.00	1.00 0.00	0.00	0.00	1.00 0.00	0.00	0.00	1.00 0.00	0.00	0.00	21589.88
Grand Total:		74.86	74.86		21664.74	21664.74		0.00	0.00		0.00	0.00	0.00