

SCHEDULE OF ADDITIONAL VOLUMES

STATION	SOIL C=0.85						WEATHERED ROCK C=1.0						ROCK C=1.2						FILLING					
	SLIP & APPROACH		SIDE BORROW	POND	TOTAL	SLIP & APPROACH	TOTAL		SLIP & APPROACH	TOTAL		SLIP & APPROACH	FILL CENTRAL RESERVE	DEDUCTION STRUCTURE VOLUMES	FILL AROUND POND	FILL SHOULDER GUARDRAIL	FILL RAILWAY	TOTAL	STATION					
	(m3)	(m3)					(m3)	(m3)		(m3)	(m3)									(m3)	(m3)	(m3)	(m3)	(m3)
26 + 200.000				0.00	0.00		0.00		0.00		0.00	9.00					9.00	26 + 200.000						
26 + 220.000				0.00	0.00		0.00		0.00		0.00	9.00	-319.90		15.40		-295.90	26 + 220.000						
26 + 240.000				0.00	0.00		0.00		0.00		0.00	9.00			15.40		24.40	26 + 240.000						
26 + 260.000				0.00	0.00		0.00		0.00		0.00	9.00			15.40		24.40	26 + 260.000						
26 + 280.000				0.00	0.00		0.00		0.00		0.00	9.00			15.40		24.40	26 + 280.000						
26 + 300.000				0.00	0.00		0.00		0.00		0.00	9.00			15.40		24.40	26 + 300.000						
26 + 320.000				0.00	0.00		0.00		0.00		0.00	9.00			15.40		24.40	26 + 320.000						
26 + 340.000				0.00	0.00		0.00		0.00		0.00	9.00			15.40		24.40	26 + 340.000						
26 + 360.000				0.00	0.00		0.00		0.00		0.00	9.00	-6319.90		15.40		-6295.90	26 + 360.000						
26 + 380.000				0.00	0.00		0.00		0.00		0.00	9.00			15.40		24.40	26 + 380.000						
26 + 400.000				0.00	0.00		0.00		0.00		0.00	9.00			15.40		24.40	26 + 400.000						
26 + 420.000				0.00	0.00		0.00		0.00		0.00	9.00			15.40		24.40	26 + 420.000						
26 + 440.000				0.00	0.00		0.00		0.00		0.00	9.00			15.40		24.40	26 + 440.000						
26 + 460.000				0.00	0.00		0.00		0.00		0.00	9.00	-4046.80		15.40		-4022.80	26 + 460.000						
26 + 480.000				0.00	0.00		0.00		0.00		0.00	9.00			15.40		24.40	26 + 480.000						
26 + 500.000				0.00	0.00		0.00		0.00		0.00	9.00			13.09		22.09	26 + 500.000						
26 + 520.000				0.00	0.00		0.00		0.00		0.00	9.00					9.00	26 + 520.000						
26 + 540.000				0.00	0.00		0.00		0.00		0.00	9.00					9.00	26 + 540.000						
26 + 560.000				0.00	0.00		0.00		0.00		0.00	9.00					9.00	26 + 560.000						
26 + 580.000				0.00	0.00		0.00		0.00		0.00	9.00					9.00	26 + 580.000						
26 + 600.000	3467.50			3467.50	0.00		0.00		0.00		0.00	27.10					36.10	26 + 600.000						
26 + 620.000	308.20			308.20	0.00		0.00		0.00		0.00	27.10					36.10	26 + 620.000						
26 + 640.000	308.20			308.20	0.00		0.00		0.00		0.00	27.10					36.10	26 + 640.000						
26 + 660.000	308.20			308.20	0.00		0.00		0.00		0.00	27.10					36.10	26 + 660.000						
26 + 680.000	308.20			308.20	0.00		0.00		0.00		0.00	27.10					36.10	26 + 680.000						
26 + 700.000	308.20			308.20	0.00		0.00		0.00		0.00	27.10					36.10	26 + 700.000						
26 + 720.000	308.20			308.20	0.00		0.00		0.00		0.00	27.10					36.10	26 + 720.000						
26 + 740.000	308.20			308.20	0.00		0.00		0.00		0.00	27.10					36.10	26 + 740.000						
26 + 760.000	308.20			308.20	0.00		0.00		0.00		0.00	27.10					36.10	26 + 760.000						

SCHEDULE OF ADDITIONAL VOLUMES

STATION	CUTTING						FILLING						STATION			
	SOIL C=0.35			WEATHERED ROCK C=1.0			ROCK C=1.2			FILLING				TOTAL		
	SLIP & APPROACH (m <sup>3</sup> )	SIDE BORROW (m <sup>3</sup> )	POND (m <sup>3</sup> )	TOTAL (m <sup>3</sup> )	SLIP & APPROACH (m <sup>3</sup> )	TOTAL (m <sup>3</sup> )	SLIP & APPROACH (m <sup>3</sup> )	TOTAL (m <sup>3</sup> )	SLIP & APPROACH (m <sup>3</sup> )	FILL CENTRAL RESERVE (m <sup>3</sup> )	REDUCTION STRUCTURE VOLUMES (m <sup>3</sup> )	FILL AROUND POND (m <sup>3</sup> )			FILL SHOULDER GUARDRAIL (m <sup>3</sup> )	FILL RAILWAY (m <sup>3</sup> )
26 + 780.000	308.20			308.20		0.00	0.00			27.10	9.00				36.10	26 + 780.000
26 + 800.000	308.20			308.20		0.00	0.00			27.10	9.00				36.10	26 + 800.000
26 + 820.000	308.20			308.20		0.00	0.00			27.10	9.00				36.10	26 + 820.000
26 + 840.000	308.20			308.20		0.00	0.00			27.10	9.00				36.10	26 + 840.000
26 + 860.000	308.20			308.20		0.00	0.00			27.10	9.00				36.10	26 + 860.000
26 + 880.000	308.20			308.20		0.00	0.00			27.10	9.00				36.10	26 + 880.000
26 + 900.000	308.20			308.20		0.00	0.00			27.10	9.00				36.10	26 + 900.000
26 + 920.000	308.20			308.20		0.00	0.00			27.10	9.00				36.10	26 + 920.000
26 + 940.000	308.20			308.20		0.00	0.00			27.10	9.00				36.10	26 + 940.000
26 + 945.157				0.00		0.00	0.00								0.00	26 + 945.157
26 + 960.000	308.20			308.20		0.00	0.00			27.10	9.00				36.10	26 + 960.000
26 + 980.000	308.20			308.20		0.00	0.00			27.10	9.00				36.10	26 + 980.000
27 + 0.000	308.20			308.20		0.00	0.00			27.10	9.00				36.10	27 + 0.000
27 + 20.000	308.20			308.20		0.00	0.00			27.10	9.00				36.10	27 + 20.000
27 + 40.000	308.20			308.20		0.00	0.00			27.10	9.00				36.10	27 + 40.000
27 + 60.000	308.20			308.20		0.00	0.00			27.10	9.00				36.10	27 + 60.000
27 + 80.000	308.20			308.20		0.00	0.00			27.10	9.00				36.10	27 + 80.000
27 + 100.000	308.20			308.20		0.00	0.00			27.10	9.00				36.10	27 + 100.000
27 + 120.000	308.20			308.20		0.00	0.00			27.10	9.00				36.10	27 + 120.000
27 + 140.000	308.20			308.20		0.00	0.00			27.10	9.00				36.10	27 + 140.000
27 + 160.000	308.20			308.20		0.00	0.00			27.10	9.00				36.10	27 + 160.000
27 + 180.000	308.20			308.20		0.00	0.00			27.10	9.00				36.10	27 + 180.000
27 + 200.000	308.20			308.20		0.00	0.00			27.10	9.00				36.10	27 + 200.000
27 + 220.000	308.20			308.20		0.00	0.00			27.10	9.00				36.10	27 + 220.000
27 + 240.000	308.20			308.20		0.00	0.00			27.10	9.00				36.10	27 + 240.000
27 + 260.000	7301.00			7301.00		0.00	0.00			27.10	9.00				36.10	27 + 260.000
27 + 280.000	308.20			308.20		0.00	0.00			27.10	9.00				36.10	27 + 280.000
27 + 300.000	656.10			656.10		0.00	0.00			114.70	9.00				123.70	27 + 300.000
27 + 320.000	656.10			656.10		0.00	0.00			114.70	9.00				123.70	27 + 320.000

SCHEDULE OF ADDITIONAL VOLUMES

STATION	SOIL C=0.85						WEATHERED ROCK C=1.0				ROCK C=L2						FILLING										
	SLIP & APPROACH		SIDE BORROW		POND		TOTAL		SLIP & APPROACH		TOTAL		SLIP & APPROACH		TOTAL		DEDUCTION STRUCTURE VOLUMES		FILL AROUND POND		FILL SHOULDER GUARDRAIL		FILL RAILWAY		TOTAL		
	(m3)	(m3)	(m3)	(m3)	(m3)	(m3)	(m3)	(m3)	(m3)	(m3)	(m3)	(m3)	(m3)	(m3)	(m3)	(m3)	(m3)	(m3)	(m3)	(m3)	(m3)	(m3)	(m3)	(m3)	(m3)	(m3)	(m3)
27 + 340.000	656.10						656.10	0.00			0.00	0.00	114.70			114.70	9.00									123.70	27 + 340.000
27 + 360.000	656.10						656.10	0.00			0.00	0.00	114.70			114.70	9.00									123.70	27 + 360.000
27 + 380.000	656.10						656.10	0.00			0.00	0.00	114.70			114.70	9.00									123.70	27 + 380.000
27 + 400.000	656.10						656.10	0.00			0.00	0.00	114.70			114.70	9.00									123.70	27 + 400.000
27 + 420.000	656.10						656.10	0.00			0.00	0.00	114.70			114.70	9.00									123.70	27 + 420.000
27 + 440.000	656.10						656.10	0.00			0.00	0.00	114.70			114.70	9.00									123.70	27 + 440.000
27 + 460.000	656.10						656.10	0.00			0.00	0.00	114.70			114.70	9.00									123.70	27 + 460.000
27 + 480.000	656.10						656.10	0.00			0.00	0.00	114.70			114.70	9.00									7053.70	27 + 480.000
27 + 500.000	656.10						656.10	0.00			0.00	0.00	114.70			114.70	9.00									123.70	27 + 480.000
27 + 520.000	656.10						656.10	0.00			0.00	0.00	114.70			114.70	9.00									123.70	27 + 500.000
27 + 540.000	656.10						656.10	0.00			0.00	0.00	114.70			114.70	9.00									123.70	27 + 520.000
27 + 560.000	656.10						656.10	0.00			0.00	0.00	114.70			114.70	9.00									123.70	27 + 540.000
27 + 580.000	656.10						656.10	0.00			0.00	0.00	114.70			114.70	9.00									123.70	27 + 560.000
27 + 600.000	656.10						656.10	0.00			0.00	0.00	114.70			114.70	9.00									123.70	27 + 580.000
27 + 620.000	656.10						656.10	0.00			0.00	0.00	114.70			114.70	9.00									123.70	27 + 600.000
27 + 640.000	656.10						656.10	0.00			0.00	0.00	114.70			114.70	9.00									123.70	27 + 620.000
27 + 660.000	656.10						656.10	0.00			0.00	0.00	114.70			114.70	9.00									123.70	27 + 640.000
27 + 660.800							0.00	0.00			0.00	0.00					9.00									9.00	27 + 660.800
27 + 680.000	656.10						656.10	0.00			0.00	0.00	114.70			114.70	9.00									123.70	27 + 680.000
27 + 700.000	656.10						656.10	0.00			0.00	0.00	114.70			114.70	9.00									123.70	27 + 700.000
27 + 720.000	656.10						656.10	0.00			0.00	0.00	114.70			114.70	9.00									123.70	27 + 720.000
27 + 740.000	656.10						656.10	0.00			0.00	0.00	114.70			114.70	9.00									123.70	27 + 740.000
27 + 760.000	656.10						656.10	0.00			0.00	0.00	114.70			114.70	9.00									123.70	27 + 760.000
27 + 780.000	656.10						656.10	0.00			0.00	0.00	114.70			114.70	9.00									123.70	27 + 780.000
27 + 800.000	656.10						656.10	0.00			0.00	0.00	114.70			114.70	9.00									123.70	27 + 800.000
27 + 820.000	656.10						656.10	0.00			0.00	0.00	114.70			114.70	9.00									123.70	27 + 820.000
27 + 828.800							0.00	0.00			0.00	0.00														0.00	27 + 828.800
27 + 840.000	656.10						656.10	0.00			0.00	0.00	114.70			114.70	9.00									123.70	27 + 840.000
27 + 860.000	656.10						656.10	0.00			0.00	0.00	114.70			114.70	9.00									123.70	27 + 860.000

SCHEDULE OF ADDITIONAL VOLUMES

STATION	CUTTING						FILLING								
	SOIL C=0.85			WEATHERED ROCK C=1.0			ROCK C=1.2			FILL			TOTAL	STATION	
	SLIP & APPROACH (m3)	SHIM BORROW (m3)	POND (m3)	TOTAL (m3)	SLIP & APPROACH (m3)	TOTAL (m3)	SLIP & APPROACH (m3)	TOTAL (m3)	SLIP & APPROACH (m3)	FILL CENTRAL RESERVE (m3)	DEDUCTION STRUCTURE VOLUMES (m3)	FILL AROUND FOND (m3)			FILL SHOULDER GUARDRAIL (m3)
27 + 880.000	656.10			656.10	0.00	0.00	0.00	0.00	114.70	9.00				123.70	27 + 880.000
27 + 900.000	656.10			656.10	0.00	0.00	0.00	0.00	114.70	9.00				123.70	27 + 900.000
27 + 920.000	1076.90			1076.90	0.00	0.00	0.00	0.00	307.70	9.00	631.70			948.40	27 + 920.000
27 + 940.000	656.10			656.10	0.00	0.00	0.00	0.00	114.70	9.00				123.70	27 + 940.000
27 + 960.000	656.10			656.10	0.00	0.00	0.00	0.00	114.70	9.00				123.70	27 + 960.000
27 + 980.000	656.10			656.10	0.00	0.00	0.00	0.00	114.70	9.00				123.70	27 + 980.000
28 + 0.000	656.10			656.10	0.00	0.00	0.00	0.00	114.70	9.00				123.70	28 + 0.000
28 + 20.000	656.10			656.10	0.00	0.00	0.00	0.00	114.70	9.00				123.70	28 + 20.000
28 + 40.000	656.10			656.10	0.00	0.00	0.00	0.00	114.70	9.00				123.70	28 + 40.000
28 + 60.000	656.10			656.10	0.00	0.00	0.00	0.00	114.70	9.00				123.70	28 + 60.000
28 + 80.000	308.20			308.20	0.00	0.00	0.00	0.00	27.10	9.00				36.10	28 + 80.000
28 + 100.000	308.20			308.20	0.00	0.00	0.00	0.00	27.10	9.00				36.10	28 + 100.000
28 + 120.000	308.20			308.20	0.00	0.00	0.00	0.00	27.10	9.00				36.10	28 + 120.000
28 + 140.000	308.20			308.20	0.00	0.00	0.00	0.00	27.10	9.00				36.10	28 + 140.000
28 + 160.000	308.20			308.20	0.00	0.00	0.00	0.00	27.10	9.00				36.10	28 + 160.000
28 + 180.000	308.20			308.20	0.00	0.00	0.00	0.00	27.10	9.00				36.10	28 + 180.000
28 + 200.000	310.50			310.50	0.00	0.00	0.00	0.00	27.70	9.00				36.70	28 + 200.000
28 + 220.000				0.00	0.00	0.00	0.00	0.00		9.00				9.00	28 + 220.000
28 + 240.000	1228.20			1228.20	0.00	0.00	0.00	0.00	831.60	9.00				840.60	28 + 240.000
28 + 244.064				0.00	0.00	0.00	0.00	0.00						0.00	28 + 244.064
28 + 244.064				0.00	0.00	0.00	0.00	0.00						0.00	28 + 244.064
28 + 260.000	1228.20			1228.20	0.00	0.00	0.00	0.00	831.60	9.00				840.60	28 + 260.000
28 + 280.000	1228.20			1228.20	0.00	0.00	0.00	0.00	831.60	9.00				840.60	28 + 280.000
28 + 289.489				0.00	0.00	0.00	0.00	0.00						0.00	28 + 289.489
28 + 300.000	1228.20			1228.20	0.00	0.00	0.00	0.00	831.60	9.00				840.60	28 + 300.000
28 + 320.000	1673.20			1673.20	0.00	0.00	0.00	0.00	905.50	9.00				914.50	28 + 320.000
28 + 333.000				0.00	0.00	0.00	0.00	0.00		9.00				9.00	28 + 333.000
28 + 333.000				0.00	0.00	0.00	0.00	0.00		9.00				9.00	28 + 333.000

SCHEDULE OF ADDITIONAL VOLUMES

STATION	SOIL C=0.85					WEATHERED ROCK C=1.0			ROCK C=1.2			FILLING						
	SLIP & APPROACH	SIDE BORROW	POND	TOTAL	SLIP & APPROACH	TOTAL	SLIP & APPROACH	TOTAL	SLIP & APPROACH	TOTAL	FILL CENTRAL RESERVE	FILL DEDUCTION STRUCTURE VOLUMES	FILL AROUND POND	FILL SHOULDER GUARDRAIL	FILL RAILWAY	TOTAL	STATION	
	(m <sup>3</sup> )	(m <sup>3</sup> )	(m <sup>3</sup> )	(m <sup>3</sup> )	(m <sup>3</sup> )	(m <sup>3</sup> )	(m <sup>3</sup> )	(m <sup>3</sup> )	(m <sup>3</sup> )	(m <sup>3</sup> )	(m <sup>3</sup> )							
28 + 340.000	1228.20			1228.20		0.00		0.00		0.00	5.70					837.30	28 + 340.000	
28 + 360.000	1228.20			1228.20		0.00		0.00		0.00						831.60	28 + 360.000	
28 + 380.000	1228.20			1228.20		0.00		0.00		0.00						831.60	28 + 380.000	
28 + 400.000	1228.20			1228.20		0.00		0.00		0.00						831.60	28 + 400.000	
28 + 416.085	6512.70			6512.70		0.00		0.00		0.00						4521.60	28 + 416.085	
TOTAL	159256.70	59199.46	9076.50	227532.66	7217.00	0.00	7217.00	0.00	64.00	64.00	10827.70	32095.30	708.00	2922.15	6930.00	187390.55		



COMPUTATION OF VOLUMES  
SUMMARY OF VOLUMES

JUNCTION OR ROAD	CUTTING			FILLING (m <sup>3</sup> )	REMARKS	
	SOIL (m <sup>3</sup> )	WEATHERED ROCK (m <sup>3</sup> )	ROCK (m <sup>3</sup> )			
<b>MOMBASA ROAD JUNCTION :</b>						
A Slip Road	266.00	235.33		8270.04	Volumes of Mombasa Road Junction is divided in the following two groups for the mass curve calculation. 1. A, B, C, D Slip Roads (0+440.000 - 0+700.000) 2. E, F, G Slip Roads and "U-Turn" Road (0+200.000 - 0+360.000)	
B Slip Road	118.14	330.98		11877.65		
C Slip Road	348.15	1073.25		6882.26		
D Slip Road	154.12	60.16		12311.93		
A+B+C+D	886.41	1699.72		39341.88		
E Slip Road	127.93	899.88		7977.57		
F Slip Road	391.16	774.65		7676.46		
G Slip Road	251.00	948.29		5193.22		
U - Turn Road	343.13	0.00		575.63		
E+F+G+U turn	1113.22	2622.82		21422.88		
Subtotal	1999.63	4322.54		60764.76		
<b>UHURU MONUMENT JUNCTION :</b>						
A Slip Road	2303.47	1805.01		2087.39	Uhuru Monument Junction is divided in the following three groups for the mass curve calculation. 1. A and B Slip Roads (6+420.000 - 6+700.000) 2. C and D Slip Roads (6+700.000 - 6+980.000) 3. Approach Road (i.e. Langata Road, C58) at the 6+700.000 station as a spotty-moving.	
B Slip Road	328.34	9.45		4786.55		
A+B	2631.81	1814.46		6873.94		
C Slip Road	348.01	0.00		14582.29		
D Slip Road	371.89	26.00		8507.73		
C+D	719.90	26.00		23090.02		
Approach Road (Langata Road, C58)	942.20	0.00		3110.00		
Subtotal	4293.91	1840.46		33073.96		
<b>NGONG ROAD JUNCTION :</b>						
A Slip Road	25023.39	0.00		0.00		Ngong Road Junction (i.e. A, B, and its Approach Road) is considered as only one volume group. Total length=164.9 m (from 15+360 before the line is adjusted to 15+320 station after the line is adjusted)
B Slip Road	6950.07	0.00		18037.52		
Approach Road (C60)	4583.50	0.00		1285.60		
Subtotal	36556.96	0.00		19923.12		

COMPUTATION OF VOLUMES  
SUMMARY OF VOLUMES

JUNCTION OR ROAD	CUTTING			FILLING (m <sup>3</sup> )	REMARKS
	SOIL (m <sup>3</sup> )	WEATHERED ROCK (m <sup>3</sup> )	ROCK (m <sup>3</sup> )		
<b>DAGOREITI FOREST JUNCTION :</b>					
A Slip Road	919.56	0.00		12705.97	Dagoreiti Forest Junction (i.e. A, B, and its Approach Road) is considered as only one volume group. (20+620.000 - 20+980.000)
B Slip Road	1367.74	0.00		29703.86	
Approach Road (C60)	3394.52	0.00		55.04	
Subtotal	5681.82	0.00		42464.87	
<b>THOGOTO JUNCTION :</b>					
A Slip Road	33399.54	1054.00	64.00	213.75	Thogoto Junction (i.e. A, B, and its Approach Road) is considered as only one volume group. (23+160.000 - 23+460.000)
B Slip Road	5667.00	0.00	0.00	24497.79	
Approach Road (C60)	4230.69	0.00	0.00	147.70	
Subtotal	43297.23	1054.00	64.00	24859.24	
<b>KIKUYU TOWN JUNCTION :</b>					
A Slip Road	25275.16	0.00		2222.38	Volumes of Kikuyu Town Junction is divided in two kind of groups for the mass curve calculation. 1. Spouty-moving: B, C, & E Slip Roads at 26+600, 27+260, and 27+920 stations respectively. 2. Lateral-moving : A Slip Road (26+580 - 28+200), and D Slip Road (27+300 - 28+060).
B Slip Road	3159.30	0.00		0.00	
C Slip Road	6992.84	0.00		0.00	
D Slip Road	13567.47	0.00		3416.84	
E Slip Road	420.80	0.00		193.00	
Subtotal	49415.57	0.00		5832.22	
<b>KIKUYU JUNCTION :</b>					
A Slip Road	12282.06	0.00		8316.29	Volumes of Kikuyu Junction is divided in two kind of groups for the mass curve calculation. 1. Spouty-moving: B & C Slip Roads at 28+320, and 28+416.085 (End Point) stations respectively. 2. Lateral-moving : A Slip Road from 28+240.000 to 28+416.085 (End Point).
B Slip Road	445.03	0.00		73.86	
C Slip Road	5284.45	0.00		3689.71	
Subtotal	18011.54	0.00	0.00	12079.86	
Total	159256.66	7217.00	64.00	198398.03	

COMPUTATION OF VOLUMES

MOMBASA ROAD JUNCTION: A Slip Road

STATION	DISTANCE	CUTTING						FILLING												
		SOIL		WEATHERED ROCK		ROCK		SECTION	AVERAGE	VOLUME										
		SECTION (m2)	AVERAGE (m2)	VOLUME (m3)	SECTION (m2)	AVERAGE (m2)	VOLUME (m3)				SECTION (m2)	AVERAGE (m2)	VOLUME (m3)							
0 + 380.000		0.00						0.00												
0 + 280.000																				
0 + 100.329	100.00	5.32	2.66	266.00																
0 + 120.000	19.67				0.00															98.50
0 + 140.000	20.00				3.76	1.88	37.60													73.77
0 + 145.905	5.91				2.95	3.36	19.81													102.20
0 + 160.000	14.10				2.81	2.88	40.59													26.60
0 + 162.278	2.28				3.00	2.91	6.62													55.11
0 + 180.000	17.72				3.67	3.34	59.10													8.69
0 + 200.000	20.00				3.49	3.58	71.60													52.72
0 + 220.000	20.00																			50.50
0 + 222.278	2.28																			369.50
0 + 240.000	17.72																			89.72
0 + 260.000	20.00																			862.97
0 + 264.945	4.94																			628.80
0 + 280.000	15.06																			48.11
0 + 300.000	20.00																			105.16
0 + 320.000	20.00																			145.10
0 + 340.000	20.00																			203.70
0 + 345.583	5.58																			330.20
0 + 360.000	14.42																			128.97
0 + 380.000	20.00																			377.87
0 + 388.250	8.25																			662.60
0 + 400.000	11.75																			313.91
0 + 420.000	20.00																			472.70
0 + 430.916	10.92																			871.00
0 + 440.000	9.08																			464.26
0 + 456.816	16.82																			372.44
0 + 460.000	3.18																			633.46
0 + 475.288	18.47																			106.07
Total	478.14	5.32	2.66	266.00	19.68	17.94	235.33													615.39
																				8270.04



COMPUTATION OF VOLUMES  
MOMBASA ROAD JUNCTION: C Slip Road

STATION	DISTANCE	CUTTING						ROCK			FILLING					
		SOIL		WEATHERED ROCK		ROCK		SECTION	AVERAGE	VOLUME	SECTION	AVERAGE	VOLUME			
		SECTION	AVERAGE	SECTION	AVERAGE	SECTION	AVERAGE							SECTION	AVERAGE	VOLUME
(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m3)	(m3)	(m3)	
0 + 019.523				1.39									53.67			
0 + 020.000	0.48		1.39	1.39	1.39				0.66				53.67	53.67	25.60	
0 + 040.000	20.00		1.80	1.80	1.60				31.90				65.77	59.72	1194.40	
0 + 060.000	20.00		2.63	2.63	2.22				44.30				54.51	60.14	1202.80	
0 + 080.000	20.00		2.54	2.54	2.59				51.70				46.16	50.34	1006.70	
0 + 081.715	1.72		2.51	2.51	2.53				4.33				48.35	47.26	81.04	
0 + 099.379	17.66		2.65	2.65	2.38				45.57				34.69	41.52	733.41	
0 + 100.000	0.62		2.53	2.53	2.59				1.61				34.87	34.78	21.50	
0 + 120.000	20.00		1.74	1.74	2.14				42.70				16.29	25.58	511.60	
0 + 140.000	20.00												27.77	22.03	440.60	
0 + 160.000	20.00												56.41	42.09	841.80	
0 + 180.000	20.00			7.57	3.79				75.70				0.34	28.38	567.50	
0 + 189.496	9.50			9.13	8.55				79.29							
0 + 200.000	10.50			13.17	11.15				117.12							
0 + 220.000	20.00			18.58	15.88				317.50							
0 + 226.502	6.50			14.06	16.32				106.11							
0 + 240.000	13.50			8.87	11.47				154.75				0.35	0.18	2.36	
(0 + 257.054)																
0 - 064.811	17.05	1.94	0.97						16.54				4.17	2.26	38.54	
0 - 080.619	15.81	2.03	1.99						31.38				0.95	2.56	40.47	
0 - 220.000	139.38	1.77	1.90						264.82				1.20	1.08	149.83	
0 - 260.000	40.00	0.00	0.89						35.40				0.00	0.60	24.00	
Total	432.72	5.74	5.74	90.56	84.56	1073.25	499.17	472.17	6882.26							



COMPUTATION OF VOLUMES  
MOMBASA ROAD JUNCTION : E Slip Road

STATION	DISTANCE	CUTTING						ROCK			FILLING						
		SOIL		WEATHERED ROCK		ROCK		SECTION	AVERAGE	VOLUME	SECTION	AVERAGE	VOLUME				
		SECTION (m2)	AVERAGE (m2)	VOLUME (m3)	SECTION (m2)	AVERAGE (m2)	VOLUME (m3)							SECTION (m2)	AVERAGE (m2)	VOLUME (m3)	
0 - 150.000		0.00									0.00						
0 - 110.000	40.00	1.77	0.89	35.40											1.32	0.66	26.40
0 - 073.555	36.45	1.68	1.73	62.87											1.74	1.53	55.76
(0 - 57.748)																	
0 + 016.644	15.81	1.71	1.70	26.79											6.19	3.97	62.67
0 + 020.000	3.36	0.00	0.86	2.87											2.19	4.19	14.06
0 + 040.000	20.00														0.00	1.10	21.90
0 + 046.959	6.96														0.00	0.00	0.00
0 + 060.000	13.04														2.00	1.00	13.04
0 + 080.000	20.00														7.23	4.62	92.30
0 + 085.678	5.68														5.93	6.58	37.36
0 + 100.000	14.32														12.75	9.34	133.77
0 + 120.000	20.00														16.35	14.55	291.00
0 + 140.000	20.00														25.62	20.99	419.70
0 + 160.000	20.00														46.84	36.23	724.60
0 + 180.000	20.00														55.67	51.26	1025.10
0 + 194.633	14.63														56.20	55.94	818.50
0 + 200.000	5.37														61.48	58.84	315.79
0 + 220.000	20.00														65.28	63.38	1267.60
0 + 234.897	14.90														69.36	67.32	1002.87
0 + 240.000	5.10														63.96	66.66	340.17
0 + 260.000	20.00														48.38	56.17	1123.40
0 + 263.960	3.96														48.38	48.38	191.58
Total	339.57	5.16	5.16	127.93	67.66	66.35	899.88	596.87	572.68	7977.57							

COMPUTATION OF VOLUMES  
MOMBASA ROAD JUNCTION : F Slip Road

STATION	DISTANCE	CUTTING										FILLING													
		SOIL			WEATHERED ROCK			ROCK			SECTION	AVERAGE	VOLUME												
		SECTION	AVERAGE	VOLUME	SECTION	AVERAGE	VOLUME	SECTION	AVERAGE	VOLUME															
(m2)	(m2)	(m3)	(m2)	(m2)	(m3)	(m2)	(m2)	(m3)	(m2)	(m2)	(m3)														
0 + 043.277																									
0 + 060.000	16.72																				70.33	35.17	588.06		
0 + 080.000	20.00																				73.99	72.16	1443.20		
0 + 081.667	1.67																				74.01	74.00	123.36		
0 + 100.000	18.33																				67.02	70.52	1292.75		
0 + 120.000	20.00																				68.63	67.83	1356.50		
0 + 140.000	20.00																				31.00	49.82	996.30		
0 + 160.000	20.00																				21.70	26.35	527.00		
0 + 180.000	20.00																				11.43	16.57	331.30		
0 + 181.497	1.50																				10.02	10.73	16.06		
0 + 200.000	18.50								0.00												8.04	9.03	167.08		
0 + 220.000	20.00								0.71	0.36	7.10										4.52	6.28	125.60		
0 + 240.000	20.00								0.97	0.84	16.80										2.56	3.54	70.80		
0 + 260.000	20.00								10.40	5.69	113.70										0.00	1.28	25.60		
0 + 280.000	20.00								14.61	12.51	250.10														
0 + 281.328	1.33								16.84	15.73	20.88														
0 + 300.000	18.67								22.37	19.61	366.06										0.00	0.00	0.00		
(0 + 311.954)																									
0 + 019.326	11.95																				8.82	4.41	52.72		
0 + 050.000	30.67																				2.40	5.61	172.08		
0 + 180.000	130.00																				2.73	2.57	333.45		
0 + 220.000	40.00																				0.00	1.37	54.60		
Total	469.35								65.90	54.72	774.65										457.20	457.20	7676.46		













COMPUTATION OF VOLUMES  
 URULU MONUMENT JUNCTION : Approach Road (Langata Road, C58)

STATION	DISTANCE	CUTTING						ROCK			FILLING		
		SOIL		WEATHERED ROCK		ROCK		SECTION	AVERAGE	VOLUME	SECTION	AVERAGE	VOLUME
		SECTION (m2)	AVERAGE (m2)	VOLUME (m3)	SECTION (m2)	AVERAGE (m2)	VOLUME (m3)						
0 + 000.000		0.00						0.00					
0 + 020.000	20.00	1.12	0.56	11.20				0.38	0.19	3.80			
0 + 040.000	20.00	1.49	1.31	26.10				0.00	0.19	3.80			
0 + 060.000	20.00	1.37	1.43	28.60				0.31	0.16	3.10			
0 + 080.000	20.00	0.99	1.18	23.60				1.17	0.74	14.80			
0 + 100.000	20.00	4.16	2.58	51.50				12.69	6.93	138.60			
0 + 120.000	20.00	1.79	2.98	59.50				14.91	13.80	276.00			
0 + 140.000	20.00	4.01	2.90	58.00				17.63	16.27	325.40			
0 + 160.000	20.00	3.86	3.94	78.70				9.83	13.73	274.60			
0 + 180.000	20.00	9.80	6.83	136.60				7.47	8.65	173.00			
0 + 200.000	20.00	1.85	5.83	116.50				6.49	6.98	139.60			
0 + 220.000	20.00	1.66	1.76	35.10				4.13	5.31	106.20			
0 + 240.000	20.00	1.18	1.42	28.40				8.45	6.29	125.80			
0 + 260.000	20.00	1.22	1.20	24.00				11.50	9.98	199.50			
0 + 280.000	20.00	0.92	1.07	21.40				11.50	11.50	230.00			
0 + 300.000	20.00	1.21	1.07	21.30				11.95	11.73	234.50			
0 + 320.000	20.00	0.75	0.98	19.60				11.61	11.78	235.60			
0 + 340.000	20.00	0.79	0.77	15.40				13.82	12.72	254.30			
0 + 360.000	20.00	1.81	1.30	26.00				7.38	10.60	212.00			
0 + 380.000	20.00	1.10	1.46	29.10				1.73	4.56	91.10			
0 + 400.000	20.00	0.95	1.03	20.50				1.62	1.68	33.50			
0 + 420.000	20.00	0.90	0.93	18.50				0.93	1.28	25.50			
0 + 440.000	20.00	1.72	1.31	26.20				0.00	0.47	9.30			
0 + 460.000	20.00	1.70	1.71	34.20									
0 + 480.000	20.00	1.52	1.61	32.20									
Total	480.00	47.87	47.11	942.20				155.50	155.50	3110.00			















COMPUTATION OF VOLUMES

THOGOTO JUNCTION : A Slip Road

STATION	DISTANCE	CUTTING												FILLING		
		SOIL				WEATHERED ROCK				ROCK				SECTION	AVERAGE	VOLUME
		SECTION	AVERAGE	VOLUME		SECTION	AVERAGE	VOLUME		SECTION	AVERAGE	VOLUME				
(m2)	(m2)	(m3)		(m2)	(m2)	(m3)		(m2)	(m2)	(m3)		(m2)	(m2)	(m3)		
0 + 020,000		2.30												11.00		
0 + 038,864	38.86	17.70	10.00	388.64										0.00	5.50	213.75
0 + 040,000	20.00	32.00	24.85	497.00												
0 + 060,000	20.00	60.20	46.10	922.00												
0 + 080,000	20.00	95.20	77.70	1554.00												
0 + 095,579	15.58	116.80	106.00	1651.37												
0 + 100,000	4.42	122.30	119.55	528.53	0.00	0.00	0.00									
0 + 120,000	20.00	152.20	137.25	2745.00	0.20	0.10	2.00									
0 + 140,000	20.00	179.40	165.80	3316.00	5.80	3.00	60.00	0.10	0.05	1.00						
0 + 160,000	20.00	183.40	181.40	3628.00	8.90	7.35	147.00	0.70	0.40	8.00						
0 + 180,000	20.00	188.30	185.85	3717.00	13.80	11.35	227.00	1.30	1.00	20.00						
0 + 200,000	20.00	185.20	186.75	3735.00	12.30	13.05	261.00	0.80	1.05	21.00						
0 + 220,000	20.00	165.80	175.50	3510.00	11.70	12.00	240.00	0.30	0.55	11.00						
0 + 240,000	20.00	147.10	156.45	3129.00	0.00	5.85	117.00	0.00	0.15	3.00						
0 + 260,000	20.00	94.80	120.95	2419.00												
0 + 277,500	17.50	94.80	94.80	1659.00												
Total	296.36	1837.50	1788.95	33399.54	52.70	52.70	1054.00	3.20	3.20	64.00				11.00	5.50	213.75



COMPUTATION OF VOLUMES  
 THOGOTO JUNCTION: Approach Road (D411)

STATION	DISTANCE	CUTTING												FILLING			
		SOIL			WEATHERED ROCK			ROCK			SECTION	AVERAGE	VOLUME	SECTION	AVERAGE	VOLUME	
		SECTION	AVERAGE	VOLUME	SECTION	AVERAGE	VOLUME	SECTION	AVERAGE	VOLUME							
(m2)	(m2)	(m3)	(m2)	(m2)	(m3)	(m2)	(m2)	(m3)	(m2)	(m2)	(m3)	(m2)	(m2)	(m3)	(m2)	(m3)	
0 + 000.000		7.77															
0 + 020.000	20.00	8.92	8.35	166.90													
0 + 040.000	20.00	6.51	7.72	154.30													
0 + 060.000	20.00	7.26	6.89	137.70													
0 + 080.000	20.00	4.68	5.97	119.40													
0 + 100.000	20.00	7.56	6.12	122.40													
0 + 120.000	20.00	7.85	7.71	154.10													
0 + 140.000	20.00	6.54	7.20	143.90													
0 + 160.000	20.00	5.64	6.09	121.80													
0 + 180.000	20.00	7.97	6.81	136.10													
0 + 200.000	20.00	8.29	8.13	162.60													
0 + 220.000	20.00	6.12	7.21	144.10													
0 + 230.000	10.00	14.71	10.42	104.15													
0 + 240.000	10.00	0.00	7.36	73.55													
0 + 244.857	4.86	0.00	0.00	0.00													
Box Culvert																	
0 + 271.857	27.00	8.26															
0 + 280.000	8.14	16.52	12.39	100.89													
0 + 300.000	20.00	8.40	12.46	249.20													
0 + 320.000	20.00	7.08	7.74	154.80													
0 + 340.000	20.00	19.38	13.23	264.60													
0 + 360.000	20.00	24.80	22.09	441.80													
0 + 380.000	20.00	27.44	26.12	522.40													
0 + 400.000	20.00	11.95	19.70	393.90													
0 + 420.000	20.00	3.80	7.88	157.50													
0 + 440.000	20.00	2.97	3.39	67.70													
0 + 460.000	20.00	3.38	3.18	63.50													
0 + 480.000	20.00	1.56	2.47	49.40													
0 + 500.000	20.00	0.84	1.20	24.00													
Total	500.00	236.20	227.77	4230.69											10.18	7.39	147.70

COMPUTATION OF VOLUMES

KIKUYU TOWN JUNCTION : A Slip Road

STATION	DISTANCE	CUTTING						FILLING		
		SOIL			WEATHERED ROCK			SECTION	AVERAGE	VOLUME
		SECTION (m <sup>2</sup> )	AVERAGE (m <sup>2</sup> )	VOLUME (m <sup>3</sup> )	SECTION (m <sup>2</sup> )	AVERAGE (m <sup>2</sup> )	VOLUME (m <sup>3</sup> )			
0 + 000.000		4.60					0.50			
0 + 006.586	6.59	4.70	4.65	30.62			0.40	0.45	2.96	
0 + 020.000	13.41	27.00	15.85	212.61			0.90	0.65	8.72	
0 + 040.000	20.00	27.50	27.25	545.00			2.60	1.75	35.00	
0 + 060.000	20.00	17.80	22.65	453.00			4.90	3.75	75.00	
0 + 080.000	20.00	17.50	17.65	353.00			5.70	5.30	106.00	
0 + 100.000	20.00	13.80	15.65	313.00			5.60	5.65	113.00	
0 + 120.000	20.00	8.80	11.30	226.00			9.30	7.45	149.00	
0 + 140.000	20.00	9.70	9.25	185.00			8.00	8.65	173.00	
0 + 160.000	20.00	8.70	9.20	184.00			7.00	7.50	150.00	
0 + 180.000	20.00	8.30	8.50	170.00			10.50	8.75	175.00	
0 + 200.000	20.00	9.70	9.00	180.00			3.40	6.95	139.00	
0 + 213.756	13.76	12.30	11.00	151.32			2.90	3.15	43.33	
0 + 220.000	6.24	13.10	12.70	79.30			2.80	2.85	17.80	
0 + 240.000	20.00	15.80	14.45	289.00			1.00	1.90	38.00	
0 + 260.000	20.00	19.60	17.70	354.00			1.20	1.10	22.00	
0 + 280.000	20.00	25.50	22.55	451.00			1.60	1.40	28.00	
0 + 300.000	20.00	22.60	24.05	481.00			0.70	1.15	23.00	
0 + 320.000	20.00	5.30	13.95	279.00			1.10	0.90	18.00	
0 + 340.000	20.00	18.80	12.05	241.00			0.20	0.65	13.00	
0 + 360.000	20.00	31.00	24.90	498.00			0.00	0.10	2.00	
0 + 380.000	20.00	40.30	35.65	713.00						
0 + 400.000	20.00	41.60	40.95	819.00						
0 + 420.000	20.00	136.80	89.20	1784.00						
0 + 440.000	20.00	64.50	100.65	2013.00						
0 + 460.000	20.00	72.80	68.65	1373.00						
0 + 480.000	20.00	30.20	51.50	1030.00						
0 + 500.000	20.00	23.40	26.80	536.00						
0 + 520.000	20.00	21.80	22.60	452.00						
0 + 540.000	20.00	22.80	22.30	446.00						
Subtotal	540.00	776.30	762.60	14841.85			70.30	70.05	1331.81	

COMPUTATION OF VOLUMES

KIKUYU TOWN JUNCTION : A Slip Road

STATION	DISTANCE	CUTTING						ROCK			FILLING					
		SOIL		WEATHERED ROCK		ROCK		SECTION	AVERAGE	VOLUME	SECTION	AVERAGE	VOLUME			
		SECTION	AVERAGE	SECTION	AVERAGE	SECTION	AVERAGE							SECTION	AVERAGE	VOLUME
(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m3)	(m3)	(m3)	
0 + 560.000	20.00	19.80	21.30		426.00											
0 + 580.000	20.00	17.60	18.70		374.00											
0 + 600.000	20.00	18.00	17.80		356.00											
0 + 620.000	20.00	18.00	18.00		360.00											
0 + 640.000	20.00	15.80	16.90		338.00											
0 + 660.000	20.00	18.50	17.15		343.00											
0 + 680.000	20.00	9.60	14.05		281.00											
0 + 700.000	20.00	7.70	8.65		173.00											
0 + 720.000	20.00	2.80	5.25		105.00											
0 + 740.000	20.00	2.30	2.55		51.00											
0 + 760.000	20.00	2.70	2.50		50.00											
0 + 780.000	20.00	3.20	2.95		59.00											
0 + 800.000	20.00	5.30	4.25		85.00											
0 + 820.000	20.00	8.30	6.80		136.00											
0 + 835.845	15.85	10.40	9.35		148.15											
0 + 840.000	4.15	11.10	10.75		44.67											
0 + 860.000	20.00	15.70	13.40		268.00											
0 + 880.000	20.00	22.60	19.15		383.00											
0 + 899.253	19.25	28.00	25.30		487.10											
0 + 900.000	0.75	27.40	27.70		20.69											
0 + 920.000	20.00	13.80	20.60		412.00											
0 + 931.123	11.12	11.30	12.55		139.59											
0 + 940.000	8.88	9.50	10.40		92.32											
0 + 960.000	20.00	6.60	8.05		161.00											
0 + 980.000	20.00	8.30	7.45		149.00											
1 + 000.000	20.00	7.00	7.65		153.00											
1 + 005.372	5.37	7.00	7.00		37.60											
1 + 020.000	14.63	7.60	7.30		106.78											
1 + 040.000	20.00	9.70	8.65		173.00											
1 + 060.000	20.00	10.90	10.30		206.00											
Subtotal	520.00	356.50	362.45		6118.91											

STATION	DISTANCE	CUTTING						FILLING			
		SOIL		WEATHERED ROCK		ROCK		SECTION	AVERAGE	VOLUME	
		SECTION	AVERAGE	VOLUME	SECTION	AVERAGE	VOLUME				SECTION
(m2)	(m2)	(m3)	(m2)	(m2)	(m3)	(m2)	(m2)	(m3)	(m2)	(m2)	(m3)
1 + 080.000	20.00	12.90	11.90	238.00					0.60	3.35	67.00
1 + 100.000	20.00	21.90	17.40	348.00					0.00	0.30	6.00
1 + 120.000	20.00	37.60	29.75	595.00							
1 + 140.000	20.00	19.10	28.35	567.00							
1 + 160.000	20.00	41.00	30.05	601.00							
1 + 180.000	20.00	9.80	25.40	508.00					0.00		
1 + 200.000	20.00	9.30	9.55	191.00					0.60	0.30	6.00
1 + 200.508	0.51	9.60	9.45	4.80					1.10	0.85	0.43
1 + 220.000	19.49	15.10	12.35	240.73					0.40	0.75	14.62
1 + 240.000	20.00	15.00	15.05	301.00					0.00	0.20	4.00
1 + 260.000	20.00	13.60	14.30	286.00							
1 + 271.222	11.22	10.80	12.20	136.91							
1 + 280.000	8.78	9.40	10.10	88.66					0.00		
1 + 299.173	19.17	1.90	5.65	108.33					1.80	0.90	17.26
1 + 300.000	0.83	2.20	2.05	1.70					2.20	2.00	1.65
1 + 320.000	20.00	0.00	1.10	22.00					0.00	1.10	22.00
1 + 340.000	20.00										
1 + 348.760	8.76										
1 + 360.000	11.24										
1 + 380.000	20.00										
1 + 400.000	20.00										
1 + 420.000	20.00	0.00	0.00	0.00							
1 + 440.000	20.00	2.00	1.00	20.00							
1 + 460.000	20.00	1.20	1.60	32.00							
1 + 468.012	8.01	0.00	0.60	4.81							
1 + 480.000	11.99	0.00	0.00	0.00							
1 + 500.000	20.00	0.20	0.10	2.00							
1 + 520.000	20.00	1.50	0.85	17.00							
1 + 520.313	0.31	1.50	1.50	0.47							
Subtotal	460.31	235.60	240.30	4314.39					6.70	9.75	138.96
Total	1520.31	1368.40	1365.35	25275.16					123.40	123.15	2222.38





COMPUTATION OF VOLUMES  
KIKUYU TOWN JUNCTION - D Slip Road

STATION	DISTANCE	CUTTING						WEATHERED ROCK			ROCK			FILLING			
		SECTION		SOIL		SECTION		SECTION		SECTION		SECTION		SECTION		SECTION	
		(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)
0 + 000.000		15.80															
0 + 020.000	20.00	8.30	12.05	241.00													
0 + 040.000	20.00	5.20	6.75	135.00													
0 + 060.000	20.00	6.00	5.60	112.00													
0 + 080.000	20.00	7.80	6.90	138.00													
0 + 100.000	20.00	13.30	10.55	211.00													
0 + 120.000	20.00	18.20	15.75	315.00													
0 + 140.000	20.00	20.90	19.55	391.00													
0 + 160.000	20.00	22.00	21.45	429.00													
0 + 180.000	20.00	18.00	20.00	400.00													
0 + 182.310	2.31	18.00	18.00	41.58													
0 + 200.000	20.00	14.10	16.05	321.00													
0 + 220.000	37.69	13.40	13.75	518.24													
0 + 240.000	20.00	9.00	11.20	224.00													
0 + 260.000	20.00	6.20	7.60	152.00													
0 + 277.864	17.86	8.40	7.30	130.41													
0 + 280.000	20.00	7.60	8.00	160.00													
0 + 300.000	20.00	3.40	5.50	110.00													
0 + 320.000	20.00	3.40	3.40	68.00													
0 + 340.000	20.00	1.20	2.30	46.00													
0 + 360.000	20.00	1.00	1.10	22.00													
0 + 380.000	20.00	1.20	1.10	22.00													
0 + 400.000	20.00	3.30	2.25	45.00													
0 + 420.000	20.00	3.70	3.50	70.00													
0 + 440.000	20.00	0.70	2.20	44.00													
0 + 460.000	20.00	0.90	0.80	16.00													
0 + 480.000	20.00	1.30	1.10	22.00													
0 + 500.000	20.00	2.20	1.75	35.00													
0 + 520.000	20.00	0.80	1.50	30.00													
0 + 540.000	20.00	22.90	11.85	237.00													
Subtotal	577.86	258.20	238.85	4686.22													





COMPUTATION OF VOLUMES

KIKUYU JUNCTION : A Slip Road

STATION	DISTANCE	SOIL						WEATHERED ROCK						CUTTING						FILLING						
		SECTION		AVERAGE		VOLUME		SECTION		AVERAGE		VOLUME		SECTION		AVERAGE		VOLUME		SECTION		AVERAGE		VOLUME		
		(m2)	(m2)	(m2)	(m2)	(m3)	(m3)	(m2)	(m2)	(m2)	(m2)	(m3)	(m3)	(m2)	(m2)	(m2)	(m2)	(m2)	(m3)	(m3)	(m2)	(m2)	(m2)	(m2)	(m3)	(m3)
(28 + 244.064)																										
0 + 083.958		1.40																								
0 + 100.000	16.04	1.40	1.40	1.40	22.46																					
0 + 120.000	20.00	1.40	1.40	1.40	28.00																					
0 + 140.000	20.00	1.30	1.35	1.35	27.00																					
0 + 160.000	20.00	1.40	1.35	1.35	27.00																					
0 + 180.000	20.00	1.10	1.25	1.25	25.00																					
0 + 200.000	20.00	1.10	1.10	1.10	22.00																					
0 + 220.000	20.00	1.20	1.15	1.15	23.00																					
0 + 240.000	20.00	7.10	4.15	4.15	83.00																					
0 + 260.000	20.00	24.60	15.85	15.85	317.00																					
0 + 280.000	20.00	43.20	33.90	33.90	678.00																					
0 + 300.000	20.00	52.80	48.00	48.00	960.00																					
0 + 320.000	20.00	58.40	55.60	55.60	1112.00																					
0 + 340.000	20.00	59.10	58.75	58.75	1175.00																					
0 + 360.000	20.00	56.80	57.95	57.95	1159.00																					
0 + 365.819	5.82	58.80	57.80	57.80	336.34																					
0 + 380.000	14.18	59.20	59.00	59.00	836.68																					
0 + 400.000	20.00	49.10	54.15	54.15	1083.00																					
0 + 420.000	20.00	43.30	46.20	46.20	924.00																					
0 + 432.486	12.49	5.20	24.25	24.25	302.79																					
0 + 440.000	7.51	2.20	3.70	3.70	27.80																					
0 + 460.000	20.00	2.20	2.20	2.20	44.00																					
0 + 480.000	20.00	1.80	2.00	2.00	40.00																					
0 + 500.000	20.00	5.30	3.55	3.55	71.00																					
0 + 520.000	20.00	16.20	10.75	10.75	215.00																					
0 + 524.703	4.70	13.80	15.00	15.00	70.54																					
0 + 540.000	15.30	7.30	10.55	10.55	161.38																					
(0 + 550.147)																										
5 + 960.000	10.15	7.18	7.24	7.24	73.46																					
Subtotal	466.19	583.88	579.59	579.59	9844.46																					













CALCULATION OF THE AVERAGE HAULING DISTANCE FOR EACH MATERIAL TYPE AND GENERAL

No.	VOLUME V (m <sup>3</sup> )	MEAN HAUL		VOLUME RATES (%)				SOIL			WEATHERED ROCK			HARD ROCK		REMARKS
		DISTANCE, D (km)	SOIL	WEATHERED RED ROCK	HARD ROCK	Vs (m <sup>3</sup> )	Vs x D (m <sup>3</sup> .km)	Vwr (m <sup>3</sup> )	Vwr x D (m <sup>3</sup> .km)	Vhr (m <sup>3</sup> )	Vhr x D (m <sup>3</sup> .km)					
3	1,918.18	0.243	0.0	100.0	0.0	0.0	0.0	1,918.18	466.89	0.00	0.00	0.00	0.00	0.00	0.00	
4	2.62	0.006	0.0	100.0	0.0	0.0	0.0	2.62	0.02	0.00	0.00	0.00	0.00	0.00	0.00	
5	19,694.31	0.410	56.0	0.0	44.0	11,028.81	4,521.81	0.00	0.00	0.00	0.00	8,665.50	3,552.85	207.25	207.25	
18	14,803.48	1.000	50.3	48.3	1.4	7,446.15	7,446.15	7,150.08	18.05	18.80	18.80	1,421.00	18.05	5.81	0.52	
19	415.27	0.090	50.3	48.3	1.4	208.88	208.88	2,786.28	1.63	1.63	1.63	1.56	2.27	2.27	0.05	
20	5,768.69	0.510	50.3	48.3	1.4	2,901.65	1,479.84	2,786.28	81.39	81.39	81.39	1.56	2.27	2.27	0.05	
21	161.80	0.020	50.3	48.3	1.4	81.39	81.39	78.15	1.63	1.63	1.63	1.56	2.27	2.27	0.05	
22	2,703.44	0.160	50.3	48.3	1.4	1,359.83	217.57	1,305.76	217.57	1,305.76	217.57	208.92	37.85	37.85	6.06	
23	12,196.22	0.260	43.2	55.5	1.3	5,268.77	1,369.88	6,768.90	5,268.77	1,369.88	1,369.88	1,759.91	158.55	158.55	41.22	
24	17,279.25	0.150	41.0	51.8	7.2	7,084.49	1,062.67	8,950.65	1,062.67	1,062.67	1,062.67	1,342.60	1,244.11	1,244.11	186.62	
25	41,295.00	0.400	76.0	22.1	1.9	31,384.20	12,553.68	9,126.20	31,384.20	12,553.68	12,553.68	3,650.48	784.61	784.61	313.84	
26	2,260.51	0.073	76.0	22.1	1.9	1,717.99	126.07	499.57	1,717.99	126.07	126.07	36.66	42.95	42.95	3.15	
27	2,637.00	0.150	76.0	22.1	1.9	2,004.12	300.43	582.78	2,004.12	300.43	300.43	87.36	50.10	50.10	7.51	
28	2,792.52	0.600	76.0	22.1	1.9	2,122.32	1,273.39	617.15	2,122.32	1,273.39	1,273.39	370.29	53.06	53.06	31.83	
29	4,362.78	0.160	76.0	22.1	1.9	3,315.71	530.51	964.17	3,315.71	530.51	530.51	154.27	82.89	82.89	13.26	
30	189.09	0.140	76.0	22.1	1.9	143.71	20.12	41.79	143.71	20.12	20.12	5.85	3.59	3.59	0.50	
31	29.31	0.010	76.0	22.1	1.9	22.28	0.22	6.48	22.28	0.22	0.22	0.06	0.56	0.56	0.01	
32	364.87	0.030	76.0	22.1	1.9	277.30	8.32	80.64	277.30	8.32	8.32	2.42	6.93	6.93	0.21	
33	47,153.74	0.590	87.2	12.0	0.8	41,118.06	24,259.66	5,658.45	41,118.06	24,259.66	24,259.66	3,338.48	377.23	377.23	222.57	
34	17,296.79	0.150	87.2	12.0	0.8	15,082.80	2,262.42	2,075.61	15,082.80	2,262.42	2,262.42	311.34	138.37	138.37	20.76	
35	56,023.81	0.260	87.2	12.0	0.8	48,852.76	12,701.72	6,722.86	48,852.76	12,701.72	12,701.72	1,747.94	448.19	448.19	116.53	
36	457.66	0.140	78.6	21.4	0.0	359.72	50.36	97.94	359.72	50.36	50.36	13.71	0.00	0.00	0.00	
37	359.52	0.120	78.6	21.4	0.0	282.58	33.91	76.94	282.58	33.91	33.91	9.23	0.00	0.00	0.00	
38	5,364.22	0.380	78.6	21.4	0.0	4,216.28	1,602.19	1,147.94	4,216.28	1,602.19	1,602.19	436.22	0.00	0.00	0.00	
39	14,699.05	0.240	98.4	1.6	0.0	14,463.87	3,471.33	235.18	14,463.87	3,471.33	3,471.33	56.44	0.00	0.00	0.00	
40	19,592.10	0.490	98.4	1.6	0.0	19,278.63	9,446.53	313.47	19,278.63	9,446.53	9,446.53	153.60	0.00	0.00	0.00	
43	30,650.31	0.460	74.5	24.1	1.4	22,834.48	10,503.86	7,386.72	22,834.48	10,503.86	10,503.86	3,397.89	429.10	429.10	197.39	
44	7,866.88	0.220	96.6	3.4	0.0	7,599.41	1,671.87	267.47	7,599.41	1,671.87	1,671.87	58.84	0.00	0.00	0.00	
45	24,339.68	0.820	74.5	24.1	1.4	18,133.06	14,869.11	5,865.86	18,133.06	14,869.11	14,869.11	4,810.01	340.76	340.76	279.42	
47	58,304.52	0.710	99.8	0.2	0.0	58,187.91	41,313.42	116.61	58,187.91	41,313.42	41,313.42	82.79	0.00	0.00	0.00	
49	79,091.24	0.290	38.0	13.6	48.4	30,054.67	8,715.85	10,756.41	30,054.67	8,715.85	8,715.85	3,119.36	38,280.16	38,280.16	11,101.25	
50	388.73	0.040	100.0	0.0	0.0	388.73	15.55	0.00	388.73	15.55	15.55	0.00	0.00	0.00	0.00	
51	14,288.95	0.460	100.0	0.0	0.0	14,288.95	6,572.92	0.00	14,288.95	6,572.92	6,572.92	0.00	0.00	0.00	0.00	

CALCULATION OF THE AVERAGE HAULING DISTANCE FOR EACH MATERIAL TYPE AND GENERAL

No.	VOLUME V (m <sup>3</sup> )	MEAN HAUL DISTANCED (km)	VOLUME RATES (%)		SOIL			WEATHERED ROCK		HARD ROCK		REMARKS
			SOIL	WEATHE- RED ROCK	HARD ROCK	Vs (m <sup>3</sup> )	Vs x D (m <sup>3</sup> .km)	Vwr (m <sup>3</sup> )	Vwr x D (m <sup>3</sup> .km)	Vhr (m <sup>3</sup> )	Vhr x D (m <sup>3</sup> .km)	
52	71,986.21	1.000	84.3	15.7	0.0	60,684.38	60,684.38	11,301.83	11,301.83	0.00	0.00	
54	13,176.97	0.120	100.0	0.0	0.0	13,176.97	1,581.24	0.00	0.00	0.00	0.00	
57	2,170.37	0.100	99.9	0.1	0.0	2,168.20	216.82	2.17	0.22	0.00	0.00	
58	5,695.06	0.050	99.9	0.1	0.0	5,689.36	284.47	5.70	0.28	0.00	0.00	
59	1,808.37	0.270	99.9	0.1	0.0	1,806.56	487.77	1.81	0.49	0.00	0.00	
60	27,823.02	0.310	97.2	2.7	0.1	27,043.98	8,383.63	751.22	232.88	27.82	8.63	
61	4,001.74	0.920	99.9	0.1	0.0	3,997.74	3,677.92	4.00	3.68	0.00	0.00	
62	6,066.38	0.130	100.0	0.0	0.0	6,066.38	788.63	0.00	0.00	0.00	0.00	
63	82,582.12	0.250	85.8	14.2	0.1	70,836.64	17,709.16	11,695.71	2,923.93	49.78	12.44	
67	92,720.99	0.730	100.0	0.0	0.0	92,720.99	67,686.32	0.00	0.00	0.00	0.00	
68	4,362.00	0.030	100.0	0.0	0.0	4,362.00	130.86	0.00	0.00	0.00	0.00	
69	7,197.41	0.270	100.0	0.0	0.0	7,197.41	1,943.30	0.00	0.00	0.00	0.00	
70	2,353.04	0.100	100.0	0.0	0.0	2,353.04	235.30	0.00	0.00	0.00	0.00	
71	35.00	0.014	20.6	79.4	0.0	7.21	0.10	27.79	0.40	0.00	0.00	
72	1,050.00	0.049	20.6	79.4	0.0	216.30	10.51	833.70	40.49	0.00	0.00	
TOTAL	827,780.22					669,836.65	332,242.19	106,425.37	48,716.50	51,518.20	16,365.05	

SUMMARY:

<1000m	827,780.22					669,836.65	332,242.19	106,425.37	48,716.50	51,518.20	16,365.05	
>1000m	604,082.36	1.000				452,535.83	452,535.83	100,826.08	100,826.08	50,720.45	50,720.45	
CROSSFILL(*)	158,020.01	0.050				133,924.31	6,696.22	21,493.05	1,074.65	2,602.65	130.13	
MASS DIA-												
GRAM TOTAL	1,589,882.59					1,256,296.79	791,474.24	228,744.50	150,617.23	104,841.30	67,215.63	

AVERAGE HAULING DISTANCE FOR EACH MATERIAL (km)

						0.630km		0.658 km		0.641 km		
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GENERAL AVERAGE HAULING DISTANCE (km)

												0.635 km
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STATION	CUTTING VOLUMES										REMARKS HAUL NUMBERS
	SOIL			WEATHERED ROCK			HARD ROCK			TOTAL (100%) COMPACTED VOLUME (m3)	
	COMPACTED VOLUME (m3)	RATE (%)	COMPACTED VOLUME (m3)	RATE (%)	COMPACTED VOLUME (m3)	RATE (%)	COMPACTED VOLUME (m3)	RATE (%)	COMPACTED VOLUME (m3)		
0+080.000 - 0+800.000	1699.66	20.6	6560.26	79.4	0.00	0.0	0.00	0.0	8259.92	0.0	71.72
4+760.000 - 5+080.000	0.00	0.0	2565.40	100.0	0.00	0.0	0.00	0.0	2565.40	0.0	3.4
5+760.000 - 6+180.000	11400.87	56.0	0.00	0.0	8951.20	44.0	20352.07	5			
7+760.000 - 8+180.000	12471.23	50.3	11965.17	48.3	340.80	1.4	24777.20	17 - 22			
8+380.000 - 8+860.000	11230.61	43.2	14448.97	55.5	342.89	1.3	26022.47	23,15			
9+060.000 - 9+260.000	7581.06	41.0	9569.11	51.8	1328.65	7.2	18478.82	24			
9+783.604 - 12+860.000	199455.22	76.0	57914.35	22.1	4900.05	1.9	262269.63	9 - 14,16,25 - 32			
14+160.000 - 15+940.000	233745.22	87.2	32233.46	12.0	2103.56	0.8	268082.24	1.2, 6 - 8, 33 - 35			
15+960.000 - 16+180.000	48130.02	88.9	6008.00	11.1	2.40	0.0	54140.42	48			
16+200.000 - 16+320.000	16824.82	80.1	4116.00	19.6	57.60	0.3	20998.42	46			
16+340.000 - 16+820.000	10676.80	78.6	2911.30	21.4	0.00	0.0	13588.10	36 - 38, 42			
17+020.000 - 17+880.000	54192.79	98.4	900.75	1.6	0.00	0.0	55093.53	39 - 41			
18+560.000 - 18+980.000	41995.97	74.5	13574.45	24.1	794.40	1.4	56364.82	43, 45			
19+240.000 - 19+380.000	8322.44	96.6	296.00	3.4	0.00	0.0	8618.44	44			
19+740.000 - 20+120.000	58924.38	99.8	142.40	0.2	0.00	0.0	59066.78	47			
21+080.000 - 21+600.000	65975.42	38.0	23335.45	13.6	84046.76	48.4	173557.63	49,66			
21+620.000 - 22+380.000	92993.68	84.3	17374.98	15.7	0.00	0.0	110368.66	52, 53, 55, 56			
22+400.000 - 22+800.000	16126.80	100.0	0.00	0.0	0.00	0.0	16126.80	50, 51			
23+480.000 - 23+640.000	13882.63	100.0	0.00	0.0	0.00	0.0	13882.63	54			
23+920.000 - 24+380.000	17513.52	99.9	10.00	0.1	0.00	0.0	17523.52	57 - 59, 61, 65			
24+500.000 - 24+760.000	27333.20	97.2	772.00	2.7	12.00	0.1	28117.20	60			
25+180.000 - 25+360.000	9629.02	100.0	0.00	0.0	0.00	0.0	9629.02	62, 64			
25+500.000 - 26+220.000	71722.68	85.8	11842.00	14.2	50.40	0.1	83615.08	63			
26+540.000 - 28+416.085	138483.65	100.0	0.00	0.0	0.00	0.0	138483.65	67 - 70			
TOTAL	1170311.66	78.5	216740.04	14.5	102930.71	6.9	1489982.42				