2-1. ABUTMENT

QUANTITY TABLE OF ABUTMENT

Tra On Bridge

Item			UNIT	ABUTMENT A1	ABUTMENT A2	Total
A - ABUTMENT						
PILES	NUMBER OF PILES		pile	17	17	34
	TOTAL LENGTH OF PILE ϕ 1500mm		m	1,343.0	1,343.0	2,686.0
	CONCRETE CLASS D		m3	2,373.3	2,373.3	4,746.6
	REINFORCEMENT	Dia 32	kg	2,272.7	2,272.7	4,545.4
		Dia 28	kg	617.8	617.8	1,235.6
		Dia 25	kg	3,872.3	3,872.3	7,744.6
		Dia 22	kg	430.1	430.1	860.2
		Dia 16	kg	33.4	33.4	66.8
		Dia 10	kg	1,240.8	1,240.8	2,481.6
		TOTAL	kg	8,467.1	8,467.1	16,934.2
ABUTMENT	CONCRETE CLASS E		m3	674.3	674.3	1,348.6
	REINFORCEMENT	Dia 25	kg	15,879.7	15,881.2	31,760.9
		Dia 22	kg	5,144.9	5,144.1	10,289.0
		Dia 20	kg	6,814.7	6,814.7	13,629.4
		Dia 18	kg	843.8	843.3	1,687.1
		Dia 16	kg	4,825.7	4,826.1	9,651.8
		Dia 14	kg	2,968.3	2,968.3	5,936.6
		Dia 10	kg	87.4	87.4	174.8
		TOTAL	kg	36,564.5	36,565.1	73,129.6
	BLINDING STONE		m3	45.7	45.7	91.4
	LEAN CONCRETE CLASS G		m3	22.8	22.8	45.7
	EXCAVATION		m3	136.1	485.0	621.1
	BACK FILL		m3	23.2	117.1	140.4
B - APPROACH SLAB						
	CONCRETE CLASS E		m3	45.1	45.1	90.2
	LEAN CONCRETE CLASS G		m3	13.1	13.1	26.3
	FORM		m2	20.4	20.4	40.8
	ASPHANTIC JOINT FILLER T=20m		m3	0.4	0.4	0.8
	REINFORCEMENT	Dia 20	kg	3,421.6	3,421.6	6,843.2
		Dia 16	kg	3,402.3	3,402.3	6,804.6
		Dia 10	kg	255.8	255.8	511.6
		TOTAL	kg	7,158.7	7,158.7	14,317.4
C - SLOPE PROTECTION						
SIDE SLOPE	STONE MASONRY T=300mm		m3	890.7	970.0	1,860.7
	BLINDING AGGREGATE T=100mm		m3	265.5	299.3	564.8
	GEOTEXTILE		m2	864.1	858.5	1,722.6
	PVC PILE Φ50mm DIA. L=1000mm		m	466.4	76.4	542.8
FOOTING	LENGTH OF FOOTING		m	149.9	156.1	306.0
	WOODEN PILE L=3.0m		m	9,228.8	9,170.6	18,399.4
	BLINDING		m3	151.1	12.3	163.4
	STONE MASONRY		m3	55.4	55.0	110.4
	EXCAVATION		m3	664.5	660.3	1,324.8
	BACK FILL		m3	273.4	273.4	546.8

Item	Formula	Quantity
Abutment A1		
1. Concrete (Class E)		
1) Paramet	V1 = 24.100 x 0.400 x 2.335 =	22.509 m3
2) Corbel	V2 =(0.300 + 0.600)x 1/2 x 0.300	
	x(22.100 + 22.700)x 1/2	3.024 m3
3) Wall	V3 = 24.100 x 1.500 x 4.640 =	167.736 m3
4) Footing	V4 = 24.100 x 9.200 x 2.000 =	443.440 m3
5) Wing Wall	V5-1 =(6.975 + 6.759)x 1/2 x 6.000	
	x 0.500 x 2 =	41.202 m3
	V5-2 =-(4.219 + 5.719)x 1/2 x 1.300	
	x 0.500 x 2 =	-6.460 m3
6) Wall Haunch	V6 = 0.500 x 0.500 x 1/2 x 6.975	
	x 2 =	1.744 m3
7) Railing	V7 =(0.300 x 0.300 - 0.02 x 0.020	
	x 1/2 x 2 +(0.35 + 0.500)	
	x 1/2 x 0.150 + 0.500 x 0.05)	
	x 6.000 x 2	1.094 m3
	Total (One Abutment)	674.289 m3
2. Form		
1) Paramet	A1 = 24.100 x 2.335 +(2.335 - 0.600)	
	x 22.100 =	94.617 m2
2) Corbel	A2 =(0.300 + 0.300 x 1.414)x(22.100	
	+ 22.700)x 1/2 =	16.222 m2
3) Wall	A3 =(24.100 + 22.100)x 4.640 =	214.368 m2
4) Footing	A4 =(24.100 + 9.200)x 2.000 x 2 =	133.200 m2
5) Wing Wall	A5-1 =(6.975 + 6.759)x 1/2 x 6.000	
	x 4 =	164.808 m2
	A5-2 =-(4.219 + 5.719)x 1/2 x 1.300	
	x 4 - 0.500 x 6.975 x 2.000 =	-18.864 m2
	A5-3 = 0.500 x 2.335 x 2 =	2.335 m2
	A5-4 =(1.040 +(1.300^2 + 1.300^2)$^{0.5}$+ 4.219)	
	x 0.500 x 2 =	7.097 m2
6) Wall Haunch	A6 =(0.300^2 + 0.300^2)$^{0.5}$x 6.975 x 2 =	5.918 m2

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Item	Formula	Quantity
7) Railing	A7-1 =(0.300 x 0.300 - 0.02 x 0.020 x 1/2 x 2 +(0.35 + 0.500) x 1/2 x 0.150 + 0.500 x 0.05) x 2	0.182 m2
	A7-2 =(0.050 + 0.150 x 1.414 + 0.280 + 0.480 + 0.020 x 1.414 x 2) x 6.000 x 2 =	12.944 m2
	Total (One Abutment)	632.827 m2
4. Lean Concrete	V = 24.300 x 9.400 x 0.1000 =	22.842 m3
5. Blinding Stone	V = 24.300 x 9.400 x 0.2000 =	45.684 m3
6.Excavation	‹cavation Hight= 0.500	
	V =(25.300 x 10.400 + 25.800 x 10.900) x 1/2 x 0.500 =	136.085 m3
7.Back Fill	V = 136.085 - 45.684 - 22.842 - 24.100 x 9.200 x 0.200 =	23.215 m3

Item	Formula	Quantity
Abutment A2		
1. Concrete (Class E)		
1) Paramet	V1 = 24.100 x 0.400 x 2.335 =	22.509 m3
2) Corbel	V2 =(0.300 + 0.600)x 1/2 x 0.300	
	x(22.100 + 22.700)x 1/2	3.024 m3
3) Wall	V3 = 24.100 x 1.500 x 4.640 =	167.736 m3
4) Footing	V4 = 24.100 x 9.200 x 2.000 =	443.440 m3
5) Wing Wall	V5-1 =(6.975 + 6.776)x 1/2 x 6.000	
	x 0.500 x 2 =	41.253 m3
	V5-2 =-(4.236 + 5.736)x 1/2 x 1.300	
	x 0.500 x 2 =	-6.482 m3
6) Wall Haunch	V6 = 0.500 x 0.500 x 1/2 x 6.975	
	x 2 =	1.744 m3
7) Railing	V7 =(0.300 x 0.300 - 0.02 x 0.020	
	x 1/2 x 2 +(0.35 + 0.500)	
	x 1/2 x 0.150 + 0.500 x 0.05)	
	x 6.000 x 2	1.094 m3
	Total (One Abutment)	674.318 m3
2. Form		
1) Paramet	A1 = 24.100 x 2.335 +(2.335 - 0.600)	
	x 22.100 =	94.617 m2
2) Corbel	A2 =(0.300 + 0.300 x 1.414)x(22.100	
	+ 22.700)x 1/2 =	16.222 m2
3) Wall	A3 =(24.100 + 22.100)x 4.640 =	214.368 m2
4) Footing	A4 =(24.100 + 9.200)x 2.000 x 2 =	133.200 m2
5) Wing Wall	A5-1 =(6.975 + 6.776)x 1/2 x 6.000	
	x 4 =	165.012 m2
	A5-2 =-(4.236 + 5.736)x 1/2 x 1.300	
	x 4 - 0.500 x 6.975 x 2.000 =	-18.952 m2
	A5-3 = 0.500 x 2.335 x 2 =	2.335 m2
	A5-4 =(1.040 +(1.300^2 + 1.300^2)$^{0.5}$+ 4.236)	
	x 0.500 x 2 =	7.114 m2
6) Wall Haunch	A6 =(0.300^2 + 0.300^2)$^{0.5}$x 6.975 x 2 =	5.918 m2

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Item	Formula										Quantity
7) Railing	A7-1 =(	0.300	x	0.300	-	0.02	x	0.020			
		x	1/2	x	2	+(	0.35	+	0.500	)	
		x	1/2	x	0.150	+	0.500	x	0.05	)	
		x	2								0.182 m2
	A7-2 =(	0.050	+	0.150	x	1.414	+	0.280			
		+	0.480	+	0.020	x	1.414	x	2	)	
		x	6.000	x	2					=	12.944 m2
								Total			632.960 m2
								(One Abutment)			
4. Lean Concrete											
	V =	24.300	x	. 9.400	x	0.1000				=	22.842 m3
5. Blinding Stone											
	V =	24.300	x	9.400	x	0.2000				=	45.684 m3
6.Excavation											
	‹cavation Hight=	1.650									
	V =(	25.300	x	10.400	+	26.950	x	12.050)			
	x	1/2	x	1.650						=	484.991 m3
7.Back Fill	V =	484.991	-	45.684	-	22.842	-	24.100			
	x	9.200	x	1.350						=	117.143 m3

No.

Tra On Bridge

LIST OF REINFORCEMENT TRA ON A1

SIGN		DIACETER	LENGTH	NOS.	UNIT WEIGHT	PIECE WEIGHT	TOTAL WEIGHT	NOTE
A1	1	D14	2,611	289	1.208	3.155	911.9	
	2	D14	24,752	18	1.208	29.911	538.4	
	3	D14	720	196	1.208	0.870	170.6	
	4	D16	1,837	97	1.578	2.899	281.3	
	5	D14	690	97	1.208	0.834	80.9	
	6	D14	23,552	4	1.208	28.461	113.9	
F	1	D25	12,500	97	3.853	48.167	4,672.2	
	2	D25	9,000	96	3.853	34.680	3,329.4	
	3	D25	9,874	97	3.853	38.048	3,690.7	
	4	D25	6,200	96	3.853	23.891	2,293.6	
	5	D20	9,655	16	2.466	23.811	381.0	
	6	D20	25,200	16	2.466	62.147	994.4	
	7	D16	4,830	176	1.578	7.623	1,341.8	
	8	D20	28,700	37	2.466	70.779	2,618.9	
	9	D20	25,900	37	2.466	63.873	2,363.4	
W	1	D22	5,485	94	2.984	16.367	1,538.6	
	2	D22	6,955	97	2.984	20.754	2,013.2	
	3	D16	6,850	97	1.578	10.812	1,048.8	
	4	D14	1,822	221	1.208	2.202	486.6	
	5	D16	24,856	20	1.578	39.231	784.7	
	6	D14	24,752	20	1.208	29.911	598.3	
	7	D16	1,860	97	1.578	2.936	284.8	
K	1	D22	6,605	8	2.984	19.710	157.7	
	2	D22	3,085	18	2.984	9.206	165.8	
	3	D22	4,185	16	2.984	12.488	199.9	
	4	D25	9,619	38	3.853	37.065	1,408.5	
	5	D25	4,587	24	3.853	17.675	424.3	
	6	D22	6,405	36	2.984	19.113	688.1	
	7	D18	7,420	8	1.998	14.822	118.6	
	8	D16	6,745	10	1.578	10.646	106.5	
	9	D16	1,731	52	1.578	2.732	142.1	
	10	D16	2,370	2	1.578	3.741	7.5	
	11	D20	2,250	18	2.466	5.549	99.9	
	12	D16	9,462	38	1.578	14.934	567.6	
	13	D18	6,335	36	1.998	12.655	455.6	
	14	D10	690	140	0.617	0.425	59.6	
	15	D22	6,170	10	2.984	18.412	184.2	
	16	D18	6,985	10	1.998	13.953	139.6	
	17	D16	2,460	10	1.578	3.883	38.9	
	18	D16	2,460	10	1.578	3.883	38.9	
	19	D22	6,620	2	2.984	19.754	39.6	
	20	D18	6,550	2	1.998	13.084	26.2	
	21	D25	3,954	4	3.853	15.236	61.0	
	22	D14	875	64	1.208	1.057	67.7	
	23	D20	3,810	38	2.466	9.396	357.1	
	24	D16	2,227	52	1.578	3.515	182.8	
	25	D22	6,609	8	2.984	19.722	157.8	
	26	D18	6,494	8	1.998	12.972	103.8	
R	1	D10	4,500	10	0.617	2.774	27.8	
						TOTAL	36,564.5	

D25	15879.7
D22	5144.9
D20	6814.7
D18	843.8
D16	4825.7
D14	2968.3
D10	87.4
	36564.5

No.

Tra On Bridge

LIST OF REINFORCEMENT A2

SIGN		DIACETER	LENGTH	NOS.	UNIT WEIGHT	PIECE WEIGHT	TOTAL WEIGHT	NOTE
A1	1	D14	2,611	289	1.208	3.155	911.9	
	2	D14	24,752	18	1.208	29.911	538.4	
	3	D14	720	196	1.208	0.870	170.6	
	4	D16	1,837	97	1.578	2.899	281.3	
	5	D14	690	97	1.208	0.834	80.9	
	6	D14	23,552	4	1.208	28.461	113.9	
F	1	D25	12,500	97	3.853	48.167	4,672.2	
	2	D25	9,000	96	3.853	34.680	3,329.4	
	3	D25	9,874	97	3.853	38.048	3,690.7	
	4	D25	6,200	96	3.853	23.891	2,293.6	
	5	D20	9,655	16	2.466	23.811	381.0	
	6	D20	25,200	16	2.466	62.147	994.4	
	7	D16	4,830	176	1.578	7.623	1,341.8	
	8	D20	28,700	37	2.466	70.779	2,618.9	
	9	D20	25,900	37	2.466	63.873	2,363.4	
W	1	D22	5,485	94	2.984	16.367	1,538.6	
	2	D22	6,955	97	2.984	20.754	2,013.2	
	3	D16	6,850	97	1.578	10.812	1,048.8	
	4	D14	1,822	221	1.208	2.202	486.6	
	5	D16	24,856	20	1.578	39.231	784.7	
	6	D14	24,752	20	1.208	29.911	598.3	
	7	D16	1,860	97	1.578	2.936	284.8	
K	1	D22	6,605	8	2.984	19.710	157.7	
	2	D22	3,085	18	2.984	9.206	165.8	
	3	D22	4,185	16	2.984	12.488	199.9	
	4	D25	9,629	38	3.853	37.104	1,410.0	
	5	D25	4,587	24	3.853	17.675	424.3	
	6	D22	6,405	36	2.984	19.113	688.1	
	7	D18	7,420	8	1.998	14.822	118.6	
	8	D16	6,745	10	1.578	10.646	106.5	
	9	D16	1,731	52	1.578	2.732	142.1	
	10	D16	2,370	2	1.578	3.741	7.5	
	11	D20	2,250	18	2.466	5.549	99.9	
	12	D16	9,472	38	1.578	14.950	568.2	
	13	D18	6,335	36	1.998	12.655	455.6	
	14	D10	690	140	0.617	0.425	59.6	
	15	D22	6,150	10	2.984	18.352	183.6	
	16	D18	6,965	10	1.998	13.913	139.2	
	17	D16	2,457	10	1.578	3.878	38.8	
	18	D16	2,457	10	1.578	3.878	38.8	
	19	D22	6,599	2	2.984	19.692	39.4	
	20	D18	6,529	2	1.998	13.042	26.1	
	21	D25	3,954	4	3.853	15.236	61.0	
	22	D14	875	64	1.208	1.057	67.7	
	23	D20	3,810	38	2.466	9.396	357.1	
	24	D16	2,227	52	1.578	3.515	182.8	
	25	D22	6,609	8	2.984	19.722	157.8	
	26	D18	6,494	8	1.998	12.972	103.8	
R	1	D10	4,500	10	0.617	2.774	27.8	
						TOTAL	36,565.1	

D25	15881.2	
D22	5144.1	
D20	6814.7	
D18	843.3	
D16	4826.1	
D14	2968.3	
D10	87.4	
	36565.1	

Tra On Bridge

Item	Formula	Quantity
1. Pile	A1,A2	
1)	Number of Pile	
	N = 17 = 17	17 Pill
2)	Total Length of Bored Piles ϕ 1500	
	L = 17 × 79.000 = 1343.0	1343.0 m
3)	Concrete Class D	
	V = 0.750 $^2\times$ π × 1343.0 = 2373.277	2373.3 m^3
4)	Reiforcemento	

D10	1240.8
D16	33.4
D22	430.1
D25	3872.3
D28	617.8
D32	2272.7
Total	8467.1

Tra On Bridge

Item	Formula									Quantity
Approach Slab										
1. Concrete (Class E)	V1 =	23.040	x	6.000	x	0.300			=	41.472 m3
	V2 =(	0.300	+	0.500	)x	1/2 x	0.200			
	x	23.040							=	3.686 m3
	V3= =-	0.500	x	0.500	x	1/2	x	0.300		
	x	2							=	-0.075 m3
								Total		45.083 m3
2. Lean Concrete	V =	23.040	x	5.700	x	0.100			=	13.133 m3
3. Form	A1 =(	0.300	+	0.500	)x	23.040			=	18.432 m2
	A2 =	0.300	x	6.000					=	1.800 m2
	A3 =(	0.300	+	0.500	)x	1/2	x	0.200		
	x	2							=	0.160 m2
								Total		20.392 m2
4.Asphtic joint	V =((	0.060	+	0.020	)x	1/2	x	0.300		
	+	0.020	x	0.300	)x	23.040			=	0.415 m3
5.Re-bar			D10	255.8						
			D16	3402.3						
			D20	3421.6						
			Total	7079.7						7079.700 kg

Bridge **TRA ON**

Abutment A1

h1	h2	h3	h4	h5	h6	d1	d2
8.94	3.5	2.9	0.41	0.91	-0.29	24.1	12

Block	a	b	Dh	R	r	L	Sxq	W	**Masonry**	**Blinding**
	(m)	(m)	(m)	(m)	(m)	(m)	(m2)	(m)	(m3)	(m3)
1	11.380	7.300	5.440	9.340	0.000	10.809	79.249		23.77	7.92
2	12.000	12.000	0.600	21.340	9.340	12.015	289.367		86.81	28.94
3	4.980	3.113	2.490	25.386	21.340	4.751	174.268		52.28	17.43
4	24.100	12.000	0.600				289.561		86.87	28.96
5	24.100	3.113	2.490				96.061		28.82	9.61
6	11.380	7.300	5.440	9.340	0.000	10.809	79.249		23.77	7.92
7	12.000	12.000	0.600	21.340	9.340	12.015	289.367		86.81	28.94
8	4.980	3.113	2.490	25.386	21.340	4.751	174.268		52.28	17.43
9			1.200				4.320	103.813		
Extra								91.108	**441**	**147**

Footing	Wood pile	(m)	6229				
	Excavation	(m3)	448				
	Binding	(m3)	8.3				
	Stone masonry	(m3)	37.4				
	Back fill	(m3)	124.6	Length of footing	=	104	m
Side slope	Geotextile	(m2)	536				
	PVC Pipe	(m)	52				
	Blinding	(m3)	147				
	Masonry	(m3)	441				

Abutment A2

h1	h2	h3	h4	h5	h6	d1	d2
8.75	3.5	2.9	0.41	0.91	-0.29	24.1	12

Block	a	b	Dh	R	r	L	Sxq	W	**Masonry**	**Blinding**
	(m)	(m)	(m)	(m)	(m)	(m)	(m2)	(m)	(m3)	(m3)
1	11.000	7.063	5.250	9.031	0.000	10.446	74.060		22.22	7.41
2	12.000	12.000	0.600	21.031	9.031	12.015	283.543		85.06	28.35
3	4.980	3.113	2.490	25.078	21.031	4.751	171.965		51.59	17.20
4	24.100	12.000	0.600				289.561		86.87	28.96
5	24.100	3.113	2.490				96.061		28.82	9.61
6	11.000	7.063	5.250	9.031	0.000	10.446	74.060		22.22	7.41
7	12.000	12.000	0.600	21.031	9.031	12.015	283.543		85.06	28.35
8	4.980	3.113	2.490	25.078	21.031	4.751	171.965		51.59	17.20
9			1.200				4.320	102.843	37.02	8.23
Extra								90.138	**470**	**153**

Footing	Wood pile	(m)	6171				
	Excavation	(m3)	444				
	Binding	(m3)	8.3				
	Stone masonry	(m3)	37.0				
	Back fill	(m3)	123.4	Length of footing	=	103	m
Side slope	Geotextile	(m2)	530				
	PVC Pipe	(m)	51				
	Blinding	(m3)	153				
	Masonry	(m3)	470				

NOTES :

* INPUT VALUES : GRAY CELLS ; TOTAL VALUES : BOLD NUMBERS

* No. of Blocks : see drawing. Extra block used for calculation only.

h_i : Elevations (see drawing)

d_i : Distances (see drawing)

a_i : Long edge of ellipse (or rectangle) : $a_i=Dh_i*slope_i$

b_i : Short edge of ellipse (or rectangle) : $b_i=Dh_i*slope_i$

Dh_i : Height of cone (or truncated cone)

R_i : Average radius of lower ellipse : $R_i=(Sa_i+Sb_i)/2$

r_i : Average radius of upper ellipse : $r_i=(Sa_{i-1}+Sb_{i-1})/2$

L_i : Generatrix of cone : $L_i=sqrt(Dh_i^2+(R_i-r_i)^2)$

Sxq_i : Area of cone's side (or plane before abutment) :

$Sxq_i=3.14/4*(R_i+r_i)*L_i$ for block 1,2,3,6,7,8

$Sxq_i=a_i*sqrt(b_i^2+Dh_i^2)$ for block 4,5

$Sxq_9=(1.8+1.8+Dh_9+2*Dh_9)*Dh_9/2$ for block 9

W : Length of masonry's footing : W_9

$W_9=2*3.14*R_3/4+a_5+2*3.14*R_8/4$, and

$W_{Ex}=2*3.14*R_2/4+a_5+2*3.14*R_7/4$

$Masonry_i = 0.3*Sxq_i$

$Blinding_i = 0.1*Sxq_i$

Geotextile = $Sxq_3+Sxq_5+Sxq_8+W_{Ex}*1$

PVC Pipe = $W_9/2$

Wood Pile = $W_9*0.8*25*3$

Excavation = W_9*Sxq_9

Backfill = Excavation-$W_9*Dh_9*1.1$

QUANTITIES OF EARTHWORKS SLOPE PROTECTION OF 25M BEHIND HEAD WALL

ABUTMENT A1 :

Block	B	L	S	Thick	Masonry	Blinding (T=0.1m)	
	m	m	m2	m	m3	m3	
10	12.16	25	304.11	0.30	91.23	30.41	
11	12.01	25	300.37	0.30	90.11	30.04	
12	5.57	25	139.20	0.30	41.76	13.92	Geotextile (m2)
15	12.16	25	304.11	0.30	91.23	30.41	= 2 x (L + S12) = 328
16	12.01	25	300.37	0.30	90.11	30.04	PVC pipe (m)
17	5.57	25	139.20	0.30	41.76	13.92	= 2 x L/2 x 1m = 25

FOOTING	Wood pile	(m)	=	3000.00	LENGTH OF FOOTING L= 50 M
	Blinding	(m3)	=	4.00	
	Stone masonry	(m3)	=	18.00	
	Excavation	(m3)	=	216.00	
	Back fill	(m3)	=	150.00	
SIDE SLOPE	Stone masonry	(m3)	=	354.97	
	Blinding	(m3)	=	118.32	
	Geotextle	(m2)	=	328.39	
	PVC pile	(m)	=	25.00	

No	h	Dh	S	L	Total (m3)		
	m	m	m2	m	Excavation	Backfill	
5	0.91						Excavation = 2 x S x L
6	-0.29	1.2	4.32	25	216	150	Backfill = Excavation - 2 x 25 x Dh x 1.1

ABUTMENT A2 :

Block	B	L	S	Thick	Masonry	Blinding (T=0.1m)	
	m	m	m2	m	m3	m3	
10	11.74	25	293.48	0.30	88.05	29.35	Geotextile (m2)
11	12.01	25	300.37	0.30	90.11	30.04	= 2 x (L + S12) = 328
12	5.57	25	139.20	0.30	41.76	13.92	PVC pipe (m)
15	11.74	25	293.48	0.30	88.05	29.35	= 2 x L/2 x 1m = 25
16	12.01	25	300.37	0.30	90.11	30.04	
17	5.57	25	139.25	0.30	41.78	13.93	

FOOTING	Wood pile	(m)	=	3000.00	LENGTH OF FOOTING L= 50 M
	Blinding	(m3)	=	4.00	
	Stone masonry	(m3)	=	18.00	
	Excavation	(m3)	=	216.00	
	Back fill	(m3)	=	150.00	
SIDE SLOPE	Stone masonry	(m3)	=	439.85	
	Blinding	(m3)	=	146.62	
	Geotextle	(m2)	=	328.39	
	PVC pile	(m)	=	25.00	

QUANTITY TABLE OF PIER

Item			UNIT	Pier 1	Pier 2	Pier 3	Pier 4	Pier 5	Pier 6	Subtotal	nos	Total
PILE	NUMBER OF PILES		pile	6	6	6	6	6	6	36	2	72.0
	TOTAL LENGTH OF BORED ϕ 1500mm		m	462.0	462.0	639.0	639.0	462.0	462.0	3,126	2	6252.0
	CONCRETE CLASS D		m3	816.4	816.4	1129.2	1129.2	816.4	816.4	5,524	2	11048.2
	REINFORCEMENT	25	kg	4524.4	4524.4	4848	4848	4524.4	4524.4	27,794	2	55587.2
		22	kg	418.3	418.3	380.3	380.3	418.3	418.3	2,434	2	4867.6
		16	kg	33.4	33.4	33.4	33.4	33.4	33.4	200	2	400.8
		10	kg	1154.4	1154.4	1084.1	1084.1	1154.4	1154.4	6,786	2	13571.6
		TOTAL	kg	6130.5	6130.5	6345.8	6345.8	6130.5	6130.5	37,214	2	74427.2
PIER	CONCRETE CLASS E		m3	243.0	241.6	541.6	541.6	241.6	243.0	2,052	2	4104.8
	REINFORCEMENT	32	kg	10429.4	10171.8	41221.1	41221.1	10171.8	10429.4	123,645	2	247289.2
		25	kg	1478.4	1478.4	7154.6	7154.6	1478.4	1478.4	20,223	2	40445.6
		22	kg	3813.7	3813.7	10909.4	10909.4	3813.7	3813.7	37,074	2	74147.2
		20	kg	721.6	721.6	1281.6	1281.6	721.6	721.6	5,450	2	10899.2
		16	kg	2629.9	2695.6	162.0	162.0	2695.6	2629.9	10,975	2	21950.0
		14	kg	1202.0	1497.4		0.0	1497.4	1202.0	5,399	2	10797.6
		10	kg		29.8		0.0	29.8	17.9	78	2	155.0
		TOTAL	kg	20275.0	20408.3	60728.7	60728.7	20408.3	20292.9	202,842	2	405683.8
	BLINDING STONE		m3	16.1	16.1	22.9	22.9	16.1	16.1	110	2	220.6
	LEAN CONCRETE CLASS G		m3	8.1	8.1	11.4	11.4	8.1	8.1	55	2	110.3
	BLINDING CONCRETE CLASS G		m3			102.1	102.1			204	2	408.2
	RIP RAP		m3			651.6	742.6			1,394	2	2788.5
	EXCAVATION		m3	508.2	432.0	1050.2	1153.9	371.1	508.2	4,023	2	8046.9
	BACK FILL		m3	319.0	246.4			188.5	255.0	1,009	2	2017.8

P1

Item	Formula	Quantity
Pier		
1. Concrete (Class E)		
	V1 = 11.400 x 2.300 x 0.800 =	20.976 m3
	V2 =(11.400 + 6.900)x 1/2 x 2.300 x 0.800 =	16.836 m3
	V3 =(0.700^2 x π + 1.400 x 5.100) x 5.900 =	51.208 m3
	V4 = 11.000 x 7.000 x 2.000 =	154.000 m3
	Total (One Pier)	243.020 m3
2. Form		
	A1 = 11.400 x 0.800 x 2 =	18.240 m2
	A2 =(11.400 + 6.900)x 1/2 x 0.800 x 2.000 =	14.640 m2
	A3 = 0.800 x 2.300 x 2 =	3.680 m2
	A4 =(0.800^2 + 2.250^2)$^{0.5}$x 2.300 x 2 =	10.985 m2
	A5 = 6.900 x 2.300 -(0.700^2 x π + 1.400 x 5.100) =	7.191 m2
	A6 =(11.000 + 7.000)x 2 x 2.000 =	72.000 m2
	Total (flat)	126.736 m2
	A7 =(1.400^2 x π + 5.100 x 2) x 5.900 =	96.509 m2
	Total (curve)	
3. Re-Bar		

D32	10429.4
D25	1478.4
D22	3813.7
D20	721.6
D16	2629.9
D14	1202.0
D10	17.9
TOTAL	20292.9

P1

Item	Formula	Quantity
4. Lean Concrete	V = 11.200 x 7.200 x 0.1000 =	8.064 m3
5. Blinding Stone	V = 11.200 x 7.200 x 0.2000 =	16.128 m3
6.Excavation	Excavation Height 3.561	
	V =(12.200 x 8.200 + 15.761 x 11.761) x 1/2 x 3.561 =	508.164 m3
7.Back Fill	V = 508.164 - 16.128 - 8.064 - 11.000 x 7.000 x 2.000 -(0.700 ^{2} x π + 1.400 x 5.100)x 1.261 =	319.027 m3

LIST OF REINFORCEMENT

SIGN		DIAMETER	LENGTH	NOS.	UNIT WEIGHT	PIECE WEIGHT	TOTAL WEIGH	NOTE
B-	1	D25	11,985	32	3.853	46.200	1,478.4	
	2	D16	6,870	10	1.578	10.800	108.0	
	3	D16	3,463	10	1.578	5.470	54.7	
	3'	D16	3,491	10	1.578	5.510	55.1	
	4	D16	11,200	6	1.578	17.700	106.2	
	4'	D16	9,259	6	1.578	14.600	87.6	
	5	D16	2,710	8	1.578	4.280	34.2	
	6	D0	0	0	-	0.000	0.0	
	7	D0	0	0	-	0.000	0.0	
	7'	D0	0	0	-	0.000	0.0	
	8	D14	5,649	35	1.208	6.830	239.1	
	9	D14	4,890	20	1.208	5.910	118.2	
	10	D14	3,950	70	1.208	4.770	333.9	
	11	D14	3,191	40	1.208	3.860	154.4	
	12	D0	0	0	-	0.000	0.0	
	13	D0	0	0	-	0.000	0.0	
	14	D0	0	0	-	0.000	0.0	
	15	D0	0	0	-	0.000	0.0	
	16	D14	2,679	110	1.208	3.240	356.4	
	17	D0	0	0	-	0.000	0.0	
C-	1	D32	9,696	112	6.313	61.200	6,854.4	
	2	D16	16,318	44	1.578	25.800	1,135.2	
	3	D16	3,479	64	1.578	5.490	351.4	
F-	1	D22	11,570	25	2.984	34.500	862.5	
	2	D22	15,087	47	2.984	45.000	2,115.0	
	3	D32	10,300	55	6.313	65.000	3,575.0	
	4	D22	7,570	37	2.984	22.600	836.2	
	5	D20	7,500	16	2.466	18.500	296.0	
	6	D20	10,800	16	2.466	26.600	425.6	
	7	D16	4,698	94	1.578	7.420	697.5	
R		D10	29,000	1	0.617	17.900	17.9	
							20,292.9	

D32	10429.4
D28	0.0
D25	1478.4
D22	3813.7
D20	721.6
D16	2629.9
D14	1202.0
D10	17.9
TOTAL	20292.9

P2

Item	Formula	Quantity
Pier		
1. Concrete (Class E)		
	V1 = 11.400 x 2.300 x 0.800 =	20.976 m3
	V2 = 11.400 x 0.400 x 0.340 =	1.550 m3
	V3 =(11.400 + 6.900)x 1/2 x 2.300 x 0.800 =	16.836 m3
	V4 =(0.700^2 x π + 1.400 x 5.100) x 5.560 =	48.257 m3
	V5 = 11.000 x 7.000 x 2.000 =	154.000 m3
	Total (One Pier)	241.619 m3
2. Form		
	A1 = 11.400 x 0.800 x 2 =	18.240 m2
	A2 = 11.400 x 0.340 x 2 =	7.752 m2
	A3 =(11.400 + 6.900)x 1/2 x 0.800 x 2.000 =	14.640 m2
	A4 = 0.800 x 2.300 x 2 =	3.680 m2
	A5 = 0.400 x 0.340 x 2 =	0.272 m2
	A6 =(0.800^2 + 2.250^2)$^{0.5}$x 2.300 x 2 =	10.985 m2
	A7 = 6.900 x 2.300 -(0.700^2 x π + 1.400 x 5.100) =	7.191 m2
	A8 =(11.000 + 7.000)x 2 x 2.000 =	72.000 m2
	Total (flat)	134.760 m2
	A9 =(1.400^2 x π + 5.100 x 2) x 5.560 =	90.948 m2
	Total (curve)	
3. Re-Bar		

D32	10171.8
D25	1478.4
D22	3813.7
D20	721.6
D16	2695.6
D14	1497.4
D10	29.8
TOTAL	20408.3

P2

Item	Formula	Quantity
4. Lean Concrete	V = 11.200 x 7.200 x 0.1000 =	8.064 m3
5. Blinding Stone	V = 11.200 x 7.200 x 0.2000 =	16.128 m3
6.Excavation	Excavation Height 3.150	
	V =(12.200 x 8.200 + 15.350 x 11.350) x 1/2 x 3.150 =	431.963 m3
7.Back Fill	V = 431.963 - 16.128 - 8.064 - 11.000 x 7.000 x 2.000 -(0.700^2 x n + 1.400 x 5.100)x 0.850 =	246.394 m3

LIST OF REINFORCEMENT

SIGN		DIAMETER	LENGTH	NOS.	UNIT WEIGHT	PIECE WEIGHT	TOTAL WEIGH	NOTE
B-	1	D25	11,985	32	3.853	46.200	1,478.4	
	2	D16	6,870	10	1.578	10.800	108.0	
	3	D16	3,463	6	1.578	5.470	32.8	
	3'	D16	3,491	6	1.578	5.510	33.1	
	4	D16	11,200	9	1.578	17.700	159.3	
	4'	D16	9,259	6	1.578	14.600	87.6	
	5	D16	2,710	8	1.578	4.280	34.2	
	6	D16	1,310	4	1.578	2.070	8.3	
	7	D16	3,803	4	1.578	6.000	24.0	
	7'	D16	3,831	4	1.578	6.050	24.2	
	8	D14	5,649	35	1.208	6.830	239.1	
	9	D14	4,890	20	1.208	5.910	118.2	
	10	D14	3,950	35	1.208	4.770	167.0	
	11	D14	3,191	20	1.208	3.860	77.2	
	12	D14	4,929	35	1.208	5.960	208.6	
	13	D14	4,170	20	1.208	5.040	100.8	
	14	D14	2,315	35	1.208	2.800	98.0	
	15	D14	1,936	20	1.208	2.340	46.8	
	16	D14	2,679	110	1.208	3.240	356.4	
	17	D14	1,279	55	1.208	1.550	85.3	
C-	1	D32	9,336	112	6.313	58.900	6,596.8	
	2	D16	16,318	44	1.578	25.800	1,135.2	
	3	D16	3,479	64	1.578	5.490	351.4	
F-	1	D22	11,570	25	2.984	34.500	862.5	
	2	D22	15,087	47	2.984	45.000	2,115.0	
	3	D32	10,300	55	6.313	65.000	3,575.0	
	4	D22	7,570	37	2.984	22.600	836.2	
	5	D20	7,500	16	2.466	18.500	296.0	
	6	D20	10,800	16	2.466	26.600	425.6	
	7	D16	4,698	94	1.578	7.420	697.5	
R		D10	48,400	1	0.617	29.800	29.8	
							20,408.3	

D32	10171.8	
D28	0.0	
D25	1478.4	
D22	3813.7	
D20	721.6	
D16	2695.6	
D14	1497.4	
D10	29.8	
TOTAL	20408.3	

P3

Item	Formula	Quantity
Pier P3		
1. Concrete (Class E)		
	$V1 = (1.500^2 \times \pi + 3.500 \times 3.000) \times 12.000$	= 210.823 m3
	$V2 = 10.500 \times 10.500 \times 3.000$	= 330.750 m3
	Total (One Pier)	541.573 m3
2. Form		
	$A1 = (3.000^2 \times \pi + 3.500 \times 2) \times 12.000$	= 423.292 m2
	Total (curve)	
	$A2 = (10.500 + 10.500) \times 2 \times 3.000$	= 126.000 m2
	Total (flat)	
3. Re-Bar	D32 41221.1 D25 7154.6 D22 10909.4 D20 1281.6 D16 162.0 TOTAL 60728.7	
4. Lean Concrete	$V = 10.700 \times 10.700 \times 0.1000$	= 11.449 m3
5. Blinding Stone	$V = 10.700 \times 10.700 \times 0.2000$	= 22.898 m3
6.Excavation	$H = (4.98 + 6.820 + 8.700 + 5.060) \times 1/4$	= 5.145
	Excavation Height= 5.145	
	$V = (14.500^2 \times 2 - 2.150 \times 5.700) \times 5.145 \times 1/2$	= 1050.210 m3
7.Rip Rap	$V = 1050.210 - (22.898 + 11.449 + 10.500 \times 10.500 \times 3.000 + (1.500^2 \times \pi + 3.500 \times 5.100) \times 1.345)$	= 651.598 m3
8.Blinding Concrete	$V = (14.500^2 \times 2.000 - 2.150 \times 5.700) \times 0.500 \times 1/2$	= 102.061 m3

LIST OF REINFORCEMENT P3

SIGN	DIAMETER	LENGTH	NOS.	UNIT WEIGHT	PIECE WEIGHT	TOTAL WEIGH	NOTE
C 1- 1	D32	15,687	126	6.313	99.000	12,474.0	
1- 2	D32	15,687	126	6.313	99.000	12,474.0	
2	D22	18,422	71	2.984	55.000	3,905.0	
3	D22	17,794	52	2.984	53.100	2,761.2	
4	D22	6,827	208	2.984	20.400	4,243.2	
F- 1	D32	16,820	42	6.313	106.000	4,452.0	
2	D32	11,520	41	6.313	72.700	2,980.7	
3	D32	16,756	42	6.313	106.000	4,452.0	
4	D25	11,174	166	3.853	43.100	7,154.6	
5	D20	10,812	48	2.466	26.700	1,281.6	
6	D32	7,562	92	6.313	47.700	4,388.4	
R	D16	102,400	1	1.578	162.000	162.0	
						60,728.7	

D32	41221.1	
D25	7154.6	
D22	10909.4	
D20	1281.6	
D16	162.0	
TOTAL	60728.7	

P4

Item	Formula	Quantity
Pier		
1. Concrete (Class E)		
	$V1 = (1.500^2 \times \pi + 3.500 \times 3.000) \times 12.000 =$	210.823 m3
	$V2 = 10.500 \times 10.500 \times 3.000 =$	330.750 m3
	Total (One Pier)	541.573 m3
2. Form		
	$A1 = (3.000^2 \times \pi + 3.500 \times 2) \times 12.000 =$	423.292 m2
	Total (curve)	
	$A2 = (10.500 + 10.500) \times 2 \times 3.000 =$	126.000 m2
	Total (flat)	
3. Re-Bar		
	D32 41221.1	
	D25 7154.6	
	D22 10909.4	
	D20 1281.6	
	D16 162.0	
	TOTAL 60728.7	
4. Lean Concrete	$V = 10.700 \times 10.700 \times 0.1000 =$	11.449 m3
5. Blinding Stone	$V = 10.700 \times 10.700 \times 0.2000 =$	22.898 m3
6.Excavation	$H = (6.590 + 5.260 + 4.720 + 6.040) \times 1/4 =$ 5.653	
	Excavation Height= 5.653	
	$V = (14.500^2 \times 2 - 2.150 \times 5.700) \times 5.653 \times 1/2 =$	1153.904 m3
7.Rip Rap	$V = 1153.904 - (22.898 + 11.449 + 10.500 \times 10.500 \times 3.000 + (1.500^2 \times \pi + 3.500 \times 5.100) \times 1.853) =$	742.633 m3
8.Blinding Concrete	$V = (14.500^2 \times 2.000 - 2.150 \times 5.700) \times 0.500 \times 1/2 =$	102.061 m3

LIST OF REINFORCEMENT

SIGN	DIAMETER	LENGTH	NOS.	UNIT WEIGHT	PIECE WEIGHT	TOTAL WEIGH	NOTE
C 1- 1	D32	15,687	126	6.313	99.000	12,474.0	
1- 2	D32	15,687	126	6.313	99.000	12,474.0	
2	D22	18,422	71	2.984	55.000	3,905.0	
3	D22	17,794	52	2.984	53.100	2,761.2	
4	D22	6,827	208	2.984	20.400	4,243.2	
F- 1	D32	16,820	42	6.313	106.000	4,452.0	
2	D32	11,520	41	6.313	72.700	2,980.7	
3	D32	16,756	42	6.313	106.000	4,452.0	
4	D25	11,174	166	3.853	43.100	7,154.6	
5	D20	10,812	48	2.466	26.700	1,281.6	
6	D32	7,562	92	6.313	47.700	4,388.4	
R	D16	102,400	1	1.578	162.000	162.0	
						60,728.7	

D32	41221.1
D25	7154.6
D22	10909.4
D20	1281.6
D16	162.0
TOTAL	60728.7

P5

Item	Formula	Quantity
Pier P5		
1. Concrete (Class E)		
	V1 = 11.400 x 2.300 x 0.800 =	20.976 m3
	V2 = 11.400 x 0.400 x 0.340 =	1.550 m3
	V3 =(11.400 + 6.900)x 1/2 x 2.300 x 0.800 =	16.836 m3
	V4 =(0.700^2 x π + 1.400 x 5.100) x 5.560 =	48.257 m3
	V5 = 11.000 x 7.000 x 2.000 =	154.000 m3
	Total (One Pier)	241.619 m3
2. Form		
	A1 = 11.400 x 0.800 x 2 =	18.240 m2
	A2 = 11.400 x 0.340 x 2 =	7.752 m2
	A3 =(11.400 + 6.900)x 1/2 x 0.800 x 2.000 =	14.640 m2
	A4 = 0.800 x 2.300 x 2 =	3.680 m2
	A5 = 0.400 x 0.340 x 2 =	0.272 m2
	A6 =(0.800^2 + 2.250^2)$^{0.5}$x 2.300 x 2 =	10.985 m2
	A7 = 6.900 x 2.300 -(0.700^2 x π + 1.400 x 5.100) =	7.191 m2
	A8 =(11.000 + 7.000)x 2 x 2.000 =	72.000 m2
	Total (flat)	134.760 m2
	A9 =(1.400^2 x π + 5.100 x 2) x 6 =	90.948 m2
	Total (curve)	
3. Re-Bar		
	D32 10171.8 D25 1478.4 D22 3813.7 D20 721.6 D16 2695.6 D14 1497.4 D10 29.8 TOTA 20408.3	

P5

Item	Formula	Quantity
4. Lean Concrete	V = 11.200 x 7.200 x 0.1000 =	8.064 m3
5. Blinding Stone	V = 11.200 x 7.200 x 0.2000 =	16.128 m3
6.Excavation	Excavation Height= 2.800	
	V =(12.200 x 8.200 + 15.000 x 11.000) x 1/2 x 2.800 =	371.056 m3
7.Back Fill	V = 371.056 - 16.128 - 8.064 - 11.000 x 7.000 x 2.000 -(0.700^2 x π + 1.400 x 5.100)x 0.500 =	188.524 m3

LIST OF REINFORCEMENT

SIGN		DIAMETER	LENGTH	NOS.	UNIT WEIGH	PIECE WEIGH	OTAL WEIGH	NOTE
B-	1	D25	11,985	32	3.853	46.200	1,478.4	
	2	D16	6,870	10	1.578	10.800	108.0	
	3	D16	3,463	6	1.578	5.470	32.8	
	3'	D16	3,491	6	1.578	5.510	33.1	
	4	D16	11,200	9	1.578	17.700	159.3	
	4'	D16	9,259	6	1.578	14.600	87.6	
	5	D16	2,710	8	1.578	4.280	34.2	
	6	D16	1,310	4	1.578	2.070	8.3	
	7	D16	3,803	4	1.578	6.000	24.0	
	7'	D16	3,831	4	1.578	6.050	24.2	
	8	D14	5,649	35	1.208	6.830	239.1	
	9	D14	4,890	20	1.208	5.910	118.2	
	10	D14	3,950	35	1.208	4.770	167.0	
	11	D14	3,191	20	1.208	3.860	77.2	
	12	D14	4,929	35	1.208	5.960	208.6	
	13	D14	4,170	20	1.208	5.040	100.8	
	14	D14	2,315	35	1.208	2.800	98.0	
	15	D14	1,936	20	1.208	2.340	46.8	
	16	D14	2,679	110	1.208	3.240	356.4	
	17	D14	1,279	55	1.208	1.550	85.3	
C-	1	D32	9,336	112	6.313	58.900	6,596.8	
	2	D16	16,318	44	1.578	25.800	1,135.2	
	3	D16	3,479	64	1.578	5.490	351.4	
F-	1	D22	11,570	25	2.984	34.500	862.5	
	2	D22	15,087	47	2.984	45.000	2,115.0	
	3	D32	10,300	55	6.313	65.000	3,575.0	
	4	D22	7,570	37	2.984	22.600	836.2	
	5	D20	7,500	16	2.466	18.500	296.0	
	6	D20	10,800	16	2.466	26.600	425.6	
	7	D16	4,698	94	1.578	7.420	697.5	
R		D10	48,400	1	0.617	29.800	29.8	
							20,408.3	

D22	3813.7
D20	721.6
D16	2695.6
D32	10171.8
D28	0.0
D25	1478.4
D14	1497.4
D10	29.8
TOTAL	20408.3

P6

Item	Formula	Quantity
Pier P6		
1. Concrete (Class E)		
	V1 = 11.400 x 2.300 x 0.800 =	20.976 m3
	V2 =(11.400 + 6.900)x 1/2 x 2.300 x 0.800 =	16.836 m3
	V3 =(0.700^2 x π + 1.400 x 5.100) x 5.900 =	51.208 m3
	V4 = 11.000 x 7.000 x 2.000 =	154.000 m3
	Total (One Pier)	243.020 m3
2. Form		
	A1 = 11.400 x 0.800 x 2 =	18.240 m2
	A2 =(11.400 + 6.900)x 1/2 x 0.800 x 2.000 =	14.640 m2
	A3 = 0.800 x 2.300 x 2 =	3.680 m2
	A4 =(0.800^2 + 2.250^2)$^{0.5}$x 0.800 x 2 =	3.821 m2
	A5 = 6.900 x 0.800 -(0.700^2 x π + 1.400 x 5.100) =	-3.159 m2
	A6 =(11.000 + 7.000)x 2 x 2.000 =	72.000 m2
	Total (flat)	109.222 m2
	A7 =(1.400^2 x π + 5.100 x 2) x 5.900 =	96.509 m2
	Total (curve)	
3. Re-Bar		

D32	10429.4
D25	1478.4
D22	3813.7
D20	721.6
D16	2629.9
D14	1202.0
D10	17.9
TOTAL	20292.9

P6

Item	Formula	Quantity
4. Lean Concrete	V = 11.200 x 7.200 x 0.1000 =	8.064 m3
5. Blinding Stone	V = 11.200 x 7.200 x 0.2000 =	16.128 m3
6.Excavation	Excavation Height= 3.200	
	V =(12.200 x 8.200 + 15.400 x 11.400) x 1/2 x 3.200 =	440.960 m3
7.Back Fill	V = 440.960 - 16.128 - 8.064 - 11.000 x 7.000 x 2.000 -(0.700^2 x π + 1.400 x 5.100)x 0.900 =	254.957 m3

LIST OF REINFORCEMENT

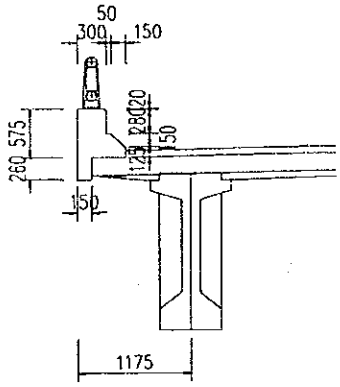
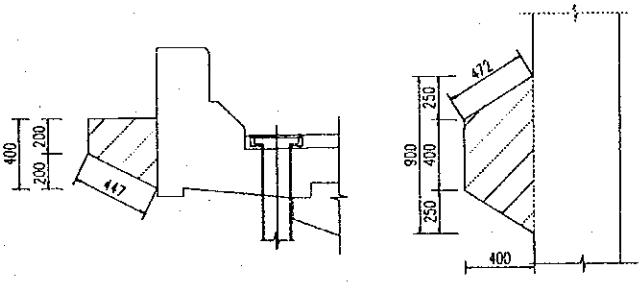
SIGN		DIAMETER	LENGTH	NOS.	UNIT WEIGH	PIECE WEIGH	OTAL WEIGH	NOTE
B-	1	D25	11,985	32	3.853	46.200	1,478.4	
	2	D16	6,870	10	1.578	10.800	108.0	
	3	D16	3,463	10	1.578	5.470	54.7	
	3'	D16	3,491	10	1.578	5.510	55.1	
	4	D16	11,200	6	1.578	17.700	106.2	
	4'	D16	9,259	6	1.578	14.600	87.6	
	5	D16	2,710	8	1.578	4.280	34.2	
	6	D0	0	0	-	0.000	0.0	
	7	D0	0	0	-	0.000	0.0	
	7'	D0	0	0	-	0.000	0.0	
	8	D14	5,649	35	1.208	6.830	239.1	
	9	D14	4,890	20	1.208	5.910	118.2	
	10	D14	3,950	70	1.208	4.770	333.9	
	11	D14	3,191	40	1.208	3.860	154.4	
	12	D0	0	0	-	0.000	0.0	
	13	D0	0	0	-	0.000	0.0	
	14	D0	0	0	-	0.000	0.0	
	15	D0	0	0	-	0.000	0.0	
	16	D14	2,679	110	1.208	3.240	356.4	
	17	D0	0	0	-	0.000	0.0	
C-	1	D32	9,696	112	6.313	61.200	6,854.4	
	2	D16	16,318	44	1.578	25.800	1,135.2	
	3	D16	3,479	64	1.578	5.490	351.4	
F-	1	D22	11,570	25	2.984	34.500	862.5	
	2	D22	15,087	47	2.984	45.000	2,115.0	
	3	D32	10,300	55	6.313	65.000	3,575.0	
	4	D22	7,570	37	2.984	22.600	836.2	
	5	D20	7,500	16	2.466	18.500	296.0	
	6	D20	10,800	16	2.466	26.600	425.6	
	7	D16	4,698	94	1.578	7.420	697.5	
R		D10	29,000	1	0.617	17.900	17.9	
							20,292.9	

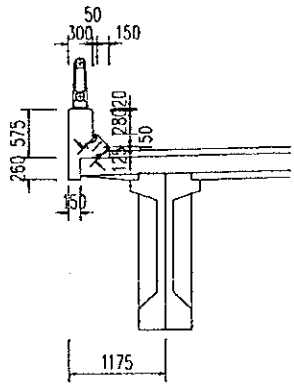
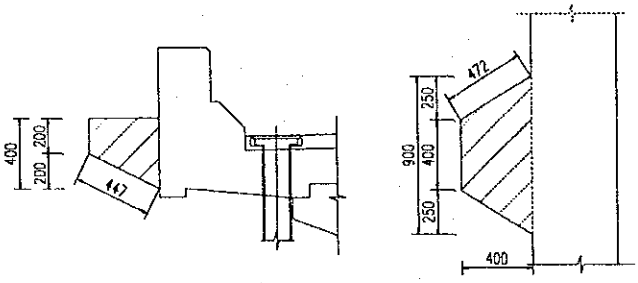
D32	10429.4	
D28	0.0	
D25	1478.4	
D22	3813.7	
D20	721.6	
D16	2629.9	
D14	1202.0	
D10	17.9	
TOTAL	20292.9	

Item	Formula	Quantity
Pile	P1,P2,P5,P6	
1)	Number of Pile	
	N = 6 = 6	6 Pill
2)	Total Length of Bored Piles ϕ 1500	
	L = 6 × 77.000 = 462.0	462.0 m
3)	Concrete Class D	
	V = 0.750 $^2\times$ π × 462.0 = 816.421	816.4 m^3
4)	Reinforcement	
	D10 1154.4 D16 33.4 D22 418.3 D25 4524.4 Total 6130.5	
Pile	`P3,P4	
1)	Number of Pile	
	N = 9 = 9	9 Pill
2)	Total Length of Bored Piles ϕ 1500	
	L = 9 × 71.000 = 639.0	639.0 m
3)	Concrete Class D	
	V = 0.750 $^2\times$ π × 639.0 = 1129.206	1129.2 m^3
4)	Reinforcement	
	D10 1084.1 D16 33.4 D22 380.3 D25 4848.0 Total 6345.8	

QUANTITY OF MISCELLANEOUS

Item		Work Item	Unit	Quantity	Remarks
Concrete	CLASS E	Parapet	m3	1061.84	
		Lighting pole base	m3	0.62	
Form		Parapet	m2	901.61	
		Lighting pole base	m2	2.44	
		Total		904.05	
Re-bar		Parapet	ton	41.183	
		Lighting pole base	ton	0.221	
		Total	ton	41.40	
Steel Railing			m	1065.60	
Lighting	Pole		set	7	
	Pipe Φ100		m	1065.60	
Drainage	Pot		set	38	
	Pipe Φ180		m	135.90	

Item	Formula	Quantity
1. Parapet CLASS "E"		
	A = {(0.300 × 0.575 + 0.260 × 0.150 + (0.125 + 0.275) × 0.150 × 1/2 + 0.275 × 0.050} × 2 × 2 = 1.021 m2	
	V = 1.021 × 260.000 × 4 = 1,061.84 m3	1,061.84 m3
2. Lighting CLASS "E"		
	V = (0.200 x 0.400 + 0.400 × 0.900) × 1/2 x 0.4 x 7 = 0.616 m3	0.616 m3

Item	Formula	Quantity
1. Parapet	 A = (0.575 + 0.260 + 0.15 + 0.125 + 0.212 + 0.280) × 2 × 2 × (28.050 + 25.200 + 37.200 + 25.200 + 25.050) = 901.61 m2	901.61 m2
2. Lighting	 A = { (0.900 + 0.400) × 0.447 × 1/2 + (0.400 + 0.200) × 0.4 × 1/2 × 2 + 0.2 × 0.400 } × 4 = 2.442 m2	2.442 m2

Accessories

Item	Formula	Quantity
1. Drainage		
	TOTAL EACH	
	EACH = 19 x 2 =	38 EACH
	PIPE	
	L1 = 0.98 x 30 = 29.4	
	L2 = 14.40 + 8.00 + 23.10 + 7.80 + 23.20	
	+ 7.90 + 14.20 + 7.90 = 106.50	
	Total	135.9 m
2. Steel railing	L = 260.000 x 4 = 1040.000	
	Length for abutment	
	L = 6.4 x 4 = 25.60 m	
	TOTAL LENGTH	
	L = 260.000 x 1 x 2 x 2 + 25.600 =	1065.600 m
3. Lighting	Each for one span	
	Each = 7	
	Total lighting poles	
	7 x 1 =	7 pole
	PVC pipe Φ100mm =	1065.600 m

Re-bar Parapet

Per 10m

SCHEDULE OF REINFORCEMENT (OF RAILING)												
BAR MARK	SIZE (mm)	DIMENSIONS (mm)						LENGTH (mm)	UNIT WEIGHT (kg/m)	NO. OF BARS	WEIGHT (kg)	REMARKS
		a	b	c	d	e	f					
P1	14	250	701	212	747	70		1980	1.208	68	162.65	
P2	14	230	297	176	275	245		1223	1.208	68	100.46	
P3	14	10000						10000	1.208	11	132.88	
Total											395.99	

Total Weight (kg)

Total = 395.99 / 10 × 260.0 × 4 = 41,182.96

Re-bar Lighting

Per BRIDGE

SCHEDULE OF REINFORCEMENT (OF LIGHTING)												
BAR MARK	SIZE (mm)	DIMENSIONS (mm)						LENGTH (mm)	UNIT WEIGHT (kg/m)	NO. OF BARS	WEIGHT (kg)	REMARKS
		a	b	c	d	e	f					
P1	20	113	825	320				1258	2.466	3	9.31	
P2	16	113	380	488	280			1261	1.578	3	5.97	
P3	20	1000	300	1000				2300	2.466	2	11.34	
P4	16	282	285	282				849	1.578	2	2.68	
P5	16	208	285	208				701	1.578	2	2.21	
Total											31.51	

Total Weight (kg)

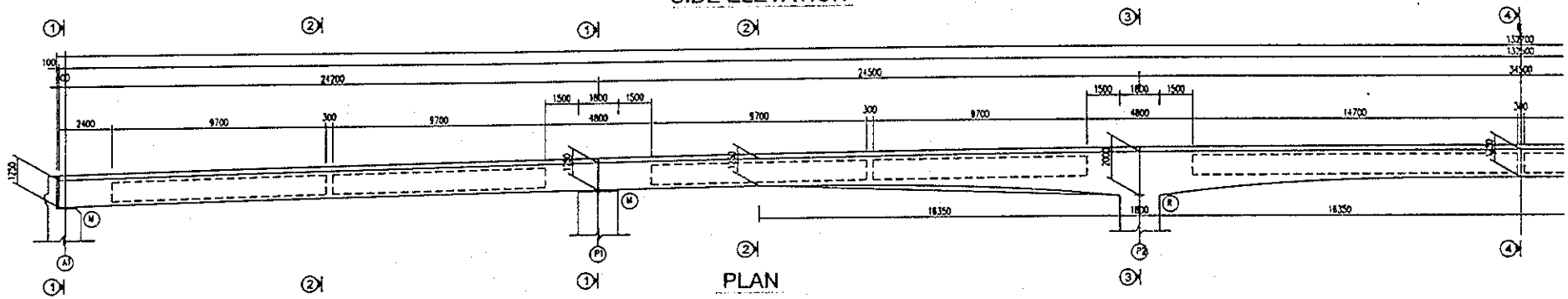
Total = 31.51 × 7 = 220.58

3.4. Interchange Bridge with NH.54

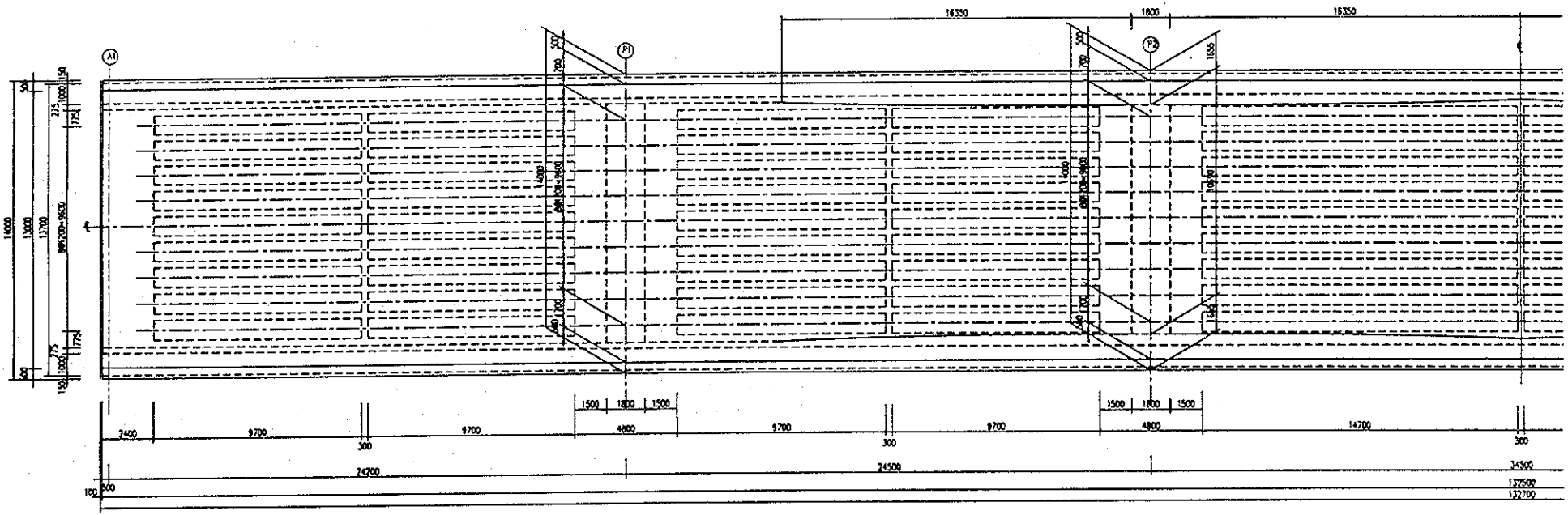
QUANTITY TABLE OF SUPERSTRUCTURE

ITEMS				UNIT	QUANTITY
A- HOLLOW SLAB	CONCRETE CLASS C			m3	1674
	ASPHALT CONCRETE 70mm			m2	1723
	WATER PROOFING 5mm			m2	1723
	CABLES 12S12.7			m	3185
	ANCHORAGE CABLES 12S12.7			set	48
	SHEATHING CABLES 12S12.7 Φ80/85mm			m	3185
	FILLING GROUT IN SHEATHING			m3	11
	REINFORCEMENT	16≤D≤25	D25	kg	17152
			D22	kg	7161
			D20	kg	23323
			D16	kg	55119
			TOTAL	kg	102754
		D≤14		kg	27649
		TOTAL		kg	130403
	FORM WORK FOR SLAB			m2	2089
	SCAFFOLGING WORK FOR HOLLOW			m2	2723
	SUPPORT WORK			m3	11682
B- PARAPET	CONCRETE CLASS D			m3	69
	REINFORCEMENT	D14		kg	10510
	FORM WORK			m2	454
C- RAILING				m	265
D- LIGHTING	LIGHTING POLES			poles	7
	CONCRETE CLASS E			m3	1
	REINFORCEMENT	D20		kg	145
		D16			76
	PVC PILE F100MM			m3	265
	FORM WORK			m2	4
E- DRAINAGE	DRAINAGE			set	20
	PVC PILE F200MM			m	62
F- EXPANSION JOINT 100MM				m	26
G- BEARING (700x350x50)MM				set	16
H- ANCHORAGE BAR Φ80MM				set	16

SIDE ELEVATION



PLAN



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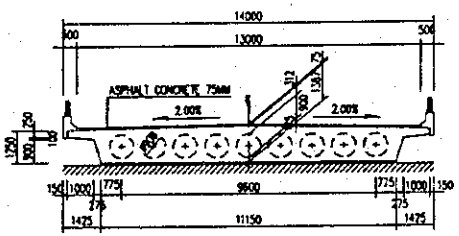

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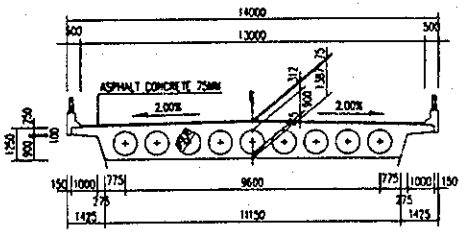

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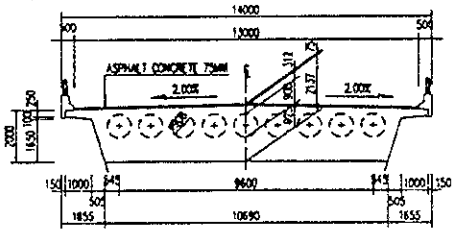
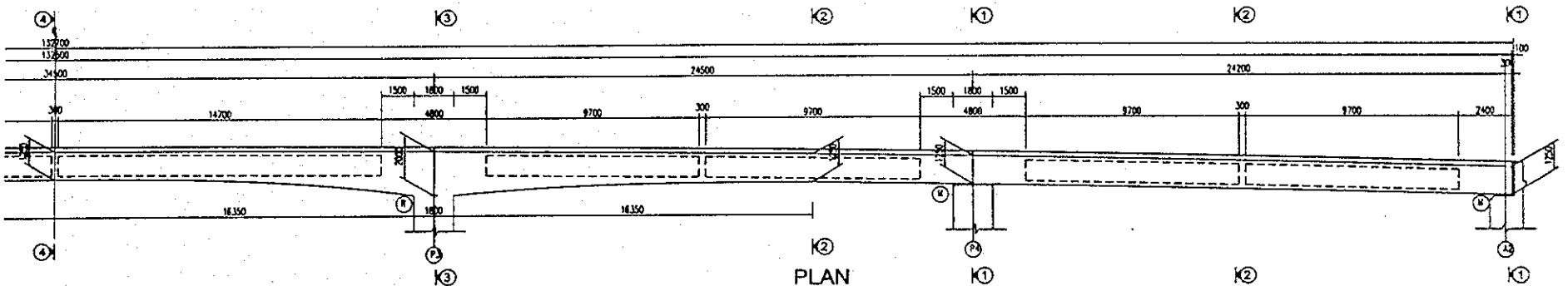


4 - 4

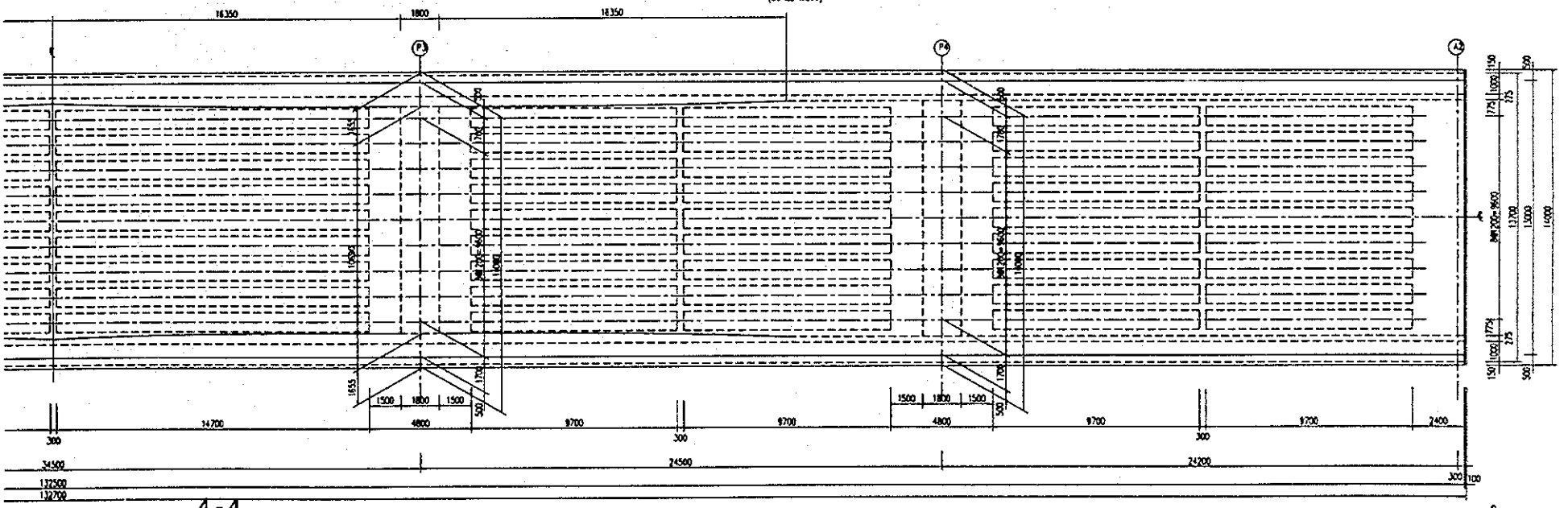
SIDE ELEVATION

(SCALE 1:200)



PLAN

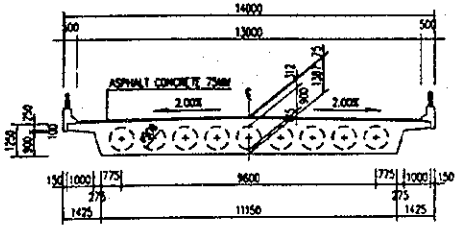
(SCALE 1:200)

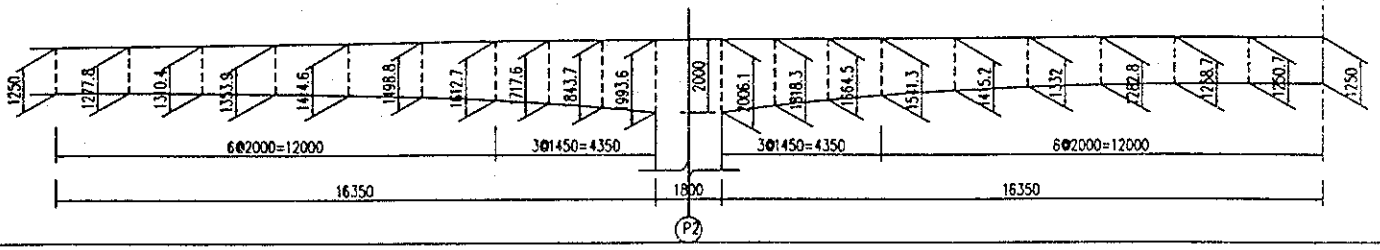


3 - 4 - 3

4 - 4

(SCALE 1:200)





I. CONCRETE:

I-1. HOLLOW SLAB:

SEC.	H	H1	H2	H3	H4	L1	L2	L3	L4	D	S	L	V
1-1	1250	250	370	1275.5	1387	1000	275	5575	11150	0	15.92	5.1	81.17
2-2	1250	250	370	1275.5	1387	1000	275	5575	11150	900	10.19	19.4	197.69
3-3	1250	250	370	1275.5	1387	1000	275	5575	11150	0	15.92	2.4	38.20
4-4	1250	250	370	1275.5	1387	1000	275	5575	11150	0	15.92		
4'-4'	1250	250	370	1275.5	1387	1000	275	5575	11150	900	10.19	4.85	49.42
5-5	1250	250	370	1275.5	1387	1000	275	5575	11150	900	10.19		
5'-5'	1250	250	370	1275.5	1387	1000	275	5575	11150	900	10.19	2	20.66
6-6	1277	250	370	1303.03	1414	1000	301.67	5548.3	11096.67	900	10.47		
6'-6'	1277	250	370	1303.03	1414	1000	301.67	5548.3	11096.67	900	10.47	2	21.30
7-7	1310	250	370	1336.57	1447	1000	328.33	5521.7	11043.33	900	10.82		
7'-7'	1310	250	370	1336.57	1447	1000	328.33	5521.7	11043.33	900	10.82	0.86	9.39
8-8	1328	250	370	1354.8	1465	1000	339.80	5510.2	11020.4	900	11.02		
8'-8'	1328	250	370	1354.8	1465	1000	339.80	5510.2	11020.4	900	11.02	0.3	3.32
9-9	1334	250	370	1360.88	1471	1000	343.80	5506.2	11012.4	900	11.08		
9'-9'	1334	250	370	1360.88	1471	1000	343.80	5506.2	11012.4	900	11.08	0.84	9.40
10-10	1354	250	370	1381.1	1491	1000	355.00	5495	10990	900	11.30		
10'-10'	1354	250	370	1381.1	1491	1000	355.00	5495	10990	900	11.30	2	23.26
11-11	1415	250	370	1442.63	1552	1000	381.67	5468.3	10936.67	900	11.96		
11'-11'	1415	250	370	1442.63	1552	1000	381.67	5468.3	10936.67	900	11.96	2	24.84
12-12	1499	250	370	1527.17	1636	1000	408.33	5441.7	10883.33	900	12.88		
12'-12'	1499	250	370	1527.17	1636	1000	408.33	5441.7	10883.33	900	12.88	2	27.02
13-13	1613	250	370	1641.7	1750	1000	435.00	5415	10830	900	14.14		
13'-13'	1613	250	370	1641.7	1750	1000	435.00	5415	10830	900	14.14	1.45	21.33
14-14	1718	250	370	1747.09	1855	1000	454.33	5395.7	10791.33	900	15.29		
14'-14'	1718	250	370	1747.09	1855	1000	454.33	5395.7	10791.33	900	15.29	1.45	23.18
15-15	1844	250	370	1873.47	1981	1000	473.67	5376.3	10752.67	900	16.68		
15'-15'	1844	250	370	1873.47	1981	1000	473.67	5376.3	10752.67	0	22.41	1.45	33.69
16-16	1994	250	370	2023.86	2131	1000	493.00	5357	10714	0	24.06		
16'-16'	1994	250	370	2023.86	2131	1000	493.00	5357	10714	0	24.06	0.9	21.67
17-17	2000	250	370	2030.1	2137	1000	505	5345	10690	0	24.11		
17'-17'	2000	250	370	2029.86	2137	1000	493.00	5357	10714	0	24.13	0.9	21.74
18-18	2006	250	370	2035.86	2143	1000	493.00	5357	10714	0	24.19		
18'-18'	2006	250	370	2035.47	2143	1000	473.67	5376.3	10752.67	0	24.22	1.45	33.60
19-19	1818	250	370	1847.47	1955	1000	473.67	5376.3	10752.67	0	22.11		
19'-19'	1818	250	370	1847.09	1955	1000	454.33	5395.7	10791.33	900	16.42	1.45	22.56
20-20	1665	250	370	1694.09	1802	1000	454.33	5395.7	10791.33	900	14.70		
20'-20'	1665	250	370	1693.7	1802	1000	435.00	5415	10830	900	14.72	1.45	20.33
21-21	1541	250	370	1569.7	1678	1000	435.00	5415	10830	900	13.32		
21'-21'	1541	250	370	1568.63	1678	1000	408.33	5468.3	10936.67	900	13.44	2	25.45
22-22	1415	250	370	1442.63	1552	1000	408.33	5468.3	10936.67	900	12.01		
22'-22'	1415	250	370	1442.1	1552	1000	381.67	5495	10990	900	12.04	2	23.13
23-23	1332	250	370	1359.1	1469	1000	381.67	5495	10990	900	11.09		
23'-23'	1332	250	370	1358.57	1469	1000	355.00	5521.7	11043.33	900	11.12	2	21.68
24-24	1283	250	370	1309.57	1420	1000	355.00	5521.7	11043.33	900	10.56		
24'-24'	1283	250	370	1309.03	1420	1000	328.33	5548.3	11096.67	900	10.59	2	20.90
25-25	1259	250	370	1285.03	1396	1000	328.33	5548.3	11096.67	900	10.31		
25'-25'	1259	250	370	1284.54	1396	1000	301.67	5573	11146	900	10.33	2	20.57
26-26	1251	250	370	1276.54	1388	1000	301.67	5573	11146	900	10.24		
26'-26'	1251	250	370	1276.5	1388	1000	277.00	5575	11150	900	10.21	1.85	18.87
27-27	1250	250	370	1275.5	1387	1000	277.00	5575	11150	900	10.19		

SEC.	H	H1	H2	H3	H4	L1	L2	L3	L4	D	S	L	V
27'-27'	1250	250	370	1275.5	1387	1000	275.00	5575	11150	0	15.92	0.15	2.39
28-28	1250	250	370	1275.5	1387	1000	275	5575	11150	0	15.92		
CONCRETE CLASS C									**1673.6**		(m^3)		

I.2 PARAPET

CONCRETE CLASS E: σ_{CK} = 24 Mpa

S = 150 x 300 + 500 x 125 + (350 + 500) x 150 / 2 + 300 x 300 -20 x 20 = 260850 mm^2)

L = 24.5 x 4 + 34.5 = 132.5 (m)

V = 0.261 x 132.5 x 2 = 69.1253 (m^3)

V = **69.13** (m^3)

I-3. LIGHTING:

CONCRETE CLASS E σ_{CK} = 24 Mpa

V = 0.078 x 7 = **0.546** (m^3)

V = **0.546** (m^3)

I-4. ASPHALT CONCRETE OF 70 mm THICKNESS :

L = 132.5 (m)

S = 13 x 132.5 = 1722.5 (m^2)

S = **1723** (m^2)

I-5. WATER PROOFING OF 5 mm THICKNESS :

L = 132.5 (m)

S = 13 x 132.5 = 1722.5 (m^2)

S = 1723 (m^2)

II. FORM WORK- SUPPORT:

II-1. FORM WORK FOR SLAB:

C_1 =	(0.25	+	1.005	+	0.941)	x	2	=	4.392	(m)
D_1 =								=	11.15	(m)
L_1 =	(49	-	0.9	-	16.35)	x	2	=	63.5	(m)
S_1 =	(4.392	+	11.15)	x	63.5			=	986.92	(m^2)
C2 =	(0.25	+	1.005	+	1.726)	x	2	=	5.962	(m)
C_2 =	(4.392	+	5.962)	:	2			=	5.177	(m)
D_2 =	(11.15	+	10.69)	:	2			=	10.92	(m)
L_2 =	(16.35	+	16.35	x	2	+	16.35)	=	65.4	(m)
S_2= (65.4	+	9.6)	x	5.177	+	10.92	x	65.4	=	1102.44	(m^2)
ΣS = S_1 + S_2 =			986.9	+	1102.44			=	2089.36	(m^2)
				ΣS				=	**2089.36**	(m^2)

II-2. FORM WORK FOR HOLLOW:

N =	(9.7	x	8	+	14.7	x	2)	x	9	=	963	(m)
L_3 =	0.9	x	π					=	2.827	(m)		
S_3 =	963	x	2.8274					=	2723	(m^2)		
					S_3			=	**2723**	(m^2)		

II-3. FORM WORK FOR PARAVET:

C =	0.875 + 0.15 + 0.05 + 0.125 + 0.15xSQRT(2) + 0.3						=	1.7121	(m)
L =							=	132.7	(m)
S_1 =	1.712	x	132.7	x	2		=	454.4	(m^2)
					S_1		=	**454.4**	(m^2)

II-4. FORM WORK FOR LIGHTING:

S_1 =	(0.2	+	0.4)	x	0.4	:	2	=	0.12	(m^2)
S_2 =	(0.2	x	0.4					=	0.08	(m^2)
S_3 =	(0.4	+	0.9)	x	0.447	:	2	=	0.29	(m^2)
Σ = (2 x S_1 + S_2 + S	0.12	x	2	+	0.08	+	0.291)	x	7	
					Σ S			=	**4.27**	(m^2)

II-4. SUPPORT:

H_tb =	(5.6	+	6.1	+	6.3	+	6.2 +	5.6) / 5	=	5.96	(m)
R =		14	+	1	+	1			=	16	(m)
L = (	24.5	x	4	+	34.5	) -	7.2	- 2.8	=	122.5	(m)
						V			=	**11682**	(m^3)

III. CABLE :

III-1. CABLE 12S12.7:

REINF	CABLE	LENGTH	NUMBER	TOTAL LENGTH
		mm		*M*
C1	12S12.7	132488	4	529.952
C2	12S12.7	132678	4	530.712
C3	12S12.7	132801	16	2124.816
TOTAL				3185.5

III-2. SHEATHING OF CABLE 12S12.7 ϕ 80/85 (mm):

L = 529.95 + 530.7 + 2124.8 = **3185.5** *(m)*

III-3. CABLE ANCHORAGES 12S12.7: **48** *(SET)*

III-4. CEMENT GROUT IN SHEATHING:

L = 529.95 + 530.7 + 2124.8 = 3185.5 *(m)*

V= (π x 0.08 x 0.08/4 - 12 x π x 0.0127 x 0.0127/4) x 3185.5 = 11.17 (m^3)

V = **11.17** (m^3)

IV.REINFORCEMENT :

IV-1. HOLLOW SLAB:

REINF No	DIA (MM)	LENGTH (MM)	NUMBER	UNIT WEIGHT KG/M	WEIGHT KG	REMARKS
A1	D20	12000	220	2.466	6510.6	
A2	D16	12000	220	1.578	4166.8	
A3	D16	9353	8	1.578	118.1	
A4	D16	8053	4	1.578	50.8	
A5	D16	7603	104	1.578	1248.0	
A6	D16	8903	104	1.578	1461.4	
A7	D16	6691	220	1.578	2323.3	
A8	D16	6111	110	1.578	1061.0	
A8'	D16	5945	110	1.578	1032.2	
A9	D25	12000	220	3.853	10172.9	
A10	D25	6766	110	3.853	2867.9	
A11	D16	12000	55	1.578	1041.7	
A12	D25	9698	110	3.853	4110.7	
A13	D16	9068	55	1.578	787.2	
A14	D12	7379	28	0.888	183.4	
A15	D12	9079	32	0.888	257.9	
A16	D22	12000	135	2.984	4834.1	
A17	D16	12000	132	1.578	2500.1	
A18	D22	10226	15	2.984	457.7	
A19	D22	7143	30	2.984	639.5	
A20	D22	8820	30	2.984	789.6	
A21	D22	11277	8	2.984	269.2	
A22	D22	6568	4	2.984	78.4	
A23	D22	4130	4	2.984	49.3	
A24	D22	3584	4	2.984	42.8	
A25	D16	10650	4	1.578	67.2	
A26	D16	7350	4	1.578	46.4	
A27	D16	4600	4	1.578	29.0	
A28	D16	8935	86	1.578	1212.8	
A29	D16	7215	86	1.578	979.3	
A30	D16	10422	4	1.578	65.8	
A31	D16	10892	4	1.578	68.8	
A32	D20	12000	360	2.466	10653.8	
A33	D16	12000	360	1.578	6818.4	
A34	D20	11703	8	2.466	230.9	
A35	D16	12000	86	1.578	1628.8	
A36	D16	12000	86	1.578	1628.8	
A37	D20	8064	86	2.466	1710.3	
A38	D20	9784	43	2.466	1037.5	
A39	D20	12000	43	2.466	1272.5	
A40	D20	2996	2	2.466	14.8	
A41	D20	7372	2	2.466	36.4	
A42	D20	8753	86	2.466	1856.4	
A43	D12	12000	220	0.888	2343.8	
A44	D12	7282	40	0.888	258.6	
A45	D12	7359	40	0.888	261.3	
A46	D12	7702	80	0.888	547.0	
A47	D16	2205	4	1.578	13.9	
A48	D16	888	250	1.578	350.4	

REINF No	DIA (MM)	LENGTH (MM)	NUMBER	UNIT WEIGHT KG/M	WEIGIT KG	REMARKS
T1	D12	10817	1061	0.8878	10189.3	
T2	D16	1429	1061	1.5783	2393.0	
T2A	D16	2317	1061	1.5783	3880.1	
T3	D12	11480	196	0.8878	1997.7	
T4	D16	11620	118	1.5783	2164.2	
T5	D12	11250	263	0.8878	2626.8	*AVERAGE*
T6	D12	11020	14	0.8878	137.0	
T7	D16	1328	1062	1.5783	2226.0	
T8	D16	1760	508	1.5783	1411.2	
T9	D16	2152	526	1.5783	1786.6	*AVERAGE*
T10	D16	2544	28	1.5783	112.4	
C1	D16	3088	16	1.5783	78.0	
C2	D16	3398	64	1.5783	343.2	*AVERAGE*
C3	D16	3328	220	1.5783	1155.6	
C4	D16	3638	880	1.5783	5052.9	*AVERAGE*
C5	D12	3066	400	0.8878	1088.8	*AVERAGE*
C6	D12	3414	474	0.8878	1436.7	*AVERAGE*
C7	D12	3755	1896	0.8878	6320.8	*AVERAGE*
C8	D16	4214	104	1.5783	691.7	
C9	D16	4789	416	1.5783	3144.4	
C10	D16	4320	52	1.5783	354.6	
C11	D16	4948	208	1.5783	1624.4	
TOTAL					**130403.1**	*KG*
D12					**27649.2**	*KG*
D16					**55118.7**	*KG*
D20					**23323.2**	*KG*
D22					**7160.6**	*KG*
D25					**17151.5**	*KG*

IV-2. PARAPET:

REINF No	DIA (MM)	LENGTH (MM)	NUMBER	UNIT WEIGHT KG/M	WEIGHT KG	REMARKS
P1	D14	1980	68	1.208	162.6	
P2	D14	1223	68	1.208	100.5	*PER*
P3	D14	10000	11	1.208	132.9	*10M LONG*
TOTAL		D14	*PER 10 M LONG*		**396.0**	*KG*
			ALL BRIDGE : 132.7 x 2 (m)		**10509.8**	

IV-3. LIGHTING:

REINF No	DIA (MM)	LENGTH (MM)	NUMBER	UNIT WEIGHT KG/M	WEIGHT KG	REMARKS
P1	D20	1258	3	2.466	9.3	
P2	D16	1261	3	1.578	6.0	
P3	D20	2300	2	2.466	11.3	
P4	D16	849	2	1.578	2.7	
P5	D16	701	2	1.578	3.7	
TOTAL		D20	*1 LIGHTING POLE*		**33.0**	*KG*
			ALL BRIDGE : 7		**231**	

V. PVC PILE:

V-1. LIGHTING: PVC PILE Φ 100mm

L = 132.7 + 132.7 = **265.4** *(m)*

V-2. DRAINAGE SYSTEM: PVC PILE Φ 200mm

L = 15.5 x 4 = **62** *(m)*

VI. LIGHTING POLE: N = **7** *(Poles)*

VII. RAILING: L = 132.7 + 132.7 = **265.4** *(m)*

VIII. DRAINAGE

DRAINAGE: 10 x 2 = **20** *(Set)*

IX. EXPANSION JOINT

EXPANSION JOINT 100 mm : 13 + 13 = **26** *(m)*

X. BEARING (700 x 350 x 50) (mm)

4 x 2 + 4 x 2 = **16** *(Set)*

XI. ANCHORAGE BAR ANCHORAGE BAR Φ 80 mm

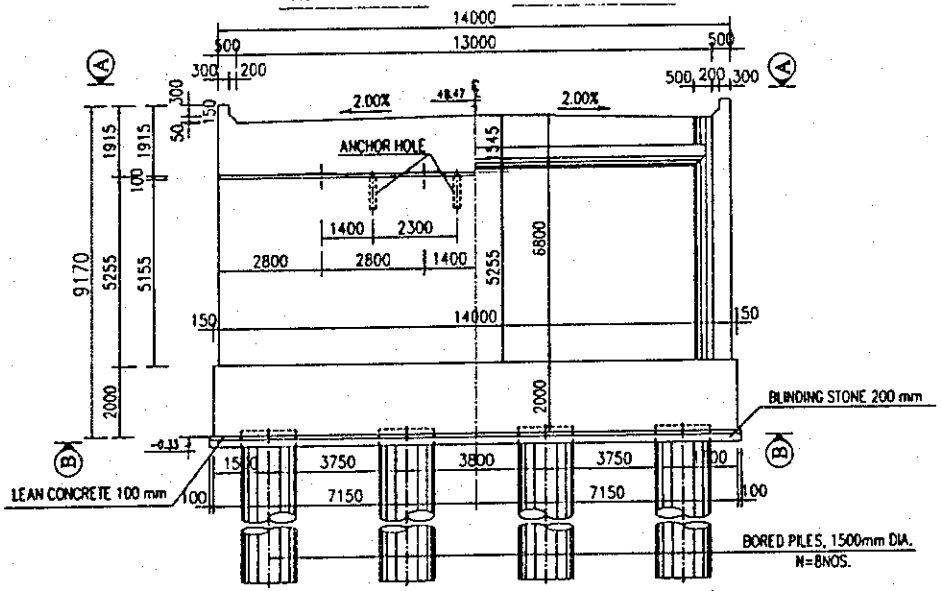
4 x 2 + 4 x 2 = **16** *(Set)*

QUANTITY TABLE OF ABUTMENT

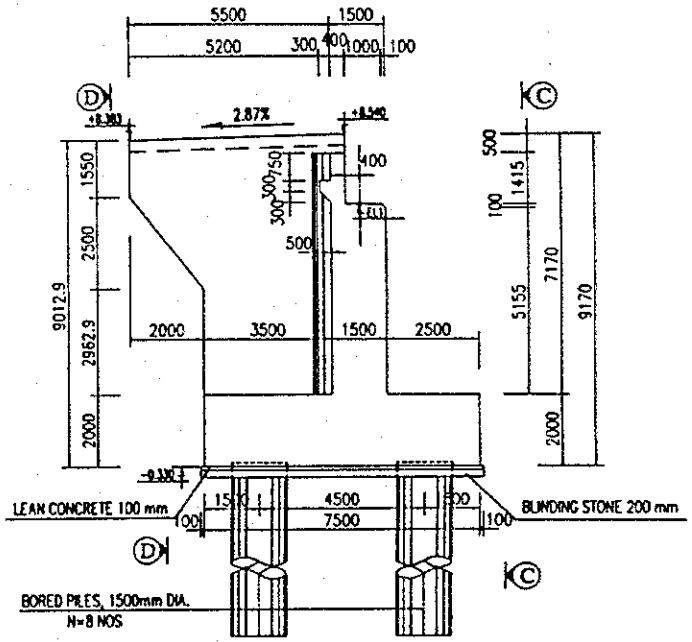
ITEMS				UNIT	ABUTMENT		TOTAL
					A1	A2	
A- ABUTMENT							
PILE	NUMBER OF PILES			PILE	8.0	8.0	16
	BORED PILES F1500MM DIA. TOTAL LENGTH			m	568.8	568.8	1138
	CONCRETE CLASS D			m3	1005.2	1005.2	2010
	REINFORCEMENT	D28		kg	14850.4	14850.4	29701
		16≤D≤25	D25	kg	32600.0	32600.0	65200
			D22	kg	3039.2	3039.2	6078
			D16	kg	267.2	267.2	534
			TOTAL	kg	35906.4	35906.4	71813
		D10		kg	8716.0	8716.0	17432
		TOTAL		kg	59472.8	59472.8	118946
ABUTMENT	CONCRETE CLASS E			m3	368.8	368.8	738
	REINFORCEMENT	16≤D≤25	D25	kg	8282.8	8282.8	16566
			D22	kg	3421.9	3421.9	6844
			D20	kg	3934.0	3934.0	7868
			D18	kg	580.0	580.0	1160
			D16	kg	3043.9	3043.9	6088
		TOTAL		kg	19262.6	19262.6	38525
		D≤14	D14	kg	1399.3	1399.3	2799
			D10	kg	140.9	140.9	282
			TOTAL	kg	1540.2	1540.2	3080
		TOTAL		kg	20802.8	20802.8	41606
	FORM			m2	302.4	302.4	605
	SCAFFOLGING WORK			m2	573.0	573.0	1146
	SUPPORT			m3	8.4	8.4	17
	LEAN CONCRETTE CLASS G			m3	9.8	9.8	20
	BLINDING STONE			m3	19.5	19.5	39
	EXCAVATION			m3	465.4	465.4	931
	FILLING			m3	217.4	217.4	435
B- APPROACH SLAB							
	CONCRETE CLASS E			m3	24.3	24.3	49
	LEAN CONCRETTE CLASS G			m3	7.5	7.5	15
	ASPHANTIC BIND FILLER T=20MM			m3	0.23	0.23	0.5
	FORM			m2	82.6	82.6	165
	REINFORCEMENT	16≤D≤25	D20	kg	1872.9	1872.9	3746
			D16	kg	1932.3	1932.3	3865
			TOTAL	kg	3805.2	3805.2	7610
		D10		kg	136.9	136.9	274
		TOTAL		kg	3942.1	3942.1	7884
C- SLOPE PROTECTION							
	STONE MASONRY T=300MM			m3	734.3	734.3	1469
	BLINDING AGGREGATE T=100MM			m3	245.1	245.1	490
	GEOTEXTILE			m2	600.0	600.0	1200
	PVC PILE 50MM DIA., L=1000MM			m	68.0	68.0	136
	EXCAVATION			m3	592.0	592.0	1184
	FILLING			m3	411.0	411.0	822
FOOTING	WOODEN PILE L=3M			m	8219.0	8219.0	16438
	BLINDING STONE			m3	11.0	11.0	22
	STONE MASONRY			m3	49.3	49.3	99

DETAILS OF ABUTMENT

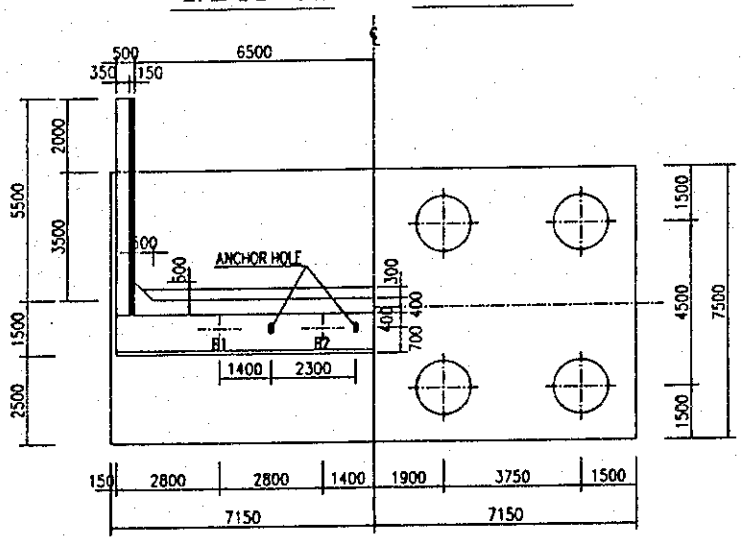
1/2 C -C 1/2 D - D



SIZE ELEVATION



1/2 A - A 1/2 B - B



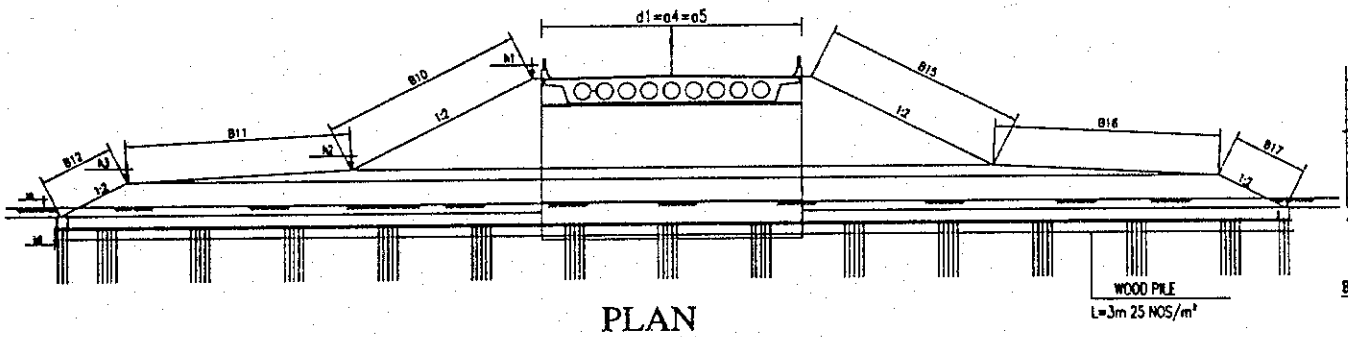
No.

Item	Formula								Quantity
1) Concrete									
	* BackWall								
	v1 =	14.30	x	1.42	x	0.40	=	8.09 m3	
	* Frontwall								
	v2 =	14.30	x {(	5.26	+	5.40	) /	2	
	x	1.50	-	0.10	^2 /	2	}=	114.18 m3	
	* Corbel								
	v3 =	0.30	x(	0.30	+	0.60	) /	2	
					x	13.30	=	1.80 m3	
	* Haunch								
	v4 =	6.67	x	0.50	x	0.50	/ 2 x 2		
							=	1.67 m3	
	*Wingwall								
	v5 =(	3.50	x(	6.67	+	6.57	) /	2	
	+	2.00	x(	1.05	+	3.61	) /	2)	
			x	0.50	x	2	=	27.83 m3	
	* Parapet								
	v7 =(	0.50	x	0.30	+	0.20	^2		
	-	0.15	^2/	2	)x	5.90	x	2	
							=	2.11 m3	
	*Footing								
	v6 =	14.30	x	7.50	x	2.00			
	-	8	x	pi	x	0.75	^2 x	0.1	
							=	213.09 m3	
							Total		368.8 m3
2) Form									
	* BackWall								
	a1 =	2.00 x		1.42	x	14.30	-		
	-	1.42 x (		0.50	+	0.50	) x	2	
							=	37.64 m2	
	* Frontwall								
	a2 =	14.3 x(		5.26	+	5.398	)		
	- (	0.5 +		0.5	) x	5.398	x	2	
	+	5.33 x		1.5	x	2	=	157.52 m2	
	* Corbel								
	a3 =(	0.3 + (		0.3	^2+	0.3	^2)^ 0.5)		
					x	13.3	=	9.63 m2	
	* Haunch								
	a4 =	+ (		0.5	^2+	0.5	^2)^ 0.5		
		x		6.67	x	2	=	9.43	
	*Wingwall								
	a5 =	2 x (		3.5	x (	6.67	+	6.57)x1/2x2	
		+		2	x (	1.05	+	3.61)x1/2x2	
	+	0.5 x (		1.05	+	3.20	+	2.96)	
		-		0.5	x	6.67	)=	111.85 m2	
	* Parapet								
	a5 =(	5.9 x(		0.5	+	0.3	+	0.05	
		+		1.4142	x	0.15	+	0.05)	
		+		2	x	0.17875	) x	2	
							=	13.84 m2	
	*Footing								
	a 6 =	2 x(		14.300	+	7.500	)x	2.00	
								87.20 m2	
							Total		427.1 m2
3) Scaffolding:	* H<=4m								
	A2 =(	2 x(		14.30	+	7.50	) +	8)	

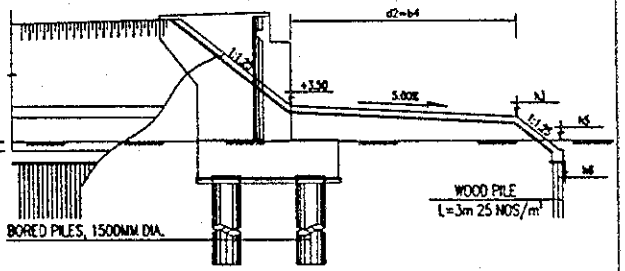
No.

Item	Formula	Quantity
	x 2. =	103.2 m2
	* 4m< H<=30m	
	A2 = {(14.3+2) + (5.5+1.5+2) + (0.5+2) + (5.5+1-1)	
	+(14.3-2 x 1.5) + (5.5-1+1) + (0.5+2) + (5.5+1.5+2)} x (1.42+5.26)	410.9 m2
4) Support	= (9.01 - 1.55 + 4.96) x 2.00 /2	
	x 0.50 x 2 =	12.4 m3
5) Lean Concrete	* Concrete class G	
	v = 0.1 x { (14.30 + 0.2) x (7.50 +	
	+ 0.2) - 8 x 1/4 x pi x 1.50 ^2}	
	=	9.8 m3
	* Form	
	A = 0.1 x { (14.30 + 0.2) + (7.50	
	+ 0.20)}x 2 =	4.44 m2
6) Blinding Stone		
	v = 0.2 x { (14.30 + 0.2) x (7.50 +	
	+ 0.2)- 8 x 1/4 x pi x 1.50 ^2}	
	=	19.5 m3
7) Bored Pile		
	* Concrete	
	= 8 x 1/4 x pi x 1.50 x 1.50	
	x (71.00 + 0.10) =	1005.2 m3
	* Excavation Length	
	N<20: = 56.0 x 8 =	448.0 m
	20<N<40: 7.0 x 8 =	56.0 m
	40<N: 8.0 x 8 =	64.0 m
	* Excavation Volume	
	= 8 x 1/4 x pi x 1.50 x 1.50	
	x 71.00	1003.7 m3
8)Earthworks	* Excavation for foundation	
	= 2.15 / 6 x{ (9.50 x 16.30)	
	+ (13.8 x 20.6) + (9.50 + 13.8)	
	x (16.30 + 20.6) = 465.4 m3	
	* Excess Soil = Lean Concrete + Blinding Stone + Footing Volume + Pile Occupied Volume	
	Pile Occupied Volume = 8 x pi /4 x 1.50	
	x 1.50 x 0.400 = 5.65 m3	
	Excess Soil = 248.00 m3	
	* Back Fill =	217.4 m3
9) Approach Slab		
	* Concrete	
	= 12.94 x { 6.00 x 0.30	
	+ (0.30 + 0.50) / 2 x 0.20)	
	- 0.50 x 0.50 / 2 x 0.3	
	x 2 =	24.25 m3
	* Lean Concrete	
	= (0.30 + 0.28 + 5.20)	
	x 12.94 x 0.1 =	7.5 m3
	* Asphaltic Joint Filler	
	= { 0.30 x (0.02 + 0.06)/ 2	
	+ 0.30 x 0.02 } x 12.94 = 0.23	
	* Form	
	A = { 0.30 x 0.50 + (0.50 + 0.30)	
	/ 2.00 x 0.20 } x 2.00 + 0.50 x	
	x 12.94 = 6.93	

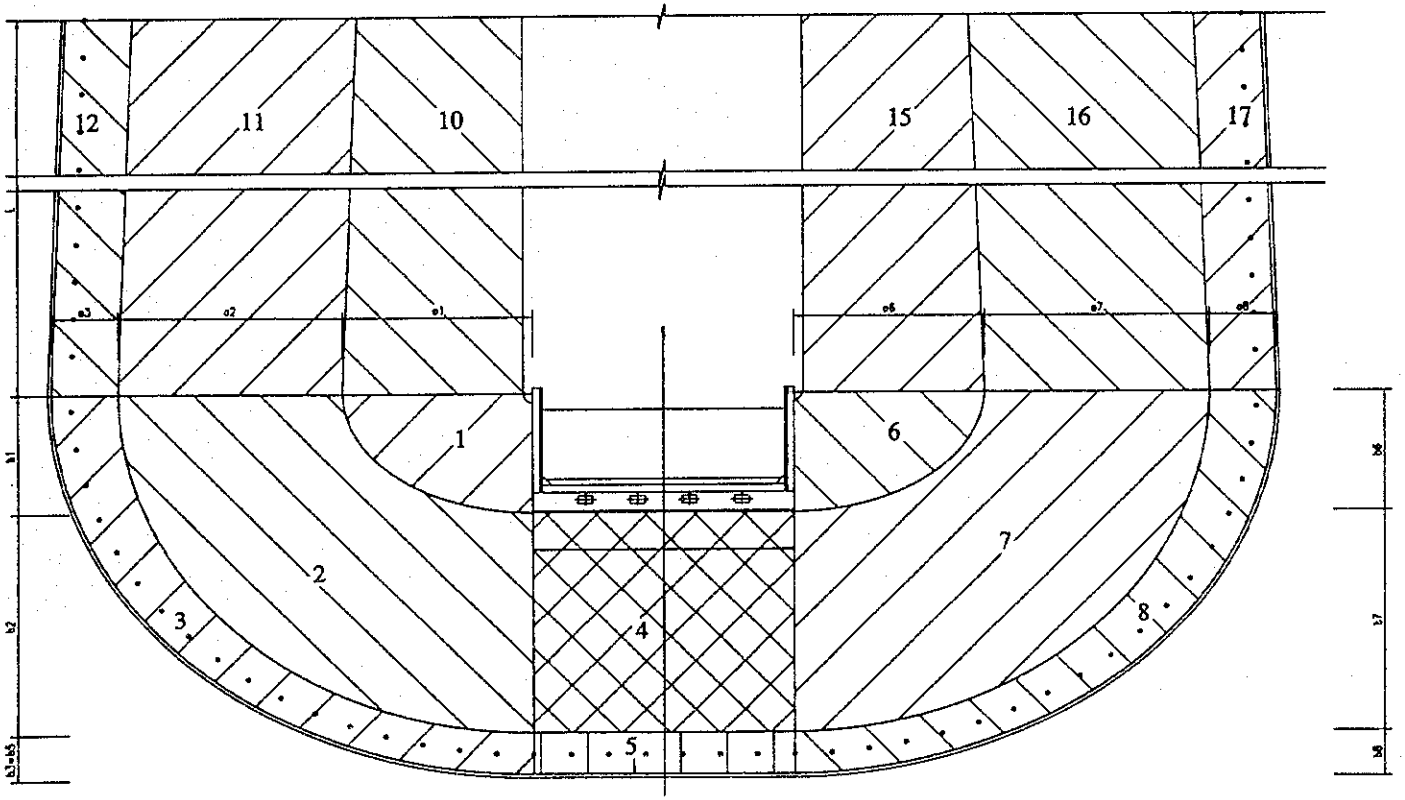
EARTHWORKS SLOPE PROTECTION



SIDE ELEVATION



PLAN



QUANTITIES FOR EARTHWORKS SLOPE PROTECTION

Bridge **INTERCHANGE 2**
Abutment A1

h1	h2	h3	h4	h5	h6	d1	d2
8.33	3.5	2.9	1.12	1.62	0.42	14	12

Block	a	b	Dh	R	r	L	Sxq	W	Masonry	Blinding
	(m)	(m)	(m)	(m)	(m)	(m)	(m2)	(m)	(m3)	(m3)
1	10.160	6.538	4.830	8.349	0.000	9.645	63.213		18.96	6.32
2	12.000	12.000	0.600	20.349	8.349	12.015	270.668		81.20	27.07
3	3.560	2.225	1.780	23.241	20.349	3.396	116.216		34.86	11.62
4	14.000	12.000	0.600				168.210		50.46	16.82
5	14.000	2.225	1.780				39.891		11.97	3.99
6	10.160	6.538	4.830	8.349	0.000	9.645	63.213		18.96	6.32
7	12.000	12.000	0.600	20.349	8.349	12.015	270.668		81.20	27.07
8	3.560	2.225	1.780	23.241	20.349	3.396	116.216		34.86	11.62
9			1.200				4.320	86.978		
Extra								77.895	332	111
Footing	WOOD PILE		(m)		5219					
	BLINDING		(m3)	V=0.1*0.8*86.978	7.0					
	STONE MASONRY		(m3)	V1=0.6*0.6*86.978	31.3					
						Geotextile	(m2)		350	
						PVC Pipe	(m)		43	
		ΣSxq (block 2,4,7)		(m2)	710	Excavation	(m3)		376	
			ΣSxq	(m2)	1108	Filling	(m3)		261	

Abutment A2

h1	h2	h3	h4	h5	h6	d1	d2
8.33	3.5	2.9	1.12	1.62	0.42	14	12

Block	a	b	Dh	R	r	L	Sxq	W	Masonry	Blinding
	(m)	(m)	(m)	(m)	(m)	(m)	(m2)	(m)	(m3)	(m3)
1	10.160	6.538	4.830	8.349	0.000	9.645	63.213		18.96	6.32
2	12.000	12.000	0.600	20.349	8.349	12.015	270.668		81.20	27.07
3	3.560	2.225	1.780	23.241	20.349	3.396	116.216		34.86	11.62
4	14.000	12.000	0.600				168.210		50.46	16.82
5	14.000	2.225	1.780				39.891		11.97	3.99
6	10.160	6.538	4.830	8.349	0.000	9.645	63.213		18.96	6.32
7	12.000	12.000	0.600	20.349	8.349	12.015	270.668		81.20	27.07
8	3.560	2.225	1.780	23.241	20.349	3.396	116.216		34.86	11.62
9			1.200				4.320	86.978		
Extra								77.895	332	111
Footing	WOOD PILE		(m)		5219					
	BLINDING		(m3)	V=0.1*0.8*86.978	7.0					
	STONE MASONRY		(m3)	V1=0.6*0.6*86.978	31.3					
						Geotextile	(m2)		350	
						PVC Pipe	(m)		43	
		ΣSxq (block 2,4,7)		(m2)	710	Excavation	(m3)		376	
			ΣSxq	(m2)	1108	Filling	(m3)		261	

NOTES :

* INPUT VALUES : GRAY CELLS ; TOTAL VALUES : BOLD NUMBERS
* No. of Blocks : see drawing. Extra block used for calculation only.

h_i : Elevations (see drawing)

d_i : Distances (see drawing)

a_i : Long edge of ellipse (or rectangle) : $a_i=Dh_i*slope_i$

b_i : Short edge of ellipse (or rectangle) : $b_i=Dh_i*slope_i$

Dh_i : Height of cone (or truncated cone)

R_i : Average radius of lower ellipse : $R_i=(Sa_i+Sb_i)/2$

r_i : Average radius of upper ellipse : $r_i=(Sa_{i-1}+Sb_{i-1})/2$

L_i : Generatrix of cone : $L_i=sqrt(Dh_i^2+(R_i-r_i)^2)$

Sxq_i : Area of cone's side (or plane before abutment) :

$Sxq_i=3.14/4*(R_i+r_i)*L_i$ for block 1,2,3,6,7,8

$Sxq_i=a_i*sqrt(b_i^2+Dh_i^2)$ for block 4,5

$Sxq_9=(1.8+1.8+Dh_9+2*Dh_9)*Dh_9/2$ for block 9

W : Length of masonry's footing : W_9

$W_9=2*3.14*R_3/4+a_5+2*3.14*R_8/4$, and

$W_{Ex}=2*3.14*R_2/4+a_5+2*3.14*R_7/4$

$Masonry_i$ = $0.3*Sxq_i$

$Blinding_i$ = $0.1*Sxq_i$

Geotextile = $Sxq_3+Sxq_5+Sxq_8+W_{Ex}*1$

PVC Pipe = $W_9/2$

Wood Pile = $W_9*0.8*25*3$

Excavation = W_9*Sxq_9

Filling = Excavation-$W_9*Dh_9*1.1$

INTERCHANGE 2 FLYOVER BRIDGE :

QUANTITIES OF EARTHWORKS SLOPE PROTECTION OF 25M BEHIND HEAD WALL

ABUTMENT A1 :

Block	B	L	S	Thick	Masonry	Blinding (T=0.1m)
	m	m	m2	m	m3	m3
10	10.80	25	270.01	0.30	81.00	27.00
11	12.01	25	300.37	0.30	90.11	30.04
12	4.00	25	100.06	0.30	30.02	10.01
15	10.80	25	270.01	0.30	81.00	27.00
16	12.01	25	300.37	0.30	90.11	30.04
17	4.00	25	100.06	0.30	30.02	10.01
Total			1340.89		402.27	134.09
Footing	0.80	25	20.00	0.10		4.00
	0.60	25	15.00	0.60	18.00	
	Wood pile (m) = 2 x L x B13 x 3 x 25 =					3000.00

Geotextile (m2)
= 2 x (L + S12) = 250

PVC pipe (m)
=2 x L/2 x 1m = 25

No	h	Dh	S	L	Total (m3)	
	m	m	m2	m	Excavation	Filling
5	1.62					
6	0.42	1.2	4.32	25	216	150

Excavation = 2 x S x L

Filling = Excavation - 2 x 25 x Dh x 1.1

ABUTMENT A2 :

Block	B	L	S	Thick	Masonry	Blinding (T=0.1m)
	m	m	m2	m	m3	m3
10	10.80	25	270.01	0.30	81.00	27.00
11	12.01	25	300.37	0.30	90.11	30.04
12	4.00	25	100.06	0.30	30.02	10.01
15	10.80	25	270.01	0.30	81.00	27.00
16	12.01	25	300.37	0.30	90.11	30.04
17	4.00	25	100.06	0.30	30.02	10.01
Total			1340.89		402.27	134.09
Footing	0.80	25	20.00	0.10		4.00
	0.60	25	15.00	0.6	18.00	
	Wood pile (m) = 2 x L x B13 x 3 x 25 =					3000.00

Geotextile (m2)
= 2 x (L + S12) = 250

PVC pipe (m)
= 2 x L/2 x 1m = 25

No	h	Dh	S	L	Total (m3)	
	m	m	m2	m	Excavation	Filling
5	1.62					
6	0.42	1.2	4.32	25	216	150

Excavation = 2 x S x L

Filling = Excavation - 2 x 25 x Dh x 1.1

LIST OF REINFORCEMENTS (FOR 1 ABUTMENT)

TYPE	DIAMETER (mm)	LENGTH (mm)	NUMBER	UNITWEIGHT (kg/m)	WEIGHT (kg)	REMARK
A1	14	1803	167	1.208	363.7	AVERAGE
A2	14	14226	13	1.208	223.4	
A3	16	1837	52	1.578	150.7	
A4	14	14226	2	1.208	34.4	
A5	14	720	56	1.208	48.7	
A6	16	760	56	1.578	67.2	
F1	25	10800	58	3.853	2413.5	
F2	25	7300	55	3.853	1547.0	
F3	25	8174	58	3.853	1826.7	
F4	25	4900	55	3.853	1038.4	
F5	20	8050	16	2.466	317.6	
F6	20	14750	16	2.466	582.0	
F7	16	4670	81	1.578	596.9	
F8	20	18250	30	2.466	1350.1	
F9	20	15147	30	2.466	1120.6	
W1	22	7410	56	2.984	1238.2	
W2	22	5185	55	2.984	851.0	
W3	16	7205	56	1.578	636.7	
W4	16	14587	20	1.578	460.4	
W5	14	1822	117	1.208	257.5	
W6	14	15016	26	1.208	471.6	
W7	16	1860	56	1.578	164.4	
K1	22	6085	8	2.984	145.3	
K2	22	2800	12	2.984	100.3	
K3	22	3200	22	2.984	210.1	
K4	25	9006	28	3.853	971.6	AVERAGE
K5	25	5787	16	3.853	356.8	
K6	22	5185	24	2.984	371.3	
K7	16	5120	4	1.578	32.3	
K8	18	6900	10	1.578	108.9	
K9	16	7280	8	1.578	91.9	
K10	16	1754	46	1.578	127.3	
K11	20	2250	14	2.466	77.7	
K12	16	8850	28	1.578	391.0	AVERAGE
K13	18	5115	24	1.998	245.3	
K14	10	756	208	0.617	97.0	
K15	22	6051	18	2.984	325.0	AVERAGE
K16	25	2389	14	3.853	128.9	AVERAGE
K17	18	5981	18	1.998	215.1	AVERAGE
K18	16	2389	14	1.578	52.8	
K19	20	3790	52	2.466	486.0	
K20	10	726	56	0.617	25.1	
K21	18	5882	2	1.998	23.5	
K22	22	5952	2	2.984	35.5	
K23	16	2251	56	1.578	163.4	
K24	22	6085	8	2.984	145.3	
K25	18	6015	8	1.998	96.1	
R1	10	400~800	56	0.617	18.8	AVERAGE

D10 :	140.9	(kg)	D20 :	3934.0	(kg)
D14	1399.3	(kg)	D22 :	3421.9	(kg)
D16 :	3043.9	(kg)	D25 :	8282.8	(kg)
D18 ;	580.0	(kg)			
TOTAL :	20802.8	(kg)			

LIST OF REINFORCEMENT
(FOR 1 APPROACH SLAB)

TYPE	DIAMETER (mm)	LENGTH OF BAR (mm)	U.WEIGHT (kg/m)	NUMBER	WEIGHT (Kg)
AS1	D20	5850	2.466	126	1817.7
AS2	D16	6620	1.578	110	1149.1
AS3	D16	6320	1.578	66	658.2
AS4	D16	1200	1.578	66	125.0
AS5	D20	700	2.466	32	55.2
AS6	D10	1580	0.617	32	31.2
AS7	D10	519	0.617	330	105.7
			D20		1872.9 kg
			D16		1932.3 kg
			D10		136.9 kg
			TOTAL :		3942.1 kg

LIST OF REINFORCEMENT
(FOR 1 NOS BORED PILE L=71M)

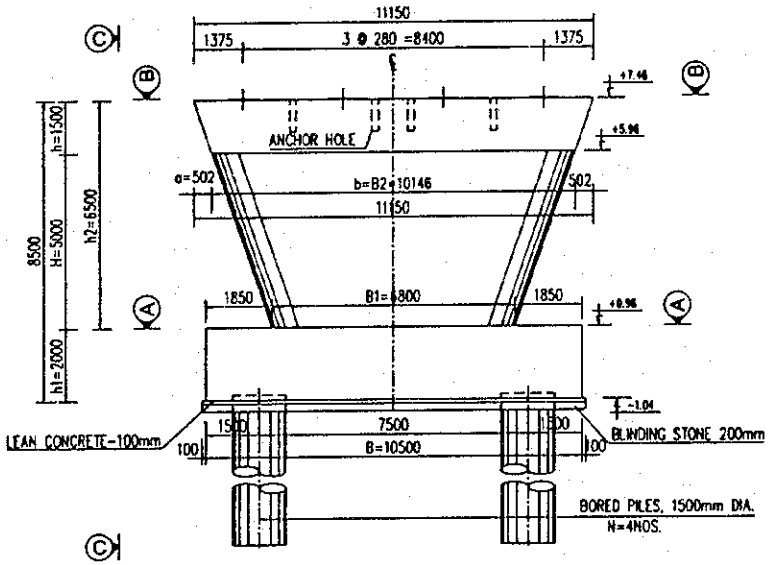
TYPE	D(mm)	LENGTH OF BAR (mm)	UNIT WEIGTH (kg/m)	NUMBER	WEIGTH (kg)
N1	D28	12000	4.834	32	1856.3
N2	D25	12000	3.853	80	3698.9
N3	D25	6100	3.853	16	376.1
N4	D22	4229	2.984	6	75.7
N5	D22	4248	2.984	24	304.2
N6	D10	152053	0.617	1	93.8
N7	D10	174681	0.617	1	107.9
N8	D10	1052968	0.617	1	649.7
N9	D10	4105	0.617	94	238.1
N10	D16	1322	1.578	16	33.4

D10	1089.5	kg
D16	33.4	kg
D22	379.9	kg
D25	4075.0	kg
D28	1856.3	kg
TOTAL	7434.1	kg

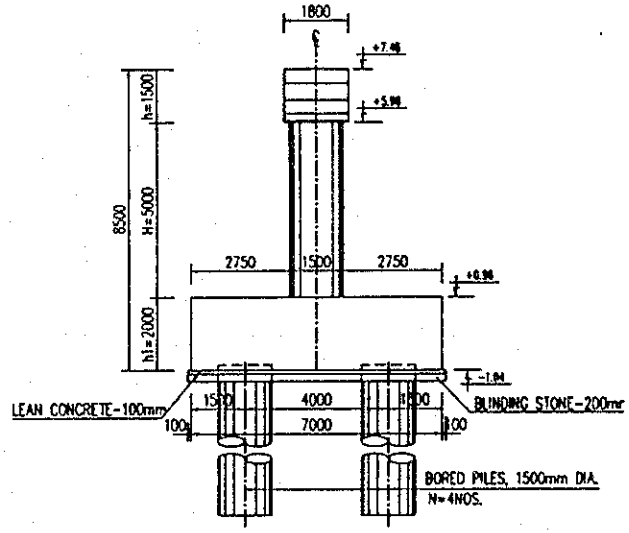
QUANTITY TABLE OF PIERS

ITEMS				UNIT	PIER P1	PIER P2	PIER P3	PIER P4	TOTAL
PILE	NUMBER OF PILES			PILE	4.0	6.0	6.0	4.0	20
	TOTAL LENGTH OF BORED PILES Ø 1500MI			m	300.0	450.0	450.0	300.0	1500
	CONCRETE CLASS D			m3	530.1	795.2	795.2	530.1	2651
	REINFORCEMENT	D28		kg	0.0	0.0	0.0	0.0	0
		16≤D≤25	D25	kg	17666.0	26499.0	26499.0	17666.0	88330
			D22	kg	1622.4	2433.6	2433.6	1622.4	8112
			D16	kg	133.6	200.4	200.4	133.6	668
			TOTAL	kg	19422.0	29133.0	29133.0	19422.0	97110
		D10		kg	4524.0	6786.0	6786.0	4524.0	22620
		TOTAL		kg	23946.0	35919.0	35919.0	23946.0	119730
PIER	CONCRETE CLASS E			m3	236.2	228.3	228.3	236.2	929
	REINFORCEMENT	D28		kg	3929.0	7999.9	7999.9	3929.0	23858
		16≤D≤25	D25	kg	7606.0	4195.1	4195.1	7606.0	23602
			D22	kg	1872.9	1850.0	1850.0	1872.9	7446
			D20	kg	725.7	1694.0	1694.0	725.7	4839
			D16	kg	2940.9	2961.8	2961.8	2940.9	11805
			TOTAL	kg	13145.5	10700.9	10700.9	13145.5	47693
		D≤14	D12	kg	703.7	743.6	743.6	703.7	2895
			D10	kg	18.8	0.0	0.0	18.8	38
			TOTAL	kg	722.5	743.6	743.6	722.5	2932
		TOTAL		kg	17797.0	19444.4	19444.4	17797.0	74483
	FORM			m2	189.2	168.2	168.2	189.2	715
	SCAFFOLGING WORK			m2	306.4	287.2	287.2	306.4	1187
	SUPPORT			m3	84.8	57.6	57.6	84.8	285
	LEAN CONCRETE			m3	7.0	6.6	6.6	7.0	27
	BLINDING STONE			m3	14.0	13.3	13.3	14.0	55
	EXCAVATION			m3	520.3	516.5	516.5	520.3	2074
	FILLING			m3	347.7	343.8	343.8	347.7	1383

PIER ELEVATION P1 (P4)

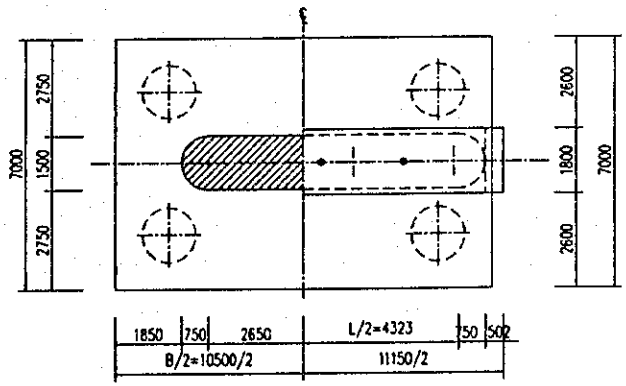


C - C

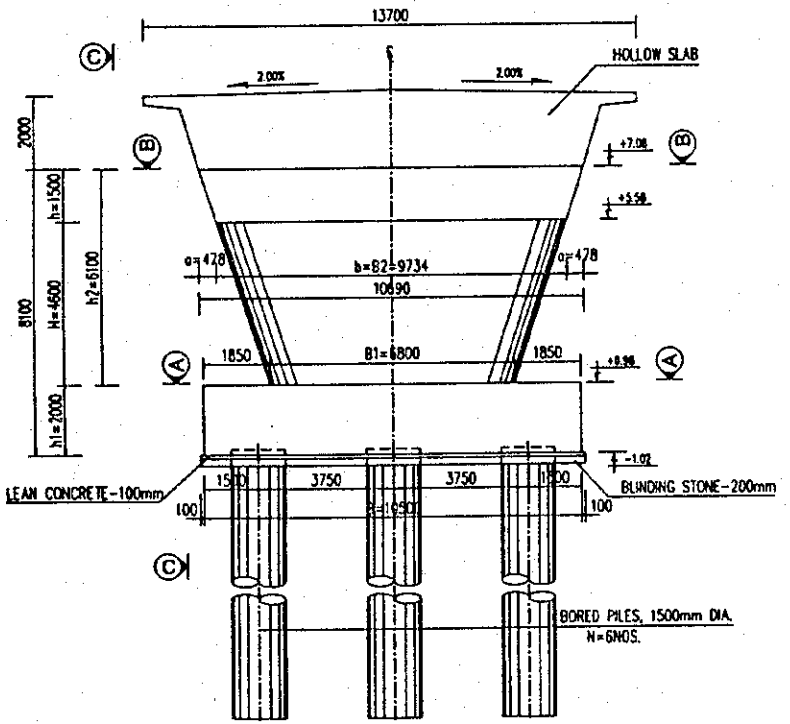


1/2 A - A

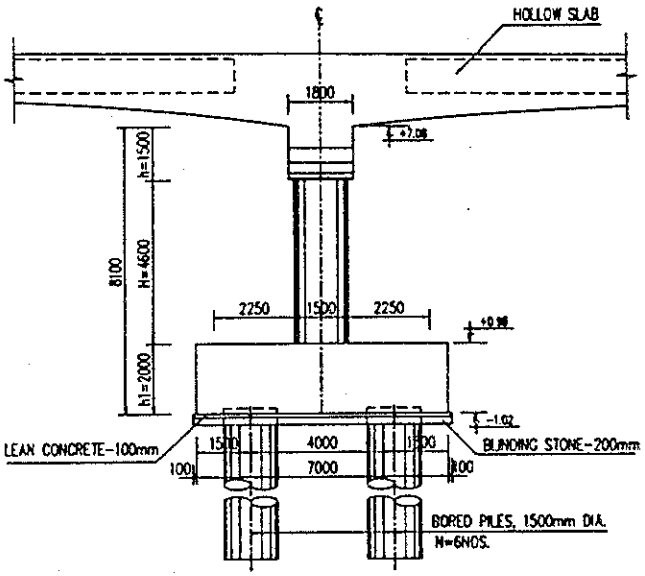
1/2 B - B



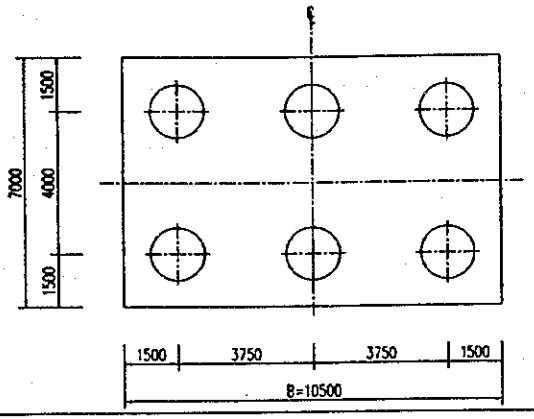
PIER ELEVATION P2 (P3)



C - C

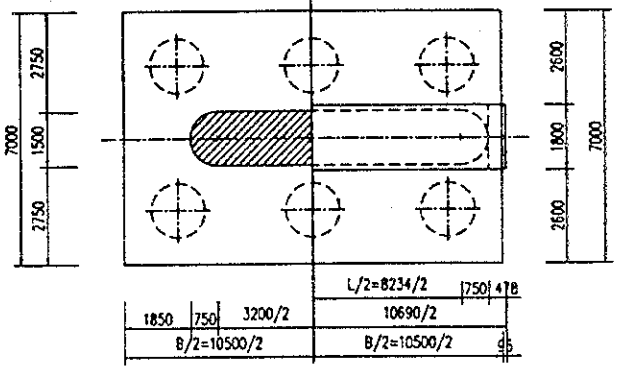


PIER CAP - PLAN



1/2 A - A

1/2 B - B



QUANTITY SURVEYING OF PIER

I. CONCRETE

1) BEAM

$A1=1/2*a*h*2+b*h$

$V1=A1*1.8$

2) COLUMN

$A1=\pi*1.5^2/4+(B1-1.5)*1.5$

$A2=\pi*1.5^2/4+(B2-1.5)*1.5$

$V=1/2*(A1+A2)*H$

3) FOOTING

$A=B*7.0$

$V=A*2.0-1/4\pi*1.5^2*0.1*n$

II. FORM

1) BEAM

$a1=1/2*a*h*2+b*h$

$A1=a1*2$

$A2=2*1.8*(a^2+h^2)^{1/2}$

$A3=b*1.8-(L*1.5+\pi*1.5^2/4)$

$A=A1+A2+A3$

2) COLUMN

$A=\pi*1.5*H+(B1+B2-1.5*2)*H$

3) FOOTING

$A=(B+7)*2*2$

III. SCAFFOLDING WORK

FRAMEWORK

1) H<4m

$A=[(B+2)+(7+2)]*2*h1$

2) 4m<H<30m

$A=[(2*a+b+2)+(1.8+2)]*2*h2$

IV. SUPPORT

ALLOWABLE LOAD

$2.81*1.5+0.4=4.62tf/m2$

$4.62<8tf/m2$

$A1=1/2(2*H+h)*a*2$

$A2=B2*1.8-\{\pi*1.5^2/4+(B2-1.5)*1.5\}$

$V1=A1*1.8$

$V2=A2*H$

$V3=\pi*1.5*H*(H/2)$

$V=V1+V2+V3$

V. LEANCONCRETE

1) CONCRETE

$V=\{7.2*(B+0.2)-1/4*\pi*1.5^2*n\}*0.10$

2) FORM

$A=(7.2+B+0.2)*2*0.10$

VI. BLINDING STONE

$V=\{7.2*(B+0.2)-1/4*\pi*1.5^2*n\}*0.20$

VII. CAST-IN-PLACE-CONCRETE PILE

1) PILE DIMENTION

D=1.5m,Lm,nnos

2) CONCRETE

$v1=1/4*\pi*1.5^2*L$

V1=v1*n

3) PILE HEAD TREAMENT

n(nos.)

4) EXCAVATION LENGTH

N<20(l1),20≤N≤40(l2),40≤N(l3)

L1=56*n,L2=7*n,L3=12*n

5) EXCAVATED MATERIALS

$v2=1/4*\pi*1.5^2*(l1+l2+l3)$

V2=v2*n

VIII. EARTH WORK

1) EXCAVATION FOR FOUNDATION

B1=7+2.2=9.2m,B2=B+2.2

B3=B1+2*h,B4=B2+2*h,h=h1+h2

v1=1/6*h*{B1*B2+B3*B4+(B1+B3)(B2+B4)}

$v2=1/4*\pi*1.5^2*1.1*n$

V1=v1-v2

2) EXCESS SOIL

V = FOOTING

v1=LEAN CONCRETE

v2=BLINDING STONE

v3=2.52*2*0.5=2.52m3(2.52 is column area)

$v4=1/4*\pi*1.5^2*0.4*n$

V2=V+v1+v2+v3+v4

3) BACK FILL

V3=V1-V2

I.CONCRETE VOLUME

		P1	P2	P3	P4
BEAM	h(m)	1.50	1.50	1.50	1.50
	a(m)	0.50	0.48	0.48	0.50
	b(m)	10.15	9.73	9.73	10.15
	V1(m^3)	28.75	27.57	27.57	28.75
COLUMN	n (nos.)	4	6	6	4
	H(m)	5.00	4.60	4.60	5.00
	B1(m)	6.80	6.80	6.80	6.80
	B2(m)	10.15	9.73	9.73	10.15
	A1(m^2)	9.72	9.72	9.72	9.72
	A2(m^2)	14.74	14.12	14.12	14.74
	V(m^3)	61.13	54.82	54.82	61.13
FOOTING	B	10.50	10.50	10.50	10.50
	V(m^3)	146.29	145.94	145.94	146.29
TOTAL		236.2	228.3	228.3	236.2

II. FORM

		P1	P2	P3	P4
BEAM	h(m)	1.50	1.50	1.50	1.50
	a(m)	0.50	0.48	0.48	0.50
	b(m)	10.15	9.73	9.73	10.15
	L(m)	8.65	8.23	8.23	8.65
	A1(m^2)	31.94	30.64	30.64	31.94
	A2(m^2)	5.69	5.67	5.67	5.69
	A3(m^2)	3.53	3.40	3.40	3.53
	A(m^2)	41.2	39.7	39.7	41.2
COLUMN	H(m)	5.00	4.60	4.60	5.00
	B1(m)	6.80	6.80	6.80	6.80
	B2(m)	10.15	7.80	7.80	10.15
	A(m^2)	93.29	75.04	75.04	93.29
FOOTING	B(m)	10.50	10.50	10.50	10.50
	A(m^2)	70	70	70	70
TOTAL		204.5	184.7	184.7	204.5

III. SCAFFOLDING WORK

		P1(m^2)	P2(m^2)	P3(m^2)	P4(m^2)
B	(m)	10.50	10.50	10.50	10.50
a	(m)	0.50	0.48	0.48	0.50
b	(m)	10.15	9.73	9.73	10.15
h1	(m)	2.00	2.00	2.00	2.00
h2	(m)	6.50	6.10	6.10	6.50
H<4m		86	86	86	86
4m≤H≤30m		220.4	201.2	201.2	220.4

IV.SUPPORT

		P1	P2	P3	P4
h	(m)	1.50	1.50	1.50	1.50
a	(m)	0.50	0.48	0.48	0.50
H	(m)	5.00	4.60	4.60	5.00
B2	(m)	10.15	9.73	9.73	10.15
V1	(m^3)	9.67	9.21	9.21	9.67
V2	(m^3)	17.63	15.65	15.65	17.63
V3	(m^3)	58.90	49.86	49.86	58.90
V	(m^3)	86.2	74.7	74.7	86.2

V. LEAN CONCRETE-BLINDING STONE

		P1	P2	P3	P4
B	(m)	10.5	10.5	10.5	10.5
n	(nos.)	4	6	6	4
LEAN	concrete	7.0	6.6	6.6	7.0
	form	3.58	3.58	3.58	3.58
BLINDING STONE (m^3)		14.0	13.3	13.3	14.0

VII.CAST-IN-PLACE-CONCRETE-PILE

		P1	P2	P3	P4
PILE DIMENTION	D(m)	1.5	1.5	1.5	1.5
	L(m)	75	75	75	75
	n(nos.)	4	6	6	4
CONCRETE	v1(m^3)	132.5	132.5	132.5	132.5
	V1(m^3)	530.1	795.2	795.2	530.1
EXCAVATION LENGTH	N<20(l1)	56	56	56	56
	L1(m)	224	336	336	224
	20≤N≤40(l2)	7	7	7	7
	L2(m)	28	42	42	28
	40≤N(l3)	12	12	12	12
	L3(m)	48	72	72	48
EXCAVATION MATERIALS	v2(m^3)	132.5	132.5	132.5	132.5
	V2(m^3)	530.1	795.2	795.2	530.1

VIII. EARTH WORK

		P1	P2	P3	P4
EXCAVATION FOR FOUNDATION	h1(m)	2	2	2	2
	h2(m)	0.5	0.5	0.5	0.5
	h(m)	2.8	2.8	2.8	2.8
	n(nos.)	4	6	6	4
	B(m)	10.5	10.5	10.5	10.5
	B1(m)	9.2	9.2	9.2	9.2
	B2(m)	12.7	12.7	12.7	12.7
	B3(m)	14.8	14.8	14.8	14.8
	B4(m)	18.3	18.3	18.3	18.3
	v1(m^3)	528.1	528.1	528.1	528.1
	v2(m^3)	7.8	11.7	11.7	7.8
	V(m^3)	520.3	516.5	516.5	520.3
EXCESS SOIL	FOOTING.V	146.29	145.94	145.94	146.29
	v1(m^3)	7.0	6.6	6.6	7.0
	v2(m^3)	14.0	13.3	13.3	14.0
	v3(m^3)	2.52	2.52	2.52	2.52
	v4(m^3)	2.8	4.2	4.2	2.8
	V2(m^3)	172.6	172.6	172.6	172.6
BACK FILL	V(m^3)	347.7	343.8	343.8	347.7

LIST OF REINFORCEMENT PEIR 1 & PIER 4 (FOR 1 PIER)

TYPE	DIAMETER (mm)	LENGTH (mm)	NUMBER	UNITWEIGHT (kg/m)	WEIGHT (kg)	REMARS
B1	25	10882	8	3.853	335.4	
B2	25	10000	8	3.853	308.2	
B3	12	1790	16	0.888	25.4	
B4	16	10443	12	1.578	197.7	AVERAGE
B5	12	2020	16	0.888	28.7	
B6	12	6788	81	0.888	488.2	
B7	12	3881	41	0.888	141.3	
B8	12	5632	4	0.888	20.0	AVERAGE
C1	25	8280	116	3.853	3700.7	AVERAGE
C2	16	20475	36	1.578	1163.1	AVERAGE
C3	16	3778	132	1.578	786.9	
F1	28	14778	55	4.834	3929.0	
F2	22	11068	28	2.984	924.8	
F3	25	10199	83	3.853	3261.6	
F4	22	7565	42	2.984	948.1	
F5	20	10298	16	2.466	406.3	
F6	20	8095	16	2.466	319.4	
F7	16	4569	110	1.578	793.1	
R	10	30400	1	0.617	18.8	
TOTAL		17796.9 KG				
	D28	3929.0 KG				
	D25	7606.0 KG				
	D22	1872.9 KG				
	D20	725.7 KG				
	D16	2940.9 KG				
	D12	703.7 KG				
	D10	18.8 KG				
				CONCRETE : 236.2 M3		

LIST OF REINFORCEMENT PIER 2 & PIER 3 (FOR 1 PIER)

TYPE	DIAMETER (mm)	LENGTH (mm)	NUMBER	UNITWEIGHT (kg/m)	WEIGHT (kg)	REMARS
B1	12	10426	8	0.888	74.1	
B2	16	9600	8	1.578	121.2	
B3	12	1785	16	0.888	25.4	
B4	16	10012	12	1.578	189.6	AVERAGE
B5	12	2020	16	0.888	28.7	
B6	12	6748	77	0.888	461.4	
B7	12	3850	39	0.888	133.3	
B8	12	5826	4	0.888	20.7	AVERAGE
B9	20	2550	154	2.466	968.4	
C1	25	9386	116	3.853	4195.1	AVERAGE
C2	16	20036	34	1.578	1075.0	AVERAGE
C3	16	3764	126	1.578	748.4	
F1	28	15069	55	4.834	4006.4	
F2	22	11065	28	2.984	924.5	
F3	28	10199	81	4.834	3993.5	
F4	22	7565	41	2.984	925.5	
F5	20	10295	16	2.466	406.2	
F6	20	8095	16	2.466	319.4	
F7	16	4601	114	1.578	827.7	
TOTAL		19444.3 KG				
	D28	7999.9 KG				
	D25	4195.1 KG				
	D22	1850.0 KG				
	D20	1694.0 KG				
	D16	2961.8 KG				
	D12	743.6 KG				
				CONCRETE : 228.3 M3		

LIST OF REINFORCEMENT
(FOR 1 NOS BORED PILE L=75M)

TYPE	D(mm)	LENGTH OF BAR (mm)	UNIT WEIGTH (kg/m)	NUMBER	WEIGTH (kg)
N1	D25	12000	3.853	84	3883.8
N2	D25	9875	3.853	14	532.7
N3	D22	4248	2.984	32	405.6
N4	D10	152053	0.617	1	93.8
N5	D10	182464	0.617	1	112.6
N6	D10	1128994	0.617	1	696.6
N7	D10	4105	0.617	90	228.0
N8	D16	1322	1.578	16	33.4

D10	1131.0	kg
D16	33.4	kg
D22	405.6	kg
D25	4416.5	kg
TOTAL	5986.5	kg

SUMMARY OF QUANTITY FOR INTERCHANGE 2 FLYOVER BRIDGE

ITEMS		UNIT	ABUTMENTS	PIERS	SUPER STRUCTERE	MISCELLANEOUS WORKS				TOTAL
						DRAINAGE	LIGHTING	PARAPET AND RAILING	PAVAMENT	
CONCRETE	CLASS C	m3			1674					1674
	CLASS D	m3	2010	2651						4661
	CLASS E	m3	786	929			1	69		1785
	CLASS G	m3	34	27						62
PC - STEEL	12 S12.7	m			3185					3185
SHEATHING OF CABLES 12S12.7 Φ80/85mm		m			3185					3185
ANCHORAGE CABLES 12S12.7		set			48					48
REINFORCEMENT	25<D≤32	kg	29701	23858	0					53559
	16≤D≤25	kg	117948	144803	102754		221			365726
	D≤14	kg	20786	25552	27649			10510		84497
	TOTAL	kg	168435	194213	130403		221	10510		503782
FORM WORK		m2	605	715	2089		4	454		3867
SCAFFOLDING WORK		m2	1146	1187	2723					5056
SUPPORT		m3	17	285	11682					11984
EXPANSION JOINT	100M	m	26							26
BEARING	700x350x50	set	8	8						16
ANCHORAGE BAR	Φ 80 mm	set	8	8						16
PVC PILE	Φ 50 mm	m	136							136
	Φ 100 mm	m					265			265
	Φ 200 mm	m				62				62
RAILING		m						287		287
LIGHTING POLE		set					7			7
DRAINAGE		set				20				20
PAVEMENT	WATERPROOFING	m2							1723	1723
	ASPHALT CONCRETE	m2							1723	1723
GEOTEXTILE		m2	1200							1200
STONE MASONRY		m3	1469							1469
BLINDING AGGREGATE		m3	490							490
BLINDING STONE		m3	39	55						94
WOODEN PILE , L=3M		m	8219							8219
FOOTING OF SLOPE PROTECTION		m	274							274
EXCAVATION GROUND		m3	2115	2074						4188
FILLING GROUND		m3	1257	1383						2640

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