

1.2.7 *Masonry revetment, Type II*

Summary of Work Quantities, Masonry Revetment, Type II

Package 1

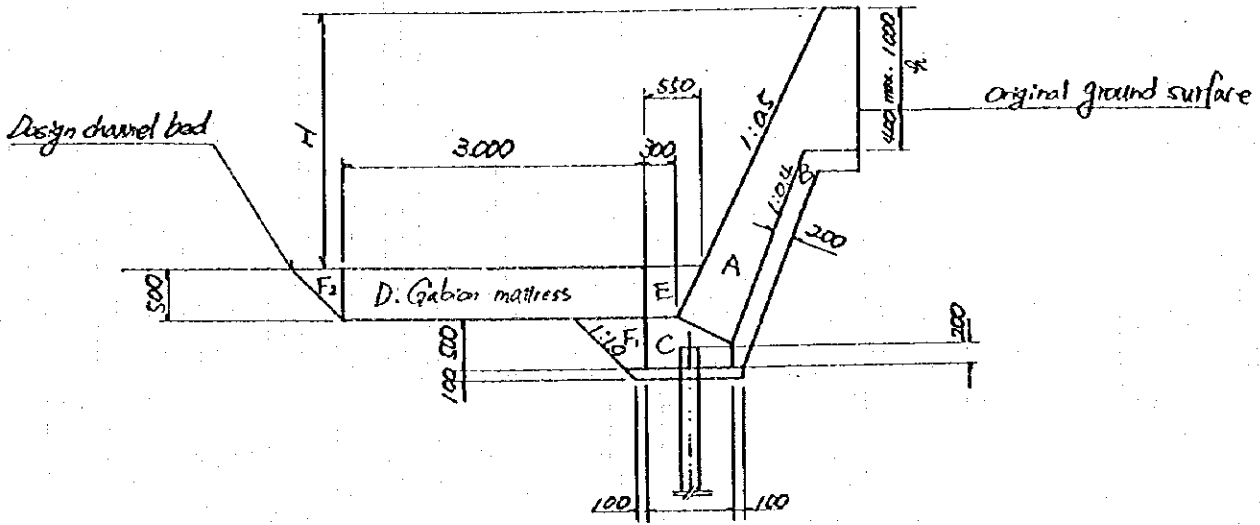
Item No.	Description	Unit	Total Package 1	Kamal				
				Stage1 main	Stage2 main	Total	Stage3	
							main	branch
2.6	Masonry Revetment, type II							
/ 01	Coffering and care of water including dewatering	L.S.						
/ 02	Excavation	cu.m	12,695		3,248	9,447	2,853	6,594
/ 03	Backfilling	cu.m	1,129		290	839	267	572
/ 04	Geo-textile, t=1.5 mm	sq.m	197		57	140	48	92
/ 05	Gravel bedding	cu.m	1,346		398	948	335	613
/ 06	Cobble/rubble filling	cu.m	688		177	511	163	348
/ 07	Wet cobble/rubble masonry, type 1	cu.m	5,252		1,494	3,758	1,288	2,470
/ 08	Gabion mattress, 3.0x1.5x0.5 m, PVC coated wire	cu.m	4,831		1,242	3,589	1,144	2,445
/ 09	PVC pipe for weep hole, diam. 50 mm	lin.m	1,231		354	877	303	574
/ 10	Furnishing and driving wooden piles, diam. 15-18cm	lin.m	4,857		1,243	3,609	1,149	2,460
/ 11	Concrete, type 4, for foundation	cu.m	802		205	597	190	407
/ 12	Concrete, type 5, for leveling	cu.m	323		85	238	77	161
/ 13	Form, type F1, for Item No. 2.6/11	sq.m	4,116		1,070	3,046	979	2,067
/ 14	Reinforcing bars, for Item No. 2.6/11	kg	32,003		8,176	23,827	7,574	16,253
/ 15	Rubber joint filler, t=10 mm	sq.m	882		250	632	217	415

Package 2

Item No.	Description	Unit	Total Package 2	Tanjungan	PIK Junction
2.4	Masonry Revetment, type II				
/ 01	Coffering and care of water including dewatering	L.S.			
/ 02	Excavation	cu.m	1,056	1,056	
/ 03	Backfilling	cu.m	123	123	
/ 04	Geo-textile, t=1.5 mm	sq.m	21	21	
/ 05	Gravel bedding	cu.m	140	140	
/ 06	Cobble/rubble filling	cu.m	75	75	
/ 07	Wet cobble/rubble masonry, type 1	cu.m	550	550	
/ 08	Gabion mattress, 3.0x1.5x0.5 m, PVC coated wire	cu.m	521	521	
/ 09	PVC pipe for weep hole, diam. 50 mm	lin.m	130	130	
/ 10	Furnishing and driving wooden piles, diam. 15-18cm	lin.m	528	528	
/ 11	Concrete, type 4, for foundation	cu.m	85	85	
/ 12	Concrete, type 5, for leveling	cu.m	36	36	
/ 13	Form, type F1, for Item No. 2.4/11	sq.m	443	443	
/ 14	Reinforcing bars, for Item No. 2.4/11	kg	3,457	3,457	
/ 15	Rubber joint filler, t=10 mm	sq.m	93	93	

Package 3

Item No.	Description	Unit	Total Package 3	Grde/Bor	Saturan Cengkareng	Meruya
2.5	Masonry Revetment, type II					
/ 01	Coffering and care of water including dewatering	L.S.				
/ 02	Demolishing, hauling and disposing concrete structures	cu.m	34			34
/ 03	Excavation	cu.m	16,757	8,375		8,382
/ 04	Backfilling	cu.m	1,368	737		631
/ 05	Geo-textile, t=1.5 mm	sq.m	266	132		134
/ 06	Gravel bedding	cu.m	1,875	915		960
/ 07	Cobble/rubble filling	cu.m	832	448		384
/ 08	Wet cobble/rubble masonry, type 1	cu.m	7,055	3,524		3,531
/ 09	Gabion mattress, 3.0x1.5x0.5 m, PVC coated wire	cu.m	2,700			2,700
/ 10	Gabion mattress, 3.0x1.5x0.5 m, galvanized wire	cu.m	3,153	3,153		
/ 11	PVC pipe for weep hole, diam. 50 mm	lin.m	1,670	830		840
/ 12	Furnishing and driving wooden piles, diam. 15-18cm	lin.m	5,893	3,165		2,718
/ 13	Concrete, type 4, for foundation	cu.m	966	523		443
/ 14	Concrete, type 5, for leveling	cu.m	401	212		189
/ 15	Form, type F1, for Item No. 2.5/13	sq.m	5,043	2,695		2,348
/ 16	Reinforcing bars, for Item No. 2.5/13	kg	38,506	20,831		17,625
/ 17	Rubber joint filler, t=10 mm	sq.m	1,186	591		595



Area of section.

A: Wet cobble/rubble masonry.

$$0 < h_2 \leq 1.0$$

$$\begin{aligned} & \frac{1}{2}(0.4+0.4)(0.4+0.4) + 0.5(H+0.5) + 0.35 - 0.4(H+0.5) + 0.35 \left[(H+0.5)^2 \right]^{\frac{1}{2}} \\ & + \frac{2}{5}(0.35+0.1)H \\ & = 0.2(0.4+0.4)^2 + (0.4+0.1H+0.35) \times (H+0.5)^{\frac{1}{2}} + 0.20833(0.35+0.1H) \end{aligned}$$

when $h_2 = 1.0$ m.

$$\begin{aligned} & = 0.392 + \frac{1}{2}(0.75+0.1H)(H+0.5) + 0.20833(0.35+0.1H) \\ & = 0.465 + \frac{1}{2}(0.75+0.1H)(H+0.5) + 0.2208H \quad (\text{m}^2) \end{aligned}$$

B: Gravel bedding

when $h_2 = 1.0$ m

$$\begin{aligned} & L = \sqrt{(H+1.0-1.4)^2 + 0.4^2} (H+1.0-1.4)^2 + 1.4 \times 0.4 \\ & = 1.0770(H-0.4) + 0.56 \\ & = 1.0770H + 0.129 \end{aligned}$$

22-2

A = L * 0.2 - a

$$= 0.2154H + 0.0258 - \frac{1}{2}(0.395 - 0.0417H)(0.142 - 0.0167H) \quad (\text{m}^2)$$

C ~ F: Same as Revetment Type I

Name of work: Revetment typeII/ Excavation

No. 2.6/02

Package 1

Name of channel: Kamal Drainage Channel (Main)

Section No.	Distance		Left Bank			Right Bank			Total	Stage
	(m)	unit (m)	Area		Volume (m3)	Area		Volume (m3)	Volume (m3)	
			unit (m2)	average (m2)		unit (m2)	average (m2)			
B.P(new)										
KM-00	62.0	62.0								
KM-01	182.6	120.6								
KM-02	269.1	86.5								
KM-03	321.8	52.7								
KM-05	441.1	119.3								
KM-06	543.8	102.7								
KM-07	659.5	115.7								
KM-08	805.6	146.1								
KM-09	868.5	62.9								
KM-10	978.1	109.6								
KM-11	1,064.3	86.2								
KM-12	1,179.4	115.1								
KM-13	1,266.9	87.5								
KM-14	1,357.3	90.4								
KM14+23.4	1,380.7	23.4	Bina Marga's Area			Bina Marga's Area				
KM16+22.8	1,443.3	22.8	Bina Marga's Area							
KM16+36.8	1,457.3	14.0								
KM-17	1,482.5	25.2								
KM-18	1,589.2	106.7								
KM-20	1,702.5	113.3	4.40	2.2	250				250	
KM-21	1,733.2	30.7	4.30	4.4	134				134	
KM-22	1,821.2	88.0	4.65	4.5	394				394	
KM-23	1,916.7	95.5	4.24	4.4	425				425	
KM-24	1,988.7	72.0	4.45	4.3	313				313	
KM-25	2,084.6	95.9	4.34	4.4	422				422	
KM-26	2,166.9	82.3	4.15	4.2	350				350	
KM-27	2,286.8	119.9		2.1	249				249	
KM-28	2,395.4	108.6								
KM-29	2,473.2	77.8								
KM-31	2,540.7	67.5								
KM-32	2,614.2	73.5								
KM-33	2,713.9	99.7								
KM-34	2,769.5	55.6								
KM-35	2,822.7	53.2								
KM-38	3,001.1	178.4								
KM-40	3,126.7	125.6								
KM-42	3,281.6	154.9								
KM-43	3,393.3	111.7								
KM-45	3,454.0	60.7								
KM-46	3,527.4	73.4				4.27	2.14	157	157	
KM-47	3,618.9	91.5				4.14	4.21	385	385	
KM-48	3,700.4	81.5					2.07	169	169	3,248
KM-50	3,831.3	130.9				4.40	2.20	288	288	
KM-51	3,926.0	94.7				3.83	4.12	390	390	
KM-52	4,022.9	96.9				4.04	3.94	382	382	
KM-54	4,110.0	87.1				4.26	4.15	362	362	
KM-55	4,247.9	137.9				4.00	4.13	570	570	
KM-56	4,370.6	122.7				4.00	4.00	491	491	
KM-57	4,462.9	92.3				4.00	4.00	370	370	2,853
Total					2,537			3,564	6,101	6,101

Name of work: Revetment typeII / Excavation

No. 2.6/02

Package 1

Name of channel: Kamal Drainage Channel (Branch)

Section No.	Distance		Left Bank			Right Bank			Total
	(m)	unit (m)	Area		Volume (m3)	Area		Volume (m3)	Volume (m3)
			unit (m2)	average (m2)		unit (m2)	average (m2)		
KE00						3.74			
KE01	36.6	36.6	3.91	1.96	72	3.94	3.84	141	213
KE02	134.0	97.4	3.98	3.95	385	3.86	3.90	380	765
KE03	272.3	138.3		1.99	276	3.87	3.87	535	811
KE04	372.7	100.4				3.98	3.93	395	395
KE07	486.8	114.1					1.99	228	228
KE08	568.3	81.5							
KE10	626.2	57.9	3.80	1.90	111				111
KE11	714.3	88.1	3.80	3.80	335				335
KE12	785.9	71.6	3.45	3.63	260				260
KE13	894.7	108.8	3.70	3.58	389				389
KE14	944.7	50.0	3.95	3.83	192				192
KE15	1,020.1	75.4	3.28	3.62	273				273
KE16	1,107.7	87.6	3.75	3.52	308				308
KE17	1,174.1	66.4	3.75	3.75	249				249
KE18	1,265.4	91.3	3.82	3.79	346				346
KE19	1,376.9	111.5	3.83	3.83	427				427
KE20	1,421.9	45.0	3.73	3.78	171				171
KE21	1,497.0	75.1	3.87	3.80	286	3.75	1.88	141	427
KE23	1,536.7	39.7	3.93	3.90	155	3.79	3.77	150	305
KE24	1,637.4	100.7		1.97	198		1.90	191	389
KE25	1,718.5	81.1							
KE26	1,870.3	151.8							
KE27	1,988.1	117.8							
KE28	2,058.7	70.6							
KE29	2,132.0	73.3							
KE30	2,298.5	166.5							
KE31	2,474.4	175.9							
KE32	2,580.3	105.9							
KE33	2,754.7	174.4							
Total					4,433			2,161	6,594

Name of work: Revetment typeII / Excavation

No. 2.4/02

Package 2

Name of channel: Tanjungan Drainage Channel

Section No.	Distance		Left Bank			Right Bank			Total
	(m)	unit (m)	Area		Volume (m3)	Area		Volume (m3)	Volume (m3)
			unit (m2)	average (m2)		unit (m2)	average (m2)		
TM00									
TM01	95.3	95.3							
TM02	192.3	97.0							
TM03	281.2	88.9							
TM04	363.7	82.5							
TM05	464.7	101.0							
TM06	581.7	117.0							
TM07	654.3	72.6							
TM08	754.1	99.8							
TM10	858.2	104.1							
TM11	949.5	91.3							
TM12	1039.6	90.1							
TM13	1082.6	43.0							
TM14	1198.3	115.7							
TM15	1281.2	82.9							
TM16	1357.3	76.1							
TM16+47.1	1404.4	47.1							
TM16+58.3	1415.6	11.2							
TM18+17.5	1472.8		Bina Marga's Area			Bina Marga's Area			
TM18+28.2	1483.5	10.7	Bina Marga's Area						
TM19	1552.7	69.2							
TM20	1652.8	100.1							
TM21	1746.1	93.3							
TM22	1840.4	94.3	3.90	1.95	184				184
TM23	1952.3	111.9	3.94	3.92	439	4.06	2.03	228	667
TM25	1977.7	25.4	3.94	3.94	101	4.06	4.06	104	205
TM26	2011.9	34.2							
TM30	2043.8	31.9							
TM33	2181.2	137.4							
TM34	2306.4	125.2							
TM35	2415.0	108.6							
TM36	2508.2	93.2							
EP	2535.8	27.6							
Total					724			332	1,056

Name of work: Revetment typell / Excavation

No. 2.5/03

Package 3

Name of channel: Gede/Bor Drainage Channel

Section No.	Distance		Left Bank			Right Bank			Total Volume (m3)
	(m)	unit (m)	Area		Volume (m3)	Area		Volume (m3)	
			unit (m2)	average (m2)		unit (m2)	average (m2)		
B.P									
GM-00	2.8	2.8							
GM-02	19.9	17.1							
GM-03	49.5	29.6	3.42	1.71	51	4.33	2.17	65	116
GM-04	169.6	120.1	4.23	3.83	460	4.08	4.21	506	966
GM-05	258.6	89.0	4.28	4.26	379	4.18	4.13	368	747
GM-06	374.1	115.5	4.42	4.35	503	4.25	4.22	487	990
GM-07	423.5	49.4	4.28	4.35	215	4.27	4.26	211	426
GM-08	536.3	112.8	4.04	4.16	470	4.14	4.21	475	945
GM-10	619.8	83.5		2.02	169	4.26	4.20	351	520
GM-11	697.1	77.3				3.26	3.76	291	291
GM-12	785.3	88.2				4.10	3.68	325	325
GM-13	886.6	101.3	4.11	2.06	209	4.15	4.13	418	627
GM-14	974.7	88.1	3.61	3.86	341	4.08	4.12	363	704
GM-15	1,072.2	97.5	3.23	3.42	334	4.01	4.05	395	729
GM-16	1,150.1	77.9	3.48	3.36	262	4.18	4.10	320	582
E.P	1,203.0	52.9	3.48	3.48	185	4.18	4.18	222	407
Total					3,578			4,797	8,375

Name of work: Revetment type11 / Excavation

No. 2.5/03

Package 3

Name of channel: Saluran Cengkareng Drainage Channel

Section No.	Distance		Left Bank			Right Bank			Total Volume (m3)
	(m)	unit (m)	Area		Volume (m3)	Area		Volume (m3)	
			unit (m2)	average (m2)		unit (m2)	average (m2)		
B.P									
CM01	17.2	17.2							
CM02	20.2	3.0							
CM03	154.6	134.4							
CM04	292.3	137.7							
CM05	392.4	100.1							
CM06	466.4	74.0	4.25	2.13	158	4.45	2.23	165	323
CM07	569.0	102.6	4.67	4.46	458	4.43	4.44	456	914
CM08	636.6	67.6	4.60	4.64	314	4.55	4.49	304	618
CM09	808.2	171.6	4.35	4.48	768	4.35	4.45	764	1,532
CM10	884.9	76.7	3.85	4.10	315	4.40	4.38	336	651
CM12	962.9	78.0	4.05	3.95	309	4.75	4.58	357	666
CM13	1,056.9	94.0	4.54	4.30	404	4.34	4.55	428	832
CM14	1,173.6	116.7	4.38	4.46	521	4.38	4.36	509	1,030
CM15	1,237.0	63.4	3.60	3.99	253	4.55	4.47	284	537
CM16	1,312.8	75.8		1.80	137		2.28	173	310
CM17	1,446.0	133.2							
CM18	1,544.5	98.5							
CM19	1,613.6	69.1							
CM20	1,740.7	127.1							
CM21	1,832.5	91.8							
CM22	1,901.7	69.2							
CM23	2,001.5	99.8							
CM24	2,102.9	101.4							
CM25	2,194.3	91.4							
CM26	2,304.8	110.5							
CM27	2,448.0	143.2							
CM29	2,599.3	151.3							
CM30	2,698.3	99.0							
CM31	2,803.5	105.2							
CM32	2,933.5	130.0							
CM34	3,047.4	113.9							
CM36	3,095.6	48.2							
CM37	3,219.0	123.4							
CM38	3,339.1	120.1							
CM39	3,425.5	86.4							
CM40	3,467.5	42.0							
CM41	3,556.9	89.4							
CM42	3,653.4	96.5							
CM43	3,777.2	123.8							
CM45	3,916.3	139.1	3.45	1.73	240	4.45	2.23	310	550
CM47	4,022.2	105.9		1.73	183		2.23	236	419
CM48	4,110.3	88.1							
CM49	4,230.2	119.9							
E.P	4,231.2	1.0							
Total					4,060			4,322	8,382

Working Division: Revetment type II / Back filling
 Package 1

No. 2.6/03

A= 0.35 m²
 V= A x L (m³)

Left bank				Right bank			
Location		Length L(m)	Volume V(m ³)	Location		Length L(m)	Volume V(m ³)
Kamal Drainage Channel (main) KM18+12.8 - KM26+28.8	Stage 2	593.7	207.80	KM45+2.2 - KM47+70.9 KM48 - KM57	Stage 2	233.6	81.76
					Stage 3	762.5	266.88
Kamal Drainage Channel (branch) KE00+8.2 - KE02+50.0	Stage 3	175.8	61.53	KE00 - KE04+70.0 KE20+35.6 - KE23+4.0	Stage 3	442.7	154.95
	Stage 3	926.9	324.42		Stage 3	83.2	29.12
Total			593.74	Total			532.70

Working Division: Revetment type II / Back filling
 Package 2

No. 2.4/03

$A = 0.35 \text{ m}^2$

$V = A \times L \text{ (m}^3\text{)}$

Left bank			Right bank		
Location	Length L(m)	Volume V(m ³)	Location	Length L(m)	Volume V(m ³)
Tanjungan Drainage Channel TM21+18.0 - TM23+16.2	203.6	71.26	TM21+79.3 - TM23+16.2	143.1	50.09
Total		71.26			50.09

Working Division: Revetment type II / Back filling
 Package 3

No. 2.5/04

A= 0.35 m²
 V= A x L (m³)

Left bank			Right bank		
Location	Length L(m)	Volume V(m ³)	Location	Length L(m)	Volume V(m ³)
Gede/Bor Drainage Channel GM02+0.1 - GM10 GM12+99.3 - EP	599.8 318.4	209.93 111.44	GM02+0.1 - EP	1183.0	414.05
Saluran Cengkareng Drainage Channel CM05+20.0 - CM15+25.8 CM43+83.4 - CM45	850.4 55.7	297.64 19.50	CM05+20.0 - CM15+6.0 CM43+77.0 - CM45	830.6 62.1	290.71 21.74
Total		638.51			726.50

Working Division: Revetment type II / Cobble/rubble filling
 Package I

No.2.6/06

A= 0.2125 m²
 V= A x L (m³)

Left bank				Right bank			
Location		Length L(m)	Volume V(m ³)	Location		Length L(m)	Volume V(m ³)
Kamal Drainage Channel (main) KM18+12.8 - KM26+28.8	Stage 2	593.7	126.16	KM45+2.2 - KM47+70.9	Stage 2	233.6	49.64
				KM48 - KM57	Stage 3	762.5	162.03
Kamal Drainage Channel (branch) KE00+8.2 - KE02+50.0	Stage 3	175.8	37.36	KE00 - KE04+70.0	Stage 3	442.7	94.07
	Stage 3	926.9	196.97	KE20+35.6 - KE23+4.0	Stage 3	83.2	17.68
Total			360.49				323.43

Working Division: Revetment type II / Cobble/rubble filling
 Package 2

No.2.4/06

A= 0.2125 m²
 V= A x L (m³)

Left bank			Right bank		
Location	Length L(m)	Volume V(m ³)	Location	Length L(m)	Volume V(m ³)
Tanjungan Drainage Channel TM21+18.0 - TM23+16.2	203.6	43.27	TM21+79.3 - TM23+16.2	143.1	30.41
Total		43.27			30.41

Working Division: Revetment type II / Cobble/rubble filling
 Package 3

No.2.5/07

A= 0.2125 m²
 V= A x L (m³)

Left bank			Right bank		
Location	Length L(m)	Volume V(m ³)	Location	Length L(m)	Volume V(m ³)
Gede/Bor Drainage Channel GM02+0.1 - GM10 GM12+99.3 - EP	599.8 318.4	127.46 67.66	GM02+0.1 - EP	1183.0	251.39
Saluran Cengkareng Drainage Channel CM05+20.0 - CM15+25.8 CM43+83.4 - CM45	850.4 55.7	180.71 11.84	CM05+20.0 - CM15+6.0 CM43+77.0 - CM45	830.6 62.1	176.50 13.20
Total		387.66			441.09

Working Division: Revetment type II / Gabion mattress(PVC coated)
 Package I

No.2.6'08

A= 1.5 m2(=3.0m x 0.5m)
 V= A x L (m3)

Left bank				Right bank			
Location		Length L(m)	Volume V(m3)	Location		Length L(m)	Volume V(m3)
Kamal Drainage Channel (main) KM18+12.8 - KM26+28.8	Stage 2	593.7	890.55	KM45+2.2 - KM47+70.9	Stage 2	233.6	350.40
				KM48 - KM57	Stage 3	762.5	1143.75
Kamal Drainage Channel (branch) KE00+8.2 - KE02+50.0	Stage 3	175.8	263.70	KE00 - KE04+70.0	Stage 3	442.7	664.05
	Stage 3	926.9	1390.35	KE20+35.6 - KE23+4.0	Stage 3	83.2	124.80
Total			2544.60				2283.00

Working Division: Revetment type II / Gabion mattress(PVC coated)
 Package 2

No.2.4/08

A= 1.5 m²(=3.0m x 0.5m)
 V= A x L (m³)

Left bank			Right bank		
Location	Length L(m)	Volume V(m ³)	Location	Length L(m)	Volume V(m ³)
Tanjungan Drainage Channel TM21+18.0 - TM23+16.2	203.6	305.40	TM21+79.3 - TM23+16.2	143.1	214.65
Total		305.40			214.65

Working Division: Revetment type II / Gabion mattress(PVC coated)
 Package 3

No.2.5/09

A= 1.5 m2(=3.0m x 0.5m)
 V= A x L (m3)

Left bank			Right bank		
Location	Length L(m)	Volume V(m3)	Location	Length L(m)	Volume V(m3)
Saluran Cengkareng Drainage Channel					
CM05+20.0 - CM15+25.8	850.4	1275.60	CM05+20.0 - CM15+6.0	830.6	1245.90
CM43+83.4 - CM45	55.7	83.55	CM43+77.0 - CM45	62.1	93.15
Total		1359.15			1339.05

Working Division: Revetment type II / Gabion mattress (galvanized)
 Package 3

No.2.5/10

$A = 1.5 \text{ m}^2 (= 3.0\text{m} \times 0.5\text{m})$
 $V = A \times L \text{ (m}^3\text{)}$

Left bank			Right bank		
Location	Length L(m)	Volume V(m ³)	Location	Length L(m)	Volume V(m ³)
Gede/Bor Drainage Channel					
GM02+0.1 - GM10	599.8	899.70	GM02+0.1 - EP	1183.0	1774.50
GM12+99.3 - EP	318.4	477.60			
Total		1377.30			1774.50

Working Division: Revetment type II / Wet cobble/rubble masonry and Gravel bedding
 Package 1

No. 2.6/07 and 05

$$V = A \times L$$

Location	Left bank					Right bank							
	Length L(m)	Height H(m)	Wet masonry		Gravel bedding		Length L(m)	Height H(m)	Wet masonry		Gravel bedding		
			Area A(m ²)	Volume V(m ³)	Area A(m ²)	Volume V(m ³)			Area A(m ²)	Volume V(m ³)			
Kamal Drainage Channel (main) KM18+12.8 - KM26+28.8 Stage 2	593.7	2.22	1.83	1088.31	0.49	290.42	KM45+2.2 - KM47+70.9 KM48 - KM57	233.6 762.5	2.06 1.99	1.73 1.69	404.48 1287.02	0.45 0.44	106.05 334.41
Kamal Drainage Channel (branch) KE00+8.2 - KE02+50.0 KE08+1.5 - KE23	175.8 926.9	1.97 1.54	1.68 1.42	294.56 1315.37	0.43 0.34	76.33 314.63	KE00 - KE04+70.0 KE20+35.6 - KE23+4.0	442.7 83.2	1.97 1.51	1.68 1.40	741.75 116.64	0.43 0.33	192.20 27.69
Total				1609.93		681.38					858.39		660.35

Working Division: Revetment type II / Wet cobble/rubble masonry and Gravel bedding
 Package 2

No. 2.4/07 and 05

V - A x L

Location	Left bank						Right bank						
	Length L(m)	Height H(m)	Wet masonry		Gravel bedding		Length L(m)	Height H(m)	Wet masonry		Gravel bedding		
			Area A(m ²)	Volume V(m ³)	Area A(m ²)	Volume V(m ³)			Area A(m ²)	Volume V(m ³)			
Tanjungan Drainage Channel TM21+18.0 - TM23+16.2	203.6	1.82	1.58	322.50	0.40	81.67	TM21+79.3 - TM23+16.2	143.1	1.82	1.58	226.67	0.40	57.40
Total				322.50		81.67					226.67		57.40

Working Division: Revetment type II / Wet cobble/rubble masonry and Gravel bedding
 Package 3

No. 2.5/08 and 06

V = A x L

Location	Left bank					Right bank						
	Length L(m)	Height H(m)	Wet masonry		Gravel bedding		Length L(m)	Height H(m)	Wet masonry		Gravel bedding	
			Area A(m ²)	Volume V(m ³)	Area A(m ²)	Volume V(m ³)			Area A(m ²)	Volume V(m ³)		
Gede/Bor Drainage Channel GM02+0.1 - GM10 GM12+99.3 - EP	599.8	1.99	1.69	1012.40	0.44	263.05	1183.0	1.97	1.68	1982.14	0.43	513.61
	318.4	1.94	1.66	527.60	0.43	136.13						
Saluran Cengkareng Drainage Channel CM05+20.0 - CM15+25.8 CM43+83.4 - CM45	850.4	2.40	1.95	1658.64	0.53	449.65	830.6	2.40	1.95	1620.02	0.53	439.18
	55.7	2.66	2.13	118.40	0.59	32.63						
Total				3317.03		881.47				3734.16		989.18

No. 2.6/04 and /09

Working Division: Revetment type II / Weep hole and Geotextile
 Package I

l0= 0.57 m : length of one PVC pipe for weep hole
 a= 4.0 m² : area of masonry surface per one weep hole
 n= A / a : nos. of weep holes
 l= 10 x n (lin.m) : Total length of PVC pipe ag= n x 0.09(m²) : Total area of geotextile

Location	Left bank					Right bank							
	Length L(m)	Height H(m)	Surface A(m ²)	nos. n	PVC l(lin.m)	Geotextile ag(m ²)	Location	Length L(m)	Height H(m)	Surface A(m ²)	nos. n	PVC l(lin.m)	Geotextile ag(m ²)
Kamal Drainage Channel (main) KM18+12.8 - KM26+28.8	593.7	2.22	1805.42	452	257.64	40.68	Stage 2 Stage 3 KM45+2.2 - KM47+70.9 KM48 - KM57	233.6	2.06	668.58	168	95.76	15.12
								762.5	1.99	2122.66	531	302.67	47.79
Kamal Drainage Channel (branch) KE00+8.2 - KE02+50.0 KE08+41.5 - KE23	175.8	1.97	485.46	122	69.54	10.98	Stage 3 Stage 3 KE00 - KE04+70.0 KE20+35.6 - KE23+4.0	442.7	1.97	1222.50	306	174.42	27.54
	926.9	1.54	2114.00	529	301.53	47.61		83.2	1.51	186.97	47	26.79	4.23
Total					628.71	99.27						599.64	94.68

Working Division: Revetment type II / Weep hole and Geotextile
 Package 2

No. 2.4/04 and /09

l₀ = 0.57 m : length of one PVC pipe for weep hole
 a = 4.0 m² : area of masonry surface per one weep hole
 n = A / a : nos. of weep holes
 l = l₀ x n (lin.m) : Total length of PVC pipe a_g = n x 0.09(m²) : Total area of geotextile

Location	Left bank				Right bank							
	Length L(m)	Height H(m)	Surface A(m ²)	nos. n	PVC l (lin.m)	Geotextile a _g (m ²)	Length L(m)	Height H(m)	Surface A(m ²)	nos. n	PVC l (lin.m)	Geotextile a _g (m ²)
Tanjungan Drainage Channel TM21+18.0 - TM23+16.2	203.6	1.82	528.09	133	75.81	11.97	143.1	1.82	371.17	93	53.01	8.37
Total					75.81	11.97					53.01	8.37

Working Division: Revetment type II / Weep hole and Geotextile
 Package 3

No. 2.5/05 and /11

- 10= 0.57 m : length of one PVC pipe for weep hole
 a= 4.0 m² : area of masonry surface per one weep hole
 n= A / a : nos. of weep holes
 l=10 x n (lin.m) : Total length of PVC pipe ag=n x 0.09(m²) : Total area of geotextile

Location	Left bank					Right bank							
	Length L(m)	Height H(m)	Surface A(m ²)	nos. n	PVC l (lin.m)	Geotextile ag(m ²)	Location	Length L(m)	Height H(m)	Surface A(m ²)	nos. n	PVC l (lin.m)	Geotextile ag(m ²)
Gede/Bor Drainage Channel GM02+0.1 - GM10 GM12+99.3 - EP	599.8	1.99	1669.74	418	238.26	37.62	GM02+0.1 - EP	1183.0	1.97	3266.81	817	465.69	73.53
	318.4	1.94	868.57	218	124.26	19.62							
Saluran Cengkareng Drainage Channel CM05+20.0 - CM15+25.8 CM43+83.4 - CM45	850.4	2.40	2757.17	690	393.30	62.10	CM05+20.0 - CM15+6.0 CM43+77.0 - CM45	830.6	2.40	2692.97	674	384.18	60.66
	55.7	2.66	196.78	50	28.50	4.50		62.1	2.66	219.39	55	31.35	4.95
Total					784.32	123.84						881.22	139.14

Working Division: Revetment type II / Wooden pile
 Package 1

No. 2.5/10

l₀ = 3.0 m : length of one pile
 d = 2.0 m : interval of piles
 n = L / d + 1 : nos. of piles
 l = l₀ x n (lin.m) : Total length of piles

Left bank					Right bank				
Location		Length L(m)	nos. n	l (lin.m)	Location		Length L(m)	nos. n	l (lin.m)
Kamal Drainage Channel (main) KM18+12.8 - KM26+28.8	Stage 2	593.7	298	894.00	KM45+2.2 - KM47+70.9	Stage 2	233.6	118	354.00
					Stage 3	762.5	383	1149.00	
Kamal Drainage Channel (branch) KE00+8.2 - KE02+50.0	Stage 3	175.8	89	267.00	KE00 - KE04+70.0	Stage 3	442.7	223	669.00
	Stage 3	926.9	465	1395.00	KE20+35.6 - KE23+4.0	Stage 3	83.2	43	129.00
Total				2556.00					2301.00

Working Division: Revetment type II / Wooden pile
 Package 2

No. 2.4/10

l₀= 3.0 m : length of one pile
 d= 2.0 m : interval of piles
 n= L / d + 1 : nos. of piles
 l= l₀ x n (lin.m) : Total length of piles

Left bank				Right bank			
Location	Length L(m)	nos. n	l (lin.m)	Location	Length L(m)	nos. n	l (lin.m)
Tanjungan Drainage Channel TM21+18.0 - TM23+16.2	203.6	103	309.00	TM21+79.3 - TM23+16.2	143.1	73	219.00
Total			309.00				219.00

Working Division: Revetment type II / Wooden pile
 Package 3

No. 2.5/12

l₀= 3.0 m : length of one pile
 d= 2.0 m : interval of piles
 n= L / d + 1 : nos. of piles
 l=L x n (lin.m) : Total length of piles

Left bank				Right bank			
Location	Length L(m)	nos. n	l (lin.m)	Location	Length L(m)	nos. n	l (lin.m)
Gede/Bor Drainage Channel GM02+0.1 - GM10 GM12+99.3 - EP	599.8 318.4	301 161	903.00 483.00	GM02+0.1 - EP	1183.0	593	1779.00
Saluran Cengkareng Drainage Channel CM05+20.0 - CM15+25.8 CM43+83.4 - CM45	850.4 55.7	427 29	1281.00 87.00	CM05+20.0 - CM15+6.0 CM43+77.0 - CM45	830.6 62.1	417 33	1251.00 99.00
Total			2754.00				3129.00

No. 2.6/11
 No. 2.6/12
 No. 2.6/13
 No. 2.6/14

Foundation concrete (Type 4)
 Leveling concrete (Type 5)
 Form
 Retin forcing bars

Working Division: Revetment type II /

Package 1

V = A x L
 Form : A = d x L
 Reinforcing bar : W = V(concrete type4) x 40kg/m

Location	Left bank										Right bank									
	Foundation (Type-4)					Leveling (Type-5)					Foundation (Type-4)					Leveling (Type-5)				
	Length L(m)	Height H(m)	Area A(m ²)	Volume V(m ³)	Reinforcing bars (kg)	Area A(m ²)	Volume V(m ³)	Form unit d (m)	Form (sq.m)	Area A(m ²)	Volume V(m ³)	Height H(m)	Length L(m)	Area A(m ²)	Volume V(m ³)	Form unit d (m)	Form (sq.m)	Area A(m ²)	Volume V(m ³)	Reinforcing bars (kg)
Karnal Drainage Channel (main) KM18+12.8 - KM26+28.8 Stage 2	593.7	2.22	0.247	146.46	60.93	0.10	1.29	768.58	5858.55				233.6	0.248	57.90	1.29	300.48	0.10	23.66	2316.01
												762.5	0.248	189.33	1.28	978.05				
Karnal Drainage Channel (branch) KE00+8.2 - KE02+50.0 Stage 3 KE08+41.5 - KE23 Stage 3	175.8 928.9	1.97 1.54	0.248 0.250	43.67 231.83	17.68 89.89	0.10 0.10	1.28 1.26	225.31 1167.40	1746.87 9273.05				442.7	0.248	109.97	1.28	567.39	0.10	44.51	4398.98
												83.2	0.250	20.81	1.26	104.66				
Total				275.50	168.50			2161.29	16878.48						130.79		1950.57		153.02	15120.71

R2-27

Working Division: Revetment type II / Foundation concrete (Type 4)
 Leveling concrete (Type 5)
 Form
 Reinforcing bars

No. 2.4/11
 No. 2.4/12
 No. 2.4/13
 No. 2.4/14

Package 2

$V = A \times L$
 Form : $A = d \times L$
 Reinforcing bar : $W = V(\text{concrete typed}) \times 40\text{kg/m}$

Location	Left bank					Right bank											
	Length L(m)	Height H(m)	Foundation Area A(m ²)	Volume V(m ³)	Leveling Area A(m ²)	Volume V(m ³)	Form unit d (m)	Reinforcing bars (kg)	Location	Length L(m)	Height H(m)	Foundation Area A(m ²)	Volume V(m ³)	Leveling Area A(m ²)	Volume V(m ³)	Form unit d (m)	Reinforcing bars (kg)
Tanjung Drainage Channel TM21+18.0 - TM23+16.2	203.6	1.82	0.249	50.74	0.10	20.22	1.27	259.37	TM21+79.3 - TM23+16.2	143.1	1.82	0.249	35.66	0.10	14.21	1.27	182.30
Total				50.74		20.22		259.37					35.66		14.21		182.30

No. 2.5/13
 No. 2.5/14
 No. 2.5/15
 No. 2.5/16

Working Division: Revetment type II / Foundation concrete (Type 4)
 Leveling concrete (Type 5)
 Form
 Rein forcing bars

Package 3

V = A x L
 Form : A = d x L
 Reinforcing bar : W = V/(concrete type4) x 40kg/m

Location	Left bank					Right bank					Reinforcing bars								
	Length L(m)	Height H(m)	Area A(m ²)	Volume V(m ³)	Leveling (Type5) Area A(m ²)	Volume V(m ³)	Form unit d(m)	Form (sq.m)	bars (kg)	Location	Length L(m)	Height H(m)	Area A(m ²)	Volume V(m ³)	Leveling (Type5) Area A(m ²)	Volume V(m ³)	Form unit d(m)	Form (sq.m)	bars (kg)
Credo/Bor Drainage Channel CM02-0.1 - GM10 CM12-99.3 - EP	599.8	1.99	0.248	148.93	0.10	60.41	1.28	769.35	5957.22	CM02+0.1 - EP	1183.0	1.97	0.248	293.88	0.10	118.95	1.28	1516.19	11755.13
	318.4	1.94	0.249	79.15	0.10	31.94	1.28	407.59	3166.02										
Saluran Pengalangan Drainage Channel CM05+20.0 - CM15+25.8 CM43+83.4 - CM45	850.4	2.40	0.245	208.45	0.10	88.54	1.30	1108.79	8338.06	CM05+20.0 - CM15+6.0 CM43+77.0 - CM45	830.6	2.40	0.245	203.60	0.10	86.48	1.30	1082.97	8143.92
	55.7	2.66	0.242	13.30	0.11	5.92	1.32	73.37	539.96		62.1	2.66	0.242	15.05	0.11	6.60	1.32	81.80	602.00
Total				450.03		186.81		2339.10	18001.25							212.03		2680.97	20501.05

22-29

Working Division: Revetment type II / Rubber joint filler
 Package 1

No. 2.6/15

$$V = A \times L$$

nos. of joints : $n = L / 6.0$

Location	Left bank				Right bank						
	Length L(m)	Height H(m)	Area of joint Am(m ²)	nos. of joints	Area A(m ²)	Location	Length L(m)	Height H(m)	Area of joint Am(m ²)	nos. of joints	Area A(m ²)
Kamal Drainage Channel (main) KM18+12.8 - KM26+28.8	593.7	2.22	1.83	99	181.48	KM45+2.2 - KM47+70.9 KM48 - KM57	233.6	2.06	1.73	39	67.53
								762.5	1.99	1.69	128
Kamal Drainage Channel (branch) KE00+8.2 - KE02+50.0 KE08+41.5 - KE23	175.8	1.97	1.68	30	50.27	KE00 - KE04+70.0 KE20+35.6 - KE23+4.0	442.7	1.97	1.68	74	123.99
	926.9	1.54	1.42	155	219.96			83.2	1.51	1.40	14
Total					451.70						427.20

Working Division: Revetment type II / Rubber joint filler
 Package 2

No. 2.4/15

$$V = A \times L$$

$$\text{nos. of joints} : n = L / 6.0$$

Location	Left bank				Right bank						
	Length L(m)	Height H(m)	Area of joint Am(m ²)	nos. of joints	Area A(m ²)	Location	Length L(m)	Height H(m)	Area of joint Am(m ²)	nos. of joints	Area A(m ²)
Tanjungan Drainage Channel TM21+18.0 - TM23+16.2	203.6	1.82	1.58	34	53.86	TM21+79.3 - TM23+16.2	143.1	1.82	1.58	24	38.02
Total					53.86						38.02

Working Division: Revetment type II / Rubber joint filler
 Package 3

No. 2.5/17

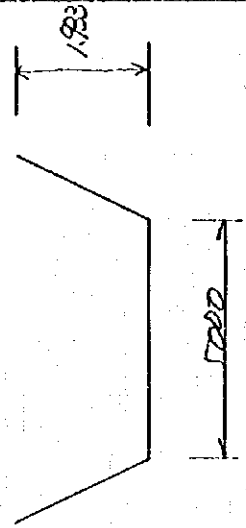
$$V = A \times L$$

$$\text{nos. of joints} : n = L / 6.0$$

Left bank						Right bank					
Location	Length L(m)	Height H(m)	Area of joint Am(m ²)	nos. of joints	Area A(m ²)	Location	Length L(m)	Height H(m)	Area of joint Am(m ²)	nos. of joints	Area A(m ²)
Gede/Bor Drainage Channel											
GM02+0.1 - GM10	599.8	1.99	1.69	100	168.79	GM02+0.1 - EP	1183.0	1.97	1.68	198	331.75
GM12+99.3 - EP	318.4	1.94	1.66	54	89.48						
Saluran Cengkareng Drainage Channel											
CM05+20.0 - CM15+25.8	850.4	2.40	1.95	142	276.96	CM05+20.0 - CM15+6.0	830.6	2.40	1.95	139	271.11
CM43+83.4 - CM45	55.7	2.66	2.13	10	21.26	CM43+77.0 - CM45	62.1	2.66	2.13	11	23.38
Total					556.49						626.24

Working Division: 2.5 Retention Typ II (Package 3)

Description	Calculation Details	Unit	Quantity	Remarks
03/ Excavation	<p>Gate/Box Drainage Channel / Connection to Secondary canal at G416 Left bank L=18.0m</p> <p>$(6.0 \times 15.5 + 4.0 \times 12.0) \times 0.5 = 70.5$</p>	m ³	70.5	L=18.0m x 2 (left & Right)
04/ Backfilling	$(0.5 \times 0.5 \times 1/2) \times 16 = 2.0$	m ³	2.0	Gabion 3900
05/ Geo-fabric	<p>nos. of weep hole</p> <p>$n = 1.933 \times \frac{\sqrt{S}}{3} \times 18 / 4 = 10$</p> <p>$0.3 \times 0.3 \times n = 0.90$</p>			
06/ Gravel bedding	<p>$0.90 \times 2 = 1.80$</p> <p>$(2 \times 5.4 + 10 \times 0.35 \times \frac{1}{2} (0.295 - 0.04174) \times (0.147 - 0.01674))^2 \times 18.0 \times 2$</p>	m ²	1.80	
07/ Cobble/Rubble filling	$0.2125 \times 18.0 \times 2 = 7.65$	m ²	7.65	

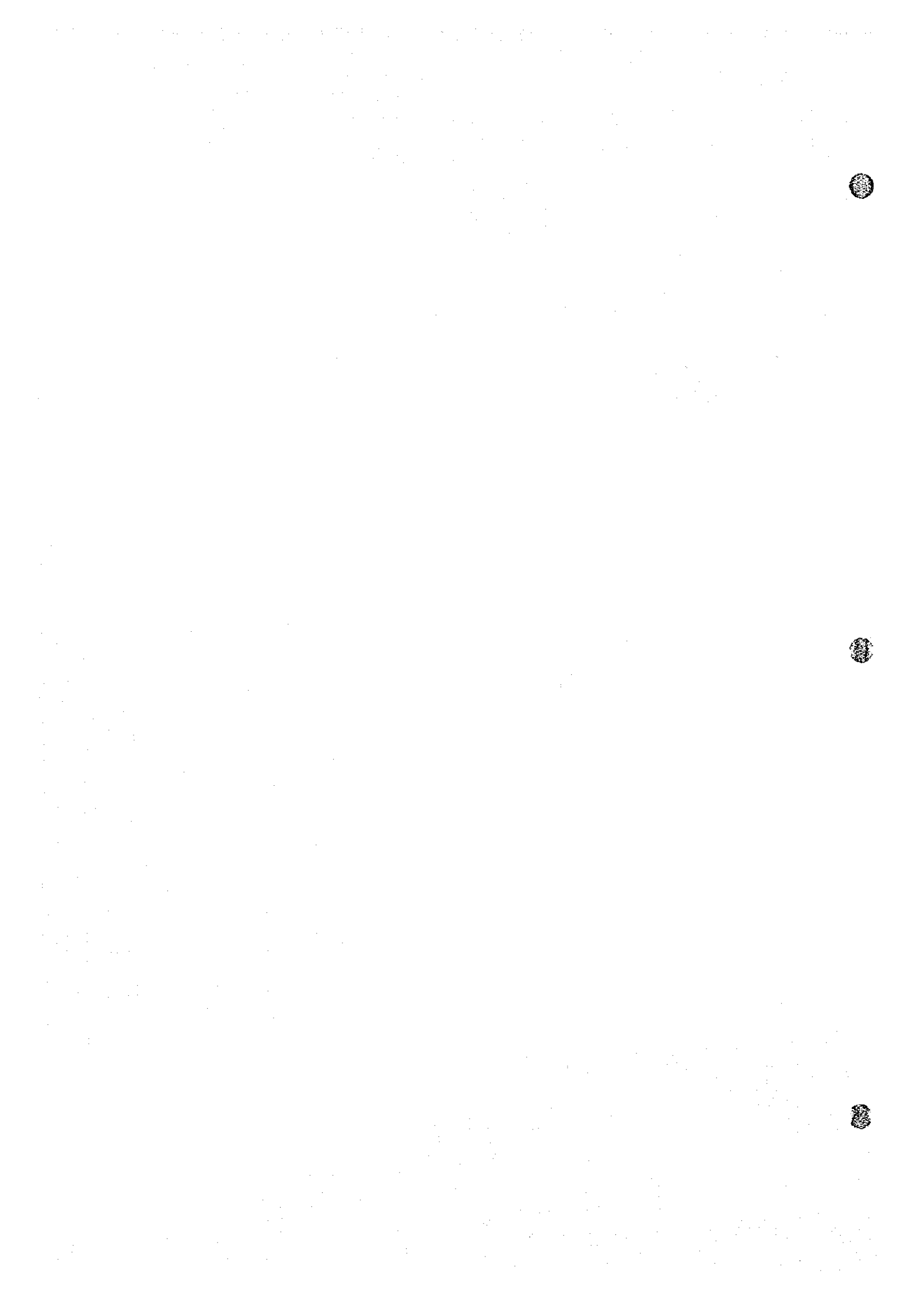


Working Division: 25 Revetment II (Package 3)

Sheet 2

Description	Calculation Details	Unit	Quantity	Remarks
08/ Wet cobble/rubble masonry				
	$1.285 \times 18.0 \times 2 = 46.265$	m ³	46.265	
10/ Gabion mattress (galvanized)				
	$(15.5 \times 5.0 + 11.0 \times 2.2) \times 0.5 = 50.85$	m ²	50.85	
11/ PVC pipe for weep holes				
	$10 \times 0.57 = 5.7$	linm	11.4	
12/ Warden Pile				
	$18.0 / 2 \times 3.0 = 27.0$			
	$27.0 \times 2 = 54.0$	m ²	54.0	
13/ Concrete Type 4				
	$2.809 \times 18.0 \times 2 = 10.111$	cum	10.111	
14/ Concrete Type 5				
	$0.10 \times 0.10 \times 18 \times 2 = 0.72$	cum	0.72	
15/ Form Type 1				
	$1.280 \times 18 \times 2 = 46.071$	sqm	46.071	
16/ Reinforcing bar				
	$10 \times 111 \times 4.0 = 404.44$	kg	404.44	
17/ Rubber joint Filler				
	$1.285 \times 18 / 6 \times 2 = 7.71$	sqm	7.71	

1.2.8 Concrete ditch and culvert



Summary of Work Quantities, Concrete Ditch and Culvert

Package 1

Item No.	Description	Unit	Total Package 1	Kamal, main channel				
				Stage 1 main	Stage 2 main	Stage 3		
						Total	main	branch
2.7	Concrete Ditch and Culvert							
/ 01	Coffering and care of water including dewatering	LS.						
/ 02	Excavation of channel including trench cut	cu.m	2,589			2,589		2,589
/ 03	Rubble bedding	cu.m	328			328		328
/ 04	Geo-textile, t=1.5mm	sq.m	27			27		27
/ 05	Backfilling	cu.m	1,189			1,189		1,189
/ 06	Gravel filter	cu.m	8			8		8
/ 07	PVC pipe for weep hole, diam. 50 mm	lin.m	118			118		118
/ 08	Gabion mattress, 3.0x1.5x0.5 m, PVC coated wire	cu.m	664			664		664
/ 09	Concrete, type 4, for ditch and culvert	cu.m	915			915		915
/ 10	Concrete, type 5, for leveling	cu.m	142			142		142
/ 11	Form, type F1, for Item No. 2.7/09	sq.m	1,640			1,640		1,640
/ 12	Form, type F2, for Item No. 2.7/09	sq.m	1,225			1,225		1,225
/ 13	Reinforcing bars, for Item No. 2.7/09	kg	54,893			54,893		54,893
/ 14	PVC waterstop, W=200mm	lin.m	320			320		320
/ 15	Joint bar, diam. 25 mm, L=1m	nos.	392			392		392
/ 16	Bitumen coating	sq.m	33			33		33

Package 2

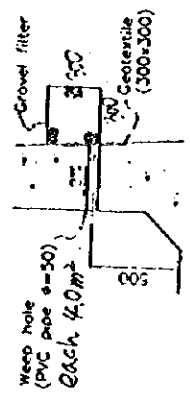
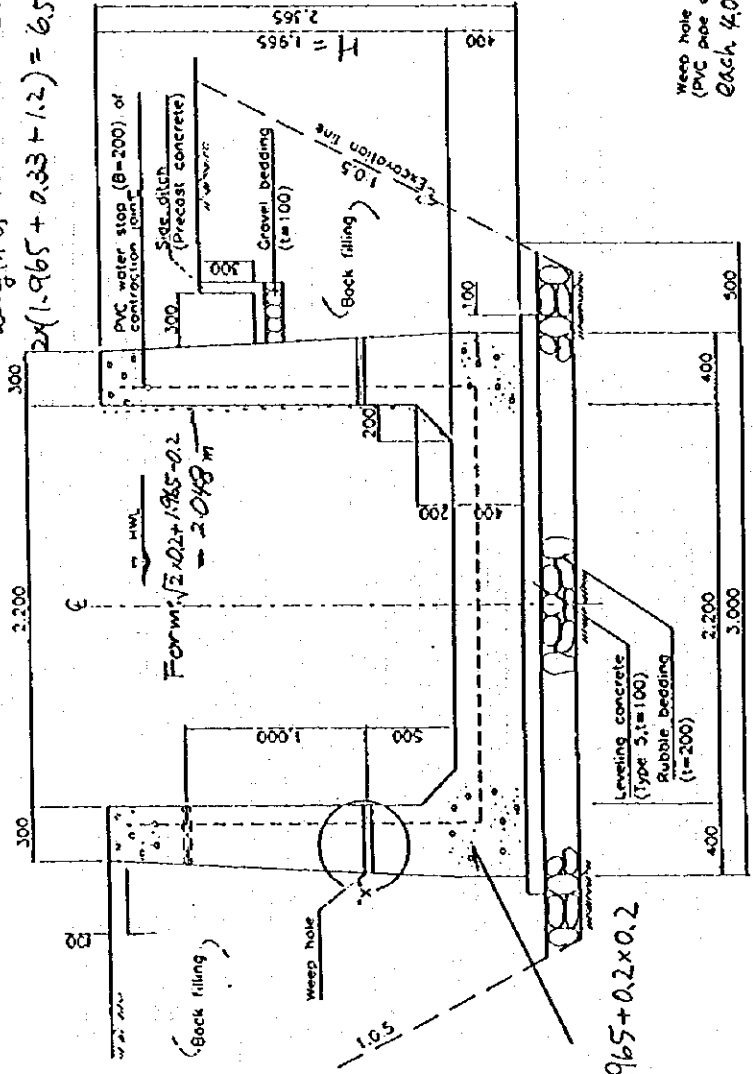
Item No.	Description	Unit	Total Package 2	Tanjungan	PiK Junction
2.5	Concrete Ditch and Culvert				
/ 01	Excavation of channel including trench cut	cu.m	7,267		7,267
/ 02	Rubble bedding	cu.m	583		583
/ 03	Geo-textile, t=1.5mm	sq.m	67		67
/ 04	Backfilling	cu.m	2,809		2,809
/ 05	Gravel filter	cu.m	21		21
/ 06	PVC pipe for weep hole, diam. 50 mm	lin.m	295		295
/ 07	Gabion mattress, 3.0x1.5x0.5 m, PVC coated wire	cu.m	1,166		1,166
/ 08	Concrete, type 4, for ditch and culvert	cu.m	1,957		1,957
/ 09	Concrete, type 5, for leveling	cu.m	240		240
/ 10	Form, type F1, for Item No. 2.5/08	sq.m	3,780		3,780
/ 11	Form, type F2, for Item No. 2.5/08	sq.m	3,103		3,103
/ 12	Reinforcing bars, for Item No. 2.5/08	kg	118,275		118,275
/ 13	PVC waterstop, W=200mm	lin.m	613		613
/ 14	Joint bar, diam. 25 mm, L=1m	nos.	651		651
/ 15	Bitumen coating	sq.m	54		54
/ 16	Furnishing steel sheet pile, YSPF, W= 400mm	sq.m	53		53
/ 17	Driving steel sheet pile, for Item No. 2.5/16	sq.m	53		53

Package 3

Item No.	Description	Unit	Total Package 3	Gede/Bor	Saluran Cengkareng	Meruya
2.6	Concrete Ditch and Culvert					
/ 01	Coffering and care of water including dewatering	LS.				
/ 02	Demolishing, hauling and disposing concrete structures	cu.m	18			18
/ 03	Demolishing, hauling and disposing asphalt/masonry	cu.m	156			156
/ 04	Excavation of channel including trench cut	cu.m	26,500	697	11,452	14,351
/ 05	Rubble bedding	cu.m	1,336			1,336
/ 06	Geo-textile, t=1.5mm	sq.m	107	3	45	59
/ 07	Backfilling	cu.m	4,327	185	2,477	1,665
/ 08	Gravel filter	cu.m	77	1	15	61
/ 09	PVC pipe for weep hole, diam. 50 mm	lin.m	1,165	12	237	916
/ 10	Gabion mattress, 3.0x1.5x0.5 m, PVC coated wire	cu.m	10		10	
/ 11	Gabion mattress, 3.0x1.5x0.5 m, galvanized wire	cu.m	129	105		24
/ 12	Furnishing steel sheet pile, YSPF, W= 400mm	sq.m	216	120		96
/ 13	Driving steel sheet pile, for Item No. 2.6/12	sq.m	216	120		96
/ 14	Furnishing RC piles, 250 mm x 250 mm	lin.m	7,164		7,164	
/ 15	Driving RC piles, for Item No. 2.6/14	lin.m	7,164		7,164	
/ 16	Concrete, type 3, for blockout concrete	cu.m	5		3	2
/ 17	Concrete, type 4, for ditch and culvert	cu.m	9,482	202	3,712	5,568
/ 18	Concrete, type 5, for leveling	cu.m	1,157	29	467	671
/ 19	Form, type F1, for Item Nos. 2.6/16 and 2.6/17	sq.m	13,524	272	2,822	10,430
/ 20	Form, type F2, for Item Nos. 2.6/16 and 2.6/17	sq.m	10,623	207	1,999	8,417
/ 21	Reinforcing bars, for Item Nos. 2.6/16 and 2.6/17	kg	569,592	12,117	220,740	336,735
/ 22	PVC waterstop, W=200mm	lin.m	2,649	57	790	1,802
/ 23	Joint bar, diam. 25 mm, L=1m	nos.	1,990	57		1,933
/ 24	Rubber joint filler, t= 10 mm	sq.m	3		3	
/ 25	Bitumen coating	sq.m	653	20	448	185
/ 26	Furnishing and installing of trashrack and accessories	kg	10,617		8,699	1,918
/ 27	Furnishing and installing steel mesh cover	kg	54,150		54,150	
/ 28	Galvanized steel pipe, diam. 1 1/4"	kg	152			152
/ 29	Galvanized steel pipe, diam. 3/4"	kg	35			35
/ 30	Fence, H=2.5m	sq.m	122		122	

$$0.025 \times \pi = 0.0785 \text{ m}^2$$

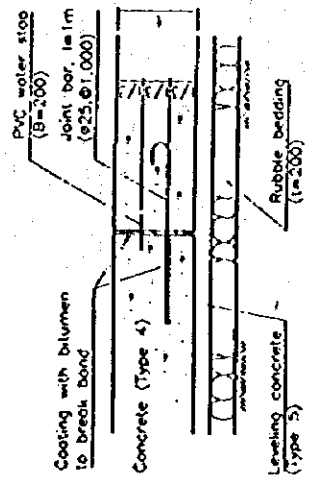
length of PVC water stop
 $2 \times (1.965 + 0.33 + 1.2) = 6.590 \text{ m}$



TYPICAL CROSS SECTION

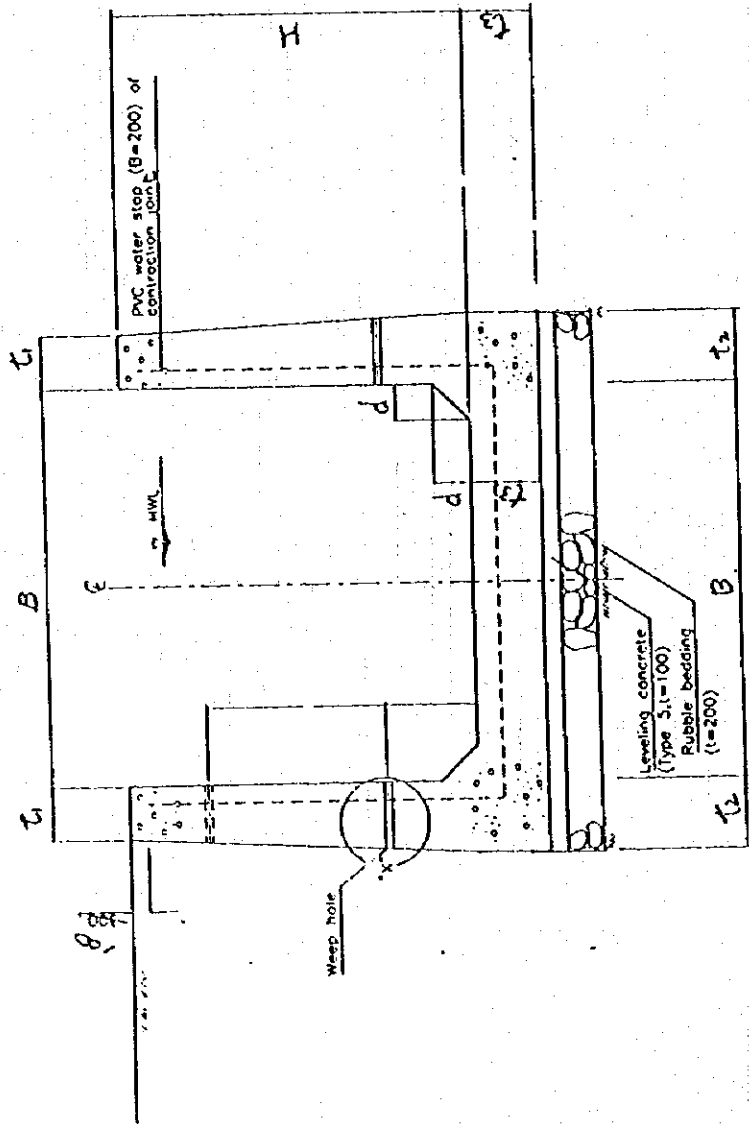
WEEP HOLE

Concrete Ditch (PIK Junction Drainage Channel)



CONTRACTION JOINT

Concrete (Type 4)
 $A_c = 0.4 \times 30 + 2 \times \frac{1}{2} (0.3 + 0.4) \times 1.965 + 0.2 \times 0.2$
 $= 2.616 \text{ (m}^2\text{)}$



TYPICAL CROSS SECTION

Menya Area

$$\begin{aligned}
 \circ \text{ MM101} &\sim 103+46.9 & L &= 948.2 \text{ m} \\
 B &= 8.0 & H &= 1.71 \text{ m} \\
 t_1 &= 0.3 \\
 t_2 = t_3 &= 0.4 & d &= 0.2 \text{ m}
 \end{aligned}$$

Section

$$\begin{aligned}
 A_c &= 0.4 \times 8.8 + (0.3 + 0.4) \times 2 \times 1.71 + 0.2 \times 0.2 \\
 &= 4.757 \text{ (m}^2\text{)}
 \end{aligned}$$

Length of water stop

$$(1.71 - 0.1 + 0.133) \times 2 + 8.2 = 11.686 \text{ m}$$

$$\begin{aligned}
 \circ \text{ MM103} &+ 46.9 - \text{MM104} & L &= 46.0 \text{ m} \\
 B &= 7.0 \text{ m} & H &= 1.85 \text{ m} \\
 t_1 &= 0.3 \\
 t_2 = t_3 &= 0.4 & d &= 0.2 \text{ m}
 \end{aligned}$$

Section

$$\begin{aligned}
 A_c &= 0.4 \times 7.8 + (0.3 + 0.4) \times 1.85 + 0.2 \times 0.2 \\
 &= 4.455 \text{ (m}^2\text{)}
 \end{aligned}$$

Length of water stop

$$(1.85 - 0.1 + 0.133) \times 2 + 7.2 = 10.966 \text{ m}$$

$$\begin{aligned}
 \circ \text{ MM104} &- \text{MM104} + 65.4 & L &= 65.4 \text{ m} \\
 B &= 6.0 & H &= 1.8 \\
 t_1 &= 0.3 \\
 t_2 = t_3 &= 0.4 & d &= 0.2 \text{ m}
 \end{aligned}$$

$$\begin{aligned}
 A_c &= 0.4 \times 6.8 + (0.3 + 0.4) \times 1.8 + 0.2 \times 0.2 \\
 &= 4.02 \text{ (m}^2\text{)}
 \end{aligned}$$

Length of water stop

$$(1.8 - 0.1 + 0.133) \times 2 + 6.2 = 9.866 \text{ (m)}$$

MM310 - MM15 + 120.8

L = 576.0m

B = 1.5m

H = 2.317

t₁ = 0.3

t₂ = t₃ = 0.4

d = 0.15

Section

$$2A_c = 2 \times \{ 2.3 \times 0.4 + (0.4 + 0.3) \times 2.317 + 0.15 \times 0.15 \}$$

$$= 5.129 \text{ m}^2 = 2.565 \text{ m}^2$$

Length of water stop

$$2 \times \{ (2.317 - 0.1 + 0.13) \times 2 + 1.7 \} = 2 \times 6.40 = 12.80$$

MM15 + 120.8 - MM19 + 5.8

L = 166.5m

B = 1.25m

H = 2.4

t₁ = 0.3

t₂ = t₃ = 0.4

d = 0.15

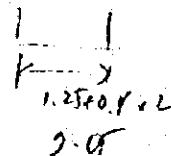
Section

$$2A_c = 2 \times \{ 2.05 \times 0.4 + (0.4 + 0.3) \times 2.4 + 0.15 \times 0.15 \}$$

$$= 5.045 \text{ (m}^2\text{)} = 2 \times 2.523$$

Length of water stop

$$2 \times \{ 2.433 \times 2 + 1.45 \} = 12.632 \text{ m} \quad 6.316 \times 2$$



MM19 + 5.8 - MM20 + 28.8

L = 88.5

B = 2.5m

H = 2.04

t₁ = 0.3

t₂ = t₃ = 0.4

d = 0.15

Section

$$A_c = 3.3 \times 0.4 + (0.4 + 0.3) \times 2.04 + 0.15 \times 0.15$$

$$= 2.771 \text{ m}^2$$

Length of water stop

$$2.073 \times 2 + 2.7 = 6.846 \text{ m}$$

MM20+28,8 - MM21+46,0

$$L = 49,8 \text{ m}$$

$$B = 2,2 \text{ m}$$

$$H = 1,9$$

$$t_1 = 0,3$$

$$t_2 = t_3 = 0,4$$

$$d = 0,15 \times 0,15$$

Section

$$A_c = 0,4 \times 3,0 + (0,3 + 0,4) \times 1,9 + 0,15 \times 0,15 \\ = 2,553 \text{ (m}^2\text{)}$$

Length of water stop

$$(1,9 - 0,1 + 0,133) \times 2 + 2,4 = 6,266 \text{ (m)}$$

MM25+89,6 - EP

$$L = 276,9 \text{ m}$$

$$B = 1,2 \text{ m}$$

$$H = 1,48$$

$$t_1 = 0,2$$

$$t_2 = t_3 = 0,3$$

$$d = 0,15 \times 0,15$$

Section

$$A_c = 0,3 \times 1,8 + (0,2 + 0,3) \times 1,48 + 0,15 \times 0,15 \\ = 1,303$$

Length of water stop

$$(1,48 - 0,1 + 0,133) \times 2 + 1,4 = 4,426 \text{ m}$$

Name of work: Concrete ditch and culvert / Excavation No. 2.7/02

Package 1

Name of channel: Kamal Drainage Channel (Branch)

Section No.	Distance		Left Bank		Volume (m3)
	(m)	unit (m)	Area		
			unit (m2)	average (m2)	
KE00					
KE01	36.6	36.6			
KE02	134.0	97.4			
KE03	272.3	138.3			
KE04	372.7	100.4			
KE07	486.8	114.1			
KE08	568.3	81.5			
KE10	626.2	57.9			
KE11	714.3	88.1			
KE12	785.9	71.6			
KE13	894.7	108.8			
KE14	944.7	50.0			
KE15	1020.1	75.4			
KE16	1107.7	87.6			
KE17	1174.1	66.4			
KE18	1265.4	91.3			
KE19	1376.9	111.5			
KE20	1421.9	45.0			
KE21	1497.0	75.1			
KE23	1536.7	39.7			
KE24	1637.4	100.7			
KE25	1718.5	81.1			
KE26	1870.3	151.8			
KE27	1988.1	117.8			
KE28	2058.7	70.6			
KE29	2132.0	73.3			
KE30	2298.5	166.5	5.59		
KE31	2474.4	175.9	5.58	5.58	982
KE32	2580.3	105.9	6.22	5.90	625
KE33	2754.7	174.4	5.04	5.63	982
Total					2,589

Name of work: Concrete ditch and culvert / Excavation No. 2.5/01

Package 2

Name of channel: PIK Junction Drainage Channel

Section No.	Distance		Area		Volume (m3)
	(m)	unit (m)	unit (m2)	average (m2)	
Outlet	-2.5		5.16		
BP		2.5	7.60	6.38	16
NM26	55.8	55.8	7.60	7.60	425
NM27	138.8	83.0	10.86	9.23	767
NM28	223.2	84.4	10.39	10.63	897
NM29	320.7	97.5	6.61	8.50	829
NM30	411.6	90.9	6.12	6.37	579
NM32	455.4	43.8	11.80	8.96	393
NM33	550.7	95.3	14.48	13.14	1,253
NM34	665.1	114.4	8.12	11.30	1,293
EP	765.4	100.3	8.12	8.12	815
Total					7,267

Name of work: Concrete ditch and culvert / Excavation No. 2.6/04
 Package 3
 Name of channel: Saluran Cengkareng Drainage Channel

Section No.	Distance		Area		Volume (m3)
	(m)	unit (m)	unit (m2)	average (m2)	
B.P					
CM01	17.2	17.2			
CM02	20.2	3.0			
CM02+1.5	21.7	1.5	35.90		
CM03	154.6	132.9	22.98	29.44	3,913
CM04	292.3	137.7	31.43	27.21	3,747
CM05	392.4	100.1	31.65	31.54	3,158
CM5+20.0	412.4	20.0	31.65	31.65	634
CM06	466.4	54.0			
CM07	569.0	102.6			
CM08	636.6	67.6			
CM09	808.2	171.6			
CM10	884.9	76.7			
CM12	962.9	78.0			
CM13	1056.9	94.0			
CM14	1173.6	116.7			
CM15	1237.0	63.4			
CM16	1312.8	75.8			
CM17	1446.0	133.2			
CM18	1544.5	98.5			
CM19	1613.6	69.1			
CM20	1740.7	127.1			
CM21	1832.5	91.8			
CM22	1901.7	69.2			
CM23	2001.5	99.8			
CM24	2102.9	101.4			
CM25	2194.3	91.4			
CM26	2304.8	110.5			
CM27	2448.0	143.2			
CM29	2599.3	151.3			
CM30	2698.3	99.0			
CM31	2803.5	105.2			
CM32	2933.5	130.0			
CM34	3047.4	113.9			
CM36	3095.6	48.2			
CM37	3219.0	123.4			
CM38	3339.1	120.1			
CM39	3425.5	86.4			
CM40	3467.5	42.0			
CM41	3556.9	89.4			
CM42	3653.4	96.5			
CM43	3777.2	123.8			
CM45	3916.3	139.1			
CM47	4022.2	105.9			
CM48	4110.3	88.1			
CM49	4230.2	119.9			
E.P	4231.2	1.0			
Total					11,452

Name of work: Concrete ditch and culvert / Excavation No. 2.6/04
 Package 3
 Name of channel: Meruya Area

Section No.	Distance		Area		Volume (m3)
	(m)	unit (m)	unit (m2)	average (m2)	
MM101			18.10		
MM102	98.9	98.9	24.40	21.25	2,102
MM103	201.3	102.4	25.70	25.05	2,566
MM104	294.2	92.9	27.35	26.53	2,465
MM104+65	359.2	65.0	27.33	27.34	1,778
MM104+115	409.2	50.0			
MM00-20	465.9	56.7			
MM302-10	504.3	38.4			
MM302	514.3	10.0			
MM303a	590.6	76.3			
MM303b	647.1	56.5			
MM307	714.7	67.6			
MM308	772.3	57.6			
MM309	819.1	46.8			
MM310	863.4	44.3	9.55		
MM310+4.7	868.1	4.7	9.55	9.55	45
MM10	883.3	15.2	3.30	6.43	98
MM11	952.7	69.4	5.25	4.28	297
MM12	1047.6	94.9	6.25	5.75	546
MM13	1129.6	82.0	7.00	6.63	544
MM14	1196.3	66.7	6.08	6.54	437
MM15	1318.6	122.3	6.08	6.08	744
MM17	1442.3	123.7	6.66	6.37	788
MM18	1505.6	63.3	4.81	5.74	364
MM19	1600.1	94.5	4.49	4.65	440
MM20	1665.6	65.5	3.09	3.79	249
MM21	1698.2	32.6	3.96	3.53	115
MM21+20.0	1718.2	20.0	3.96	3.96	80
MM21+46.0	1744.2	26.0			
MM22	1775.2	31.0			
MM22+42.2	1817.4	42.2			
MM23	1829.4	12.0			
MM24	1893.8	64.4			
MM25	1942.6	48.8			
MM25+89.6	2032.2	89.6	3.64		
MM26	2053.5	21.3	3.64	3.64	78
MM27	2161.3	107.8	2.89	3.27	352
MM28	2268.5	107.2	1.97	2.43	261
EP	2269.1	0.6	1.97	1.97	2
Total					14,351

Name of work: Concrete ditch and culvert / Backfilling

No. 2.7/05

Package 1

Name of channel: Kamal Drainage Channel (Branch)

Section No.	Distance		Left Bank			Right Bank			Total Volume (m3)
	(m)	unit (m)	Area		Volume (m3)	Area		Volume (m3)	
			unit (m2)	average (m2)		unit (m2)	average (m2)		
KE00									
KE01	36.6	36.6							
KE02	134.0	97.4							
KE03	272.3	138.3							
KE04	372.7	100.4							
KE07	486.8	114.1							
KE08	568.3	81.5							
KE10	626.2	57.9							
KE11	714.3	88.1							
KE12	785.9	71.6							
KE13	894.7	108.8							
KE14	944.7	50.0							
KE15	1020.1	75.4							
KE16	1107.7	87.6							
KE17	1174.1	66.4							
KE18	1265.4	91.3							
KE19	1376.9	111.5							
KE20	1421.9	45.0							
KE21	1497.0	75.1							
KE23	1536.7	39.7							
KE24	1637.4	100.7							
KE25	1718.5	81.1							
KE26	1870.3	151.8							
KE27	1988.1	117.8							
KE28	2058.7	70.6							
KE29	2132.0	73.3							
KE30	2298.5	166.5	1.17	0.58	97	1.04	0.52	87	184
KE31	2474.4	175.9	1.16	1.16	205	1.04	1.04	183	388
KE32	2580.3	105.9	1.17	1.17	124	1.09	1.07	113	237
KE33	2754.7	174.4	0.67	0.92	161	1.42	1.26	219	380
Total					587			602	1,189

Name of work: Concrete ditch and culvert / Backfilling
 Package 2

No. 2.5/04

Name of channel: PIK Junction Drainage Channel

Section No.	Distance		Left Bank			Right Bank			Total
	(m)	unit (m)	Area		Volume (m3)	Area		Volume (m3)	Volume (m3)
			unit (m2)	average (m2)		unit (m2)	average (m2)		
Outlet	-2.5		1.33			1.33			
BP		2.5	1.33	1.33	4	1.20	1.27	4	8
NM26	55.8	55.8	1.33	1.33	75	1.20	1.20	67	142
NM27	138.8	83.0	2.95	2.14	178	1.73	1.47	122	300
NM28	223.2	84.4	1.53	2.24	190	1.94	1.84	155	345
NM29	320.7	97.5	1.55	1.54	151	0.91	1.43	139	290
NM30	411.6	90.9	0.64	1.10	100	0.75	0.83	76	176
NM32	455.4	43.8	2.59	1.62	71	2.31	1.53	68	139
NM33	550.7	95.3	3.25	2.92	279	3.10	2.71	258	537
NM34	665.1	114.4	1.69	2.47	283	1.53	2.32	265	548
EP	765.4	100.3	1.69	1.69	170	1.53	1.53	154	324
Total					1,501			1,308	2,809

Name of work: Concrete ditch and culvert / Backfilling

No. 2.6/07

Package 3

Name of channel: Saluran Cengkareng Drainage Channel

Section No.	Distance		Left Bank			Right Bank			Total Volume (m3)
	(m)	unit (m)	Area		Volume (m3)	Area		Volume (m3)	
			unit (m2)	average (m2)		unit (m2)	average (m2)		
B.P									
CM01	17.2	17.2							
CM02	20.2	3.0							
CM02+1.5	21.7	1.5	3.20			2.80			
CM03	154.6	132.9	2.74	2.97	395	2.55	2.68	356	751
CM04	292.3	137.7	4.20	3.47	478	2.96	2.76	380	858
CM05	392.4	100.1	3.55	3.88	388	3.70	3.33	334	722
CM5+20.0	412.4	20.0	3.55	3.55	72	3.70	3.70	74	146
CM06	466.4	54.0							
CM07	569.0	102.6							
CM08	636.6	67.6							
CM09	808.2	171.6							
CM10	884.9	76.7							
CM12	962.9	78.0							
CM13	1056.9	94.0							
CM14	1173.6	116.7							
CM15	1237.0	63.4							
CM16	1312.8	75.8							
CM17	1446.0	133.2							
CM18	1544.5	98.5							
CM19	1613.6	69.1							
CM20	1740.7	127.1							
CM21	1832.5	91.8							
CM22	1901.7	69.2							
CM23	2001.5	99.8							
CM24	2102.9	101.4							
CM25	2194.3	91.4							
CM26	2304.8	110.5							
CM27	2448.0	143.2							
CM29	2599.3	151.3							
CM30	2698.3	99.0							
CM31	2803.5	105.2							
CM32	2933.5	130.0							
CM34	3047.4	113.9							
CM36	3095.6	48.2							
CM37	3219.0	123.4							
CM38	3339.1	120.1							
CM39	3425.5	86.4							
CM40	3467.5	42.0							
CM41	3556.9	89.4							
CM42	3653.4	96.5							
CM43	3777.2	123.8							
CM45	3916.3	139.1							
CM47	4022.2	105.9							
CM48	4110.3	88.1							
CM49	4230.2	119.9							
E.P	4231.2	1.0							
Total					1,333			1,144	2,477

Name of work: Concrete ditch and culvert / Backfilling

No. 2.6/07

Package 3

Name of channel: Meruya Area

Section No.	Distance		Left Bank			Right Bank			Total
	(m)	unit (m)	Area		Volume (m3)	Area		Volume (m3)	Volume (m3)
			unit (m2)	average (m2)		unit (m2)	average (m2)		
MM101			1.60			1.25			
MM102	98.9	98.9	2.45	2.03	201	2.25	1.75	174	375
MM103	201.3	102.4	2.45	2.45	251	2.80	2.53	259	510
MM104	294.2	92.9	2.60	2.53	235	2.20	2.50	233	468
MM104+65	359.2	65.0	2.60	2.60	169	2.20	2.20	143	312
MM104+115	409.2	50.0							
MM00-20	465.9	56.7							
MM302-10	504.3	38.4							
MM302	514.3	10.0							
MM303a	590.6	76.3							
MM303b	647.1	56.5							
MM307	714.7	67.6							
MM308	772.3	57.6							
MM309	819.1	46.8							
MM310	863.4	44.3							
MM310+4.7	868.1	4.7							
MM10	883.3	15.2							
MM11	952.7	69.4							
MM12	1047.6	94.9							
MM13	1129.6	82.0							
MM14	1196.3	66.7							
MM15	1318.6	122.3							
MM17	1442.3	123.7							
MM18	1505.6	63.3							
MM19	1600.1	94.5							
MM20	1665.6	65.5							
MM21	1698.2	32.6							
MM21+20.0	1718.2	20.0							
MM21+46.0	1744.2	26.0							
MM22	1775.2	31.0							
MM22+42.2	1817.4	42.2							
MM23	1829.4	12.0							
MM24	1893.8	64.4							
MM25	1942.6	48.8							
MM25+89.6	2032.2	89.6							
MM26	2053.5	21.3							
MM27	2161.3	107.8							
MM28	2268.5	107.2							
EP	2269.1	0.6							
Total					856			809	1,665

Work division: No. 2.7 Concrete ditch and culvert

Package 1 (Stage 3)

Name of channel: Kamal drainage channel (branch)

- L= 442.4 m : Length of concrete ditch (KE30+4.6 - KE33)
H= 1.322 m : Height of concrete channel (Design crest EL. - Design channel bed EL)
Ac= 2.068 m²: Section area of concrete ditch
n1= 293 : nos. of weep holes (= 2 x H x L / 4.0m²)
n2= 56 : nos. of contraction joints (= L / 8.0m)

Item No.	Description	Quantity	unit
2.7			
/03	Rubble bedding	327.4	cu.m
/04	Geo-textile	26.4	sq.m
/06	Gravel filter	7.9	cu.m
/07	PVC pipe for weep hole	117.2	lin.m
/08	Gabion (PVC)	663.6	cu.m
/09	Concrete Type 4	914.9	cu.m
/10	Concrete Type 5	141.6	cu.m
/11	Form, Type F1 (for concrete ditch) (for joints)	1,523.6	sq.m
/12	Form, Type F2	115.8	sq.m
/13	Reinforcing bars	1,224.6	sq.m
/14	PVC water stop	54,893.0	kg
/15	Joint bar	319.4	lin.m
/16	Bitumen coating	392	nos.
		32.8	sq.m

Work division: No. 2.5 Concrete ditch and culvert

Package 2

Name of channel: PIK Junction drainage channel

L= 743.4 m : Length of concrete wall (B.P - E.P, excluding outlet structure)
 H= 1.965 m : Height of concrete channel (Design crest EL. - Design channel bed EL)
 Ac= 2.616 m²: Section area of concrete ditch
 n1= 731 : nos. of weep holes (= 2 x H x L / 4.0m²)
 n2= 93 : nos. of contraction joints (= L / 8.0m)

Item No.	Description	Quantity	unit
2.5			
/02	Rubble bedding	579.9	cu.m
/03	Geo-textile	65.8	sq.m
/05	Gravel filter	19.7	cu.m
/06	PVC pipe for weep hole	292.4	lin.m
/07	Gabion (PVC)	1,115.1	cu.m
/08	Concrete Type 4	1,944.7	cu.m
/09	Concrete Type 5	237.9	cu.m
/10	Form, Type F1 (for concrete ditch) (for joints)	3,516.3	sq.m
/11	Form, Type F2	243.3	sq.m
/12	Reinforcing bars	3,045.0	sq.m
/13	PVC water stop	116,684.1	kg
/14	Joint bar	612.9	lin.m
/15	Bitumen coating	651	nos.
		53.7	sq.m

Work division: No. 2.6 Concrete ditch and culvert
 Package 3

Name of channel: Saluran Cengkareng drainage channel

- L= 379.4 m : Length of open culvert (CM02+10.8 - CM05+18.0)
 H= 2.406 m : Height of concrete channel (Design crest EL. - Design channel bed EL)
 Ac= 9.328 m²: Section area of concrete ditch
 n1= 457 : nos. of weep holes (= 2 x H x L / 4.0m²)
 n2= 48 : nos. of contraction joints (= L / 8.0m)
 n3= 1140 : nos. of piles (= L/2.0 x 10.5/2.0)

Item No.	Description	Quantity	unit
2.6			
/06	Geo-textile	41.1	sq.m
/08	Gravel filter	12.3	cu.m
/09	PVC pipe for weep hole	228.5	lin.m
/14	Furnishing RC pile	6,840.0	lin.m
/15	Driving RC pile	6,840.0	lin.m
/17	Concrete Type 4	3,539.0	cu.m
/18	Concrete Type 5	443.9	cu.m
/19	Form, Type F1 (for concrete ditch) (for joints)	2,205.1	sq.m
/20	Form, Type F2	447.7	sq.m
/21	Reinforcing bars	1,888.7	sq.m
/22	PVC water stop	212,342.6	kg
/23	Joint bar	768.6	lin.m
/25	Bitumen coating	447.7	nos.
/27	Steel mesh cover	54,150.0	kg

Work division: No. 2.6 Concrete ditch and culvert

Package 3

Name of channel: Meruya area

MM101 - MM103+46.9

L= 248.2 m : Length of concrete ditch
H= 1.71 m : Height of concrete channel (Design crest EL. - Design channel bed EL)
Ac= 4.757 m²: Section area of concrete ditch
n1= 213 : nos. of weep holes (= 2 x H x L / 4.0m²)
n2= 32 : nos. of contraction joints per lane (= L / 8.0m)

Item No.	Description		Quantity	unit
2.6				
/05	Rubble bedding	=8.8 x 0.2 x L	436.8	cu.m
/06	Geo-textile	=0.3 x 0.3 x n1	19.2	sq.m
/08	Gravel filter	=0.3 x 0.3 x 0.3 x n1	5.8	cu.m
/09	PVC pipe for weep hole	=0.4 x n1	85.2	lin.m
/16	Concrete Type 3			cu.m
/17	Concrete Type 4	=Ac x L	1,180.7	cu.m
/18	Concrete Type 5	=8.8 x 0.1 x L	218.4	cu.m
/19	Form, Type F1 (for concrete ditch) (for joints)	=(H+0.4) x 2 x L =Ac x n2	1,047.4	sq.m
/20	Form, Type F2	=H x 2 x L	848.8	sq.m
/21	Reinforcing bars	=V(No.18) x 60	70,841.2	kg
/22	PVC water stop	=11.686 x n2	374.0	lin.m
/23	Joint bar	=12 x n2	384	nos.
/25	Bitumen coating	= Ac+0.0785 x 12 x n2	34.9	sq.m

Work division: No. 2.6 Concrete ditch and culvert

Package 3

Name of channel: Meruya area

MM103+46.9 - MM104

L= 46 m : Length of concrete ditch
H= 1.85 m : Height of concrete channel (Design crest EL. - Design channel bed EL)
Ac= 4.455 m²: Section area of concrete ditch
n1= 43 : nos. of weep holes (= 2 x H x L / 4.0m²)
n2= 6 : nos. of contraction joints per lane (= L / 8.0m)

Item No.	Description		Quantity	unit
2.6				
/05	Rubble bedding	=7.8 x 0.2 x L	71.8	cu.m
/06	Geo-textile	=0.3 x 0.3 x n1	3.9	sq.m
/08	Gravel filter	=0.3 x 0.3 x 0.3 x n1	1.2	cu.m
/09	PVC pipe for weep hole	=0.4 x n1	85.2	lin.m
/16	Concrete Type 3			cu.m
/17	Concrete Type 4	=Ac x L	204.9	cu.m
/18	Concrete Type 5	= 7.8 x 0.1 x L	35.9	cu.m
/19	Form, Type F1 (for concrete ditch) (for joints)	=(H+0.4) x 2 x L =Ac x n2	207.0	sq.m
/20	Form, Type F2	=H x 2 x L	170.2	sq.m
/21	Reinforcing bars	=V(No.18) x 60	12,295.8	kg
/22	PVC water stop	=10.966 x n2	65.8	lin.m
/23	Joint bar	=11 x n2	66	nos.
/25	Bitumen coating	= Ac+0.0785 x 11 x n2	9.6	sq.m

Work division: No. 2.6 Concrete ditch and culvert

Package 3

Name of channel: Meruya area

MM104 - MM104+65.4

- L= 65.4 m : Length of concrete ditch
H= 1.8 m : Height of concrete channel (Design crest EL. - Design channel bed EL.)
Ac= 4.02 m²: Section area of concrete ditch
n1= 59 : nos. of weep holes (= 2 x H x L / 4.0m²)
n2= 9 : nos. of contraction joints pre lane(= L / 8.0m)

Item No.	Description		Quantity	unit
2.6				
/05	Rubble bedding	=6.8 x 0.2 x L	88.9	cu.m
/06	Geo-textile	=0.3 x 0.3 x n1	5.3	sq.m
/08	Gravel filter	=0.3 x 0.3 x 0.3 x n1	1.6	cu.m
/09	PVC pipe for weep hole	=0.4 x n1	23.6	lin.m
/16	Concrete Type 3			cu.m
/17	Concrete Type 4	=Ac x L	262.9	cu.m
/18	Concrete Type 5	=6.8 x 0.1 x L	44.5	cu.m
/19	Form, Type F1 (for concrete ditch) (for joints)	=(H+0.4) x 2 x L. =Ac x n2	287.8	sq.m
/20	Form, Type F2	=H x 2 x L	36.2	sq.m
/21	Reinforcing bars	=V(No.18) x 60	235.4	sq.m
/22	PVC water stop	=9.866 x n2	15,774.5	kg
/23	Joint bar	=10 x n2	88.8	lin.m
/25	Bitumen coating	= Ac+0.0785 x 10 x n2	90	nos.
			11.1	sq.m

Work division: No. 2.6 Concrete ditch and culvert

Package 3

Name of channel: Meruya area

MM310 - MM15+120.8

- L= 508.2 m : Length of concrete ditch
H= 2.317 m : Height of concrete channel (Design crest EL. - Design channel bed EL.)
Ac= 2.565 m²: Section area of concrete ditch(per one lane)
n1= 589 : nos. of weep holes per lane (= 2 x H x L / 4.0m²)
n2= 64 : nos. of contraction joints pre lane(= L / 8.0m)

Item No.	Description		Quantity	unit
2.6				
/05	Rubble bedding	=2.3 x 0.2 x L x 2	467.5	cu.m
/06	Geo-textile	=0.3 x 0.3 x n1 x 2	0.4	sq.m
/08	Gravel filter	=0.3 x 0.3 x 0.3 x n1 x 2	31.8	cu.m
/09	PVC pipe for weep hole	=0.4 x n1 x 2	471.2	lin.m
/16	Concrete Type 3		0.195	cu.m
/17	Concrete Type 4	=Ac x L x 2	2,607.1	cu.m
/18	Concrete Type 5	=2.3 x 0.1 x L x 2	233.8	cu.m
/19	Form, Type F1 (for concrete ditch) (for joints)	=(H+0.4) x 2 x L x 2 =Ac x n2 x 2	5,523.1	sq.m
/20	Form, Type F2	=H x 2 x L x 2	328.3	sq.m
/21	Reinforcing bars	=V(No.18) x 60	4,710.0	sq.m
/22	PVC water stop	=2 x 6.4 x n2	156,424.0	kg
/23	Joint bar	=7 x n2 x 2	819.2	lin.m
/25	Bitumen coating	= (Ac+0.0785 x 7 x n2) x 2	896	nos.
/26	Trash rack	=2 x 1.5 x 2.81 x 151 km/m ²	75.5	sq.m
			1,272.9	kg

Work division: No. 2.6 Concrete ditch and culvert

Package 3

Name of channel: Meruya area

MM15+120.8 - MM19+5.8

L= 133.1 m : Length of concrete ditch
H= 2.4 m : Height of concrete channel (Design crest EL. - Design channel bed EL)
Ac= 2.523 m²: Section area of concrete ditch(per one lane)
n1= 160 : nos. of weep holes per lane (= 2 x H x L / 4.0m²)
n2= 17 : nos. of contraction jounts pre lane(= L / 8.0m)

Item No.	Discription		Quantity	unit
2.6				
/05	Rubble bedding	=2.05 x 0.2 x L x 2	109.1	cu.m
/06	Geo-textile	=0.3 x 0.3 x n1 x 2	0.4	sq.m
/08	Gravel filter	=0.3 x 0.3 x 0.3 x n1 x 2	8.6	cu.m
/09	PVC pipe for weep hole	=0.4 x n1 x 2	128.0	lin.m
/16	Concrete Type 3			cu.m
/17	Concrete Type 4	=Ac x L x 2	671.6	cu.m
/18	Concrete Type 5	=2.05 x 0.1 x L x 2	54.6	cu.m
/19	Form, Type F1 (for concrete ditch) (for joints)	=(H+0.4) x 2 x L x 2 =Ac x n2 x 2	1,490.7 85.8	sq.m sq.m
/20	Form, Type F2	=H x 2 x L x 2	1,277.8	sq.m
/21	Reinforcing bars	=V(No.18) x 60	40,297.4	kg
/22	PVC water stop	=2 x 6.316 x n2	214.7	lin.m
/23	Joint bar	=7 x n2 x 2	238	nos.
/25	Bitumen coating	=(Ac+0.0785 x 7 x n2) x 2	23.7	sq.m

Work division: No. 2.6 Concrete ditch and culvert

Package 3

Name of channel: Meruya area

MM19+5.8 - MM20+28.8

L= 80.9 m : Length of concrete ditch
H= 2.04 m : Height of concrete channel (Design crest EL. - Design channel bed EL)
Ac= 2.771 m²: Section area of concrete ditch
n1= 83 : nos. of weep holes (= 2 x H x L / 4.0m²)
n2= 11 : nos. of contraction jounts pre lane(= L / 8.0m)

Item No.	Discription		Quantity	unit
2.6				
/05	Rubble bedding	=3.3 x 0.2 x L	53.4	cu.m
/06	Geo-textile	=0.3 x 0.3 x n1	7.5	sq.m
/08	Gravel filter	=0.3 x 0.3 x 0.3 x n1	2.2	cu.m
/09	PVC pipe for weep hole	=0.4 x n1	33.2	lin.m
/16	Concrete Type 3			cu.m
/17	Concrete Type 4	=Ac x L	224.2	cu.m
/18	Concrete Type 5	= 3.3 x 0.1 x L	26.7	cu.m
/19	Form, Type F1 (for concrete ditch) (for joints)	=(H+0.4) x 2 x L =Ac x n2	394.8 30.5	sq.m sq.m
/20	Form, Type F2	=H x 2 x L	330.1	sq.m
/21	Reinforcing bars	=V(No.18) x 60	13,450.4	kg
/22	PVC water stop	=6.846 x n2	75.3	lin.m
/23	Joint bar	=7 x n2	77	nos.
/25	Bitumen coating	= Ac+0.0785 x 7 x n2	8.8	sq.m

Work division: No. 2.6 Concrete ditch and culvert

Package 3

Name of channel: Meruya area

MM20+28.8 - MM21+46.0

- L= 42.2 m : Length of concrete ditch
H= 1.9 m : Height of concrete channel (Design crest EL. - Design channel bed EL.)
Ac= 2.553 m²: Section area of concrete ditch
n1= 41 : nos. of weep holes (= 2 x H x L / 4.0m²)
n2= 6 : nos. of contraction joints (= L / 8.0m)

Item No.	Description		Quantity	unit
2.6				
/05	Rubble bedding	=3.0 x 0.2 x L	25.3	cu.m
/06	Geo-textile	=0.3 x 0.3 x n1	3.7	sq.m
/08	Gravel filter	=0.3 x 0.3 x 0.3 x n1	1.1	cu.m
/09	PVC pipe for weep hole	=0.4 x n1	16.4	lin.m
/16	Concrete Type 3			cu.m
/17	Concrete Type 4	=Ac x L	107.7	cu.m
/18	Concrete Type 5	= 3.0 x 0.1 x L	12.7	cu.m
/19	Form, Type F1 (for concrete ditch) (for joints)	=(H+0.4) x 2 x L =Ac x n2	194.1	sq.m
/20	Form, Type F2	=H x 2 x L	15.3	sq.m
/21	Reinforcing bars	=V(No.18) x 60	160.4	sq.m
/22	PVC water stop	=6.266 x n2	6,464.2	kg
/23	Joint bar	=7 x n2	37.6	lin.m
/25	Bitumen coating	= Ac+0.0785 x 7 x n2	42	nos.
			5.9	sq.m

Work division: No. 2.6 Concrete ditch and culvert

Package 3

Name of channel: Meruya area

MM25+89.6 - E.P.

- L= 221.7 m : Length of concrete ditch
H= 1.48 m : Height of concrete channel (Design crest EL. - Design channel bed EL.)
Ac= 1.303 m²: Section area of concrete ditch
n1= 165 : nos. of weep holes (= 2 x H x L / 4.0m²)
n2= 28 : nos. of contraction joints (= L / 8.0m)

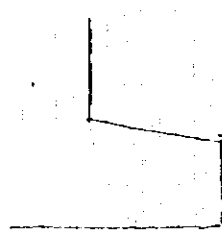
Item No.	Description		Quantity	unit
2.6				
/05	Rubble bedding	=1.8 x 0.2 x L	79.8	cu.m
/06	Geo-textile	=0.3 x 0.3 x n1	14.9	sq.m
/08	Gravel filter	=0.3 x 0.3 x 0.3 x n1	4.5	cu.m
/09	PVC pipe for weep hole	=0.4 x n1	66.0	lin.m
/16	Concrete Type 3		0.156	cu.m
/17	Concrete Type 4	=Ac x L	288.9	cu.m
/18	Concrete Type 5	= 1.8 x 0.1 x L	39.9	cu.m
/19	Form, Type F1 (for concrete ditch) (for joints)	=(H+0.4) x 2 x L =Ac x n2	833.6	sq.m
/20	Form, Type F2	=H x 2 x L	36.5	sq.m
/21	Reinforcing bars	=V(No.18) x 60	656.2	sq.m
/22	PVC water stop	=4.426 x n2	17,332.5	kg
/23	Joint bar	=5 x n2	123.9	lin.m
/25	Bitumen coating	= Ac+0.0785 x 5 x n2	140	nos.
/26	Trash rack	=2.2 x 1.94 x 151 km/m ²	12.3	sq.m
			644.5	kg

Working Division: 25 Concrete ditch & Culvert

Sheet 1

Description	Calculation Details	Unit	Quantity	Remarks
Outlet structure of PK Junction Drainage Channel (Package 2)				
02/ Rubble Bedding				
	$2.5 \times 4.7 \times 0.2 = 2.35$	m ³	2.35	
03/ Geotextile				
	nos. of weep holes			
	$1.695 \times (2.5 + 2.0 + 2.5) / 4.0 = 3$			
	$0.3 \times 0.3 \times 3 = 0.27$	m ²	0.27	
05/ Gravel Filter				
	$0.3 \times 0.3 \times 0.3 \times 3 = 0.081$	m ³	0.081	
06/ PVC pipe for weep hole				
	$0.4 \times 3 = 1.2$	linm	1.20	
07/ Gabion mattress (PVC coated)				
	$(7.4 \times 3.0 + 6.7 \times 4.5 + 1.0 \times 4.8) \times 0.5$ $+ (3.0 \times 6.7 + 7.4 \times 3.0) \times 0.5 = 49.925$	m ³	49.925	
16/ Furnishing steel sheet pile				
	$(6.7 - 0.4 + 2.5) \times 6.0 = 52.8$	m ²	52.80	
17/ Driving Steel sheet pile				
		m ²	52.80	

Description	Calculation Details	Unit	Quantity	Remarks
108 Concrete Type 4	$(2.3 \times 2.4) / 2 \times 1.965 \times (2.5 + 2.0 + 2.5)$ $+ (2.2 + 2.5) \times 2.5 \times 0.4 + (0.4 + 0.5) / 2 \times 2.06 \times (4.7 + 2.5)$ $+ 0.3 \times 0.15 \times (4.7 + 2.5)$ $= 4.814 + 4.7 + 1.944 + 0.324 = 11.785$	m ³	11.785	
109 Concrete Type 5	$(2.5 \times 4.7 + 2.0 \times 0.4 + 2.5 \times 0.4) \times 0.1$ $= 1.355$	m ³	1.355	
110 Form type 1	$(1.15 + 0.698) \times (6.7 + 2.1 + 2.5)$ $= 19.865$	m ²	19.865	
111 Form type 2	$(1.765 + 0.283 + 1.968) \times 2 \times (2.5 + 2.5 + 2.0)$ $+ \sqrt{2} \times 0.15 \times (2.5 + 4.7)$ $= 57.457$	m ²	57.457	
112 Reinforcing bars	$19.865 \times 80 = 1589.2$	kg	1589.2	



Working Division: 2/6 Concrete ditch and culvert

Sheet 1

Description	Calculation Details	Unit	Quantity	Remarks
Outlet Structure of Gode/Bar Drainage Channel Package 3				
104 Excavation	$4.25 \times 2.18 + (0.5 + 1.4 + 1.4) \times 2.18 \times 2.0 = 696.818$	CUM	696.818	
106 Geo-textile				
	nos. of weep hole			
	$2.3 \times 200 \times 2 / 4 = 23$			
	$23 \times 0.3 \times 0.3 = 2.07$	Sq.m	2.07	
107 Back filling				
	$(0.5 + 1.4 \times 2) \times 2.8 \times 20 = 184.8$	CUM	184.80	
108 Gravel filter				
	$23 \times 0.3 \times 0.3 = 2.07$	CUM	2.07	
109 PVC pipe for weep hole				
	$23 \times 0.5 = 11.5$	lin.	11.50	
111 Gabion mattress (galvanize)				
	$(3.0 + 1.5) \times 0.5 \times 20 \times 2 = 105$	CUM	105.00	
112 Furnishing steel sheet pile				
	$20.0 \times 6.0 = 120.0$	Sq.m	120.00	
113 Driving steel sheet pile				
		Sq.m	120.00	
117 Concrete type 4				
	Cumulative $(0.3 + 0.5) \times 2.3 + 1.4 \times 0.5 + 0.2 \times 0.2 + 0.4 \times 0.4 \times 2.0 = 180.8$			
	Bill $(0.7 + 0.7 + 0.5) \times 1.6 \times 0.5 \times 13.0 = 6.175$			
	$0.4 \times 0.4 \times 13.0 = 2.08$			
	$(0.3 + 0.5) \times 2.3 \times 3.5 = 12.88$			
		CUM	201.935	

Working Division: 2.6 Ditch and Culvert

Sheet 1

Description	Calculation Details	Unit	Quantity	Remarks
Package 9 Saluran Conkoreng				
	CHD: 4.5 = C.M.D. + 10.8 (Transitron)			
10.6 Geo-Textile				
	Nos. of weep holes			
	$n = (9.51 + 5.31 + 10.10) \times 2.4 / 4.0 = 16$			
	$0.3 \times 0.3 \times 16 = 1.44$	sq.m	1.44	
10.8 Gravel Filter				
	$0.3 \times 0.3 \times 0.3 \times 16 = 0.432$	cu.m	0.432	
10.9 PVC Pipe for weep hole				
	$16 \times 0.5 = 8.0$	lin.m	8.0	
1.10 Gabion mattress (PVC)				
	$1.5 \times 5.0 \times 0.5 = 3.75$	cu.m	3.75	
1.14 Furnishing RC piles				
	Area = 188.0 m ²			
	$188.0 / 4.0 = 47$ nos of piles			
	$47 \times 6.0 = 282.0$	lin.m	282.0	
1.15 Drilling RC piles				
		lin.m	282.0	
1.16 Concrete types				
	$(0.2 \times 0.25 + 0.35 \times 0.2) \times 5.8 = 0.940$	cu.m	0.940	

Working Division: 2.6 Ditch and culvert

Sheet 2

Description	Calculation Details	Unit	Quantity	Remarks
117 Concrete Type 4	$1.88 \times 0.5 + (9.51 + 7.81 + 12.6) \times 0.5 \times 2.41$ $+ 0.5 \times 0.5 \times 16.3 = 134.13$			
	$5.8 \times 0.22 \times 0.75 + 0.25 \times 2.51 = 1.50$			
	$0.4 \times 0.4 \times 5.8 = 0.928$	CUM	126.56	
118 Concrete type 5	$1.88 \times 0.1 = 1.88$	CUM	127.50	
119 Form - F1	$(9.51 + 7.81 + 12.6) \times (9.41 + 0.5) = 87.07$ $1.0 \times 16.3 + 0.5 \times 2.41 \times 2 = 18.71$	Sq.m	105.78	
120 Form F2	$(9.51 + 7.81 + 12.6) \times 2.41 = 72.11$ $2.51 \times 1.5 \times 2 + 2.357 \times 2 = 12.24$	Sq.m	84.46	
121 Reinforcing bars	$105.78 \times 60 = 6346.8$	Kg	6346.8	
122 PVC waterstop	$2.51 \times 2 + 1.57 = 20.72$	lin.m	20.72	
126 Trash rack (inlet from bridge)	$2 \times 5 \times 2.87 \times 1.51 = 433.4$	Kg	4334.0	
130 Ferno	$H=2.70 \quad 2.5 \times 0.87 = 12.175$	Sq.m	121.75	

Working Division: 2.6 Concrete ditch and culvert

Sheet 1

Description	Calculation Details	Unit	Quantity	Remarks
Package 3 Salinas Landmark Drainage Channel				
Intake of open culvert	$L = 2.0M + 5.5M$			
606 Geotextile				
	nos. of woodholes $2 \times 2.002 \times 7.5 / 4.0$			
	≈ 10.0			
	$0.3 \times 0.3 \times 10.0 = 0.9$	sq.m	0.9	
108 Gravel filter				
	$0.3 \times 0.3 \times 0.3 \times 10.0 = 0.27$	cu.m	0.27	
110 Gabion mattress (PVC)				
	$3.0 \times 4.0 \times 0.5 = 6.0$	cu.m	6.0	
114 Furnishine Re.piles				
	$(10.5 \times 2.0 + 1.1 \times 5.5 \times 2) / 4 = 7$ (bracket pile)			
	$7 \times 6.0 = 42.0$	linm	42.0	
115' Driving RC piles				
		linm	42.0	
116 Concrete Type 3				
	$0.25 \times 0.2 \times 10.5 + 0.4 \times 0.2 \times 10.5 = 1.365$	cu.m	1.365	
117 Concrete Type 4				
	$A_0 = 0.65 \times 2.402 \times 2 + 11.8 \times 0.5 + 0.2 \times 0.2$			
	$= 8.102$			
	$V_1 = 8.102 \times 2.0 + 0.5 \times 0.5 \times 11.3 = 19.029$			
	$V_2 = 1.1 \times 5.5 \times 0.5 \times 2 = 6.05$			

Working Division: 2. Concrete ditch and culvert

Description	Calculation Details	Unit	Quantity	Remarks
	$T_3 = 2.684 \times 0.5 \times 5.5 = 7.982$			
	$V_4 = 0.2 \times 0.75 \times 11.3 = 1.695$	CUM	34.156	
1/8 Concrete Types				
	$(11.5 \times 7.0 + 1.75 \times 5.5) \times 0.1 = 3.263$	CUM	3.263	
1/9 Form Type F1				
	$2.402 \times 2.0 \times 2 + 0.541 \times 3 + (8 + 5.5) \times 2 + 2 \times 0.5$			
	$+ 2.684 \times 5.5 \times 2 + 0.6655$			
	$= 62.582$	Sq.m	62.582	
1/20 Form Type F2				
	$2.402 \times 2.0 \times 2 + 2.684 \times 2 + 10 \times 1.0$			
	$= 24.976$	Sq.m	24.976	
1/21 Reinforcing Bars				
	$34.156 \times 60 = 2049.36$	Kg	2049.36	
1/24 Rubber joint filler				
	$2.684 \times 0.5 \times 2 = 2.684$	Sq.m	2.684	
1/26 Trash rack				
	Inlet: $3 \times (110 + 1345) = 4365 \text{ Kg}$	Kg	4365.0	
1/27 Mesh cover	$51300 + 2850 = 54150 \text{ Kg}$	Kg	54150.0	

Working Division: 2.6 Concrete ditch and culvert

Description	Calculation Details	Unit	Quantity	Remarks
Package 9 Heavy Area Outlet structure				
1.1 Gabion mattress (galvanized)				
	$30 \times 160 \times 0.5 = 2400$	sqm	24.0	
1.2 Furnishing steel sheet pile				
	$16.0 \times 6.0 = 96.0$	sqm	96.0	
1.3 Driving steel sheet pile		sqm	96.0	
1.7 Concrete Type 4				
	$4.0 \times 2.18 \times 0.4 \times 2 + 1.5 \times 0.9 \times 8.0$			
	$+ 1.5 \times 0.3 \times 12.0 + 0.25 \times 1.28 \times 1.5$			
	$= 16.91$	Cum	16.91	
1.8 Concrete Type 5				
	$4.0 \times 0.4 \times 0.1 \times 2 = 0.32$	Cum	0.32	
1.9 Form F1				
	$(4.0 + 0.4 \times 2) \times 2.18 \times 2 = 20.928$			
	$(1.5 + 0.6) \times 12 + (1.5 + 0.6) \times 8.6 = 43.26$	sqm	64.19	
1.20 Form F2				
	$4.0 \times 2.18 \times 2 + (1.5 + 0.25) \times 2 \times 1.78$			
	$= 23.67$	sqm	23.67	

Working Division: 2.6 Concrete ditch and Culvert

Description	Calculation Details	Unit	Quantity	Remarks
/21 Reinforcing bars				
	$64.19 \times 00 = 3851.28$	Cum	3851.28	
/28 Galvanized steel pipe	1 1/4"			
	$(1.1 \times 13 + 12.5) + 1.1 \times 9 + 8.3$			
	$= 45.0 \text{ (in. M)}$			
	$45 \text{ m} \times 3.38 \text{ kg/m} = 152.10 \text{ kg}$	kg	152.10	
/29 Galvanized steel pipe	3/4"			
	$1.25 + 8.3 = 20.8 \text{ (in. M)}$	kg	34.94	
	$20.8 \times 1.68 = 34.944 \text{ kg}$			

1.3 Drainage Facilities
1.3.1 Sluiceway

Summary of Work Quantities, SLUICEWAY

Package 1

Item No.	Description	Unit	Total Package 1	Kamal				
				Stage1 main	Stage2 msin	Stage3		
						Total	main	branch
3.1	Sluiceway							
/ 01	Coffering and care of water including dewatering	L.S.						
/ 02	Excavation including trench cut	cu.m	2,493		1,594	899	250	649
/ 03	Backfilling with selected materials	cu.m	614		453	161	86	75
/ 04	Geo-textile, t=1.5 mm	sq.m	23		13	10	2	8
/ 05	Gravel bedding	cu.m	157		135	22	7	15
/ 06	Cobble/rubble filling	cu.m	41		31	10		10
/ 07	Wet cobble/rubble masonry, type 2	cu.m	334		285	49	15	34
/ 08	Gabion mattress, 3.0x1.5x0.5 m, PVC coated wire	cu.m	277		164	113	27	86
/ 09	PVC pipe for weep hole, diam. 50mm	lin.m	37		25	12	4	8
/ 10	Bitumen coating	sq.m	4		4			
/ 11	Furnishing steel sheet pile, YSPF, W= 400mm	sq.m	354		247	107	37	70
/ 12	Driving of steel sheet pile, for Item No. 3.1/11	sq.m	354		247	107	37	70
/ 13	Furnishing RC Piles, 250 mm x 250 mm	lin.m	1,703		1,113	590	180	410
/ 14	Driving of RC piles, for Item No. 3.1/13	lin.m	1,703		1,113	590	180	410
/ 15	Concrete, type 3, for blackout concrete	cu.m	24		14	10	2	8
/ 16	Concrete, type 4, for sluiceway structures and	cu.m	377		273	104	35	69
/ 17	Concrete, type 5, for leveling	cu.m	57		42	15	4	11
/ 18	Base mortar	cu.m	84		71	13	4	9
/ 19	Form, type F1, for Item Nos. 3.1/15 and 3.1/16	sq.m	1,944		1,472	472	176	296
/ 20	Form, type F2, for Item Nos. 3.1/15 and 3.1/16	sq.m	474		341	133	43	90
/ 21	Reinforcing bars, for Item Nos. 3.1/15 and 3.1/16	kg	44,216		32,157	12,059	4,110	7,949
/ 22	Joint bars, diam. 25mm, L=1 m	nos.	10		10			
/ 23	PVC waterstop, W=200mm	lin.m	10		10			
/ 24	Rubber joint filler, t= 10 mm	sq.m	45		22	23	10	13
/ 25	Steel slide gate including hoist, guide frame, accessories and spare parts, W= 0.7 m x H= 0.7 m	set	1		1			
/ 26	Steel slide gate including hoist, guide frame, accessories and spare parts, W= 0.8 m x H= 0.8 m	set	7		3	4	1	3
/ 27	Steel slide gate including hoist, guide frame, accessories and spare parts, W= 0.9 m x H= 0.9 m	set	1			1		1
/ 28	Steel slide gate including hoist, guide frame, accessories and spare parts, W= 1.0 m x H= 1.0 m	set	4		3	1	1	
/ 29	Steel slide gate including hoist, guide frame, accessories and spare parts, W= 1.1 m x H= 1.1 m	set	3		3			
/ 30	Steel slide gate including hoist, guide frame, accessories and spare parts, W= 1.2 m x H= 1.2 m	set	2		2			
/ 31	Steel slide gate including hoist, guide frame, accessories and spare parts, W= 1.3 m x H= 1.3 m	set	1		1			
/ 32	Steel slide gate including hoist, guide frame, accessories and spare parts, W= 1.5 m x H= 1.3 m	set	1		1			
/ 33	Steel flap gate including guide frame, accessories and spare parts, W= 0.4 m x H= 0.4 m	set	4			4		4
/ 34	Timber stoplog, W= 0.4 m x H= 0.4 m	set	1			1		1
/ 35	Timber stoplog, W= 0.7 m x H= 0.7 m	set	1		1			
/ 36	Timber stoplog, W= 0.8 m x H= 0.8 m	set	1		1			
/ 37	Timber stoplog, W= 0.9 m x H= 0.9 m	set	1			1		1
/ 38	Timber stoplog, W= 1.0 m x H= 1.0 m	set	1		1			
/ 39	Timber stoplog, W= 1.1 m x H= 1.1 m	set	1		1			
/ 40	Timber stoplog, W= 1.2 m x H= 1.2 m	set	1		1			
/ 41	Timber stoplog, W= 1.3 m x H= 1.3 m	set	1		1			
/ 42	Timber stoplog, W= 1.5 m x H= 1.3 m	set	1		1			
/ 43	Maintenance tool for gate, stoplog and hoist	set	2		2			

Summary of Work Quantities, SLUICEWAY

Package 2

Item No.	Description	Unit	Total Package 2	Tanjungan	PIK Junction
3.1	Sluiceway				
/ 01	Coffering and care of water including dewatering	L.S.			
/ 02	Excavation including trench cut	cu.m	549	538	11
/ 03	Backfilling with selected materials	cu.m	78	67	11
/ 04	Geo-textile, t=1.5 mm	sq.m	6	5	1
/ 05	Gravel bedding	cu.m	24	20	4
/ 06	Wet cobble/rubble masonry, type 2	cu.m	57	47	10
/ 07	Cabion mattress, 3.0x1.5x0.5 m, PVC coated wire	cu.m	78	71	7
/ 08	PVC pipe for weep hole, diam. 50mm	lin.m	9	7	2
/ 09	Furnishing steel sheet pile, YSPF, W= 400mm	sq.m	20	20	
/ 10	Driving of steel sheet pile, for Item No. 3.1/09	sq.m	20	20	
/ 11	Furnishing RC Piles, 250 mm x 250 mm	lin.m	560	512	48
/ 12	Driving of RC piles, for Item No. 3.1/11	lin.m	560	512	48
/ 13	Concrete, type 3, for blockout concrete	cu.m	9	8	1
/ 14	Concrete, type 4, for sluiceway structures and revetment	cu.m	71	62	9
/ 15	Concrete, type 5, for leveling	cu.m	12	11	1
/ 16	Base mortar	cu.m	14	12	2
/ 17	Form, type F1, for Item Nos. 3.1/13 and 3.1/14	sq.m	228	214	14
/ 18	Form, type F2, for Item Nos. 3.1/13 and 3.1/14	sq.m	128	113	15
/ 19	Reinforcing bars, for Item Nos. 3.1/13 and 3.1/14	kg	7,914	6,934	980
/ 20	Rubber joint filler, t= 10 mm	sq.m	4	4	
/ 21	Steel slide gate including hoist, guide frame, accessories and spare parts, W= 0.8 m x H = 0.8 m	set	4	4	
/ 22	Steel slide gate including hoist, guide frame, accessories and spare parts, W= 1.0 m x H = 1.0 m	set	3	3	
/ 23	Steel slide gate including hoist, guide frame, accessories and spare parts, W= 1.1 m x H = 1.1 m	set	1		1
/ 24	Steel flap gate including guide frame, accessories and spare parts, W= 0.4 m x H = 0.4 m	set	1	1	

Summary of Work Quantities, SLUICEWAY

Package 3

Item No.	Description	Unit	Total Package 3	Gede/Bor	Saluran Cengkareng	Meruya
3.1	Sluiceway					
/ 01	Coffering and care of water including dewatering	L.S.				
/ 02	Demolishing, hauling and disposing existing concrete structures	cu.m	65	20	45	
/ 03	Demolishing, hauling and disposing existing asphalt/masonry	cu.m	112	38	74	
/ 04	Excavation including trench cut	cu.m	3,625	590	3,035	
/ 05	Backfilling with selected materials	cu.m	831	121	710	
/ 06	Geo-textile, t=1.5 mm	sq.m	19	4	15	
/ 07	Sod facing	sq.m	62		62	
/ 08	Gravel bedding	cu.m	181	9	172	
/ 09	Cobble/rubble filling	cu.m	41		41	
/ 10	Wet cobble/rubble masonry, type 2	cu.m	389	21	368	
/ 11	Gabion mattress, 3.0x1.5x0.5 m, PVC coated wire	cu.m	299	58	241	
/ 12	Gabion mattress, 3.0x1.5x0.5 m, galvanized wire	cu.m	36	36		
/ 13	PVC pipe for weep hole, diam. 50mm	lin.m	39	6	33	
/ 14	Bitumen coating	sq.m	110		110	
/ 15	Furnishing steel sheet pile, YSPF, W= 400mm	sq.m	391	100	291	
/ 16	Driving of steel sheet pile, for Item No. 3.1/15	sq.m	391	100	291	
/ 17	Furnishing RC Piles, 250 mm x 250 mm	lin.m	1,403	474	929	
/ 18	Driving of RC piles, for Item No. 3.1/17	lin.m	1,403	474	929	
/ 19	Furnishing RC Piles, 300 mm x 300 mm	lin.m	560		560	
/ 20	Driving of RC piles, for Item No. 3.1/19	lin.m	560		560	
/ 21	Concrete, type 3, for blockout concrete	cu.m	31	7	24	
/ 22	Concrete, type 4, for sluiceway structures and revetment	cu.m	934	98	836	
/ 23	Concrete, type 5, for leveling	cu.m	106	11	95	
/ 24	Base mortar	cu.m	98	10	88	
/ 25	Form, type F1, for Item Nos. 3.1/21 and 3.1/22	sq.m	2,594	364	2,230	
/ 26	Form, type F2, for Item Nos. 3.1/21 and 3.1/22	sq.m	901	175	726	
/ 27	Reinforcing bars, for Item Nos. 3.1/21 and 3.1/22	kg	111,990	11,546	100,444	
/ 28	Joint bars, diam. 25mm, L=1m	nos.	68		68	
/ 29	PVC waterstop, W=200mm	lin.m	65		65	
/ 30	Rubber joint filler, t= 10 mm	sq.m	33	19	14	
/ 31	Sub-base course	cu.m	22		22	
/ 32	Base-course	cu.m	16		16	
/ 33	Asphalt pavement	sq.m	106		106	
/ 34	Furnishing and installing traps	kg	125		125	
/ 35	Steel galvanized pipe, diam. 1 1/4"	kg	28		28	
/ 36	Steel galvanized pipe, diam. 3/4"	kg	61		61	
/ 37	Embedded metal for stoplog groove	kg	260		260	
/ 38	Steel slide gate including hoist, guide frame, accessories and spare parts, W= 0.8 m x H = 0.8 m	set	5	4	1	
/ 39	Steel slide gate including hoist, guide frame, accessories and spare parts, W= 0.9 m x H = 0.9 m	set	1		1	
/ 40	Steel slide gate including hoist, guide frame, accessories and spare parts, W= 1.0 m x H = 1.0 m	set	7	2	5	
/ 41	Steel slide gate including hoist, guide frame, accessories and spare parts, W= 1.1 m x H = 1.1 m	set	4		4	
/ 42	Steel slide gate including hoist, guide frame, accessories and spare parts, W= 1.2 m x H = 1.2 m	set	4		4	
/ 43	Steel slide gate including hoist, guide frame, accessories and spare parts, W= 1.3 m x H = 1.3 m	set	1		1	
/ 44	Steel slide gate including hoist, guide frame, accessories and spare parts, W= 2.3 m x H = 2.3 m	set	5		5	
/ 45	Timber stoplog, W = 2.3 m x H = 2.3 m	set	2		2	
/ 46	Steel stand for portable hanger	set	10		10	
/ 47	Portable hanger, handling tools and slings for 2.3mx2.3m stoplog	set	2		2	

Calculation formula

type linear mesh type long conduct / Area

Type	Item No.	Description	Unit	Quantity
7.0	7.0	Calculating, holding and disposing existing concrete structures	none	
7.0	7.0	Calculating, holding and disposing existing temporary structures	none	
7.0	7.0	Calculating, holding and disposing existing temporary structures	none	
7.0	7.0	Calculating, holding and disposing existing temporary structures	none	
7.0	7.0	Calculating, holding and disposing existing temporary structures	none	
7.0	7.0	Calculating, holding and disposing existing temporary structures	none	
7.0	7.0	Calculating, holding and disposing existing temporary structures	none	
7.0	7.0	Calculating, holding and disposing existing temporary structures	none	

SW-6

Type	Item No.	Description	Unit	Quantity
7.14	7.14	Concrete retaining wall 1.5m x 0.3m x 1.5m (incl. 1.5m)	m ²	
7.15	7.15	Concrete retaining wall 1.5m x 0.3m x 1.5m (incl. 1.5m)	m ²	
7.16	7.16	Concrete retaining wall 1.5m x 0.3m x 1.5m (incl. 1.5m)	m ²	
7.17	7.17	Concrete retaining wall 1.5m x 0.3m x 1.5m (incl. 1.5m)	m ²	
7.18	7.18	Concrete retaining wall 1.5m x 0.3m x 1.5m (incl. 1.5m)	m ²	
7.19	7.19	Concrete retaining wall 1.5m x 0.3m x 1.5m (incl. 1.5m)	m ²	

Type	Item No.	Description	Unit	Quantity
7.20	7.20	Concrete retaining wall 1.5m x 0.3m x 1.5m (incl. 1.5m)	m ²	
7.21	7.21	Concrete retaining wall 1.5m x 0.3m x 1.5m (incl. 1.5m)	m ²	
7.22	7.22	Concrete retaining wall 1.5m x 0.3m x 1.5m (incl. 1.5m)	m ²	
7.23	7.23	Concrete retaining wall 1.5m x 0.3m x 1.5m (incl. 1.5m)	m ²	
7.24	7.24	Concrete retaining wall 1.5m x 0.3m x 1.5m (incl. 1.5m)	m ²	
7.25	7.25	Concrete retaining wall 1.5m x 0.3m x 1.5m (incl. 1.5m)	m ²	

Type	Item No.	Description	Unit	Quantity
7.20	7.20	Concrete retaining wall 1.5m x 0.3m x 1.5m (incl. 1.5m)	m ²	
7.21	7.21	Concrete retaining wall 1.5m x 0.3m x 1.5m (incl. 1.5m)	m ²	
7.22	7.22	Concrete retaining wall 1.5m x 0.3m x 1.5m (incl. 1.5m)	m ²	
7.23	7.23	Concrete retaining wall 1.5m x 0.3m x 1.5m (incl. 1.5m)	m ²	
7.24	7.24	Concrete retaining wall 1.5m x 0.3m x 1.5m (incl. 1.5m)	m ²	
7.25	7.25	Concrete retaining wall 1.5m x 0.3m x 1.5m (incl. 1.5m)	m ²	

Type Item No.	Description	Unit	Quantity
7.00	Prepaid contract work, at 100.00/hr	hour	NONE
7.07	Sub-base course	cum	NONE
7.08	Base course	cum	NONE
7.09	Asphalt pavement	cum	60.00

Type Item No.	Description	Unit	Quantity
7.01	<p>Change type of the existing structure</p> <p>1.00m x 0.50m x 0.20m $V_1 = 0.10$</p> <p>Foundation wall $V_2 = 0.3 \times 0.3 \times 1.0 \times 1.0 \times 2.0 = 0.36$</p> <p>Foundation $V_3 = 0.186 \times 2.2$</p> <p>$V = V_1 + V_2 + V_3$</p>	cum	
7.02	<p>Change type of the existing structure</p> <p>1.00m x 0.50m x 0.20m $V_1 = 0.10$</p> <p>Foundation wall $V_2 = 0.3 \times 0.3 \times 1.0 \times 1.0 \times 2.0 = 0.36$</p> <p>Foundation $V_3 = 0.186 \times 2.2$</p> <p>using $V_4 = 0.12 (1.2 \times 1.9 \times 0.2)$</p> <p>$V = V_1 + V_2 + V_3 + V_4$</p>	cum	
7.03	Form type #1, for form Nos. 2.072 and 2.075	hour	See
7.04	Form type #2, for form Nos. 2.072 and 2.075	hour	See

SW-9

Type Item No.	Description	Unit	Quantity
7.01	<p>Reinforcing bars, see form Nos. 2.072 and 2.075</p> <p>$W = \pi (10.25)^2 \times 1.20 \text{ (kg/m)}^2$</p>	kg	
7.03	Joint bars, diam. 20mm, L=1.0m	hour	NONE
7.04	PVC membrane, 2.0mm	hour	NONE
7.05	Rebar post (dia. 10mm)	hour	NONE
7.06	Prepaid contract work, at 100.00/hr	hour	NONE
7.07	Prepaid contract work, at 100.00/hr	hour	NONE

The lower members will type long conduct / none

Type	Item No.	Description	Unit	Quantity
	71	Summary		
	702	Ditching, lining and clearing existing concrete drains	lin. ft.	1100.00
	703	Construction, lining and clearing existing temporary drains		none
	704	Striping, painting and flagging		none
	705	Excavation and backfill trench cut	cu. yd.	$V_1 = (E13 - E14 + 0.35) \times (L1 + 3.0) \times (800' \times 2.5 + 2.0)$ $V_2 = V_1 \times \pi \times (0.66)$
	706	Backfilling with crushed material	cu. yd.	$\text{Conduct } V_1 = 0.55(E13 - E14 + 0.35) \times (L1 + 3.0)$ $\text{Strip } V_2 = (E13 - E14 + 0.35) \times (L1 + 3.0) \times 2$ $V = V_1 + V_2 = (E13 - E14 + 0.35) \times (5L1 + 1.5 + 2L1 + 2L1.9)$
	707	Fill-in with crushed material	cu. yd.	4000.0
	708	Construction of 2' diam PVC cut wrap holes	lin. ft.	$N_1 = 0.79 \times (L1) \times (L17 + L1 + L3 - 0.5)$ $N_2 = L1 \times (E13 - E14) \times (L10 + L4 + L5) / 4 \times 2$ $0.3 \times 0.3 \times (N_1 + N_2) \times L11 \times (L17 + L1 + L3 - 0.5) \times (E13 - E14) \times (L4 + L5 + L10)$

SW-10

Type	Item No.	Description	Unit	Quantity
	714	Galvanneal 3.001-3.603 in. PVC conduct wire	lin. ft.	$2 \times (L13 + L8 + 1.9) \times 1.5 = 1.5(L13 + L8 + 1.9)$ $V_2 = 0.39 \times L7 \times 0.15$ $V = V_1 + V_2$
	715	Galvanneal 3.001-3.603 in. galvanized wire	lin. ft.	none
	716	PVC pipe for wrap hole, 2' diam, 3/4" thick	lin. ft.	$2 \times \pi \times 0.35 = 0.354$ $2 \times \pi \times (0.66 \times 0.66) = 0.3 \times \pi \times (E13 + E14) \times (L17 + L1 + L3 - 0.5) + 0.3 \times \pi \times (E13 - E14) \times (L4 + L5 + L10)$ $= 0.0394 \times (N_1 + N_2)$
	717	Summary	lin. ft.	$H1 \times 0.4 / 2 = 0.5 + 1.1$ $2 \times \pi \times 2.2 \times 0.4 \times 2 \times 2 \times 53$ $= 4 \times 2 \times 2 + 2 \times 2 \times 54$
	718	Flashing and sealant for PVC cut wrap	lin. ft.	none

Type	Item No.	Description	Unit	Quantity
	719	Small filling		none
	720	Concrete filling	cu. yd.	$2 \times \pi \times (L1 + 3.0) \times (1.18 \times L7 + 0.8) \times (2.0 + 1.0 \times L1) \times (0.6 + 2 \times L1 + L2) \times 2 \times 0.1$ $0.1 \times \pi \times (E13 - E14) \times (L10 + L4 + L5) \times 2 \times L5 \times L10 \times 2 \times (L4 + L5) \times L9$ $= 28.8 \times (E13 - E14) \times (L10 + L4 + L5) \times 2 \times L5 \times (L4 + L5) \times L9$ $V = V_1 + V_2$
	721	Construction of 2' diam PVC cut wrap holes	lin. ft.	none
	722	Construction of 2' diam PVC cut wrap holes	lin. ft.	none
	723	Construction of 2' diam PVC cut wrap holes	lin. ft.	none
	724	Construction of 2' diam PVC cut wrap holes	lin. ft.	$V = \pi \times (0.10) \times 2 \times 0.4 \times 0.1 \times 2 \times (L10 + L5) = 0.2 \times (L10 + L5) \times 2 \times (L17 - 1.5)$ $= \pi \times (0.10) \times 2 \times 0.2 \times (L1 + L5 + L11 + L12 + L17 - 1.0)$
	725	Construction of 2' diam PVC cut wrap holes	lin. ft.	none

Type	Item No.	Description	Unit	Quantity
	719	Concrete fill-in (for item No. 3.1.1.1)	cu. yd.	$4 \times 52 + 2 \times 53 = 54$
	720	Forming PVC pipe, 2.00 in. x 2.00 in.	lin. ft.	none
	721	Forming PVC pipe, 2.00 in. x 2.00 in.	lin. ft.	none
	722	Forming PVC pipe, 2.00 in. x 2.00 in.	lin. ft.	none
	723	Forming PVC pipe, 2.00 in. x 2.00 in.	lin. ft.	none
	724	Forming PVC pipe, 2.00 in. x 2.00 in.	lin. ft.	$0.3 \times (1.18 \times L7 + 1.1 + L10 - 1.0) = 0.3 \times (1.18 \times L7 + L10 - 1.0 + 1.1)$ $V = V_1 + V_2$

Calculation for work

Zone 1 area program wall type 2003 conduct 110ms

Type Item No.	Description	Unit	Quantity
107	Slipstream		
108	Demolition, hauling and dumping of existing concrete structures	None	
109	Demolition, hauling and dumping of existing masonry structures	None	
110	Striping, painting and sealing	None	
111	Barrel vaulting for bridge	sqm	$71 \times (EL3-EL1+0.5) \times (L1-3.55) + L2 + 30 \times L6 + 0.5 = (EL3-EL1+0.5) \times (L1-3.55) + L2 + 1.5 \times L6$ $T = V_1 + V_2 (No.6)$
112	Barrel vaulting for tunnel	sqm	$T = (EL3-EL1+0.5) \times 0.5 \times (L1-3.55) / 2 + 2 \times (L1-3.55) = 0.5 \times (EL3-EL1+0.5) \times (L1-3.55)$
113	Fillings with crushed material	sqm	None
114	Concrete in 1:5 ratio	sqm	POS. of steep hole: $n_1 = 0.707 (EL3-EL1) (L12-L9+L10-0.5)$ $n_2 = 1.414 (EL3-EL1) (L8+L4+L5) / 4 \times 2$ $C_3 = 0.3 \times (n_1 + n_2) = 0.0636 (EL3-EL1) (L12-L9+L10-0.5) + 0.0635 (EL3-EL1) (L8+L4+L5)$

SW-12

Type Item No.	Description	Unit	Quantity
714	Concrete structure, 3,081.33603 sqm, 200 mm thick wall	sqm	$1.5 (0.5 \times L3 + L6 = 1.9)$
715	Concrete structure, 3,081.33603 sqm, 200 mm thick wall	sqm	None
716	RC pipe for steep hole, 300 mm dia	sqm	$f = 0.0574$ $f \times n (No.8) = 0.2210 (EL3-EL1) (L11+L9+L10-0.5) = 0.250 (EL3-EL1) (L8+L4+L5)$
717	Reinforcement	kgm	$H1 \times 0.4 \times 2 = 0.8 \times H1$
718	Reinforcement	kgm	$S \times 2 \times S1$

Type Item No.	Description	Unit	Quantity
719	Steel lining	None	
720	Concrete walling	sqm	$2 \times (L10+1.0) \times 1.45 \times 2 + 1.6 \times 2 \times 0.9 = (1.0 \times 1.414 \times 1.0) \times 2 (L12-L10+0.9+L10) + 0.1$ $= 0.29 (L10+1.0) + 0.32 \times L9 + 0.2 \times (1.0 + 1.414 \times 0.9 \times L10 + L12 - 1.0)$ $C_{th} (T) = 1.414 (EL3-EL1) (L8+L4+L5) + 2 \times L5 \times 1.0 \times 2 + (4 \times 0.5) \times L7$ $= 2.828 (EL3-EL1) (L8+L4+L5) + 2 \times 0.65 + (4 \times 0.5) \times L7$ $T = V_1 + V_2$
721	Concrete filling	sqm	None
722	Concrete structure, 1:5 ratio	sqm	$T = V_1 (No.8) \times 2 = 0.4 \times 2 \times (L4+L5) \times 2 \times (L9+L10+0.5) + 2 \times (L12-L10)$ $= V_1 (No.8) \times 2 + 0.32 (L4+L5 \times L9+L10 + L12 - 1.0)$
723	Concrete structure, 1:5 ratio	sqm	None

Type Item No.	Description	Unit	Quantity
719	Concrete structure, 3,081.33603 sqm, 200 mm thick wall	sqm	None
720	Concrete structure, 3,081.33603 sqm, 200 mm thick wall	sqm	None
721	Concrete structure, 3,081.33603 sqm, 200 mm thick wall	sqm	None
722	Concrete structure, 3,081.33603 sqm, 200 mm thick wall	sqm	None
723	Concrete structure, 3,081.33603 sqm, 200 mm thick wall	sqm	None
724	Concrete structure, 3,081.33603 sqm, 200 mm thick wall	sqm	None
725	Concrete structure, 3,081.33603 sqm, 200 mm thick wall	sqm	None

Sheet 3

Type	Description	Unit	Quantity
727	Concrete (M2.5) for bedding $T = (L \times 0.2) \times 1.1 = (2.0 \times 0.25 \times 0.45) \times 1.1 = 0.11 (2 \times 0.2) = 0.115 = 413$	m ³	
727	Base material $V = 0.5 \times T (No. 10)$	m ³	
728	Formwork (P1, for form Nos. 31704 and 31705)	m ²	50.0
729	Formwork (P2, for form Nos. 31704 and 31705)	m ²	50.0
730	Reinforcing bars (for form Nos. 31704 and 31705) $T = V (No. 25) \times 120 (kg/m^3)$	kg	
731	Joint form cloth, 2mm, 2m x 1m	m ²	

Sheet 4

Type	Description	Unit	Quantity
732	PVC membrane, 2mm thick $2 \times (41 = 0.3)$	m ²	
733	Rubber joint filler, 10 mm $2 \times 36 (EL3 - EL1) \times 0.5 = 1.118 (EL3 - EL2)$	m	
734	Precast concrete depth, 100mm	m ³	None
735	Precast concrete depth, 400mm	m ³	None
736	Precast concrete depth, 800mm	m ³	1.000
737	Self-heal coating	m ²	None
738	Base course	m ³	None
739	Asphalt pavement	m ²	None

Calculation Formulas

Type: Concrete L-type Wall, Long Crank, 1 lane, Side Clear

Item No.	Description	Unit	Quantity
7.02	Structural Demolition, tying and supporting existing concrete structures	cu m	
7.03	Demolishing, hauling and disposing existing preliminary structures	cu m	
7.04	Shoring, propping and bracing	sq m	
7.05	Excavation including intercept $V_1 = 0.5 \times (L_8 + 2L) \times (B_0 + 2L + 2.0) + (1.18 \times 4 + 4L) \times L_2$ $V = V_1 + V_2$	cu m	
7.06	Backfilling with selected materials $V_1 = 0.5 \times 0.5 \times (L_1 - 3.0) = 0.125 (L_1 - 3.0)$ $V_2 = 0.125 (2 \times L_5 + L_2)$ $V = V_1 + V_2$	cu m	
7.07	Plugging with expanded metal	cu m	
7.08	Concrete, in situ	cu m	

SW-14

Calculation Formulas

Type: Concrete L-type Wall, Long Crank, 1 lane, Side Clear

Item No.	Description	Unit	Quantity
7.14	Concrete reinforcement, 3mm dia, 100 mm c/c, PVC coated wire $(L_2 + 2 \times L_9 + 2 \times (4.14 \times L_4)) \times 0.5 = 0.5 \times L_2 + L_9 + 1.044 \times L_4$	kg/m	
7.15	Galvanneal mesh, 3mm dia, 100 mm c/c, galvanized wire	kg/m	
7.16	PVC pipe (for support, diam. 50mm)	kg/m	
7.17	Reinforcement	kg/m	
7.18	Formwork and steel sheet pile, for form No. 3.116	kg/m	

Sheet 7

Calculation Formulas

Type: Concrete L-type Wall, Long Crank, 1 lane, Side Clear

Item No.	Description	Unit	Quantity
7.09	Soil filling	cu m	
7.10	Ground heaving $(1.18 \times L_4 + L_9) \times L_{10} \times 0.1$	cu m	
7.11	Construction shoring	cu m	
7.12	Wire mesh/expandable metal mesh, type 2	cu m	
7.13	Wire mesh/expandable metal mesh, type 2 $V = V_1 + V_2 + V_3 + V_4 + V_5 + V_6 + V_7 + V_8 + V_9 + V_{10} + V_{11} + V_{12} + V_{13} + V_{14} + V_{15} + V_{16} + V_{17} + V_{18} + V_{19} + V_{20} + V_{21} + V_{22} + V_{23} + V_{24} + V_{25} + V_{26} + V_{27} + V_{28} + V_{29} + V_{30} + V_{31} + V_{32} + V_{33} + V_{34} + V_{35} + V_{36} + V_{37} + V_{38} + V_{39} + V_{40} + V_{41} + V_{42} + V_{43} + V_{44} + V_{45} + V_{46} + V_{47} + V_{48} + V_{49} + V_{50} + V_{51} + V_{52} + V_{53} + V_{54} + V_{55} + V_{56} + V_{57} + V_{58} + V_{59} + V_{60} + V_{61} + V_{62} + V_{63} + V_{64} + V_{65} + V_{66} + V_{67} + V_{68} + V_{69} + V_{70} + V_{71} + V_{72} + V_{73} + V_{74} + V_{75} + V_{76} + V_{77} + V_{78} + V_{79} + V_{80} + V_{81} + V_{82} + V_{83} + V_{84} + V_{85} + V_{86} + V_{87} + V_{88} + V_{89} + V_{90} + V_{91} + V_{92} + V_{93} + V_{94} + V_{95} + V_{96} + V_{97} + V_{98} + V_{99} + V_{100}$	cu m	

Sheet 8

Calculation Formulas

Type: Concrete L-type Wall, Long Crank, 1 lane, Side Clear

Item No.	Description	Unit	Quantity
7.19	Drilling of steel sheet pile, for form No. 3.116	kg/m	
7.20	Furnishing RC piles, 250 mm x 250 mm See	kg/m	
7.21	Drilling of RC piles, for form No. 3.117	kg/m	
7.22	Furnishing RC piles, 300 mm x 300 mm See	kg/m	
7.23	Drilling of RC piles, for form No. 3.122	kg/m	
7.24	Concrete (type 3), for sections concrete See	cu m	
7.25	Concrete (type 4), for abutment structure and partition wall Concrete, inner, outer, $V_1 = (5m)$ Partition wall $V_2 = 1.18 \times (L_4 + 0.8) + 9.372 \times 0.3 \times 0.5 = 0.354 (L_4 + 0.8) + 0.69$ $V = V_1 + V_2$ $= 0.354 \times L_4 + 0.992$	cu m	

Calculations Formulas

Type Concrete Layer Wall, Long Corridor, 1 long, 1 short Corridor

No.	Description	Units	Quantity
7.25	Concrete layer 2 for walling 240mm, concrete, 200mm, $V_1 = (L \times H \times W) \times (B \times 10^3)$ Foundation wall $V_1 = (L \times H \times W) \times (B \times 10^3) = 0.224 \times (4 \times 1.0) \times 0.18 = 0.224 \times 4 \times 1 + 0.18 \times 4$ $V = V_1 + V_2$	cum	
7.27	Base finish $V = 0.5 \times V(No.10)$	cum	
7.28	Form, type F1, for item Nos. 7.1724 and 7.1725	sqm	
7.29	Form, type F2, for item Nos. 7.1724 and 7.1725	sqm	
7.30	Reinforcing bars, for item Nos. 7.1724 and 7.1725 $M = V(No.2) \times 120 (kg/m^3)$	kg	
7.31	Joint bars, 20mm, 20mm, 20mm	cum	

Calculations Formulas

Type Concrete Layer Wall, Long Corridor, 1 long, 1 short Corridor

No.	Description	Units	Quantity
7.32	PVC membrane, 2mm/3mm	sqm	
7.33	Rubber joint (flex), 10 mm	sqm	
7.34	Formwork concrete slab, 100mm/120mm	sqm	
7.35	Formwork concrete slab, 100mm/120mm	sqm	
7.36	Formwork concrete slab, 100mm/120mm	sqm	
7.37	Scaffolding	sqm	
7.38	Backfill	sqm	
7.39	Asphalt pavement	sqm	

SI-15

Calculation Formula
Type: Concrete L-type Wall, Slab, Curb, 1 tier, Slab Clear
Unit: US Customary

Item No.	Description	Unit	Quantity
714	Concrete mainstem, 3000 psi, 12" x 12" x 12" RC, cast in situ $(2.2 + 4.6) \times 0.5 = 0.5 \times L2 + L6$	cum	
715	Concrete mainstem, 3000 psi, 12" x 12" x 12" RC, cast in situ	cum	
716	PVC pipe for weepholes, 4" diam, 10' long $\beta = 0.354$ $\beta \times n (No. of holes) = 0.354 \times n = 0.150 \times L5 = (L4 + L5 + L6)$	lin ft	
717	Sheet piling	sq ft	
718	Formwork, 2" x 8" x 10' panels, 1/2" thick	sq ft	

Calculation Formula
Type: Concrete L-type Wall, Slab, Curb, 1 tier, Slab Clear
Unit: US Customary

Item No.	Description	Unit	Quantity
719	Driving of steel sheet piling, for Item No. 717	sq ft	
720	Formwork for RC piles, 24" diam x 24" high	sq ft	500
721	Driving of RC piles, for Item No. 720	sq ft	500
722	Formwork for RC piles, 30" diam x 30" high	sq ft	
723	Driving of RC piles, for Item No. 722	sq ft	
724	Concrete type 3 for structural concrete	cum	500
725	Concrete type 4 for slabs, curbs and structures	cum	500

Calculation Formula
Type: Concrete L-type Wall, Slab, Curb, 1 tier, Slab Clear
Unit: US Customary

Item No.	Description	Unit	Quantity
719	Sheet piling	sq ft	
720	Formwork, 2" x 8" x 10' panels, 1/2" thick	sq ft	
721	Driving of steel sheet piling, for Item No. 719	sq ft	
722	Formwork for RC piles, 24" diam x 24" high	sq ft	
723	Driving of RC piles, for Item No. 722	sq ft	
724	Concrete type 3 for structural concrete	cum	
725	Concrete type 4 for slabs, curbs and structures	cum	

Calculation Formula
Type: Concrete L-type Wall, Slab, Curb, 1 tier, Slab Clear
Unit: US Customary

Item No.	Description	Unit	Quantity
726	Concrete, 3000 psi 700,000 cu ft weep holes, $n = 1.414 \times L5 \times 2 \times (L4 + L5 + L6) / 4 = 0.707 \times L5 \times (L4 + L5 + L6)$ $0.3 \times 0.3 \times n = 0.0636 \times L5 \times (L4 + L5 + L6)$	cum	
727	Sheet piling with weep holes	sq ft	
728	Formwork, 2" x 8" x 10' panels, 1/2" thick	sq ft	
729	Driving of steel sheet piling, for Item No. 727	sq ft	
730	Formwork for RC piles, 24" diam x 24" high	sq ft	
731	Driving of RC piles, for Item No. 730	sq ft	
732	Formwork for RC piles, 30" diam x 30" high	sq ft	
733	Driving of RC piles, for Item No. 732	sq ft	
734	Concrete type 3 for structural concrete	cum	
735	Concrete type 4 for slabs, curbs and structures	cum	

Sheet 3

Calculations Permits

Type Concrete Layer Wall, Sheet Cribbing, 1 Layer, Shale Clear

Item No.	Description	Unit	Quantity
7.27	Concrete layer 2, for bracing $(0.04 \times 1.5) \times 2.1 \times (0.08 \times 1.3) \times 0.1 = 0.21 (0.2 + 1.3)$ $W = 0.45 \times (4.9 \times 0.1) \times 0.1 = 0.025 \times (4.9 \times 0.1)$ $V = V_1 + V_2 = 0.218 + 0.025 = 0.243$ $V = 0.5 \times V (No. 10)$	cubic meter	
7.28	Form, type F1, for form Nos. 3.1724 and 3.1725	sq. ft.	See
7.29	Form, type F2, for form Nos. 3.1724 and 3.1725	sq. ft.	See
7.30	Reinforcement steel for form Nos. 3.1724 and 3.1725 $W = V (No. 5) \times 120 (kg/m^3)$	kg	
7.31	Form bracing, 2 form, 1.5 m	mm	

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Sheet 4

Calculations Permits

Type Concrete Layer Wall, Sheet Cribbing, 1 Layer, Shale Clear

Item No.	Description	Unit	Quantity
7.32	PVC membrane, W=200mm	sq. mm	
7.33	Rubber joint filler, 10 mm	sq. mm	
7.34	Formwork release agent, 400x400mm	mm	
7.35	Formwork release agent, 400x400mm	mm	
7.36	Formwork release agent, 400x400mm	mm	
7.37	Formwork release agent, 400x400mm	mm	
7.38	Formwork release agent, 400x400mm	mm	
7.39	Formwork release agent, 400x400mm	mm	

Sheet 6

Item No.	Description	Unit	Quantity
7.26	Concrete, type 3, for concrete $Conduits V_1 = 2.1 \times (28.25) \times 0.1 = 0.21 (28.25)$ $Wing V_2 = 0.045 \times (19 \times 0.1)$ $V = V_1 + V_2$ $V = 0.5 \times V (No. 10)$	cu ft	
7.28	Form, type P1, for item Nos. 7.1724 and 7.1725	sq ft	
7.29	Form, type P2, for item Nos. 7.1724 and 7.1725	sq ft	
7.30	Reinforcing bars, for item Nos. 7.1724 and 7.1725 $W = V (No. 10) \times 120 (19/ft^2)$	lb	
7.31	Joint bars, diam. 20mm, unit in	unit	

Sheet 6

Item No.	Description	Unit	Quantity
7.22	PVC waterproofing, 100%Kopp	sq ft	
7.23	Rubber joint filler, 10 mm	unit	
7.24	Form concrete deck, 60/10/30mm	sq ft	
7.25	Form concrete deck, 60/10/30mm	sq ft	
7.26	Form concrete deck, 60/10/30mm	sq ft	
7.27	Form concrete deck, 60/10/30mm	sq ft	
7.28	Form concrete deck, 60/10/30mm	sq ft	
7.29	Form concrete deck, 60/10/30mm	sq ft	

Calculations Formulas

Item No.	Description	Unit	Quantity
701	Structure	cum	
702	Demolishing, heaving and disposing existing concrete structures	cum	
703	Demolishing, heaving and disposing existing masonry structures	cum	
704	Stripping, patching and filling	sqm	
705	Excavation including trench cut	cum	
$0.05 \times (L_1 - 4.0) \times (B + 2T + 2.0) + L_5 \times L_2 \times 0.5$ $V = V_1 + V_2$			
706	Backfilling with selected material	cum	
$V_1 = 0.5 \times 0.5 \times (L_1 - 4.0) = 0.125 (L_1 - 4.0)$ $V_2 = (2 \times L_5 + L_2) \times \frac{1}{2} \times 0.5 \times 0.5 = 0.125 (2 \times L_5 + L_2)$			
707	Fillings with selected material	cum	
708	Concrete, in 1:5 ratio	sqm	

ORMS

Calculations Formulas

Item No.	Description	Unit	Quantity
714	Concrete (Type 4), for masonry structures and precast concrete, in 1:1:4 ratio	cum	
715	Concrete (Type 3), for masonry structures and precast concrete, in 1:1:4 ratio	cum	
716	PVC pipe for water supply, diam. 300mm	sqm	
717	Business coating	sqm	
718	Painting with epoxy resin, 1:1:1 ratio	sqm	

Calculations Formulas

Item No.	Description	Unit	Quantity
709	Soil layer	sqm	
710	Gravel filling	cum	
711	Compacted filling	cum	
712	Workable masonry, Type 1	sqm	
713	Workable masonry, Type 2	sqm	
$V = V_1(N_0 \times 0.3) + 0.05 \times 0.3 (L_9 + 2 \times L_{10}) = 2 \times V_1(N_0 \times 0.3) + 0.15 (L_9 + 2 \times L_{10})$			

Calculations Formulas

Item No.	Description	Unit	Quantity
719	Drainage of earth stores (for item No. 711)	sqm	
720	Furnishing R.C.Pipe, 250 mm x 250 mm	sqm	
721	Drainage of R.C. pipes, for item No. 7120	sqm	
722	Furnishing R.C.Pipe, 300 mm x 300 mm	sqm	
723	Drainage of R.C. pipes, for item No. 7122	sqm	
724	Concrete, Type 3, for hydraulic masonry	sqm	
725	Concrete, Type 4, for masonry structures and precast concrete, in 1:1:4 ratio	cum	
$V_2 = \frac{1}{2} \times (1.8 \times (L_4 + 0.8) + 2.3) \times 2.0 \times 0.5 = 0.354 \times L_4 + 0.973$ $V = V_1 + V_2$			

Calculations Formulas

Item No.	Description	Unit	Quantity
7.26	Concrete Lintel Wall, Lintel, 1 line, 1 line clear (include $V_s = (L+1/2) \times (B_s + 1.0) \times 0.1$ Part 100 wall $V_s = \sqrt{118} \times (L+1.0) + 2.4 \times 1.0 = 0.224 \times 1.4 + 0.74$ $V = 0.5 \times V (No. 10)$	m ²	
7.27	Formwork	m ²	
7.28	Formwork for form Nos. 3.17A and 3.17B	m ²	500
7.29	Formwork for form Nos. 3.17A and 3.17B	m ²	500
7.30	Reinforcing bars, for form Nos. 3.17A and 3.17B $W = V (No. 5) \times 120 (kg/m^3)$	kg	
7.31	Joint bars, diam. 20mm, L=1m	m	

ITMS

Calculations Formulas

Item No.	Description	Unit	Quantity
7.32	PVC waterproofing, No. 200mm	m ²	
7.33	Bitumen primer (100g/m ²)	m ²	
7.34	Protective concrete (M20, 60mm)	m ²	
7.35	Protective concrete (M20, 100mm)	m ²	
7.36	Protective concrete (M20, 150mm)	m ²	
7.37	Joint bars, diam. 20mm	m	
7.38	Formwork	m ²	
7.39	Reinforcing bars	kg	

Sheet 5

Type	Description	Unit	Quantity
7.26	Concrete, Type 3 for footing 1/2" x 1/2" x 1/2" concrete. $T_2 = L_2 \times D_2 \times L_2 = 2 \times 11 \times 11 = 242 \times 1.1 = 266.2$ Perimeter wall $T_3 = (11 \times 2 \times 11) + (11 \times 2 \times 11) + (11 \times 2 \times 11) + (11 \times 2 \times 11) = 154 \times 4 = 616$ $W_2 = T_2 + T_3 = 266.2 + 616 = 882.2$ $T_4 = 2 \times 11 \times 11 = 242$ $T_5 = T_4 \times 0.5 = 121$	cu yd	
7.27	Formwork	sq yd	
7.28	Form, Type #1, for Item Nos. 3.1724 and 3.1725	sq yd	
7.29	Form, Type #2, for Item Nos. 3.1724 and 3.1725	sq yd	
7.30	Reinforcing bars, for Item Nos. 3.1724 and 3.1725 $W = \pi \times D \times L = \pi \times 1.0 \times 120 = 377 \text{ (lb/ft)}$	kg	
7.31	Joint form, 2' x 2' x 1/2"	sq ft	

SW-23

Sheet 6

Type	Description	Unit	Quantity
7.32	PVC waterproofing, 1/2" thick	sq ft	
7.33	Reinforcing bars, for Item Nos. 3.1724 and 3.1725 $2 \times (L_2 \times D_2 - E_2 \times D_2) + (L_2 \times D_2) - (H_2 \times E_2) - (H_2 \times E_2)$ $= 2 \times (17 \times 11 - 2 \times 4 \times 11) + (17 \times 11) - (11 \times 2 - 2 \times 11) = 2 \times (187 - 88) + 187 - (22 - 22) = 2 \times 99 + 187 = 385$	sq ft	
7.34	Formwork, 2' x 2' x 1/2"	sq ft	
7.35	Formwork, 2' x 2' x 1/2"	sq ft	
7.36	Formwork, 2' x 2' x 1/2"	sq ft	
7.37	Formwork, 2' x 2' x 1/2"	sq ft	
7.38	Formwork, 2' x 2' x 1/2"	sq ft	
7.39	Formwork, 2' x 2' x 1/2"	sq ft	

Calculation Formula
Type: Retention Type II, Long Channel, 2-lane (SDM-2L, as represented in Submittal Compliance Drawing Sheet 1)

Item No.	Description	Unit	Quantity
7.14	Concrete material, 2-lane (SDM-2L, as represented in Submittal Compliance Drawing Sheet 1) $54 \times 55 \times 0.5 = 1485$	cum	
7.15	Concrete material, 2-lane (SDM-2L, as represented in Submittal Compliance Drawing Sheet 1)	cum	
7.16	PCC type for approach, item 7.14	cum	
7.17	Brickwork masonry	m ²	
7.18	Reinforcing steel sheet piling, 100% $2 \times (51 + 54) \times 30 = 2 \times (51 + 54 + 30) \times 30$	m ²	

Calculation Formula
Type: Retention Type II, Long Channel, 2-lane (SDM-2L, as represented in Submittal Compliance Drawing Sheet 1)

Item No.	Description	Unit	Quantity
7.19	Drilling of steel sheet piling, 100% $2 \times (51 + 54 + 30) \times 30$	sqm	
7.20	Perforating RC piles, 200 mm x 200 mm See	m ²	
7.21	Drilling of RC piles, 100% See	m ²	
7.22	Perforating RC piles, 300 mm x 300 mm	m ²	
7.23	Drilling of RC piles, 100% See	m ²	
7.24	Concrete type 3, for backfill concrete See	cum	
7.25	Concrete type 4, for substructure concrete and approach See	cum	

Calculation Formula
Type: Retention Type II, Long Channel, 2-lane (SDM-2L, as represented in Submittal Compliance Drawing Sheet 1)

Item No.	Description	Unit	Quantity
7.01	Shoulder Direct filling, paving and dressing starting concrete approach $2 \times 0.5 \times 0.5 \times 1.5 = 0.75 \text{ cum}$ Direct filling, paving and dressing existing approach $7.5 \times 0.5 \times 0.5 = 2.375 \text{ cum}$	cum	
7.02	Striping, painting and clearing $V = 6.66 - 6.11 = 0.55$ $V = 7.17 \times 0.55$	cum	
7.03	Direct filling with subgrade material $6.66 \times 0.5 = 3.33$ with $V = 6.66 - 6.11 = 0.55$ $V = 7.17 \times 0.55$	cum	
7.04	Perforating steel sheet piling $V = 7.17 \times 0.55$	cum	
7.05	Concrete, 100% $V = 7.17 \times 0.55$	cum	

Calculation Formula
Type: Retention Type II, Long Channel, 2-lane (SDM-2L, as represented in Submittal Compliance Drawing Sheet 1)

Item No.	Description	Unit	Quantity
7.06	Soil filling	cum	
7.07	Gravel bedding	cum	
7.08	Concrete (filling)	cum	
7.09	Wet substructure masonry, type 1	cum	
7.10	Wet substructure masonry, type 2	cum	

MS-24

Sheet 5

Calculations Formulas

Type: Reinforcement Type II, Long Column, 2 tier (SGM-ZL) at upper end of Submergible Drainage Chamber

Item No.	Description	Unit	Quantity
7.26	Concrete (M20) for working Zink, random, surface $V_1 = 2.8 \times 1.4$	cum	
7.27	For Cuboid wallness with mortar filling $V_2(0.14) = 0.4 = 9450.4 = 3.78$	cum	
7.28	Form, type P1, for both Nos. 3.1726 and 3.1725	Sqm	
7.29	Form, type P2, for both Nos. 3.1726 and 3.1725	Sqm	
7.30	Reinforcing bars, for both Nos. 3.1726 and 3.1725 $W = \sqrt{(0.25)^2 + (2.0)^2} \times 120(40/m)$	kg	
7.31	Joint work, labor, 200mm, 1m	work	

57-25

Sheet 6

Calculations Formulas

Type: Reinforcement Type II, Long Column, 2 tier (SGM-ZL) at upper end of Submergible Drainage Chamber

Item No.	Description	Unit	Quantity
7.32	PVC membrane, 1mm, 200mm	litre	
7.33	Reinforcing bars (type, for 10 nos) $2 \times (0.25)^2 + 2 \times (1.4 + 0.25)^2 + (1.4 + 0.25)^2 - (1.4 + 0.25)^2$	kg	
7.34	Formwork concrete (M20), 400mm, 100mm	litre	
7.35	Formwork concrete (M20), 400mm, 100mm	litre	
7.36	Formwork concrete (M20), 400mm, 100mm	litre	
7.37	Surface charge	cum	75100.02 = 15.0
7.38	Reinforcement	cum	7200.01 = 7.5
7.39	Asphalt pavement	cum	75100 = 75

Calculation Formula	Type	Revisions	Type II, Sheet Contents	1 Item	Unit	Quantity
No.	Description					
7.14	Current material, 3.0M, 3.0M, 3.0M, PVC channel etc (except for 1 pipe/100 drainage channel)				m ²	
	$V = 1.3 \times 1.5 + 2 \times (1.6 - 1.5) \times 1.5 + 0.5 \times 0.75 \times 1.3 + 1.5 \times (1.6 - 1.5)$					
7.15	Current material, 3.0M, 3.0M, 3.0M, PVC channel etc (for 1 pipe/100 drainage channel only)				m ²	
	$V = 0.75 \times 1.3 + 1.5 \times (1.6 - 1.5)$					
7.16	PVC pipe for slope pipe, drain, storm				m	
	$L = 0.354$ $L = 0.7 \times (1.0 \times 0.8) = 0.280 \times 1.0 \times (1.9 + 1.0 + 1.3 - 0.5)$					
7.17	Blowers coating				m ²	
7.18	Painting and oiling PVC pipe, water drain				m ²	
	$2.0 \times 2 \times 2.0 = 4.0 / 8.2$					

Calculation Formula	Type	Revisions	Type II, Sheet Contents	1 Item	Unit	Quantity
No.	Description					
7.19	Drilling of steel sheet pile, per item No. 3.11.1.8				m	
	do					
	4.0 / 8.2					
7.20	Formwork for RC pile, 200 mm x 250 mm				m ²	
	5.00					
7.21	Drilling of RC pile, per item No. 3.11.7.0				m	
	See					
7.22	Formwork for RC pile, 300 mm x 300 mm				m ²	
	—					
7.23	Drilling of RC pile, per item No. 3.11.7.2				m	
	—					
7.24	Concrete type 3, for pilehead concrete				m ³	
	5.00					
7.25	Concrete type 4, for chimney structure and pilehead				m ³	
	See					

Calculation Formula	Type	Revisions	Type II, Sheet Contents	1 Item	Unit	Quantity
No.	Description					
7.01	Structure				m ²	
7.02	Demolishing, building and repairing existing concrete structure				m ²	
7.03	Demolishing, building and repairing existing masonry structure				m ²	
7.04	Shipping, packaging and cleaning				m ²	
7.05	Excavation including trench pit				m ³	
	$V = (1.6 \times 2 + 1.6) \times 0.5 \times (1.1 - 3.55) + 1.2 \times 1.5 \times 1.66$					
	$V = 1.1 \times 1.4 \times (1.0 \times 1)$					
7.06	Backfilling with selected materials				m ³	
	$V = 0.5 \times (1.6 \times 2 + 1.6) \times 0.5 \times (1.1 - 3.55)$					
7.07	Painting with selected materials				m ²	
7.08	Concrete, masonry				m ³	
	10% of workholes $N = 0.77 \times 1.0 \times (1.9 + 1.0 + 1.3 - 0.5)$					
	$0.3 \times 0.3 \times 1.1 = 0.063 \times 1.0 \times (1.9 + 1.0 + 1.3 - 0.5)$					

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Calculation Formula	Type	Revisions	Type II, Sheet Contents	1 Item	Unit	Quantity
No.	Description					
7.09	Soil filling				m ³	
7.10	Gravel bedding				m ³	
	$V = (0.3 + 0.2 \times 2 \times 1.0) \times (1.9 + 1.0 + 1.3 + 0.5) + 0.3 \times 1.4 \times 1.9$					
7.11	Gravel bedding (filling)				m ³	
7.12	Water impermeable membrane, type 1				m ²	
7.13	Water impermeable membrane, type 2				m ²	
	$V = 7 \times (1.1 \times 1.0) + 2 \times 0.24 \times (1.9 + 1.0 + 1.3 + 0.5)$					

Sheet 5

Item No.	Description	Unit	Quantity
7.26	Concrete, type 3, for bridge $V = 0.11 \times (L \times 0.7) = 0.105 \times LE$	cubic	
7.27	Clear center $V = 0.5 \times V (No. 10)$	cubic	
7.28	Form, type PA, for form Nos. 3.1726 and 3.1725	sq. ft.	
7.29	Form, type PA, for form Nos. 3.1726 and 3.1725	sq. ft.	500
7.30	Reinforcing bars, for form Nos. 3.1726 and 3.1725 $70 \times V (No. 25) \times 120 (lb/ft^3)$	lb	500
7.31	Steel bars, 1/4" dia., 20 ft. long	lbf.	

6-27-W

Sheet 6

Item No.	Description	Unit	Quantity
7.32	PVC manholes, No. 24 items	item	
7.33	Rebar for pipe (1/4" dia., 40 ft. long) $2(E \times L + 0.05) \times (L + 0.35) \times (HWL - EL)^2$	lbf.	
7.34	Precast concrete Jack, 4 ft. dia. 10 ft. long	item	
7.35	Precast concrete Jack, 6 ft. dia. 10 ft. long	item	
7.36	Precast concrete Jack, 8 ft. dia. 10 ft. long	item	
7.37	Clear base material	cubic	
7.38	Base course	cubic	
7.39	Asphalt pavement	sq. ft.	

Calculation Formulae
Type: Reinforcement Type II, Sheet Crankin, 1 layer (BSPW) to be considered for existing chamber)

Item No.	Description	Unit	Quantity
7.14	Concrete reinforcement, 10% L, 20% S, 10% P, 10% C, 20% W, 20% T $V = 0.75 \times 2.3 + 1.5 \times (4.6 - 1.5) - 1.5 \times 0.8 = 0.512$ $= 0.75 \times 2.3 + 1.5 \times (4.6 - 1.5) - 1.2$	cum	
7.15	Cast-in-place concrete, 10% L, 20% S, 10% P, 10% C, 20% W, 20% T	cum	
7.16	Formwork (see Note 2) - 0.25D x L10 x (L13 + L9 + L10 - 1.5) $P = 0.354$	sqm	
7.17	Reinforcement	sqm	
7.18	Formwork sheet piling, 25% W, 25% S, 25% P, 25% C, 25% T	sqm	

Calculation Formulae
Type: Reinforcement Type II, Sheet Crankin, 1 layer (BSPW) to be considered for existing chamber)

Item No.	Description	Unit	Quantity
7.19	Driving of sheet piling, 25% W, 25% S, 25% P, 25% C, 25% T	sqm	do
7.20	Formwork RC Piles, 25% W, 25% S, 25% P, 25% C, 25% T	sqm	4.0182
7.21	Driving of RC piles, for Item No. 3.1/20	sqm	See
7.22	Formwork RC Piles, 25% W, 25% S, 25% P, 25% C, 25% T	sqm	See
7.23	Driving of RC piles, for Item No. 3.1/22	sqm	
7.24	Concrete, Type II, for chamber structure and pavement	cum	See
7.25	Concrete, Type II, for chamber structure and pavement	cum	See

Calculation Formulae
Type: Reinforcement Type II, Sheet Crankin, 1 layer (BSPW) to be considered for existing chamber)

Item No.	Description	Unit	Quantity
7.09	Concrete reinforcement, 10% L, 20% S, 10% P, 10% C, 20% W, 20% T $V = (0.3 \times 0.3 \times 10.5) \times (L1 - 0.355) \times 2.2 + 1.5 \times 4.6$ $V = 0.197 \times (4.6)$ $V = 0.91 \times (4.6)$	cum	
7.10	Concrete reinforcement, 10% L, 20% S, 10% P, 10% C, 20% W, 20% T $V = 0.3 \times 0.3 \times 11 = 0.99$ $n = 1.44 \times 4.0 \times 1.5 \times (4.3 - 1.0) + 2 \times (2.9 + 4.0) - 1.0 \times 4$ $n = 0.707 \times 4.10 \times (4.13 + 4.9 + 4.10 - 1.5)$	cum	
7.11	Concrete reinforcement, 10% L, 20% S, 10% P, 10% C, 20% W, 20% T $V = 0.3 \times 0.3 \times 11 = 0.99$ $n = 1.44 \times 4.0 \times 1.5 \times (4.3 - 1.0) + 2 \times (2.9 + 4.0) - 1.0 \times 4$ $n = 0.707 \times 4.10 \times (4.13 + 4.9 + 4.10 - 1.5)$	cum	
7.12	Concrete reinforcement, 10% L, 20% S, 10% P, 10% C, 20% W, 20% T	cum	
7.13	Concrete reinforcement, 10% L, 20% S, 10% P, 10% C, 20% W, 20% T	cum	

Calculation Formulae
Type: Reinforcement Type II, Sheet Crankin, 1 layer (BSPW) to be considered for existing chamber)

Item No.	Description	Unit	Quantity
7.10	Concrete reinforcement, 10% L, 20% S, 10% P, 10% C, 20% W, 20% T $V = (0.2 + 0.2 \times 2.8 \times 4.10) \times (2.9 + 4.10 + 3 - 0.5) + 0.3 \times 0.3 \times 1.9 + (0.1 + 1.44 \times 4.0) \times (2.9 + 4.10)$	cum	
7.11	Concrete reinforcement, 10% L, 20% S, 10% P, 10% C, 20% W, 20% T	cum	
7.12	Concrete reinforcement, 10% L, 20% S, 10% P, 10% C, 20% W, 20% T	cum	
7.13	Concrete reinforcement, 10% L, 20% S, 10% P, 10% C, 20% W, 20% T $V = 0.197 \times (4.6) \times 2 + 0.3 \times 0.3 \times 1.9 + (L13 - 0.5 + L10 + 6.5)$ $V = 0.197 \times (4.6) \times 2 + 0.3 \times 0.3 \times 1.9$	cum	

Calculation Formula
 Type: Reinforce Type II, Sheet Concrete, 1 lane, (SMA) to be considered (see existing plan)

Item No.	Description	Unit	Quantity
7.26	Concrete, Type II, for base	cu yd	
7.27	Base course	cu yd	
7.28	Formwork, Type II, for base	sq ft	
7.29	Formwork, Type II, for base	sq ft	
7.30	Reinforcing bars, for base	lb	
7.31	Joint bars, sheet piling, for 1st	lb	

$V = 0.11 \times (L2 + 0.7) = 0.105 \times L2$
 $V = 0.547 (No. 10)$
 See
 See
 $W = V (No. 25) \times 120 (kg/m^3)$

SW-29

Calculation Formula
 Type: Reinforce Type II, Sheet Concrete, 1 lane, (SMA) to be considered (see existing plan)

Item No.	Description	Unit	Quantity
7.32	PVC membrane, W=20mm	sq m	
7.33	Reinforce joint bars, for 1st	lb	
7.34	Formwork, Type II, for base	sq ft	
7.35	Formwork, Type II, for base	sq ft	
7.36	Formwork, Type II, for base	sq ft	
7.37	Formwork, Type II, for base	sq ft	
7.38	Formwork, Type II, for base	sq ft	
7.39	Formwork, Type II, for base	sq ft	
7.40	Formwork, Type II, for base	sq ft	

$2(EL2 - EL4 + 0.05) \times (L5 + 0.35) = (HWL - EL4)^2$

Calculation Formula

Item No.	Description	Unit	Quantity
714	Galvan. material, 3.001 (3.003) m, PVC coated wire	kg/m	
	$V = 0.75 \times 6.3 \times 1.5 \times (6.6 - 1.5)$		
715	Galvan. material, 3.001 (3.003) m, galvanized wire	kg/m	
716	PVC pipe for wrap holes, diam. 30mm	kg/m	
	$l = 0.154$ $l \times n (50 \times 100) = 0.250 \times 1.10 \times (1.9 + 1.0 + 1.3 - 0.5)$		
717	Reinforcement	kg/m	
718	Purchasing steel sheet (MC, VSPF, No. 41100)	kg/m	
	$82 \times 2.2 \times 2.0 = 40.722$		

Calculation Formula

Item No.	Description	Unit	Quantity
719	Driving of steel sheet (MC, (or Item No. 3117))	kg	
	40		
720	Purchasing RC plate, 250 mm x 250 mm	kg	
	40.722		
721	Driving of RC plate, (or Item No. 3117)	kg	
	500		
722	Purchasing RC plate, 300 mm x 300 mm	kg	
	500		
723	Driving of RC plate, (or Item No. 3117)	kg	
	500		
724	Concrete, type 3, for structural concrete	kg	
	500		
725	Concrete, type 4, for structural concrete	kg	
	500		

Calculation Formula

Item No.	Description	Unit	Quantity
711	Structure	kg/m	
712	Demolishing, bedding and improving existing concrete structure	kg/m	
713	Demolishing, bedding and improving existing supplementary structures	kg/m	
714	Soilwork, grading and clearing	kg/m	
715	Excavation (concrete structure)	kg/m	
	$V_1 = (0.25 \times 0.61 + 0.05 \times 1.1 - 0.355) \times 1.2 + 1.5 \times 1.6$ $V = 0.19 \times V (No. 6)$		
716	Bedding with epoxy materials	kg/m	
	$V = 0.5 (0.25 \times 0.61 + 0.05) \times (1.1 - 0.355)$		
717	Fill-up with structural materials	kg/m	
718	Concrete, M20	kg/m	
	nos. of wrap holes. $n = 0.707 \times 1.10 \times (1.9 + 1.0 + 1.3 - 0.5)$ $0.25 \times 0.3 \times n = 0.0636 \times 1.10 \times (1.9 + 1.0 + 1.3 - 0.5)$		

Calculation Formula

Item No.	Description	Unit	Quantity
719	Soil filling	kg/m	
720	Other bedding	kg/m	
	$V = (0.25 + 0.2528 \times 1.10) \times (1.9 + 1.0 + 1.3 - 0.5) \times 0.32 \times 1.9$		
721	Concrete (filler)	kg/m	
	$V = (0.25 + 0.2528 \times 1.10) \times (1.9 + 1.0 + 1.3 - 0.5) \times 0.32 \times 1.9$		
722	Weld reinforcement, type 1	kg/m	
723	Weld reinforcement, type 2	kg/m	
	$V = V (No. 6) \times 2 + 0.24 \times (1.9 + 1.0 + 1.3 - 0.5)$		

Calculation Formulas

Type: Reinforcement Type II, Steel Concrete, 1 Layer, Plain joint

No.	Description	Unit	Quantity
7.25	Concrete, type X, for slabs $V = 0.11 \times (L2 + 0.2) = 0.105 \times L2$	cubic	
7.27	Steel rebar $V = 0.55 \pi^2 (N \times D)$	cubic	
7.28	Formwork, type #1, for item Nos. 3.174 and 3.175	sqm	500
7.29	Formwork, type #2, for item Nos. 3.174 and 3.175	sqm	500
7.30	Reinforcing bars, for item Nos. 3.174 and 3.175 $\pi D^2 \times V (N \times 2.5) = 120 (kg/m)$	kg	
7.31	Steel Form, Sheet, 2.00m, 0.7m	piece	

Calculation Formulas

Type: Reinforcement Type II, Steel Concrete, 1 Layer, Plain joint

No.	Description	Unit	Quantity
7.32	PVC waterproofing, Waralamin	sqm	
7.33	Waterproof joint filter, 10 mm $2 (EL2 - EL4 + 0.05) \times (L5 + 0.35) = (H \times L - EL1) \times$	sqm	
7.34	Protect concrete slab, 60x60x10mm	piece	
7.35	Protect concrete slab, 120x120x10mm	piece	
7.36	Protect concrete slab, 150x150x10mm	piece	
7.37	Sub-base concrete	cubic	
7.38	Base concrete	cubic	
7.39	Asphalt (intercourse)	sqm	

Calculation from 16
Type 71 Case Conduct / Lane

Type	Item No.	Description	Unit	Quantity
71	71.1	Shoring	sqm	
72	71.2	Dismantling, hauling and dumping existing concrete structures	cu m	
73	71.3	Dismantling, hauling and dumping existing retaining structures with tops	sqm	
74	71.4	Shoring, propping and retaining	sqm	
75	71.5	Excavation including trench cut	cu m	
76	71.6	Backfilling with selected material (mm) (L1) = 0.35 (E.L. 2 = E.L. 1 + 0.35) = (L1 - 3.0)	cu m	
77	71.7	Backfilling with selected material (mm) (L2) = 0.35 (E.L. 3 = E.L. 2 + 0.35) = (L2 - 1.5 + 2.0) = 0.5	cu m	
78	71.8	Backfilling with selected material (mm) (L3) = 0.35 (E.L. 4 = E.L. 3 + 0.35) = (L3 - 1.5 + 2.0) = 0.5	cu m	
79	71.9	Backfilling with selected material (mm) (L4) = 0.35 (E.L. 5 = E.L. 4 + 0.35) = (L4 - 1.5 + 2.0) = 0.5	cu m	
80	71.10	Backfilling with selected material (mm) (L5) = 0.35 (E.L. 6 = E.L. 5 + 0.35) = (L5 - 1.5 + 2.0) = 0.5	cu m	
81	71.11	Concrete with nos of work hole	sqm	
82	71.12	Concrete with nos of work hole	sqm	
83	71.13	Concrete with nos of work hole	sqm	

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Type	Item No.	Description	Unit	Quantity
71	71.1	Shoring	sqm	
72	71.2	Dismantling, hauling and dumping existing concrete structures	cu m	
73	71.3	Dismantling, hauling and dumping existing retaining structures with tops	sqm	
74	71.4	Shoring, propping and retaining	sqm	
75	71.5	Excavation including trench cut	cu m	
76	71.6	Backfilling with selected material (mm) (L1) = 0.35 (E.L. 2 = E.L. 1 + 0.35) = (L1 - 3.0)	cu m	
77	71.7	Backfilling with selected material (mm) (L2) = 0.35 (E.L. 3 = E.L. 2 + 0.35) = (L2 - 1.5 + 2.0) = 0.5	cu m	
78	71.8	Backfilling with selected material (mm) (L3) = 0.35 (E.L. 4 = E.L. 3 + 0.35) = (L3 - 1.5 + 2.0) = 0.5	cu m	
79	71.9	Backfilling with selected material (mm) (L4) = 0.35 (E.L. 5 = E.L. 4 + 0.35) = (L4 - 1.5 + 2.0) = 0.5	cu m	
80	71.10	Backfilling with selected material (mm) (L5) = 0.35 (E.L. 6 = E.L. 5 + 0.35) = (L5 - 1.5 + 2.0) = 0.5	cu m	
81	71.11	Concrete with nos of work hole	sqm	
82	71.12	Concrete with nos of work hole	sqm	
83	71.13	Concrete with nos of work hole	sqm	

Type	Item No.	Description	Unit	Quantity
71	71.1	Shoring	sqm	
72	71.2	Dismantling, hauling and dumping existing concrete structures	cu m	
73	71.3	Dismantling, hauling and dumping existing retaining structures with tops	sqm	
74	71.4	Shoring, propping and retaining	sqm	
75	71.5	Excavation including trench cut	cu m	
76	71.6	Backfilling with selected material (mm) (L1) = 0.35 (E.L. 2 = E.L. 1 + 0.35) = (L1 - 3.0)	cu m	
77	71.7	Backfilling with selected material (mm) (L2) = 0.35 (E.L. 3 = E.L. 2 + 0.35) = (L2 - 1.5 + 2.0) = 0.5	cu m	
78	71.8	Backfilling with selected material (mm) (L3) = 0.35 (E.L. 4 = E.L. 3 + 0.35) = (L3 - 1.5 + 2.0) = 0.5	cu m	
79	71.9	Backfilling with selected material (mm) (L4) = 0.35 (E.L. 5 = E.L. 4 + 0.35) = (L4 - 1.5 + 2.0) = 0.5	cu m	
80	71.10	Backfilling with selected material (mm) (L5) = 0.35 (E.L. 6 = E.L. 5 + 0.35) = (L5 - 1.5 + 2.0) = 0.5	cu m	
81	71.11	Concrete with nos of work hole	sqm	
82	71.12	Concrete with nos of work hole	sqm	
83	71.13	Concrete with nos of work hole	sqm	

Type	Item No.	Description	Unit	Quantity
71	71.1	Shoring	sqm	
72	71.2	Dismantling, hauling and dumping existing concrete structures	cu m	
73	71.3	Dismantling, hauling and dumping existing retaining structures with tops	sqm	
74	71.4	Shoring, propping and retaining	sqm	
75	71.5	Excavation including trench cut	cu m	
76	71.6	Backfilling with selected material (mm) (L1) = 0.35 (E.L. 2 = E.L. 1 + 0.35) = (L1 - 3.0)	cu m	
77	71.7	Backfilling with selected material (mm) (L2) = 0.35 (E.L. 3 = E.L. 2 + 0.35) = (L2 - 1.5 + 2.0) = 0.5	cu m	
78	71.8	Backfilling with selected material (mm) (L3) = 0.35 (E.L. 4 = E.L. 3 + 0.35) = (L3 - 1.5 + 2.0) = 0.5	cu m	
79	71.9	Backfilling with selected material (mm) (L4) = 0.35 (E.L. 5 = E.L. 4 + 0.35) = (L4 - 1.5 + 2.0) = 0.5	cu m	
80	71.10	Backfilling with selected material (mm) (L5) = 0.35 (E.L. 6 = E.L. 5 + 0.35) = (L5 - 1.5 + 2.0) = 0.5	cu m	
81	71.11	Concrete with nos of work hole	sqm	
82	71.12	Concrete with nos of work hole	sqm	
83	71.13	Concrete with nos of work hole	sqm	

Calculation Formula

Item No.	Description	Unit	Quantity
101	Submersibles	sqm	
102	Dredging, hauling and depositing existing structure materials	cum	
103	Dredging, hauling and depositing existing equipment/structure materials	sqm	
104	Stripping, grading and clearing	sqm	
105	Excavation and filling with concrete	cum	
106	Backfilling with selected materials	cum	
107	Photograph with increased material	cum	
108	Concrete in 3 m NOS of wrap holes $N = 0.7 \times L \times L \times (L5 + L6 + L7 + 0.5)$	sqm	
			$0.7 \times 0.3 \times N = 0.0636 \times L6 \times (L5 + L6 + L7 + 0.5)$

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Calculation Formula

Item No.	Description	Unit	Quantity
109	Concrete in 3 m NOS of wrap holes $N = 0.7 \times L \times L \times (L5 + L6 + L7 + 0.5)$	sqm	
110	Concrete in 3 m NOS of wrap holes $N = 0.7 \times L \times L \times (L5 + L6 + L7 + 0.5)$	sqm	
111	Concrete in 3 m NOS of wrap holes $N = 0.7 \times L \times L \times (L5 + L6 + L7 + 0.5)$	sqm	
112	Concrete in 3 m NOS of wrap holes $N = 0.7 \times L \times L \times (L5 + L6 + L7 + 0.5)$	sqm	
113	Concrete in 3 m NOS of wrap holes $N = 0.7 \times L \times L \times (L5 + L6 + L7 + 0.5)$	sqm	
114	Concrete in 3 m NOS of wrap holes $N = 0.7 \times L \times L \times (L5 + L6 + L7 + 0.5)$	sqm	
115	Concrete in 3 m NOS of wrap holes $N = 0.7 \times L \times L \times (L5 + L6 + L7 + 0.5)$	sqm	
116	Concrete in 3 m NOS of wrap holes $N = 0.7 \times L \times L \times (L5 + L6 + L7 + 0.5)$	sqm	
117	Concrete in 3 m NOS of wrap holes $N = 0.7 \times L \times L \times (L5 + L6 + L7 + 0.5)$	sqm	
118	Concrete in 3 m NOS of wrap holes $N = 0.7 \times L \times L \times (L5 + L6 + L7 + 0.5)$	sqm	

Calculation Formula

Item No.	Description	Unit	Quantity
109	Submersibles	sqm	
110	Concrete in 3 m NOS of wrap holes $N = 0.7 \times L \times L \times (L5 + L6 + L7 + 0.5)$	cum	
111	Concrete in 3 m NOS of wrap holes $N = 0.7 \times L \times L \times (L5 + L6 + L7 + 0.5)$	cum	
112	Concrete in 3 m NOS of wrap holes $N = 0.7 \times L \times L \times (L5 + L6 + L7 + 0.5)$	cum	
113	Concrete in 3 m NOS of wrap holes $N = 0.7 \times L \times L \times (L5 + L6 + L7 + 0.5)$	cum	
114	Concrete in 3 m NOS of wrap holes $N = 0.7 \times L \times L \times (L5 + L6 + L7 + 0.5)$	cum	
115	Concrete in 3 m NOS of wrap holes $N = 0.7 \times L \times L \times (L5 + L6 + L7 + 0.5)$	cum	
116	Concrete in 3 m NOS of wrap holes $N = 0.7 \times L \times L \times (L5 + L6 + L7 + 0.5)$	cum	
117	Concrete in 3 m NOS of wrap holes $N = 0.7 \times L \times L \times (L5 + L6 + L7 + 0.5)$	cum	
118	Concrete in 3 m NOS of wrap holes $N = 0.7 \times L \times L \times (L5 + L6 + L7 + 0.5)$	cum	

Calculation Formula

Item No.	Description	Unit	Quantity
119	Concrete in 3 m NOS of wrap holes $N = 0.7 \times L \times L \times (L5 + L6 + L7 + 0.5)$	sqm	
120	Concrete in 3 m NOS of wrap holes $N = 0.7 \times L \times L \times (L5 + L6 + L7 + 0.5)$	sqm	
121	Concrete in 3 m NOS of wrap holes $N = 0.7 \times L \times L \times (L5 + L6 + L7 + 0.5)$	sqm	
122	Concrete in 3 m NOS of wrap holes $N = 0.7 \times L \times L \times (L5 + L6 + L7 + 0.5)$	sqm	
123	Concrete in 3 m NOS of wrap holes $N = 0.7 \times L \times L \times (L5 + L6 + L7 + 0.5)$	sqm	
124	Concrete in 3 m NOS of wrap holes $N = 0.7 \times L \times L \times (L5 + L6 + L7 + 0.5)$	sqm	
125	Concrete in 3 m NOS of wrap holes $N = 0.7 \times L \times L \times (L5 + L6 + L7 + 0.5)$	sqm	



Sheet 5

Calculations Formulas

Type: Open end pipe Concrete Arch - Short Culvert, 1 lane
Description

Item No.	Description	Unit	Quantity
7.26	Concrete pipe 3.0m diameter	m ² /m	
$V = 2.1 \times (B+1) \times 0.45 \times L \text{ for } 2 \times 1001$ $= 0.21 \times (B+1) \times 0.9 \times L \times 10$ $V = 0.187 \text{ (No. 10)}$			
7.27	Base course	m ² /m	
7.28	Form type #1, for items Nos. 7.17a and 7.1725	m ² /m	
7.29	Form type #2, for items Nos. 7.17a and 7.1725	m ² /m	
7.30	Reinforcing steel, for items Nos. 7.17a and 7.1725	kg	
$W = V \times (No. 10) \times 100 \text{ (kg/m)}$			
7.31	Joint type, rubber gaskets, 1.0m	mm	

Sheet 6

Calculations Formulas

Type: Open end pipe Concrete Arch - Short Culvert, 1 lane

Item No.	Description	Unit	Quantity
7.32	PVC manholes, 1.0m x 2.0m	mm	
7.33	Rebar joint filler, 1.0m	m ² /m	
7.34	Form concrete arch, 1.0m x 1.0m	m ² /m	
7.35	Form concrete arch, 1.0m x 1.0m	m ² /m	
7.36	Form concrete arch, 1.0m x 1.0m	m ² /m	
7.37	Sub-base course	m ² /m	
7.38	Base course	m ² /m	
7.39	Asphalt pavement	m ² /m	

56-MS

Calculation Formula

Item No.	Description	Unit	Quantity
111	Slab formwork	sqm	
112	Demolition, loading and dumping of concrete structures	cu m	
113	Demolition, loading and dumping of existing parapet/masonry walls	sqm	
114	Striping, painting and sealing	sqm	
115	Excavation including trench	cu m	
	$V = (E L_3 - E L_1 + 0.5) \times L_1 = L_2$		
	$V = 0.7 + 0.7 (0.66)$		
116	Backfilling with selected material	cu m	
	$V = 0.5 \times (E L_3 - E L_1 + 0.5) \times L_1$		
117	Pumpup with increased material	cu m	
118	Concrete work	cu m	
	100% of subsoil hole: $V = 0.07 \times L_6 \times (L_5 + L_6 + L_8 - 0.5)$		
	$0.3 \times 0.3 \times 1 = 0.0636 = L_6 (L_5 + L_6 + L_8 - 0.5)$		

92-M-36

Calculation Formula

Item No.	Description	Unit	Quantity
119	Open cut trench concrete slab, Street Curbcut, 1 lane, 10m long	sqm	
120	Concrete structure, 3m x 3m x 0.5m, precast concrete	cu m	
	$V = 0.25 \times L_2 + 1.5 (L_4 + L_5)$		
121	PVC pipe for water table drain, 300mm	sqm	
	$P = 0.354$		
	$P \times M (500 \times 100.0) = 0.250 \times L_6 (L_5 + L_6 + L_8 - 0.5)$		
122	Blindwork concrete	sqm	
123	Furnishing work sheet (No. 1) SP, No. 4/100m	sqm	

Calculation Formula

Item No.	Description	Unit	Quantity
124	Open cut trench concrete slab, Street Curbcut, 1 lane, 10m long	sqm	
125	Driveway at right sheet (No. 1) SP, No. 3/178	sqm	
126	Paving of RC Piles, 240 mm x 240 mm	sqm	
	See		
127	Driveway of RC piles, for item No. 3/178	sqm	
	See		
128	Paving of RC Piles, 300 mm x 300 mm	sqm	
129	Driveway of RC piles, for item No. 3/172	sqm	
130	Concrete, 100% for mechanical concrete	sqm	
	See		
131	Concrete, 100% for driveway shoulders and trenches	sqm	
	See		

Calculation Formula

Item No.	Description	Unit	Quantity
132	Open cut trench concrete slab, Street Curbcut, 1 lane, 10m long	sqm	
133	Driveway at right sheet (No. 1) SP, No. 3/178	sqm	
134	Paving of RC Piles, 240 mm x 240 mm	sqm	
	See		
135	Driveway of RC piles, for item No. 3/178	sqm	
	See		
136	Paving of RC Piles, 300 mm x 300 mm	sqm	
137	Driveway of RC piles, for item No. 3/172	sqm	
138	Concrete, 100% for mechanical concrete	sqm	
	See		
139	Concrete, 100% for driveway shoulders and trenches	sqm	
	See		

$$V = \sqrt{(M_{10})^2 + 0.4 (M_{10})^2 (L_5 + L_6 + L_8 + 2 \times L_5 + 2 \times L_6 + 2 \times L_8)} \\ = \sqrt{(M_{10})^2 + 0.24 (2 \times L_5 + L_6 + L_8 + 2 \times L_6)}$$



Calculation Formulae

Item No.	Description	Unit	Quantity
1.26	Concrete, type 3, for formwork $V = (1.8 \times (80 + 1.1) + 0.4 \times 2.9 \times 2) \times 0.1$ $= 2.18 + (80 + 1.1) + 0.08 \times 2.9$	cu.m	
1.27	Formwork $V = 0.5 \times V(1.26)$	cu.m	
1.28	Formwork, type F1, for items Nos. 1.124 and 1.125	sq.m	
1.29	Formwork, type F2, for items Nos. 1.124 and 1.125	sq.m	
1.30	Reinforcing bars, for items Nos. 1.124 and 1.125 $W = \sqrt{160.25} \times 100 (kg/m^2)$	kg	
1.31	Formwork, labor, 2500h, 1.124	man	

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Calculation Formulae

Item No.	Description	Unit	Quantity
1.32	PVC wrapping, 200g/cm ²	sq.m	
1.33	Reinforcing bars, for items Nos. 1.124 and 1.125	kg	
1.34	Formwork, labor, 2500h, 1.124	man	
1.35	Formwork, labor, 2500h, 1.125	man	
1.36	Formwork, labor, 2500h, 1.124	man	
1.37	Formwork, labor, 2500h, 1.125	man	
1.38	Formwork, labor, 2500h, 1.124	man	
1.39	Formwork, labor, 2500h, 1.125	man	

Type	Item No.	Description	Unit	Quantity
1.20	Barrenage	$16.3 \times 6.5 \times 0.15 = 15.893$	mm	15.89
1.20	Asphalt pavement	$16.3 \times 6.5 = 105.95$	sqm	105.95
1.20	Perimeter and retaining walls	$11/12 \times 3 - 1 + (7/12 \times 3) = 5 = 6 - 0.15 = 4.85$ m Length 4.612×55.2 m 65.2×2.25 kg/m = 124.2 kg	kg	124.20
1.21	Concrete	8.25 m x 3.38 kg/m = 27.855 kg	kg	27.87
1.21	Steel reinforcement	Length $16.1 \times 2.25 \times 0.7 = 24.93$ m 36.3×1.42 kg/m = 51.746	kg	60.97
1.21	Formwork	Area $16.3 \times 6.5 = 105.95$ sqm Length $16.1 \times 2.25 \times 0.7 = 24.93$ m 36.3×1.42 kg/m = 51.746	sqm	240.0
1.21	Formwork	Area $16.3 \times 6.5 = 105.95$ sqm Length $16.1 \times 2.25 \times 0.7 = 24.93$ m 36.3×1.42 kg/m = 51.746	sqm	5
1.21	Formwork	Area $16.3 \times 6.5 = 105.95$ sqm Length $16.1 \times 2.25 \times 0.7 = 24.93$ m 36.3×1.42 kg/m = 51.746	sqm	20
1.21	Formwork	Area $16.3 \times 6.5 = 105.95$ sqm Length $16.1 \times 2.25 \times 0.7 = 24.93$ m 36.3×1.42 kg/m = 51.746	sqm	1
1.21	Formwork	Area $16.3 \times 6.5 = 105.95$ sqm Length $16.1 \times 2.25 \times 0.7 = 24.93$ m 36.3×1.42 kg/m = 51.746	sqm	0

Type	Item No.	Description	Unit	Quantity
1.20	Concrete	$16.3 \times 6.5 \times 0.15 = 15.893$	mm	67.142
1.20	Asphalt pavement	$16.3 \times 6.5 = 105.95$	sqm	0.846
1.20	Perimeter and retaining walls	$11/12 \times 3 - 1 + (7/12 \times 3) = 5 = 6 - 0.15 = 4.85$ m Length 4.612×55.2 m 65.2×2.25 kg/m = 124.2 kg	kg	64.70
1.21	Concrete	8.25 m x 3.38 kg/m = 27.855 kg	kg	36.83
1.21	Steel reinforcement	Length $16.1 \times 2.25 \times 0.7 = 24.93$ m 36.3×1.42 kg/m = 51.746	kg	66.212
1.21	Formwork	Area $16.3 \times 6.5 = 105.95$ sqm Length $16.1 \times 2.25 \times 0.7 = 24.93$ m 36.3×1.42 kg/m = 51.746	sqm	50

Type	Item No.	Description	Unit	Quantity
1.20	Concrete	$16.3 \times 6.5 \times 0.15 = 15.893$	mm	49.91
1.20	Asphalt pavement	$16.3 \times 6.5 = 105.95$	sqm	0.846
1.20	Perimeter and retaining walls	$11/12 \times 3 - 1 + (7/12 \times 3) = 5 = 6 - 0.15 = 4.85$ m Length 4.612×55.2 m 65.2×2.25 kg/m = 124.2 kg	kg	64.70
1.21	Concrete	8.25 m x 3.38 kg/m = 27.855 kg	kg	36.83
1.21	Steel reinforcement	Length $16.1 \times 2.25 \times 0.7 = 24.93$ m 36.3×1.42 kg/m = 51.746	kg	66.212
1.21	Formwork	Area $16.3 \times 6.5 = 105.95$ sqm Length $16.1 \times 2.25 \times 0.7 = 24.93$ m 36.3×1.42 kg/m = 51.746	sqm	50

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