

## COMPUTATION OF SUBGRADE VOLUMES

STATION	DISTANCE	SUBGRADE AREAS						CENTRAL RESERVE SECTION (m2)	SUBGRADE VOLUME				SUBGRADE DISTRIBUTION		ROCK FORMATION LEVELLING
		CARRIAGE ROAD		SHOULDER SECTION		SECTION (m2)	AVERAGE (m2)		VOLUME (m3)	FILL AREAS (m3)	CUT AREAS (m3)				
		LEFT SIDE WIDTH (m)	RIGHT SIDE WIDTH (m)	LEFT SIDE (m2)	RIGTH SIDE (m2)										
22 + 380.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16		(m2)		
22 + 400.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16				
22 + 420.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		76.97	62.19			
22 + 440.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		112.80	26.36			
22 + 460.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		105.17	33.99			
22 + 480.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		105.91	33.25			
22 + 500.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		69.58	69.58			
22 + 520.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		20.75	118.41			
22 + 540.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16				
22 + 560.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16				
22 + 580.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16				
22 + 600.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16				
22 + 620.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16				
22 + 640.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16				
22 + 660.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16				
22 + 680.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16				
22 + 700.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16				
22 + 720.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16				
22 + 740.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16				
22 + 760.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16				
22 + 780.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16				
22 + 800.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16				
22 + 820.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16				
22 + 840.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16				
22 + 860.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16				
22 + 880.000	20.000	7.00	7.00	0.747	0.854	1.050	6.85	6.90	138.09		138.09				
22 + 900.000	20.000	7.00	7.00	0.747	0.747	1.050	6.74	6.80	135.95		135.95				
22 + 920.000	20.000	7.00	7.00	0.747	0.747	1.050	6.74	6.74	134.88		134.88				
22 + 940.000	20.000	7.00	7.00	0.747	0.747	1.050	6.74	6.74	134.88		134.88				
22 + 960.000	20.000	7.00	7.00	0.747	0.747	1.050	6.74	6.74	134.88		134.88				
22 + 979.000	19.000	7.00	7.00	0.747	0.747	1.050	6.74	6.74	128.14		128.14				
23 + 000.000	21.000	7.00	7.00	0.747	0.747	1.050	6.74	6.74	141.62		141.62				

COMPUTATION OF SUBGRADE VOLUMES

MAIN ROAD

STATION	DISTANCE	SUBGRADE AREAS						CENTRAL RESERVE SECTION (m <sup>2</sup> )	SUBGRADE VOLUME			SUBGRADE DISTRIBUTION		ROCK FORMATION LEVELLING (m <sup>2</sup> )
		CARRIAGE ROAD		SHOULDER SECTION		SECTION (m <sup>2</sup> )	AVERAGE (m <sup>2</sup> )		VOLUME (m <sup>3</sup> )	FILL AREAS (m <sup>3</sup> )	CUT AREAS (m <sup>3</sup> )			
		LEFT SIDE WIDTH (m)	RIGHT SIDE WIDTH (m)	LEFT SIDE (m <sup>2</sup> )	RIGHT SIDE (m <sup>2</sup> )									
23 + 020.000	20.000	7.00	7.00	0.747	0.747	1.050	6.74	6.74	134.88	134.88				
23 + 040.000	20.000	7.00	7.00	0.747	0.747	1.050	6.74	6.74	134.88	134.88				
23 + 060.000	20.000	7.00	7.00	0.747	0.747	1.050	6.74	6.74	134.88	134.88				
23 + 080.000	20.000	7.00	7.00	0.747	0.747	1.050	6.74	6.74	134.88	134.88				
23 + 100.000	20.000	7.00	7.00	0.747	0.000	1.050	6.00	6.37	127.41	127.41				
23 + 120.000	20.000	7.00	7.00	0.747	0.000	1.050	6.00	6.00	119.94	119.94				
23 + 129.105	9.105	7.00	7.00	0.747	0.000	1.050	6.00	6.00	54.60	54.60				
23 + 140.000	10.895	7.00	7.00	0.747	0.747	1.050	6.74	6.37	69.41	69.41				
23 + 160.000	20.000	7.00	7.00	0.747	0.747	1.050	6.74	6.74	134.88	134.88				
23 + 180.000	20.000	7.00	7.00	0.747	0.747	1.050	6.74	6.74	134.88	134.88				
23 + 200.000	20.000	7.00	7.00	0.747	0.000	1.050	6.00	6.37	127.41	127.41				
23 + 220.000	20.000	7.00	7.00	0.000	0.000	1.050	5.25	5.62	112.47	112.47				
23 + 240.000	20.000	7.00	7.00	0.000	0.000	1.050	5.25	5.25	105.00	105.00				
23 + 260.000	20.000	7.00	7.00	0.000	0.000	1.050	5.25	5.25	105.00	105.00				
23 + 280.000	20.000	7.00	7.00	0.000	0.000	1.050	5.25	5.25	105.00	105.00				
23 + 300.000	20.000	7.00	7.00	0.000	0.000	1.050	5.25	5.25	105.00	105.00				
23 + 320.000	20.000	7.00	7.00	0.000	0.000	1.050	5.25	5.25	105.00	105.00				
23 + 340.000	20.000	7.00	7.00	0.000	0.000	1.050	5.25	5.25	105.00	105.00				
23 + 360.000	20.000	7.00	7.00	0.000	0.000	1.050	5.25	5.25	105.00	105.00				
23 + 380.000	20.000	7.00	7.00	0.000	0.000	1.050	5.25	5.25	105.00	105.00				
23 + 400.000	20.000	7.00	7.00	0.000	0.000	1.050	5.25	5.25	105.00	105.00				
23 + 404.000	4.000	7.00	7.00	0.000	0.000	1.050	5.25	5.25	21.00	21.00				
23 + 404.000	0.000	8.50	8.50	0.225	0.225	1.050	6.60	6.60						
23 + 420.000	16.000	8.50	8.50	0.225	0.225	1.050	6.60	6.60	105.60	105.60				
23 + 436.000	16.000	8.50	8.50	0.225	0.225	1.050	6.60	6.60	105.60	105.60				
23 + 436.000	0.000	7.00	7.00	0.000	0.000	1.050	5.25	5.25						
23 + 440.000	4.000	7.00	7.00	0.000	0.000	1.050	5.25	5.25	21.00	21.00				
23 + 460.000	20.000	7.00	7.00	0.000	0.000	1.050	5.25	5.25	105.00	105.00	3.60			
23 + 480.000	20.000	7.00	7.00	0.000	0.000	1.050	5.25	5.25	105.00	65.94	39.06			
23 + 500.000	20.000	7.00	7.00	0.000	0.000	1.050	5.25	5.25	105.00	9.90	95.10			
23 + 520.000	20.000	7.00	7.00	0.000	0.000	1.050	5.25	5.25	105.00		105.00			
23 + 540.000	20.000	7.00	7.00	0.000	0.000	1.050	5.25	5.25	105.00		105.00			

COMPUTATION OF SUBGRADE VOLUMES  
MAIN ROAD

STATION	DISTANCE	SUBGRADE AREAS				CENTRAL RESERVE SECTION (m <sup>2</sup> )	SUBGRADE VOLUME			SUBGRADE DISTRIBUTION		ROCK FORMATION LEVELLING (m <sup>2</sup> )
		LEFT SIDE WIDTH (m)	RIGHT SIDE WIDTH (m)	LEFT SIDE (m <sup>2</sup> )	RIGHT SIDE (m <sup>2</sup> )		SECTION (m <sup>2</sup> )	AVERAGE (m <sup>2</sup> )	VOLUME (m <sup>3</sup> )	FILL AREAS (m <sup>3</sup> )	CUT AREAS (m <sup>3</sup> )	
23 + 560,000	20,000	7.00	7.00	0.000	0.854	1.050	6.10	5.68	113.54		113.54	
23 + 580,000	20,000	7.00	7.00	0.000	0.854	1.050	6.10	6.10	122.08		122.08	
23 + 600,000	20,000	7.00	7.00	0.000	0.854	1.050	6.10	6.10	122.08		122.08	
23 + 620,000	20,000	7.00	7.00	0.000	0.854	1.050	6.10	6.10	122.08		122.08	
23 + 640,000	20,000	7.00	7.00	0.000	0.854	1.050	6.10	6.10	122.08		122.08	
23 + 652,373	12,373	7.00	7.00	0.747	0.854	1.050	6.85	6.48	80.15		80.15	
23 + 660,000	7,627	7.00	7.00	0.747	0.854	1.050	6.85	6.85	52.25		52.25	
23 + 680,000	20,000	7.00	7.00	0.747	0.854	1.050	6.74	6.80	135.95		135.95	
23 + 700,000	20,000	7.00	7.00	0.747	0.854	1.050	6.74	6.74	134.88		134.88	
23 + 720,000	20,000	7.00	7.00	0.747	0.854	1.050	6.74	6.74	134.88		134.88	
23 + 740,000	20,000	7.00	7.00	0.747	0.854	1.050	6.74	6.74	134.88		134.88	
23 + 760,000	20,000	7.00	7.00	0.747	0.854	1.050	6.74	6.74	134.88		134.88	
23 + 780,000	20,000	7.00	7.00	0.747	0.854	1.050	6.74	6.74	134.88		134.88	
23 + 800,000	20,000	7.00	7.00	0.747	0.854	1.050	6.74	6.74	134.88		134.88	
23 + 820,000	20,000	7.00	7.00	0.747	0.854	1.050	6.74	6.74	134.88		134.88	
23 + 840,000	20,000	7.00	7.00	0.747	0.854	1.050	6.74	6.74	134.88		134.88	
23 + 860,000	20,000	7.00	7.00	0.747	0.854	1.050	6.74	6.74	134.88		134.88	
23 + 880,000	20,000	7.00	7.00	0.747	0.854	1.050	6.74	6.74	134.88		134.88	
23 + 900,000	20,000	7.00	7.00	0.854	0.854	1.050	6.96	6.85	137.02		137.02	
23 + 920,000	20,000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16	
23 + 940,000	20,000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16	
23 + 960,000	20,000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16	
23 + 980,000	20,000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16	
24 + 000,000	20,000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16	
24 + 020,000	20,000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16	
24 + 040,000	20,000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16	
24 + 060,000	20,000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16	
24 + 080,000	20,000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16	
24 + 083,917	3,917	7.00	7.00	0.854	0.854	1.050	6.96	6.96	27.25		27.25	
24 + 100,000	16,083	7.00	7.00	0.854	0.854	1.050	6.96	6.96	111.91		111.91	
24 + 120,000	20,000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16	
24 + 140,000	20,000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16	

COMPUTATION OF SUBGRADE VOLUMES  
MAIN ROAD

STATION	DISTANCE	SUBGRADE AREAS						SUBGRADE VOLUME				SUBGRADE DISTRIBUTION		ROCK FORMATION LEVELLING (m2)
		CARRIAGE ROAD		SHOULDER SECTION		CENTRAL RESERVE SECTION (m2)	SECTION (m2)	AVERAGE (m2)	VOLUME (m3)	FILL AREAS (m3)	CUT AREAS (m3)			
		LEFT SIDE WIDTH (m)	RIGHT SIDE WIDTH (m)	LEFT SIDE (m2)	RIGHT SIDE (m2)									
24 + 160.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
24 + 180.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
24 + 200.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
24 + 220.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
24 + 240.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
24 + 260.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
24 + 280.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
24 + 297.250	17.250	7.00	7.00	0.854	0.854	1.050	6.96	6.96	120.03	6.87	113.15			
24 + 300.000	2.750	7.00	7.00	0.854	0.854	1.050	6.96	6.96	19.13	19.13				
24 + 320.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	139.16				
24 + 340.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	139.16				
24 + 360.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	139.16				
24 + 380.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	139.16				
24 + 400.000	20.000	7.00	7.00	0.854	0.854	1.050	6.85	6.90	138.09	138.09				
24 + 420.000	20.000	7.00	7.00	0.747	0.747	1.050	6.74	6.80	135.95	135.95				
24 + 440.000	20.000	7.00	7.00	0.747	0.747	1.050	6.74	6.74	134.88	134.88				
24 + 460.000	20.000	7.00	7.00	0.747	0.747	1.050	6.74	6.74	134.88	134.88				
24 + 480.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.85	137.02	137.02				
24 + 500.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	123.22	15.94			
24 + 520.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
24 + 540.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
24 + 560.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
24 + 580.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
24 + 600.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
24 + 620.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
24 + 640.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
24 + 660.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
24 + 680.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
24 + 700.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
24 + 720.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
24 + 740.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
24 + 760.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	12.50	7.40			

COMPUTATION OF SUBGRADE VOLUMES

MAIN ROAD

STATION	DISTANCE	SUBGRADE AREAS					SUBGRADE VOLUME				SUBGRADE DISTRIBUTION		ROCK FORMATION LEVELLING (m2)
		CARRIAGE ROAD		SHOULDER SECTION		CENTRAL RESERVE SECTION (m2)	SECTION (m2)	AVERAGE (m2)	VOLUME (m3)	FILL AREAS (m3)	CUT AREAS (m3)		
		LEFT SIDE WIDTH (m)	RIGHT SIDE WIDTH (m)	LEFT SIDE (m2)	RIGHT SIDE (m2)								
24 + 780.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	139.16			
24 + 800.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	139.16			
24 + 820.000	20.000	7.00	7.00	0.747	0.854	1.050	6.85	6.90	138.09	138.09			
24 + 840.000	20.000	7.00	7.00	0.747	0.854	1.050	6.85	6.85	137.02	137.02			
24 + 860.000	20.000	7.00	7.00	0.747	0.854	1.050	6.85	6.85	137.02	137.02			
24 + 880.000	20.000	7.00	7.00	0.747	0.854	1.050	6.85	6.85	137.02	137.02			
24 + 900.000	20.000	7.00	7.00	0.747	0.854	1.050	6.85	6.85	137.02	137.02			
24 + 920.000	20.000	7.00	7.00	0.747	0.854	1.050	6.85	6.85	137.02	137.02			
24 + 940.000	20.000	7.00	7.00	0.747	0.747	1.050	6.74	6.80	135.95	135.95			
24 + 960.000	20.000	7.00	7.00	0.747	0.747	1.050	6.74	6.74	134.88	134.88			
24 + 980.000	20.000	7.00	7.00	0.747	0.747	1.050	6.74	6.74	134.88	134.88			
25 + 000.000	20.000	7.00	7.00	0.747	0.747	1.050	6.74	6.74	134.88	134.88			
25 + 020.000	20.000	7.00	7.00	0.747	0.747	1.050	6.74	6.74	134.88	134.88			
25 + 024.729	14.729	7.00	7.00	0.747	0.747	1.050	6.74	6.74	99.33	99.33			
25 + 040.000	5.271	7.00	7.00	0.747	0.747	1.050	6.74	6.74	35.55	35.55			
25 + 060.000	20.000	7.00	7.00	0.747	0.747	1.050	6.74	6.74	134.88	134.88			
25 + 080.000	20.000	7.00	7.00	0.747	0.854	1.050	6.85	6.80	135.95	135.95			
25 + 100.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.90	138.09	138.09			
25 + 120.000	20.000	7.00	7.00	0.000	0.000	1.050	5.25	6.10	122.08	122.08			
25 + 140.000	20.000	7.00	7.00	0.000	0.000	1.050	5.25	5.25	105.00	105.00			
25 + 160.000	20.000	7.00	7.00	0.000	0.000	1.050	5.25	5.25	105.00	105.00			
25 + 180.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.10	122.08	122.08			
25 + 200.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	139.16			
25 + 220.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	139.16			
25 + 240.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	139.16			
25 + 248.062	8.062	7.00	7.00	0.854	0.854	1.050	6.96	6.96	56.10	56.10			
25 + 260.000	11.938	7.00	7.00	0.854	0.854	1.050	6.96	6.96	83.06	83.06			
25 + 280.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	139.16			
25 + 300.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	139.16			
25 + 320.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	139.16			
25 + 340.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	139.16			
25 + 360.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	139.16	104.68		

COMPUTATION OF SUBGRADE VOLUMES

MAIN ROAD

STATION	DISTANCE	SUBGRADE AREAS						SUBGRADE VOLUME				SUBGRADE DISTRIBUTION		ROCK FORMATION LEVELLING (m2)
		CARRIAGE ROAD		SHOULDER SECTION		CENTRAL RESERVE SECTION (m2)	SECTION (m2)	AVERAGE (m2)	VOLUME (m3)	FILL AREAS (m3)	CUT AREAS (m3)			
		LEFT SIDE WIDTH (m)	RIGHT SIDE WIDTH (m)	LEFT SIDE (m2)	RIGHT SIDE (m2)									
25 + 380.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	139.16				
25 + 400.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	139.16				
25 + 420.000	20.000	7.00	7.00	0.854	0.747	1.050	6.85	6.90	138.09	138.09				
25 + 440.000	20.000	7.00	7.00	0.747	0.747	1.050	6.74	6.80	135.95	135.95				
25 + 460.000	20.000	7.00	7.00	0.747	0.747	1.050	6.74	6.74	134.88	134.88				
25 + 480.000	20.000	7.00	7.00	0.747	0.854	1.050	6.85	6.80	135.95	124.57	11.38			
25 + 500.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.90	138.09		138.09			
25 + 520.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
25 + 540.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
25 + 560.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
25 + 580.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
25 + 600.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
25 + 620.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
25 + 640.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
25 + 660.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
25 + 680.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
25 + 700.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
25 + 720.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
25 + 740.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
25 + 760.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
25 + 780.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
25 + 800.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
25 + 820.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
25 + 840.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
25 + 860.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
25 + 880.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
25 + 900.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
25 + 920.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
25 + 940.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
25 + 960.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16			
25 + 977.161	17.161	7.00	7.00	0.854	0.854	1.050	6.96	6.96	119.41		119.41			
25 + 980.000	2.839	7.00	7.00	0.854	0.854	1.050	6.96	6.96	19.75		19.75			

COMPUTATION OF SUBGRADE VOLUMES

MAIN ROAD

STATION	DISTANCE	SUBGRADE AREAS				CENTRAL RESERVE SECTION (m <sup>2</sup> )	SUBGRADE VOLUME			SUBGRADE DISTRIBUTION		ROCK FORMATION LEVELLING (m <sup>2</sup> )
		CARRIAGE ROAD		SHOULDER SECTION			SECTION (m <sup>2</sup> )	AVERAGE (m <sup>2</sup> )	VOLUME (m <sup>3</sup> )	FILL AREAS (m <sup>3</sup> )	CUT AREAS (m <sup>3</sup> )	
		LEFT SIDE WIDTH (m)	RIGHT SIDE WIDTH (m)	LEFT SIDE (m <sup>2</sup> )	RIGHT SIDE (m <sup>2</sup> )							
26 + 000.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16	
26 + 020.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16	
26 + 040.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16	
26 + 060.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16	
26 + 080.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16	
26 + 100.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16	
26 + 120.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16	
26 + 140.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16	
26 + 160.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16	
26 + 180.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16	
26 + 200.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16	
26 + 220.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16	
26 + 240.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16	
26 + 260.000	20.000	7.00	7.00	0.854	0.747	1.050	6.85	6.90	138.09		138.09	
26 + 280.000	20.000	7.00	7.00	0.747	0.747	1.050	6.74	6.80	135.95		135.95	
26 + 300.000	20.000	7.00	7.00	0.747	0.747	1.050	6.74	6.74	134.88		134.88	
26 + 320.000	20.000	7.00	7.00	0.747	0.747	1.050	6.74	6.74	134.88		134.88	
26 + 340.000	20.000	7.00	7.00	0.747	0.747	1.050	6.74	6.74	134.88		134.88	
26 + 360.000	20.000	7.00	7.00	0.747	0.747	1.050	6.74	6.74	134.88		134.88	
26 + 380.000	20.000	7.00	7.00	0.747	0.747	1.050	6.00	6.37	127.41		127.41	
26 + 400.000	20.000	7.00	7.00	0.747	0.747	1.050	6.00	6.00	119.94		119.94	
26 + 420.000	20.000	7.00	7.00	0.747	0.747	1.050	6.00	6.00	119.94		119.94	
26 + 440.000	20.000	7.00	7.00	0.747	0.747	1.050	6.00	6.00	119.94		119.94	
26 + 460.000	20.000	7.00	7.00	0.747	0.747	1.050	6.00	6.00	119.94		119.94	
26 + 480.000	20.000	7.00	7.00	0.747	0.747	1.050	6.00	6.00	119.94		119.94	
26 + 500.000	20.000	7.00	7.00	0.747	0.747	1.050	6.00	6.00	119.94		119.94	
26 + 520.000	20.000	7.00	7.00	0.747	0.747	1.050	6.00	6.00	119.94		119.94	
26 + 540.000	20.000	7.00	7.00	0.854	0.854	1.050	6.10	6.05	121.01	60.51		60.51
26 + 560.000	20.000	7.00	7.00	0.854	0.854	1.050	6.10	6.10	122.08		122.08	
26 + 580.000	20.000	7.00	7.00	0.854	0.854	1.050	6.10	6.10	122.08		122.08	
26 + 584.000	4.000	7.00	7.00	0.854	0.000	1.050	6.10	6.10	24.42		24.42	
26 + 584.000	0.000	7.00	8.50	0.854	0.225	1.050	6.78					

COMPUTATION OF SUBGRADE VOLUMES

MAIN ROAD

STATION	DISTANCE	SUBGRADE AREAS				SUBGRADE VOLUME			SUBGRADE DISTRIBUTION		ROCK FORMATION LEVELLING	
		CARRIAGE ROAD		SHOULDER SECTION		CENTRAL RESERVE SECTION	SECTION	AVERAGE	VOLUME	FILL AREAS		CUT AREAS
		LEFT SIDE WIDTH (m)	RIGHT SIDE WIDTH (m)	LEFT SIDE (m <sup>2</sup> )	RIGTH SIDE (m <sup>2</sup> )							
26 + 600.000	16.000	7.00	8.50	0.854	0.225	1.050	6.78	6.78	108.46		108.46	(m <sup>2</sup> )
26 + 616.000	16.000	7.00	8.50	0.854	0.225	1.050	6.78	6.78	108.46		108.46	
26 + 616.000	0.000	7.00	7.00	0.854	0.000	1.050	6.10					
26 + 620.000	4.000	7.00	7.00	0.854	0.000	1.050	6.10	6.10	24.42		24.42	
26 + 640.000	20.000	7.00	7.00	0.854	0.000	1.050	6.10	6.10	122.08		122.08	
26 + 660.000	20.000	7.00	7.00	0.854	0.000	1.050	6.10	6.10	122.08		122.08	
26 + 680.000	20.000	7.00	7.00	0.854	0.000	1.050	6.10	6.10	122.08		122.08	
26 + 700.000	20.000	7.00	7.00	0.854	0.000	1.050	6.10	6.10	122.08		122.08	
26 + 720.000	20.000	7.00	7.00	0.854	0.000	1.050	6.10	6.10	122.08		122.08	
26 + 740.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.53	130.62		130.62	
26 + 760.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16	
26 + 780.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	8.04	131.12	
26 + 800.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	29.43	109.73	
26 + 820.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	45.36	93.80	
26 + 840.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	30.52	108.64	
26 + 860.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	35.25	103.91	
26 + 880.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	45.36	93.80	
26 + 900.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16		139.16	
26 + 920.000	20.000	7.00	7.00	0.854	0.854	1.170	7.08	7.02	140.36	19.88	120.48	
26 + 940.000	20.000	7.00	7.00	0.854	0.854	1.290	7.20	7.14	142.76		142.76	
26 + 945.157	5.157	7.00	7.00	0.854	0.854	1.321	7.23	7.21	37.20		37.20	
26 + 960.000	14.843	7.00	7.00	0.854	0.854	1.410	7.32	7.27	107.96		107.96	
26 + 980.000	20.000	7.00	7.00	0.854	0.854	1.530	7.44	7.38	147.56	1.84	145.72	
27 + 000.000	20.000	7.00	7.00	0.854	0.854	1.650	7.56	7.50	149.96		149.96	
27 + 020.000	20.000	7.00	7.00	0.854	0.854	1.650	7.56	7.56	151.16		151.16	
27 + 040.000	20.000	7.00	7.00	0.854	0.854	1.650	7.56	7.56	151.16		151.16	
27 + 060.000	20.000	7.00	7.00	0.854	0.854	1.530	7.44	7.50	149.96		149.96	
27 + 080.000	20.000	7.00	7.00	0.000	0.000	1.410	5.61	6.52	130.48		130.48	
27 + 100.000	20.000	7.00	7.00	0.000	0.000	1.290	5.49	5.55	111.00		111.00	
27 + 120.000	20.000	7.00	7.00	0.000	0.000	1.170	5.37	5.43	108.60		108.60	
27 + 140.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.16	123.28		123.28	
27 + 160.000	20.000	7.00	7.00	0.000	0.854	1.050	6.10	6.53	130.62		130.62	



## COMPUTATION OF SUBGRADE VOLUMES

MAIN ROAD

STATION	DISTANCE	SUBGRADE AREAS					CENTRAL RESERVE SECTION (m2)	SUBGRADE VOLUME				SUBGRADE DISTRIBUTION		ROCK FORMATION LEVELLING (m2)
		CARRIAGE ROAD		SHOULDER SECTION		SECTION (m2)		AVERAGE (m2)	VOLUME (m3)	FILL AREAS (m3)	CUT AREAS (m3)			
		LEFT SIDE WIDTH (m)	RIGHT SIDE WIDTH (m)	LEFT SIDE (m2)	RIGH T SIDE (m2)									
27 + 180.000	20.000	7.00	7.00	0.000	0.854	1.050	6.10	6.10	122.08		122.08			
27 + 200.000	20.000	7.00	7.00	0.000	0.854	1.050	6.10	6.10	122.08		122.08			
27 + 220.000	20.000	7.00	7.00	0.000	0.854	1.050	6.10	6.10	122.08		122.08			
27 + 240.000	20.000	7.00	7.00	0.000	0.854	1.050	6.10	6.10	122.08		122.08			
27 + 254.000	14.000	7.00	7.00	0.000	0.854	1.050	6.10	6.10	85.46		85.46			
27 + 254.000	0.000	8.50	7.00	0.225	0.854	1.050	6.78	6.78						
27 + 260.000	6.000	8.50	7.00	0.225	0.854	1.050	6.78	6.78	40.67		40.67			
27 + 280.000	20.000	8.50	7.00	0.225	0.854	1.050	6.78	6.78	135.58		135.58			
27 + 286.000	6.000	8.50	7.00	0.225	0.854	1.050	6.78	6.78	40.67		40.67			
27 + 286.000	0.000	7.00	7.00	0.000	0.854	1.050	6.10	6.10						
27 + 300.000	14.000	7.00	7.00	0.000	0.854	1.050	6.10	6.10	85.46		85.46			
27 + 320.000	20.000	7.00	7.00	0.000	0.854	1.050	6.10	6.10	122.08	8.85	113.23			
27 + 340.000	20.000	7.00	7.00	0.000	0.854	1.050	6.10	6.10	122.08	12.07	110.01			
27 + 360.000	20.000	7.00	7.00	0.000	0.854	1.050	6.10	6.10	122.08	20.89	101.19			
27 + 380.000	20.000	7.00	7.00	0.000	0.854	1.050	6.10	6.10	122.08	21.21	100.87			
27 + 400.000	20.000	7.00	7.00	0.000	0.854	1.050	6.10	6.10	122.08	19.03	103.05			
27 + 420.000	20.000	7.00	7.00	0.000	0.854	1.050	6.10	6.10	122.08	23.74	98.34			
27 + 440.000	20.000	7.00	7.00	0.000	0.854	1.050	6.10	6.10	122.08	20.69	101.39			
27 + 460.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	130.62	20.32	110.30			
27 + 480.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	21.46	117.70			
27 + 500.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	27.71	111.45			
27 + 520.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	14.04	125.12			
27 + 540.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	12.26	126.90			
27 + 560.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	29.56	109.60			
27 + 580.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	67.24	71.92			
27 + 600.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	42.91	96.25			
27 + 620.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	80.92	58.24			
27 + 640.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	79.79	59.37			
27 + 660.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	80.40	58.76			
27 + 669.800	9.800	7.00	7.00	0.854	0.854	1.050	6.96	6.96	68.19	39.83	28.36			
27 + 680.000	10.200	7.00	7.00	0.854	0.854	1.050	6.96	6.96	70.97	38.00	32.97			
27 + 700.000	20.000	7.00	7.00	0.854	0.854	1.050	6.96	6.96	139.16	78.82	60.34			

COMPUTATION OF SUBGRADE VOLUMES

— MAIN ROAD

STATION	DISTANCE	SUBGRADE AREAS					CENTRAL RESERVE SECTION (m2)	SUBGRADE VOLUME			SUBGRADE DISTRIBUTION		ROCK FORMATION LEVELLING (m2)
		CARRIAGE ROAD		SHOULDER SECTION		SECTION (m2)		AVERAGE (m2)	VOLUME (m3)	FILL AREAS (m3)	CUT AREAS (m3)		
		LEFT SIDE WIDTH (m)	RIGHT SIDE WIDTH (m)	LEFT SIDE (m2)	RIGTH SIDE (m2)								
27 + 720.000	20.000	7.00	7.00	0.854	0.854	0.854	1.050	6.96	139.16	77.38	61.78		
27 + 740.000	20.000	7.00	7.00	0.854	0.854	0.854	1.050	6.96	139.16	67.12	72.04		
27 + 760.000	20.000	7.00	7.00	0.854	0.854	0.854	1.050	6.96	139.16	64.04	75.12		
27 + 780.000	20.000	7.00	7.00	0.854	0.854	0.854	1.050	6.96	139.16	47.61	91.55		
27 + 800.000	20.000	7.00	7.00	0.854	0.854	0.854	1.050	6.96	139.16	26.36	112.80		
27 + 820.000	20.000	7.00	7.00	0.854	0.854	0.854	1.050	6.96	139.16		139.16		
27 + 829.800	9.800	7.00	7.00	0.854	0.854	0.854	1.050	6.96	68.19		68.19		
27 + 840.000	10.200	7.00	7.00	0.854	0.854	0.854	1.050	6.96	70.97		70.97		
27 + 860.000	20.000	7.00	7.00	0.854	0.854	0.854	1.050	6.96	139.16		139.16		
27 + 880.000	20.000	7.00	7.00	0.854	0.854	0.854	1.050	6.96	139.16		139.16		
27 + 900.000	20.000	7.00	7.00	0.854	0.854	0.854	1.050	6.96	139.16		139.16		
27 + 920.000	20.000	7.00	7.00	0.854	0.854	0.854	1.050	6.96	139.16		139.16		
27 + 940.000	20.000	7.00	7.00	0.854	0.854	0.854	1.050	6.96	139.16		139.16		
27 + 960.000	20.000	7.00	7.00	0.854	0.854	0.854	1.050	6.96	139.16		139.16		
27 + 980.000	20.000	7.00	7.00	0.854	0.854	0.854	1.050	6.96	139.16		139.16		
28 + 000.000	20.000	7.00	7.00	0.854	0.854	0.854	1.050	6.96	139.16		139.16		
28 + 020.000	20.000	7.00	7.00	0.854	0.854	0.854	1.050	6.96	139.16		139.16		
28 + 040.000	20.000	7.00	7.00	0.854	0.854	0.854	1.050	6.96	139.16		139.16		
28 + 060.000	20.000	7.00	7.00	0.854	0.854	0.854	1.050	6.96	139.16	39.76	99.40		
28 + 080.000	20.000	7.00	7.00	0.854	0.854	0.854	1.050	6.96	139.16	61.11	78.05		
28 + 100.000	20.000	7.00	7.00	0.747	0.747	0.854	1.050	6.85	138.09	40.40	97.69		
28 + 110.000	10.000	7.00	7.00	0.747	0.747	0.854	1.050	6.85	68.51	24.90	43.61		
28 + 110.000	0.000	7.00	8.50	0.747	0.747	0.225	1.050	6.67					
28 + 120.000	10.000	7.00	8.50	0.747	0.747	0.225	1.050	6.67	66.72	29.06	37.66		
28 + 120.000	0.000	7.00	14.00	0.747	0.747	0.854	1.050	8.95					
28 + 140.000	20.000	7.00	12.73	0.747	0.747	0.854	1.050	8.57	175.21	77.67	97.54		
28 + 160.000	20.000	7.00	11.46	0.747	0.747	0.747	1.050	8.08	166.52	67.44	99.08		
28 + 160.738	0.738	7.00	11.41	0.747	0.747	0.747	1.050	8.07	5.96	2.41	3.54		
28 + 180.000	19.262	7.81	10.18	0.747	0.747	0.747	1.050	7.94	154.17	61.78	92.39		
28 + 200.000	20.000	8.65	7.91	0.747	0.747	0.747	1.050	7.51	154.53	69.37	85.16		
28 + 220.000	20.000	9.49	7.64	0.747	0.747	0.747	1.050	7.68	151.95	70.65	81.30		
28 + 240.000	20.000	10.33	7.00	0.747	0.747	0.854	1.050	7.85	155.33	84.14	71.19		

COMPUTATION OF SUBGRADE VOLUMES

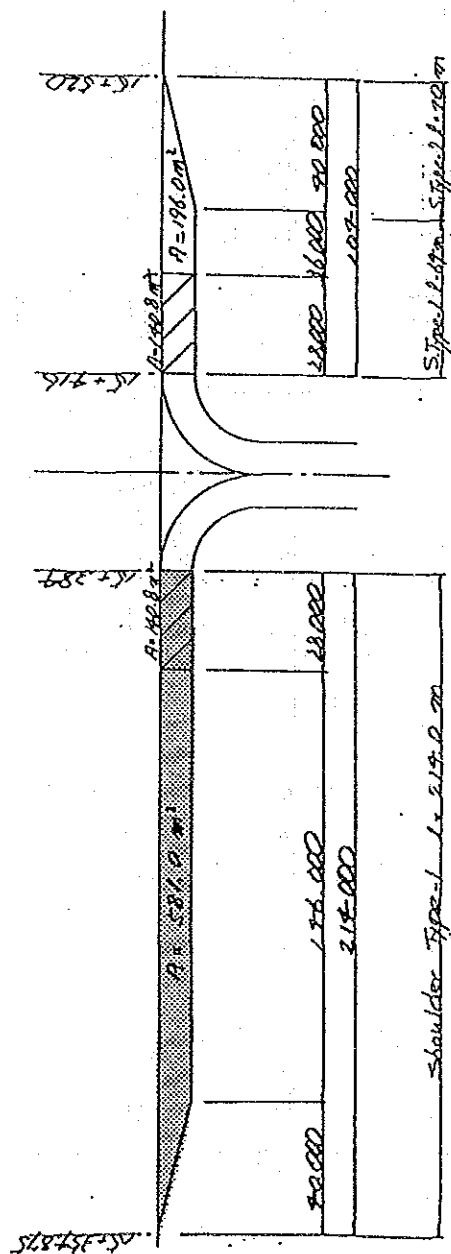
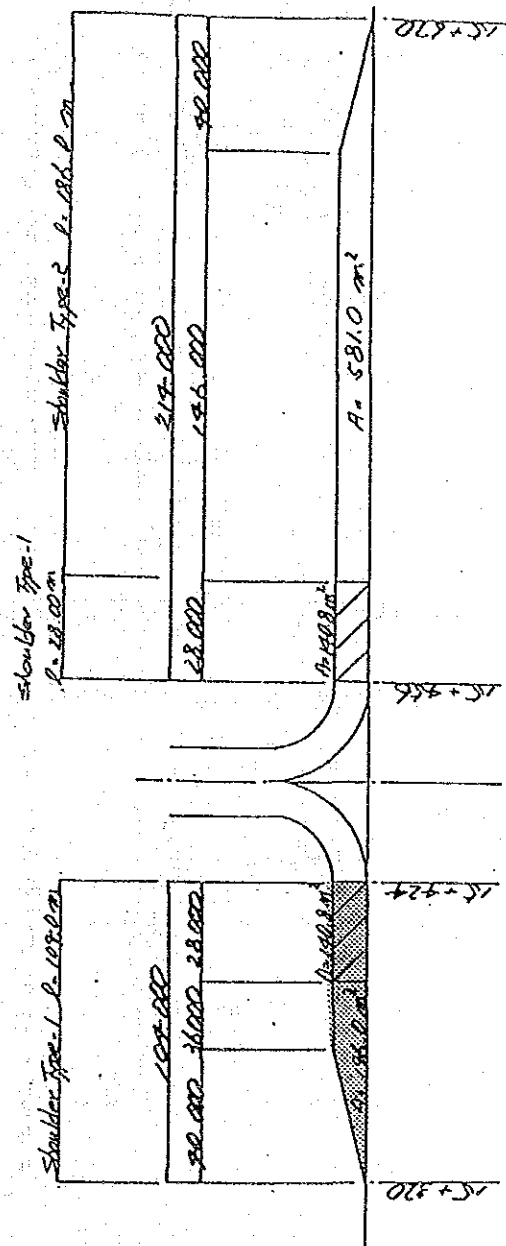
MAIN ROAD

STATION	DISTANCE	SUBGRADE AREAS						SUBGRADE VOLUME				SUBGRADE DISTRIBUTION		ROCK FORMATION LEVELLING
		CARRIAGE ROAD		SHOULDER SECTION		CENTRAL RESERVE SECTION	SECTION	AVERAGE	VOLUME	FILL AREAS	CUT AREAS			
		LEFT SIDE WIDTH (m)	RIGHT SIDE WIDTH (m)	LEFT SIDE (m <sup>2</sup> )	RIGHT SIDE (m <sup>2</sup> )									
28 + 244.064	4.064	10.50	7.00	0.747	0.854	1.050	7.90	7.88	32.01	16.23	15.78	(m <sup>2</sup> )		
28 + 244.064	0.000	5.00	7.00	0.225	0.854	1.050	5.73	5.73	57.29	24.40	32.89			
28 + 254.064	10.000	5.00	7.00	0.225	0.854	1.050	5.73	5.73						
28 + 254.064	0.000	3.50	7.00	0.747	0.854	1.050	5.80	5.80						
28 + 260.000	5.936	3.50	7.00	0.747	0.854	1.050	5.80	5.80	34.43	12.49	21.95			
28 + 280.000	20.000	3.50	7.00	0.747	0.854	1.050	5.80	5.80	116.02	37.68	78.34			
28 + 289.489	9.489	3.50	7.00	0.747	0.854	1.050	5.80	5.80	55.05	16.26	38.79			
28 + 298.146	8.657	3.50	7.00	0.747	0.854	1.050	5.80	5.80	50.22	17.39	32.83			
28 + 300.000	1.854	3.50	7.08	0.747	0.854	1.050	5.83	5.81	10.78	3.85	6.93			
28 + 320.000	20.000	3.50	7.94	0.747	0.854	1.050	6.08	5.95	119.08	34.02	85.06			
28 + 333.000	13.000	3.50	8.50	0.747	0.854	1.050	6.25	6.17	80.17	32.45	47.72			
28 + 333.000	0.000	3.50	5.00	0.747	0.225	1.050	4.57							
28 + 340.000	7.000	3.50	5.00	0.747	0.225	1.050	4.57	4.57	32.00	15.80	16.21			
28 + 343.000	3.000	3.50	5.00	0.854	0.225	1.050	4.68	4.63	13.88	7.64	6.24			
28 + 343.000	0.000	3.50	3.50	0.854	0.854	1.050	4.86							
28 + 360.000	17.000	3.50	3.50	0.854	0.854	1.050	4.86	4.86	82.59	71.30	11.29			
28 + 380.000	20.000	3.50	3.50	0.854	0.854	1.050	4.86	4.86	97.16	31.53	65.63			
28 + 380.000	0.000	5.20	5.20	0.854	0.854		4.83							
28 + 400.000	20.000	4.26	4.26	0.854	0.854		4.26	4.55	90.92	31.28	59.64			
28 + 416.085	16.085	3.50	3.50	0.854	0.854		3.81	4.04	64.92		64.92			
Total	28600.960			1246.113	1248.970	1776.302	11084.670	10806.215	196845.668	99711.800	75225.068	72082.691		



# COMPUTATION OF SUBGRADE

## NGONG ROAD JUNCTION (ACCELERATION & DECELERATION LANES)

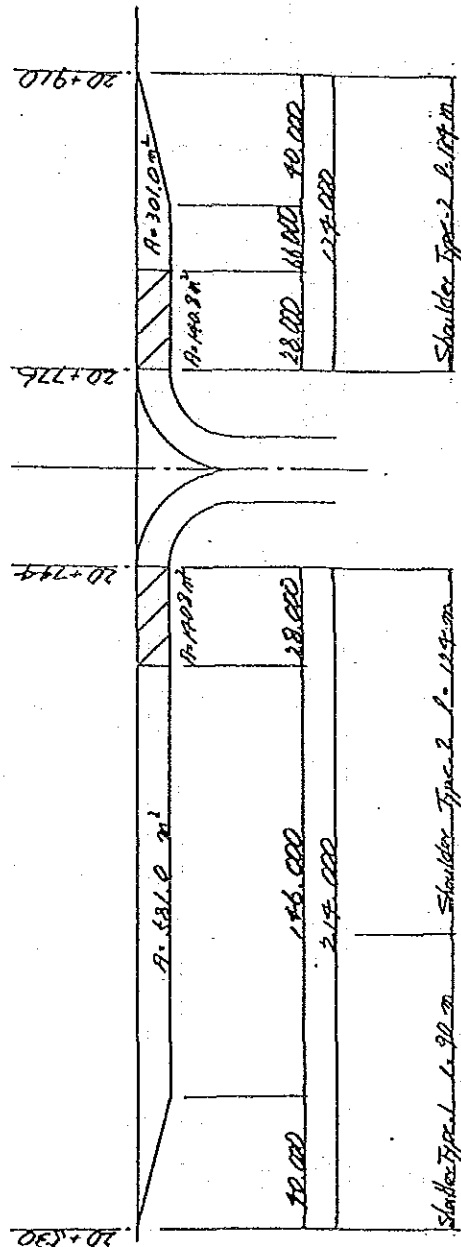
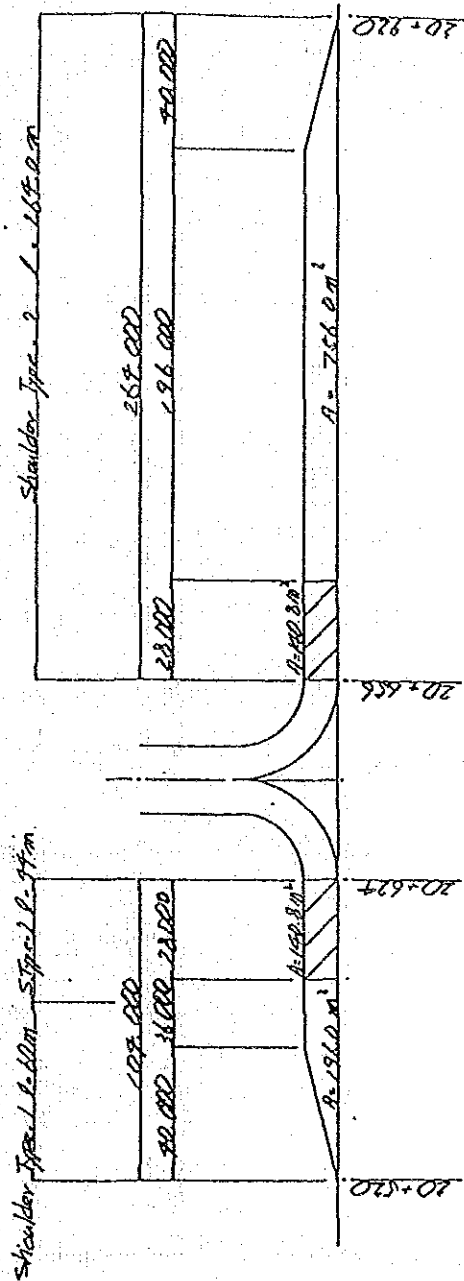


SUBGRADE IN CUT AREAS:  $1058.6m^2 \times 0.3m + (104 + 214)m \times 0.854m^2 = 589.152m^3$

IN FILL AREAS:  $1058.6m^2 \times 0.3m + 0.854m^2 \times 64m + 0.747m^2 \times (186 + 40)m = 541.058m^3$

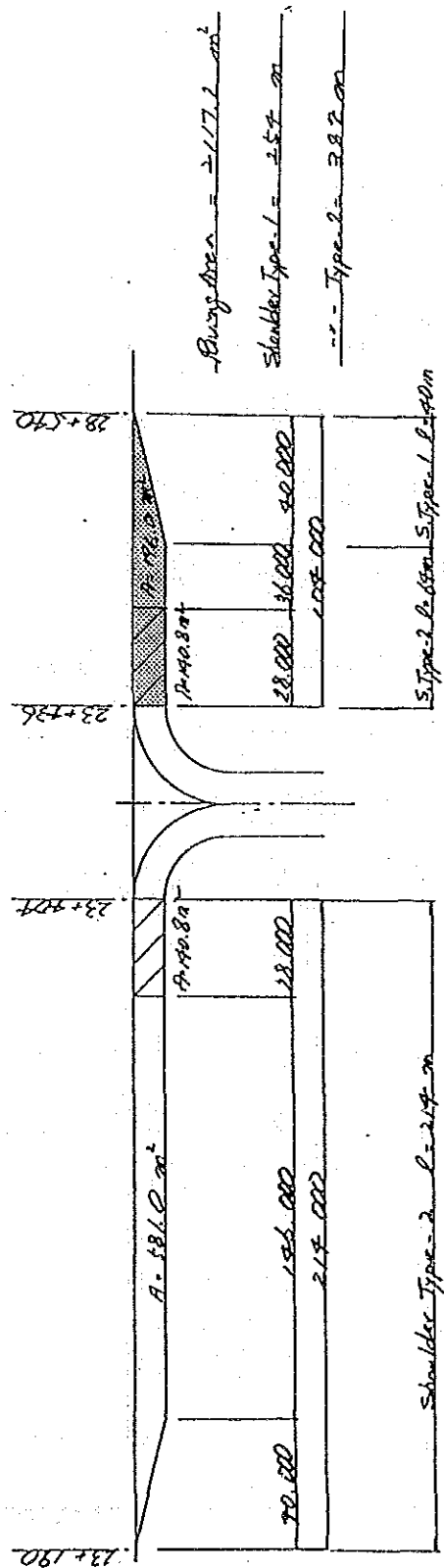
# COMPUTATION OF SUBGRADE

## DAGORETTI FOREST JUNCTION (ACCELERATING & DECELERATION LANES)



SUBGRADE IN FILL AREAS: 2397.2m<sup>2</sup> x 0.3m + 150m x 0.854m<sup>2</sup> x 566m x 0.747m<sup>2</sup> = 1270.062m<sup>3</sup>

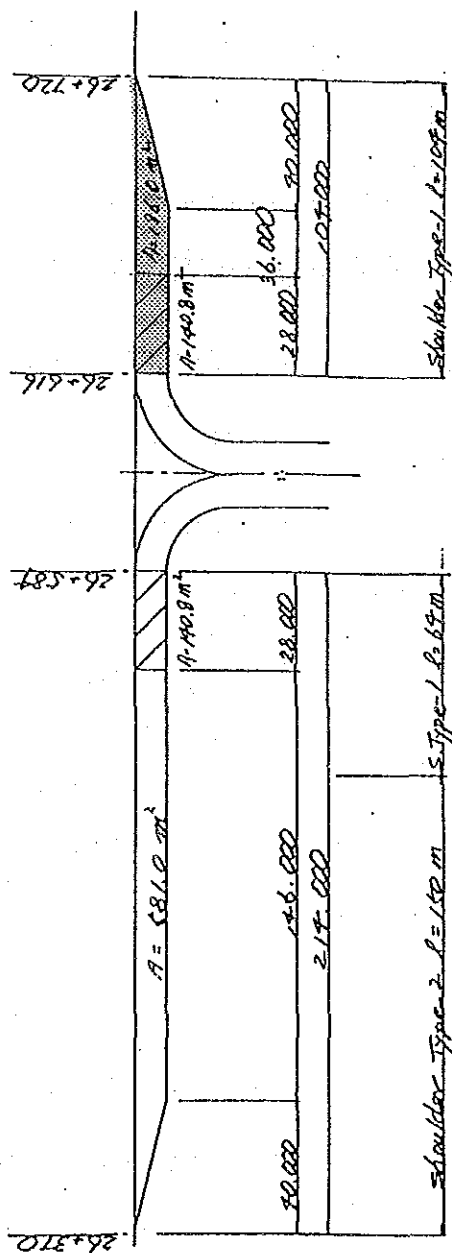
## THOGOTO JUNCTION (ACCELERATION &amp; DECELERATION LANES)



SUBGRADE IN FILL AREAS:  $1058.6\text{m}^2 \times 0.3\text{m} + (104 + 214)\text{m} \times 0.747\text{m}^2 = 555.126\text{m}^3$

IN CUT AREAS:  $1058.6\text{m}^2 \times 0.3\text{m} + 0.747\text{m}^2 \times 64\text{m} + 0.854\text{m}^2 \times (214 + 40)\text{m} = 582.304\text{m}^3$

## KIKUYU TOWN JUNCTION (ACCELERATION &amp; DECELERATION LANES)



SUBGRADE IN CUT AREAS:  $1220.4\text{m}^2 \times 0.3\text{m} + 0.854\text{m}^2 \times (104 + 164 + 104)\text{m} = 683.808\text{m}^3$

IN FILL AREAS:  $721.8\text{m}^2 \times 0.3\text{m} + 0.854\text{m}^2 \times 64\text{m} + 0.747\text{m}^2 \times 150\text{m} = 383.246\text{m}^3$



## COMPUTATION OF SUBGRADE VOLUMES

### BUSSTOP

BUSSTOP (1:2) Per 1 spot

Paving Area  $129.50\text{m}^2 \times 0.30 = 38.85\text{m}^3$

Shoulder Type-1  $21.0\text{m} \times 0.854 = 17.93\text{m}^3$

Shoulder Type-2  $40.0\text{m} \times 0.933 = 37.32\text{m}^3$

Total  $94.10\text{m}^3 / 1 \text{ spot}$

BUSSTOP (1:1.5) Per 1 spot

Paving Area  $129.50\text{m}^2 \times 0.30 = 38.85\text{m}^3$

Shoulder Type-1  $21.0\text{m} \times 0.747 = 15.69\text{m}^3$

Shoulder Type-2  $40.0\text{m} \times 0.804 = 32.16\text{m}^3$

Total  $86.70\text{m}^3 / 1 \text{ spot}$

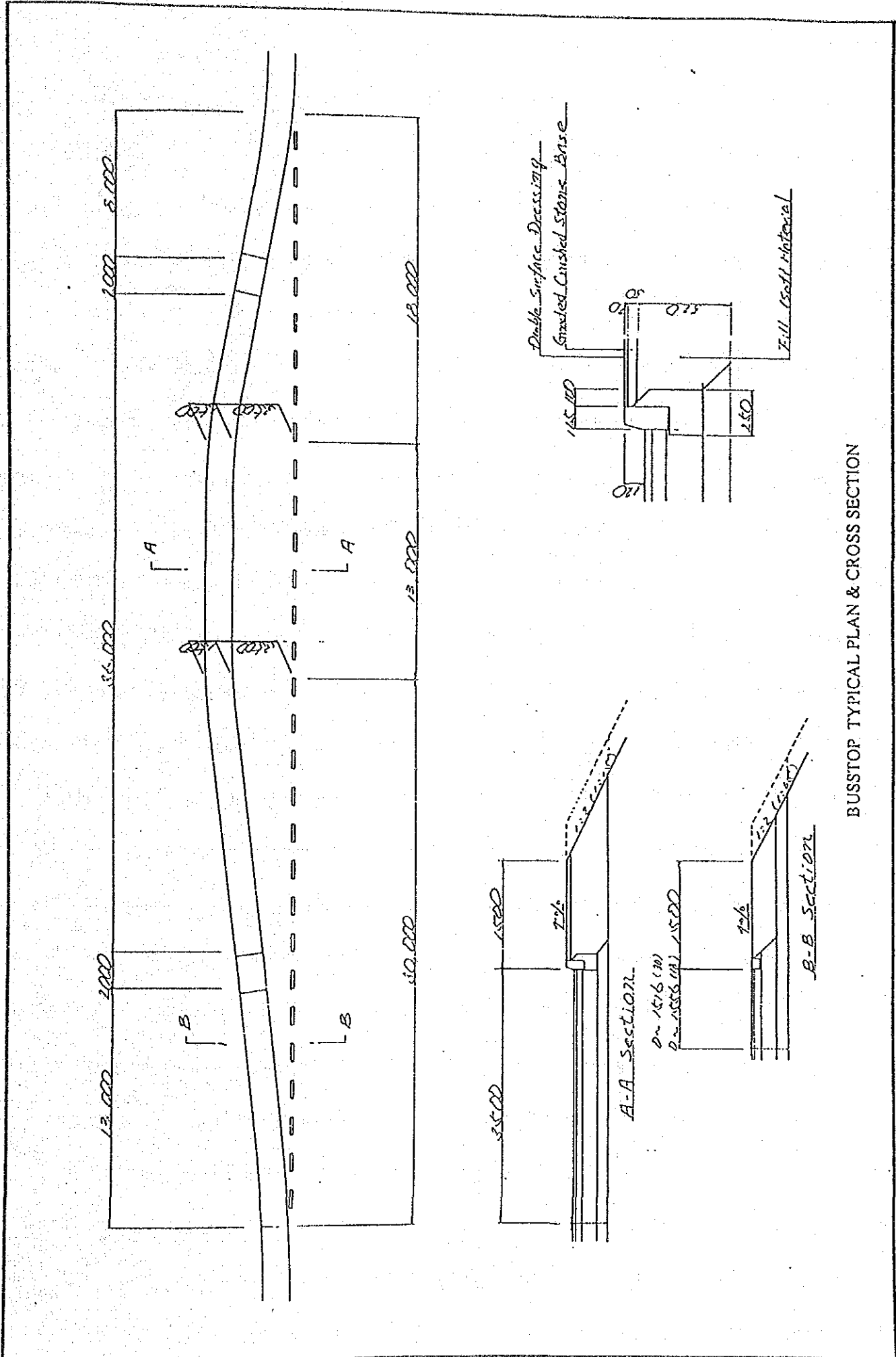
LOCATION		LEFT SIDE	RIGTH SIDE
1 +	200	(1:2) IN FILL	(1:2) IN FILL
7 +	300	(1:2) IN FILL	(1:2) IN FILL
15 +	60	(1:2) IN CUT	(1:2) IN CUT
18 +	460	(1:1.5) IN FILL	(1:1.5) IN FILL
20 +	980	(1:1.5) IN FILL	(1:1.5) IN FILL
23 +	200	(1:1.5) IN FILL	(1:1.5) IN FILL
25 +	100	(1:2) IN FILL	(1:2) IN FILL
27 +	60	(1:2) IN CUT	(1:2) IN CUT

### SUBGRADE IN FILL AREA

$94.10\text{m}^3 \times 6 \text{ Spots} + 86.70\text{m}^3 \times 6 \text{ Spots} = 1,084.80\text{m}^3$

### SUBGRADE IN CUT AREA

$94.10\text{m}^3 \times 4 \text{ Spots} = 376.40\text{m}^3$



BUSSTOP TYPICAL PLAN & CROSS SECTION



COMPUTATION OF SUBGRADE VOLUMES  
MOMBASA ROAD JUNCTION : A Slip Road

STATION	DISTANCE	SUBGRADE AREAS				SUBGRADE			DISTRIBUTION OF SUBGRADE		
		CARRIAGEWAY WIDTH (m)	SHOULDER SECTION		SECTION (m2)	AVERAGE (m2)	VOLUME (m3)	COMPACTION SUBGRADE IN FILL AREA (m3)	COMPACTION SUBGRADE IN CUT AREA (m3)	ON HARD ROCK (m3)	
			LEFT SIDE (m2)	RIGHT SIDE (m2)							
0 + 380.000		0.00	0.85		0.85						
(0 + 280.000)											
0 + 100.329	100.00	4.74	0.35	0.23	2.50	1.68	167.75	94.07	73.68		
0 + 120.000	19.67	4.07	0.85	0.70	2.77	2.64	51.89	51.89			
0 + 140.000	20.00	4.40	0.85	0.70	2.87	2.82	56.49	48.14	8.34		
0 + 145.905	5.91	4.50	0.85	0.70	2.90	2.89	17.06	15.19	1.87		
0 + 160.000	14.10	4.50	0.85	0.70	2.90	2.90	40.93	36.43	4.50		
0 + 162.278	2.28	4.50	0.85	0.70	2.90	2.90	6.62	5.90	0.72		
0 + 180.000	17.72	4.35	0.85	0.70	2.86	2.88	51.07	25.54	25.54		
0 + 200.000	20.00	4.19	0.85	0.70	2.81	2.83	56.69	56.69			
0 + 220.000	20.00	4.02	0.75	0.70	2.66	2.73	54.67	54.67			
0 + 222.278	2.28	4.00	0.75	0.70	2.65	2.65	6.05	6.05			
0 + 240.000	17.72	4.00	0.75	0.70	2.65	2.65	46.98	46.98			
0 + 260.000	20.00	4.00	0.85	0.70	2.75	2.70	54.05	54.05			
0 + 264.945	4.94	4.00	0.85	0.70	2.75	2.75	13.62	13.62			
0 + 280.000	15.06	4.00	0.85	0.70	2.75	2.75	41.46	41.46			
0 + 300.000	20.00	4.00	0.85	0.70	2.75	2.75	55.08	55.08			
0 + 320.000	20.00	4.00	0.85	0.70	2.75	2.75	55.08	55.08			
0 + 340.000	20.00	4.00	0.85	0.70	2.75	2.75	55.08	55.08			
0 + 345.583	5.58	4.00	0.85	0.70	2.75	2.75	15.38	15.38			
0 + 360.000	14.42	4.00	0.85	0.70	2.75	2.75	39.70	39.70			
0 + 380.000	20.00	4.00	0.85	0.70	2.75	2.75	55.08	55.08			
0 + 388.250	8.25	4.00	0.85	0.70	2.75	2.75	22.72	22.72			
0 + 400.000	11.75	4.00	0.75	0.60	2.54	2.65	31.13	31.13			
0 + 420.000	20.00	4.00	0.75	0.60	2.54	2.54	50.88	50.88			
0 + 430.916	10.92	4.00	0.75	0.60	2.54	2.54	27.77	27.77			
0 + 440.000	9.08	4.00	0.85	0.70	2.76	2.65	24.08	24.08			
0 + 456.816	16.82	4.00	0.85	0.70	2.76	2.76	46.38	46.38			
0 + 460.000	3.18	3.98	0.85	0.70	2.75	2.75	8.77	8.77			
0 + 475.288	15.29	4.90	0.85	0.23	2.55	2.65	40.51	40.51			
Total	474.96						1192.95	1078.30	114.66	0.00	

**MOMBASA ROAD JUNCTION : B Slip Road**

2.4.61

## COMPUTATION OF SUBGRADE VOLUMES

**MOMBASA ROAD JUNCTION : C Slip Road**

STATION	DISTANCE	SUBGRADE AREAS				SUBGRADE			DISTRIBUTION OF SUBGRADE		
		CARRIAGEWAY WIDTH (m)	SHOULDER SECTION		SECTION (m2)	AVERAGE (m2)	VOLUME (m3)	COMPACTION SUBGRADE IN FILL AREA (m3)	COMPACTION SUBGRADE IN CUT AREA (m3)	ON HARD ROCK (m3)	
			LEFT SIDE (m2)	RIGHT SIDE (m2)							
0 + 019.523		4.50	0.75	0.23	2.32						
0 + 020.000	0.48	4.50	0.75	0.23	2.32	1.11		1.11			
0 + 040.000	20.00	4.50	0.75	0.60	2.69	50.16		50.16			
0 + 060.000	20.00	4.50	0.75	0.60	2.69	53.88		53.88			
0 + 080.000	20.00	4.50	0.75	0.60	2.69	53.88		53.88			
0 + 081.715	1.72	4.50	0.75	0.60	2.69			4.62			
0 + 099.379	17.66	4.50	0.85	0.70	2.91			49.48			
0 + 100.000	0.62	4.50	0.85	0.70	2.91	1.81		1.81			
0 + 120.000	20.00	4.50	0.85	0.70	2.91	58.16		58.16			
0 + 140.000	20.00	4.50	0.85	0.70	2.91	58.16		58.16			
0 + 160.000	20.00	4.50	0.85	0.70	2.91	58.16		58.16			
0 + 180.000	20.00	4.50	0.85	0.70	2.91	58.16		58.16			
0 + 189.496	9.50	4.50	0.85	0.70	2.91	16.94		16.94	41.22		
0 + 200.000	10.50	4.64	0.85	0.70	2.91	27.61			27.61		
0 + 220.000	20.00	4.91	0.85	0.70	2.93	30.77			30.77		
0 + 226.502	6.50	5.00	0.85	0.70	3.03	59.82			59.82		
0 + 240.000	13.50	5.00	0.85	0.70	3.06	19.80			19.80		
(0 + 257.054)					3.06	41.28	8.81		32.46		
0 - 064.811	17.05	6.00	0.85	0.23	2.88						
0 - 080.619	15.81	3.50	0.85		1.90	50.62	28.03		22.59		
0 - 220.000	139.38	3.50	0.85		1.90	37.80	6.50		31.31		
0 - 260.000	40.00	0.00	0.85		0.85	265.38	73.96		191.42		
						55.16			55.16		

MOMBASA ROAD JUNCTION: D Slip Road

2.4. 63

**MOMBASA ROAD JUNCTION: E Slip Road**

2.4. 64



MOMBASA ROAD JUNCTION: F Slip Road

2.4. 65

## COMPUTATION OF SUBGRADE VALUES

**MOMBASA ROAD JUNCTION: G Slip Road**

STATION	DISTANCE	SUBGRADE AREAS				SUBGRADE			DISTRIBUTION OF SUBGRADE		
		CARRIAGEWAY WIDTH (m)	SHOULDER SECTION		SECTION (m2)	AVERAGE (m2)	VOLUME (m3)	COMPACTION SUBGRADE IN FILL AREA (m3)	COMPACTION SUBGRADE IN CUT AREA (m3)	ON HARD ROCK (m3)	
			LEFT SIDE (m2)	RIGHT SIDE (m2)							
0 + 100.245		4.50	0.75	0.23	2.32						
0 + 115.106	14.86	3.50	0.75	0.60	2.39	35.04	35.04				
0 + 120.000	4.89	3.56	0.75	0.60	2.41	11.76	11.76				
0 + 140.000	20.00	3.79	0.75	0.60	2.48	48.93	48.93				
0 + 157.772	17.77	4.00	0.75	0.60	2.54	44.66	44.66				
0 + 160.000	2.23	4.00	0.75	0.60	2.54	5.67	5.67				
0 + 180.000	20.00	4.00	0.75	0.60	2.54	50.88	50.88				
0 + 200.000	20.00	4.00	0.85	0.70	2.75	52.98	52.98				
0 + 220.000	20.00	4.00	0.85	0.70	2.76	55.12	55.12				
0 + 240.000	20.00	4.00	0.85	0.70	2.76	55.16	55.16				
0 + 260.000	20.00	4.00	0.85	0.70	2.76	55.16	55.16				
0 + 280.000	20.00	4.00	0.85	0.70	2.76	55.16	55.16				
0 + 300.000	20.00	4.00	0.85	0.70	2.76	55.16	55.16				
0 + 320.000	20.00	4.00	0.85	0.23	2.28	23.34	23.34	27.03			
(0 + 325.775)											
0 + 224.958	5.77	5.00	0.85	0.23	2.58	14.03	7.59	6.44			
0 + 254.000	29.04	3.50	0.85		1.90	65.10	17.07	48.02			
0 + 380.000	126.00	3.50	0.85		1.90	239.90	62.93	176.98			
0 + 420.000	40.00	0.00	0.85		0.85	55.16		55.16			

COMPUTATION OF SUBGRADE VOLUMES

MOMBASA ROAD JUNCTION : U - Turn Road

STATION	DISTANCE	SUBGRADE AREAS			SUBGRADE		DISTRIBUTION OF SUBGRADE				
		CARRIAGEWAY WIDTH (m)	SHOULDER SECTION		SECTION (m2)	AVERAGE (m2)	VOLUME (m3)	COMPACTION SUBGRADE IN FILL AREA (m3)	COMPACTION SUBGRADE IN CUT AREA (m3)	ON HARD ROCK (m3)	
			LEFT SIDE (m2)	RIGHT SIDE (m2)							
1. ACCELERATION LANE											
0 + 700.000		0.00		0.70	0.70						
0 + 750.000	50.00	3.50		0.70	1.75	1.23	61.25	33.91	27.34		
0 + 800.000	50.00	3.50		0.70	1.75	1.75	87.50	48.44	39.06		
0 + 860.000	60.00	3.50		0.70	1.75	1.75	105.00	58.13	46.88		
0 + 900.000	40.00	3.50		0.70	1.75	1.75	70.00	38.75	31.25		
0 + 930.000	30.00	3.50		0.70	1.75	1.75	52.50	29.06	23.44		
Subtotal							376.25	208.28	167.97		0.00
2. DECELERATION LANE											
0 + 700.000											
0 + 750.000	50.00										
0 + 810.000	60.00	0.00		0.70	0.70						
0 + 860.000	50.00	3.50		0.70	1.75	1.23	61.45	33.52	27.93		
0 + 900.000	40.00	3.50		0.70	1.75	1.75	70.16	38.27	31.89		
0 + 930.000	30.00	3.50		0.70	1.75	1.75	52.62	28.70	23.92		
Subtotal							184.23	100.49	83.74		
3. U - TURN LANE											
Global (*)		( 384.3 m2 )					115.29	115.29			
		Shoulder Type-4 44m					30.98	30.98			
		Shoulder Type-1 51m					43.55	43.55			
Subtotal							189.82	189.82			
Total							750.30	498.59	251.71		0.00

## COMPIIATION OF SUBGRADE VOLUMES

[illegible]

[illegible]

UHUHURU MONUMENT JUNCTION C Slip Road

**Total**

UHURU MONUMENT JUNCTION D Slip Road

2.4. 71

### UHURU MONUMENT JUNCTION Approach Road

2.4. 72



# NGONG ROAD JUNCTION A Slip Road

[illegible]

NGONG ROAD JUNCTION B Slip Road

2.4. 74

## COMPUTATION OF SUBGRADE VOLUMES

NGONG ROAD JUNCTION Approach Road

STATION	DISTANCE	SUBGRADE AREAS				SUBGRADE		DISTRIBUTION OF SUBGRADE			
		CARRIAGEWAY WIDTH (m)	SHOULDER SECTION		SECTION (m <sup>2</sup> )	AVERAGE (m <sup>2</sup> )	VOLUME (m <sup>3</sup> )	COMPACTION SUBGRADE IN FILL AREA (m <sup>3</sup> )	COMPACTION SUBGRADE IN CUT AREA (m <sup>3</sup> )	ON HARD ROCK (m <sup>3</sup> )	
			LEFT SIDE (m <sup>2</sup> )	RIGHT SIDE (m <sup>2</sup> )							
0 + 000.000		7.00	0.71	0.71	3.53						
0 + 020.000	20.00	7.00	0.71	0.71	3.53	3.53	70.56		70.56		
0 + 040.000	20.00	7.35	0.71	0.71	3.63	3.58	71.61		71.61		
0 + 060.000	20.00	8.75	0.71	0.71	4.05	3.84	76.86		76.86		
0 + 080.000	20.00	10.15	0.71	0.71	4.47	4.26	85.26	57.29	27.97		
0 + 100.000	20.00	10.50	0.71	0.71	4.58	4.53	90.51	90.51			
0 + 120.000	20.00	10.50	0.71	0.71	4.58	4.58	91.56	91.56			
0 + 140.000	20.00	10.50	0.71	0.71	4.58	4.58	91.56	91.56			
0 + 160.000	20.00	10.50	0.71	0.71	4.58	4.58	91.56	91.56			
0 + 180.000	20.00	10.50	0.71	0.71	4.58	4.58	91.56	91.56			
0 + 200.000	20.00	10.50	0.71	0.71	4.58	4.58	91.56	91.56			
0 + 220.000	20.00	9.10	0.71	0.71	4.16	4.37	87.36	64.54	22.82		
0 + 240.000	20.00	7.70	0.71	0.71	3.74	3.95	78.96	28.29	50.67		
0 + 260.000	20.00	7.00	0.71	0.71	3.53	3.63	72.66	31.87	40.79		
0 + 280.000	20.00	7.00	0.71	0.71	3.53	3.53	70.56		70.56		
0 + 300.000	20.00	7.00	0.71	0.71	3.53	3.53	70.56		70.56		
0 + 320.000	20.00	7.00	0.71	0.71	3.53	3.53	70.56		70.56		
0 + 340.000	20.00	7.00	0.71	0.71	3.53	3.53	70.56		70.56		
0 + 360.000	20.00	7.00	0.71	0.71	3.53	3.53	70.56		70.56		
0 + 380.000	20.00	7.00	0.71	0.71	3.53	3.53	70.56		70.56		
0 + 383.970	3.97	7.00	0.71	0.71	3.53	3.53	14.01		14.01		
Box Culvert											
0 + 416.770	32.80	7.00	0.71	0.71	3.53						
0 + 420.000	3.23	7.00	0.71	0.71	3.53	3.53	11.40	11.40			
0 + 440.000	20.00	7.00	0.71	0.71	3.53	3.53	70.56	70.56			
0 + 460.000	20.00	7.00	0.71	0.71	3.53	3.53	70.56	70.56			
0 + 480.000	20.00	7.00	0.71	0.71	3.53	3.53	70.56	70.56			
0 + 500.000	20.00	7.00	0.71	0.71	3.53	3.53	70.56	70.56			
0 + 520.000	20.00	7.00	0.71	0.71	3.53	3.53	70.56	70.56			
0 + 540.000	20.00	7.00	0.71	0.71	3.53	3.53	70.56	70.56	70.56		
0 + 560.000	176.03	8.40	0.71	0.71	3.95	3.74	658.00		658.00		
0 + 580.000	20.00	9.80	0.71	0.71	4.37	4.16	83.16		83.16		

COMPUTATION OF SUBGRADE VOLUMES  
 NONG ROAD JUNCTION Approach Road

STATION	DISTANCE	SUBGRADE AREAS				SUBGRADE			DISTRIBUTION OF SUBGRADE		
		CARRIAGEWAY WIDTH (m)	SHOULDER SECTION		SECTION  (m2)	AVERAGE  (m2)	VOLUME  (m3)	COMPACTION SUBGRADE IN FILL AREA  (m3)	COMPACTION SUBGRADE IN CUT AREA  (m3)	ON HARD ROCK  (m3)	
			LEFT SIDE (m2)	RIGHT SIDE (m2)							
0 + 600.000	20.00	10.50	0.71	0.71	4.58	4.47	89.46		89.46		
0 + 620.000	20.00	10.50	0.71	0.71	4.58	4.58	91.56	6.23	85.33		
0 + 640.000	20.00	10.50	0.71	0.71	4.58	4.58	91.56	6.85	84.71		
0 + 660.000	20.00	10.50	0.71	0.71	4.58	4.58	91.56		91.56		
0 + 680.000	20.00	10.50	0.71	0.71	4.58	4.58	91.56		91.56		
0 + 700.000	20.00	10.50	0.71	0.71	4.58	4.58	91.56		91.56		
0 + 720.000	20.00	9.45	0.71	0.71	4.26	4.42	88.41		88.41		
0 + 740.000	20.00	8.05	0.71	0.71	3.84	4.05	81.06		81.06		
0 + 760.000	20.00	7.00	0.71	0.71	3.53	3.69	73.71		73.71		
0 + 780.000	20.00	7.00	0.71	0.71	3.53	3.53	70.56		70.56		
0 + 800.000	20.00	7.00	0.71	0.71	3.53	3.53	70.56		70.56		

COMPUTATION OF SUBGRADE VOLUMES  
DAGORETTI FOREST JUNCTION A Slip Road

STATION	DISTANCE	SUBGRADE AREAS			SUBGRADE		DISTRIBUTION OF SUBGRADE			
		CARRIAGEWAY WIDTH (m)	SHOULDER SECTION		SECTION (m2)	AVERAGE (m2)	VOLUME (m3)	COMPACTION SUBGRADE IN FILL AREA (m3)	COMPACTION SUBGRADE IN CUT AREA (m3)	ON HARD ROCK (m3)
			LEFT SIDE (m2)	RIGHT SIDE (m2)						
			Shoulder Type-16 27m				4.27	4.27		
		( 335m2 )	Shoulder Type-7 27.2m				22.52	22.52		
							100.50	100.50		
0 + 038.750	38.75	11.00	0.73	0.73	4.76					
0 + 040.000	40.00	9.29	0.73	0.73	4.24	4.50	180.00	180.00		
0 + 060.000	20.00	8.00	0.73	0.73	3.86	4.05	81.00	81.00		
0 + 080.000	20.00	8.00	0.73	0.73	3.86	3.86	77.12	77.12		
0 + 100.000	20.00	8.00	0.73	0.83	3.96	3.91	78.12	78.12		
0 + 120.000	20.00	8.00	0.83	0.83	4.06	4.01	80.12	80.12		
0 + 140.000	20.00	8.00	0.83	0.83	4.06	4.06	81.12	81.12		
0 + 158.579	18.58	8.00	0.83	0.83	4.06	4.06	75.36	75.36		
0 + 160.000	1.42	8.00	0.83	0.83	4.06	4.06	5.76	5.76		
0 + 180.000	20.00	8.00	0.83	0.83	4.06	4.06	81.12	81.12		
0 + 200.000	20.00	8.00	0.83	0.83	4.06	4.06	81.12	81.12		
0 + 200.595	0.59	8.00	0.83	0.83	4.06	4.06	2.41	2.23	0.19	
0 + 220.000	19.41	8.00	0.83	0.83	4.06	4.06	78.71	72.65	6.05	
0 + 240.000	20.00	8.00	0.83	0.83	4.06	4.06	81.12	70.16	10.96	
0 + 260.000	20.00	8.00	0.83	0.83	4.06	4.06	81.12	81.12		
0 + 270.000	10.00	8.00	0.83	0.83	4.06	4.06	40.56	40.56		
		( 583m2 )					174.90	174.90		
			Shoulder Type-16 66m				10.43	10.43		
			Shoulder Type-7 113m				93.56	93.56		

COMPUTATION OF SUBGRADE VOLUMES  
DAGORETTI FOREST JUNCTION B Slip Road[illegible]

# COMPUTATION OF SUBGRADE VOLUMES

STATION	DISTANCE	SUBGRADE AREAS				SUBGRADE			DISTRIBUTION OF SUBGRADE		
		CARRIAGEWAY WIDTH (m)	SHOULDER SECTION		SECTION (m2)	AVERAGE (m2)	VOLUME (m3)	COMPACTION SUBGRADE IN FILL AREA (m3)	COMPACTION SUBGRADE IN CUT AREA (m3)	ON HARD ROCK (m3)	
			LEFT SIDE (m2)	RIGHT SIDE (m2)							
0 + 000.000		7.00	0.71	0.71	3.53						
0 + 020.000	20.00	8.05	0.71	0.71	3.84	3.69	73.71		73.71		
0 + 040.000	20.00	9.45	0.71	0.71	4.26	4.05	81.06		81.06		
0 + 060.000	20.00	10.50	0.71	0.71	4.58	4.42	88.41		88.41		
0 + 080.000	20.00	10.50	0.71	0.71	4.58	4.58	91.56		91.56		
0 + 100.000	20.00	10.50	0.71	0.71	4.58	4.58	91.56	10.66	80.90		
0 + 120.000	20.00	10.50	0.71	0.71	4.58	4.58	91.56	7.74	83.82		
0 + 140.000	20.00	10.50	0.71	0.71	4.58	4.58	91.56	13.70	77.86		
0 + 160.000	20.00	8.17	0.71	0.71	3.88	4.23	84.56	30.44	54.12		
0 + 177.200	17.20	7.00	0.71	0.71	3.53	3.70	63.69	22.93	40.76		
Box Culvert											
0 + 225.600	48.40	7.00	0.71	0.71	3.53						
0 + 240.000	14.40	7.00	0.71	0.71	3.53	3.53	50.80	8.90	41.90		
0 + 260.000	20.00	7.70	0.71	0.71	3.74	3.63	72.66	6.89	65.77		
0 + 280.000	20.00	9.10	0.71	0.71	4.16	3.95	78.96	12.66	66.30		
0 + 300.000	20.00	10.50	0.71	0.71	4.58	4.37	87.36		87.36		
0 + 320.000	20.00	10.50	0.71	0.71	4.58	4.58	91.56		91.56		
0 + 340.000	20.00	10.50	0.71	0.71	4.58	4.58	91.56		91.56		
0 + 360.000	20.00	10.50	0.71	0.71	4.58	4.58	91.56		91.56		
0 + 380.000	20.00	10.50	0.71	0.71	4.58	4.58	91.56		91.56		
0 + 400.000	20.00	10.50	0.71	0.71	4.58	4.58	91.56		91.56		
0 + 420.000	20.00	10.15	0.71	0.71	4.47	4.53	90.51		90.51		
0 + 440.000	20.00	8.75	0.71	0.71	4.05	4.26	85.26		85.26		
0 + 460.000	20.00	7.35	0.71	0.71	3.63	3.84	76.86		76.86		
0 + 465.000	5.00	7.00	0.71	0.71	3.53	3.58	17.90		17.90		

## THOGOTO JUNCTION A Slip Road

STATION	DISTANCE	SUBGRADE AREAS				SUBGRADE			DISTRIBUTION OF SUBGRADE		
		CARRIAGEWAY WIDTH (m)	SHOULDER SECTION		SECTION (m2)	AVERAGE (m2)	VOLUME (m3)	COMPACTION SUBGRADE IN FILL AREA (m3)	COMPACTION SUBGRADE IN CUT AREA (m3)	ON HARD ROCK (m3)	
			LEFT SIDE (m2)	RIGHT SIDE (m2)							
			Shoulder Type-16 54m					7.70	8.53	0.83	
			Shoulder Type-7 54.8m					40.94	45.37	4.43	
		(335m2)						90.69	100.50	9.81	
0 + 038.750		11.00		0.83	0.83	4.96					
0 + 040.000	40.00	9.80		0.83	0.83	4.60	4.78		191.04	191.04	
0 + 060.000	20.00	7.75		0.83	0.83	3.98	4.29		85.77	85.77	
0 + 080.000	20.00	7.75		0.83	0.83	3.98	3.98		79.62	79.62	
0 + 095.579	15.58	7.75		0.83	0.83	3.98	3.98		62.02	62.02	
0 + 100.000	4.42	6.80		0.83	0.83	3.69	3.84		16.97	16.97	
0 + 120.000	20.00	6.16		0.83	0.83	3.50	3.60		72.00	72.00	
0 + 140.000	20.00	6.00		0.83	0.83	3.46	3.48		69.61	69.61	
0 + 160.000	20.00	6.00		0.83	0.83	3.46	3.46		69.12	69.12	
0 + 180.000	20.00	6.00		0.83	0.83	3.46	3.46		69.12	69.12	
0 + 200.000	20.00	6.00		0.83	0.83	3.46	3.46		69.12	69.12	
0 + 220.000	20.00	6.50		0.83	0.83	3.61	3.53		70.62	70.62	
0 + 240.000	20.00	8.80		0.83	0.83	4.30	3.95		79.02	79.02	
		(523m2)							156.90	156.90	
		Shoulder Type-16 118m							18.64	18.64	
		Shoulder Type-7 99.5m							82.39	82.39	



## THOGOTO JUNCTION, B Slip Road

2.4. 81

COMPUTATION OF SUBGRADE VOLUMES  
THOGOTO JUNCTION Approach Road

STATION	DISTANCE	SUBGRADE AREAS			SUBGRADE			DISTRIBUTION OF SUBGRADE		
		CARRIAGEWAY WIDTH (m)	SHOULDER SECTION		SECTION (m2)	AVERAGE (m2)	VOLUME (m3)	COMPACTION SUBGRADE IN FILL AREA (m3)	COMPACTION SUBGRADE IN CUT AREA (m3)	ON HARD ROCK (m3)
			LEFT SIDE (m2)	RIGHT SIDE (m2)						
0 + 000.000		6.00	0.64	0.64	3.08					
0 + 020.000	20.00	6.30	0.64	0.64	3.17	3.12	62.46	62.46		
0 + 040.000	20.00	7.50	0.64	0.64	3.53	3.35	66.96	66.96		
0 + 060.000	20.00	8.70	0.64	0.64	3.89	3.71	74.16	74.16		
0 + 080.000	20.00	9.00	0.64	0.64	3.98	3.93	78.66	78.66		
0 + 100.000	20.00	9.00	0.64	0.64	3.98	3.98	79.56	79.56		
0 + 120.000	20.00	9.00	0.64	0.64	3.98	3.98	79.56	79.56		
0 + 140.000	20.00	9.00	0.64	0.64	3.98	3.98	79.56	79.56		
0 + 160.000	20.00	9.00	0.64	0.64	3.98	3.98	79.56	79.56		
0 + 180.000	20.00	9.00	0.64	0.64	3.98	3.98	79.56	79.56		
0 + 200.000	20.00	7.80	0.64	0.64	3.62	3.80	75.96	75.96		
0 + 220.000	20.00	6.65	0.64	0.64	3.27	3.45	68.91	68.91		
0 + 230.000	10.00	6.00	0.64	0.64	3.08	3.18	31.76	31.76		
0 + 240.000	10.00	6.00	0.64	0.64	3.08	3.08	30.78	30.78		
0 + 244.857	4.86	6.00	0.64	0.64	3.08	3.08	14.95	14.95		
Box Culvert										
0 + 271.857	27.00	6.00	0.64	0.64	3.08					
0 + 280.000	8.14	6.00	0.64	0.64	3.08	3.08	25.06	25.06		
0 + 300.000	20.00	6.00	0.64	0.64	3.08	3.08	61.56	61.56		
0 + 320.000	20.00	6.00	0.64	0.64	3.08	3.08	61.56	61.56		
0 + 340.000	20.00	6.00	0.64	0.64	3.08	3.08	61.56	61.56		
0 + 360.000	20.00	8.10	0.64	0.64	3.71	3.39	67.86	67.86		
0 + 380.000	20.00	9.00	0.64	0.64	3.98	3.84	76.86	76.86		
0 + 400.000	20.00	9.00	0.64	0.64	3.98	3.98	79.56	79.56		
0 + 420.000	20.00	9.00	0.64	0.64	3.98	3.98	79.56	79.56		
0 + 440.000	20.00	9.00	0.64	0.64	3.98	3.98	79.56	79.56		
0 + 460.000	20.00	7.80	0.64	0.64	3.62	3.80	75.96	75.96		
0 + 480.000	20.00	6.60	0.64	0.64	3.26	3.44	68.76	68.76		
0 + 500.000	20.00	6.00	0.64	0.64	3.08	3.17	63.36	63.36		
Total							1703.62	184.76	1518.86	0.00

COMPUTATION OF SUBGRADE VOLUMES  
KIKUYU TOWN JUNCTION A Slip Road

STATION	DISTANCE	SUBGRADE AREAS				SUBGRADE			DISTRIBUTION OF SUBGRADE		
		CARRIAGEWAY WIDTH (m)	SHOULDER SECTION		SECTION (m2)	AVERAGE (m2)	VOLUME (m3)	COMPACTION SUBGRADE IN FILL AREA (m3)	COMPACTION SUBGRADE IN CUT AREA (m3)	ON HARD ROCK (m3)	
			LEFT SIDE (m2)	RIGHT SIDE (m2)							
0 + 000.000		7.00	0.81	0.81	3.72						
0 + 006.586	6.59	7.00	0.81	0.81	3.72	3.72	24.49	2.34	22.14		
0 + 020.000	13.41	7.00	0.81	0.81	3.72	3.72	49.87	10.02	39.86		
0 + 040.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	37.18	37.18		
0 + 060.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	44.03	30.33		
0 + 080.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	48.04	26.32		
0 + 100.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	46.03	28.33		
0 + 120.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	46.23	28.13		
0 + 140.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	51.08	23.28		
0 + 160.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	53.02	21.34		
0 + 180.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	74.36			
0 + 200.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	45.26	29.10		
0 + 213.756	13.76	7.00	0.81	0.81	3.72	3.72	51.14	32.34	18.80		
0 + 220.000	6.24	7.00	0.81	0.81	3.72	3.72	23.22	12.63	10.58		
0 + 240.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	20.89	53.47		
0 + 260.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	26.72	47.64		
0 + 280.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	33.97	40.39		
0 + 300.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	20.11	54.25		
0 + 320.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	24.36	50.00		
0 + 340.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	0.65	73.71		
0 + 360.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36		
0 + 380.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36		
0 + 400.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36		
0 + 420.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36		
0 + 440.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36		
0 + 460.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36		
0 + 480.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36		
0 + 500.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36		
0 + 520.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36		
0 + 540.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36		
0 + 560.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36		
0 + 580.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36		

COMPUTATION OF SUBGRADE VOLUMES

KIKUYU TOWN JUNCTION A Ship Road

STATION	DISTANCE	SUBGRADE AREAS			SUBGRADE		DISTRIBUTION OF SUBGRADE			
		CARRIAGEWAY WIDTH (m)	SHOULDER SECTION		SECTION (m2)	AVERAGE (m2)	VOLUME (m3)	COMPACTION SUBGRADE IN FILL AREA (m3)	COMPACTION SUBGRADE IN CUT AREA (m3)	ON HARD ROCK (m3)
			LEFT SIDE (m2)	RIGHT SIDE (m2)						
0 + 600.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36	
0 + 620.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36	
0 + 640.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36	
0 + 660.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36	
0 + 680.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36	
0 + 700.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	13.84	60.52	
0 + 720.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	33.62	40.74	
0 + 740.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	51.73	22.63	
0 + 760.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	50.54	23.82	
0 + 780.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	32.29	42.07	
0 + 800.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	21.25	53.11	
0 + 820.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	9.98	64.38	
0 + 835.845	15.85	7.00	0.81	0.81	3.72	3.72	58.91		58.91	
0 + 840.000	4.15	7.00	0.81	0.81	3.72	3.72	15.45		15.45	
0 + 860.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36	
0 + 880.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36	
0 + 899.253	19.25	7.00	0.81	0.81	3.72	3.72	71.58		71.58	
0 + 900.000	0.75	7.00	0.81	0.81	3.72	3.72	2.78		2.78	
0 + 920.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	7.05	67.31	
0 + 931.123	11.12	7.00	0.81	0.81	3.72	3.72	41.36	6.11	35.24	
0 + 940.000	8.88	7.00	0.81	0.81	3.72	3.72	33.00	11.71	21.29	
0 + 960.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	35.41	38.95	
0 + 980.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	31.57	42.79	
1 + 000.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	29.74	44.62	
1 + 005.372	5.37	7.00	0.81	0.81	3.72	3.72	19.97	7.44	12.54	
1 + 020.000	14.63	7.00	0.81	0.81	3.72	3.72	54.39	22.60	31.78	
1 + 040.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	4.83	69.53	
1 + 060.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	44.62	29.74	
1 + 080.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	18.11	56.25	
1 + 100.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36	
1 + 120.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36	
1 + 140.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36	

COMPUTATION OF SUBGRADE VOLUMES  
KIKUYU TOWN JUNCTION A Slip Road

STATION	DISTANCE	SUBGRADE AREAS				SUBGRADE		DISTRIBUTION OF SUBGRADE		
		CARRIAGEWAY WIDTH (m)	SHOULDER SECTION		SECTION (m <sup>2</sup> )	AVERAGE (m <sup>2</sup> )	VOLUME (m <sup>3</sup> )	COMPACTION SUBGRADE IN FILL AREA (m <sup>3</sup> )	COMPACTION SUBGRADE IN CUT AREA (m <sup>3</sup> )	ON HARD ROCK (m <sup>3</sup> )
			LEFT SIDE (m <sup>2</sup> )	RIGHT SIDE (m <sup>2</sup> )						
1 + 160.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36	
1 + 180.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36	
1 + 200.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	11.77	62.59	
1 + 200.508	0.51	7.00	0.81	0.81	3.72	3.72	1.89	0.44	1.45	
1 + 220.000	19.49	7.00	0.81	0.81	3.72	3.72	72.47	0.60	71.87	
1 + 240.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36	
1 + 260.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36	
1 + 271.222	11.22	7.00	0.81	0.81	3.72	3.72	41.72		41.72	
1 + 280.000	8.78	7.00	0.81	0.81	3.72	3.72	32.64		32.64	
1 + 299.173	19.17	7.00	0.81	0.81	3.72	3.72	71.29	31.48	39.81	
1 + 300.000	0.83	7.00	0.81	0.81	3.72	3.72	3.07	1.54	1.54	
1 + 320.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36	
1 + 340.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36	
1 + 348.760	8.76	4.00	0.68	0.68	2.71	3.21	28.14		28.14	
1 + 360.000	11.24	4.00	0.68	0.68	2.71	2.71	30.42		30.42	
1 + 380.000	20.00	4.00	0.68	0.68	2.71	2.71	54.12		54.12	
1 + 400.000	20.00	4.00	0.68	0.68	2.71	2.71	54.12		54.12	
1 + 420.000	20.00	4.00	0.68	0.68	2.71	2.71	54.12		54.12	
1 + 440.000	20.00	4.00	0.68	0.73	2.61	2.66	53.12		53.12	
1 + 460.000	20.00	4.00	0.68	0.73	2.61	2.61	52.12		52.12	
1 + 468.012	8.01	4.00	0.68	0.73	2.61	2.61	20.88		20.88	
1 + 480.000	11.99	4.00	0.68	0.73	2.61	2.61	31.24		31.24	
1 + 500.000	20.00	4.00	0.68	0.73	2.61	2.61	52.12		52.12	
1 + 520.000	20.00	4.00	0.68	0.21	2.09	2.35	46.97	23.35	23.62	
1 + 520.313	0.31	4.00	0.68	0.21	2.09	2.09	0.65	0.33	0.33	
Total				69.69			5460.14	1710.32	3749.82	0.00

COMPUTATION OF SUBGRADE AREAS  
KIKUYU TOWN JUNCTION B Slip Road

[illegible]

COMPUTATION OF SUBGRADE VOLUMES  
KIKUYU TOWN JUNCTION C Slip Road

[illegible]

COMPUTATION OF SUBGRADE VOLUMES  
KIKUYU TOWN JUNCTION D Slip Road

STATION	DISTANCE	SUBGRADE AREAS			SUBGRADE		DISTRIBUTION OF SUBGRADE			
		CARRIAGEWAY WIDTH (m)	SHOULDER SECTION LEFT SIDE (m2)	RIGHT SIDE (m2)	SECTION (m2)	AVERAGE (m2)	VOLUME (m3)	COMPACTION SUBGRADE IN FILL AREA (m3)	COMPACTION SUBGRADE IN CUT AREA (m3)	ON HARD ROCK (m3)
0 + 000.000		7.00	0.81	0.81	3.72					
0 + 020.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36	
0 + 040.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	17.57	56.79	
0 + 060.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36	
0 + 080.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36	
0 + 100.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36	
0 + 120.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36	
0 + 140.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36	
0 + 160.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36	
0 + 180.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36	
0 + 182.310	2.31	7.00	0.81	0.81	3.72	3.72	8.59		8.59	
0 + 200.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36	
0 + 220.000	37.69	7.00	0.81	0.81	3.72	3.72	140.13		140.13	
0 + 240.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	15.00	59.36	
0 + 260.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	26.87	47.49	
0 + 277.864	17.86	7.00	0.81	0.81	3.72	3.72	66.42	25.80	40.62	
0 + 280.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	28.21	46.15	
0 + 300.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	35.78	38.58	
0 + 320.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	53.56	20.80	
0 + 340.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	74.36		
0 + 360.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	74.36		
0 + 380.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	74.36		
0 + 400.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	74.36		
0 + 420.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	74.36		
0 + 440.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	74.36		
0 + 460.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	74.36		
0 + 480.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	74.36		
0 + 500.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36	74.36		
0 + 520.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36	
0 + 540.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36	
0 + 560.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36	
0 + 580.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36	



COMPUTATION OF SUBGRADE VOLUMES  
KIKUYU TOWN JUNCTION D Slip Road

STATION	DISTANCE	SUBGRADE AREAS				SUBGRADE			DISTRIBUTION OF SUBGRADE			
		CARRIAGEWAY WIDTH (m)	SHOULDER SECTION		SECTION (m2)	AVERAGE (m2)	VOLUME (m3)	ON HARD ROCK (m3)	COMPACTION SUBGRADE IN CUT AREA (m3)	COMPACTION SUBGRADE IN FILL AREA (m3)		
			LEFT SIDE (m2)	RIGHT SIDE (m2)								
0 + 583.566	3.57	7.00	0.81	0.81	3.72	3.72	13.26		13.26			
0 + 600.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36			
0 + 620.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36			
0 + 640.000	20.00	7.00	0.81	0.81	3.72	3.72	74.36		74.36			
0 + 660.000	20.00	6.00	0.64	0.64	3.08	3.40	67.96		67.96			
0 + 674.507	14.51	6.00	0.64	0.64	3.08	3.08	44.65		44.65			
0 + 680.000	20.00	6.00	0.64	0.64	3.08	3.08	61.56		61.56			
0 + 700.000	20.00	6.00	0.64	0.64	3.08	3.08	61.56		61.56			
0 + 720.000	20.00	6.00	0.64	0.64	3.08	3.08	61.56		61.56			
0 + 740.000	20.00	6.00	0.64	0.64	3.08	3.08	61.56		61.56			
0 + 760.000	20.00	6.00	0.64	0.64	3.08	3.08	61.56		61.56			
0 + 775.000	15.00	6.00	0.64	0.64	3.08	3.08	46.17		46.17			
Total							3000.14		946.38	2053.76		0.00